MINUTES

33rd Meeting of the Academic Council

Dated: 12/10/2021 at 11:30 A.M.

The 33rd meeting of the Academic Council of the University of Haryana was held on October 12, 2021 at 11:30 A.M. in the Conference Room, Administrative Block, Central University of Haryana.

The following members attended the meeting:

1. **Prof. (Dr.) Tankeshwar Kumar, Vice Chancellor - Chairperson**
2. Prof. Sathans
3. Prof. Suresh Kumar
4. Prof. (Dr.) Param Jeet Singh
5. Prof. P.C. Pattnaik
6. Dr. P.K. Khurana
7. Dr. Narender Hooda
8. Prof. Sanjiv Kumar
9. Prof. Rajesh Kumar Malik
10. Prof. Neelam Sangwan
11. Prof. Rajbir Singh Dalal
12. Prof. Ravinder Pal Ahlawat
13. Prof. Dinesh Kumar Gupta
14. Prof. Chanchal Kumar Sharma
15. Dr. Anand Sharma
16. Dr. Vinod Kumar
17. Dr. Rajesh Kumar Dubey
18. Dr. Vikas Garg
19. Dr. Gunjan Goel
20. Dr. Rajesh Kumar Gupta
21. Dr. Suneel Kumar
22. Dr. Ranbir Singh
23. Dr. Vishwanand Yadav
24. Dr. Ranjan Aneja
25. Dr. Bijender Singh

26. Dr. Monika
27. Dr. Dinesh Kumar
28. Dr. Rakesh Kumar
29. Dr. Harish Kumar
30. Dr. Pawan Kumar Maurya
31. Dr. Ajay Kumar Bansal
32. Dr. Samiksha Godara
33. Dr. Ravinder Kaur
34. Dr. Santosh C. Hulagabali, Librarian
35. Prof. Ranvir Singh (Special Invitee)
36. Dr. Vipul Yadav, COE (Special Invitee)
37. Ms. Sarita Kumari (Student Representative)
38. **Prof. Sarika Sharma, Registrar (In-Charge)** - **Secretary**

The following members could not attend the meeting: -

1. Prof. Raj Kumar
2. Dr. Annapoorni Subramanian
3. Prof. Ram Singh
4. Dr. Ashwani Mahajan
5. Dr. Markanday Ahuja
6. Dr. (Mrs.) Shimla
7. Mr. Manas Chandra Fuloria

At the outset, the Vice-Chancellor welcomed all the members of the Academic Council particularly the following new members:

1. Dr. Annapoorni Subramanian, Professor, Dept. of Physics and Astrophysics, University of Delhi, Delhi
2. Dr. Narender Hooda, Controller of Examinations, NIFTEM, Kundli, Sonepat, Haryana
3. Dr. Rajesh Kumar Dubey, Dean, School of Engineering & Technology, CUH
4. Dr. Monika, Head, Department of Law, CUH
5. Dr. Chanchal Kumar Sharma, Professor, Department of Political Science, CUH
6. Dr. Harish Kumar, Associate Professor, Department of Chemistry, CUH
7. Dr. Pawan Kumar Maurya, Associate Professor, Department of Biochemistry, CUH
8. Dr. Ravinder Kaur, Assistant Professor, Department of Commerce, CUH
9. Dr. Samiksha Godara, Assistant Professor, Department of Law, CUH

The Council acknowledged and appreciated the contribution of the following members of the Academic Council who have completed their term, for Academic Development of the University:

1. Prof. Deepak Pant, School of Basic Sciences, CUH

2. Prof. Satish Kumar, School of Interdisciplinary & Applied Sciences, CUH
3. Dr. Parmod Kumar, School of Education, CUH
4. Dr. Ajai Pal Sharma, Assistant Professor, Department of Management Studies, CUH
5. Dr. Anju Beniwal, Assistant Professor, Department of Law, CUH

The members were informed about the demise of the esteemed members of the Academic Council namely Prof. Deepak Gaur, Professor, School of Biotechnology, Jawaharlal Nehru University, New Delhi and Dr. Kadloor Savitri, Professor, Dept. of Political Science, Jamia Millia Islamia, New Delhi due to COVID-19. The Council members remembered their contributions and paid tribute to them.

The Council place on record its appreciation on the contribution of previous Vice-Chancellor, Prof. R.C. Kuhad towards the overall development of the University during his tenure. The Council congratulated and welcome Prof. (Dr.) Tankeshwar Kumar as the new Vice-Chancellor of the University.

After that, the Vice-Chancellor briefed the progress made by the University in recent times. Thereafter, the Agenda Items were taken up for consideration.

R.No.	Resolution Passed
1.	The Minutes of the 32nd meeting of the Academic Council held on 23-04-2021, were confirmed. **(Minutes already circulated)**
2.	The action taken on the resolutions of the 32nd meeting of the Academic Council held on 23-04-2021, were reported, recorded and confirmed. **(Annexure-I, Page-33 to 35)**
	ITEMS FOR CONSIDERATION
3.	Resolved that the draft Policy on "Innovation and Startup" recommended by the Committee constituted for drafting guidelines for Innovation and Startup projects (Notified vide notification No. CUH/2021/Estt.Sec.(T)/298 dated 25.03.2021), be approved. **(Annexure-II, Page-36 to 54)**
4.	The Council considered the proposal for award of Ph.D. degree to Late Ms. Ekta (Roll No-10087) a research Scholar in the School of Education, on the basis of the evaluation report of the External and Internal Examiners, posthumously, without *Viva-Voce* examination, as recommended by the Dean, School of Education. The Council further resolved that Examination Branch may send thesis submitted by Late Ms. Ekta for evaluation. After receipt of the evaluation report, the matter may be submitted for consideration of the Academic Council. **(Annexure-III, Page-55)**
5.	Resolved that the addition of new Ordinance-XXXIV relating to undergraduate programmes and UG-PG five-year integrated programmes after Ordinance-XXXIII as recommended by the Committee constituted by the Vice-Chancellor, be approved and recommended to Executive Council for consideration: **ORDINANCE-XXXIV** **UNDERGRADUATE PROGRAMMES AND UG-PG FIVE-YEAR INTEGRATED PROGRAMMES** **1.** Integrated Programmes of study leading to award of respective Certificates/Diplomas/Degrees shall be offered and conducted by the respective Schools/Departments/ Centres established by the University. This Ordinance pertains to Undergraduate programmes and UG-PG Five-Year Integrated Programmes (introduced

w.e.f. the Academic Session: 2021-22 and thereafter) with provision of 'Multiple Entry and Exit' at various stages.

2. Definition of Keywords

2.1 Choice-Based Credit System (CBCS)

The CBCS provides choice for the students to select course from the prescribed courses (Elective or soft-skill courses). It provides a 'cafeteria' approach in which the students can take courses of their choice, learn at their own pace, study additional courses and acquire more than the minimum required credits, and adopt an inter-disciplinary approach to learning.

2.2 Academic Year

Two consecutive (one odd + one even) semesters shall constitute one academic year.

2.3 Semester

Each Semester shall consist of 15-18 weeks of academic work equivalent to 90 actual teaching days. The odd semester may be scheduled ordinarily from July to December and even semester from January to June. The credit-based semester system provides flexibility in designing curriculum and assigning credits based on the course content and hours of teaching.

2.4 Credit

A unit by which the course work is measured. It determines the number of hours of instructions required per week. One credit is equivalent to one hour of teaching (lecture or tutorial) or two hours of practical work/field work, per week.

Credits: A credit defines the quantum of contents/syllabus prescribed for a course and determines the number of hours of instruction required per week. Thus, in each course, credits are assigned on the basis of the number of lectures/tutorials/laboratory work/field work and other forms of learning required for completing the contents in 15 week schedule. 2 hours of laboratory work/field work is generally considered equivalent to 1 hour of lecture.

i. 1 Credit = 1 Theory/Tutorial period of one hour duration, or

ii. In case of practical, 1 Credit = 1 Practical period of two hour duration

iii. Credit(s) for internship shall be one credit per one week of internship, subject to a maximum of six credit

2.5 Grade Point

It is a numerical weight allotted to each letter grade on a 10-point scale.

2.6 Letter Grade

It is an index of the performance of students in a said course. Grades are denoted by letters O, A+, A, B+, B, C, P and F. means a letter grade assigned to a student on the basis of evaluation of a course on a ten point scale.

2.7 Semester Grade Point Average (SGPA)

It is a measure of performance of the work done in a semester. It is ratio of total credit points secured by a student in various courses registered in a semester and the total course credits taken during that semester. It shall be expressed up to two decimal places.

2.8 Cumulative Grade Point Average (CGPA)

It is a measure of overall cumulative performance of a student over all semesters. The CGPA is the ratio of total credit points secured by a student in various courses in all semesters and the sum of the total credits of all courses in all the semesters. It is expressed up to two decimal places.

2.9 Transcript/ Grade Card or Certificate

Based on the grades earned, a grade certificate shall be issued to all the registered students after every semester. The grade certificate will display the course details (code, title, number of credits, grade secured) along with SGPA of that semester and CGPA earned till that semester.

2.10 Programme

An educational programme leading to the award of a Degree, Diploma or Certificate.

2.11 Course

Usually referred to as paper, it is a component of a Programme. All courses need not carry the same weightage. A course may be designed to comprise lectures/tutorials/laboratory work/field work/outreach activities/project work/dissertation/practical training/viva/seminars/term-papers/assignments/presentations/self-studywork/clinical component, etc., or a combination of some of these. Each course should define the learning objectives and the learning outcomes.

2.12 Undergraduate Programmes:

Undergraduate Programmes of study leading to award of Bachelor Degrees shall be offered and conducted by the respective Schools/Departments/ Centres established by the University.

2.13 UG-PG Five-Year Integrated Programmes

Integrated Programmes of study leading to award of respective Certificates/Diplomas/Degrees shall be offered and conducted by the respective Schools/Departments/ Centres established by the University.

3. Type of Courses

Each programme may have various types of courses, namely, Core courses, Ability Enhancement Courses, Skill Enhancement Courses, Discipline Specific Electives, Generic Electives, MOOCs and Self-Study Courses.

3.1 Core Courses

The core courses are those courses whose knowledge is deemed essential for the students registered for a particular programme of study.

3.2 Elective Courses

The elective courses can be chosen from a pool of papers. These courses may be very specific or specialized or advanced or supportive to the discipline/ subject of study or which provide an

extended scope or which enable an exposure to some other discipline/subject/domain or nurtures the candidate's proficiency/skill are called an Elective Courses.

3.3 Discipline Specific Elective (DSE) Course

Elective course offered under the main discipline/subject of study is referred to as Discipline Specific Elective. The respective department may offer various DSE courses based on the requirements, scope and need of the programme. The department may also offer discipline related Elective courses of interdisciplinary nature.

3.4 Generic Elective (GE) Course

It is an elective course chosen from an unrelated discipline/subject, with an intention to seek exposure beyond one's primary discipline. The purpose of this category of papers is to offer the students the option to explore disciplines of interest beyond the choices they make in Core and Discipline Specific Elective papers. The respective department may offer various courses under this category based on the expertise, specialization, requirements, scope and need.

3.5 Ability Enhancement Course (AEC)

The Ability Enhancement (AE) Courses are based upon the content that leads to Knowledge enhancement; i. Environmental Science and ii. English/Hindi/MIL Communication, etc. These courses are mandatory for all disciplines particularly at undergraduate level.

3.6 Skill Enhancement Course (SEC)

These courses may be chosen from a pool of courses designed to provide value-based and/or skill-based knowledge and should contain both theory and lab/hands-on/training/field work. The main purpose of these courses is to provide students life-skills in hands-on mode so as to increase their employability.

3.7 Self-study Courses

The self-study courses, if offered, are optional and not mandatory. Being non-credit courses, the performance of students in these courses shall be indicated either as "satisfactory" or as "unsatisfactory", instead of the Letter Grade and this shall not be counted for the computation of SGPA/CGPA.

3.8 MOOCs

MOOCs (Massive Open Online Courses) approved by the UGC and available on SWAYAM Platform.

4. Duration of the Programmes:

Programmes	**Bachelor's Degree#**	**Integrated UG-PG Degree**
Minimum Duration	Three Years or Six Semesters	Five Years or ten semesters/ Two years or four semesters after obtaining a Bachelor's Degree/One year or two semesters after obtaining a four-year Bachelor's Degree, whatever is applicable

Maximum Duration	Two Years period beyond the normal period to clear the backlog to be qualified for the Degree.	Two Years period beyond the normal period to clear the backlog to be qualified for the Degree.

Pass Course, Subject-specific or Honours as specified by the Board of Studies of the respective Department.

4.1 The students enrolled in Bachelor's or UG-PG Integrated Programme shall also be eligible for multiple entry and exit as prescribed by the respective department/relevant clause of the Ordinance.

4.2 Provided that a semester or a year may be approved a zero semester or a zero year for a student if he/she could not continue with the academic work during that period due to illness and hospitalization, or due to accepting a scholarship/fellowship subject to the fulfilment of requirements laid down in this respect by the regulations with the approval of Academic Council. Such a zero semester/year shall not be counted for calculation of the duration of the programme in case of such a student. On re-joining, the student shall resume the academic programme with the subsequent batch. For example, a student availing zero semester in an odd semester shall resume the studies of that semester with subsequent batch of odd semester students.

5. Eligibility for Admission: The eligibility criteria for admission to various Courses/Programmes offered by the University shall be as decided by the University from time to time.

6. Syllabi and Structure of the Programmes of Study: The Syllabi and Structure of the Programme of study shall be as approved by the Academic Council on the recommendations of the Board of Studies/School Board of the Department/Centre/School concerned.

7. Mobility Options and Credit Transfers:

The students shall be permitted to opt inter-disciplinary/multidisciplinary courses of their choice, learn at their paces, undergo additional courses, acquire more than the required credits, and adopt an interdisciplinary/ multidisciplinary approach to learning.

7.1 The mobility across the disciplines is also subject to availability of desired elective course, faculty, infrastructure and no. of students (as fixed by the University/department from time to time) opting that elective course.

7.2 Mobility of Credits earned by the students from GIAN (Global Initiative of Academic Networks) courses/ MOOCs (Massive Open Online Courses)/ SWAYAM (Study Webs of Active –Learning for Young Aspiring Minds)/ Swachh Bharat Internship Programme/ etc. shall be credited in accordance with the provisions made under the respective schemes, as amended from time to time; subject to compatibility of course content & assessment process with the prior approval of the respective Board of Studies.

7.3 The student shall be given the equivalent credit weightage for the credits earned vide online learning credit courses through SWAYAM platform as approved by the respective Board of Studies.

8. Course Coding:

Each course offered by a school/department is identified by a unique course code indicating school, department, programme, semester, course no., core/ ability enhancement course, skill enhancement course, elective course, and self-study course. The concerned Board of Studies and School Board shall recommend a specific course codification pattern for the approval of the Academic Council.

9. Student Advisor:

The Department shall appoint an Advisor for each student from amongst the faculty members of the Department concerned. All faculty members of the department shall act as Student Advisors and shall have more or less equal number of students. The Student Advisor shall advise the student in selection of courses and shall render all possible support, guidance and counselling to him/her.

10. Course Registration:

10.1 The registration for courses shall be the sole responsibility of the student. No student shall be allowed to do a course without registration, and no student shall be entitled to any credits in the course, unless he/she has been registered for the course by the scheduled date fixed by the University.

10.2 Every student has to register in each semester (in consultation with his/her Student Advisor) for the courses he/she intends to undergo in that semester by applying as per the prescribed proforma, duly signed by him/her, the Student Advisor and the Head of the Department, within the deadline notified for the purpose by the University.

10.3 A student shall register for minimum 18 credits in a semester, and shall register for the required credits for completion of the programme as mentioned at Clause-10.

10.4 Late registration may be permitted by the Head/Incharge of the Department up to a maximum of six weeks after the commencement of the semester, on payment of late fee prescribed by the university.

10.5 Withdrawal from a course may be permitted up to two weeks from the date of registration, provided the courses registered after withdrawal shall enable the student to earn a minimum prescribed credits.

10.6 A student may be allowed by the Head/Incharge of the Department to add a course or substitute a course for another course of the same type (skill enhancement course/ elective course/ self-study course), for valid reasons with the consent of the Student Advisor not later than two weeks from the date of commencement of the semester.

10.7 If a student registers himself/herself for more elective courses than the prescribed in the programme, while calculating the Semester/Cumulative Grade Point Average, only the prescribed number of elective courses for the programme of study shall be included in the descending order of the grades obtained by him/her.

10.8 The elective courses (Discipline-specific or Generic) opted and registered and attempted by the student in the end-semester examination may not be replaced, unless it is otherwise not mandatory. However, a student studying in odd or even semester shall have the option of choosing an elective course offered by the respective/allied/other department at same level from the corresponding semester i.e. students of odd semester shall opt for the

courses of odd semesters and students of even semester shall opt for the courses offered by the parent or other department in even-semester. In case of an elective opted in addition to the minimum requirement of the programme, it will not be binding on the students to qualify such courses.

11. Minimum Credit Requirements

The student shall be required to register for the credits as specified by the Board of Studies of the respective department for a programme of study, as amended from time to time. The Academic Council, on the recommendation of BoS/School Board of the respective Department/School, shall decide the curriculum with specific minimum credit requirements for Certificate, Diploma, Bachelor's Degree, Bachelor's Degree (Honours/Research), Postgraduate Diploma, Postgraduate Degree and UG-PG Integrated programme(s) in accordance with relevant Ordinance/UGC Regulations/Guidelines, as amended from time to time. The credit requirements for various levels of Certificate, Diploma and Degree Programmes are as under:

Sr. No.	Certificate/ Diploma/ Degree	Qualification	Credit Requirements
1.	Undergraduate Certificate	Exit after successful completion of the courses prescribed in the first year of an Undergraduate/UG-PG Integrated programme with required number of credits/grade	36-40, including minimum credits from the elective courses (DSE/GE) as prescribed in the syllabi of the first year).
2.	Undergraduate Diploma	Exit after successful completion of the courses prescribed in the first two years of an Undergraduate/UG-PG Integrated programme with required number of credits/grade	72-80, including minimum credits from the elective courses (DSE/GE) as prescribed in the syllabi of the first two years).
3.	Bachelor's Degree	Exit after successful completion of the courses prescribed in the first three years of an Undergraduate/UG-PG Integrated programme with required number of credits/grade	108-120, including minimum credits from the elective courses (DSE/GE) as prescribed in the syllabi of the first three years).
4.	Bachelor's Degree (Honours)	Exit after successful completion of the courses prescribed in the first three years of an Undergraduate/UG-PG Integrated programme with	148-160, including minimum credits from the elective courses (DSE/GE) as prescribed in the syllabi of the

		required number of credits/grade	Bachelor's Degree (Honours) programme.
5.	Bachelor's Degree (Research)	Exit after successful completion of the courses prescribed in the first four years of an Undergraduate/UG-PG Integrated programme with required number of credits/grade required for Bachelor's Degree (Research), if any such degree is specifically offered by a department.	148-160, including minimum credits from the elective courses (DSE/GE) as prescribed in the syllabi of the Bachelor's Degree (Honours/Research) programme.
6.	Postgraduate Diploma	Exit after successful completion of the courses prescribed in the first four years of the UG-PG integrated Programme with required number of credits/grade.	144-148, including minimum 8 credits from the elective courses (DSE/GE) as prescribed in the syllabi of first four years of the UG-PG integrated Programme.
		Exit after the successful completion of the first year or two semesters of the two-year Master's Degree Programme with required number of credits/grade after obtaining a Bachelor's Degree	36-40, including minimum 8 credits from the elective courses (DSE/GE) of which at least 4 credits shall be from elective courses offered by another Department.
7.	Master's Degree	Exit after the successful completion of the two years or four semesters of the two-year Master's Degree Programme with required number of credits/grade after obtaining a Bachelor's Degree Or	72-80, including a minimum of 16 credits from elective courses (of which at least 8 credits shall be from elective courses offered by other Departments).
		Exit after the successful completion of one year or two semesters of the one-year Master's Degree Programme with required number of credits/grade after obtaining a Bachelor's Degree (Research), if any such degree is specifically offered by the Department.	36-40, including minimum 8 credits from the elective courses (DSE/GE) of which at least 4 credits shall be from elective courses offered by another Department.

8.	Degree in Integrated UG-PG Programme	Exit after successful completion of the courses prescribed in the first five years of the UG-PG integrated Programme with required number of credits/grade.	180-200, including minimum credits from elective courses (DSE/GE) of which at least 8 credits shall be from elective courses offered by other Departments).
9.	Degree in Integrated UG-PG Programme (Hons.)	Exit after successful completion of the courses prescribed in the first five years of the UG-PG integrated Programme with required number of credits/grade.	220-240, including minimum credits from elective courses (DSE/GE) of which at least 8 credits shall be from elective courses offered by other Departments).

However, the Academic Council of the University, on the recommendation of the Board of Studies of the respective department, may increase the minimum and maximum credits for the award of Certificate, Diploma or Degree, wherever required, to ascertain that Certificate, Diploma or Degree meets the equivalence requirements at national/international level.

12. Examination and Internal Assessment

The internal assessment work and the End-Semester examination shall have the weightage of 30% and 70%, respectively. For practical examination also, 70 percent of the marks will be awarded through an end semester practical exam and remaining 30 percent of the marks will consist of internal assessment to be awarded by concerned faculty member(s) of the department.

12.1 Internal Assessment

12.1.1 Internal Assessment shall be done on a continuous basis, taking into account the student's class performance, completion of assignments and performance at the two compulsory sessional tests to be conducted in a semester.

12.1.2 For conducting Internal Assessment, one or more assessment tools, such as written tests, assignments, oral quizzes, paper presentation, laboratory work, etc., suitable to the course may be employed.

12.1.3 The Internal Assessment for theory shall consist of the following components with marks indicated against each:

(i) Attendance:	**5 marks**
Below 75%	Nil
75% to <80%	1 Mark
80 % to <85%	2 Marks
85% to <85%	3 Marks
90% to <95%	4 Marks
95% and above	5 Marks

(ii) Assignments/Presentations and Class Participation	**5 Marks**
(iii) Sessional Tests (Best of the two shall be counted)	**20 Marks**
(iv) Sessional Tests to be conducted at specific intervals	**10 Marks each**

12.1.4 For practical examination, 70 percent of the marks will be awarded through an end semester practical exam and remaining 30 percent of the marks will consist of internal assessment to be awarded by concerned faculty member(s) of the concerned department. Maximum 05 marks to be awarded for attendance of students (Same as mentioned in case of internal assessment for theory examination).

12.1.5 The seminar paper shall be assessed on the basis of the contents of the paper submitted and its presentation, equally. The assessment will be made by the concerned teacher/advisor/supervisor. A Seminar presentation paper will not exceed 4 credits per semester.

12.1.6 The Head/Incharge of the Department may allow a student to repeat one sessional test, if his/her application in this regard is considered as genuine on valid reasons.

12.1.7 A student is required to secure, in aggregate, a minimum of 'P' grade in the Internal Assessment and in the End-Semester examinations. However, he/she shall have to pass the practical examination separately, with a minimum of 'P' grade.

12.2 End-Semester Examination

12.2.1 The End-semester Examinations covering the entire syllabus prescribed for the course and carrying 70% of weightage, shall be conducted by the Examination Branch of the University, in consultation with the Head of the Department.

12.2.2 The Examiners or Board of Examiners shall be appointed for each course by the Board of Studies of the Department concerned.

12.2.3 The hall ticket/admit card shall be issued to the student on the recommendation of the Head of the Department, subject to the following conditions:

(i) Having fulfilled the requirement of attendance as prescribed;

(ii) Submission of a "No dues" certificate in the prescribed form.

12.2.4 The distribution of weightage for the valuation of semester-long project work/ dissertation shall be:

I. Periodic presentation: 30%;
II. Project Report: 40%; and
III. Viva voce- : 30% **Or** as decided by the Board of Studies of the Department concerned.

12.3 Setting of Question Papers, Moderation and Evaluation

12.3.1 The question papers for the End-Semester theory examination shall be set and evaluation of answer books shall be done by the examiners (Internal and/or External) out of the Panel

of Examiners recommended by the Board of Studies of the Department concerned on the basis of their expertise/ specialization/area of interest.

12.3.2 The question papers shall be moderated by a Board of Moderators (ordinarily not below the rank of Associate Professor) to be appointed by the Controller of Examinations out of the panel drawn by the concerned Board of Studies of the department.

12.3.3 In the case of the practical examination of the courses, the assessment shall be jointly undertaken by the internal and external examiners. The External examiners shall be invited from amongst the panel of examiners proposed/recommended by the Head/Dean of the concerned Department and approved by the Vice Chancellor/Vice Chancellor's nominee.

12.3.4 In case of the Project reports, Thesis and Dissertation, the assessment shall be jointly carried out by the internal and external examiners. External examiners shall be invited from amongst the panel of examiners (ordinarily not below the rank of Associate Professor) proposed/recommended by the Head/Dean of the concerned Department and approved by the Vice Chancellor/ Vice Chancellor's nominee.

12.3.5 The result of the students shall be subject to moderation by a Board of Moderators appointed by the Vice Chancellor on the recommendation of the Controller of Examinations.

12.3.6 Unless otherwise specified by the respective Board of Studies, the pattern of Question Papers for End-Semester Examinations shall be as under:

i. Question no. 1: Shall consist of short answer type questions of specific word length from all the units with internal choice.
ii. Question No.2: Shall consist of essay type question of specific word length from all the units with internal choice.

12.4 Letter Grades and Grade Points

12.4.1 In the End-semester theory or practical examinations, the examiner shall award the marks and these marks shall be further converted into Grades/Grade points by the examination branch in accordance with the provisions of the Ordinance.

12.4.2 Detailed Marks Card issued at the end of the semester or the programme shall carry marks/percentage and equivalent grades both.

12.4.3 The University shall adopt the 10-point Grading System, with the Letter Grades as given under:

Letter Grade	**Grade Point (SGPA/CGPA)**	**Range of Grade Point (SGPA/CGPA)**	**Class Interval (in %)**
O (Outstanding)	10	Above 9 to 10	Above 90 and < 100
A+ (Excellent)	9	Above 8 to 9	Above 80 and <90
A (Very Good)	8	Above 7 to 8	Above 70 and < 80
B+ (Good)	7	Above 6 to 7	Above 60 and < 70

B (Above Average)	6	Above 5 to 6	Above 50 and < 60
C (Average)	5	Above 4.5 to 5	Above 45 and < 50
P (Pass)	4	4 to 4.5	40 to 45
F (Fail)	0		< 40
Ab (Absent)	0		Absent

Note:

(i) F= Fail, and the students graded with 'F' in a programme or course shall be required to re-appear in the examination. However, students appearing in their final Semester Examination, may be permitted to appear in the reappear papers of all preceding Semesters.

(ii) The minimum qualifying marks for a course or programme shall be 40% (i.e., 'P' grade).

(iii) The students shall have to qualify at the Internal Assessment and the End-Semester examinations in the aggregate, and in the practical examinations, separately.

(iv) There shall be no rounding off of SGPA/CGPA.

(v) The SGPA/CGPA obtained by a student shall be out of a maximum of 10 points.

(vi) In order to be eligible for the award of the Certificate/Diploma/ Degree of the University, a student must obtain CGPA of 4 at the end of the programme.

(vii) Provided that the student who is otherwise eligible for the award of the certificate/diploma/degree but has secured a CGPA of less than 4 at the end of the permissible period of semesters may be allowed by the Department concerned to repeat the same course(s) or other courses of the same nature in lieu thereof in the extra semesters within the maximum duration of the programme.

(viii) The Cumulative Grade Point Average (CGPA) obtained by a student shall be classified into the following division/Class:

CGPA	Class/Division
Above 9	Outstanding
Above 8 to 9	First Division (With Distinction)
6 to 8	First Division
5.5 to <6	High-Second Division
5 to <5.5	Second Division
4 to <5	Third Division

12.5 Re-appear Examination

The students failing to score minimum grade required to qualify a course/programme may be allowed to re-appear in those papers where they couldn't score 'P' grade in the extra semesters provided in Clause 10 on "Duration of Programme" with the following provisions:

12.5.1 A student securing "F" Grade in a course shall be permitted to repeat/ reappear in the End-Semester Examination of the Course for a maximum number of three times i.e. a student with arrears on account of "F" Grade, shall be permitted to repeat / reappear in the End Semester Examination for a maximum of three times (including the first appearance), along with the subsequent End Semester Examinations.

12.5.2 If a student secures "F" Grade in a Project Work / Project Report/ Dissertation / Field Work Report / Training Report etc, he/she shall be required to resubmit the revised Project Work / Project Report/ Dissertation / Field Work Report / Training Report etc. as required by the evaluator(s). Provided further that a student shall be permitted to resubmit the Project Work / Project Report / Dissertation / Field Work Report/ Training Report etc. for a maximum of three times (including the first submission).

12.5.3 Such students may avail the chance to re-appear only within the maximum duration of the programme.

12.5.4 Re-appear examination of even semesters shall be conducted with the end-semester examinations of even semesters and similarly examinations of odd semesters shall be conducted with the end-semester examinations of odd semesters. However a student in the final semester/exit stage is allowed to re-appear in the courses of both odd and even semesters.

12.5.5 A 'Re-appear' examination shall be based on the syllabi of the course/programme in force at the time of initial registration to the course/programme.

12.5.6 A student who has got the migration certificate issued from the university shall not be allowed to re-appear at any examination.

However, the credits earned by the student shall be credited to the Academic Bank of Credits as per the relevant guidelines/Ordinance, as amended from time to time.

12.6 Improvement of Grades

For improvement of grades, a student shall have to apply on the prescribed form available on the University website or the Examination Branch of the University, along with the original Detail Marks Certificate or the copy of the result sheet and the prescribed fee, as revised from time to time.

12.6.1 A student shall be allowed to improve the division only after qualifying required number of credits as prescribed for the programme.

12.6.2 The student may be allowed to avail only two chances for improvement within the maximum duration of the programme.

12.6.3 Improvement examination of even semesters shall be conducted with the end-semester examinations of even semesters and similarly examinations of odd semesters shall be conducted with the end-semester examinations of odd semesters.

12.6.4 Improvement examination shall be based on the syllabi of the course/programme in force at the time of initial registration to the course/programme.

12.6.5 A student shall be allowed to improve his performance/grades in not more than 30% of total courses prescribed in the programme for improvement of division only.

12.6.6 A student improving the Division/grade shall not be considered for Gold Medal/Rank Certificate.

12.7 Re-evaluation/Re-checking:

12.7.1 A student may apply for revaluation/rechecking of his/her answer scripts within thirty days of the declaration of the result.

12.7.2 For re-evaluation/re-checking of the answer scripts, a student shall have to apply on the prescribed form available on the University website or the Examination Branch of the University, along with the original Detail Marks Certificate or the copy of the result sheet and the prescribed fee for each Course/Paper, or as revised from time to time.

12.7.3 Declaration of Result after Re-evaluation:

(a) If after the first revaluation, the difference of the original marks and re-evaluated marks is up to plus or minus 5% of the maximum marks of the paper, the higher score shall be considered.

(b) If after the first re-evaluation, the difference of the original marks and re-evaluated marks is more than 5% and less than 10%, the average of the two scores will be considered as final score and the result shall be revised accordingly.

(c) If after the first re-evaluation, the difference comes to more than plus or minus 10% of the maximum marks of the paper, the answer script shall be re-evaluated by a third examiner.

(d) After the second re-evaluation, the average of the nearest two awards/marks shall be taken as final and result shall be revised accordingly.

13. Award of Certificate/Diploma/ Degree:

13.1 Unless otherwise prescribed/amended by the University Grants Commission or the respective regulatory body, the Certificate/Diploma/ Degree shall be awarded on successful completion of prescribed courses with minimum credit/grade requirements as specified by the department.

13.2 The student registered for an Undergraduate or UG-PG Integrated programme of study may avail multiple Exit options as under:

13.2.1 If a student enrolled in Undergraduate or UG-PG integrated programme exits after successful completion of the courses prescribed in the first year of an Undergraduate programme with required number of credits/grade, he/she shall be awarded a Certificate.

13.2.2 If a student enrolled in Undergraduate or UG-PG integrated programme exits after successful completion of the courses prescribed in the first two years of an

Undergraduate programme with required number of credits/grade, he/she shall be awarded Undergraduate Diploma.

13.2.3 If a student enrolled in Undergraduate or UG-PG integrated programme exits after successful completion of the courses prescribed in the first three years of an Undergraduate programme with required number of credits/grade, he/she shall be awarded Bachelor's Degree.

13.2.4 If a student enrolled in UG-PG integrated programme exits after successful completion of the courses prescribed in the first four years of the UG-PG integrated Programme with required number of credits/grade, he/she shall be awarded Postgraduate Diploma.

13.2.5 If a student enrolled in UG-PG integrated programme exits after successful completion of the courses prescribed in the first five years of the UG-PG integrated Programme with required number of credits/grade, he/she shall be awarded Master's Degree.

13.3 In addition to the above, the entry and exit options shall also be available as under:

13.3.1 If a student enrolled in Undergraduate or UG-PG integrated programme exits after successful completion of the courses prescribed in the first four years of an Undergraduate programme (Honours/Research), if offered by a department, with required number of credits/grade, he/she shall be awarded Bachelor's Degree (Honours/Research).

13.3.2 Postgraduate Diploma for those who exit after the successful completion of the first year or two semesters of the two-year Master's Degree Programme with required number of credits/grades specified for the programme after obtaining a Bachelor's Degree.

13.3.3 Master's Degree for those who exit after the successful completion of two years or four semesters of the two-year Master's Degree programme with required number of credits/grade specified for the programme after obtaining a Bachelor's Degree.

13.3.4 Master's Degree for those who exit after the successful completion of one year or two semesters of the two-year Master's Degree programme with required number of credits/grade specified for the programme after obtaining a four-year Bachelor's Degree (Honours/Research).

13.3.5 Integrated UG-PG Degree for those who exit after the successful completion of the courses prescribed in the five-years or ten semesters of the five-year Integrated UG-PG Degree programme with required number of credits/grade specified for the programme.

14. Computation of SGPA and CGPA

The University shall follow the following procedure to compute the Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA):

14.1 The SGPA is the ratio of sum of the product of the number of credits with the grade points scored by a student in all the courses taken by a student and sum of the number of credits of all the courses undergone by a student, i.e.

$$SGPA\ (Si) = \sum(Ci \times Gi)/\sum Ci$$

where Ci is the number of credits of the i^{th} course and Gi is the grade point scored by the

student in the i^{th} course.

14.2 The CGPA is also calculated in the same manner taking into account all the courses undergone by a student over all the semesters of a programme, i.e.

$$CGPA=\sum(Ci \times Si)/\sum Ci$$

where Si is the SGPA of the i^{th} semester and Ci is the total no. of credits in that semester.

14.3 The SGPA and CGPA shall be rounded off to 2 decimal points.

15. Illustration of the Computation of SGPA and CGPA

15.1 Illustration of Computation

Course	Credit	Grade Letter	Grade Point	Credit Point
Course I	3	A	8	3 x 8 = 24
Course II	4	B+	7	4 x 7 = 28
Course III	3	B	6	3 x 6 = 18
Course IV	3	O	10	3 x 10 =30
	Total credits for the semester=13			Total Credit points earned= 100

Thus, SGPA= 100/13= 7.69

15.2 Illustrations for computing CGPA:

Semester I	Semester II	Semester III	Semester IV	Semester V	Semester VI
Credit: 20	Credit: 22	Credit: 25	Credit: 26	Credit: 26	Credit: 25
SGPA: 6.9	SGPA: 7.8	SGPA: 5.6	SGPA: 6.0	SGPA: 6.3	SGPA= 8.0

Thus,

$$CGPA = \frac{((20 \times 6.9) + (22 \times 7.8) + (25 \times 5.6) + (26 \times 6.0) + (26 \times 6.3) + (25 \times 8.0))}{(20 + 22 + 25 + 26 + 26 + 25)}$$

= (969.4/144) =6.73

Note: Formula to calculate percentage from CGPA/SGPA= CGPA or SGPA x 10; and formula to calculate percentage to CGPA or SGPA = Percentage/10

e.g. In case of example mentioned in table 12.2, the percentage of CGPA = 6.73x10 =67.30.

15.3 Transcript (Format): Based on the above, letter grades, grade points, SGPA, and the CGPA, the Transcripts/Detail Marks Certificates (DMCs) shall be issued to the candidates for each semester and a consolidated transcript indicating the performance in all the semesters. The percentage of marks shall be reflected in the DMC of the final semester on the basis of the CGPA.

16. Removal of Student Name from the Programme:

16.1 The name of a student falling under any one of the following categories shall automatically stand removed from the rolls of the University:

(a) A student who has failed to fulfil the minimum grade point requirements prescribed for the programme during the maximum duration of the programme.

(b) A student who has already exhausted the maximum duration allowed for completion of the Programme and has not fulfilled the requirements for the award of the degree /diploma.

(c) A student who is found to be involved in misconduct, forgery, indiscipline or any other objectionable conduct, upon recommendation of the Discipline Committee/ Proctorial Board, and

(d) A student who has failed to attend the classes as stipulated under Ordinance XV (II).

16.2 Promotion Rules

(a) A student will be promoted from an odd semester to the next even semester without any restrictions on the minimum number of credits earned. However for promotion from an even semester to the next odd semester, a student should have earned atleast 50% of the credits of the current and all previous semesters taken together. A student failing to earn at least 50% of the credits from the prescribed courses of all present and all previous semesters taken together will be treated as an 'Ex-student' and will be allowed to repeat in the end semester examination of the previous semesters as applicable (for example for a student going from semester 4 to 5 who becomes an Ex. Student, he/ she shall be required to repeat all the papers of semester 3 and semester 4 in the next odd/even semester). However such student will not be allowed to repeat the internal assessment for the said paper/s of the respective semester/s as the case may be. After passing the said semesters, the student shall be promoted to the next odd semester and shall be treated as a 'Regular' student.

(b) A student shall be declared to have passed the programme of study and award of the degree if he/she has secured the required credits with at least 'P' grade.

17. Miscellaneous

17.1 The University shall provide the facility of Academic Bank of Credits in consonance with UGC (Establishment and Operationalisation of Academic Bank of Credits (ABC) Scheme in Higher Education) Regulations, 2021, as amended from time to time.

17.2 For any programme approved by the Academic Council, if a regulation is issued by the Academic Council, which is at variance with the provisions of this Ordinance, then the Ordinance shall prevail.

Notwithstanding anything stated in this Ordinance, for any unforeseen issue arising, and not covered by this Ordinance, or in the event of difference in interpretation, the Vice Chancellor may take an appropriate decision.

6. Resolved that the following amendments to Ordinance-II (A) Degree of Doctor of Philosophy (Ph.D.) of the University, as recommended by the Committee constituted to review the Ordinance-II(A), be approved with minor modifications and recommended to the Executive Council for consideration:

Existing Clause	Proposed Amendments
Clause-2.4: The candidates who have qualified the UGC/CSIR-JRF/NET/SLET, or are Teacher Fellowship-holders or have passed M. Phil. programme with course work recognised by the U.G.C., as per the UGC Regulations (Minimum Standards and Procedure for award of M.Phil./Ph.D. Degree, 2009), shall be exempted from appearing at the written test.	Clause 2.4: The candidates who have qualified the **UGC-NET (including JRF)/ UGC-CSIR-NET (including JRF)/SLET/GATE**, or are Teacher Fellowship-holders or have passed M. Phil. programme with course work recognised by the U.G.C., as per the **UGC (Minimum Standards and Procedure for award of M.Phil./Ph.D. Degree) Regulations 2016,** shall be exempted from appearing at the written test.
Clause-2.5: A candidate shall be eligible for admission to the part-time Ph.D. programme, if he/she fulfils the following conditions: • The candidate should be working in an organization on regular basis. • He/she meets the requisite minimum qualification for admission to Ph. D programme of the University. • The candidate should have at least five years of continuous service. The candidate should furnish a "No Objection Certificate" from his/her organization in the prescribed format.	Clause-2.5: To be deleted.
Clause-3.2: Integrated M.Phil.-Ph.D. Programme	**Clause-3.2:** To be deleted
Clause-6.2: Only a full-time regular teacher of the University can act as a Supervisor. No external supervisor is allowed. However, a Co-Supervisor can be allowed in inter-disciplinary areas from the same/other department(s) of the same institute or from any other related institution, with the approval of the Research Advisory Committee.	**Clause-6.2:** Only a full-time regular teacher of the University can act as a Supervisor. No external supervisor is allowed. However, a Co-Supervisor can be allowed in inter-disciplinary areas from the same/other department(s) of the same institute or from any other related institution, with the approval of the **Departmental Research Committee.**
Clause-6.4: In the case of the topics which are of inter-disciplinary nature, where the Department concerned feels that the expertise in the Department has to be supplemented from outside, the D.R.C. may appoint a Research Supervisor from the Department itself, who	**Clause-6.4:** In the case of the topics which are of inter-disciplinary nature, where the Department concerned feels that the expertise in the Department has to be supplemented from outside, the D.R.C. may appoint a Research Supervisor from the

shall be known as the Research Supervisor, and a Co-Supervisor from outside the Department/ School/Institution, on such terms and conditions as may be specified and agreed upon by the consenting Institutions.	Department itself, who shall be known as the Research Supervisor, and a Co-Supervisor from outside the Department/ School/**University**, on such term, on such terms and conditions as may be specified and agreed upon by the consenting Institutions.
Clause-7.3: Those who have already completed the course work in M.Phil. programme with the required CGPA score, and have been permitted to proceed to the Ph.D. programme in integrated course, may be exempted by the D.R.C. from the Ph.D. course work. In case of a direct Ph.D., the candidates who have passed M.Phil. Degree with Course Work as per the UGC Regulations (Minimum Standards and Procedure for award of M.Phil./Ph.D. Degree, 2009), shall be exempted from the requirements of Course Work. All other candidates admitted to the Ph.D. programme shall be required to complete the Ph.D. course work prescribed by the Department.	**Clause-7.3:** ~~Those who have already completed the course work in M.Phil. programme with the required CGPA score, and have been permitted to proceed to the Ph.D. programme in integrated course, may be exempted by the D.R.C. from the Ph.D. course work. In case of a direct Ph.D.,~~ the candidates who have passed M.Phil. Degree with Course Work as per the **UGC (Minimum Standards and Procedure for award of M.Phil./Ph.D. Degree) Regulations 2016, as amended from time to time,** shall be exempted from the requirements of Course Work. All other candidates admitted to the Ph.D. programme shall be required to complete the Ph.D. course work prescribed by the Department.
Clause-7.7: A student for whom pre-requisite courses are prescribed shall be required to clear the Course Work within the first semester **and in case of part-time Ph.D. within one year**. The registration of such students shall be confirmed only if he/she has qualified minimum credits with a minimum CGPA of the Course Work may be designed by the Department as under: XXX XXX XXX XXX XXX	**Clause-7.7:** A student for whom pre-requisite courses are prescribed shall be required to clear the Course Work within the first semester. The registration of such students shall be confirmed only if he/she has qualified minimum credits with a minimum CGPA of the Course Work may be designed by the Department as under: XXX XXX XXX XXX XXX
Clause-8: Registration and Approval of Topic: a. Consequent upon confirmation of his/her admission in the Board of Studies and/or School Board, the topic of dissertation shall be approved by the School Board/BOS on the recommendations of the Department/Centre concerned and the DRC on a proposal submitted by the student.	**Clause-8: Registration and Approval of Topic:** a. Consequent upon confirmation of his/her admission in the Board of Studies and/or School Board, the topic of dissertation**/thesis** shall be approved by the School Board/BOS on the recommendations of the ~~Department/Centre concerned and the~~ DRC on a proposal submitted by the student.

	After approval of the topic, the student shall submit the registration form with prescribed fee to the Registration Branch.
Clause-9: Requirements during Registration Period d. The research scholar shall present a seminar on his/her research at the completion of each year after his/her registration to Ph.D. programme till submission of Ph.D. thesis. This seminar will be organized by the concerned Department.	**Clause-9: Requirements during Registration Period** d. The research scholar shall present a seminar on his/her research at the completion of each year after his/her registration to Ph.D. programme till submission of Ph.D. thesis. This seminar will be organized by the concerned **Supervisor with the approval of the Head of the Department.**
Clause-9: Requirements during Registration Period e. Every research student shall pursue full time research as a regular student for a minimum period of two years from the date of registration.	**Clause-9: Requirements during Registration Period** e. Every research student shall pursue full time research as a regular student for a minimum period of two years from the date of registration of research topic.
Clause-11: Research Advisory Committee i. To review the research proposal and finalize the topic of research iv. A research scholar shall appear before the Research Advisory Committee once in six months to make a presentation of the progress of his/her work for evaluation and further guidance. The six monthly progress reports shall be submitted by the Research Advisory Committee to the ~~Institution/College~~ with a copy to the research scholar	**Clause-11: Research Advisory Committee** i. **To be deleted.** iv. A research scholar shall appear before the Research Advisory Committee once in six months to make a presentation of the progress of his/her **research** work **related to the topic approved** for evaluation and further guidance. The six monthly progress reports shall be submitted by the Research Advisory Committee to the **Departmental Research Committee** with a copy to the research scholar.
Clause-15: Viva Voce: h. In case the Viva-Voce Board recommends that the candidate be awarded the Ph.D. degree, the Departmental Research Committee shall recommend to the Vice Chancellor that the Ph.D. degree may be awarded to the candidate.	**Clause-15: *Viva-Voce*:** h. In case the *Viva-Voce* Board**/Examiner** recommends that the candidate be awarded the Ph.D. degree, **the recommendation/ report shall be submitted to the Departmental Research Committee. The DRC shall further** recommend to the Vice Chancellor that the Ph.D. degree may be awarded to the candidate**. Accordingly, the notification shall be issued after approval of the Vice Chancellor, and the date of award of**

		Ph.D. Degree shall be the date of Notification.
	The Council further resolved that a new Ordinance will be drafted for part-time Ph.D. programme. A Committee will be constituted for drafting new Ordinance. **Note:** (i) Prof. Rajesh Kumar Malik, Dean, School of Law gave his dissent on proposed amendments in Clause-2.5 and 7.7 of the Agenda Item No-6. **(Annexure-LXX, Page-3463 to 3465)** (ii) It was informed to the house that Ministry of Education has raised objections to the Ordinance-II(A) submitted by the University **(Annexure-LXXI, Page- 3466 to 3467).**	
7.	Resolved that the recommendations of the Board of Studies of the School of Education dated 07.09.2021 and School Board of School of Education dated 14.09.2021, for the scheme and syllabi of B.Ed. programme (Semester III & IV) in the School of Education, w.e.f. the Academic Session-2021-22, be approved. **(Annexure-IV, Page-56 to 124)**	
8.	Resolved that the recommendations of the Board of Studies of the School of Education dated 07.09.2021 and School Board of School of Education dated 14.09.2021, for the scheme and syllabi of M.Ed. programme (Semester III & IV) in the School of Education, w.e.f. the Academic Session-2021-22, be approved. **(Annexure-V, Page- 125 to 172)**	
9.	Resolved that the recommendations of the Board of Studies of the School of Education dated 07.09.2021 and School Board of School of Education dated 14.09.2021, for the scheme and syllabi of B.Ed. programme in the School of Education as per the Learning Outcome Based Curriculum Framework (LOCF) guidelines, w.e.f. the Academic Session-2021-22, be approved. **(Annexure-VI, Page-173 to 368)**	
10.	Resolved that the recommendations of the Board of Studies of the School of Education dated 07.09.2021 and School Board of School of Education dated 14.09.2021, for the scheme and syllabi of M.Ed. programme in the School of Education as per the Learning Outcome Based Curriculum Framework (LOCF) guidelines, w.e.f. the Academic Session-2021-22, be approved. **(Annexure-VII, Page-369 to 514)**	
11.	Resolved that the recommendations of the Board of Studies of the Department of Physical Education and Sports dated 26.08.2021 and School Board of School of Education dated 14.09.2021, for the scheme and syllabi of M.P.E.S. programme in the Department of Physical Education and Sports, as per the Learning Outcome Based Curriculum Framework (LOCF) guidelines, w.e.f. the Academic Session-2021-22, be approved. **(Annexure-VIII, Page- 515 to 607)**	
12.	Resolved that the recommendations of the Board of Studies of the Department of Physical Education and Sports dated 26.08.2021 and School Board of School of Education dated 14.09.2021, for the scheme and syllabi of M.P.Ed. programme in the Department of Physical Education and Sports, as per the Learning Outcome Based Curriculum Framework (LOCF) guidelines, w.e.f. the Academic Session-2021-22, be approved. **(Annexure-IX, Page- 608 to 701)**	
13.	The Council considered the request of Mr. Rahul Yadav, for the continuation of the Ph.D. programme in the School of Education after his joining in the Department of Education, Uttar Pradesh, as recommended by the BoS and School Board of School of Education and resolved that he may complete the rest of the residency period by taking leave from his Employer.	

	Note: Mr. Rahul Yadav has submitted the NOC from the department where he is presently joined and a letter of self-declaration mentioning that after getting permission from the School of Education, Central University of Haryana; he will complete the rest of the residency period by taking leave without pay from his department. **(Annexure-X, Page-702 to 703)**
14.	Resolved that the recommendations of the Board of Studies of the Department of English and Foreign Languages dated 21.08.2021 and School Board of School of Humanities and Social Sciences dated 09.09.2021, for the scheme and syllabi of M.A. English programme in the Department of English and Foreign Languages, as per the Learning Outcome Based Curriculum Framework (LOCF) guidelines, w.e.f. the Academic Session-2021-22, be approved. **(Annexure-XI, Page-704 to 803)**
15.	दिनांक 02.09.2021 को हिंदी विभाग के अध्ययन मंडल तथा दिनांक 09.09.2021 को मानविकी एवं समाज विज्ञान पीठ के स्कूल बोर्ड की संस्तुति उपरांत राष्ट्रीय शिक्षा नीति, 2020 एवं अधिगम परिणाम आधारित पाठ्यचर्या की रूप-रेखा के आलोक में शैक्षणिक सत्र 2021-22 से प्रभावी एम.ए. (हिंदी) का पाठ्यक्रम यथावत अनुमोदित एवं पारित किया गया। Resolved that the recommendations of the Board of Studies of the Department of Hindi dated 02.09.2021 and School Board of School of Humanities and Social Sciences dated 09.09.2021, for the scheme and syllabi of M.A. Hindi programme in the Department of Hindi, as per the Learning Outcome Based Curriculum Framework (LOCF) guidelines, w.e.f. the Academic Session-2021-22, be approved. **(Annexure-XII, Page-804 to 899)**
16.	दिनांक 02.09.2021 को हिंदी विभाग के अध्ययन मंडल तथा दिनांक 09.09.2021 को मानविकी एवं समाज विज्ञान पीठ के स्कूल बोर्ड की संस्तुति उपरांत शैक्षणिक सत्र 2021-22 से प्रभावी पीएच.डी. (हिंदी), कोर्स वर्क का पाठ्यक्रम यथावत अनुमोदित एवं पारित किया गया। Resolved that the recommendations of the Board of Studies of the Department of Hindi dated 02.09.2021 and School Board of School of Humanities and Social Sciences dated 09.09.2021, for the course work of the Ph.D. programme in the Department of Hindi, w.e.f. the Academic Session-2021-22, be approved. **(Annexure-XIII, Page-900 to 908)**
17.	Resolved that the recommendations of the Board of Studies of the Department of History and Archaeology dated 08.09.2021 and School Board of School of Humanities and Social Sciences dated 09.09.2021, for the scheme and syllabi of M.A. History programme in the Department of History and Archaeology, as per the Learning Outcome Based Curriculum Framework (LOCF) guidelines, w.e.f. the Academic Session-2021-22, be approved. **(Annexure-XIV, Page-909 to 1162)**
18.	Resolved that the recommendations of the Board of Studies of the Department of History and Archaeology dated 08.09.2021 and School Board of School of Humanities and Social Sciences dated 09.09.2021, for the course work of the Ph.D. programme in the Department of History and Archaeology, w.e.f. the Academic Session-2021-22, be approved. **(Annexure-XV, Page-1163 to 1172)**
19.	Resolved that the recommendations of the Board of Studies of the Department of Journalism and Mass Communication dated 08.09.2021 and School Board of School of Humanities and Social Sciences dated 09.09.2021, for the scheme and syllabi of MAJMC programme in the Department of Journalism and Mass Communication, as per the Learning Outcome Based Curriculum Framework (LOCF) guidelines, w.e.f. the Academic Session-2021-22, be approved. **(Annexure-XVI, Page-1173 to 1261)**

20.	Resolved that the recommendations of the Board of Studies of the Department of Political Science dated 20.08.2021 and School Board of School of Humanities and Social Sciences dated 09.09.2021, for the scheme and syllabi of M.A. Political Science programme in the Department of Political Science, as per the Learning Outcome Based Curriculum Framework (LOCF) guidelines, w.e.f. the Academic Session-2021-22, be approved. **(Annexure-XVII, Page-1262 to 1367)**
21.	Resolved that the recommendations of the Board of Studies of the Department of Psychology dated 19.08.2021 and School Board of School of Humanities and Social Sciences dated 09.09.2021, for the scheme and syllabi of Advance Diploma in Child Guidance and Counselling in the Department of Psychology, as per the Learning Outcome Based Curriculum Framework (LOCF) guidelines, w.e.f. the Academic Session-2021-22, be approved. **(Annexure-XVIII, Page- 1368 to 1410)** ***Note: The programme will be offered after receipt of the approval from the Rehabilitation Council of India, New Delhi.***
22.	Resolved that the recommendations of the Board of Studies of the Department of Psychology dated 19.08.2021 and School Board of School of Humanities and Social Sciences dated 09.09.2021, for the scheme and syllabi of PG Diploma in Rehabilitation Psychology in the Department of Psychology, as per the Learning Outcome Based Curriculum Framework (LOCF) guidelines, w.e.f. the Academic Session-2021-22, be approved. **(Annexure-XIX, Page-1411 to 1418)** ***Note: The programme will be offered after receipt of the approval from the Rehabilitation Council of India, New Delhi.***
23.	Resolved that the recommendations of the Board of Studies of the Department of Psychology dated 19.08.2021 and School Board of School of Humanities and Social Sciences dated 09.09.2021, for the scheme and syllabi of B.Sc. (Hons.) Psychology programme in the Department of Psychology, as per the Learning Outcome Based Curriculum Framework (LOCF) guidelines, w.e.f. the Academic Session-2021-22, be approved. **(Annexure-XX, Page- 1419 to 1438)**
24.	Resolved that the recommendations of the Board of Studies of the Department of Psychology dated 19.08.2021 and School Board of School of Humanities and Social Sciences dated 09.09.2021, for the scheme and syllabi of M.A. Psychology programme in the Department of Psychology, as per the Learning Outcome Based Curriculum Framework (LOCF) guidelines, w.e.f. the Academic Session-2021-22, be approved. **(Annexure-XXI, Page-1439 to 1525)**
25.	संस्कृतविभागस्य एम.ए.-संस्कृत-कक्षायाः प्रथमतः तृतीयसत्र-पर्यन्तस्य, अत्र च संलग्नकेषु 22तमे पी-डी-एफ. इति संलग्नके निबद्धस्य, 2021-2022 वर्षतः प्रस्तावितस्य पाठ्यक्रमस्य स्वीकरणमनुमोदनं च क्रियते। अयं पाठ्यक्रमः पाठ्य-समित्याः 28.08.2021 दिनाङ्कस्य उपवेशने, मानविकी-सामाजिकविज्ञान-विद्यापीठस्य च 09.09.2021 दिनाङ्कस्य उपवेशने स्वीकृतः विद्यते, अधिगम-परिणामाधारित-पाठ्यक्रम-संरचन-स्वरूपमाधृत्य च संरचितः। Resolved that the recommendations of the Board of Studies of the Department of Sanskrit dated 28.08.2021 and School Board of School of Humanities and Social Sciences dated 09.09.2021, for the scheme and syllabi of M.A. Sanskrit (Semester-I to III) programme in the Department of Sanskrit, as per the Learning Outcome Based Curriculum Framework (LOCF) guidelines, w.e.f. the Academic Session-2021-22, be approved. **(Annexure-XXII, Page-1526 to 1565)**
26.	Resolved that the recommendations of the Board of Studies of the Department of Sociology dated 07.09.2021 and School Board of School of Humanities and Social Sciences dated 09.09.2021, for the scheme and syllabi of M.A. Sociology programme in the Department of Sociology, as per the

	Learning Outcome Based Curriculum Framework (LOCF) guidelines, w.e.f. the Academic Session-2021-22, be approved. **(Annexure-XXIII, Page- 1566 to 1670)**
27.	Resolved that the recommendations of the Board of Studies of the Department of Chemistry dated 09.09.2021 and School Board of School of Basic Sciences dated 20.09.2021, for the scheme and syllabi of M.Sc. Chemistry programme in the Department of Chemistry, as per the Learning Outcome Based Curriculum Framework (LOCF) guidelines, w.e.f. the Academic Session-2021-22, be approved. **(Annexure-XXIV, Page-1671 to 1830)**
28.	Resolved that the recommendations of the Board of Studies of the Department of Chemistry dated 09.09.2021 and School Board of School of Basic Sciences dated 20.09.2021, for the scheme of first three years and syllabi of first year of Integrated B.Sc.-M.Sc. programme in the Department of Chemistry, as per the Learning Outcome Based Curriculum Framework (LOCF) guidelines, w.e.f. the Academic Session-2021-22, be approved. **(Annexure-XXV, Page-1831 to 1888)**
29.	Resolved that the recommendations of the Board of Studies of the Department of Chemistry dated 09.09.2021 and School Board of School of Basic Sciences dated 20.09.2021, for the course work of the Ph.D. programme in the Department of Chemistry, w.e.f. the Academic Session-2021-22, be approved. **(Annexure-XXVI, Page-1889 to 1906)**
30.	Resolved that the recommendations of the Board of Studies of the Department of Geography dated 13.09.2021 and School Board of School of Basic Sciences dated 20.09.2021, for the scheme and syllabi of M.Sc. Geography programme in the Department of Geography, as per the Learning Outcome Based Curriculum Framework (LOCF) guidelines, w.e.f. the Academic Session-2021-22, be approved. **(Annexure-XXVII, Page-1907 to 1997)**
31.	Resolved that the recommendations of the Board of Studies of the Department of Mathematics dated 04.09.2021 and School Board of School of Basic Sciences dated 20.09.2021, for the scheme and syllabi of M.Sc. Mathematics programme in the Department of Mathematics, as per the Learning Outcome Based Curriculum Framework (LOCF) guidelines, w.e.f. the Academic Session-2021-22, be approved. **(Annexure-XXVIII, Page-1998 to 2180)**
32.	Resolved that the recommendations of the Board of Studies of the Department of Mathematics dated 04.09.2021 and School Board of School of Basic Sciences dated 20.09.2021, for the scheme of first three years and syllabi of first year of Integrated B.Sc.-M.Sc. programme in the Department of Mathematics, as per the Learning Outcome Based Curriculum Framework (LOCF) guidelines, w.e.f. the Academic Session-2021-22, be approved. **(Annexure-XXIX, Page-2181 to 2238)**
33.	The Council considered the request of Ms. Varsha (10909) a student of M.Sc. Mathematics (Batch 2017-19) for another chance to appear for Numerical Analysis (II Semester) end term examination and resolved to give her a Special Chance, keeping in view of hardship faced by her due to technical issues during the online examination. **Note:** Ms. Varsha (10909), student of M.Sc. Mathematics for the academic session 2017-19 appeared for Numerical Analysis (II Semester) end term exam thrice and was not able to clear the passing criteria. However, as per her representation, during the third attempt, which was conducted in online mode due to covid-19 pandemic, she was not able to complete her exam due to technical issue.
34.	Resolved that the recommendations of the Board of Studies of the Department of Physics and Astrophysics dated 08.09.2021 and School Board of School of Basic Sciences dated 20.09.2021, for the scheme and syllabi of M.Sc. Physics programme in the Department of Physics and Astrophysics,

	as per the Learning Outcome Based Curriculum Framework (LOCF) guidelines, w.e.f. the Academic Session-2021-22, be approved. **(Annexure-XXX, Page-2239 to 2388)**
35.	Resolved that the recommendations of the Board of Studies of the Department of Physics and Astrophysics dated 08.09.2021 and School Board of School of Basic Sciences dated 20.09.2021, for the scheme of first three years and syllabi of first year of Integrated B.Sc.-M.Sc. programme in the Department of Physics and Astrophysics, as per the Learning Outcome Based Curriculum Framework (LOCF) guidelines, w.e.f. the Academic Session-2021-22, be approved. **(Annexure-XXXI, Page-2389 to 2423)**
36.	Resolved that the recommendations of the Board of Studies of the Department of Statistics dated 08.09.2021 and School Board of School of Basic Sciences dated 20.09.2021, for the scheme and syllabi of M.Sc. Statistics programme in the Department of Statistics, as per the Learning Outcome Based Curriculum Framework (LOCF) guidelines, w.e.f. the Academic Session-2021-22, be approved. **(Annexure-XXXII, Page-2424 to 2490)**
37.	Resolved that the recommendations of the Board of Studies of the Department of Electrical Engineering dated 26.08.2021 and School Board of School of Engineering and Technology dated 14.09.2021, for the scheme and syllabi of B.Tech. (Semester 7th & 8th) programme in the Department of Electrical Engineering w.e.f. the Academic Session-2021-22 (for 2018-19 admitted students), be approved. **(Annexure-XXXIII, Page-2491 to 2514)**
38.	Resolved that the recommendations of the Board of Studies of the Department of Civil Engineering dated 04.09.2021 and School Board of School of Engineering and Technology dated 14.09.2021, for the scheme and syllabi of B.Tech. (Semester 7th & 8th) programme in the Department of Civil Engineering w.e.f. the Academic Session-2021-22 (for 2018-19 admitted students), be approved. **(Annexure-XXXIV, Page-2515 to 2556)**
39.	Resolved that the recommendations of the Board of Studies of the Department of Computer Science and Engineering dated 02.09.2021 and School Board of School of Engineering and Technology dated 14.09.2021, for the scheme and syllabi of B.Tech. (Semester 7th & 8th) programme in the Department of Computer Science and Engineering w.e.f. the Academic Session-2021-22 (for 2018-19 admitted students), be approved. **(Annexure-XXXV, Page-2557 to 2600)**
40.	Resolved that the recommendations of the Board of Studies of the Department of Printing and Packaging Technology dated 27.08.2021 and School Board of School of Engineering and Technology dated 14.09.2021, for the scheme and syllabi of B.Tech. (Semester 7th & 8th) programme in the Department of Printing and Packaging Technology w.e.f. the Academic Session-2021-22 (for 2018-19 admitted students), be approved. **(Annexure-XXXVI, Page-2601 to 2629)**
41.	Resolved that the recommendations of the Board of Studies of the Department of Electrical Engineering dated 26.08.2021 and School Board of School of Engineering and Technology dated 14.09.2021, for the scheme and syllabi of M.Tech. (Energy Systems and Management) Programme in the Department of Electrical Engineering, as per the Learning Outcome Based Curriculum Framework (LOCF) guidelines, w.e.f. the Academic Session-2021-22, be approved. **(Annexure-XXXVII, Page-2630 to 2687)**
42.	Resolved that the recommendations of the Board of Studies of the Department of Civil Engineering dated 04.09.2021 and School Board of School of Engineering and Technology dated 14.09.2021, for the scheme and syllabi of M.Tech. (Structural Engineering) Programme in the Department of Civil Engineering, as per the Learning Outcome Based Curriculum Framework (LOCF) guidelines, w.e.f. the Academic Session-2021-22, be approved. **(Annexure-XXXVIII, Page-2688 to 2739)**

43. Resolved that the recommendations of the Board of Studies of the Department of Computer Science and Engineering dated 02.09.2021 and School Board of School of Engineering and Technology dated 14.09.2021, for the scheme and syllabi of M.Tech. (Computer Science and Engineering) Programme in the Department of Computer Science and Engineering, as per the Learning Outcome Based Curriculum Framework (LOCF) guidelines, w.e.f. the Academic Session-2021-22, be approved. **(Annexure-XXXIX, Page-2740 to 2810)**

44. Resolved that the following amendments in the Admission rules of the University be approved and recommended to the Executive Council for consideration:

Existing Clause	Proposed Amendments
4. (c) Supernumerary seats: **(iv)** Two seats for the students of Jammu & Kashmir	**4. (c) Supernumerary seats:** (iv) Two seats for the wards of Kashmiri Migrants and Kashmiri Pandits/ Kashmiri Hindu families (Non-Migrants) living in the Kashmir Valley.

The Council further resolved that a proposal for providing supernumerary seats in admissions as mentioned as Sr. No- (v) and (vi) may be sent to University Grants Commissions for approval:

(v) Doesn't exist	(v) One seat in each programme (governed by UGC only) for the candidates who are bonafide residents of the Jant and Pali villages, Mahendergarh, Haryana.
(vi) Doesn't exist	(vi) One seat in each programme for the students who have lost their parents due to COVID-19 pandemic.

45. The Council deliberated upon the issue of reservation of PwD in Research Programmes in light of the observation/ recommendations given by the Chief Commissioner for Persons with Disabilities (Divyangjan), Department of Empowerment of Persons with Disabilities (Divyangjan), Ministry of Social Justice and Empowerment, Government of India, in Case No. 12793/1031/2021 titled Ms. Meena Kadian vs Central University of Haryana and resolved to Constitute a Committee to devise modalities for admissions in Ph.D. programme under PwD quota, in consonance with the observation/ recommendations given by the Chief Commissioner for Persons with Disabilities.
(Annexure-XL, Page-2811 to 2814)

REPORTING ITEMS

46. The action taken by the Vice-Chancellor in approving the starting of Ph.D. programme in the following Departments/Subjects, w.e.f. Academic Session 2021-22, was reported, recorded and confirmed:

a. English under School of Engineering and Technology (To be conducted under Department of English and Foreign Languages)
b. Management Studies under School of Engineering and Technology (To be conducted under Department of Management Studies)

Note: The Academic Council vide its Resolution No-17 of the 19th meeting held on 06.02.2016, authorised the Vice-Chancellor to approve starting of Ph.D. programmes.

47.	The action taken by the Vice-Chancellor in approving the Academic Calendars of the University for Academic Session-2021-22, was reported, recorded and confirmed: **(Annexure-XLI, Page-2815 to 2818)**
48.	The action taken by the Vice-Chancellor in condoning the delay in submission of Ph.D. thesis by Ms. Tushma Devi (Roll No-5055), a Research Scholar in the Department of Political Science, was reported, recorded and confirmed. **(Annexure-XLII, Page-2819)**
49.	The Action taken by the Vice-Chancellor in starting of the new programmes from the Academic Session-2021-22, in anticipation of the approval from the Academic Council, was reported, recorded and confirmed:

S.No.	Name of Programme	Name of Department	No. of Seats
1.	B.Sc. (Hons.) Psychology	Department of Psychology	30
2.	Integrated B.Sc.-M.Sc.	Department of Chemistry	30
3.	Integrated B.Sc.-M.Sc.	Department of Mathematics	30
4.	Integrated B.Sc.-M.Sc.	Department of Physics & Astrophysics	30
5.	M.Tech. (Energy Systems and Management)	Department of Electrical Engineering	18
6.	M.Tech. (Structural Engineering)	Department of Civil Engineering	18
7.	M.Tech. (Computer Science and Engineering)	Department of Computer Science and Engineering	18

50.	The receipt of NCTE letter No.F./NRC/NCTE/HR....-M.P.Ed./342nd (Virtual) meeting/2021/215597603 dated 16.09.2021, regarding approval of an Intake of 40 seats in the M.P.Ed. programme in the Central University of Haryana w.e.f. Academic Session-2021-22, was reported and recorded. **(Annexure-XLIII, Page-2820 to 2823)**
51.	The signing of Memorandum of Understanding (MoU) between Department of Printing and Packaging Technology under School of Engineering and Technology, CUH and Offset Printer's Association, 2051, B-XX, Gobind Nagar, Ludhiana, Punjab, was reported and recorded. **(Annexure-XLIV, Page-2824 to 2829)**
52.	The signing of Memorandum of Understanding (MoU) between Department of Electrical Engineering under School of Engineering and Technology, CUH and L&T Electrical and Automation, A-25, Mohan Cooperative, Mathura Road, Sarita Vihar, New Delhi, was reported and recorded. **(Annexure-XLV, Page-2830 to 2832)**
53.	The signing of Memorandum of Understanding (MoU) between Central University of Haryana and J.C. Bose University of Science and Technology, YMCA, Faridabad, was reported and recorded. **(Annexure-XLVI, Page-2833 to 2839)**
54.	The receipt of letter No. F.No.24-9/2021(CU) dated 16.09.2021 received from Under Secretary, UGC regarding CA/CS/ICWA qualification to be treated equivalent to PG Degree, was reported and recorded. **(Annexure-XLVII, Page-2840 to 2842)**
55.	The Agenda Item was withdrawn.

Supplementary Agenda Items	
ITEMS FOR CONSIDERATION	
56.	Resolved that the recommendations of the Board of Studies of the Department of Biochemistry dated 08-09-2021 and School Board of School of Interdisciplinary and Applied Sciences dated 07-10-2021, for the scheme and syllabi of M.Sc. (Biochemistry) programme in the Department of Biochemistry, as per the Learning Outcome Based Curriculum Framework (LOCF) guidelines, w.e.f. the Academic Session-2021-22, be approved. **(Annexure-XLVIII, Page-2843 to 2900)**
57.	Resolved that the recommendations of the Board of Studies of the Department of Biochemistry dated 08-09-2021 and School Board of School of Interdisciplinary and Applied Sciences dated 07-10-2021, for the course work of the Ph.D. programme in the Department of Biochemistry, w.e.f. the Academic Session-2021-22, be approved. **(Annexure-XLIX, Page-2901 to 2909)**
58.	Resolved that the recommendations of the Board of Studies of the Department of Biotechnology dated 01-09-2021 and School Board of School of Interdisciplinary and Applied Sciences dated 07-10-2021, for the scheme and syllabi of M.Sc. (Biotechnology) programme in the Department of Biotechnology, as per the Learning Outcome Based Curriculum Framework (LOCF) guidelines, w.e.f. the Academic Session-2021-22, be approved. **(Annexure-L, Page-2910 to 2993)**
59.	Resolved that the recommendations of the Board of Studies of the Department of Biotechnology dated 24-07-2020 and School Board of School of Interdisciplinary and Applied Sciences dated 07-10-2021, for the course work of the Ph.D. programme in the Department of Biotechnology, w.e.f. the Academic Session-2021-22, be approved. **(Annexure-LI, Page-2994 to 3005)**
60.	Resolved that the recommendations of the Board of Studies of the Department of Environmental Studies dated 14-09-2021 and School Board of School of Interdisciplinary and Applied Sciences dated 07-10-2021, for the scheme and syllabi of M.Sc. programme in the Department of Environmental Studies, as per the Learning Outcome Based Curriculum Framework (LOCF) guidelines, w.e.f. the Academic Session-2021-22, be approved. **(Annexure-LII, Page-3006 to 3080)**
61.	Resolved that the recommendations of the Board of Studies of the Department of Library and Information Science dated 03-09-2021 and School Board of School of Interdisciplinary and Applied Sciences dated 07-10-2021, for the scheme and syllabi of M.Lib.I.Sc. programme in the Department of Library and Information Science, as per the Learning Outcome Based Curriculum Framework (LOCF) guidelines, w.e.f. the Academic Session-2021-22, be approved. **(Annexure-LIII, Page-3081 to 3168)**
62.	Resolved that the recommendations of the Board of Studies of the Department of Library and Information Science dated 03-09-2021 and School Board of School of Interdisciplinary and Applied Sciences dated 07-10-2021, for the course work of the Ph.D. programme in the Department of Library and Information Science, w.e.f. the Academic Session-2021-22, be approved. **(Annexure-LIV, Page-3169 to 3182)**
63.	Resolved that the recommendations of the Board of Studies of the Department of Microbiology dated 09-09-2021 and School Board of School of Interdisciplinary and Applied Sciences dated 07-10-2021, for the scheme and syllabi of M.Sc. programme in the Department of Microbiology, as per the Learning Outcome Based Curriculum Framework (LOCF) guidelines, w.e.f. the Academic Session-2021-22, be approved. **(Annexure-LV, Page-3183 to 3239)**
64.	Resolved that the recommendations of the Board of Studies of the Department of Microbiology dated 09-09-2021 and School Board of School of Interdisciplinary and Applied Sciences dated 07-10-

	2021, for the course work of the Ph.D. programme in the Department of Microbiology, w.e.f. the Academic Session-2021-22, be approved. **(Annexure-LVI, Page-3240 to 3253)**
65.	Resolved that the recommendations of the Board of Studies of the Department of Nutrition Biology dated 14-09-2021 and School Board of School of Interdisciplinary and Applied Sciences dated 07-10-2021, for the scheme and syllabi of M.Sc. programme in the Department of Nutrition Biology, as per the Learning Outcome Based Curriculum Framework (LOCF) guidelines, w.e.f. the Academic Session-2021-22, be approved. **(Annexure-LVII, Page-3254 to 3310)**
66.	Resolved that the recommendations of the Board of Studies of the Department of Nutrition Biology dated 14-09-2021 and School Board of School of Interdisciplinary and Applied Sciences dated 07-10-2021, for the course work of the Ph.D. programme in the Department of Nutrition Biology, w.e.f. the Academic Session-2021-22, be approved. **(Annexure-LVIII, Page-3311 to 3323)**
67.	Resolved that the recommendations of the Board of Studies of the Department of Pharmaceutical Science dated 26-08-2021 and School Board of School of Interdisciplinary and Applied Sciences dated 07-10-2021, for the scheme and syllabi of M.Pharm (Pharmacology) programme in the Department of Pharmaceutical Sciences, as per the Learning Outcome Based Curriculum Framework (LOCF) guidelines, w.e.f. the Academic Session-2021-22, be approved. **(Annexure-LIX, Page-3324 to 3349)**
68.	Resolved that the recommendations of the Board of Studies of the Department of Pharmaceutical Sciences dated 14-09-2021 and School Board of School of Interdisciplinary and Applied Sciences dated 07-10-2021, for the course work of the Ph.D. programme in the Department of Pharmaceutical Sciences, w.e.f. the Academic Session-2021-22, be approved. **(Annexure-LX, Page-3350 to 3363)**
69.	Resolved that the recommendations of the Board of Studies of the Department of Yoga dated 01-09-2021 and School Board of School of Interdisciplinary and Applied Sciences dated 07-10-2021, for the scheme and syllabi of M.Sc. programme in the Department of Yoga, as per the Learning Outcome Based Curriculum Framework (LOCF) guidelines, w.e.f. the Academic Session-2021-22, be approved. **(Annexure-LXI, Page-3364 to 3436)**
70.	Resolved that the guidelines for awarding 1-2 credits for SEVA/Service/Community Service programme in tune with the existing provisions of Swachh Bharat Summer Internship programme and scheme and syllabi of the proposed course, as proposed by the Committee, be approved. **(Annexure-LXII, Page-3437 to 3439)**
	REPORTING ITEMS
71.	The action taken by the Vice-Chancellor in approving the revised Fee Structure of Integrated/UG/PG/Ph.D. programmes, Instruction of Fee Payment, Other Fee Payable by the Students and Rules for the Refund of Fee, was reported, recorded and confirmed. **(Annexure-LXIII, Page-3440 to 3448)**
72.	The action taken by the Vice-Chancellor on 26.08.2021, in approving the starting of the M.Pharm. (Pharmacognosy) programme in the Department of Pharmaceutical Sciences, w.e.f the Academic Session 2022-23, was reported, recorded and confirmed. **(Annexure-LXIV, Page-3449)**
73.	The receipt of the "**UGC Guidelines on Examination and Academic Calendar in view of the COVID-19 Pandemic**" July, 2021, was reported and recorded. **(Annexure-LXV, Page-3450 to 3453)**

	Under Any other Item
74.	The Council authorized the Vice-Chancellor to approve the revised syllabi of the Departments, as per the Learning Outcome Based Curriculum Framework (LOCF) guidelines and the same be reported in the next meeting of the Academic Council.
75.	Resolved that the extension of the period of submission of Ph.D. thesis by Ms. Geeta Rani, a Research Scholar in the Department of Management Studies, be approved, as recommended by the DRC and School Board of the School of Business and Management Studies. **(Annexure-LXVI, Page-3454 to 3455)**
76.	The public Notice No. F.No.1-10/2020(CPP-II) dated 16.03.2021 and D.O.No.1-10/2020(CPP-II) dated 02.09.2021 issued by University Grants Commission regarding **"Extension of date for submission of thesis for terminal M.Phil./Ph.D. students"** was reported and recorded. **(Annexure-LXVII, Page-3456)**
77.	The signing of Memorandum of Understanding (MoU) between Central University of Haryana and Central University of Himachal Pradesh was reported and recorded. **(Annexure-LXVIII, Page-3457 to 3460)**
78.	The Council resolved that a seat under a supervisor be treated as vacant consequent upon submission of thesis by a registered Ph.D. student.
79.	The Council considered the request of Mr. Sudhir, for the continuation of the Ph.D. programme in the Department of Economics after his joining in the Department of Higher Education, Govt. of Haryana, as recommended by the Departmental Research Committee of the Department of Economics and School Board of School of Business and Management Studies and resolved that he may complete the rest of the residency period by taking leave from his Employer. **(Annexure-LXIX, Page-3461 to 3462)**
80.	The Agenda related to change in title of research work of a Ph.D. student, namely, Mr. Ankush in the Department of Biotechnology was put before the Council. In this regard, Head, Department of Biotechnology informed that the matter is being dealt at Departmental level and will be resolved at the earliest.
The meeting ended with a vote of thanks to the chair.	

26/11/21

VICE-CHANCELLOR
(Chairperson)

Sanjeev 26.11.21

REGISTRAR
(Secretary)

Annexure-I

ACTION TAKEN REPORT

32nd Meeting of the Academic Council held on 23/04/2021

R.No.	Resolution Passed	Action Taken
1.	The Minutes of the 31st meeting of the Academic Council held on 08-10-2020, were confirmed.	Noted
2.	The action taken on the resolutions of the 31st meeting of the Academic Council held on 08.10.2020, were reported, recorded and confirmed.	Noted
ITEMS FOR CONSIDERATION		
3.	Resolved that the National Education Policy-2020 notified by the Ministry of Education, Government of India, be adopted.	Noted
4.	Resolved that the implementation plan for National Education Policy-2020, be approved.	Noted
5.	Resolved that the following amendments to Ordinance-II (A) Degree of Doctor of Philosophy (Ph.D.) of the University, in light of the comments received from Ministry of Education vide letter F.No. 58-6/2018-CU.III dated 17.03.2021, be approved and recommended to Executive Council for consideration: **XXXX XXXX XXXX XXXX**	The amendments in Ordinance-II (A); in consonance with the MoE instructions are listed in the main Agenda of the current meeting of the Academic Council.
6.	Resolved that the recommendations of the Board of Studies of the Department of Mathematics dated 09.09.2020 & 19.11.2020 and School Board of School of Basic Sciences dated 14.12.2020, for the scheme and syllabi of course work for Ph.D. programme in the Department of Mathematics, w.e.f. the Academic Session-2020-21, be approved.	Implemented
7.	Resolved that the recommendations of the Board of Studies of the Department of Computer Science and Information Technology dated 02.09.2020 and School Board of School of Basic Sciences dated 14.12.2020, for the scheme and syllabi of course work for Master of Computer Applications (MCA) programme in the Department of Computer Science and Information Technology, w.e.f. the Academic Session-2020-21, be approved.	Implemented
8.	Resolved that the recommendations of Board of Studies, School of Education dated 18.02.2021 and School Board of School of Education dated 09.03.2021, for the Scheme and Syllabus of Semester-II, M.Ed. Programme in the School of Education, w.e.f. Academic Session 2020-2021, be approved.	Implemented
9.	Resolved that the recommendations of Board of Studies, School of Education dated 18.02.2021 and School Board of School of Education dated 09.03.2021, for the Scheme and Syllabus of	Implemented

	Semester-II, B.Ed. Programme in the School of Education, w.e.f. Academic Session 2020-2021, be approved.	
10.	Resolved that the recommendations of Board of Studies of the Department of Vocational Studies and Skill Development dated 13-10-2020, for the Scheme and Syllabus of B.Voc. Biomedical Sciences Programme in the Department of Vocational Studies and Skill Development, w.e.f. Academic Session 2021-2022, be approved.	Implemented
11.	The Council considered the application of Mr Anil Kumar (Roll No-180648) a student of M.Sc. (Statistics) regarding Mercy/Special Chance to appear in Examination of Course "Distribution Theory" of 1st Semester and resolved that he may be given a Mercy/ Special Chance taking into consideration the internet connectivity issues and present COVID-19 pandemic situation.	Resolution sent to concerned Department for further necessary action.
12.	The Council considered the application of Ms. Chetna Singh Meena (Roll No-180617) a student of M.Sc. (Physics) regarding Mercy/Special Chance to appear in Examination of Course "Electronics" and resolved that he may be given a Mercy/ Special Chance taking into consideration the internet connectivity issues and present COVID-19 pandemic situation.	Resolution sent to concerned Department for further necessary action
REPORTING ITEMS		
13-29	Reporting Items	No action was needed.
Under Any other Item		
30.	Resolved that the following amendments to Statute-13 of the Statutes of the University relating to the constitution of the Academic Council and the term of office of its members, be approved and recommended to Executive Council for consideration: **XXXX XXXX XXXX XXXX**	The recommendations regarding amendments to Statute-13 will be placed in the next meeting of the Executive Council.
31.	Resolved that the recommendations of the Board of Studies of the Department of Psychology dated 03.03.2021 and School Board of School of Humanities and Social Sciences dated 18.03.2021, for the scheme and syllabi of M.A. Psychology (Semester-II) programme in the Department of Psychology, w.e.f. the Academic Session-2021-22, be approved.	Implemented
32.	The Council recommended the starting of B.A.LL.B. (5 Year) Hons Integrated programme in the Department of Law and resolved that the programme be started after taking approval of all the concerned Regulatory Authorities and exploring feasibility. **Note:** The start of B.A.LL.B. (5 Year) Hons Integrated programme has already been recommended by the Committee constituted vide Notification No. CUH/2018/A&C/87 dated 07-09-2018 and	The University has submitted the application for recognition of B.A.LL.B. (5 Year) Hons Integrated programme alongwith requisite fee to BCI.

	subsequently recommended by the Board of Studies of the Department of Law.	BCI team may visit University/ Department in near future.
33.	Resolved that the M.Phil. Programme be discontinued from the next Academic Session i.e. 2021-22 in all the Departments of the University as recommended in the New Education Policy-2020.	Implemented
34.	Resolved that one credit (over and above the credits already prescribed) be given to the students who recites the National Anthem, National Song and University Kulgeet.	Noted

Annexure - A

DRAFT POLICY ON

INNOVATION AND STARTUP POLICY

EK PRAYAS & EK AARAMBH

For Entrepreneurship

CENTRAL UNIVERSITY OF HARYANA

MAHENDERGARH, HARYANA

DRAFT COMMITTEE ON INNOVATION AND START UP

1. **Prof. Asha Kwatra, Dean Post Graduate Studies** - **Chairperson**
   CCS Haryana Agriculture University, HISAR

2. **Prof. Rajesh Kumar Malik, Dean, School of Law** - **Member**
   Central University of Haryna, Mahendergarh

3. **Prof. Neelam Sangwan, Head, Department of Biochemistry** - **Member**
   Central University of Haryna, Mahendergarh

4. **Dr. Vikas Garg, Head, Department of Civil Engineering** - **Member**
   Under SOET, Central University of Haryna, Mahendergarh

5. **Dr. Suneel Kumar, Head, Department of Physics** - **Convener**
   and Astrophysics,
   Central University of Haryna, Mahendergarh

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PREAMBLE

In November, 2016, All India Council of Technical Education (AICTE) released a Startup Policy document for AICTE approved institutions, to address the need of inculcation of innovation and entrepreneurial culture in higher education institutions (HEIs). The policy primarily focused on guiding the AICTE approved institutions in implementing 'Startup Action Plan' of Government of India. Subsequent to release of the Startup policy by AICTE and further interaction & feedback received from education institutions, a need was felt for a more elaborate and comprehensive policy guiding document, which could be applicable for all the HEIs in India.

A fifteen membered committee was constituted by Ministry of Human Resource Development to formulate detailed guidelines for various aspects related to innovation, Startup and entrepreneurship management. This committee deliberated on various facets for nurturing the innovation and Startup culture in HEIs, which covered Intellectual Property ownership, revenue sharing mechanisms, norms for technology transfer and commercialization, equity sharing, etc. After multiple rounds of meetings, National Innovation and Startup Policy , 2019 for students and faculties of HEIs was prepared.

In order to achieve the desired objectives of National Innovation and Start up policy, 2019, there is a need to draft a policy at the level of Higher Education Institutions. Hence, a policy titled as Draft Policy on Innovation and Startup Policy, CUH, 2021 has been prepared.

NEED OF POLICY

India aspires to become 5 trillion-dollar economy by 2024. To reach the mark, it needs to evolve systems and mechanisms to convert the present demographic dividend into high quality technical human resource capable of doing cutting edge research and innovation and deep-tech entrepreneurship.

The 'National Student and Faculty Startup policy, 2019' for HEIs is a guiding framework to envision an educational system oriented towards start ups and entrepreneurship opportunities for student and faculties. The guidelines provide ways to Indian HEIs for developing entrepreneurial agenda, managing Intellectual Property Rights (IPR) ownership, technology licensing and equity sharing in Startups or enterprises established by faculty and students.

In India, innovation is still not the epicenter of education. In order to achieve the cultural and attitudinal shift and to ensure that 'Innovation and Startup' culture is the primary fulcrum of our higher education system, a policy framework and guidelines are the need of this hour. These guidelines will enable **Central University of Haryana (CUH)** to actively support their faculty, staff and students to participate in innovation and entrepreneurship (I&E) related activities, thus encouraging students and faculty to consider start ups and entrepreneurship as a career option.

Central University of Haryana is situated in the remote area of Haryana. For creating new opportunities, to uplift the living standard of local villagers, and to bring the local technologies related to food items, agriculture, science and many more on the world map, decided to create innovation and startup policy.

Based on recommendation made by MHRD's National Innovation and Star up policy, 2019 for students and faculty, a Start up Policy for Central University of Haryana, Mahendergarh has been formulated.

This policy document provides guidelines to actively support, faculty members and students to participate in Innovation and Entrepreneurship (I & E) activities. This policy document will also evolve with time and adopt best practices to facilitate Innovation and Entrepreneurship.

DEFINITIONS:

"CUH" shall mean " Central University of Haryana"

"Policy" shall mean " Innovation and Start up Policy"

"Faculty Member" shall mean "a Regular faculty member of Central University of Haryana"

"**Student**" shall mean a "Full-time studying at Central University of Haryana"

" Member" shall mean shall mean any permanent faculty member of the university , research associates, post-doctoral fellows and students during active registration.

"Startup" shall mean entity that develops a business model based on either product innovation or service innovation and makes it scalable, replicable and self-reliant as defined in Gazette Notification No. G.S.R. 127(E) dated February 19, 2019 or as per the prevailing notifications of the Government of India issued from time to time.

Guidelines Regarding Faculty, Staff, Research Scholars and Students in Startups

Universities throughout the world encourage and enable their faculty members, researchers and students to involve in startups in various capacities in professional employment with the university/institute. Such measures encourage translation of inventions and innovations into commercial products for the larger good of the society. In many instances, such startups are often established in campuses of universities/research institutions due to their special needs and resource requirements such as; domain expertise, specialized facilities and knowhow. Faculty members and students at **CUH** too are motivated and are encouraged continuously who are engaged in several cutting-edge research areas. However, most of these research outcomes may/may not get translated into commercial products, benefiting the society in general, due to one or the other reason. To promote entrepreneurship among faculty members, CUH in line with the best practices of other institutes of higher learning across the world, encourages faculty members and students to undertake entrepreneurship-related activities. The objective of supporting entrepreneurship is to encourage participation of faculty members and students in commercial ventures, companies or similar entities with equity participation as an additional dimension to their existing roles as faculty members or students. CUH encourages its faculty members and students to engage in businesses that are direct results of the research activities at CUH, be on the board of such companies in the capacities of Director, Chairperson, Promoter or any role of similar nature. The overall goal of implementing this Policy is to encourage entrepreneurship at CUH and to link innovation to enterprises to financial success.

With a view to permit and enable the faculty members, research scholars and students to set up and involve in startups set up both at the campus as well as outside the campus, CUH may consider the following guidelines for the same:

Guidelines for Faculty Members:

- Any regular faculty member will be permitted to involve with startups either on a full- or part-time basis as owner/direct promoter/mentor/consultant/on-board member.

- Respective faculty member will be permitted to use specified physical and/or intellectual resources (e.g. laboratory and workshop equipment, laboratory instrument, IT resources).

- The startup formed by the faculty member/staff /student would be promoted at the individuals level as well as University level (Permitted to exhibit at social media).

- It has also to be ensured that no reputational, financial or any other liabilities accrue to CUH.

- Participation in startup related activities will be considered as a legitimate activity of faculty members in addition to teaching, conducting research, guiding researchers, providing industrial consultancy and completing management duties. The same will be considered while evaluating the annual performance of faculty members. Each faculty member is encouraged to mentor at least one startup.

- The faculty member has to take prior permission from the Institute before associating with any business venture or starting a new venture, through a proper application process (Permission on prescribed application/Performa).

- The CUH Member should take all possible steps to ensure that his/her duties and responsibilities as a member of CUH take precedence over all other activities regardless of the nature of his/her engagement with the startup. CUH responsibilities should be on first priority.

- Investment in the entrepreneurial activities may be a part of the institutional financial strategy. Adequate percentage of funds of the total annual budget of the institution may be allocated (As per National Innovation and Startup Policy) for funding and supporting innovation and startups related activities through creation of separate 'Innovation fund'.

- Competent authority may allow faculty member duty leave for taking entrepreneurship training and hand on experience of product development in other institutes..

- In addition to minimum required teaching and guidance respective faculty are evaluated accordingly for their performance and promotion.

- Faculty may be given reward e.g. office space, lab space, reduced teaching load, awards for enhancing startup activities.

- University may start **'Innovation & Entrepreneurship Award'** to recognize outstanding ideas, successful enterprises and contributors for promoting innovation and enterprises ecosystem within the institute.

Guidelines for Research Scholar/ Students

- An CUH Research Scholar/Student/Project fellow can join Startup with prior permission from the competent authorities of CUH for a startup on a part-time basis. An appreciation certificate will be provided as per their contribution in Startup/Innovation Project.

- Weather a research scholar/student initiate or join a startup will have to satisfy all norms including attendance for his/her program of study in order to earn a degree and no relaxation can be given on the basis that research scholar/student is involved in Startup.

- CUH can extend on case to case basis this startup facility to alumni of CUH.

- If a research scholar/student want to initiate a new startup, then he/she must apply for approval from competent authority and the startup must enter into an agreement with CUH. Such an agreement should establish the mode of engagement of the research scholar/student with startup besides including CUH technology/intellectual property being licensed to the startup.

General Guidelines:

- In the event the startup or company uses any "know-how" for business purpose, which has not been secured through any IP registration application, the faculty member has to disclose the source and origin of such "know-how".

- In case the startup or company to which the IP has been licensed to further sublicenses the same to any other entity, then the licensing revenue generated by the said company will be distributed among the inventors and CUH as per the extant IPR Policy of the Institute.

- The startup or company may be permitted to use the laboratory and other such facilities to which the founding faculty member(s) is/are entitled and allowed with a clearly defined conflict of interest policy. The company may also use other facilities of the Institute on payment basis as per prevailing norms. In addition, to ensure safety and security of all concerned, all compliances and procedures for laboratory usage should be strictly adhered to.

- Care must be taken to clearly separate the personal financial aspects of the entrepreneurial activities of faculty members, research scholars and students from their respective roles, duties and responsibilities at CUH and should be consistent with the value system of CUH. Similarly, the use of CUH facilities and equipment must be free from unauthorized and conflicting uses and must be suitably compensated for as per the policies of CUH. Appropriate judgement should be applied by all concerned parties, the faculty members, research scholars, students, CUH employees and associates besides the incubated startups, their promoters, employees and staff.

- Following guidelines are suggested for CUH members:
    i. Obtaining appropriate approvals in advance
    ii. Disclosure of conflict intersts/situations
    iii. Abstain from participating in a decision-making process involving such situations
    iv. Immediate reporting of the breach of policy
    v. Disputes should be reported to the appropriate notified authorities of CUH.

Jurisdiction Regarding Dispute Resolution:

- The Vice Chancellor, Central University of Haryana will be Competent Administrative Authority to decide any dispute related to Startup. The decisions of Vice Chancellor shall be final.

  Further, the judicial jurisdiction will be of the courts situated at Mahendergarh/Narnoul and Punjab & Haryana High court, Chandigarh.

Annexure – B

CENTRAL UNIVERSITY OF HARYANA

Minutes of meeting committee constituted for drafting guidelines for Innnovation and Startup Projects

Dated: 29-04-2021

An University level meeting of the members of committee constituted **(CUH/2021/Est. Sec.(T)/298 dated 25-03-2021)** by Hon'ble Vice Chancellor for drafting the policy for Innovation and Startup projects to be initiated/executed by Faculty/Staff/Research Scholars/Students, held on 27-04-2021 at 2:30 PM in the office of Head, Department of Law, Central University of Haryana. The meeting was attended by the following members via online mode.

1. Prof. Asha Kawatra -Chairperson
2. Prof. Rajesh Malik -Member
3. Prof. Neelam Sangwan -Member
4. Dr. Vikas Garg -Member
5. Dr. Suneel Kumar -Convener

Following issues were discussed in the meeting

1. Prof. Rajesh Malik, welcome the committee member and apprise them for the requirement of policy for Innovation and Startup projects at Central University of Haryana.

2. Dr. Suneel Kumar gave the detailed explanation about the draft of policy. He mentioned that while framing the policy, the guidelines issued by MHRD in 2019 (*National INNOVATION and STARTUP Policy 2019 for Students and Faculty*) were kept in mind. Also guidelines released by other reputed institutes/Universities have been studied.

3. Members of the committee interacted and gave thorough discussion on various pointes. Various issues related to policy were elaborated and corrections were suggested that are required to be incorporated in the present version of policy.

4. It was resolved that discussion will be made again after corrections in the present draft.

Meeting end with vote of thanks

Prof. Asha Kawatra

Prof. Rajesh Malik

Prof. Neelam Sangwan

Dr. Vikas Garg

Dr. Suneel Kumar

Dr. Suneel Kumar <suneelkumar@cuh.ac.in>

Corrected Draft Policy on Innovation and Startup

5 messages

Dr. Suneel Kumar <suneelkumar@cuh.ac.in> Wed, Jun 16, 2021 at 1:21 PM
To: dpgs@hau.ac.in, rajeshmalik@cuh.ac.in, "Dr. Neelam Sangwan" <nsangwan@cuh.ac.in>, gargvikas27@cuh.ac.in, ashakwatra@gmail.com, "Dr. Suneel Kumar" <suneelkumar@cuh.ac.in>

Dear Respected Committee Members

Please find the updated draft policy for Innovation and Startup Projects for Central University of Haryana. The corrections have been made as per the suggestions of respected committee members given in the meeting held on 27-04-2021 in online mode.

Any addition or deletion may be intimated by 21-06-2021. So that final draft policy may be incorporated.

With regards

On Thu, Apr 22, 2021 at 6:04 PM Dr. Suneel Kumar <suneelkumar@cuh.ac.in> wrote:

Respected
Prof. Asha Kwatra
Prof. Rajesh Malik
Prof. Neelam Sangwan
Dr. Vikas garg

Dear Sir/Madam,

An online meeting to draft a policy on **"Innovation and Startup"** is scheduled on 27-04-2021 at 2:30 PM. Please find a rough draft prepared on policy attached herewith. You are requested to spare some time and give your valuable feedback.
The link for online meeting is

https://meet.google.com/dyq-kbrc-bfu

With regards

On Thu, Mar 25, 2021 at 12:21 PM Establishment CUH Teaching <establishmentteaching@cuh.ac.in> wrote:

Madam/Sir,
Please find attached a Notification for Constitution of Committee.

--
Regards,
Establishment Branch (Teaching)
Central University of Haryana
Mahendergarh.

--
With Best Regards

Dr. Suneel Kumar
Associate Professor
Head,

Department of Physics
Central University of Haryana
Jant Pali, Mahendergarh -123031 (Haryana)
Mob: 94630 54791

--
With Best Regards

Dr. Suneel Kumar
Associate Professor
Head,
Department of Physics
Central University of Haryana
Jant Pali, Mahendergarh -123031 (Haryana)
Mob: 94630 54791

CUH-Guidelines for Startup Projects.docx.pdf
686K

Dr. Suneel Kumar <suneelkumar@cuh.ac.in> Thu, Jun 24, 2021 at 4:34 PM
To: ashakawatra@gmail.com

Dear madam
Please check now. Last email went on wrong address
[Quoted text hidden]

CUH-Guidelines for Startup Projects.docx.pdf
686K

Dr. Suneel Kumar <suneelkumar@cuh.ac.in> Thu, Jun 24, 2021 at 6:45 PM
To: ashakawatra@gmail.com

---------- Forwarded message ---------
From: **Dr. Suneel Kumar** <suneelkumar@cuh.ac.in>
Date: Wed, Jun 16, 2021, 13:21
Subject: Corrected Draft Policy on Innovation and Startup
To: <dpgs@hau.ac.in>, <rajeshmalik@cuh.ac.in>, Dr. Neelam Sangwan <nsangwan@cuh.ac.in>, <gargvikas27@cuh.ac.in>, <ashakwatra@gmail.com>, Dr. Suneel Kumar <suneelkumar@cuh.ac.in>

[Quoted text hidden]

CUH-Guidelines for Startup Projects.docx.pdf
686K

asha kawatra <ashakawatra@gmail.com> Thu, Jun 24, 2021 at 8:15 PM
To: "Dr. Suneel Kumar" <suneelkumar@cuh.ac.in>

The proposal seems fine as discussed in meeting and can be submitted. How ever, further modifications if deemed necessary after implementation can be done accordingly.
[Quoted text hidden]

Dr. Suneel Kumar <suneelkumar@cuh.ac.in> Thu, Jun 24, 2021 at 8:58 PM

To: asha kawatra <ashakawatra@gmail.com>

Thanks a lot. Madam ji

[Quoted text hidden]

Dr. Suneel Kumar <suneelkumar@cuh.ac.in>

To frame the guidelines at the University level in consonance with National Innovation and Startup Policy 2019

8 messages

Establishment CUH Teaching <establishmentteaching@cuh.ac.in> Thu, Jun 24, 2021 at 10:09 AM
To: suneelkumar@cuh.ac.in
Cc: Amit Sindhu <amitsindhu@cuh.ac.in>

Sir,

With reference to Notification No CUH/2021/Estt.(T)/298 dated 25.03.2021 on the subject cited above, you are requested to update the status. If the meeting of the Committee has not been conducted so far, you are requested to conduct the same at the earliest.

--
Regards,
Establishment Branch (Teaching)
Central University of Haryana
Mahendergarh.

Dr. Suneel Kumar <suneelkumar@cuh.ac.in> Thu, Jun 24, 2021 at 3:48 PM
To: Establishment CUH Teaching <establishmentteaching@cuh.ac.in>
Cc: Amit Sindhu <amitsindhu@cuh.ac.in>

Dear Sir
The meeting to frame guidelines have been already conducted. The minutes have been shared. Also guidelines have been prepared and laying with Prof. Rajesh Malik for final check.

We will submit the guidelines next week.
[Quoted text hidden]

Dr. Suneel Kumar <suneelkumar@cuh.ac.in> Thu, Jun 24, 2021 at 3:48 PM
To: "Dr. Savita Dahiya" <savitadahiya@cuh.ac.in>

[Quoted text hidden]

Dr. Suneel Kumar <suneelkumar@cuh.ac.in> Thu, Jun 24, 2021 at 4:08 PM
To: ashakwatra@gmail.com, "Dr. Neelam Sangwan" <nsangwan@cuh.ac.in>, rajeshmalik@cuh.ac.in, gargvikas27@cuh.ac.in

Dear All
I have received the email from Establishment Section. If there is no corrections in the guidelines then kindly give approval via email for draft policy on innovation and startup projects.

With regards

---------- Forwarded message ---------
From: **Establishment CUH Teaching** <establishmentteaching@cuh.ac.in>
Date: Thu, Jun 24, 2021, 10:09
Subject: To frame the guidelines at the University level in consonance with National Innovation and Startup Policy 2019
To: <suneelkumar@cuh.ac.in>
Cc: Amit Sindhu <amitsindhu@cuh.ac.in>

[Quoted text hidden]

Dr. Suneel Kumar <suneelkumar@cuh.ac.in> Thu, Jun 24, 2021 at 4:32 PM
To: ashakawatra@gmail.com

[Quoted text hidden]

Prof. Neelam Sangwan <nsangwan@cuh.ac.in> Thu, Jun 24, 2021 at 5:11 PM
To: "Dr. Suneel Kumar" <suneelkumar@cuh.ac.in>
Cc: ashakwatra@gmail.com, "Prof. Rajesh Kumar Malik" <rajeshmalik@cuh.ac.in>, gargvikas27@cuh.ac.in

Approved from my side.
Regards

Prof Neelam Sangwan,
Head, Department of Biochemistry,
Central University of Haryana, Mahendergarh
[Quoted text hidden]

---

asha kawatra <ashakawatra@gmail.com> Thu, Jun 24, 2021 at 4:34 PM
To: "Dr. Suneel Kumar" <suneelkumar@cuh.ac.in>

Kindly, send draft to go through please.
[Quoted text hidden]

Dr. Vikas Garg <gargvikas27@cuh.ac.in> Thu, Jun 24, 2021 at 7:55 PM
To: "Dr. Suneel Kumar" <suneelkumar@cuh.ac.in>

Dear Sir,
Approved form my side also

With regards
[Quoted text hidden]
--

Dr. Vikas Garg, F.I.E., F.I.S.H.

Associate Professor & HoD, Civil Engg.

School of Engineering and Technology,

Central University of Haryana

Mahendergarh-123031 (Haryana)

09690757370

हरियाणा केन्द्रीय विश्वविद्यालय
CENTRAL UNIVERSITY OF HARYANA
(संसद अधिनियम 25 (2009) के तहत स्थापित)
(Established vide Act No. 25 (2009) of Parliament)
गांव: जांट–पाली, जिला–महेन्द्रगढ (हरियाणा) . 123031
Village: Jant-Pali, Distt: Mahendergarh (Haryana)-123031

No.: CUH/2021/Estt.Sec.(T)/298 Date: 25./03/2021

NOTIFICATION

With the approval of the competent authority, a Committee of the following members has been constituted to frame the guidelines at the University level in consonance with National INNOVATION and STARTUP Policy 2019:

1. Prof. Asha Kwatra, Dean, Post Graduate Studies, CCS Haryana Agricultural University, Hisar - Chairperson
2. Prof. Rajesh Kumar Malik, Dean, School of Law, Central University of Haryana, Mahendergarh. - Member
3. Prof. Neelam Singh Sangwan, Head, Dept. of Biochemistry, Central University of Haryana, Mahendergarh. - Member
4. Dr. Vikas Garg, HoD, Dept. of Civil Engineering under SoET, Central University of Haryana, Mahendergarh. - Member
5. Dr. Suneel Kumar, HoD, Department of Physics & Astrophysics, Central University of Haryana, Mahendergarh - Convener

25/03/2021

Assistant Registrar (AC) (Estt)

Copy of above is forwarded to the following for information and necessary action:

1. Concerned Committee Members.
2. Director, IQAC, Central University of Haryana, Mahendergarh.
3. Dean Students Welfare, Central University of Haryana, Mahendergarh.
4. Assistant Registrar, Vice-Chancellor's Secretariat (for information of the Hon'ble Vice-Chancellor), Central University of Haryana, Mahendergarh.
5. Registrar Office (for information of the Registrar), Central University of Haryana, Mahendergarh.

25/3/21

Section Officer (Establishment)

Annexure-III

AGENDA ITEM FOR ACADEMIC COUNCIL MEETING

To consider and approve the request of School of Education for Submission, Forwarding the thesis for Evaluation and Award of Ph.D. degree to deceased Scholar Ms. Ekta, Roll no. 10087 posthumously.

Statement of Case:-

It is submitted that late. Ms. Ekta, Roll no. 10087 was a scholar of School of Education in Ph.D. Programme and expired on 10-05-2021 as per the Dead Body Transportation Certificate issued by Mahatma Gandhi Institute of Medical Sciences, ITI Chowk, Behind Hari Place, Tosham Road, Hisar. Her Ph.D. thesis submission request was initiated on 30-04-2021 and received in the Examination Branch on 23-06-2021. The request for submission was submitted to the Hon'ble Vice Chancellor for approval. The Hon'ble Vice Chancellor recommended that the matter may be placed before the Academic Council for policy decision.

Diary No. 114
Dated: 18/08/2021
Academic Section

Agenda:-

To consider and approve the request of the School of Education for submission, Forwarding the thesis for evaluation and subsequent award of the Ph.D. degree, on the basis of the evaluation reports of the External and Internal Examiner, posthumously without Viva Voce Examinations, to Late. Ms. Ekta, Roll no. 10087, School of Education.

Submitted for consideration.

18/08/2021

Assistant Registrar (Examinations)

Controller of Examinations (I/C)

Academic Branch !

क्रमांक / No. CUH/SOE/BS... दिनांक / Date: 07.09.2021

School of Education
Minutes of Meeting of the Board of Studies

A Meeting of Board of Studies, School of Education held on 07.09.2021 at 11:00 am (through Video Conference). The following members were present during the meeting:

1. **Prof. Sarika Sharma** — Chairperson
   Dean, School of Education
2. **Prof. Indira Dhull** — Member Expert
   Former Dean & Head
   Department of Education
   MDU, Rohtak, Haryana
3. **Dr. Parmod Kumar** — Member
   Associate Professor, School of Education
4. **Dr. Renu Yadav** — Member
   Assistant Professor, School of Education
5. **Dr. Dinesh** — Special Invitee
   Assistant Professor, School of Education
6. **Dr. Aarti Yadav** — Special Invitee
   Assistant Professor, School of Education

The following member could not attend the meeting:

1. Prof. Namita Ranganathan, Member Expert

At the outset, Prof. Sarika Sharma, Dean of School, School of Education and Chairperson, Board of Studies, School of Education welcomed Prof. Indira Dhull, outside expert and all other members of the Board of Studies and also presented the brief report of School of Education of the academic session 2020-21. Thereafter, the following agenda items (one by one) were taken up and discussed in the meeting for consideration and approval of the Board of Studies of School of Education, Central University of Haryana:

7/9/21 7/9/21 Sarika 7/9/2021

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Item No.	Description
	Reporting Items
01	**Confirmation of the Minutes of Meeting of Board of Studies, School of Education held on 18.02.2021.**
	The Board of Studies of School of Education confirmed and approved the Minutes of the Meeting of Board of Studies, School of Education held on 18.02.2021. **(Annexure-I)**
	Items for Consideration
02	**To consider and approve the Minutes of Departmental Research Committee, School of Education held on 06.09.2021.**
	The Board of Studies of School of Education approved the minutes of Departmental Research Committee (DRC), School of Education held on 06.09.2021. **(Annexure-II)**
03	**To consider and approve the Syllabi of M.Ed. Programme of Semester- III & IV for the Academic Session 2021-2022.**
	The Board of Studies of School of Education discussed the Syllabi of M.Ed. Programme of Semester- III & IV for the Academic Session 2021-2022 in detail and considered and approved the same. **(Annexure-III)**
04	**To consider and approve the Syllabi of B.Ed. Programme of Semester- III & IV for the Academic Session 2021-2022.**
	The Board of Studies of School of Education discussed the Syllabi and approved the Syllabi of B.Ed. Programme of Semester-III & IV for the Academic Session 2021-2022 **(Annexure-IV)**
05	**To consider and approve the Syllabi of B.Ed. Programme as per LOCF guidelines of UGC to be implement from the academic year 2021-22**
	The Board of Studies of School of Education discussed and approved the Syllabi of B.Ed. Programme as per LOCF guidelines of UGC to be implement from the academic year 2021-22 onwards. **(Annexure-V)**
06	**To consider and approve the Syllabi of M.Ed. Programme as per LOCF guidelines of UGC to be implement from the academic year 2021-22**
	The Board of Studies of School of Education discussed and approved the Syllabi of M.Ed. Programme as per LOCF guidelines of UGC to be implement from the academic year 2021-22. **(Annexure-VI)**
07	**To consider and approve the Panel of Moderators, Paper Setters, and Examiners for Theory and Practical examination of 1st and 3th Semester, B.Ed. and M.Ed. programme for the academic session 2021-2022.**
	The Board of Studies of School of Education discussed and approved the Panel of

7/9/21

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	Moderators, Paper Setters, and Examiners for Theory & Practical examination of 1st and 3rd Semester, B.Ed. and M.Ed. programme for the academic session 2020-2021. **(Annexure-VII)**
08	**To consider the case of Rahul Yadav for the continuation of Ph.D. programme.**
	Mr. Rahul Yadav has submitted the NOC from the department where he is presently joined and a letter of self-declaration mentioning that after getting permission from the School of Education, Central University of Haryana; he will join the rest of the residency period by taking leave without pay from his department. The members of BOS discussed the case of Rahul Yadav and considered that keeping in view the academic career of the student, a chance may be given to Rahul Yadav to complete the rest of the residency period as the essential requirement of the Ph.D. Programme as per the recommendation of DRC held on 06.09.2021. Further the members of the BOS are of the view that the case may be forward to the School Board and then to the Academic Council for further necessary action in this regard. The copy of ordinance, NOC and request letter are attached as Annexure **(Annexure VIII)**
09	**Any other items, with the permission of Chairperson**
	Nil

The meeting ended with a vote of thanks to the chair.

7/9/21

Dr. Parmod Kumar **Prof. Indira Dhull** **Prof. Sarika Sharma**

Dr. Renu Yadav **Dr. Aarti Yadav** **Dr. Dinesh Chahal**

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Dean school of Education <deansoe@cuh.ac.in>

Consideration of Minutes of Board of Studies held on 07.09.2021

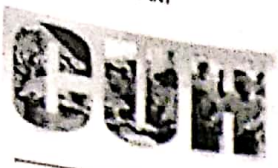
indira dhull <indiradhull@hotmail.com> Fri, Sep 10, 2021 at 2:26 PM
To: Dean school of Education <deansoe@cuh.ac.in>

May be considered as approved
Prof. Indira Dhull

Sent from my iPhone
[Quoted text hidden]

[Quoted text hidden]
<List of experts for thesis evaluation.docx>
<List of Experts for Paper setters.docx>

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Dean school of Education <deansoe@cuh.ac.in>

Consideration of Minutes of Board of Studies held on 07.09.2021

Dr. Dinesh Chahal <dineshchahal@cuh.ac.in> Fri, Sep 10, 2021 at 2:17 PM
To: Dean school of Education <deansoe@cuh.ac.in>
Cc: indiradhull@hotmail.com, pkyadav <pkyadav@cuh.ac.in>, "Dr. Renu Yadav" <renuyadav@cuh.ac.in>

Approved from my side madam
[Quoted text hidden]

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क्रमांक / No. CUH/SOE/SB/460 दिनांक / Date: 14.09.2021

Minutes of Meeting of School Board, School of Education

The Meeting of the School Board, School of Education was held on 09.03.2021 at 11:00 A.M. through online mode (Google Meet). The following members were present:

1. **Prof. Sarika Sharma** — **Chairman**
   Dean, School of Education,
   Central University of Haryana
2. **Prof. Shamsher Singh** — **Member**
   Professor (Retd.), Department of Physical Education,
   Chaudhary Devi Lal University, Sirsa
3. **Prof. S.V.S. Choudhary** — **Member**
   Former Chairman, NCTE, New Delhi
4. **Prof. Jatinder Grover** — **Member**
   Department of Education, Panjab University, Chandigarh
   Central University of Haryana
5. **Prof. Gurmeet Singh** — **Member**
   Department of Physical Education
   Panjab University, Chandigarh
6. **Prof. Ravinder Pal Ahalawat** — **Member**
   Head, Department of Physical Education and Sports,
   Central University of Haryana
7. **Dr. Parmod Kumar** — **Member**
   Associate Professor, School of Education
   Central University of Haryana
8. **Dr. Jaipraksah Bhukar** — **Member**
   Associate Professor, Department of Physical Education and Sports,
   Central University of Haryana
9. **Dr Renu Yadav** — **Member**
   Assistant Professor, School of Education,
   Central University of Haryana
10. **Dr. Dinesh Chahal** — **Member**
    Assistant Professor, School of Education,
    Central University of Haryana

11. **Dr. Sandeep Dhull** **Member**
Assistant Professor, Department of Physical Education and Sports,
Central University of Haryana

At the very outset, Prof. Sarika Sharma, Chairman, School Board of School of Education, Central University of Haryana, initiated the meeting with the warm welcome of all the members of School Board and also presented the brief report of the progress made during this pandemic by the School of Education during the last academic session 2020-21 which was appreciated widely. Prof. Sangeeta from Kurukshetra University, Kurukshetra could not attend the meeting due to departmental engagement. The following agenda items (one by one) were taken up and discussed in the meeting for consideration and approval of the School Board:

Item No	Description
1	**Confirmation of the Minutes of School Board, School of Education held on 09.03.2021.**
	School Board, School of Education endorsed the Minutes of Meeting of School Board, School of Education held on 09.03.2021 **(Annexure-I)**
2	**To consider and approve the Minutes of Board of Studies of School of Education (M.Ed. and B.Ed. Programme) held on 07.09.2021.**
	The School Board, School of Education considered and approved the Minutes of the Meeting of Board of Studies (B.Ed. & M.Ed.), School of Education held on 07.09.2021. **(Annexure-II)**
3	**To consider and approve the Minutes of Board of Studies of Department of Physical Education held on 26.08.2021.**
	The School Board, School of Education considered and approved the Minutes of the Meeting of Board of Studies, Department of Physical Education, School of Education held on 26.08.2021. **(Annexure-III)**
4	**To consider and approve the Syllabi of M.Ed. Programme of Semester- III & IV for the Academic Session 2021-2022.**
	The School Board of School of Education confirmed and approved the Syllabi of M.Ed. Programme of Semester- III & IV w.e.f. the Academic Session 2021-2022. **(Annexure-IV)**
5	**To consider and approve the Syllabi of B.Ed. Programme of Semester- III & IV for the Academic Session 2021-2022**
	The School Board, School of Education considered and approved the Syllabi of B.Ed. Programme of Semester- III & IV w.e.f. the Academic Session 2021-2022. **(Annexure-V)**
6	**To consider and approve the Scheme and Syllabi of B.Ed. Programme as per the LOCF Guidelines to be implement from the current academic year 2021-22.**

	After the detailed discussion, School Board, School of Education considered and approved the Scheme and Syllabi of B.Ed. Programme as per LOCF to be implement from the current academic year 2021-22 (Semester-I onwards). **(Annexure-VI)**
7	**To consider and approve the Scheme and Syllabi of M.Ed. Programme as per LOCF to be implement from the academic year 2021-22.**
	The School Board of School of Education considered and approved the scheme and Syllabi of M.Ed. programme as per LOCF to be implement from the current academic year 2021-22 (Semester-I onwards). **(Annexure-VII)**
8	**To consider and approve the Scheme and Syllabi of M.P.E.S Programme offered by Department of Physical Education and Sports as per LOCF Guidelines to be implement from the current academic year 2021-22.**
	The School Board, School of Education considered and approved the scheme and Syllabi of M.P.E.S. Programme offered by Department of Physical Education and Sports as per LOCF Guidelines to be implement from the current academic year 2021-22 (Semester-I onwards). **(Annexure-VIII)**
9	**To consider and approve the Syllabi of M.P.Ed. Programme offered by Department of Physical Education as per LOCF to be implement from the academic year 2021-22**
	Prof. Ravinder Pal Ahalawat, Head, Department of Physical Education and Sports informed to the members of School Board that NCTE granted the permission to the Central University of Haryana to start M.P.Ed. Programme for the Academic Session 2020-21. The School Board, School of Education considered and approved the Syllabi of M.P.Ed. Programme offered by Department of Physical Education and Sports as per LOCF Guidelines to be implement from the current academic year 2021-22. **(Annexure-IX)**
10	**To consider the case of Rahul Yadav for the continuation of Ph.D. programme, School of Education.**
	Dean, School of Education presented the case of Mr. Rahul Yadav for the continuation of Ph.D. programme and she said that he has submitted the NOC from the department where he is presently joined and a letter of self-declaration mentioning that after getting permission from the School of Education, Central University of Haryana, he will join

	the rest of the residency period by taking leave without pay from his department. The members of BOS discussed the case of Rahul Yadav and considered that keeping in view the academic career of the student, a chance may be given to Rahul Yadav to complete the rest of the residency period as the essential requirement of the Ph.D. Programme as per the recommendation of DRC held on 06.09.2021 and BOS held on 07.09.2021. Further the members of the School Board are of the view that the case may be forward to the Academic Council for further necessary action in this regard. The copy of Ph.D. Ordinance, CUH, NOC and request letter are attached as Annexure **(Annexure-X)**
11	**To consider and approve the Syllabi of B.P.Ed. Programme offered by Department of Physical Education and Sports as per LOCF to be implement from the academic year 2021-22**
	After the detailed deliberation, the School Board, School of Education has deferred back the item to Department of Physical and Sports.
12	**Any other item, with the permission of Chairperson**
	Nil

The Meeting was ended with vote of thanks to the Chair.

Sarika 14/9/21

Prof. Sarika Sharma **Prof. Shamsher Singh** **Prof. S.V.S. Choudhary**

14/9/21 14/9/21

Prof. Jatinder Grover **Prof. Ravinder Pal Ahalawat** **Dr. Parmod Kumar**

14/9/21

Dr. Jaipraksah Bhukar **Dr. Renu Yadav** **Dr. Dinesh Chahal** **Dr. Sandeep Dhull**

Dean school of Education <deansoe@cuh.ac.in>

Minutes of School Board with other annexure

10 messages

Dean school of Education <deansoe@cuh.ac.in> Wed, Sep 15, 2021 at 12:19 PM
To: pkyadav <pkyadav@cuh.ac.in>, "Dr. Renu Yadav" <renuyadav@cuh.ac.in>, "Dr. Aarti Yadav <aartiyadav@cuh.ac.in>,, Dr. Dinesh Chahal" <dineshchahal@cuh.ac.in>, SVS Chaudhary <svschaudhary@ignou.ac.in>, ahlawatravi74@gmail.com, jpbhukar@cuh.ac.in, Sandeep Dhull <sandeepdhull@cuh.ac.in>, Shamsher Singh Jang Bahadur <ssjbcdlu@gmail.com>, Jatinder Grover <jatinder1633@gmail.com>, heallysir@gmail.com

Dear Sir,
Please find enclosed the draft minutes along with annexures of the School Board for the consideration and approval pl. The minutes are written as per the discussion.
सादर / Regards,

Prof. Sarika Sharma

Dean, School of Education

Director, IQAC

Former Head & Dean, Department of Education under School of AHSS
Convener Cell for Person with Disabilities

नोडल अधिकारी, 'आजादी का अमृत महोत्सव'

हरियाणा केंद्रीय विश्वविद्यालय/ *Central University of Haryana*

जांट-पाली, महेंद्रगढ़ (हरियाणा) / *Jant-Pali, Mahendergarh (Haryana)*

Phone No. 08222088814

12 attachments

- **Minutes of School Baord, SOE_14.09.2021 (1).docx** 26K
- **2. BS 07.09.2021.pdf** 1389K
- **1. School Board 09.03.2021.pdf** 4974K
- **3. BOS Physical Education.pdf** 1437K
- **4. MED III and IV Sem Syllabus.doc** 415K
- **5. BED Semester III and IV.docx** 238K
- **7. MED Syllabus LOCF.docx** 591K
- **6. BED Syllabus LOCF.docx** 520K
- **Annexure-4 M.P.E.S Scheme and Syllabus 2021 NEP.docx** 133K
- **Annexure-5 M.P.Ed Scheme and Syllabus 2021 NEP.docx** 137K
- **M.P.E.S Scheme and Syllabus 2021 LOCF NEP.docx** 361K

M.P.Ed Scheme and Syllabus 2021 LOCF NEP.docx
366K

Shamsher Singh Jang Bahadur <ssjbcdlu@gmail.com> Wed, Sep 15, 2021 at 12:50 PM
To: Dean school of Education <deansoe@cuh.ac.in>

I approve the minutes as circulated by you.
[Quoted text hidden]

SVS Chaudhary <svschaudhary@ignou.ac.in> Wed, Sep 15, 2021 at 2:44 PM
To: Dean school of Education <deansoe@cuh.ac.in>
Cc: pkyadav <pkyadav@cuh.ac.in>, "Dr. Renu Yadav" <renuyadav@cuh.ac.in>, "Dr. Aarti Yadav <aartiyadav@cuh.ac.in>,, Dr. Dinesh Chahal" <dineshchahal@cuh.ac.in>, ahlawatravi74@gmail.com, jpbhukar@cuh.ac.in, Sandeep Dhull <sandeepdhull@cuh.ac.in>, Shamsher Singh Jang Bahadur <ssjbcdlu@gmail.com>, Jatinder Grover <jatinder1633@gmail.com>, heallysir@gmail.com

The minutes of the BoS meeting are approved.
SVS Chaudhary
[Quoted text hidden]

--
Dr. S V S Chaudhary
Professor of Education
(Former Vice Chairman, NCTE & Project Director, DEP-SSA)
School of Education
Indira Gandhi National Open University
New Delhi 110068 India
e-mail: chaudhary38@hotmail.com
svschaudhary@ignou.ac.in

Dr. Renu Yadav <renuyadav@cuh.ac.in> Wed, Sep 15, 2021 at 2:47 PM
To: SVS Chaudhary <svschaudhary@ignou.ac.in>
Cc: Dean school of Education <deansoe@cuh.ac.in>, pkyadav <pkyadav@cuh.ac.in>, "Dr. Aarti Yadav <aartiyadav@cuh.ac.in>,, Dr. Dinesh Chahal" <dineshchahal@cuh.ac.in>, ahlawatravi74@gmail.com, jpbhukar@cuh.ac.in, Sandeep Dhull <sandeepdhull@cuh.ac.in>, Shamsher Singh Jang Bahadur <ssjbcdlu@gmail.com>, Jatinder Grover <jatinder1633@gmail.com>, heallysir@gmail.com

Dear ma'am
Minutes are approved from my side.
[Quoted text hidden]

Sandeep Dhull <sandeepdhull@cuh.ac.in> Wed, Sep 15, 2021 at 2:52 PM
To: Dean school of Education <deansoe@cuh.ac.in>

Dear Ma'am,

The minutes are approved from my end.

Warm regards,
Sandeep Dhull
[Quoted text hidden]

Dr. Parmod Kumar <pkyadav@cuh.ac.in> Wed, Sep 15, 2021 at 3:20 PM
To: Dean school of Education <deansoe@cuh.ac.in>
Cc: "Dr. Renu Yadav" <renuyadav@cuh.ac.in>, "Dr. Aarti Yadav <aartiyadav@cuh.ac.in>,, Dr. Dinesh Chahal" <dineshchahal@cuh.ac.in>, SVS Chaudhary <svschaudhary@ignou.ac.in>, ahlawatravi74@gmail.com, jpbhukar@cuh.ac.in, Sandeep Dhull <sandeepdhull@cuh.ac.in>, Shamsher Singh Jang Bahadur <ssjbcdlu@gmail.com>, Jatinder Grover <jatinder1633@gmail.com>, heallysir@gmail.com

Dear Madamji,
Draft Minutes of School Board, School of Education are being approved by me subject to the minor corrections in B.Ed. and M.Ed. Syllabus in the light of LOCF guidelines.

Thanks and regards,

डॉ० प्रमोद कुमार / Dr. Parmod Kumar

सह-आचार्य / Associate Professor

शिक्षापीठ /School of Education
हरियाणा केंद्रीय विश्वविद्यालय / Central University of Haryana
महेन्द्रगढ़-१२३०३१/ Mahendergarh-123031
ईमेल/ Email: pkyadav@cuh.ac.in & pkyadav40@gmail.com
मोबाइल/Mobile-+91 (0)-9896755399

दूरभाष/ Telephone- O1285-260170 (Office)

वेबसाइट/Website - www.cuh.ac.in
[Quoted text hidden]
--

Dean school of Education <deansoe@cuh.ac.in> Wed, Sep 15, 2021 at 4:22 PM
To: HOD Physical Education <hodphe@cuh.ac.in>

सादर / Regards,

Prof. Sarika Sharma

Dean, School of Education

Director, IQAC

Former Head & Dean, Department of Education under School of AHSS
Convener Cell for Person with Disabilities

नोडल अधिकारी, 'आजादी का अमृत महोत्सव'

हरियाणा केंद्रीय विश्वविद्यालय/ *Central University of Haryana*

जांट-पाली, महेंद्रगढ़ (हरियाणा) / *Jant-Pali, Mahendergarh (Haryana)*

Phone No. 08222088814

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M.P.Ed Scheme and Syllabus 2021 LOCF NEP.docx
366K

HOD Physical Education <hodphe@cuh.ac.in> Wed, Sep 15, 2021 at 5:07 PM
To: Dean school of Education <deansoe@cuh.ac.in>

Dear Madam,

The minutes are approved from my side.

Regards,
Prof. Ravinder Pal Ahlawat
[Quoted text hidden]
--
Prof. Ravinder Pal Ahlawat
Head, Dept. of Physical Education & Sports
Central University of Haryana, Mahendergarh

Dr. Dinesh Chahal <dineshchahal@cuh.ac.in> Wed, Sep 15, 2021 at 9:01 PM
To: Dean school of Education <deansoe@cuh.ac.in>
Cc: pkyadav <pkyadav@cuh.ac.in>, "Dr. Renu Yadav" <renuyadav@cuh.ac.in>, SVS Chaudhary <svschaudhary@ignou.ac.in>, ahlawatravi74@gmail.com, jpbhukar@cuh.ac.in, Sandeep Dhull <sandeepdhull@cuh.ac.in>, Shamsher Singh Jang Bahadur <ssjbcdlu@gmail.com>, Jatinder Grover <jatinder1633@gmail.com>, heallysir@gmail.com

Respected madam
Minutes are approved from my side.
[Quoted text hidden]

Prof.Gurmeet Singh <heallysir@gmail.com> Thu, Sep 16, 2021 at 10:17 AM
To: Dean school of Education <deansoe@cuh.ac.in>

Thanks Madam,

Minutes of the meeting are approved from my side.

regards

Prof. Gurmeet Singh
(Mulana Abul Kalam Azad Chair Professor) in Physical Education,
Chairperson
Former Director Sports,
Department of Physical Education
Arts Block-II, Panjab University,
Chandigarh –160014, India (U.T.)
athletics_chd@yahoo.com, heallysir@gmail.com
+91-172-2541438 (O), +91-9872723820 (Cell)

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Scheme and Syllabus

B.Ed.
(Bachelor of Education)

School of Education

w.e.f. Academic Session 2020-22

B.Ed. Semester-III

Sl. No.	Total Credits	Course Code	Course Title	Credits (Theory)	Credits (Tutorial/ Practicum/ Practical)	Class Teaching Hours per week
25.	**16**	SOE 02 03 13 C 001616	**School Internship (Part-II)**	0	16	32
26.	**04**		**To be taken from other Department/MOOC**	4	0	04

B.Ed. Semester-IV

S. No.	Course Credit	Course Code	Course Title	Credits (Theory)	Credits (Tutorial/ Practicum)	Credits (Practical)	Class Teaching / Field Based Activity Hours per week
Core Courses							
27.	**4**	SOE 02 04 14 C3104	Gender, School and Society	3	1	0	4
28.	**4**	SOE 02 04 15 C3104	Assessment for Learning	3	1	0	4
29.	**4**	SOE 02 04 16 C3104	Curriculum Transaction	3	1	0	4
30.	**2**	SOE 02 04 17 C0022	Yoga Education	0	0	2	4
31.	**2**	SOE 02 04 18 C2002	Environmental Education	2	0	0	2
32.	**2**	SOE 02 04 19 C0022	Art, Craft and Aesthetics	0	0	2	4
Discipline Centre Elective Courses (Any Two)							
33.	4	SOE020412 DCEC3104	Guidance and Counselling	3	1	0	4
34.	4	SOE020413 DCEC3104	Comparative Education	3	1	0	4
35.	4	SOE020414 DCEC3104	Life Skills Education	3	1	0	4
36.	4	SOE020415	Web Technologies in	3	1	0	4

		DCEC3104	Education				
37.	4	SOE020416 DCEC3104	Human Rights in Education	3	1	0	4
38.	4	SOE020417 DCEC3104	Education for Mental Health	3	1	0	4

Generic Electric Courses (GECs) - Semester IV

S. No.	Course Credit	Course Code	Course Title	Credits (Theory)	Credits (Tutorial/ Practicum)	Credits (Practical)	Class Teaching / Field Based Activity Hours per week
5.	**4**	SOE 02 04 05 GEC 3104	Educational Management and Leadership	3	1	0	4
6.	**4**	SOE 02 04 06 GEC 3104	Peace Education	3	1	0	4

SEMESTER-IV

Year	II	Gender, School and Society	Course Credits	4
Semester	IV		Course code	SOE 02 04 14 C3104
Learning Outcomes	At the end of the course, the students will be able to: ● Understand and differentiate the concept of gender and sex. ● Familiarize about policies, plans and schemes of the government for addressing all forms of disparities and inequalities existing in the society. ● Sensitize about gender issues in school, curriculum, and textual materials. ● Familiarize with the outstanding personalities who mark the women empowerment. ● Aware about the role of mass media in bringing gender parity in society.			
Course Content				
Unit -1	**Introduction to Gender**			
	● Gender: Concept, Difference between Gender and Sex ● Gender related Concepts: Sexuality, Feminism, Equity and Equality ● Gender Identity and Socialisation Process ● Gender Roles through Social Institutions: Family, Community, Society			
Unit -2	**Gender and School**			
	● Gender bias in School Enrolments, Dropouts, Household Responsibilities and Societal Attitudes towards Girl's Education ● Gender Issues in Schools: Bullying, Eve teasing, Sexual Abuse ● Gender Construction through Curriculum, Hidden Curriculum ● Gender Sensitivity Pedagogy			
Unit -3	**Gender and society**			

<table>
<tr><td></td><td>

Concept of Patriarchy and Matriarchy
Issues related to Women/ Girl Child: Female Infanticide and Feticide, Sex Ratio, Honour Killing, Dowry, Property Rights and Divorce
Contemporary Women Role Models in India
Ruma Devi, Dipika Karmakar, Gujan Saxena, ChhaviRajawat

</td></tr>
<tr><td rowspan="2">Unit -4</td><td>Role of Media and Government in Gender Parity</td></tr>
<tr><td>

Role of Print and Electronic Media in Gender Stereotyping
Provisions for developing gender parity:

Domestic Violence Act (2005)
Reservation for Women (2008)
Supreme Court Verdict about Transgender (2018)
National Policy for the Empowerment of Women, 2001

</td></tr>
<tr><td>Transaction Strategies</td><td>Lecture cum discussion, Tutorials, Brainstorming Session, Use of PPT, Film Shows (selected films), Assignments on different key areas of gender related issues given in syllabus through Google Group, Google Classroom and other online resources.</td></tr>
<tr><td colspan="2">Practicum:

Organising debates on equality cutting across gender, class, cast and religion.
Case study on how students perceive role models in their own lives.
Debate on women role models in various fields with emphasis on women in unconventional roles.
Prepare an analytical report on portrayal of women in print and electronic media.

</td></tr>
<tr><td colspan="2">Suggested Readings:

Chaudhary, D.R. (2007). Haryana at cross roads, problems and prospects. New Delhi: National Trust of India.
Chowdhary, P. (1994). The veiled women. Shifting gender equations in rural Haryana (1980-1990). New Delhi: Oxford University

</td></tr>
</table>

Press.

- Chowdhary, P. (2004). Caste panchayats and the policing of marriage in Haryana: Enforcing kinship and territorial exogamy. In *Contribution to Indians Sociology* (Vol. 38, (Jan to Aug 2004).
- Dasgupta, J. (2015). *Gender gap: Men get away with too many privileges*. Available: http://www.dailyo.in/politics/gender-equality-menget-toomany-privileges-no-country-for-women-india-gendergap-index/story/1/1478.html [Accessed 2015, September 14]
- Dhar, A. (2012). *42 per cent of Indian children are underweight.* The Hindu. October 10.
- FAO (2010-11). *The state of food and agriculture 2010-11: Women in agriculture*. Rome: Food and Agriculture Organization of the United Nations.
- Gandhi, R. (2015). *Women in business: Can P2P lending bridge gender gap in access to capital*. The Times of India. June 19.
- Gupta, S., &Dhull, K. (2018). *Gender, school and society.* New Delhi: Sudha Publication.
- International Labour Organization. (2014). *Global employment trends 2014: Risk of jobless recovery.*
- Jammer, V.(1998).Attainment struggle to make healthier food choices: The importance of psychological and social factors. In *Psychological Health*(24 (9): 1003-20. 156)
- Kabir, N. (2014). *What works in reducing gender inequality*. Available:https://oxfamblogs.org/fp2p/whatworks-in-reducing-genderinequality-greatoverview-from-naila-kabeer/ [Accessed 2015, January, 12]
- Lal, N. (2016). *India needs to save its daughters through education and gender equality.* Inter Press Services, March 4.
- Malhotra, S. (2015). *India in the world economic forum global gender gap report 2015*. Business Today, November 23.
- Misra, U. (2015). *How India ranks on gender parity- and why?* Indian Express November 4.
- Nair, S. (2015). *More gender inequality in India than Pakistan and Bangladesh*: UN. Indian Express December 15.
- Pachauri, G. (2018). *Gender, school and society*. Meerut: R. Lal Publication.
- Pulugurtha, S. (2008). How a lack of education adversely affects girls. In*Psychological Health*26 (9): 1005-20. 158 Available: http://empowermentinternational.org/2008/08/01/how-a-lack-of-educationadversely-affects-girls/[Accessed 2015, January 12].
- Salve, P. (2015). #Selfie with Daughter:Can India save 23 million girls? Available http://scroll.in/article/738068/selfiewithdaughter-can-india-save-23-million-girls[Accessed 2015, June 23].

- The World Bank (2014). *Financial inclusion data*. Global Index. Available http://datatopics.worldbank.org/financialinclusion/country/india [Accessed 2014, November 21].
- Wodon, Q. (2014). *Eliminating child marriage to boost girls' education*. The World Bank. Available: http://blogs.worldbank.org/education/eliminating-child-marriageboost-girls-education[Accessed 2015, January 6].

Web Resources:

- *Gender, School and Society*. Retrieved from http://www.bdu.ac.in/cde/docs/ebooks/BEd/II/GENDER,%20SCHOOL,%20SOCIETY%20AND%20INCLUSIVE%20SCHOOL.pdf
- *Ruma Devi Biography*. Retrieved from https://hindi.oneindia.com/news/jaipur/ruma-devi-biography-in-hindi-know-her-journey-from-barmer-hut-to-europe/articlecontent-pf301835-573426.html
- *DipaKarmakar*. Retrieved from https://en.wikipedia.org/wiki/Dipa_Karmakar
- *Gunjan Saxena*. Retrieved from https://starsunfolded.com/gunjan-saxena/
- *How can teachers be more gender inclusive in the classroom?* Retrieved from https://www.brookings.edu/blog/education-plus-development/2017/11/02/how-can-teachers-be-more-gender-inclusive-in-the-classroom/
- *Gender-Responsive Life Skills-Based Education*. Retrieved from http://unesdoc.unesco.org/images/0017/001781/178125e.pdf

Year	II	Assessment for Learning	Course Credit	4
Semester	IV		Course code	SOE 02 04 15 C3104
Learning Outcomes	At the end of the course, the students will be able to: ● Elaborate the fundamentals of evaluation in education. ● Characterize the domains of knowledge and formulate instructional objectives and construct achievement test. ● Estimate characteristics of a good test. ● Appraise realistic, comprehensive and dynamic procedures of assessment. ● Judge the various assessment tools and trends of evaluation in education. ● Employ statistical techniques to analyse data and interpret results of the assessment.			
Course Content				
Unit -1	**An Overview of Evaluation in Education**			
	● Clarifying the terms: Test, Examination, Measurement, Assessment and Evaluation ● Functions and Principles of Evaluation ● Types of Evaluation: Placement, Diagnostic, Formative and Summative ● Continuous and Comprehensive Assessment: Concept, Nature and Process			
Unit -2	**Assessment Tools**			
	● Assessment of Cognitive, Affective and Psychomotor domains of learning (Revised taxonomy of objectives). ● Characteristic of a Good Test: Reliability, Validity, Objectivity and Usability (only concept and use). ● Different kinds of tools: Project, Assignment, Observation &Kinds of Tests- Written and Oral ● Feedback – Concept and Purposes			
Unit -3	**Trends and Issues in Assessment for Learning**			
	● Reporting students' performance: Progress Report, Anecdotal Records, Cumulative Record, Constructing portfolios			

	● Existing practices: Unit test, Half-yearly and Annual examinations, Semester System ● Issues and Problems: Marking Vs. Grading, Credit System, Online Examination, Open Book Examination, Menace of Coaching
Unit -4	**Application of Statistics**
	● Measures of Central Tendency: Mean, Median, Mode – their uses and limitations. ● Measures of Variability: Range, Average Deviation, Quartile Deviation, Standard Deviation – their uses and limitations. ● Percentile and Percentile Rank ● Correlation: Meaning, uses & calculation of correlation of coefficients by Rank Difference and Product Moment Methods. ● Concept and Properties of Normal Probability Curve
Transaction Strategies	Lecture cum Discussion Method, Use of PPT, and Assignments on various topics and their presentation. Continuous practice of the computations of various statistical techniques, Group discussion, Panel discussion and Brainstorming Sessions will be encouraged.

Practicum:

- Preparation of Students' Portfolio
- Designing of Feedback Performa
- Constructing an Achievement Test of any School Subject
- Collection of Examination Marks of examination of students and apply different statistical techniques to analyze data

Suggested Readings:

- Agarwal, Y.P. (2002). *Statistical methods: concepts, applications and computation*. New Delhi: Sterling Publishers.
- Asthana, B. (2020). *Measurement and evaluation in psychology and education.* Agra (U.P.): Shree Vinod Pustak Mandir.
- Begum, A.J., & Reddy, G.L. (2015). *Assessment for learning.* Agra: Rakhi Prakashan.
- Black, P. (2015). Formative assessment – an optimistic but incomplete vision.In *Assessment in Education: Principles, Policy & Practice*, 22(1).
- Black, P., Harrison, C., Lee, C., Marshall, B., & William, D. (2004). *Working inside the back bos: Assessment for learning in the*

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- Burk, K. (2005). *How to assess authentic learning* (4th Ed). Thousand Oaks, CA: Corwin.
- Burk, K., Fogarty, R., &Belgrad, S (2002). *The portfolio connection: Student work linked to standards* (2nd Ed.) Thousand Oaks: C.A. Corwin.
- Butler, S. M.,&McMunn, N. D. (2006). *A teacher's guide to classroom assessment: Understanding and using assessment to improve student learning*. Jossey Bass.
- Carr. J.F., & Harris, D.C. (2001). *Succeeding with standards: Linking curriculum, assessment and action planning*. Alexandria, VA P: Association for Supervision and Curriculum Development.
- Freeman Richard, Lewis Roger (2016). *Planning and implementing assessment*. Routledge. ISBN-10: 0749420871, ISBN-13: 9780749420871.
- Garrett, H.E. (1973). *Statistics in psychology and education* (6th ed). Bombay: Vakils, Feffors& Simon.
- Gentile, J.R. &Lalley, J.P. (2003).*Standards and mastery Learning: Aligning teaching and assessment so all children can learn*. Thousand Oaks, CA: Corwin.
- Goswami, M. (2016). *Measurement and evaluation in psychology and education.* Hyederabad: Neelkamal Publications Pvt. Ltd.
- Guskey, T.R. (2003). How classroom assessments improve learning. In *Educational Leadership*, 60(5), 7-11.
- Guskey, T.R., & Bailey, J.M. (2001). *Developing grading and reporting systems for student learning*. Thousand Oaks, CA: Corwin.
- Marzano, R. J. (2012). *Formative assessment & standards-based grading* (The Classroom Strategies Series). Denver, Colorado: Marzano Research Laboratory.
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- Nawani, D (2012), Continuously and comprehensively evaluating children. In *Economic & Political Weekly*, Vol. XLVIII, Jan 12, 2013.

- Nawani, D (2015). Re-thinking assessments in schools. In *Economic & Political Weekly*, Jan 17, Vol L, No. 3.
- Nitko, A.J., & Brookhart, S. (2011). *Educational assessment of students*. Boston: Pearson.
- Popham, J.W. (2018). *Classroom assessment: What teachers need to know*. Boston: Allyn & Bacon.
- Reynolds, C.R., Livingston, R. B., Willson, V., & Jha, A.K. (2018). *Measurement and assessment in education* (2nd edition). Noida: Pearson India Education Services Pvt. Ltd.
- Ronald Jay Cohen, Mark, E. Swerdlik, and Medhe M. Kumtheker (2014). *Psychological testing and Assessment*. McGraw Hill Education (India) Private limited.
- Stanley, T. (2014). *Performance-based assessment for 21st-century Skills: Provides real-world examples, breaks down the process into easy steps, contains ready-to-use reproducible.* Prufrock.
- Stiggins, R. (2008). Assessment for learning. *The achievement gap and truly effective schools*. Portland: ETS Assessment Training Institute. Retrieved January 16, 2012 at http://www.ets.org/Media/Conferences_and_Events/pdf/stiggins.pdf
- Thorndike, R.M., Tracy M. Thorndike-Christ. (2009). *Measurement and evaluation in psychology and education* (8th ed.). Pearson Publishing.
- Waugh, C. K., & K., &Gronlund, N. E. (2012). *Assessment of student achievement.* Pearson Publication: ISBN-10: 0132689634, ISBN-13: 9780132689632.

Year	II	Curriculum Transaction	Course Credits	4
Semester	IV		Course code	SOE 02 04 16 C3104

Learning Outcomes	At the end of the course, the students will be able to: • describe the concept of curriculum and compare various curriculums. • appraise the recommendation of NCF 2005 and NCFTE2009. • criticize various models of curriculum development and implementation. • outline the various factors affecting curriculum transaction and make use of various approaches of curriculum transaction. • appraise the importance of curriculum evaluation and select the sources of curriculum evaluation. • classify contents, analyse and review the contents.
Course Content	
Unit -1	**Foundations of Curriculum Development**
	• Curriculum Development: Concept, Significance and Principles • Foundations of the Curriculum: Philosophical, Sociological, Psychological, and Historical. • Types of Curriculum with special reference to Child-centred curriculum, Subject centred curriculum, Activity curriculum and Hidden Curriculum • Curriculum organization: Horizontal & Vertical
Unit -2	**Curriculum Framework & Models of Curriculum**
	• NCF 2005 and NCFTE 2009: Recommendations on Curriculum • Models of Curriculum Development - Tylor's Model and Hilda Taba's Model • Concept and Nature of Curriculum Implementation • Curriculum Implementation Models: ORC Model and Organizational-Development Model
Unit -3	**Curriculum Transaction**

	• Concept and Factors affecting Curriculum Transaction • Modes of Curriculum Transaction • Approaches for Curriculum Transaction: Collaborative Learning, Cooperative Learning, Team Teaching • Role of different agents in curriculum transaction: Principal & Teachers
Unit -4	**Curriculum Evaluation**
	• Curriculum Evaluation: Concept, Need and Importance • Sources of Curriculum Evaluation • Types of Curriculum Evaluation: Formative and Summative • Content Analysis
Transaction Strategies	Lecture cum Discussion Method, Assignments on various topics, PPT presentation followed by Discussion, Chart preparation on various Models of Curriculum Development, Group Discussion and Panel Discussion on various aspects of Curriculum Development and Transaction, Reviewing B.Ed. curriculum.

Practicum:

- Critical review of any one curriculum framework: NCF, 2005 or NCFTE, 2009
- Practice of Team-Teaching Approach
- Book Review
- Content Analysis of a School Textbook

Suggested Readings:

- Aggrawal, J.C. & Gupta, S. (2005). *Curriculum development.* New Delhi: Shipra Publisher.
- Alaxander, W.M., & Saylor, J.G. (1966). *Curriculum planning for modern schools.* New York: Holt, Rinhart and Winston Inc.
- Balrara, M. (1999). *Principles of curriculum renewal.* New Delhi: Kanishka Publishers.
- Candra, A. (1977). *Curriculum development and evaluation in education.* New Delhi: Sterling Publishers.
- D'Costa, Agnes, R. (2016). *Knowledge and curriculum.* Mumbai: Himalaya Publishing House.

- Jenkins, D. &Shifrnan, D.M. (1976). *Curriculum: An introduction.* London: Pitman Publishing House.
- Khan, M.I. & Nigam, B.K. (2007). *Curriculum reform change and continuity*. New Delhi: Kanishka Publication.
- McKernan, J. (2007). *Curriculum and imagination: Process, theory, pedagogy and action research.* U.K.: Routledge.
- Musgrave, P.W. (1974). *Contemporary studies in the Curriculum.* Australia: Angus and Roberston Publishers.
- National Curriculum Framework (2005): New Delhi: NCERT.
- Nigam, B.K. & Khan, M.I. (1993). *Evaluation and research in curriculum construction*. New Delhi: Kanishka Publishers.
- Ornstein A. C., &Hunkins, F. P. (2009). *Curriculum foundations, principles and issues*. (5th edition). Boston, MA: Allyn and Bacon
- Panday, M. (2007). *Principles of curriculum development*. New Delhi; Rajat Publications.
- Sharma, R. (2002). *Modern methods of curriculum organization*. Jaipur: Book Enclave.
- Sharma, S.R. (1999). *Issues in curriculum administration*. New Delhi: Pearl Publishing House.
- Sockett, H. (1976). *Designing the curriculum.* Britain: Pitman Press.
- Srivastava, H.S. (2006). *Curriculum and methods of teaching*. New Delhi: Shipra Publishers.
- Tala, M. (2012). *Curriculum development-Perspectives, principles and issues*. Delhi: Dorling Kindersley Pvt. Ltd.
- Tata, H. (1962). *Curriculum development theory & practice*. New York: Harcourt, Brace & World Inc.
- Taylor, P. (2003): *How to Design a training course: A guide to participatory curriculum development.* London: Continuum.
- Walker, D. F. (1990). *Fundamentals of curriculum.* Fort Worth. TX: Harcourt Brace College.
- Yadav, S.K (2013). *School curriculum: Structure and practice*. New Delhi: NCERT.
- Yadav, Y.P. (2006). *Fundamentals of curriculum design*. New Delhi: Shri Sai Printographers.

Web Sources

- NCF-2005 available on www.ncert.ac.in
- NCFTE:http://www.ncte-india.org/publicnotice/NCFTE_2010.pdf
- National Curriculum Framework for Teacher Education, 2009. Available online at www.teindia.nic.in/files/national_curriculu-for-teacher-education-2009.pdf

<table>
<tr><td>Year</td><td>II</td><td rowspan="2">Yoga Education</td><td>Course Credits</td><td>2</td></tr>
<tr><td>Semester</td><td>IV</td><td>Course code</td><td>SOE 02 04 17 C0022</td></tr>
<tr><td>Learning Outcomes</td><td colspan="4">At the end of the course, the students will be able to:
discuss how Yoga and Yoga practices are important for healthy living.
explain the different limbs of Ashtanga Yoga.
state and demonstrate different types of Yogasanas.
demonstrate some important Asanas, Pranayama, Kriya, Bandh etc. while observing precautions.
learn the sequence, and benefits of Surya Namaskar.
develop an understanding about International Day for Yoga and the Common Yoga protocol.
comprehend how Yoga and Education are complementary to each other.
plan and conduct instruction and appropriate assessment in Yoga.
orient towards practicing meditation and yogic life-style.
practice yoga and motivate others for practicing Yoga.</td></tr>
<tr><td colspan="5">Course Content</td></tr>
<tr><td>Unit -1 (Practical)</td><td colspan="4">Introduction to Yoga
Etymology, Origin, History and Development of Yoga
General Guidelines and Preparatory Steps for Yogasana and Pranayama
Patanjali’s Ashtang Yoga
International Day of Yoga (Common Yoga Protocol)
Sadilaja /CālanaKriyās/Loosening Practices/Sithlikaranvyayam: Jogging, MukhaDhauti, Loosening of ankle joints,Loosening of Knee joints, Loosening of Hip joints, Pada Sanchalana, Front and Back bending of Waist, Side Bending and Twisting of Waist, Rotation for Shoulder-joints, Neck-Stretch, Tiger Stretch, Back-Stretch and Breathing exercises with Hand movements</td></tr>
</table>

	• **Surya Namskar:**Pranamasan,Hastauttanasana, Hasta Padasana, AshwaSanchalanasana, Dandasana, Ashtanga Namaskara, Bhujangasana, Parvatasana, AshwaSanchalanasana, Hasta Padasana, Hastauttanasana, Tadasana • **Standing postures:**Tadasana, Trikonsana, Vrikashana, Garudasana, ArdhChakrasana, Chakrasana, Natarajasana,Virabhadrasana, ArdhaChandrasana, Utkatasana • **Sitting postures:**Sukhasana, Siddhasana, Padmasana, Vajrasana, Vakrasana, Paschimottanasana, Matsyasana, Gomukhasana, Ushtrasana, Shalabhasana, • **Upside postures:**Halasana, Sarvangana, Sheersasana • **Laying postures:** Uttanpadasana, VipreetKarni, AdhomukhVakrasana, Bhujangasana, Dhanursana, Mayurasana, Savasana. • **Pranayamas:**AnulomVilom, Bhramari, Ujjayi, Bhastrika, Kumbhak, NadiShodhan, Shitli, Sheetkari. • **Meditation, its preparation, steps and types:** Mantra Chanting, Third Eye, Chakra, Gazing, Kundalini, Naad/Sound, Zen, Vipassana, Mettameditations.
Unit -2 (Practical)	**Introduction to Yoga Education, Yogic practices; their physiological and psychological effect.**
	• Concept, Importance and Objectives of Yoga Education • Eight step teaching method and Assessment in Yoga Education • Concept of Triguna and Yogic Diet • **Mudras:** Gyaan Mudra, Shunya Mudra, Apaan Mudra, Surya Mura, Varun Mudra, Haakini Mudra. • **Bandh**: Jalandra Bandha,Uddiyana Bandha, Moola Bandha • **Yogic Kriya:** KapalaBhati, Trataka, Neti – JalaNeti, Sutra Neti, Dhouti-Vamana dhouti, Vastradhouti • **YogNidra**
Transaction Strategies	**Unit 1** • Lecture cum demonstration • Group discussion and presentation • Demonstration using audio-visual material

	• Excursion • Practicum **Unit 2** • Lecture cum demonstration • Group discussion and presentation • Demonstration using audio-visual material • Excursion • Practicum

Practicum:

1. Surya Namaskar, its steps and benefits
2. International Day of Yoga; (Common Yoga Protocol).
3. Any three Sitting Postures; their steps, precautions and benefits
4. Any three Standing Postures; their steps, precautions and benefits
5. Any three Laying Postures; their steps, precautions and benefits
6. Any three Upside Postures; their steps, precautions and benefits
7. Any three Pranayamas, their steps, precautions and benefits
8. Any three Mudras; their steps, precautions and benefits
9. Bandh; types and benefits
10. Any two Yogic Kriya, Their precautions and benefits
11. Any two Meditations
12. YogNidra
13. Any other as suggested by the teacher.

Suggested Readings:

- Besant, A. (2005). *An introduction to yoga.*New Delhi: Cosmo.
- Goel, A. (2007). *Yoga education: Philosophy and practice*. New Delhi: Deep & Deep Publications Pvt. Ltd.
- Gupta, S.K. (2019). *Yoga & concentration.*New Delhi publication, Delhi
- Kaul, H.K. (2013). *Yoga asana for everyone.* Surjeet Publishers.
- Kubalker, R. (2015). *Know your stress-manage*. Neel Kamal Publishers.
- Mangal, S.K., Mangal, U and Mana, S. K.(2009). *Yoga education*. New Delhi: Arya Publication.
- NCERT (2015). *Yoga: A healthy way of living secondary stage*. New Delhi. (Also available in Hindi)
- NCERT (2015). *Yoga: A healthy way of living upper primary stage.* New Delhi (Also available in Hindi)
- Omand, S.(2006). *Patanjali yoga.*Pradeep Gorakhpur: Gita Press.
- Pramanik, T.N. (2018). *Yoga education.* New Delhi: Sports Publication.
- Yadav, Y.P. and Yadav, R. (2003). *Art of yoga*. New Delhi: Friends.
- Yogacharya, O. S. (2007). *Freedom of body and mind: yogasanas, pranayam and meditation*. New Delhi: Rawat.

Web links:

- Ashish. (2019, July 18). Trigunas (Sattva, Rajas, Tamas): 3 Gunas to Know Your Personality. *FITSRI.* Retrieved on 07.01.2021 https://fitsri.com/yoga/trigunas
- Basavaraddi, I.V. (2015, April 23). Yoga: Its Origin, History and Development. *Ministry of External Affairs: Government of India.*Retrieved on 07.01.2021 https://mea.gov.in/in-focus-article.htm?25096/Yoga+Its+Origin+History+and+Development
- Carrico, M. (2007, August 28). A beginners' guide to meditation. *Yoga Journal.* Retrieved on 07.01.2021. https://www.yogajournal.com/meditation/let-s-meditate.
- Giovanni (n.d.). Types of Meditation: An overview of 23 Meditation Techniques. Retrieved on 24.01.2021https://liveanddare.com/types-of-meditation/
- Krishna KantaHandiqui State Open University, Assam (n.d.). *Introduction to Yoga*. Retrieved on 04.02.2021.

http://www.kkhsou.in/4mobile/deledunits/Course9Eng/unit1.pdf

- Ministry of AYUSH: GoI (2019, May). International Day of Yoga: Common Yoga Protocol. 4th Ed. New Delhi: Morarji Desai National Institute of Yoga. Retrieved on 02.02.2021. http://mea.gov.in/images/pdf/common-yoga-protocol-english.pdf
- Sandhu, D. (2019, March 24). Yoga Mudra and All Its Benefits: 8 Basic Mudras. *Book Yoga Teacher Training Blog.*Retrieved on 24.01.2021https://www.bookyogateachertraining.com/news/yoga-mudra-and-all-its-benefits
- Sree, Y.V. (2018, November 21). How to teach Yoga in a group by using 8 step method. *Yogic Life Souls.* Retrieved on 07.01.2021 https://www.yogiclifesouls.com/how-to-teach-yoga-by-using-8-step-method/
- Woodyard, C. (2011). Exploring the therapeutic effects of yoga and its ability to increase quality of life. *International Journal of Yoga.*4(2), 49–54. https://dx.doi.org/10.4103%2F0973-6131.85485 Retrieved on 07.01.2021
- Yogaholic Tribe. (2018, January 21). Shithilikaranvyayam or loosening exercises. [Video] *YouTube*. Retrieved on 07.01.2021. https://www.youtube.com/watch?v=zzZ4DemVXDw
- Yoga Vini (2017, July 22). How to do 12 Surya Namaskar postures – You should practice every morning. *Yoga Vini.* Retrieved on 07.01.2021 https://yogavinirishikesh.com/12-surya-namaskar-postures-practice/

<table>
<tr><td>Year</td><td>II</td><td rowspan="2">Environmental Education</td><td>Course Credits</td><td>2</td></tr>
<tr><td>Semester</td><td>IV</td><td>Course code</td><td>SOE 02 04 18 C2002</td></tr>
<tr><td>Learning Outcomes</td><td colspan="4">At the end of the course, the students will be able to:
familiarize with the concept and nature of Environmental Education.
acquaint the importance of incorporating this course in curriculum.
list the various environmental pollutions and issues.
acquaint with the objectives, and importance of Environmental Education.
sensitize the family members, peers and neighbours to preserve the natural resource.
identify various environmental issues, problems affecting human life.
develop knowledge, skills, attitudes, motivation and commitment to work individually and collectively towards the environmental problems, solutions and prevention of new ones.
recognize the way of protecting and managing the environment.
analyze various causes for environmental disequilibrium.
develop a positive attitude towards animals, wildlife and plants.</td></tr>
<tr><td colspan="5">Course Content</td></tr>
<tr><td rowspan="2">Unit -1</td><td colspan="4">Conceptual Understanding of Environmental Education</td></tr>
<tr><td colspan="4">Concept & Components of Environment
Concept & Components of Environmental Education
Need and Importance of teaching Environment at school level
Strategies for Environmental Education
Human interaction and dependency on Environment</td></tr>
<tr><td>Unit -2</td><td colspan="4">Environmental Issues and Concerns</td></tr>
</table>

<table>
<tr><td></td><td>

Environmental Imbalance: Causes and its impact on health

Greenhouse Effect
Ozone Depletion
Acid rain
Air pollution
Water pollution
Soil pollution
Noise pollution etc.

Deforestation and its impacts on environment
Sustainable Developments: Concept, component, SDGs
Role of Education, School and Teacher in Environment Conservation
Contribution of Prominent Indian Environmentalist: Sundarlal Bahuguna, Smt. Indira Gandhi, M.S. Swaminathan

</td></tr>
<tr><td>Transaction Strategies</td><td>Lecture cum discussion, Lecture cum demonstration, use of laptop as audio-visual aid, Assignments on various topics, Presentation and group discussion, and presentations by Pupil Teachers will be encouraged.</td></tr>
<tr><td colspan="2">Practicum:

Prepare a report on the present status of climate change.
Prepare a report on recycling of non-decomposable material.
Prepare a report on environment protection act.
Prepare a report on environmental standards.
Prepare a report on environmental issues what you see in your surroundings.
Any topic suggested by the teacher.
Action Plan for Vulture Conservation,2020-2025.

</td></tr>
</table>

8. To prepare report on State of forest.
9. To prepare report on administrative bodies in India working for Protection of Environment/Forest/Wild life.
10. To prepare a report on Govt. Initiatives for preservation of Natural Resources.
11. Govt. Initiatives for saving Rivers.
12. National Green Tribunal Act.
13. To prepare a report on science and technological advancement and degradation of Environment.
14. To organize at least two activities nearby your areas to sensitize people, children, peers etc to preserve and conserve natural Resources.
15. Any topic suggested by the teacher.

Suggested Readings:

- Aggarwal, J. C.(2010). *Education for values, environment and human rights.* Delhi: Shipra Publications.
- Ardoin, N. M. (2009). *Environmental Education: A Strategy for the future*. New York: EGMA. Retrieved, from https://nmardoin.people.stanford.edu/sites/g/files/sbiybj4916/f/documents/EE_Strategy_for_the_Future.pdf
- Briceno, S. & Pitt, C.D. (Ed.). (2018). *New ideas in environmental education.* U.K: Routledge Publication.
- Catherine, J. (2011). *Environmental education.* New Delhi: Neel Kamal Publication.
- Gopal Dutt, N. H. (2014). *Environmental education*. New Delhi: Neel Kamal Publication.
- Jain, K.C., & Garg, R. (2016). *Environment education.* Ludhiana: Vijaya Publication.
- Krishnamacharyulu, V. et al. (2017). *Environmental education*. New Delhi: Neel Kamal Publication.
- Nagarjan, K. (2017). *Environmental education*. Chennai: Sriram Publisher.
- Packiam, S. (2018). *Education for sustainable development.* New Delhi: Neel Kamal Publication
- Palmer, P., & Neal, P. (2003). *The handbook of environmental education.* UK: Routledge Publication.
- Reddy, V. Purushotham et al. (2013). *Environmental education.* New Delhi: Neel Kamal Publication.
- Ravinder, Ch. & Ramakrishna, A. (2017). *Environmental education issues and concerns.* New Delhi: Neel Kamal Publication.
- Ramchandra, T. V. (2015). *Environment Management.* Bangalore: Energy & Wetlands Research Group Centre for Ecological Sciences Indian

Institute of Science. Retrieved from https://nptel.ac.in/courses/120108004/module1/lecture1.pdf

- Sharma, R. A. et. al. (2012). *Environmental education*. New Delhi: Surya Publication.
- Sharma, S. (2016). *Environment Education*.New Delhi: R. Lall Publication.
- Saminathan, B. (2015). *Environmental education.* Retrieved fromhttp://www.bdu.ac.in/cde/docs/ebooks/B-Ed/II/ENVIRONMENTAL%20EDUCATION.pdf
- United Nations. *Transforming Our world: The 2030 Agenda for sustainable Development*. New York City. Retrieved fromhttps://sustainabledevelopment.un.org/content/documents/21252030%20Agenda%20for%20Sustainable%20Development%20web.pdf
- Verma, K. & Kaur, G. & Singh, P. (2010).*Introduction to environment*. New Delhi: Indira Gandhi National Open University.

<table>
<tr><td>Year</td><td>II</td><td rowspan="2">Art, Craft and Aesthetics</td><td>Course Credits</td><td>2</td></tr>
<tr><td>Semester</td><td>IV</td><td>Course code</td><td>SOE 02 04 19 C0022</td></tr>
<tr><td>Learning Outcomes</td><td colspan="4">At the end of the course, the students will be able to:
develop all the senses of children through observation, exploration and expression.
know about the purpose of introducing practical exercises in Painting and other subjects is to help and enable the students.
develop an awareness of the historical, social and economic role and value of art, craft and design and aspects of contemporary culture and mass-media.
develop competencies and skills for teaching of Art.
develop the artistic and aesthetic sensibilities among students to enable them to respond to the beauty in different art forms.
develop imagination and sense of art and creative interest in art in teaching learning process.</td></tr>
<tr><td colspan="5">Course Content</td></tr>
<tr><td rowspan="2">Unit -1</td><td colspan="4">Applied Art and Crafts</td></tr>
<tr><td colspan="4">Drawing and Painting (Still life and Landscape)
Block Painting
Calligraphy
Paper and Paper Crafts
Craft Traditions
Collage Making
Construction (Using Waste Materials)
Mounting and Framing
Flash Cords and Model making with different Material</td></tr>
<tr><td>Unit -2</td><td colspan="4">Play and Design Production Process</td></tr>
</table>

<table>
<tr><td></td><td colspan="2">

- Production Design
- Acting
  - ✓ Mime, Storytelling, Role play
  - ✓ Dance Traditions folk & classical
- Theatre crafts, creative arts
- Direction and Stage Craft
- Play / Drama – distinctions & their role as learning methodologies
- Application of theatre Art in Education

</td></tr>
<tr><td>Transaction Strategies</td><td colspan="2">Hand on experience of working in different medium and materials, preparation and presentation of teaching learning materials, workshop, exhibition, slid/film show, project work, group work planning of a stage-setting, visit, role play, celebrations of Indian festivals and fairs brain-storming, interaction with artists, lectures and demonstration.</td></tr>
<tr><td>Practicum</td><td>Unit -1

- Still life and Landscape
- Teaching Animation
- Block Painting
- Logo and Poster Design
- Calligraphy
- Paper Crafts
- Craft Traditions
- Collage Making
- Waste Materials
- Mounting and Framing
- Mould making

</td><td>Unit -1I

- Production Design
- Acting
- Theatre crafts
- Direction and Stage Craft
- Play / Drama

</td></tr>
</table>

Suggested Readings:

- Bhatachrya,Dilip (1999).*Musical Instrument of tribal India.* New Delhi.
- CCRT official website.
- Gill Rajesh (2017).*A Textbook of Art Education.* New Delhi: Paragon International Publishers.
- Gill Rajesh (2018).*Art Education.* New Delhi: Paragon International Publishers.
- Kakkar Rekha, MakkharRagini (2018).*Drama, Art and Aesthetics in Education*. Agra: Rakhi Prakashan.
- MedhaSudumbarekar , RamaHardeekar Shailendra Pardeshi (2010).*Art & Craft Books*. Jyotsna Prakashan.
- NCERT (2006).*Position paper national focus group on Arts. Music, Dance and theatre*. New Delhi: NCERT.
- Raw K. Ravikant and P. Ananad Kumar (2017).*Drama and Art in Education*. Neelkamal Publishers.
- Roy Reeta (2017).*Perfect Art Education*. Arya: Publisher Company.
- Saxena Avnish and Sirth Sushil (2016).*Drama, Art and Aesthetics in Education*.Agra:RakhiPrakashan Raman Tower, Sanjay place.
- Sharma R. P., Sharma R. K. (2016).*Drama and Art in Education*. Agra: Radha Prakashan Mandir.
- Singh Chitralekha (2016).*Drama and Art in Education*. Agra: Publisher Shri Vinod Pustak Mandir.
- Singh Yadav Narendra (2010).*Advertising Technical and Theory*.Jaipur: Rajsthan Hindi GranthAkadami.
- Singh Yadav Narendra (2012).*Graphic Design*.Jaipur: Rajsthan Hindi GranthAkadami.
- Tivari Arjun (2010).*Modern Advertising Art and Behaviour*. Varanasi:VishwavidyalayaPrakashan.

Year	II	Guidance and Counselling	Course Credits	4
Semester	IV		Course code	SOE020412 DCEC3104

Learning Outcomes	At the end of the course, the students will be able to: • conceptualize the concept and importance of guidance and counseling. • explain the principles, issues, problems & procedures of guidance & counselling. • identify and explain necessary guidance & Counselling services. • select appropriate test to identify the problem and strength areas of the learners. • describe various techniques adopted for guidance and counselling. • observe the role of Guidance & Counselling in Personnel in Promoting Positive Mental Health. • select Evaluation techniques in guidance programme. • construct and develop an appropriate methodology for development of individual. • record, store and manage the fundamental data of counselling process. • value and promote integrity, truth, accuracy, honesty, ethical behaviour and accountability in guidance and counselling.
Course Content	
Unit -1	**Fundamentals of Guidance & Counselling** • Guidance and Counselling: Concept, Need & Importance • Principles of Guidance and Counselling • Scope of Guidance and Counselling • Types of Guidance: Educational, Vocational, Social & Personal Guidance • Types of necessary guidance & Counselling services
Unit -2	**Counselling Services & Ethics** • Techniques & Procedure of Counselling • Counsellor: Characteristics, Functions & Professional Ethics

	• Identification of Issues and problems of Counselling • Skills of Counselling: Building Trust, Listening, Observation & Empathy • Approaches of Counselling: Directive, Non-directive and Eclectic Counselling
Unit -3	**Counselling at school level** • Importance & Dimensions of Counselling in schools • Counselling for special children • Counselling for drug addicts • Role of Guidance & Counselling in Personnel in Promoting Positive Mental Health • Organization of Guidance Programmes in schools
Unit -4	**Role of Guidance and Counselling** • Role of Guidance in self-management • Role of Guidance in development of learning • Role of parents and teachers in Guidance and counselling • Evaluation techniques in guidance programme
Transaction Strategies	Lecture cum discussions, presentation of case study of students in need of counselling, use MOOCs and e-platforms. Group discussion and presentation, Lecture, Conduct of Psychological Tests**,** Assignments on various types of knowledge, presentation and discussion, Lecture cum demonstration, Ask pupil teachers to prepare write up on various maxims of education, Preparation of activity based curriculum in groups and discussion, observation of students, conducting career guidance in the schools, counsel students by identifying their mental health problems such as lack of concentration, anxiety, anger etc, Audio and Video Lecture, Group Discussions by online softwares, use of audio and video materials, Review of various literature available, Providing reading material to students, Organising tutorials if needed.
Practicum: • Draw a plan for the assessment of ability, aptitude, interest or personality of students. Explore two tests.	

- One each for the assessment of intelligence and aptitude at the elementary and secondary stage through different sources and prepare critical writeups.
- Prepare a script of a session with a client student communicating either low ability or high ability scores highlighting the skills used by you in the session.
- Prepare a sociometric test. Administer the test on a group of students. Draw a sociogram and describe in details the group climate.
- Any other project/assignment prescribed by the teacher.

Suggested Readings:

- Mathur, S. S. (2008). *Fundamentals of guidance & counselling*, (2nded.). Agra: Aggarwal Publication.
- Gladding, R.(2018). *Introduction to counseling.* New Delhi: Pearson.
- Chandanpat (2018). *Guidance and counselling*. ND: Educational Publisher & Distributor.
- Gibson, Robert L. & Mitchell, Marianne, H. (2016). *Introduction to counselling and guidance*. 6th edition, New Delhi: Pearson Prentice Hall in India.
- Oberoi, S.C (2015). *Educational vocational guidance & counselling*. International Publishing House.
- Kubalker, R. (2015). *Know your Stress-Manage Your Stress*. Neel Kamal Publishers.
- Charles, K. and Arul, V. (2015). *Peace and Value Education*.Selvi Publishers.
- Yadav, R.H. (2012). Guidance & Counselling. New Delhi: APH Publishing Corporation.
- Steve, D. (2012). *The Basics of Communication*: *A relational Perspective*. Sage Publishers
- Snyder, C.R. (2011). *Positive Psychology: The Scientific and Practical Explorations of Human Strengths*. Sage Publishers.
- Sharma, R. A.(2011).*Fundamentals of guidance and counselling.* Meerut: R. Lal Book Depot.
- Aggarwal, R. (2010).*Elementary guidance and counselling*. New Delhi: Shipra Publication. 83
- Kochhar, S.K. (2009). *Guidance & counselling in colleges & universities*. New Delhi: Sterling Publishers Pvt Ltd.
- Feldonan, R.S. (2009). *Essentials of understanding psychology seventh edition.* Tata Mc Graw Hill, New Delhi.

- Chandra, R. (2009). *Career information and guidance and counselling.* Delhi: Isha Books.
- Topichik, G.S. (2008). *Managing Workplace Negativity*. PHI, Delhi.
- Sheorron, B. (2008). *The presentation skills workshop*.New Delhi: Prentice Hall of India.
- Sharma, S.P. (2008). *Career guidance & counselling*. New Delhi: Kanishka Publishers & Distributors.
- Kottler, J. A. & Shepard, D. S. (2008). *Counselling theories & practices*. Cenage Learning: 1st Edition.
- Gibson, R. L. & Mitchell, M. (2008). *Introduction counselling and guidance*. New Delhi: PHI Learning Pvt. Ltd.
- Sexena, A. (2007). *Modern techniques of counselling*. New Delhi: Rajat Publications.
- Saxena, A. (2007). *Introduction to educational & vocational guidance*. Delhi: Rajat Publications.
- Naik, D. (2007). *Fundamentals of guidance and counselling*. New Delhi: Adhyayan publishers.
- Madhukumar, I. (2007). *Guidance and counselling*. New Delhi: Authors Press.
- Koshy, J. (2007). *Guidance and counselling*. New Delhi: Dominant Pub. & Distributors.
- Chauhan, S.S. (2007). *Principle and techniques of guidance*. New Delhi: Vikas Publishing House.
- Bala, Rajni. (2007).*Guidance and counselling: Modern Review*. New Delhi: Afa Publication.
- Varky, B. G. & Mukhopadhyay, M. (2006). *Guidance and Counselling*. New Delhi: Sterling Publications.
- Saxena, A. (2006). *Organization of Guidance Service*. Delhi: Rajat Publications.
- Rao, S N. (2006). *Counselling and guidance*. Delhi: McGraw hill Publication.
- Pandey, V.C. (2006). *Educational guidance & counselling.* Delhi: Isha Books.
- Kochhar, S. K. (2006). *Educational and vocational guidance in secondary education*. Delhi: Sterling Publications.
- Sharma, Y.K. (2005). *Principles of educational & vocational guidance*. New Delhi: Kanishka Publishers.

Web resources

- Systemic Reforms for Curriculum Change, http://www.ncert.nic.in/new_ncert/ncert/rightside/links/pdf/focus_group/Systemic_reforms_final.pdf
- Curriculum, Syllabus and Textbooks: http://www.ncert.nic.in/new_ncert/ncert/rightside/links/pdf/focus_group/cst_final.pdf

Year	II	Comparative Education	Course Credits	4
Semester	IV		Course code	SOE020413 DCEC3104

Learning Outcomes

At the end of the course, the students will be able to:

- acquaint with the concepts of comparative education.
- understand history and developmental stages of comparative education.
- familiar with educational systems in terms of factors and approaches of comparative education.
- acquaint with the efficiency of educational systems of various countries in terms of prevailing trends.
- create a perspective about the implications of educational policies and problems in India.
- acquaint with the concept of primary, secondary and higher education and its implication in India, U.K. and U.S.A.

Course Content

Unit -1 **Conceptual Understanding of Comparative Education**

- Concept of Comparative Education: History and developmental stages of Comparative Education
- Aims of Comparative Education
- Need and scope of Comparative Education
- Approaches to Comparative Education: Historical, Philosophical, Sociological and Problem Approach
- Factors affecting of education system

Unit -2 **Primary/Elementary Education in India, U.K. and U.S.A.**

- Concept, Origin and development of primary education in India, U.K. and U.S.A.
- Primary education- aims, features, Content, methods & instruction and evaluation system in India, U.S.A. and U.K.
- Concept of Universalization of Elementary education in India and its implications.
- Comparison of Primary education of India with U.K. and U.S.A.

Unit -3 **Secondary Education in India, U.K. and U.S.A.**

- Secondary education : Concept, meaning ,Structure ,need and importance

	• Secondary education in India, U.K. and U.S.A. (Aims, Salient features, Content, Methods & Instruction and Evaluation System) • Problems of Secondary education in India
Unit -4	**Higher Education in India, U.K. and U.S.A.**
	• Higher education- meaning, aims, features, Content, methods & instruction and evaluation system in India, U.S.A. and U.K. • Comparison of higher education of India with U.K. and U.S.A. • Defects of the prevalent system of higher education in India • Distance education: its needs and various concepts with reference to India, U.K. and U.S.A.
Transaction Strategies	Lecture cum discussion, use of PPT, assignments on various topics, Lecture cum demonstration, ask pupil teachers to prepare write up on various factors influencing of education system and Comparative Education, debate on aims, content, methods & instruction and evaluation system in India, U.K. and U.S.A., chart preparation on education system in India, U.K. and U.S.A., In depth analysis of various education system by the student teachers and presentations will be encouraged.

Practicum:

- Write up on various factors influencing of education system.
- Chart preparation on education system in India.
- Reflections on secondary and higher education in India, U.K. and U.S.A.

Suggested Readings:

- Andrey, A. & Howard N. (1978). *Developing curriculum: A practical guide*. London: George Allen and Unwin.
- Baradey, G.Z.F. (1964). *Comparative methods in education*. New Delhi: Oxford and IBH Publishing Co.
- Chaube, S. P. (2009). *Comparative education*. New Delhi: Vikas Publication.
- Chaube, S. P. (2017). *Features of comparative education*. New Delhi: Vikas Publication.
- Cowen, R. (2017). *Narrating and relating educational reform and comparative education.* Switzerland AG.: Springer Nature
- Cramer, I.F. & Brown, G.S. (1965). *Contemporary education: A comparative study of national system*. New York: Harcourt Brace &

Company.

- Denis, L. (1986). *School curriculum planning*. London: Hodder ad Stoughton.
- Dent, H.C. (1981). *Educational system of England.* London: George Allen and Unwon.
- Edward, A. K. (1960). *The secondary school's curriculum*. New York: Harper and Row Publishers.
- Hans, N. (1961). *Comparative education.* London: Routledge and Kegan Paul.
- Harold A. &Elsic, J. A. (1957). *The curriculum*. New York: The MacMillan Company.
- Holmes, B. (2018). *Comparative education: Some considerations of method*. London: Taylor & Francis Group
- International encyclopedia of curriculum. (1991) London: Pergamon Oxford.
- Kandel, I.L. (1963). *Studies in comparative education.* New York: George Harrup.
- Marshall, J. (2019). *Introduction to Comparative and International Education.* New Delhi: SAGE Publication India Pt. Ltd.
- Parmaji, S, (1984). *Distance education*. New Delhi: Sterling Publishers Pt. Ltd.
- Rajput, J.S. (2004). *Encyclopaedia of Indian education.* New Delhi: NCERT.
- Sodhi T.S. (1988). *A text book of comparative education.* New Delhi: Association of Indian Universities, IGNOU.
- William, M. A. (1966). *Planning curriculum for schools*. New York: Holt, Rinehart and Winston

<table>
<tr><td>Year</td><td>II</td><td rowspan="2">Life Skills Education</td><td>Course Credits</td><td>4</td></tr>
<tr><td>Semester</td><td>IV</td><td>Course code</td><td>SOE020414 DCEC3104</td></tr>
<tr><td>Learning Outcomes</td><td colspan="4">At the end of the course, the students will be able to:
provide orientation in life skills.
recognize and analyse the importance of life skills education by studying the reports of international organizations and committees.
develop strategies and be able to apply Life Skills in various spheres of life.
develop professionals Life Skills Education.
foster the spirit of social responsibility and enhance social and emotional well-being.
understand the thinking skills and coping skills and its practice in the field.</td></tr>
<tr><td colspan="5">Course Content</td></tr>
<tr><td rowspan="2">Unit -1</td><td colspan="4">Introduction to Life Skills</td></tr>
<tr><td colspan="4">Life Skills: Genesis of the Concept(National and International)
Definition and significance of Life Skills
Life Skills Education in the Indian Context
Role of teacher in encouraging them to practice core life skills in daily life</td></tr>
<tr><td rowspan="2">Unit -2</td><td colspan="4">Thinking Skills</td></tr>
<tr><td colspan="4">Nature, Elements of Thought
Types of Thinking
Creative and Critical Thinking
Problem Solving
Definition,
Steps in Problem Solving</td></tr>
</table>

	- Factors Influencing Problem Solving • Decision Making - Definition, Process, Need - Consequences, Models of Decision Making - Goal Setting
Unit -3	**Coping Skills**
	• Coping with Emotions o Definition, Characteristics, Types of emotions o Causes and effects of different emotions o Strategies of coping with emotions o Strategies to develop skills of managing emotions: Classroom discussion; Brainstorming; Role-plays, Audio and visual activities e.g., Arts, Music, Theatre, Dance; Case Studies, Storytelling, Debates • Coping with Stress o Definition, Stressors o Sources of Stress o The General Adaptive Syndrome Model of Stress o Coping Strategies
Unit -4	**Social and Negotiation Skills**
	• Introduction Life Skills: Generic, Problem Specific and Area Specific Skills • Self-Awareness - Definition, Types of Self - Self Concept, Body Image, Self Esteem - Techniques used for Self-Awareness: Johari Window, SWOT Analysis • Empathy - Sympathy, Empathy & Altruism • Effective Communication - Definition, Functions, Models, Barriers

	• Interpersonal Relationship - Definition, Factors affecting Relationships
Transaction Strategies	Lecture cum discussion, Group discussion and presentation, Brainstorming Session, Use of PPT, Assignments on various topics, Lecture cum demonstration, Preparation of activity based on the strategies of life skills development in groups and discussion, Debate on various problems, panel discussion, in depth analysis of various life skills by the student teachers and presentations will be encouraged.

Practicum:

- Activities related to the various skills described.
- Organizing workshops on developing social and negotiation skills, thinking skills etc.
- Organize collaborative activities under the guidance of the teacher.
- Case Study in any of the area.
- Any other activity as assigned by the teacher.

Suggested Readings:

- A Life Skills Program for Learners in Senior Phase. (2002). University of Pretoria: Chapter in Thesis. Retrieved from; http://www2.ed.gov/offices/OVAE/AdultEd/OCE/SuccessStories/success.pdf
- Dakar Framework for Action, (2000). Education for All: Meeting our Collective Commitments, Dakar, Senegal. 17
- Delors, Jacques (1997). *Learning; The Treasure Within*.Paris: UNESCO.
- Handbook for Teachers, Vol. I – IV (2008).*YUVA School Life Skills Programme*.Delhi: Department of Education and State Council of Educational Research and Training, Delhi
- Kumar, J. Keval (2008).*Mass Communication in India*. JAICO Publication India Pvt. Ltd
- Life Skills Based Education (2011). Wikipedia. Retrieved from: http://en.wikipedia.org/wiki/Life_skills-based_educaion ·
- Life Skills Based Education CCE. (2009). CBSE. Retrieved from: http://www.cbse.nic.in/cce/life_skills_cce.pdf ·
- Life Skills Resource Manual, Schools Total Health Program (2006). Chennai: Health Education and Promotion International Inc.
- Ministry of Education (2006). Senior Secondary Phase. Republic of Namibia. Retrieved from: http://www.nied.edu.na/publications

- Morgan and King (1993). *Introduction to Psychology*. New Delhi: Tata McGraw-Hill Publishing Company Ltd.
- Nair.V. Rajasenan, (2010). *Life Skills, Personality and Leadership*. Tamil Nadu: Rajiv Gandhi National Institute of Youth Development. Page 8 of 62
- Nair. A. Radhakrishnan, (2010). *Life Skills Training for Positive Behaviour*. Tamil Nadu: Rajiv Gandhi National Institute of Youth Development.
- Rao P.L. (2008). *Enriching Human Capital through Training and Development.*Delhi: Excel Books.
- Santrock W.John (2006). *Educational Psychology*. (2nd Edn.)New Delhi: Tata McGraw-Hill Publishing Company Ltd.
- Singh, Madhu (2003). *Understanding Life Skills*, Background paper prepared for Education for All: The Leap to Equality
- Tull, M.(2010).*Post-Traumatic Stress (PTSD).* How to Monitor Your Emotions and Increase Emotional Awareness http://ptsd.about. com/ Accessed30/01/2010.
- UNESCO (1997). *Adult Education.*Paris: The Hamburg Declaration, UNESCO.
- UNESCO (2005). *Quality Education and Life Skills.*Paris: Darkar Goals, UNESCO.
- UNESCO and Indian National Commission for Co-operation with UNESCO (2001). *Life Skills in Non-formal Education.* A Review
- WHO (1999).*Partners in Life Skills Education.* Geneva: Conclusions from a United Nations Inter-Agency Meeting, WHO.

<table>
<tr><td>Year</td><td>II</td><td rowspan="2">Web Technologies in Education</td><td>Course Credits</td><td>4</td></tr>
<tr><td>Semester</td><td>IV</td><td>Course code</td><td>SOE020415 DCEC3104</td></tr>
<tr><td>Learning Outcomes</td><td colspan="4">At the end of the course, the students will be able to:
● familiarize with concept and nature of web technology.
● acquaint with the importance of web-based teaching learning activities.
● understand the functioning of online learning platforms.
● develop skills for dealing with various web-based technology.</td></tr>
<tr><td colspan="5">Course Content</td></tr>
<tr><td rowspan="2">Unit -1</td><td colspan="4">Conceptual Understanding of Web Technology</td></tr>
<tr><td colspan="4">● Concept, Meaning and definition of Web Technology
● Aim and importance of Web Technology
● Contribution of Web Technology in teaching
● Constraints in the use of Web Technology</td></tr>
<tr><td rowspan="2">Unit -2</td><td colspan="4">Teaching Learning and Web Technology</td></tr>
<tr><td colspan="4">● Security and privacy in social networked learning
● Technical support and infrastructure for using web-based learning
● Administrative support issues in web-based learning
● Social issues in social network learning</td></tr>
<tr><td rowspan="2">Unit -3</td><td colspan="4">Web based Learning Platforms</td></tr>
<tr><td colspan="4">● SWAYAM
● Unacademy
● NPTEL
● Swayam Prabha</td></tr>
</table>

	• E-patashala • Diksha • Coursera
Unit -4	**Web based Learning** • Virtual classroom • Forum • Blogs • Bulletin Board
Transaction Strategies	Lecture cum discussion, Lecture cum demonstration, Use of PPT, Assignments on various topics, Presentation and discussion, Debate and presentations by Pupil Teachers will be encouraged.

Practicum:

- Assignments on various topics given in syllabus
- Visits in ICT Lab
- First-hand experience of virtual learning
- Panel discussion on issues related to Web based Learning.

Suggested Readings:

- Biggs, J. B., & Tang, C. S. (2007). *Teaching for quality learning at university: What the student does*. Maidenhead: McGraw-Hill/Society for Research into Higher Education & Open University Press.
- Brown, A., & Green, T. D. (2016). *The essentials of instructional design: Connecting fundamental principles with process and practice.* New York: Routledge.
- Bullen, M., & Janes D. P. (2007). *Making the transition to e-learning: Strategies and issues.* Hershey, PA: Information Science Pub.
- Conole, G., & Oliver, M. (2006). *Contemporary perspectives in e-learning research: Themes, methods and impact on practice.* Hoboken: Taylor & Francis Ltd.

- Dirksen, J. (2012). *Design for how people learn.* Berkeley, CA: New Riders.
- Dron, J. (2007). *Control and constraint in e-learning: Choosing when to choose.* Hershey, PA: Idea Group Pub.
- Fraser, K. (2014). *The future of learning and teaching in next generation learning spaces.* Bradford: Emerald Group Publishing Limited.
- Gee, J. P. (2007). *What video games have to teach us about learning and literacy.* New York: Palgrave Macmillan.
- Hew, K. F., & Cheung, W. S. (2012). *Student participation in online discussions: Challenges, solutions, and future research.* New York: Springer.
- Inoue, Y. (2007). *Online education for lifelong learning.* Hershey, PA: Information Science Pub.
- Kirsch, B. A. (2014). *Games in libraries: Essays on using play to connect and instruct.* Jefferson, North Carolina: McFarland & Company, Inc.
- McGonigal, J. (2012). *Reality is broken: Why games make us better and how they can change the world.* London: Vintage.
- McPherson, M., & Nunes, M. B. (2004). *Developing innovation in online learning: An action research framework.* London: RoutledgeFalmer.
- Muilenburg, L. Y., & Berge, Z. L. (2016). *Digital badges in education: Trends, issues, and cases.* New York: Routledge, Taylor & Francis.
- Pagowsky, N., & McElroy, K. (2016). *Critical library pedagogy handbook: Lesson plans*. Chicago: ACRL.

<table>
<tr><td>Year</td><td>II</td><td rowspan="2">Human Rights in Education</td><td>Course Credits</td><td>4</td></tr>
<tr><td>Semester</td><td>IV</td><td>Course code</td><td>SOE020416 DCEC3104</td></tr>
<tr><td>Learning Outcomes</td><td colspan="4">At the end of the course, the students will be able to:
understand the Human Rights policies and practices at national and international levels.
develop the knowledge of policies concerning Human Rights Education.
understand prevailing trends in the field of Human Right Education.
understand the roles of various government and non-government agencies in the promotion for Human Rights.
identify potential roles for oneself in the promotion of Human Rights Education.</td></tr>
<tr><td colspan="5">Course Content</td></tr>
<tr><td rowspan="2">Unit -1</td><td colspan="4">Concept of Human Rights and Human Rights Education</td></tr>
<tr><td colspan="4">Meaning of Rights, Human Rights and Human Rights Education with reference to Philosophical, Psychological, Political, and Sociological perspective.
Approaches to Human Rights:
Western political liberalism
Socialism and social welfare principles
Cross-cultural rights traditions
The UN instruments
Policies on Human Rights</td></tr>
<tr><td rowspan="2">Unit -2</td><td colspan="4">Emerging Concerns in Human Rights</td></tr>
<tr><td colspan="4">Debates in the Human Rights discourse:
Universal versus Relativism
Legal versus Ethical demands
Rights versus Human rights</td></tr>
</table>

	○ Collective versus Individual rights ○ West versus Rest • Methods of Human Rights Research and Human Rights as pedagogy • Critical review of Democracy with reference to Human rights
Unit -3	**School Education and Human Rights Perspective** • Human Rights perspective in curriculum • Human Rights perspective in teaching-learning Processes • Human Rights Perspectives in Assessment • Human Right Perspective and school ethos and culture • Inclusion and Exclusion
Unit -4	**Issues, Movements and Promotion of Human Rights** • Understanding Human Rights of Children, Women, Minorities, Dalits, Differently abled and Homosexuals. • Role of Government, Non-Government Organizations, Education, family and self in promotion of Human Rights. • Critical review of Human Right in globalized world • Revisiting of Indian constitution with reference to Human Rights
Transaction Strategies	Lecture-cum-discussion along with interactive group discussion, field trips, group discussions, brain storming and simulation in the form of mock session, Bal Panchayat etc.
Practicum: Learner may take any two tasks from the following: • Workshop/Seminar/Class presentation on Human rights in a socio-cultural context. • Poster Presentation reflecting Human right issues. • Identification of discriminative practices at school level (Gender, Caste, Disability). • Awareness Campaign to promote Educational rights. • Any other assignment given by teacher.	

Suggested Readings

- Alam, Aftab (2000). *Human Rights in India: Issues and Challenges*. Delhi: Raj Publication.
- Bajpai, Asha (2010). *Child Rights in India: Law, Policy and Practice.* New Delhi: Oxford University Press.
- Baxi, Upendra (2010). *The Future of Human Rights.* New Delhi: Oxford University Press.
- Baxi, Upendra. *Human Rights to the Right to be Human; Some Heresies in Upendra Baxi (ed.) The Right to be Human*. New Delhi: Lancer International.
- Byrne, Darren, J.O. (2000). *Human Rights: An Introduction*. New Delhi: Pearson Education Limited.
- Chandohoke, Neera (2012). *Contested Secession: Rights, Self-determination, Democracy, and Kashmir*. New Delhi: Oxford University Press.
- Chaudhary, Dashrath (2004). *Human Rights and Education.* New Delhi: Rainbow Publishers Ltd.
- Conventions on the Rights of the child (2000). MHRD Govt of India.
- Dagar, B.S. (1948). *Perspectives in Human Rights Education.* Chandigarh: Haryana Sahitya Academy.
- Dennis, Altman (2004). *Sexuality and Globalization, Agenda: Empowering Women for Gender Equity*, No. 62, African Feminisms Volume 2,1: Sexuality in Africa (2004) on behalf of Taylor & Francis, Ltd.
- Desai, A.R. *Democratic and Authoritarian Faces of the Indian constitution, in A.R. Desai (ed.) Violation of Democratic Rights in India*. Bombay: Popular Prakashan.
- Donnelly, Jack (1989). *Universal Human Rights in Theory and Practice*. Cornell: Cornell University Press.
- Elbers, Frank (2002). *Human Rights Education Resource book.* Cambridge, MA: Human Rights Education Associates.
- Messer, Ellen (1997). Pluralist Approaches to Human Rights. In *Journal of Anthropological Research (Vol. 53, No. 3*,293-317).University of New Mexico:Universal Human Rights versus Cultural Relativity (Autumn, 1997).
- Emilie, M. Hafner-Burton and Kiyoteru, Tsutsui (2005). Human Rights in a Globalizing World. The Paradox of Empty Promises'.In *American Journal of Sociology*(Vol. 110, No. 5, 1373-1411). The University of Chicago Press.
- FonsCoomans, Fred Grünfeld, Menno T. Kamminga (2010). Methods of Human Rights Research.In *A Primer',Human Rights Quarterly* (Volume 32, Number 1, February 2010,179-186). The Johns Hopkins University Press.
- Gopalan, S.B. (1998). *India and Human Rights*. New Delhi: LokSabha Secretariat.

- Gupta, Madan (2001). *What will be Human Rights of students.* New Delhi: Jnanada Pub.
- Hugh (1991). *The challenges of Human Rights.* London: Cassell, Education Ltd.
- Patnaik, J. K. (2004). Human Rights: the concept and perspectives: a third world view.In *The Indian Journal of Political Science*(Vol. 65, No. 4, 499-514). Indian Political Science Association.
- Donnelly, Jack (1982). Human Rights and Human Dignity. An Analytic Critique of Non-Western Conceptions of Human Rights.In *The American Political Science Review*(Vol. 76, No. 2, 303-316). American Political Science Association 3.
- Das, Jogendra Kr. (2003). Reflections on Human Rights and the Position of Indian Women. In*The Indian Journal of Political Science* (Vol. 64, No. 3/4, 203-220). Indian Political Science Association.
- Kothari, Rajni (1989). Human Rights – A movement in Search of Theory.In *Smitu Kothari and Harsh Sethi (eds.) Rethinking Human Rights: Challenges for theory and action.* New York: New Horizons Press and Delhi: Lokayan.
- Kothari, Smitu (1989). The Human Rights Movement In India: A critical overview.In *Smitu Kothari and Harsh Sethi (eds.) Rethinking Human Rights: Challenges for theory and action*. New York: New Horizons Press and Delhi: Lokayan.
- Krishanmurthy, J. (2001). *The First and Last Freedom.* Chennai: Krishanmurthy Foundation.
- Kumar, Sandeep (2012). *Human Rights and Pedagogy*. Delhi: Discovery publishing House.
- Macwan, Martin (2006). *Dalit Rights*. New Delhi: NHRC. 4.
- Mani, V.S. (1998). *Human Rights in India*. New Delhi: An overview, Institute for the world congress on Human Rights.
- MHRD (2003). *Human Rights Education.* New Delhi: Teaching and Training, Indian Institute of Human Rights.
- Mittler, P. (2000). *Working towards Inclusive Educating Social contexts.* London: David Fulton publishers.
- NHRC (2005). *Human Rights Education for beginners.* New Delhi: National Human Rights Commission.
- Jain, Nilanjana (2006). *Human Rights under Democracy, The Indian Journal of Political Science, Vol. 67, No. 1 (JAN. - MAR., 2006), pp. 143-152*: Indian Political Science Association.
- Pachuari, S.K. (1995). *Children and Human Rights*. Delhi: APH, Publication.
- Pachuari, S.K. (1995). *Women and Human Rights*. Delhi: APH, Publication.
- Philip, Kavita (2004). *Constructing Human Rights in the Age of Globalization.* New Delhi: PHI.

- Sen, Amartya (2004). *Elements of a Theory of Human Rights.* Philosophy and public-Affairs, 32. No.4

Year	II	Education for Mental Health	Course Credits	4
Semester	IV		Course code	SOE020417 DCEC3104
Learning Outcomes	At the end of the course, the students will be able to: ● define the concept of mental health and mental hygiene. ● explain the process and criteria for good adjustment. ● illustrate the methods of adjustment/Adjustment mechanism. ● identify various categories of mental disorder/mental health issues. ● suggest measures for developing good mental health ● develop the understanding of the role of home and school in mental health.			
Course Content				
Unit -1	**Mental Health** ● Concept, factors affecting mental health ● Characteristics of a mentally healthy person ● Symptoms and causes of bad mental health ● Role of the parents in developing mental health of their children			
Unit -2	**Mental Hygiene** ● Concept, aspects, goals and principles of mental hygiene. ● Nature and scope of mental hygiene, principles of guidance and counselling for mental health and hygiene. ● Need, importance and functions of mental hygiene. ● Principles of curriculum construction from mental hygiene point of view.			
Unit -3	**Adjustment or mal-adjustment** ● Concept, process and perspective for adjustment ● Methods of adjustment/adjustment mechanism			

	• Concept and causes of maladjustment • Effects of maladjustment on children/student's mental health
Unit -4	**Mental health in schools** • Mental illness/disorder (personality disorder, anxiety, mood disorder, substance related addictive disorder): types, symptoms and causes • Assessment of mental health status • Stress: types, symptoms of stress and Stress management for students • Role of teacher in fostering mental health, ways and means of improving mental health
Transaction Strategies	E-learning, Lecture-cum-discussion, Tutorials, Brainstorming Session, Recorded/live Video and Audio lectures, Use of PPT, Assignments on different key areas given in syllabus through Google Group, Google classroom and other appropriate online apps.

Practicum:

- Case Study of Mentally Healthy and Mentally Retarded individual.
- Individualized Education Plan for Mentally Healthy and Mentally Retarded individual.
- Visit of nearby School, gather information and prepare a report on healthy mental habits adopted by school teachers for students.

Suggested Readings:

- Aggarwal, R. (2010). *Elementary Guidance and Counselling*. New Delhi: Shipra Publication.
- Arkoff Abe (1968). *Adjustment and Mental health*. New York: Mc Graw Hill Company.
- Bernard, Harold, W. (1952). *Mental hygiene for class-room teachers*. New York: Mc Graw Hill book Co.
- Bonny, M. E. (1960). *Mental Health in Education*. Boston: Allyn and Bacon.
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- Carson, R. C., Butcher, J. N., Mineka, S. (2000). *Abnormal Psychology and Modern Life*. New Delhi: Pearson Education.
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- Ranganathan, N. (Ed.) (2012). *Education for Mental Health*. New Delhi: Shipra publication.
- Sharma, R.N. & Sharma, R. (2013). *Guidance and Counselling in India*. New Delhi: Atlantic Publishers and Distributors Private Limited.
- Suraj, B. &Dutt, N. K. (1978). *Mental Health through Education.* New Delhi: Vision Books Publications
- Thorpe, L. P. (1950). *The Psychological of Mental Health*. New York: The Ronald Press Co.
- Walia, J.S. (2014). *Learner, learning and cognition.* Punjab: Ahim Paul publishers.
- Watkins Ted. R. &Callicut, J. W. (1990). *Mental health: Policy & Practice Today*. New Delhi: Saga Publications.

Year	II	Educational Management and Leadership	Course Credits	4
Semester	IV		Course code	SOE 02 04 06 GEC 3104
Learning Outcomes	At the end of the course, the students will be able to: ● understand the concepts of educational management and leadership. ● develop awareness of various functions of educational management. ● understand various styles of leadership. ● develop some leadership qualities in themselves. ● develop some leadership qualities in themselves. ● understand educational administration in India at local, state and central level.			
Course Content				
Unit -1	**Educational Management: Conceptual Understanding** ● Meaning, Concept, Needs of Educational Management ● Objectives & Scope of Educational Management ● Educational Manager: Functions and Roles ● Professional Ethics			
Unit -2	**School Management and Communication** ● Role and functions of Headmaster/ Principal/ Teacher ● Process, Human Relations Approach to Management. ● Types of Communication ● Barriers of Communication			
Unit -3	**Leadership: traits and skills** ● Meaning and Concept of Leadership ● Difference between Leader and Manager			

	• Leadership Traits and Skills • Functions and Styles of Leadership
Unit -4	**Educational Administrative Bodies in India at National Level: Role & Functions**
	• University Grant Commission (UGC) • National Council of Educational Research and Training (NCERT) • National Institute of Educational Planning and Administration (NIEPA) • Ministry of Human Resource Development (MHRD) • National Council for Teacher Education (NCTE)
Transaction Strategies	Lectures, field visits to various educational institutions, case studies, assignments, discussions etc.

Practicum:

- Compile articles from newspapers, magazines, and internet discussing present policies and operational strategies of central and state Govt. for secondary education. Prepare a report of entire activity.
- Review research on educational management or management of secondary schools which are used in other countries but not in India.
- Evaluation of management of SSA activities in a district.
- Collect data from relevant sources on student &teachers' ratio for secondary level school of your district. Is it according to provision of RTE act? Prepare a report and send it to authorities.
- Examine the effectiveness of any one programme run by central Govt. for secondary students. Present the report in a classroom seminar.

Suggested Readings:

- Altrichter, H. and Elliot, J. (2000). *Images of Educational Change*. England: Buckingham Open University.
- Bhattacharya, D.K. (2001). *Managing People*. New Delhi: Excel Books.
- Bush T., L. B. (2003). *Theprinciples and practice of educational management*, (Edited, Ed.). New Delhi: Sage Publications.

- Bush, T. (2013). *Educational management, administration & leadership*. New Delhi: Sage Publications.
- Chauhan,S.(2012). Educational management. New Delhi: Pearson Publication.
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- Harigopal, K. (2001). *Management of organizational change*. New Delhi: Response Books.
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- Lunenburg,F.C. & Orenstein, A.C.(2012).*Educational administration-Concept &practices*. USA: Wadsworth, Cengage Learning Solutions, Canada.
- McCaffery, P. (2004). *The higher education manager's handbook.* NewYork and Canada: Routledge.
- Nair, S.R. (2004).*Organizational behavior- Texts and cases.* Mumbai: Himalaya Publication.
- Nangia, S.B. (2009). *Educational administration*. New Delhi: APH Publishing Corporation Publishing House.
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- Owens, R.C. (2001). *Organizational behaviour in education.* Boston: Allyn and Bacon.
- Prasad, A. (2007). *Universityeducation administration and the law*, New Delhi: Deep& Deep Publications.
- Punia,V. (2004).*Managerial skills in educational administration.* New Delhi: Deep& Deep Publications Pvt. Ltd.
- Rita, S. (2004). *Assessment and accreditation in higher education.* New Delhi: Association of Indian Universities.
- Sayeed, O. B. and Pareek, U. (2000). *Actualizing managerial roles*. New Delhi: Tata McGraw-Hill Publishing Company Limited.
- Srivastav, A.K. (2009). *Educational administration policy, planning and survey*. New Delhi: Kunal Books.
- Sharma, R. A. (2009). *Educational administration & management.* Meerut: R Lal Book Depot.
- Sindhu, I.S.(2012).*Educational administration & management*. New Delhi: Pearson Publications.

Year	II	Peace Education	Course Credits	4
Semester	IV		Course code	SOE 02 04 07 GEC 3104
Learning Outcomes	At the end of the course, the students will be able to: ● explain the need and importance of peace. ● understand various methods, techniques and approaches of Peace development. ● know the different approaches of peace. ● develop personal initiative and resources for the pursuit and Promotion of peace. ● manage conflict in personal and professional life. ● understand the importance of 'livein harmony'.			
Course Content				
Unit -1	**Concept of Peace** ● Concept and importance of Peace ● Gandhian Concept of Peace ● Gandhiji's contributions to peace movement ● Different Approaches of Peace			
Unit -2	**Peace Education** ● Peace Education: Concept and Scope ● Nature of Peace Education ● Aim and objectives of Peace Education ● Organizations involved in promoting peace Education (UNO, UNESCO)			
Unit -3	**Peace and Conflict** ● Conflict: Meaning and characteristics ● Types of Conflict			

	• Process of Conflict • Peace and Conflict Management
Unit -4	**Pedagogy of Peace Education**
	• Approaches and Techniques for PeaceEducation: - Roll Playing, value-based Storytelling • Group activities (literary activities, games and sports, service activities) • Counselling, organizing value based co-curricular activities
Transaction Strategies	Lecture cum discussion, Tutorials, Brainstorming Session, Use of PPTs, Assignments on different key areas of Peace related issues.

Practicum:

- Seminar and group discussion on importance peace in the class.
- Chart preparation on various Peace Education.
- Reflection on various conflicts in day-to-day life.
- Organize mock activities on working of UNO for Peace Education.

Suggested Readings:

- Arulsamy, S. (2016). *Peace and value education.*New Delhi: Neelkamal Publication.
- Barash, P. David (2000). A*pproaches to peace*. New York: Oxford University Press.
- Charles, K., &Selvi, A. (2016). *Peace and value education.*New Delhi: Neelkamal Publication.
- Gandhi, M.K. (1944). *Non-violence in peace and war.* Ahmedabad: Navajivan Publishing House.
- Kapani, M. (2000). *Education in human values – concept and practical implications*. New Delhi: Sterling Publishers.
- National Curriculum Framework (2005).*National Focus group on Education for Peace*. New Delhi: NCERT.
- Pandey, S. (2004). *Education for peace, self-instructional package for teacher education*. New Delhi: NCERT.
- UNESCO (2001).*Learning the way of peace, "a teacher guide to education for peace*". UNESCO.

Web Sources

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- *Peace Education.* Retrieved from www.bdu.ac.in/cde/docs/ebooks/B-Ed/II/PEACE%20EDUCATION.pdf
- *The Five Steps to Conflict Resolution.*Retrieved from https://www.amanet.org/training/articles/the-five-steps-to-conflict resolution.aspx
- *Conflict management*. Retrieved from https://www.managers.org.uk/knowledge-bank/conflict-management
- *Importance of Peace* Retrieved from *cejsh.icm.edu.pl/cejsh/element/bwmeta1.element.ojs-doi.../10472-10011.pdf*
- शान्तिकामहः व .Retrieved from *https://www.jagran.com/editorial/apnibaat-the-importance-of-peace 10751783.htmlhttps://www.quora.com/What-is-the-importance-ofpeace-in-our-life-Why-and-how-do-you-achieve-it*
- *Peace education: definition, approaches, and future directions.* Retrieved from *http://www.eolss.net/sample-chapters/c04/e1-39a-06.pdfhttps://unesdoc.unesco.org/ark:/48223/pf0000150262https://dialog1.webs.com/sejv2i1/samwaad_2.pdf*

SEMESTER-III

M.Ed.

Year	II	TEACHER EDUCATION	Credits	4
Semester	III		Course code	SOE 01 03 12 C 3104
Learning Outcomes	**After the completion of this course the students will be able to:** ● Explain the Concept, Need and Importance and development of Teacher Education. ● Understand the structure, Curriculum and Modes of Pre-Service Teacher Education ● Exhibit the various components of Professional Growth of Teachers. ● Reflect on various Agencies of Teacher Education and categorise various Challenges in teaching profession			
Course Content				
Unit-1	**Introduction to Teacher Education** ● Meaning, Nature and Scope of Teacher Education; Types of Teacher Education Programs. (ONLINE) ● Committees and Commissions contribution to Teacher Education: Kothari Commission Report (1964-66), NCF (2005) and NCFTE (2009), Justice Verma Commission Report (2012). (Both NEP and Online)			
Unit-2	**Structure, Curriculum and Modes of Pre-Service Teacher Education** ● Pre- Service Teacher Education: Concept, Nature, Objectives at different levels. (online) ● Components of Pre-Service Teacher Education: Foundation Courses, Subject Specialization and Pedagogy, School based Practicum and Internship. ● Reflective Teaching and Strategies for promoting reflective teaching.			

Unit-3	**Structure and Modes of In-service Teacher Education** ● In-service Teacher Education; concept, Need, Objectives and areas of Professional development. ● **Types of In-Service courses for Teachers; Orientation and refresher Courses, workshops, seminars, Internship and Summer Institutes. (online)** ● Modes of In-service teacher education; Induction, Cascade, School based, Face to face, Distance and online mode.
Unit-4	**Teaching as a Profession, Agencies of Teacher Education** ● **Agencies of Teacher Education and their functions: DIET, SCERT, NCERT, NCTE.(Both online and NEP)** ● Profession and Professionalism, Teaching as a profession, Professional ethics of a teacher. ● Challenges of teacher education in the 21st Century.
Teaching learning process/Transaction Strategies	Lecture cum Discussion, Debates, illustrations, presentations, Projects Method, E-learning, assignments on different key areas, panel discussion, brainstorming sessions.
Field Trip:	DIET/SCERT/NCERT
Practicum (Assignment on any one of the following):	● Prepare a report on the role of various central and state agencies in Teacher Education. ● Visit DIET/SCERT/NCERT and prepare a note on its functions. ● Attend any program related to in-service teacher education programs and write a report on it.

Suggested Readings:

- Batra, P. (2014). Problematizing teacher education practice in India: Developing a research agenda. *Education as Change. 18,* 5- 18.
- Behari, A. & Menon, S. (2009). *National Curriculum Framework 2005: Implications for Teacher Education.*
- Cochran, S. M. (2008). *Handbook of research on teacher education: Enduring questions in changing contexts* (3). New York: Routledge.
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- Kohli, V.K. (1992). *Teacher education in India.* Ambala: Vivek Publishers.\
- Kumar, K. (2005). *Political agenda of education: A study of colonialist and nationalist ideas* (2nd ed.). New Delhi: Sage Publications.
- Linda D. H. & John B. (2005). *Preparing teachers for a changing world*. Jossey-Bass, San Francisco.
- Mangla, S. (2000). *Teacher Education: Trends and Strategies*. New Delhi: Radha Publishing.
- MHRD (1985). *Report of the National Commission on Teachers* (1983-85). New Delhi: Govt. of India.
- MHRD (1986). *National Policy of Education and Program of Action*. New Delhi: Govt. of India.
- MHRD (1992). *Program of Action*. New Delhi: Department of Education, Govt. of India.
- MHRD (2012). *Vision of teacher education in India: quality and regulatory perspective*. New Delhi: Govt. of India.1 & 3.
- M. A. Siddiqui, A. K. Sharma & G. L. Arora (Eds). *Teacher Education: Reflections towards Policy Formulation*. New Delhi: NCTE.
- NCERT (2006). *Position paper on teacher education*. New Delhi: National Council for Educational Research and Training.
- NCTE (2009). *National curriculum framework for teacher education: Towards preparing professional and humane teachers*. New Delhi: NCTE.
- Null, J. W. & Bohan, C.H. (2005). Teacher education curriculum: what, how and why. *Curriculum and teaching dialogue* pp.39-49.
- National Curriculum Framework (2005), NCERT, New Delhi.
- National Curriculum Frameworks for Teacher Education (2009). *Towards preparing professional and humane teachers.* NCTE, New Delhi. Retrieved fromhttps://ncte.gov.in/Website/PDF/NCFTE_2009.pdf.
- National Policy on Education (1986), Govt. of India, Department of Education, MHRD,
- New Delhi retrieved from https://mhrd.gov.in/sites/upload_files/mhrd/files/document- reports/NPE86-mod92.pdf.
- NCERT (2006). *The reflective teacher: Organisation of in-service training of the teachers of elementary schools under SSA, Guidelines.*
- NCTE (1998). *Competency based and commitment oriented teacher education for quality school education: Pre-service education.* NCTE, New Delhi.
- NCTE (1998). *Policy perspective in teacher education- critique and documentation*. NCTE, New Delhi
- Pollard, A. (2002). *Reflective teaching: Effective and evidence informed professional practice*. London: Continuum.
- Purnima, K. (2018). *Teacher education in 21st century. ND:* APH Publishing Corporation.
- Sharma (2017). *Teaching effectiveness. ND:* APH Publishing Corporation.
- Sharma, R.A. (2005). *Teacher Education*. Meerut: Loyal Book Depot.
- Sharma, S.P. (2005). *Teacher Education*. New Delhi: Kanishka Publishers.
- Shrimali .K.L (1954). *Better teacher education*. New Delhi: Ministry of Education Govt. of India.
- Sikula, J., Buttery, T. J. & Guyton, E. (Ed.) (1996). *Handbook of Research on Teacher Education*. USA: Macmillan.http://tanvirdhaka.blogspot.com/2011/01/models-of-teacher-education.html
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Web-Resources

- **https://nroer.gov.in/home/file/readDoc/59835ecf16b51cc4c4db285a/academic-support-structures-like-nuepa-ncert-scert-siemat-diet.pdf**

- **https://files.eric.ed.gov/fulltext/EJ1056080.pdf**
- **http://dspace.vpmthane.org:8080/jspui/bitstream/, https://schooleducation.mizoram.gov.in/uploads/attachments/http://ddceutkal.ac.in/Syllabus/MA_Education/Paper-4.pdf**
- **https://www.researchgate.net/publication/248607615pdf**
- **http://www.ncert.nic.in/rightside/links/pdf/framework/english/nf2005.pdf**
- **https://ncte.gov.in/Website/PDF/NCFTE_2009.pdf**

Year	**II**	**Inclusive Education**	**Credits**	**4**
Semester	**III**		**Course code**	**SOE0103 13 C3014**
Learning Outcomes	**After the completion of this course, the students will be able to:** ● Explain the concept of inclusive education ● Describe the role of various agencies on inclusive education ● Evaluation of various resources for children with special abilities and needs for inclusion ● Reflect on the implementations of policies and program for children with special needs and abilities			
Course Content				
Unit-1	**Inclusive Education for Children with Diverse needs** ● Introduction to Inclusive Education: Definition, concept and importance of Inclusive Education. • Concept of Access, Equity, Diversity, Human Rights & Social Justice. • Evolution of the Philosophy of Inclusive Education: Special, Integrated, Inclusive Education • Readiness of School, Principles and Models of Inclusion ● Definition and characteristics of children with sensory (hearing, visual and physically challenged) ● Intellectual (gifted, talented and children mentally challenged children), ● Developmental disabilities (autism, cerebral palsy, learning disabilities), social and emotional problems, scholastic backwardness, under-achievers, slow learners and other marginal groups.			
Unit-2	**Provisions, Trends and Issues in Inclusive Education:-(online)** ● The World Declaration on the Survival, Protection and Development of Children and the Plans of action			

	(Outcome of the UNICEF World Summit for Children, (1990). ● The Asian and Pacific decade of Disabled Persons, 1993-2002, The World Conference on Special needs Education and the Salamanca Statement and framework for action on Special Needs Education. • Legal Provisions: Policies and Legislations (National Policy of Education (1986), Programme of Action (1992) Persons with Disabilities Act (1995), National Policy of Disabilities (2006), National Curriculum Framework (2005). • Rehabilitation Council of India Act (1992), Inclusive Education under SarvaShikshaAbhiyan (SSA). • The National Trust for the welfare of Persons with autism, cerebral palsy, mental retardation and Multiple Disabilities Act, 1999.
Unit-3	**Identification of Diverse Learners, Planning and Management of Inclusive Education (NEP)** ● Approaches to Evaluation and Identification of Diverse Learners for Inclusion ● Educational Evaluation : Meaning, Methods, Tools and Techniques ● Planning and Management of Inclusive Classrooms: material resources, Human Resource and Instructional Practices, Curriculum and Curricular Adaptations for Diverse Learners ● Practices and Classroom Management: Seating arrangement, whole class teaching, collaborative Teaching, activity based Learning, Pear tutorial and cooperative Learning.
Unit-4	**Resources and Facilitators of Inclusion- Assistive /Adaptive Technology:-** ● Assistive and Adaptive Technology for Diverse learners: Product (Aids and Appliances) and Process (Individualized Education Plan (IEP), Remedial Teaching). ● Therapeutic Interventions: Need and Scope, Use of Information Communication Technology (ICT) in inclusive classroom) Facilitators for Inclusive Education ● Parent – Professional Partnership: Role of Parents, Peers, Professionals, School Management & Community. ● Role Responsibilities of General, Special and Resource Teachers, Skills & Competencies among Inclusive school teachers.
Teaching learning process/Transaction Strategies	Field visits and projects, discussions on policies and programs, action research, observation schedules to observe various institutions for provision of inclusive education , designing awareness programs
Evaluation Strategies	**Tasks and Assignments : The students may undertake any two of the following activities:** ● Field visit to school/institutions promoting inclusive practices and discussion with teachers and observation and analysis of teaching learning practices. ● Analysis of policy document (national, international) related to diversity. ● Critical review of policy and practice and panel discussion by a group of students.

	• Visit to special, integrated and inclusive classrooms .Reflective journal writing. • Make a list of existing resources in the local area and discuss their use and limitations based on survey of five inclusive schools.

Suggested Readings:

- Ainscow, M., Booth, T. (2003). *The index for inclusion: developing learning and participation in schools*. Bristol: Center for Studies in Inclusive Education.
- Ahuja. A; Jangira, N.K. (2002). *Effective teacher training; cooperative learning based approach.* New Delhi National Publishing house.
- Bartlett, L. D. and Weisentein, G. R. (2003). *Successful inclusion for educational leaders.* New Jersey: Prentice Hall.
- Daniels, H. (1999). *Inclusive Education.* London: Koegan.
- Deiner, P. L. (1993). *Resource for teaching children with diverse abilities*. Florida: Harcourt Brace and Company.
- Gartner, A. &Lipsky, D. D. (1997). *Inclusion and school reform transferring america's classrooms.* Baltimore: P. H. Brookes Publishers.
- Gore, M. C. (2004). *Successful inclusion strategies for secondary and middle school teachers,* Crowin Press: Sage Publications.
- Hegarthy, S. & Alur, M. (2002). *Education of children with special needs: from segregation to inclusion.* Corwin Press: Sage Publishers.
- Hollahan and kauffman (1978). *Exceptional Children: An Introduction to Special Education.* India: Prentice Hall.
- Jha, M. M. (2002). *School without walls: inclusive education for all.* Oxford: Heinemann Education.
- Jangira N.K. and Mani, M.N.G. (1990). *Integrated education for visually handicapped.* Gurgaon, Old Subjimandi, Academic Press.
- Karten, T. J. (2007). *More inclusion strategies that work*. Corwin Press, Sage Publications.
- King Sears, M. (1994). *Curriculum based assessment in special education.* California, Singular Publications.
- Panda, K. C. (1997). Education of Exceptional Children. New Delhi: Vikas Publications.
- Rangasayee, R.& Gathoo, V. (2007). *Towards inclusive education of children with hearing impairment*: *a hand book for regular school teachers.* AYJNIHH Publishers.
- Rayner, S. (2007). *Managing special and inclusive education*. Sage Publications.
- Ryandak, D. L. &Alper, S. (1996). *Curriculum content for students with moderate and severe disabilities in inclusive* Setting.
- Sedlak, R. A. & Schloss, P. C. (1986). *Instructional methods for students with learning and behaviour problems*.
- Allyn, Bacon, Stow L. & Selfe, L. (1989). *Understanding Children with Special Needs.* London Unwin Hyman.
- Sharma, P.L. (1990). *Teachers handbook on helping children with special needs.* N.C.E.R.T Publication.
- Sharma P.L (2003). *Planning inclusive education in small schools*. RIE. Mysore
- Turnbull, A., Turnbull, R. Turnbull, M., & Shank, D. L. (1995). *Exceptional lives: special education in today's schools.* (2). New Jersey Prentice Hall. Inc.
- Vlachou D. A. (1997). *Struggles for inclusive education: an ethnographic study*. Philadelphia, Open University Press.

Year	II	Internship	Credits	4
Semester	III		Course code	SOE 01 03 14 C0044
Learning Outcomes	**After the completion of this course, the students will be able to:** ● Develop nuanced understanding of pedagogical practices and programme structures in institutes and other sites. ● Understanding about children's thinking and learning processes, and their relationships. ● Refine skills of interpersonal interactions with young children. ● Critically reflect upon the field experiences and link them with theoretical constructs.			
Course Content				
Brief description of internship:	Internship have been designed to deepen students' engagement with education as praxis and to develop professionals who understand the interrelationship between the theory and practice in the 'field' which includes development sector, state functionaries, centrally sponsored schemes and initiatives among others. During this field attachment, students will be placed at a field site for three weeks. This prolonged engagement will enable students to gain an "insider-outsider" perspective to the field and critically engage with questions around equity, quality and social justice related to learning and development of young children.			
Assessment Details: **Suggested Internship activities**	**Concerned supervisor will evaluate the internship activities of students. The activities will depend upon the situation of COVID-19. If a normal situation prevails then students will do internships related to teacher training institutes. Otherwise students will do online internship activities.** 1. Collaborative small projects in community 2. Action Research 3. Study of one Moodle/ LMS 4. One course of their interest on swayam 5. preparing small module related to their subjects 6. Observation of B. Ed Plan 7. Interview of teachers working in schools 8. Webinar			

	9. Content review of website 10. Attend live lectures on facebook or any other social media 11. Video analysis of NCERT of content 12. Analysis of website of innovative schools- Doon School, Digenter, Rishi Valley- Compulsory 13. Challenges and Opportunity in COVID-19- interview of 5 people 14. Video presentation – on any relevant topic of teacher education 15. Challenges and Opportunity in COVID-19- for study- interview of 5 students of schools/university

Year	II	Dissertation Part-II	Credits	4
Semester	III		Course code	SOE 01 03 15 C0044
Learning Outcomes		**After the completion of this course, the students will be able to:** ● Critically read, understand and evaluate the latest literature and research process ● Exhibit skills for selecting appropriate research methods ● Demonstrate a comprehensive understanding of techniques critical to scholarship in the field ● Communicate clearly and effectively to specialist and non-specialist research		

ELECTIVE COURSES

Year	II	INSTITUTIONS, SYSTEMS AND STRUCTURES	Credits	4
Semester	III	(ELEMENTARY LEVEL)	Course code	SOE01 03 08 DCEC 2002
Learning Outcomes		**After completion of the course, students will be able to:** ● Explain the role of various institutions and institutional planning in education at the elementary stage ● Reflection on the recommendations of various commissions and committees.		
Course Content				
Unit-1		**Introduction: Elementary Education** ● Indigenous system of Elementary Education, Objectives of Elementary Education ● Recommendations of various committees and commissions: Secondary Education Commission, Kothari commission, NPE – '1986, POA 92, Rama Murthy Committee, Yashpal, Committee and NCF-2005., NEP 2020: Pedagogical and curricular structuring (online & NEP)		
Unit-2		**Educational Management and Institutional planning at Elementary level** ● National Level , State Level and District Level Ministry of Education (MoE) CABE-NCERT-RIE NIEPA, NCTE, CIET State Level and District Level : Ministry of School Education ii. Directorate of School Education iii. Board of Education iv. SCERT – SSA – SIET – SRC – SIEMAT ,District Education Administration –DEO, Dy. DPO (SSA) . ● Concept, scope and nature of Institution Planning ,Need and importance of Institution Planning Types of Institution Planning (online)		
Teaching learning process/Transaction Strategies		Lecture cum discussion, Use of PPT, Assignments on various topics, Lecture cum demonstration, In depth analysis of various education commissions, debate on elementary Education.		

Practicum	• Conduct a play to illustrate recommendations of various committees on elementary education. • Organize a Seminar on indigenous system of elementary education. • Visit any two schools and find out innovative teachers. Prepare a detailed report on their innovation. • Prepare a yearly plan for school after reviewing all the activities of the school. • Design an instructional plan of a unit in a subject at elementary level.

Suggested Readings:

- Celin R. (1984). *The study of elementary education and resource book.* Vol. I.
- Government of India (1986). *National policy on education*. New Delhi: MHRD.
- Government of India (1987). *Programme of action*. New Delhi: MHRD
- Government of India (1987). *Report of the committee for review of national policy on education.* New Delhi: MHRD.
- Hayes, Denis (2008). *Elementary teaching today: an introduction*. Routledge Publications,
- U.K. Hurlock, E. (1995). *Child development*. USA Kabra: McGraw Hill Book Company.
- K.M. (1977). *Planning process in a district*. New Delhi: Indian Institute of Public Administration.
- Kurrian, J. (1993). *Elementary education in India.* New Delhi: Concept Publication.
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- Mohanty, J. N. (2002). *Elementary and elementary education.* Deep & Deep Publications. New Delhi
- National Curriculum Framework (NCF)-2005 NCERT New Delhi.
- Rao, V.K. (2007). *Universalization of elementary education*. New Delhi: Indian Publishers.
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- Sharma, R. N. (2002): *Indian education at the cross road*. Shubhi Publications.
- Tilak, J.B. (1992). *Educational planning at gross roots.* New Delhi.
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- NCERT (2005). *National curriculum framework*, New Delhi.
- NCTE, (2004). *Teacher education curriculum*. New Delhi.
- Singh, L.C. (Ed.) (1987). *Teacher education – a resource book.* NCERT, New Delhi.
- The Study of Elementary Education – A Source Book. (1984). Volume I & II, 1984.
- Victor & Learner. (1971). *Readiness in science education for the elementary school*, McMillan Co., N.Y.
- UNESCO (2006). *Teachers and educational quality: monitoring global needs for 2015*. UNESCO Publication. Montreal

Year	II	INSTITUTIONS, SYSTEMS AND STRUCTURES (SECONDARY LEVEL)	Credits	4
Semester	III		Course code	SOE01 03 09 DCEC 2002
Learning Outcomes		**After completion of the course, students will be able to:** ● Understand the system of secondary and senior secondary education in India. ● Critically evaluate the role of teacher in institutional planning and execution		
Course Content				
Unit-1		**System and Structure of Secondary Education in India** ● Meaning, aims ,objective of Secondary education ● Structure of secondary education in India in the overall structure of education ● System of Secondary Education in India – Pre and Post independence • Macaulay's Minute of 1835 • The Dispatch of 1854 • Sargent Report 1944 ● Nai Talim **(online)** ● Secondary Education Commission (1952-53) **(online)** • Kothari commission (1964-66) ● Secondary Education and National Policy on education(1986) **(online)**		
Unit-2		**Conceptual Understanding of Institution Planning** ● Meaning, nature and scope of Institution Planning ● Purposes of Institution Planning ● Need and importance of Institution Planning ● Steps for preparing an effective Institution Plan ● Role of a teacher in Institution Planning		
Teaching learning process/Transaction Strategies		**Tasks and Assignment: any two of the following:** Lecture cum discussion, Use of PPT, Assignments on various topics, Lecture cum demonstration, In depth analysis of various education commissions, debate on Secondary Education and National Policy on education, Ask pupils to prepare an effective Institution Plan for secondary school by the student teachers and presentations will be		

	encouraged. *** In addition, school and community based activities may be organised**

Suggested Readings:

- Aggarwal. J., C., (2018). *Landmarks in the history of modern indian education.* New Delhi: Vikas Publishing house.
- Buch, M.B (1969), *Institutional planning for improvement and development*, RCE: Bhopal.
- Dash & Dash (2008). *School management.* New Delhi: Atlantic Publishers and Distributers Pvt. Ltd.
- Govt. of India (1953). *Report of secondary education commission.* New Delhi
- Govt. of India (1996). *Indian education commission*. (1964-66) Report. New Delhi
- Govt. of India - (1986/1992). *National policy of education*. 1992 Modification and their POA's, MHRD, Dept. of Education
- Govt. of India, MHRD (2005). *Universalisation of secondary education: report of the CABE committee.* New Delhi
- Government of India, (2005). Report of the Council of Advisory Board on Education (CABE) Committee on '*Universalizing secondary education'*. Retired from www.education.nic
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- Lewin, K.M. (2008b). *Secondary education in India: Managing expansion with affordable costs*. Policy Guidance Note for MHRD, GOI, New Delhi
- Malhotra, P.L. (1986). *School education in India: present status and future needs* NCERT, New Delhi.
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- MHRD Government of India (2010). *Centrally sponsored schemes in secondary education.* Retired fromhttp://education.nic.in/secedu/secondary.htm.
- Mishra, A., D., (2015). *Mahatma Gandhi on education.* New Delhi: Vikas Publishing house.
- Mishra, V. & Pundir, V. (2011). Institutional planning: The working principles. *International Journal of Multidisciplinary Research;* 1(6), 238 – 252.
- Mohanty, J. (1990). *Educational administration, supervision and school management.* Deep & Deep Publications F-159, Rajouri Garden, New Delhi-110.
- Mudhopadyay, S. & Kumar K. A. (2001). *Quality profiles of secondary schools.* NIEPA, New Delhi
- MacBeth, J. (1999). *Schools must speak for themselves.* Routledge, UK
- Naik, J.P (1968). *The role of teachers in educational planning and development*, RCE Bhopal.
- NSSO (2010). *Education in India: 2007-08–Participation and Expenditure*. 64thRound (July 2007-June 2008), Ministry of Statistics and Programme Implementation, GOI, New Delhi.
- Planning and Development Department [PPD]. (2016). *About the planning and development department* [PPD]. Retired from: http://mak.ac.ug/university-services/planning-and-development-department.
- National Policy of Education 1986/1992.
- National Curriculum Framework on school education, (2005).
- Report of the Education Commission (1964-66).
- Report of the Delors Commission, UNESCO, 1996
- Yadav, M.S. & Lakshmi, T.K.S. (2003). *Conceptual inputs for secondary teacher education: the instructional role*. India, NCTE.

Web-Resources

- https://www.oercommons.org/courseware/lesson/60861
- https://www.oercommons.org/courses/careers-in-education-model
- https://www.oercommons.org/courses/curriculum-standards
- https://www.oercommons.org/courses/ict-essentials-unit-02-ict-curriculum
- https://www.oercommons.org/courses/curriculum-studies
- https://www.oercommons.org/courses/curriculum-video-collection
- https://www.oercommons.org/courses/goopen-phase-3-putting-in-place-a-robust-infrastructure-for-learning
- https://www.jstor.org/stable/1503555

Year	II	STAGE SPECIFIC STATUS, ISSUES AND CONCERNS (ELEMENTARY LEVEL)	Credits	2
Semester	III		Course code	SOE010318C2002
Learning Outcomes	**After completion of the course, students will be able to:** ● Understand the historical perspective of elementary education and reflection on various programmes implemented in India in context of school education ● Analyse the various issues and concerns at elementary level			
Course Content				
Unit-1	**Elementary school education in India: Aims, historical perspective and structure** ● Historical perspective of elementary education system in India, Aims and objectives of elementary school education ● School – concept, need & role and structures of school education ● UEE, District Elementary Education Programme & RTE Act,2009. (ONLINE) ● EFA Global Monitoring Report (UNESCO, 2005: 142) (ONLINE)			
Unit-2	**Major issues in elementary school education** ● Students strength , Mid-Day meal, PTA ,SMC, Role of head of institution and teacher ● Infrastructure: school building, sport ground ,NEP 2020: Vocationalisation, Tackling the issues of elementary education (ONLINE & NEP)			
Teaching learning process/Transaction Strategies	Lecture cum discussion, Use of PPT, Assignments on various topics, Lecture cum demonstration, In depth analysis of various education commissions, debate on elementary Education.			
Practicum	**Tasks and Assignment: any two of the following** ● Study of Annual report of annual report or any Govt. school to identify issues of elementary education in India ● Prepare a report on major obstacles and challenges in elementary education. ● Prepare an annual school calendar for elementary education. ● In a recent book, journal, or article available on the internet, find a proposal for a basic reform or restructuring in the public/Govt./private elementary education. ● Organize a Debate on the best approach to planning and Skill for effective management in elementary education. ● Any other suggestions by teacher education.			

Suggested Readings:

- Government of India (1986). *National policy on education*. New Delhi: MHRD.
- Government of India (1987). *Programme of action.* New Delhi: MHRD

- Government of India (1987). *Report of the committee for review of national policy on education*. New Delhi: MHRD.
- Hayes, D. (2008). *Elementary teaching today: An introduction.* Routledge Publications,
- K.M. (1977). *Planning process in a district.* New Delhi: Indian Institute of Public Administration.
- Kurrian, J. (1993). *Elementary education in India.* New Delhi: Concept Publication.
- Lewis, Ramón (2008). *Understanding pupil behaviour*. U.K: Routledge Publications.
- Mohanty, J. N. (2002). *Elementary and elementary education.* Deep & Deep Publications. New Delhi
- National Curriculum Framework (NCF)-(2005) NCERT New Delhi.
- NCERT (1987). *In-service teacher education package for elementary school teachers.* New Delhi.
- NCERT (1991). *Elementary teacher education curriculum, guidelines and syllabi*. New Delhi.
- NCERT (2005). *National curriculum framework.* New Delhi.
- NCTE, (2004). *Teacher education curriculum.* New Delhi.
- Rao, V.K. (2007). *Universalization of elementary education*. New Delhi: Indian Publishers.
- Rita Chemicals (2008). *Engaging pupil voice to ensure that every child matters: a practical guide*. David Fultan Publishers.
- Singhal, R.P. (1983). *Revitalizing school complex in India,* New Delhi.
- Sharma, R. N. (2002). *Indian education at the cross road.* Shubhi Publications. .
- Singh, L.C. (1987). *Teacher education – A resource book.* NCERT, New Delhi
- Tilak, J.B. (1992). *Educational planning at gross roots.* New Delhi
- U.K. Hurlock, E. (1995). *Child development*. USA Kabra: McGraw Hill Book Company.

Year	II	STAGE SPECIFIC STATUS, ISSUES AND CONCERNS (SECONDARY LEVEL)	Credits	2
Semester	III		Course code	SOE010319C2002
Learning Outcomes	**After completion of the course, students will be able to:** ● Explain the status and structure of secondary education in India ● Reflection on various contemporary issues and concerns in secondary education in India			
Course Content				
Unit-1	**Status of Secondary Education in India** ● Aims and objectives of Secondary school education ● Historical perspective of Secondary stage education system in India ● Constitutional obligation related to Education (With special reference to Secondary Education) **(online)** ● Present status of Secondary Education **(online)**			
Unit-2	**Issues and concerns of Secondary Education** ● Vocationalisation of Secondary Education ● Quality issues and concerns of Secondary Education ● Problem and reforms in examination system **(online)** ● Role of PTA and SMC's in Secondary Education. **(online)** ● Role of Principal and Teachers in the development of Secondary Education **(online)**			
Teaching learning process/Transaction Strategies	Lecture cum discussion, Use of PPT, Assignments on various topics, Lecture cum demonstration, In depth analysis of various education commissions, debate on issues and concerns of Secondary Education,. *** In addition, school and community based activities may be organised.**			

Suggested Readings:

- Aggarwal. J., C., (2018).*Landmarks in the history of modern Indian education.* New Delhi: Vikas Publishing house.
- Buch, M.B (1969). *Institutional planning for improvement and development*, RIE: Bhopal.
- Dash & Dash (2008). *School Management*, New Delhi: Atlantic Publishers and Distributers Pvt. Ltd.
- Govt. of India (1953). *Report of secondary education commission.* New Delhi
- Govt. of India (1996). *Indian education commission* (1964-66) Report. New Delhi
- Govt. of India - (1986/1992). *National policy of education.* Modification and their POA's, MHRD, Dept. of Education
- Govt. of India, MHRD (2005). *Universalisation of secondary education : Report of the CABE committee*, New Delhi

- Government of India, (2005). *Report of the council of advisory board on education (CABE) committee on universalizing secondary education.* Retired from: www.education.nic
- Kochhar, S.K (2007).*Secondary School Administration*. New Delhi: Sterling Publishers Pvt. Ltd.
- Lewin, K.M. (2008b). *Secondary education in India: Managing expansion with affordable costs*. Policy Guidance Note for MHRD, GOI, New Delhi
- Malhotra, P.L. (1986) School Education in India: Present Status and Future Needs NCERT, New Delhi.
- Malhotra, P.L. (1986). *School education in India: Present status and future needs,* New Delhi:NCERT.
- MHRD Government of India (2010). *Centrally sponsored schemes in secondary education*. Retired from: http://education.nic.in/secedu/secondary.htm.
- Mishra, A. D. (2015). *Mahatma Gandhi on education.* New Delhi: Vikas Publishing house.
- Mishra, V. & Pundir, V. (2011). Institutional planning: The working principles. *International Journal of Multidisciplinary Research;* 1(6), 238 – 252.
- Mohanty J. (1990). *Educational administration, supervision and school management.* Deep & Deep Publications F-159, Rajouri Garden, New Delhi-110.
- Mudhopadyay, S., & Kumar, K. A. (2001). *Quality profiles of secondary schools.* NIEPA, New Delhi
- MacBeth, J. (1999). *Schools must speak for themselves.* Routledge, UK
- Naik, J.P (1968). *The role of teachers in educational planning and development,* RCE Bhopal.
- NSSO (2010). *Education in india: 2007-08–participation and expenditure*. 64thRound (July 2007-June 2008), Ministry of Statistics and Programme Implementation, GOI,New Delhi.
- Planning and Development Department [PPD]. (2016). *About the planning and development department* [PPD]. Retired from: http://mak.ac.ug/university-services/planning-and-development-department.
- National Policy of Education 1986/1992.
- National Curriculum Framework on school education, 2005.
- Report of the Education Commission (1964-66).
- Report of the Delors Commission, UNESCO, 1996
- Yadav, M.S. & Lakshmi, T.K.S. (2003). *Conceptual inputs for secondary teacher education: the instructional role.* India, NCTE.

E-Resources

- https://www.oercommons.org/courseware/lesson/60861
- https://www.oercommons.org/courses/careers-in-education-model
- https://www.oercommons.org/courses/curriculum-standards
- https://www.oercommons.org/courses/ict-essentials-unit-02-ict-curriculum
- https://www.oercommons.org/courses/curriculum-studies
- https://www.oercommons.org/courses/curriculum-video-collection
- https://www.oercommons.org/courses/goopen-phase-3-putting-in-place-a-robust-infrastructure-for-learning
- https://www.jstor.org/stable/1503555

Generic Elective Course (GEC)

<table>
<tr><td>Year</td><td>II</td><td rowspan="2">ART OF TEACHING</td><td>Credits</td><td>4</td></tr>
<tr><td>Semester</td><td>III</td><td>Course code</td><td>SOE010304GEC3014</td></tr>
<tr><td colspan="2">Learning Outcomes</td><td colspan="3">After completion of the course, students will be able to:

● Understand the concept, principles, maxims of teaching and factors influence the teaching- learning process.
● Acquainted with the concept of communication process and its elements, types and barriers
● Understand the techniques and practices used to improve teaching learning process.
● Gain knowledge of various teaching aids and also their significance in transaction of the relevant content.
● Comprehend the characteristics of an effective teacher and realize teaching as a profession.</td></tr>
<tr><td colspan="5">Course Content</td></tr>
<tr><td colspan="2">Unit-1</td><td colspan="3"><u>Understanding of Teaching - Learning Process</u>

● Teaching: Concept, principles, types, and maxims of teaching
● Learning: Concept, and prerequisite relationship of Teaching-Learning and Characteristics of Teaching
● Characteristics of Learning and Factors influencing Teaching & Learning
● Phases of Teaching</td></tr>
<tr><td colspan="2">Unit-2</td><td colspan="3"><u>Communication</u>

● Communication: Meaning and Concept
● Elements of Communication
● Process of Communication
● Types of Communication: Verbal Communication & Non-verbal Communication, Interpersonal, Intra-personal communication, Group and Mass, etc.
● General barriers to Communication
● Ways and means of developing communication</td></tr>
</table>

Unit-3	**Techniques and Practices of Teaching** ● Motivation: Concept and its need and Importance and Types ● Ways and Techniques of Enhancing Learner's Motivation ● Role of Motivation in Teaching – Learning Process ● Micro Teaching: Concept, Objectives, and its need and Importance ● Preparation of lesson plan, and Practices of Skills (Skill of Questioning, and Explanation). ● Need and importance of Aids and its types ● Preparation and use of Teaching aids, Traditional: Black Board, Charts, Models, etc. ● Modern Teaching Aids: ICT, web and video conferences, Power Point Presentation, Presentation Tube, etc. ● Preparation and Presentation of Teaching aids (Practical)
Unit-4	**Teaching as a Profession** ● Teaching as a Profession; Characteristics of an effective teacher () ● Role, Accountabilities and Ethics of a teacher towards teaching Profession ● Approaches of Teaching: Learner centered and teacher centered, various methods and techniques employed in teaching (Group discussion; Brain storming, Collaborative and cooperative teaching, etc.) ● Classroom Management: Teacher as Facilitator (Heterogeneous classroom, Styles of learning, etc.)
Teaching learning process/Transaction Strategies	The content of the course would be transacted through lectures, group discussion, self-study, and seminar/presentations by students.
Practicum	**Each student has to undertake the following activities:** ● Preparation of Teaching aids ● Preparing a lesson plan on any topic and also presented in the class ● Preparation and Presentation of Micro lessons under certain skills ● Group Discussion and seminars presentation through collaboratively

Suggested Readings:

- Anderson, J.R. (1983). *Rules of the mind*. Hillsdale, NJ: Erlbaum
- Barry and Johnson (1964). *Classroom Group Behaviour*. New York: Macmillan.
- Bower, G.H. and Hilgard, E.R. (1981). *Theories of learning*. New Jersey: Prentice Hall Inc. Englewood Cliffs.
- Dash, B.N. (2014). *Psychology of teaching learning process*. New Delhi: Dominant Publishers & Distributors Pvt. Ltd.
- Dececo, J.P. (1977). *The Psychology of learning and instruction*. Delhi: Prentice Hall
- Eason, M.E. (1972). *Psychological foundation of education*. New York: Holt Rincehart and Winston

- Grammage, P. (1990). *Teacher and pupil: some socio-psychological principles and applications* (3rd Edition) Illinois: Scott. Pressman Little, Brown Higher Education.
- Guilford, J.P. (1967). *Nature of human intelligence. New York*: McGraw Hill

SEMESTER IV

Year	II	RECENT TRENDS IN TEACHER EDUCATION	Credits	4

Semester	IV		Course Code	SOE01 04 16 C 3104
Learning Outcomes		**After the completion of the course, the students will be able to:** ● Explain the Historical Development of Teacher Education in India. ● Categorize the Initiatives for Professional Development of Teachers ● Develop the Ethics, Competency and Accountability among teachers ● Construct ideas to tackle the emerging issues in teacher education and demonstrate the uses of various Digital initiatives		
Course Content				
Unit-I		**Historical overview of Teacher Education** ● Development of Teacher Education Pre-Independence: Hunter Commission (1882), Sadlar Commission (1917-19) and Sargent Report (1944). ● Development of Teacher Education Post-Independence: Kothari Commission (1964-66), NCFTE (2009), NCTE Regulations (2014) and New Education Policy (2020)- (both online and NEP)		
Unit -2		**Initiatives for Professional Development of Teachers** ● Policies and Programmes:SSA, RMSA, and SAMAGRA ● Digital Initiatives:-MOOCs, SWAYAM, SWAYAM Prabha-e-Pathshala, e-PG Pathshala, (both online and NEP) • Faculty Development through online programmes		
Unit-3		**Teacher Ethics, Teacher Competency and Accountability** ● Teaching as a profession and Teacher as a reflective practitioner ● Professional ethics for teacher educators (online) ● Competency based teacher education and Core competencies of teacher educators(NEP) • Roles and accountability of teacher educators and characteristics of effective teacher educators (ONLINE)		

Unit-4	**Emerging Issues in Teacher Education** ● Personal and contextual factors affecting the teacher development ● Innovative practices/approaches in teacher education: Constructivist, ICT based approach, Integrated approach– School cantered teacher education and Teacher cantered approach to community development. (ONLINE) ● Quality concerns in teacher education, Research priorities in teacher education (NEP)
Teaching learning process/Transaction Strategies	Lecture cum Discussion, Debates, illustrations, presentations, Projects Method, E-learning, assignments on different key areas , panel discussion, brainstorming sessions, hands on practice.
Practicum (Assignment on any one of the following:	● Write on Historical development of Teacher Education . ● Prepare a report on Digital Initiatives by Govt. of India in Education. ● Attend any in-service teacher education program and write a report on it. ● Critically evaluate New Education Policy (2020)

Suggested Readings:

- Arora, G.L. (2002). *Teachers and their teaching*. Delhi: Ravi Books.
- Adam, D. M. (1985). *Computers and Teacher Training: A Practical Guide*. N.Y.: The Haworth Pren, Inc.
- Anand, C. L. (1988). *Aspects of Teacher Education*. Delhi: S. Chand and Co.
- CABE (1992). *Report of the CABE Committee on Policy Perspectives*. New Delhi: Govt. of India, MHRD.
- Dunkin, J. Michal (1987). *The International Encyclopedia of Teaching and Teacher Education*. Pergamon Press.
- Chaurasia G. (2000).*Teacher education and professional organizations*. Delhi: Authors Press.
- Chauhan, S.S. (2018). *Professional ethics and accountability in education*. New Delhi: APH Publications
- Day, C. & J. Sachs, J. (2004). *International handbook on the continuing professional development of teachers*. Maidenhead: Brinks Open University Press.
- Dillon J. & Maguire, M. (1997). *Becoming a teacher: Issues in secondary teaching*. Buckingham: Open University Press.
- Dunking, Michael, J. (1987). *The international encyclopedia of teaching and teacher education*. Oxford: Pergamon Press.
- Elahi, N. (1997). *Teacher's education in India*. New Delhi: APH Publishing Corporation.
- Husen, Tosten& Postlethwaite (1994). *The International Encyclopedia of Education* (Ed.), Vol. 1-12. New York: Pergamon Press.
- Indian Education Commission (1964-66). *Report of Indian Education Commission on Education and National Development*. Ministry of Education, Govt. of India.
- Kundu, C.L. (1998). *Indian year book on teacher education.* New Delhi: Sterling Publishers Privatization Ltd.
- McNergney, Robert F. & Joanne M. H. (2001). *Foundations of education*: *The challenge of professional practice*. Boston: Allyn and Bacon.
- Misra, K.S. (1993). *Teachers and their education*. Ambala Cantt.: The Associated Publishers.
- Mohammad Miyan (2004). *Professionalization of teacher education*. New Delhi: Mittal Publications.
- Murray, Frank B. (1996). *Teacher educator's handbook: Building a base for preparation of teachers*. San Francisco: Jossey-Bass

Publishers.
- Mangla, Sheela (2000). *Teacher Education: Trends & Strategies*. New Delhi: Radha Publishing.
- MHRD (1986). *National Policy on Education and Programme of Action*. New Delhi: Govt. of India.
- MHRD (1992). *Programme of Action*. New Delhi: Department of Education, Govt. of India.
- Mukherjee, S. N. (1988). *Education of the Teacher in India – I & II*. Delhi: S. Chand and Co.
- National Council for Teacher Education (1998). NCTE Document. New Delhi: Member Secretary, NCTE.
- NCTE. (1998). *Policy perspective in teacher education-Critique and documentation.* New Delhi: NCTE.
- NCERT. (2019). *Continuous and Comprehensive Evaluation Guidelines*. New Delhi: NCERT.
- NCERT. (1988). *In-Service Teacher Education Package for Primary and Secondary Teachers – I & II*. New Delhi: NCERT.
- Reimers, E.V. (2003). *Teacher professional development: An international review of the literature.* UNESCO Paris: IIEP.
- Siddiqui, M.A. (1993). *In-service education of teachers*. New Delhi: NCERT.
- Sen.S. (2018). *Teachers in 21st century characteristics and role performance*. New Delhi: APH Publishing House.
- Sharma, S. P. (2004). *Teacher Education in India*. New Delhi: Vikas Publications.
- Singh, L. C. (1990). *Teacher Education in India* (Ed.) - Source Book. New Delhi: NCERT.
- Smith, E. R. (1962). *Teacher Education: A Re-appraisal* (Ed.). New York: Harper & Row Publishers.
- Soder, R. (1991). *The Ethics of the Rhetoric of Teacher Professionalism*. Teaching and Teacher Education, 7(3).
- Stiles, L. J. & Parker, R. (1969). *Teacher Education Programme: Encyclopedia of Educational Research*, 4th Edition. New York: McMillan.
- Wasnik (2018). *Skilling training: A complete guide for trainers and learners.* New Delhi: APH Publications.

Web-References

- https://www.researchgate.net/publication/329528233_Teacher_Education_in_Pre-Independence_India#:~:text=In%20pre%2Dindependence%20India%2C%20the,well%2Dbeing%20of%20the%20community.
- http://www.gcoekmr.org/pdf/MED15042CR_HistoricalDevelopmentofTE_Unit2.pdf
- http://www.vidyawarta.com/04/wp-content/uploads/2015/10/Teacher-Education-in-Pre-Independence-India.pdf
- https://dera.ioe.ac.uk/14020/1/1009_Accountability_of_teachers_Literature_review.pdf
- https://www.researchgate.net/publication/334459316_Development_of_21_St_Century_School_Teachers'_Teaching_Competencies_in_India
- http://irjrr.com/irjrr/March2014/1.pdf

Year	II	EDUCATIONAL STUDIES	Credits	4
Semester	IV		Course Code	SOE01 04 17 C 3104

Learning Outcomes	**After the completion of the course, the students will be able to:** ● Acquainted concepts involved in education as a discipline ● Establish relationship of education with other disciplines ● Application of education in society ● Analyse thoughts of great scholars, thinkers and educators on education
Course Content	
Unit-I	**Theoretical Perspective of Education as a Discipline** ● Education as a socially contrived system influenced by social, cultural, political, economic, and technological factors. ● Aims of Indian Education in the context of a democratic, secular, egalitarian and a humane society. ● Procedure of bridging gap in the process of knowledge construction between: • Content knowledge and Pedagogy knowledge, • School knowledge and out of the school knowledge, • Experiential knowledge and empirical knowledge, • Knowledge on action and reflection on outcome of action, • Theoretical knowledge and practical knowledge, • Universal knowledge and contextual knowledge. ● Transformation of national aspirations into educational goals/aims of education, its linkage with curricular decision, teaching-learning process and pedagogy for different stages of education. ● Analysis and synthesis of thoughts of great educators: Acharya Vinoda Bhave, Tagore, Shri Aurobindo, Maria Montessori.
Unit -2	**Education as Interdisciplinary Knowledge** ● Interdisciplinary nature of education; relationships with philosophy, psychology, sociology, management, economics, anthropology etc. ● Contribution of science and technology in education and challenges ahead. ● Axiological issues in education: role of peace and other values, aesthetics in education. ● Dynamic relationship of education with the political process. . ● Interrelation between education and development.
Unit-3	**Socio-cultural Context of Education** ● Social purpose of education. ● Understanding Indian society-with reference to multilingual and multicultural and other diversity, approaches

	for teaching young children in the context of diversity. ● Process of socialization and acculturation of the child: role of school, parents, peer group and the community. ● Equality in educational opportunity-critical analysis of the ways in which schooling, teaching-learning and curriculum contribute to social inequality. ● Education of socio-economically deprived groups based on gender, local (rural/urban), income differential and different disabilities as reflected in society.
Unit-4	**School Context** ● Multiple schools contexts-rural/urban, tribal etc. ● School management: Role of teachers, headmasters, and administrators. ● Nurturing learner friendly school environment. ● School as site of curricular engagement. ● Teacher's autonomy and professional independence. ● Participation of different stakeholders in school education-role of media, use of technology, NGOs, Civil society groups, Teacher organizations, family and local community. ● Monitoring and evaluation of schools.
Teaching learning process/Transaction Strategies	Lectures, discussions, reflections on biographies, case studies of various types of schools
Practicum (Assignment on any one of the following:	● Readings of original texts of Rabindranath Tagore/M.K. Gandhi/Sri Aurobindo etc. and presentation on linkage of various theoretical concepts with pedagogy and practices. ● Assignment based on policy perspectives and status of education of socio-economically disadvantaged children of India/of a particular State, vision of school education in India. ● Visit to a school, observation of activities and preparation of a reflective report. ● Any other task/assignment given by the institution.

Suggested Readings:

- Banrs, J.A. (1996). *Cultural diversity and education: Foundations curriculum and teaching* (4)Boston: Alynand, Becon.
- Beyer, L.E. (Ed.) (1996). *Creating democratic classrooms: The struggle to integrate theory and Practice*. New York: Teachers College Press.
- Bruner, J.S. (1996). *The culture of education.* Cambridge, M.A.: Harward University Press.
- Dearden R. F. (1984). *Theory and practice in Education*. London, Routledge K Kegan & Paul.
- Heyes, D., Hills, M., Chistien, P. & Lingard, B. (2007). *Teachers and schooling: Making a Difference*. Australia Allen and Unwin,.
- Delors, J., et al; (1996). *Learning: The Treasure within report of the international commission on education for 21st century*, UNESCO.
- Dewey, J. (1916/1977). *Democracy and Education: An introduction to the philosophy of education*. New York: Macmillan.
- Govt. of India (1992). *National policy on education* (revised) New Delhi.
- Govt. of India (1992*). Programme of Action*. Govt. of India, New Delhi.
- International Encyclopedia of Education. (1994) 2nd edition.Vol.10. Perganon Press.

- Matheson, David (2004). *An Introduction to the study of education* (2nd edition). David Fulton Publishers.
- NCERT (2005).National curriculum framework, New Delhi.
- Palmer, Joy A, (2001). *Fifty Modern thinkers on education: From Piaget to the present Day*. London: Routledge Flamer.
- Wall, Edmund (2001).*Educational theory: philosophical and political Perspectives*. Prometheus Books.
- Winch, C. (1st edition).(1996). *Key Concepts in the philosophy of education.* London, Routledge.
- Winch, C. (1986). *Philosophy of human learning.* London Routledge.

Year	**II**	**EDUCATIONAL TECHNOLOGY**	**Credits**	**4**
Semester	**IV**		**Course Code**	**SOE01 04 19 C 3104**

Learning Outcomes	**After the completion of the course, the students will be able to:** ● Explain the concept, nature, forms and historical development of educational technology. ● Elaborate the steps of instructional designing on the basis of models of Instructional design ● Analyse the implications of digital initiatives by the Government of India for promoting learning Explore the integration of ICT in education.
Course Content	
Unit-I	**Educational Technology: An Overview** ● Educational Technology: Concept, nature, components (hardware & software) and scope (Online mode) ● Historical development of Educational Technology (Online mode) ● Application of educational technology in Formal, Non-formal (open and distance learning) and Informal Education systems Systems approach to education: concept, characteristics and application in education
Unit -2	**Instructional Design** ● Overview of Behaviourist, Cognitive, and Constructivist theories and their implications to instructional design ● Instructional design: Concept, significance, process and stages of development of Instructional Design. (Online mode) ● Overview of models of instructional design: ADDIE, ASSURE, DICK and CAREY Model. (Online mode) Gagne's Nine events of instruction and 5 E's instructional model based on constructivist instructional design (Online mode)
Unit-3	**Emerging Trends in e-learning (NEP)** ● Concept of e- learning and approaches to e-learning (Offline, Online, Synchronous, Asynchronous, Blended Learning, Flipped learning). (Online mode) ● National initiative for Digital education- DIKSHA, SWAYAM PRABHA, SWAYAM, On Air, E content for inclusive education,Open Educational Resources (OERs), National digital Library and other significant initiatives. (Online mode) ● Approaches for development of learner centric MOOC: LCM approach, Four quadrant approach

	(Online mode) • Learning Management Systems (Online mode)
Unit-4	**ICT in Education (NEP)** • ICT in Education: Concept, significance and applications of ICT tools • Social learning- Concept, use of web 2.0 tools for learning, social networking sites, blogs, chats, video conferencing, discussion forum. • E-portfolios and Online Assessment- concept and development. (Online mode) • E- inclusion- Concept, Assistive technology in e-learning and disruptive technologies.
Teaching learning process/Transaction Strategies	Lecture-cum- demonstration and hands on experiences on the production of audio-visual material; observation of various modes of training programmes by the different organizations / institutions and analyzing the different instructional design.

Suggested Readings:

- Apple, M. (1991). *The new technology: Is it part of the solution or part of the problem in education? Computers in the Schools*. 8(2), 59-81.
- Ahuja, M. (2007). *Mastery learning- A practical approach*. Meerut: Vivek Publishers.
- Behera, S.C. (1991). *Educational television programmes.* New Delhi: Deep and Deep Publications.
- Bhushan, A & Ahuja, M. (1992). *Educational technology*. Meerut: Vikas Publication.
- Bloom, B.S. (1972). *Taxonomy of educational objectives. A hand book- I (cognitive domain).* New York: DevidMokeay Campo.
- Das, R.C. (1993). *Educational technology– A basic text*. New Delhi: Sterling Publishers Pvt. Ltd.
- Flanders, Ned A. (1978). *Analyzing teacher behavior.* London: Addison Wesley Publishing Co.
- Goel, S. (2019). *ICT waves in education: challenges for 21st century teachers*. New Delhi; Atlantic publishers
- Haas, K.B. and Packer, H.Q. (1990). *Preparation and use of audio visual aids.* New York: Prentice Hall.
- Jena, S.S. (2018). *ICT in Education.* New Delhi: Shipra Publication.
- Joyce, B. Weil, M. & Showers, B. (1985). *Models of Teaching.* New Delhi: Prentice Hall of India Pvt. Ltd.
- Kumar, K.L. (2008). *Educational technology*. New Delhi: New Age International Pvt. Ltd. Publishers.
- Kumar, N. & Chandiram, J. (1967). *Educational television in India*, New Delhi: Arya Book Depot.
- Ledford, B.R. & Sleeman, P.J. (2001). Instructional Design: A Primer. Greenwich: Information Age Publishing.
- Mohanty, J. (2007). *Modern trends in educational technology*. Hyderabad: Neelkamal Publications.
- Mukhopadhyay, M. (1990). *Educational technology challenging issues.* New Delhi*:* Sterling Publishers Pvt. Ltd.
- Mukhopadhyay, M. (1990). *Educational technology.* New Delhi: Shipra Publication.
- Narang, V.K. (2015). *Modern trends in educational technology.* New Delhi: Astha Publishers.
- Pandey, S. (2018). *A textbook of educational technology*.New Delhi: Pearson
- Pathak, R. P. (2007): *Shaikshik Prodyogiki Kein Nay eAayaam.* Delhi: S. M. Books.
- Ray, P.K.S. (2012). *Educational technology*. Delhi: Dominant Publishers.

- Roy, R. (2011). *Educational technology in changing society*. Delhi: Shipra Publication.
- *Saxena, P. K. (2008): Shaikshik Prodyogiki evam KakshaPrabandh. Delhi: KK Publications.*
- *Sharma, S. & Gupta, N. (2007): Shaishik Takniki Avam KakshaKaksh Prabandhan. Jaipur: ShyamPrakashan.*
- *Spector, J.M. (2012. Foundations of Educational Technology: Integrative Approaches and Interdisciplinary Perspectives.* Routledge, NY, 2012.
- Pragyata: Guidelines for Digital Education by MHRD. Available at : https://www.education.gov.in/sites/upload_files/mhrd/files/pragyata-guidelines_0.pdf

Year	**II**	**ENVIRONMENTAL EDUCATION**	**Credits**	**4**
Semester	**IV**		**Course Code**	**SOE01 04 20 C 3104**

Learning Outcomes	**After the completion of the course, the students will be able to:** ● Develop competencies to examine the intrinsic relationship between biological sciences and Environmental Education vis-à-vis the possibilities and challenges within. ● Explain the role of professionals and ethics in environmental management..
Course Content	
Unit-I	**Environmental Education:** ● Environmental Education: Concept, guiding principles, significance (Online) ● Environmental hazards: pollution, global warming and human health (Online) ● Sustainable development goals: Guiding principles and strategies (Online) ● Place of Environmental Education in National Curricular Framework (2000) given by NCERT and Environmental Education Curriculum Framework For Teachers and Teacher Educators (2005) given by NCTE.
Unit -2	**Environmental Management** ● Characteristics and Functions of Environment management ● Teaching – Learning Strategies For Environmental Education: Field visits, Demonstration, Observation, Group- Discussion and Dramatization. ● Strategies for evaluating environmental education-Use of Observation, Self-reporting techniques (attitude scale, interview and questionnaire) in Environmental Education (Online) ● Relationship between Men and Environment: Ecological and Psychological Perspective
Teaching learning process/Transaction Strategies	**Lectures, Debates, Assignments, Projects, PowerPoint Presentations, Demonstration**
Evaluation Strategies	**Tasks and Assignments : Any two of the following** ● Project on Any Environmental Issue ● Field Experience in a polluted Environmental area. ● Celebrations/observation of different environmentally important days. ● Preparation and Use of a strategy for teaching Environmental Education at school level / college level

Suggested Readings:

- Goleman, D. (2010). *Ecological Intelligence.* Penguin Books, London
- Bodzin, A., Klein, B. & Weaver, S. (2010). *The inclusion of environmental education in science teacher education.* Springer, London.
- Bonnet, M. (2002a). *Education for sustainability as a frame of mind. environmental education research*, 8(1), 9-20. Taylor & Francis Ltd.
- Fien, J. (2000). *Education for the environment: a critique—an analysis, environmental education research*, 6(2), pp.179-192. Taylor &

Francis Ltd.
- Gough, S. & Reid, A. (2000). *Environmental Education Research as Profession, as Science, as Art and as Craft: implications for guidelines in qualitative research.* Environmental Education Research. 6(1): Taylor & Francis Ltd.
- Gough, S. & Scott, W. (2006). *Promoting environmental citizenship through learning: toward a theory of change*.
- A. Dobson &D. Bell (Eds.) *Environmental Citizen ship,* Cambridge and London: The MIT Press.
- Kulkarni, V., & Ramachandra, T V. (2009). *Environmental Management*, TERI Press, New Delhi
- NCERT, (2000). National Curriculum Framework 2000. New Delhi: NCERT Press.
- NCTE, (2005). *Environmental education curriculum frame working for teacher & teacher education*. New Delhi: NCERT.
- SAUVEÂ , L. (1999). *Environmental education-between modernity and postmodernity- searching for an integrating education framework.* Canadian Journal of Environmental Education, 4, 9-35
- Grace M. & Sharp, J. (2000). *Exploring the actual and potential rhetoric-reality gaps in environmental education and their implications for pre-service teacher training*. Environmental Education Research. 6(4), 331-45. Routledge
- Kaushik,A. & Kaushik, C.P.(2004). *Perspectives in environmental studies*, New Age International (P) Ltd. Publishers, New Delhi
- Kim, M. and Diong, C.H. (Eds.) (2012). *Biology education for social and sustainable development.* Sense Publishers. The Netherlands.
- Kohli, V.K. and Kohli, V (2000). *Environmental pollution and management*. Vivek Publishers, Ambala
- Lovelock, James (1979). *Gaia: a new look at life on earth*. Oxford: Oxford University Press.
- NCERT (2004). *Environmental education in schools.* NCERT, New Delhi.112.
- NCERT (2011). *Teachers' handbook on environmental education for the higher secondary stage*, DESM, NCERT, New Delhi, Pp.316.
- Powers, A.L. (2004). *Teacher preparation for environmental education: faculty perspectives on the infusion of environmental education into pre-service methods courses*. The Journal of Environmental Education. Taylor & Francis Ltd.
- Palmer, J. (1998). Theory of Environmental Education. Routledge.
- Rathore, H.C.S., Bhattacharya, G. C., Singh, S.K., Singh, M. & Gardia, A.(2008). *Society and environmental ethics*, Seema Press, Varanasi, Pp. 242.
- Sharma, R.C., Mahajan, B., Premi, K.K., Nuna, S.C., Menon, P.(1994). *Source book on environmental education for elementary teacher educators.* NIEPA, New Delhi.pp.278.
- Singh, S.K. (2010). *Fundamentals of environmental education*. Sharda Pustak Bhawan ,Allahabad ,Pp.175
- Stevenson, R.B. (2007). *Schooling and environmental education: contradictions in purpose and practice*. Environmental Education Research. Vol. 13(2) pp. 139-153.
- Revisioning Environmental Education through Whole Systems Thinking http://www.bath.ac.uk/cree/sterling/sterlingpartd.pdf
- The World Summit on Sustainable Development: Agenda 21 Chapter 36, UNESCO 2002 http://habitat.igc.org/agenda21/a21-36.htm. (20 June 2004)
- Aggarwal, J.C. (2007). *Education for values, environment and human rights*. Shipra Publications, Delhi.
- Reddy, K.P. and Reddy, D.N. (2002). *Environmental Education.* Neelkamal Publications Pvt. Ltd. Hyderabad.
- Sungosh, S.M. (2006). *An introduction to environmental education.* Akashi Book Depot, Shillong.

Year	**II**	**DISSERTATION**	**Credits**	**4**
Semester	**IV**		**Course Code**	**SOE 01 04 21 C0044**

Learning Outcomes	**After the completion of the course, the students will be able to:** ● Demonstrate comprehensive knowledge of the data analysis techniques ● Critically evaluate the process of report writing. ● Communicate clearly and effectively to specialist and non-specialist research ● Contribute new knowledge and skills for welfare of society and academia.

Year	II	PRACTICE RELATING TO CURRICULUM, PEDAGOGY AND ASSESSMENT (ELEMENTARY LEVEL)	Credits	4
Semester	IV		Course Code	SOE01 01 12 DCEC 2002

Learning Outcomes	**After the completion of the course, the students will be able to:** ● Understanding about development of curriculum in teaching and learning, and assessment practices at elementary level. ● Analyse and reflect on the new developments in the area of curriculum development in elementary level
Course Content	
Unit-I	**Curriculum development in elementary level:** ● Meaning, principles of curriculum development and need of curriculum development ● Selection of content and learning experiences and their organization ● Pedagogy, Pedagogical Analysis-Concept and Stages; Organising teaching: Memory level (Herbatian model), Understanding level (Morrison teaching model), Reflective level (Bigge and Hunt teaching model) Online
Unit -2	**Assessment and evaluation in elementary school level** ● Assessment-Meaning, nature, perspective (Assessment for learning, Assessment of learning and assessment learning);Relation between Objectives and outcomes ● Types of Assessment (Placement, Formative, Diagnostic, Summative); Assessment of cognitive (Anderson and Krathwohl) Affective (Krathwohl) and Psychomotor domains (R.H. Dave) of learning (Online) ● New trends in evaluation-grading, internal assessment, semester system, CCE, On demand examination system, online examination Critical appraisal of the present evaluation system at secondary school level in context to the alignment between the curriculum and forms of assessment with special reference to Learning Outcomes Based Curriculum(LOCF)
Teaching learning process/Transaction	Lectures, Brainstorming, Group Discussion and Self-study Projects

Strategies	

Suggested Readings:

- Beauchamp, G.A (1981). *Curriculum theory* (4th edition.). Itasca, II: Peacock Publishers
- Bruner. J.S. (1966). *Towards a theory of instruction.* Cambridge. Harvard University Press.
- Henson, Kenneth.T (1978). *Curriculum development for education reform*. Harper Collins College publishers.
- Davies, Ivan, K. (1976). *Objectives in curriculum design*. Mcgraw Hill Book Company Limited, England.
- Gakhar, S.C.(2009). *curriculum development*, Panipat, N.M. Publications
- Joseph Schwab, (1969). *The Practical: A language for curriculum*. School Review, November.
- Kelley, A.B. (1996). *The curricular theory and practice*. Harper and Row, US.
- Nirantar (1997). *Developing a curriculum for rural women*, Nirantar, New Delhi.
- Padma M. S. (2003). *Constructing school knowledge, an ethnography of learning in an Indian village*, Sage Publication Inc., New Delhi.
- Pratt, David (1980). *Curriculum design and development*. Harcourt Brace and World Inc., New York.
- Romiszowski, A.J. (1986). *Designing instructional system-decision making in course planning & design*.
- Saylor,J.G. & Alexander, W.M.(1966). *Curriculum planning for modern schools*. New York: Holt, Rinehart & Winston.
- Taba, H. (1962). *Curriculum development. Theory and practice*. Har Court, Brace and Wald. New York.
- Tyler, R.W. (1949). *Basic principles of curriculum and instruction*. Chicago: University of Chicago Press.
- Wheeler: curriculum process Zias, R S. (1976). *Curriculum principles and foundations*. New York: Harper & Row.

Year	II	POLICY AND PRACTICE RELATING TO CURRICULUM,	Credits	2

Semester	IV	PEDAGOGY AND ASSESSMENT (SECONDARY LEVEL)	Course Code	SOE01 01 13 DCEC 2002
Learning Outcomes		**After the completion of the course, the students will be able to:** ● Understanding about development of curriculum in teaching and learning, and assessment practices. ● Analyse and reflect on the new developments in the area of curriculum development.		
Course Content				
Unit-I		**Curriculum development in secondary level:** ● Meaning, principles of curriculum development and need of curriculum development ● Selection of content and learning experiences and their organization ● Pedagogy, Pedagogical Analysis-Concept and Stages; Critical pedagogy- meaning, need and its implications in teacher education ● Organising teaching: Memory level (Herbatian model), Understanding level (Morrison teaching model), Reflective level (Bigge and Hunt teaching model) Online		
Unit -2		**Assessment and evaluation in secondary school level** ● Assessment-Meaning, nature, perspective (Assessment for learning, Assessment of learning and assessment learning);Relation between Objectives and outcomes ● Types of Assessment (Placement, Formative, Diagnostic, Summative); Assessment of cognitive (Anderson and Krathwohl) Affective (Krathwohl) and Psychomotor domains (R.H. Dave) of learning (Online) ● New trends in evaluation-grading, internal assessment, semester system, CCE, On demand examination system, online examination Critical appraisal of the present evaluation system at secondary school level in context to the alignment between the curriculum and forms of assessment with special reference to Learning Outcomes Based Curriculum(LOCF)		
Teaching learning process/Transaction Strategies		Lectures, Brainstorming, Group Discussion and Self-study Projects		

Suggested Readings:

- Beauchamp, G.A (1981): *Curriculum theory* (4th edition.). Itasca, II: Peacock Publishers
- Bruner. J.S. (1966). *Towards a theory of Instruction*. Cambridge. Harvard University Press.

- Henson, Kenneth.T (1978). *Curriculum development for Education reform*. Harper Collins College publishers.
- Davies, Ivan, K. (1976). "*Objectives in curriculum design*", Mcgraw Hill Book Company Limited, England.
- Gakhar, S.C.(2009): *Curriculum development*, Panipat, N.M. Publications
- Joseph Schwab, (1969). *The practical: A language for curriculum*. School Review, November.
- Kelley, A.B. (1996). *The curricular theory and practice*. Harper and Row, US.
- Nirantar (1997). *Developing a Curriculum for Rural Women.* Nirantar, New Delhi.
- Padma M. S. (2003). *Constructing school knowledge, an ethnography of learning in an indian village*, Sage Publication Inc., New Delhi.
- Pratt, David (1980). "*Curriculum design and development*", Harcourt Brace and World Inc., New York.
- Romiszowski, A.J. (1986). "*Designing instructional system-decision making in course planning & design*".
- Saylor,J.G& Alexander, W.M.(1966). *Curriculum planning for modern schools*, New York: Holt, Rinehart & Winston.
- Taba, Hilda (1962). *Curriculum development*. Theory and Practice, Har Court, Brace and Wald. New York.
- Tyler, R.W. (1949). *Basic principles of curriculum and instruction*. Chicago: University of Chicago Press.
- Wheeler: curriculum process Zias, R S. (1976). *Curriculum principles and foundations*. New York: Harper & Row.

Year	II	EDUCATIONAL POLICY, ECONOMICS AND PLANNING AT (ELEMENTARY LEVEL)	Credits	4
Semester	IV		Course Code	SOE01 01 14 DCEC2002
Learning Outcomes	**After the completion of the course, the students will be able to:** ● Understand the financing of education in India. ● Understand the concept and nature of educational planning. ● Define education as an investment ● Critically analyze some governmental plans and policies of education			
Course Content				
Unit-I	**Educational Policy at Elementary Level (NEP)** ● Concept, Need and Importance ● Types of Educational Policy- State level Institutional ,Short –term, Long- term at Elementary Level ● Linkage between national Educational Policy and State Development Policy at Elementary Level ● Government Initiatives and constitutional provisions: NPE (1986); POA (1992); DPEP (1994); SSA; RTE Act			
Unit -2	**Economics of Education** ● Meaning, Significance and Scope of economics of education ● Education and Economic Development, Financing of Education in India: Center- State relationship, mobilization of resources ● Financial Contribution of community to school. ● Models of development based on free market economies			
Unit -3	**Educational Planning at Elementary Level** ● Concept, needs and goals of Educational Planning ● Principles of Educational Planning. ● Approaches of Educational Planning			

	• Educational Planning in India since independence at elementary stage
Unit- 4	**Inspection, Supervision and Monitoring** • Monitoring and Supervision at Elementary Level • Research and Evaluation of specific schemes like Mid-Day Meals, establishments of Village Education Committee and different incentive schemes and achievement levels • Quality concern at elementary Education and assessment of quality • Factors affecting quality and literacy achievement
Teaching learning process/Transaction Strategies	Discussions, debates, analysis of plans and policies, suggestions for improvement
Practicum :	• Preparation of research design on a theme, discipline and RTE act. 2009 • Visit a school for reporting on access, and enrolment/ retentions of girl students and give suggestions for improvement. • Critical Analysis of Research Studies on programs and policies related to elementary education (Survey a Govt. school nearby and Prepare of report on critically analyze the SSA and Mid May Meal programme) • Any other assignment/ project given by the Institute. • Annual Status of Education Report (ASER); Achievement surveys; PROBE; Pratichi Report on Education; Global Monitoring; Report of UNESCO

Suggested Readings:

- Althusser, L. (1971). *Ideology and ideological state apparatuses*, in L. Althusser (eds), *Lenin and philosophy and other essays.* London: New Left Review.
- Apple, M. (2004). *Ideology and curriculum*. New York: Routledge Falmer.
- Banerjee, S. Cole, E. Duflo and L. Linden. (2003). *Improving the quality of education in India: Evidence from three randomized experiments*. NBER mimeo.
- Becker, Gary (1993). Nobel Lecture: The Economic Way of Looking at Behavior. *Journal of Political Economy* 101, pp. 385-409.
- Becker, Gary S. (1964). Human capital (eds).*Investment in Human Capital: Effects on Earning*. NBER: New York.
- Belfield. Clive. (2000). *Economic principles for education.* Edward Elgar.
- Blaug, Mark. (1970). Where are we now in Economics of Education?. *Economics of Education Review.*
- Blaug, Mark. (1972). *An introduction to economics of education*. London: Penguin.
- Caplin, B. (2018). *The case against education: why education is waste of time and money.* USA: Princeton university press.
- Chattopadhyay, S. (2012) .*Education and Economics*. London: Oxford University Press.
- Clarke, S. (2005). The neoliberal theory of society, In A. Saad-Filho& D. Johnston (eds.) *Neoliberalism: A Critical Reader*. Ann Arbour, MI: Pluto Press, 50-59.

- Coombs, P.H. (1969). *What is Educational Planning?*. Paris: International Institute of Educational Planning (IIEP).
- Fereeti, R. (2018). *Teachers, teaching and reforms; perspectives on reforms to improve educational outcomes*. India: Routledge.
- Giroux, H. (2005). *The terror of neoliberalism: cultural politics and the promise of democracy*. Boulder: Paradigm Publishers.
- H. Levin.(1987). Education as a Public and Private Good. *Journal of Policy Analysis and Management*, Summer.
- Harvey, D. (2005). *A brief history of neoliberalism*. New York: Oxford University Press.
- Hayek, F. A. (1979). *Law, legislation and liberty: a new statement of the liberal principles and political economy*; *the political order of a free people*,(3rd ed.).. London: Routledge.
- Naik, J.P.(1975) .*Equality, quality and quantit: The elusive triangle in Indian education.*Bombay:Allied.
- Oreopoulos, P.,&Kjell S. (2011). Priceless: the non-pecuniary benefits of schooling. *Journal of Economic Perspectives* 25(1), 159-184.
- Padmanabhan,C.B.(1986). *Economics of Educational planning in India*. New Delhi: Arya Book Depot.
- Palley, T.I. (2005). From Keynisianism to Neoliberalism: shifting paradigms in economics,' in A. Saad-Filho& D. Johnston (eds.,) *Neoliberalism: A critical Reader.* Ann Arbour, MI: Pluto Press.
- Parkash S. (1999). *Educational planning*. New Delhi: Gyan Publishing House.
- Prakash, V. &K. B. (2008). *Perspectives on Education and Development*. Delhi: NUEPA.
- Psacharapoulos, George. (1996). *The profitability of investment in education: Concepts and methods, human development and operations policy,* working Paper No. 15280. Washington, DC: The World Bank.
- Psacharopolous, G. (1985). *Planning of education: Where do we stand*?. Washington: World Bank.
- Saad-Filho, A. & D. Johnston. (eds.) (2005). *Neoliberalism: A critical reader*. Ann Arbour, MI: Pluto Press.

Year	II	EDUCATIONAL POLICY, ECONOMICS AND PLANNING AT (SECONDARY LEVEL)	Credits	4
Semester	IV		Course Code	SOE01 01 15 DCEC2002

Learning Outcomes	**After the completion of the course, the students will be able to:** ● Understand the financing of education in India. ● Differentiate between education as an investment and education as consumption. ● Discuss the application of economic theories in the educational field. ● Analyse governmental plans and policies related to education.
Course Content	
Unit-I	**Educational Policy at Secondary Level (NEP) (Online)** ● Concept, need and importance of educational policies. ● Types of educational policies- National and State Level, Short and long term ● Relationship between policies and education, Linkage between Educational Policy and National Development Policy ● Planning of policy implementation, policy impact assessment and subsequent policy cycles.
Unit -2	**Economics of Education** ● Education as Consumption and Investment ● Cost Benefit Analysis Vs Cost Effective Analysis in Education. ● Education and Economic Development; ● Signalling theory Vs Human Capital theory
Unit -3	**Educational Planning at Secondary Level** ● Concept, needs, goals and principles of Educational Planning at Secondary Level (online) ● Features of NITI Aayog (online) ● Perspective planning at central, state and local levels: Concepts of Macro, and Micro level planning. ● Priorities to be given at Central and State level, Recent initiatives in educational planning.
Unit- 4	**Educational Expenditure** ● Availability of educational statistics at central, state and district levels. ● Educational Expenditure and its Source of finance: Government grants (Central, State, Local), School Budgetary and accounting procedure. ● Allocation of grants by U.G.C. Grant-in-aid policy, Monitoring of expenditure control and utilization of funds

	Central-State Relationship in Financing of Education. ● Financial estimates by Tapas Mazumdar Committee (GoI, 1998)
Teaching learning process/Transaction Strategies	Lecture**,** Discussions, Debates, Analysis of plans and policies.
Practicum : **Any one of the Following:**	● Preparation of research design on a theme, discipline and RTE act. 2009 ● Estimation of opportunity cost on a sample of working school age children. ● Preparation of a blue-print for expenditure control in a school ● Preparation of a school budget ● Any other given assignment by the teacher educators

Suggested Readings:

- Becker, Gary (1993). Nobel Lecture: The Economic Way of Looking at Behavior. *Journal of Political Economy* 101, pp. 385-409.
- Becker, Gary S. (1964). Human capital (eds).*Investment in Human Capital: Effects on Earning*. NBER: New York.
- Belfield. Clive. (2000). *Economic principles for education.* Edward Elgar.
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- Caplin, B. (2018). *The case against education: why education is waste of time and money.* USA: Princeton university press.
- Chattopadhyay, Saumen. (2012) .*Education and Economics.* London: Oxford University Press.
- Clarke, S. (2005). The neoliberal theory of society,in A. Saad-Filho& D. Johnston (eds.) *Neoliberalism: A Critical Reader.* Ann Arbour, MI: Pluto Press, 50-59.
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- Fereeti, R. (2018). *Teachers, teaching and reforms; perspectives on reforms to improve educational outcomes*. India: Routledge.
- Giroux, H. (2005). *The terror of neoliberalism: cultural politics and the promise of democracy.* Boulder: Paradigm Publishers.
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- Naik, J.P.(1975) .*Equality, quality and quantity: The elusive triangle in Indian education.*Bombay:Allied.
- Oreopoulos, P.,&Kjell S. (2011). Priceless: the non-pecuniary benefits of schooling.*Journal of Economic Perspectives* 25(1), 159-184.
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- Parkash S. (1999). *Educational planning*. New Delhi: Gyan Publishing House.

- Prakash, V. &K. B. (2008). *Perspectives on Education and Development*. Delhi: NUEPA.
- Psacharapoulos, George.(1996). *The profitability of investment in education: Concepts and methods, human development and operations policy,*working Paper No. 15280. Washington, DC: The World Bank.
- Psacharopolous, G. (1985). *Planning of education: Where do we stand*?. Washington: World Bank.
- Saad-Filho, A. & D. Johnston. (eds.) (2005). *Neoliberalism: A critical reader*. Ann Arbour, MI: Pluto Press.
- Schultz, T.W. (1961). Investment in Human Capital, *American Economic Review*.
- Sen, Amartya and Dreze. (1996). *India: Economic development and social opportunity*. Oxford: University Press.
- Tilak, Jandhyala B. G. (2002). Education and Poverty. *Journal of Human Development (New York: UNDP),*3 (2), 191-207.
- Tilak, Jandhyala B.G. (2006). Economics of Human Capital in India.*Indian Economic Journal*, 3(20).
- Tilak, Jandhyala B.G. (2008). "Education, Growth and Development, Keynote Address". 91stIEA Annual Conference 705 (19).

GEC

Year	II	INTRODUCTION TO COUNSELLING	Credits	4
Semester	IV		Course Code	SOE010405GEC3014
Learning Outcomes	**After the completion of the course, the students will be able to:** ● Explain the meaning and concept of counselling in India. ● Understand various models and approaches adopted for and counselling. ● Apply various techniques of counselling in real life. ● Identify the factors affecting mental health.			
Course Content				
Unit-I	**Introduction to Counselling** ● Introduction to Counselling and Characteristics of a Counsellor (online) ● Process of Counselling (online) ● Theoretical Approaches to Counselling (online) ● Ethics in Counselling			
Unit -2	**Counselling: Models and Approaches (online)** ● Psychoanalysis, Psychodynamic and Psychotherapy ● Behavioural Therapy, Cognitive Behaviour Therapy and Approaches to Counselling ● Drama and Art Therapy in Counselling ● Other Therapies (Persons Center Counselling and Solution Focus Counselling)			
Unit -3	**Types of Counselling** ● HIV/AIDS Counselling			

	• Educational and Vocational Counselling • Child Protection and Child Rights Counselling • Addiction/Anxiety Counselling
Unit- 4	**Counselling for Mental Disorders** • Depression (online) • Personality Disorder • Gender Identity Disorder • Eating Disorder
Teaching learning process/Transaction Strategies	Lectures, discussions, use of psychological tests, observation of students, conducting career guidance in the schools, counsel students by identifying their mental health problems such as lack of concentration, anxiety, anger etc.

Suggested Readings:

- Aggarwal, J.C. (2005). *Career information in career guidance theory & practice*. Delhi: Doaba House.
- Aggarwal, R. (2010).*Elementary guidance and counselling*. New Delhi: Shipra Publication.
- Bala, Rajni. (2007).*Guidance and counselling: Modern Review*. New Delhi: Afa Publication.
- Burnard, P. (2005). *Counselling Skills Training*. New Delhi: Viva Book Private Limited.
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- Chauhan, S.S. (2007). *Principle and techniques of guidance.* New Delhi: Vikas Publishing House.
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- Kochhar, S.K. (2009). *Guidance & counselling in colleges & universities*. New Delhi: Sterling Publishers Pvt Ltd.
- Koshy, J. (2007). *Guidance and counselling*. New Delhi: Dominant Pub. & Distributors.
- Kottler, J. A. & Shepard, D. S. (2008). *Counselling theories & practices.* Cenage Learning: 1st Edition.
- Madhukumar, I. (2007). *Guidance and counselling*. New Delhi: Authors Press.
- Mathur, S. S. (2008). *Fundamentals of guidance & counselling, (*2nd ed.). Agra: Aggarwal Publication.
- Mishra, R.C. (2004). *Guidance & counselling*. New Delhi: APH Publishing Corporation.
- Naik, D. (2007). *Fundamentals of guidance and counselling*. New Delhi: Adhyayan publishers.
- Pandey, V.C. (2006). *Educational guidance & counselling*. Delhi: Isha Books.
- Rao, S N. (2006). *Counselling and guidance*. Delhi: McGraw hill Publication.
- Rao, S. N. & Hari, H. S. (2004).*Guidance and counselling*. New Delhi: Discovery Pub. House.
- Safaya, B.N. (2002). *Guidance & counselling.* Chandigarh: Abhishek Publications.

- Saxena, A. (2006). *Organization of Guidance Service*. Delhi: Rajat Publications.
- Saxena, A. (2007). *Introduction to educational & vocational guidance*. Delhi: Rajat Publications.
- Sexena, A. (2007). *Modern techniques of counselling*. New Delhi: Rajat Publications.
- Sharma, R. A.(2011). *Fundamentals of guidance and counselling*. Meerut: R. Lal Book Depot.
- Sharma, S.P. (2008). *Career guidance & counselling*. New Delhi: Kanishka Publishers & Distributors.
- Sharma, T.C. (2002). *Modern methods of guidance & counselling*. New Delhi: Sarup & Sons.
- Sharma, Y.K. (2005). *Principles of educational & vocational guidance*. New Delhi: Kanishka Publishers.
- Shrivastava, K.K. (2003). *Principles of guidance & counselling*. New Delhi: Kanishka Publishers.
- Singh, R. (2002). *Educational & Vocational Guidance*. New Delhi: Commonwealth Publishers.
- Varky, B. G. & Mukhopadhyay, M. (2006). *Guidance and counselling*. New Delhi: Sterling Publications.
- Vashist, S.R. (2004). *Evaluation of guidance.* New Delhi: Anmol Publications Pvt. Ltd.

Learning Outcomes-Based Curriculum Framework
(LOCF)

B.Ed. Programme

School of Education
Central University of Haryana, Mahendergarh

NCTE Regulation-2014/NEP-2020/UGC-LOCF Based Curriculum (2021 -2023)

1. **Background**
2. **Vision and Mission**
3. **Programme Educational Objectives (PEOs)/ POs**
4. **Program Specific Outcomes (PSO's)**
5. **Program Outcomes (PO) with Graduate Attributes**
6. **Structure of program**
7. **Learning Outcome Index**
8. **Semester-wise courses and credit distribution**
9. **Course Level Learning outcome**
10. **Teaching- Learning process**
11. **Blended Learning**
12. **Assessment and Evaluation**
13. **Keywords**
14. **References**
15. **Appendices**

Background

Considering the curricular reforms as instrumental for desired learning outcomes, all the academic departments of Central University of Haryana made a rigorous attempt to revise the curriculum of undergraduate and postgraduate programmes in alignment with National Education Policy-2020 and UGC Quality Mandate for Higher Education Institutions-2021. The process of revising the curriculum could be prompted with the adoption of "Comprehensive Roadmap for Implementation of NEP-2020" in the 32nd meeting of the Academic Council of the University held on April 23, 2021. The Roadmap identified the key features of the Policy and elucidated the Action Plan with well-defined responsibilities and indicative timeline for major academic reforms.

The process of revamping the curriculum started with the series of webinars and discussions conducted by the University to orient the teachers about the key features of the Policy, enabling them to revise the curriculum in sync with the Policy. Proper orientation of the faculty about the vision and provisions of NEP-2020 made it easier for them to appreciate and incorporate the vital aspects of the Policy in the revised curriculum focused on 'creating holistic, thoughtful, creative and well-rounded individuals equipped with the key 21st century skills' for the 'development of an enlightened, socially conscious, knowledgeable, and skilled nation'.

With NEP-2020 in background, the revised curricula articulate the spirit of the policy by emphasizing upon— integrated approach to learning; innovative pedagogies and assessment strategies; multidisciplinary and cross-disciplinary education; creative and critical thinking; ethical and Constitutional values through value-based courses; 21st century capabilities across

the range of disciplines through life skills, entrepreneurial and professional skills; community and constructive public engagement; social, moral and environmental awareness; Organic Living and Global Citizenship Education (GCED); holistic, inquiry-based, discovery-based, discussion-based, and analysis-based learning; exposure to Indian knowledge system, cultural traditions and classical literature through relevant courses offering 'Knowledge of India'; fine blend of modern pedagogies with indigenous and traditional ways of learning; flexibility in course choices; student-centric participatory learning; imaginative and flexible curricular structures to enable creative combination of disciplines for study; offering multiple entry and exit points initially in undergraduate programmes; alignment of Vocational courses with the International Standard Classification of Occupations maintained by the International Labour Organization; breaking the silos of disciplines; integration of extra-curricular and curricular aspects; exploring internships with local industry, businesses, artists and crafts persons; closer collaborations between industry and higher education institutions for technical , vocational and science programmes; and formative assessment tools to be aligned with the learning outcomes, capabilities, and dispositions as specified for each course. In case of UG programmes in Engineering and Vocational Studies, it was decided that the departments shall incorporate pertinent NEP recommendations while complying with AICTE, NBA, NSQF, International Standard Classification of Occupations, Sector Skill Council and other relevant agencies/sources. The University has also developed consensus on adoption of Blended Learning with 40% component of online teaching and 60% face to face classes for each programme.

The revised curricula of various programmes could be devised with concerted efforts of the faculty, Heads of the Departments and Deans of Schools of Study. The draft prepared by each department was discussed in series of discussion

sessions conducted at Department, School and the University level. The leadership of the University has been a driving force behind the entire exercise of developing the uniform template and structure for the revised curriculum. The Vice Chancellor of the University conducted series of meetings with Heads and Deans to deliberate upon the vital parameters of the revised curriculum to formulate a uniform template featuring Background, Programme Outcomes, Programme Specific Outcomes, Postgraduate Attributes, Structure of Masters Course, Learning Outcome Index, Semester-wise Courses and Credit Distribution, Course-level Learning Outcomes, Teaching-Learning Process, Blended Learning, Assessment and Evaluation, Keywords, References and Appendices. The experts of various Boards of Studies and School Boards contributed to a large extent in giving the final shape to the revised curriculum of each programme.

To ensure the implementation of curricular reforms envisioned in NEP-2020, the University has decided to implement various provisions in a phased manner. Accordingly, the curriculum may be reviewed annually.

Programme Name: B.Ed., School of Education

Vision and Mission of Central University of Haryana

UNIVERSITY VISION

To develop enlightened citizenship of a knowledge society for peace and prosperity of individuals, nation and the world, through promotion of innovation, creative endeavors, and scholarly inquiry.

UNIVERSITY MISSION

To serve as a beacon of change, through multi-disciplinary learning, for creation of knowledge community, by building a strong character and nurturing a value-based transparent work ethics, promoting creative and critical thinking for holistic development and self-sustenance for the people of India. The University seeks to achieve this objective by cultivating an environment of excellence in teaching, research and innovation in pure and applied areas of learning.

Objectives of School of Education

in consonance with vision and mission of University School of Education has framed following objectives

1. To prepare outstanding teacher educators for transforming lives of individuals and lead to national development.
2. To prepare teacher educators who have a sound knowledge base, essential professional skills and humanitarian values and ethics.
3. To impart skills among teachers in Information & Communication Technology with experiential learning for education.
4. To develop research skills in the pupil teachers with moral and ethical development.
5. To build self-disciplined individuals who appreciate work and manage time efficiently.

Mapping of University Vision and Mission to Department Vision and Mission

Acclaimed as modal Centre of Learning and Research by

University Vision and Mission	**Objectives of School**
High quality knowledge society creation for peace and prosperity of individuals, nation and the world, through and scholarly inquiry	**Yes**

Promotion of innovation, creative endeavours, research and development	**Yes**
Students excellence through multi-disciplinary learning, value-based transparent work ethics, creative and critical thinking	**Yes**
Environment of excellence in teaching, research and innovation in pure and applied areas of learning	**Yes**

1. PROGRAMME OUTCOMES (POs), SCHOOL OF EDUCATION

After successful completion of the programme:

PO1 Learners will be able to comprehend the acquired knowledge during the Programme of study.

PO2 Learners will be able to reflect on the problems relating to discipline and society with ethical guidelines.

PO3 Learners will be able to exhibit the professional skills and competencies acquired during the Programme of study.

PO4 Learners will be able to show scientific & research capabilities in their academic, professional and general life pursuits.

PO5 Learners will be able to apply the knowledge and skills acquired in academic management and resource management according to predetermined objectives/outcomes.

PO6 Learners will be able to work as a member or a leader in various teams and multidisciplinary & diverse settings.

2. PROGRAMME SPECIFIC OUTCOMES (PSOs), B.Ed. Programme

The B.Ed Two-Year, a Pre-Service Teacher Education Programme at Secondary Level Aims at:

PSO-1. Acquiring conceptual understanding of sociological, psychological and philosophical aspects of an individual's development and its relationship with the teaching-learning process.

PSO-2. Develop critical understanding of the school curriculum, pedagogy, discipline and research related to different aspects of teaching-learning.

PSO-3. Enhance professional capacities and 21st Century skills of learners such as Critical reading, communication, literary ICT, aesthetics and self-development.

PSO-4. Enhance the competencies of prospective teachers by way of designing effective lesson-plans, applying various teaching skills, using suitable teaching aids and conducting 360° holistic assessment in their chosen pedagogy subjects.

PSO-5. Providing first-hand experience of all the school activities and field work through engaging learners as interns at secondary and senior secondary school level.

PSO-6. Develop desirable life-skills and values such as environmental awareness, inclusion, yogic life-style and ability to provide suitable guidance and counselling.

Scheme and Syllabus

B.Ed.
(Bachelor of Education)

School of Education

w.e.f. Academic Session 2021-22

SEMESTER-I

S. No.	Course Credit	Course Code	Course Title	Credits (Theory)	Credits (Tutorial/ Practicum)	Credits (Practical)	Class Teaching / Field Based Activity Hours per week
Core Courses							
1.	**4**	SOE 02 01 01 C3104	Childhood and Growing Up	3	1	0	4
2.	**4**	SOE 02 01 02 C3104	Contemporary India and Education	3	1	0	4
3.	**4**	SOE 02 01 03 C3104	Learning and Teaching	3	1	0	4
4.	**2**	SOE 02 01 04 C2002	Understanding Discipline and Subjects	2	0	0	4
5.	**2**	SOE 02 01 05 C0022	Reading and Reflection on Text	0	0	2	4
6.	**2**	SOE 02 01 06 C0022	Understanding the Self	0	0	2	4
Elective Courses							
7.	**4**	SOE 02 01 01 DCEC3104	School Administration and Management	3	1	0	4
8.	**4**	SOE 02 01 02 DCEC	Art in Education (Visual & Performing Arts)	2	0	2	6

		2024					
9.	**4**	SOE 02 01 03 DCEC 3104	Health & Physical Education	3	1	0	4
10.	**4**		**To be taken from other Department/MOOC**	4	0	0	4
	Total	**26**					

Generic Elective Courses (GECs)- Semester I

S. No.	Course Credit	Course Code	Course Title	Credits (Theory)	Credits (Tutorial/ Practicum)	Credits (Practical)	Class Teaching / Field Based Activity Hours per week
1.	**4**	SOE 02 01 01 GEC 3104	Value Based Education	3	1	0	4
2.	**4**	SOE 02 01 02 GEC 2024	Art in Education	2	0	2	6

B.Ed. Semester-II

S. No.	Course Credit	Course Code	Course Title	Credits (Theory)	Credits (Tutorial/ Practicum)	Credits (Practical)	Class Teaching / Field Based Activity Hours per week
Core Courses							
11.	**4**	SOE 02 02 07 C3104	Foundation of Education	3	1	0	4
12.	**4**	SOE 02 02 08 C3104	Creating an Inclusive School	3	1	0	4
13.	**4**	SOE 02 02 09 C3104	Value and Peace Education	3	1	0	4
14.	**2**	SOE 02 02 10 C2002	Language across the Curriculum	2	0	0	2
15.	**2**	SOE 02 02 11 C0022	Critical Understanding of ICT	0	0	2	4
16.	**4**	SOE 02 02 12 C0044	School Internship (Part-I)	0	0	4	8
Discipline Courses Elective Courses (Any Two)							
17.	**4**	SOE 02 02 04 DCEC3104	Pedagogy of Hindi	3	1	0	4

18.	**4**	SOE 02 02 05 DCEC3104	Pedagogy of English	3	1	0	4
19.	**4**	SOE 02 02 06 DCEC3104	Pedagogy of Social Sciences	3	1	0	4
20.	**4**	SOE 02 02 07 DCEC3104	Pedagogy of Mathematics	3	1	0	4
21.	**4**	SOE 02 02 08 DCEC3104	Pedagogy of Life Science	3	1	0	4
22.	**4**	SOE 02 02 09 DCEC3104	Pedagogy of Physical Science	3	1	0	4
23.	**4**	SOE 02 02 10 DCEC3104	Pedagogy of Economics	3	1	0	4
24.	**4**	SOE 02 02 11 DCEC3104	Pedagogy of Commerce	3	1	0	4
	Total	**28**					

Generic Elective Courses (GECs) - Semester II

S. No.	Course Credit	Course Code	Course Title	Credits (Theory)	Credits (Tutorial/ Practicum)	Credits (Practical)	Class Teaching / Field Based Activity Hours per week
3.	**4**	SOE 02 02 03 GEC 2024	Essentials of Guidance and Counselling	2	0	2	06
4.	**4**	SOE 02 02 04 GEC 2024	Performing and Visual Arts	2	0	2	06

B.Ed. Semester-III

Sl. No.	Total Credits	Course Code	Course Title	Credits (Theory)	Credits (Tutorial/ Practicum/ Practical)	Class Teaching Hours per week
25.	**16**	SOE 02 03 13 C 001616	**School Internship (Part-II)**	0	16	32
26.	**04**		**To be taken from other Department/MOOC**	4	0	04

B.Ed. Semester-IV

S. No.	Course Credit	Course Code	Course Title	Credits (Theory)	Credits (Tutorial/ Practicum)	Credits (Practical)	Class Teaching / Field Based Activity Hours per week
Core Courses							
27.	**4**	SOE 02 04 14 C3104	Gender, School and Society	3	1	0	4
28.	**4**	SOE 02 04 15 C3104	Assessment for Learning	3	1	0	4
29.	**4**	SOE 02 04 16 C3104	Curriculum Transaction	3	1	0	4
30.	**2**	SOE 02 04 17 C0022	Yoga Education	0	0	2	4
31.	**2**	SOE 02 04 18 C2002	Environmental Education	2	0	0	2
32.	**2**	SOE 02 04 19 C0022	Art, Craft and Aesthetics	0	0	2	4
Discipline Centre Elective Courses (Any Two)							
33.	4	SOE020412 DCEC3104	Guidance and Counselling	3	1	0	4
34.	4	SOE020413	Comparative	3	1	0	4

		DCEC3104	Education				
35.	4	SOE020414 DCEC3104	Life Skills Education	3	1	0	4
36.	4	SOE020415 DCEC3104	Web Technologies in Education	3	1	0	4
37.	4	SOE020416 DCEC3104	Human Rights in Education	3	1	0	4
38.	4	SOE020417 DCEC3104	Education for Mental Health	3	1	0	4

Generic Elective Courses (GECs) - Semester IV

S. No.	Course Credit	Course Code	Course Title	Credits (Theory)	Credits (Tutorial/ Practicum)	Credits (Practical)	Class Teaching / Field Based Activity Hours per week
5.	**4**	SOE 02 04 05 GEC 3104	Educational Management and Leadership	3	1	0	4
6.	**4**	SOE 02 04 06 GEC 3104	Peace Education	3	1	0	4

Matching of Programme outcomes with Programme Specific outcomes

P.S.O ↓ / P.O.→	P.O. 1	P.O. 2	P.O. 3	P.O. 4	P.O. 5	P.O. 6
P.S.O. 1	X	X		X	X	
P.S.O. 2	X	X	X	X	X	
P.S.O. 3	X	X	X	X	X	
P.S.O. 4	X	X	X	X	X	
P.S.O. 5	X	X	X	X	X	X
P.S.O. 6	X	X	X		X	X
Total	6	6	5	**5**	6	2

Matching of Programme outcomes with Learning Outcomes/ Course outcomes

PO	CC-1	CC-2	CC-3	CC-4	CC-5	CC-6	CC-7	CC-8	CC-9	CC-10	CC-11	CC-12	CC-13	CC-14	CC-15	CC-16	CC-17	CC-18	CC-19
PO-1	X	X	X	X		X	X	X		X	X	X	X	X	X	X		X	X
PO-2	X	X	X	X			X	X				X	X	X	X	X		X	X
PO-3			X	X		X		X	X			X	X			X		X	X
PO-4								X							X				
PO-5	X		X		X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
PO-6		X								X	X								

PO	EC-1	EC-2	EC-3	EC-4	EC-5	EC-6	EC-7	EC-8	EC-9	EC-10	EC-11	EC-12	EC-13	EC-14	EC-15	EC-16	EC-17
PO-1	X	X		X	X		X	X	X	X	X	X	X	X	X	X	X
PO-2	X	X					X	X	X	X	X		X			X	X
PO-3		X		X	X	X	X	X	X	X	X	X		X	X		
PO-4							X		X				X				
PO-5	X	X		X	X	X	X	X	X	X	X		X	X	X		X
PO-6																X	

PO	GEC-1	GEC-2	GEC-3	GEC-4	GEC-5	GEC-6
PO-1	X	X	X	X	X	
PO-2		X		X	X	
PO-3		X	X	X	X	X
PO-4						
PO-5	X	X	X	X		X
PO-6						

Matching of Programme Specific outcomes with Learning outcomes/ Course outcomes

PSO	CC-1	CC-2	CC-3	CC-4	CC-5	CC-6	CC-7	CC-8	CC-9	CC-10	CC-11	CC-12	CC-13	CC-14	CC-15	CC-16	CC-17	CC-18	CC-19
PSO-1	X	X	X	X	X	X	X	X	X					X		X	X		
PSO-2				X				X				X	X		X	X			X
PSO-3	X		X	X	X	X	X		X		X	X	X			X		X	X
PSO-4			X				X	X				X	X		X	X			X
PSO-5	X								X			X	X			X		X	X
PSO-6	X	X				X	X	X	X	X		X	X	X			X	X	X

PSO	EC-1	EC-2	EC-3	EC-4	EC-5	EC-6	EC-7	EC-8	EC-9	EC-10	EC-11	EC-12	EC-13	EC-14	EC-15	EC-16	EC-17
PSO-1	X					X							X	X		X	X
PSO-2	X					X		X	X				X			X	
PSO-3	X	X						X	X	X	X			X	X		X
PSO-4		X		X	X	X		X	X	X	X		X		X		
PSO-5	X					X		X	X	X	X	X					
PSO-6	X	X			X			X				X		X		X	X

PSO	GEC-1	GEC -2	GEC -3	GEC -4	GEC -5	GEC -6
PSO-1	X		X			X
PSO-2				X		X
PSO-3	X	X	X	X	X	
PSO-4		X		X	X	
PSO-5			X			X
PSO-6	X	X	X	X		X

SEMESTER-I

<table>
<tr><td>Year</td><td>I</td><td colspan="2" rowspan="2">CHILDHOOD AND GROWING UP</td><td>Credits</td><td>4</td></tr>
<tr><td>Semester</td><td>I</td><td>Course code</td><td>SOE 02 01 01 C3104</td></tr>
<tr><td>Learning Outcomes</td><td colspan="5">After the completion of the course the pupil-teachers will be able to:
Comprehend the developmental process of a child and recognize the role of heredity and environment in individual development.
Analyze various theories of child development and their educational implications.
Sensitize about various emerging issues of childhood and adolescence and recognize the need and importance of adolescence education programmes.
Apply the knowledge of agents of the socialization process in management of personal and social life.</td></tr>
<tr><td colspan="6">Course Content</td></tr>
<tr><td>Unit -1</td><td colspan="5">Growth and Development</td></tr>
<tr><td></td><td colspan="5">Growth and development: Concept, meaning and definition, differences between growth and development, principles of growth and development (NEP 2020, Online mode)
Stages of Development: Physical development, social development, emotional development and intellectual development during childhood and adolescence. (NEP 2020, Online mode)
Role of Heredity and environment in growth and development of individuals. (NEP 2020)
Individual Differences: Concept, types of individual differences, implications of individual differences for organizing educational programmes (NEP 2020)</td></tr>
<tr><td>Unit -2</td><td colspan="5">Theories of Child Development</td></tr>
</table>

	• Theory of Cognitive Development by Piaget: Concept, Stages and Implications **(NEP 2020, Online mode)** • Theory of Social & Emotional Development by Erickson: Concept, Stages and Implications **(NEP 2020, Online mode)** • Kohlberg theory of Moral Development: Concept, Stages and Implications **(NEP 2020, Online mode)** • Vygotsky theory of sociocultural development and its implications (**NEP 2020)**
Unit -3	**Childhood and Adolescent**
	• Emerging Issues of Childhood and Adolescent**:** Social issues, Emotional issues, Health issues **(NEP 2020)** • Need and Importance of Adolescence Education Programme **(NEP 2020, Online mode)** • Significance of Life Skill Education for Adolescence **(NEP 2020, Online mode)** • Role of Teacher in addressing their emerging issues **(NEP 2020)**
Unit -4	**Socialization of Children**
	• Meaning and definition of Socialization **(NEP 2020)** • Aims and objectives of socialization process • Types of socialization process • Agents of socialization process: Parents and Family, Peer group, Classroom & School Climate, Role of Community
Transaction Strategies/ Teaching Learning Process	E-learning, Lecture cum discussion, power-point presentations, assignments on various topics, presentation and discussion, lecture cum demonstration, debate on various emerging issues of childhood and adolescence, in-depth analysis of various agents of socialization process by the student teachers and presentations will be encouraged.

Practicum:

- Assign a task to a student to speak 10 sentences about himself/herself and analyze them linguistically & psychologically
- Organize a debate on the emerging issues of childhood and adolescence. Note down the main point spoken for and against.
- Administration and Interpretation of any one psychological test -(a) Intelligence (b) Creativity (c) Personality
- Examine the physical hygiene of a school or any social place in order to make critical appreciation.
- Prepare a report on some existing social taboos and interpret it logically and scientifically.

Suggested Readings:

- Aggarwal, J. C. (2014). *Essentials of educational psychology (3rd Edition)*. New Delhi: Vikas Publishing House Pvt. Ltd.
- Ballantine., J. H. & Spade, J.Z. (2015). *Schools and society: A sociological approach to education.* New Delhi: Sage Publications, Inc.
- Bhatia, P.R. (2005). *Psychology of teaching learning process*. New Delhi: Anmol Publication Pvt Ltd.
- Chatterjee, S.K. (2002). *Advanced educational psychology*. Calcutta: Books and Allied Pvt Ltd.
- Dandapani, S. (2001). *A textbook of advanced educational psychology*. New Delhi: Anmol Publications.
- Dash, M. (1988). *Educational psychology.* Delhi: Deep and Deep Publication.
- Fontana, D. (1995). *Psychology for teachers (3rd edition).* The British Psychological Society, London: McMillan in association with BPS Books.
- Hill, D. & Cole, M. (Ed.). (2001). *Schooling and equality – fact, concept and policy*. London: Kogan page.
- James, A. & James, A. (2008). *Key concepts in childhood studies*. UK: Sage.
- Kakkar, S.B. (2005). *Educational psychology.* New Delhi: Prentice Hall of India Pvt. Ltd.
- Kumar, S. (2014). *Child development and pedagogy*. New Delhi: Pearson.
- Kundu C.L. & Tutoo, D.N. (1988). *Educational psychology*. New Delhi: Sterling Publishers Pvt. Ltd.

- Mahapatra, D. (2015). *Ubiquity of porn leading India to social crisis: CBI*. Times of India. Retrieved from http://timesofindia.indiatimes.com/india/Ubiquityof- porn-leading-India-to-social-crisis-CBI/articleshow/49306899.cms.
- Mangal, S.K. (2007). *Essentials of educational psychology.* New Delhi: Prentice Hall of India Pvt. Ltd.
- Mangal, S.K. (2019). *Psychology of learning and development*. New Delhi: Prentice Hall of India Pvt. Ltd.
- Mangal, S.K. & Mangal, S. (*2019). Childhood and growing up*. New Delhi: Prentice Hall of India Pvt. Ltd.
- Mathur, S.S (1994). Educational psychology. Meerut: Loyal Book Depot.
- Nagaraju M. T. V., Manivannan M. & Patteti A. P. (2015). *Psychology of teaching and learning.* Hyderabad: Neelkamal Publications Pvt. Ltd.
- Newman,D.M, (2014). *Sociology: Exploring the architecture of everyday life*. New Delhi: Sage Publications.
- Nirmala J. (2014). *Psychology of learning and human development*. Hyderabad: Neelkamal Publications Pvt. Ltd.
- Oza, D.J. and Ronak, R.P. (2011). *Management of behavioural problems of children with mental retardation*. Germany: VDM publication.
- Phens, J.M., and Evans, E.D. (1973). *Development and classroom learning: An introduction to educational psychology.* New York: Holt Rinehart and Winston Inc.
- Pruthi, R. K (2006). *Educational psychology*. New Delhi: Discovery Publishing House.
- Santrock, John W. (2007). *Adolescence (11th ed.).* New Delhi: Tata McGraw-Hill Publishing Company Limited.
- Skinner, E.C. (1984). *Educational Psychology (4th Edition)*. New Delhi: Prentice Hall of India Pvt. Ltd.
- Spinthall, N., and Spinthall, R.C. (1990). *Educational psychology (5th Edition).* Delhi: McGraw Hill Publishing Company.

Year	I	CONTEMPORARY INDIA AND EDUCATION	Credits	4
Semester	I		Course code	SOE 02 01 02 C3104

Learning Outcomes	After the completion of the course the pupil-teachers will be able to: ● Explain about varied forms of Indian society along with the current problems, road safety measures and emergency first aid services. ● Discuss the concept of education and its constitutional provisions. ● Analyze the underlying philosophical reflections and educational thoughts of great educational thinkers. ● Evaluate the contributions of various educational commissions and policies in Indian education system.
Course Content	
Unit -1	**Contemporary India: Issues and challenges**
	● Indian society: Concept, types, importance and ways of interaction. ● Impact of Urbanization, Industrialization, Globalization, modernization, economic liberalization and digitalization on Indian society. **(Online Mode)** ● Population explosion and educational challenge: Population size; composition and distribution in India; consequences of population growth **(NEP 2020, Online Mode)** ● First Aid and Road Safety: Concept, importance, rules and basic procedures.
Unit -2	**Contemporary Indian Education: Concerns and Issues**
	● Aims and purposes of education drawn from constitutional provision, Education and Fundamental Rights and Duties: Article 14,15,16,30 and 51A **(NEP 2020, Online Mode)** ● Challenges in Implementation of RTE Act 2009 (**NEP2020)** ● Universalization of Elementary Education and related issues such as Mid-Day Meal (MDM), Sarva Shiksha

	Abhiyaan(SSA) and Rashtriya Madhiyamik Shiksha Abhiyaan(RMSA) **(NEP2020)** ● Critical review of present school system – non-formal school, educational guarantee scheme, Kendriya Navodaya and PratibhaVikasVidyalaya and Vision of common school system **(NEP2020, Online Mode)**
Unit -3	**Educational Thinkers (Indian & Western)**
	● Analytical study of thoughts of the Indian thinkers in relation to their formulation about aims of education, curriculum, teaching methodology and teacher: ● RabindraNath Tagore ● Mahatma Gandhi ● Pandit Madan Mohan Malviya ● Analytical study of thoughts of the Western thinkers in relation to their formulation about aims of education, curriculum, teaching methodology and teacher: ● Rousseau ● John Dewey ● Plato
Unit -4	**Policy Framework for Development of Education in India**
	● Overview of educational reform in the Pre-independence period: Macaulay's Minutes, Woods Despatch, Hunter Commission and Sargent Report **(Online Mode)** ● Overview and major recommendations of commissions, policies and mission of Education in Post-Independence Period: **(Online Mode)** ● Mudaliar Commission (1952)

	• Education Commission (1964-66) • NPE 1968 • NPE 1986 • National Knowledge Commission • National Curriculum Framework (NCF) 2005 • National Education Policy (2020) **(NEP 2020)**
Transaction Strategies/ Teaching Learning Process	E-learning, Lecture cum discussion, Tutorials, Brainstorming Session, Recorded/ live Video and Audio lectures, Use of PPT, Film Shows (selected films), assignments on different key areas given in syllabus through Google Group, Google Classroom and other appropriate online apps. Workshop on Road Safety and First Aid, Setting up a road safety group.

Practicum:

- Study of the impact of Right to Education Act on schools
- Critical Analysis of Committees, Commissions and Mission on education
- Panel discussion on Aims and purposes of education drawn from constitutional provision
- Creating awareness among SC/ST students about various schemes and scholarships available
- Any other activity suggested by the teacher

Suggested Readings:

- Bhattacharya, S. (20016). *Sociological Foundation of Education*. Atlantic Publishers. New Delhi.
- Chand, B. (2017). *Education in Contemporary Indian Society*. Neel Kamal Publications. New Delhi.

- Dhankar, N. (2010). *Education in Emerging Indian Society*. New Delhi: APH Publishing Corporation.
- Fagerling, I., and Saha, L.J.O. (1989). *Education and National Development (2nd Ed.)*. England: Pergamon Press.
- Kakkar, S.B. (1995). *Changing Perspectives in Education*. New Delhi: Vikas Publishing House Pvt. Ltd.
- Mehta, D. D. (2009). *Indian Education.* Ludhiana: Tondon Publications, Books Market.
- Mehta, D. D. (2009). *Education in Emerging Indian Education*. Ludhiana: Tondon Publications, Books Market.
- Murthy, S. K. (2009). *Philosophical and Sociological Foundation of Education*. Ludhiana: Tondon Publication, Books Market.
- National Policy and Education (1986) revised 1992. MHRD. New Delhi: Govt. of India.
- Pathak, K.R. (2007). *Education in Emerging India*. New Delhi: Atlantic Publishers.
- Pathak, R.P. (2009). *Philosophical and Sociological Foundations of Education.* New Delhi: Kanishka Publishers.
- Rao, D. B. (1996). *Global's Perception on Peace Education*. Vol. I, II & III. New Delhi: Discovery Publishing House.
- Rassekh, S., and Vaideanu, G. (1987). *The contents of education*. UNESCO, Paris: Richard Clay Ltd., Bungay, Suffolk, England.
- Siddiqui, M.H. (2009). *Philosophical and Sociological foundation of Education*. New Delhi: APH Publishing Corporation.
- Govt. of India. (1986). Ministry of Human Resource Development. The National Policy of Education. New Delhi.
- Govt. of India. (1992). Ministry of Human Resource Development. The Revised Policy Formulation. New Delhi.
- Siddiqui, M.H. (2009). *Philosophical and Sociological foundation of Education*. APH Publishing Corporation, New Delhi.
- Singh Y.K. (2007). *Philosophical Foundation of Education.* New Delhi: APH Publication Corporation.
- Singh, Y.K. (2005). *Education in Emerging Indian Society*. New Delhi: APH Publishing.
- Thakur, A.S., and Berwal, S. (2007). *Education in Emerging Indian Society*. New Delhi: National Publishing House.
- National Policy on Education, 1986,http://mhrd.gov.in/sites/upload_files/mhrd/files/document-reports/NPE86-mod92.pdf
- Kothari, D. S. (1964). Education and national development: Report of the Education

- National policy on Education (1986). Available at www.ncert.ac.in
- http://samvada.org/2010/news/150th-birth-anniversary-of-malviya-ji/. Vishwa Samvada Kendra. 31 October 2010.
- https://www.youtube.com/watch?v=oxFrQd6lVzA YouTube (29 April 2015). Retrieved on 20 December 2020.
- http://egyankosh.ac.in/bitstream/123456789/8526/1/Unit%205.pdf EDUCATION COMMISSIONS AND POLICIES SINCE INDEPENDENCE.
- https://www.yourarticlelibrary.com/education/recommendations-of-indian-education-commission/84839 Recommendations of Indian Education Commission.
- https://www.youtube.com/watch?v=DZ22H1HFaEg

<table>
<tr><td>Year</td><td>I</td><td rowspan="2">LEARNING AND TEACHING</td><td>Credits</td><td>4</td></tr>
<tr><td>Semester</td><td>I</td><td>Course Code</td><td>SOE 02 01 03 C 3104</td></tr>
<tr><td>Learning Outcomes</td><td colspan="4">At the end of the course, the pupil-teachers will be able to:
● point out the significance of various learning theories and illustrate their educational implications.
● elaborate and organize the various dimensions of creativity, intelligence and learning styles.
● explain the various aspects of teaching and organize phases and levels of teaching.
● critically evaluate the teaching profession and appraise the diverse role of teachers.</td></tr>
<tr><td colspan="5">Course Content</td></tr>
<tr><td>Unit -1</td><td colspan="4">Learning and It’s Theories (NEP 2020, Online mode)</td></tr>
<tr><td></td><td colspan="4">● Learning: Concept, Characteristics and Factors affecting learning
● Behaviourist Theories: Concept of Connectionism (Thorndike) and Conditioning (Classical & Operant Conditioning) (online mode)
● Cognitive Theory – Concept of Gestalt (Insightful Learning), Social Cognitive Theory – Vygotsky
● Meaningful Learning by Ausubel and Discovery learning by Bruner</td></tr>
<tr><td>Unit -2</td><td colspan="4">Creativity, Intelligence and Learning Styles</td></tr>
<tr><td></td><td colspan="4">● Creativity: Concept, Relationship and differences between intelligence and creativity, Characteristics of creative person, Stages of creativity, Techniques of fostering creativity in classroom (NEP 2020)
● Intelligence: Concept and Nature
● Theories of Intelligence: Spearman’s Two Factor Theory, Thurston’s Group Factor Theory, Structure of Intellect by J.P. Guilford, Gardner’s Theory of Multiple Intelligence (NEP 2020)
● Learning Styles: Concept & Implications for classroom environment (VARK Model & Kolb’s Model of Learning style)</td></tr>
</table>

	(**NEP 2020, online mode)**
Unit -3	**Understanding the Teaching**
	• Teaching: Concept, Nature & Factors affecting teaching • Principles and Maxims of Teaching • Phases of Teaching • Levels of Teaching
Unit -4	**Teaching as a Profession**
	• Teaching as a profession and professional ethics of teachers • Role of a teacher (as Transmitter and Facilitator of knowledge) in teaching-learning process **(NEP 2020, online mode)** • Reflective teaching: Concept and strategies for making teachers reflective practitioners **(NEP 2020)** • Skills & Competencies of 21st century teachers **(NEP 2020, online mode)**
Transaction Strategies/ Teaching Learning Process	Lecture cum Discussion, Use of PPT, Assignments, Debate & Panel Discussion, Brainstorming Session, Use of multimedia applications like Google Classroom, Google Drive.
Practicum • Creativity test and intelligence test • Presentation on the comparative analysis of the various learning theories through multimedia approach. • Analysis of influential factors affecting learning to the same class and students on the basis of regular visit (one week) to school. • Report on effective teacher behavior or classroom instruction strategies of effective teacher.	

Suggested Readings:

- Bigge, M. L. (1982). *Learning theories for teachers* (4th edition). New York: Harper and Row Publishers.
- Chauhan, S.S. (2007). *Advanced educational psychology* (7th edition). New Delhi: Vikas Publishing House Pvt. Ltd.
- Chauhan, S.S. (2014). *Innovations in teaching learning process*. Noida: Vikas Publishing House Pvt. Ltd.
- Dececco, J.P. (1988). *The psychology of learning and instruction*. New Delhi: Prentice Hall.
- Wheldall, K. (2006). *Developments in educational psychology*. New York: Routledge.
- Hergerhahn, B.R. (1976). *An introduction to theories of learning*. Englewood Cliffs, NJ: Prentice Hall.
- Kumar, S. (2016). *Child development and pedagogy*. Delhi: Pearson Education (Singapore) Pvt. Ltd.
- Lefrancois, G.R. (1999). *Psychology for teaching* (10th edition). London: Woodsworth Publishing.
- Ohles, J.F. (1970). *Introduction to teaching*. New York: Random House, INC.
- Ormrod. J.E. (2006). *Educational psychology*: *Developing learners* (5th edition). New Jersey: Prentice Hall.
- Ormrod, J.E., Anderman, E.M., & Anderman, L.H. (2016). *Educational psychology* (9th). Delhi: Pearsons Publishing.
- Pandey, K.P. (1983). *Dynamics of teaching behaviour.* Ghaziabad: Amitash Parkashan.
- Rinehart, Winston, & Bhatia, K.K. (2008). *Basis of educational psychology.* Ludhiana: Kalyani Publishers.
- Santrock, J.W. (2018). *Educational psychology* (6th Edition). McGraw Hill Education.
- Siddiqui, M. H. (2005). *Techniques of classroom teaching.* Delhi:APH Publishing Corporation.
- Skinner, E.C. (1984). *Educational psychology* (4th edition). New Delhi: Prentice Hall of India Pvt. Ltd.
- Snowman., & Baihler. (2006). *Psychology applied to teaching*. Boston: Houghton Mifflin Company.
- Snowman., J., & Biehler, R. (2002). *Psychology applied to teaching*. New York: Houghton Mifflin.
- Stephens, L.M., & Evans, E.D. (1973). *Development and classroom learning: An introduction to educational psychology*. New York: Holt, Rinehart and Winston, Inc.

- Tanner, L.N., & Lindgren, H.C. (1971). *Classroom teaching and learning*. New York: Holt, Rinehart and Winston, Inc.
- Upadhya,B.,& Singh Y.K.(2011). *Encyclopaedia of education psychology* (Vol. I to II). Delhi: APH Publishing Corporation.
- Wilkinson, B., & Vaughan, A. (2019). *Educational psychology for learners: Connecting theory, research and application* (2nd edition). Iowa, U.S.: Kendall Hunt Publishing.
- Woolfolk, A. (2017). *Educational psychology* (13th edition). Delhi: Pearson Education (Singapore) Pvt. Ltd., Indian Branch.

Web Resources:

- Chick, N. (2010). *Learning styles*. Vanderbilt University Centre for Teaching. Retrieved from https://cft.vanderbilt.ed/guides-sub-pages/learning-styles-preferences/.
- Gatumu, J. C. (2011). *Reflective Teaching*. Retrieved from http://oer.avu.org/bitstream/handle/123456789/155/REFLECTIVE-TEACHING.pdf?sequence=1
- Hussain, I. (2017). Pedagogical implications of VARK model of learning. *Journal of Literature, Languages and Linguistics, 38*, 33-37. Retrieved from https://www.researchgate.net/publication/337274707_Pedagogical_Implications_of_VARK_Model_of_Learning
- Mathew a, P., Mathew, P., & Peechattu, P. (2017). Reflective practices: A means to teacher development. Asia Pacific Journal of Contemporary Education and Communication Technology, 3(1), 126-131. Retrieved from https://apiar.org.au/wp-content/uploads/2017/02/13_APJCECT_Feb_BRR798_EDU-126-131.pdf

Year	I	Understanding Discipline and Subjects	Credits	2
Semester	I		Course Code	SOE 02 01 04 C2002

Learning Outcomes	After the completion of the course, the pupil-teachers will be able to: ● Explain Academic discipline and different levels of integration of knowledge. ● Describe the nature of school subjects and their Inter & multidisciplinary linkage of subjects in curriculum.
Course Content	
Unit -1	**The Doctrine of Academic Discipline and Integration of Knowledge.** ● Meaning, Concept, Classification of Academic Discipline; Approximate classification, Aristotle and Biglan taxonomy. **(Online Mode)** ● Historical, Philosophical, Sociological Perspective of Discipline (Knowledge). **(NEP 2020, Online Mode)** ● Integration of Knowledge: Transdisciplinary approach, Cross disciplinary approach, Multidisciplinary Approach. **(NEP 2020)** ● Relationship between School Subjects and Academic discipline. **(Online Mode)**
Unit -2	**School Subjects & Interdisciplinary Learning** ● Meaning, Definition, Concept & Characteristics of School Subjects. ● Nature & Importance of Subjects in school curriculum: Language, Social Science, Physical & Natural Science, Art & Crafts, Mathematics, Information Technology, Health & Physical Education **(NEP 2020, Online Mode)** ● Inter & Multidisciplinary subjects and Learning. **(NEP 2020)** ● Interdisciplinary Learning and issues and concerns of interdisciplinary learning. **(NEP 2020)**
Transaction Strategies/ Teaching	**Offline Mode;** Lecture cum discussion, assignments on various topics, discussion & Ppt presentations in class.

Learning Process	**Online Mode;** Using PowerPoint Presentations, sharing e content, self-made content, moocs courses, recorded lectures, audio and video materials etc.

Practicum:

- Find out how many disciplines are there in your university and which subjects come under which Disciplines and prepare a chart/ppt.
- Prepare a report on any one school subject (CBSE & ICSE) and their interdisciplinary nature.
- Find out how your pedagogy subject is related to other academic disciplines.
- Find out any five Interdisciplinary topics from your pedagogy subject and their interdisciplinary nature.
- Find out which disciplines are taught at school level by which subjects.
- Find out which subjects come under which disciplines at school level.
- Prepare a chart/ppt on which school subjects are taught in CBSE, ICSE and SBSE at senior secondary level
- Any other activity suggested by the teacher.
- Choose any five topics of your subject and analyze the content knowledge from a different perspective.
- Prepare a report and presentation on historical evolution of your both pedagogy subjects.
- Choose any 2 topics from both pedagogy subjects and analyze the historical evolution of that knowledge.
- Choose any 2 topics from both pedagogy subjects and analyze the philosophical perspective of that knowledge.
- Choose any 2 topics from both pedagogy subjects and analyze the Cultural perspective of that knowledge.
- Choose any 2 topics from both pedagogy subjects and analyze the Sociological perspective of that knowledge.
- Analyze the interdisciplinary linkage of your pedagogy subjects with other disciplines/subjects.

Suggested Readings:

- Aram, John (2004), *'Concepts of Interdisciplinary: Configurations of Knowledge and Action'*, Human Relations 57(4), 379-412.
- Bryantala, L. H. and Niewolnyb, K., Clarkc, S. and Watson, C. Edward. (2014). *Complicated Spaces: Negotiating Collaborative*

Teaching and Interdisciplinarity in Higher Education. The Journal of Effective Teaching, 14(2), 83-101. Retrieved from https://files.eric.ed.gov/fulltext/EJ1060430.pdf

- *Defining Interdisciplinary Studies.* (n.d.). Retrieved March 25, 2021 from https://www.sagepub.com/sites/default/files/upm-binaries/43242_1.pdf
- Dey, N. (2021 Jan. 29th). Understanding Discipline and Subjects. Retrieved from https://onlinecourses.swayam2.ac.in/nou21_ed05/preview
- Deng, Z. (2013). School subjects and academic disciplines. In A. Luke, A. Woods, & K. Weir (Eds.), Curriculum, syllabus design and equity: A primer and model. Routledge.
- Friedow, A. J., Blankenship, E. E., Green, J. L. and Stroup, W.W. (2012). Learning Interdisciplinary Pedagogies: Critical Approaches to Teaching Literature, Language, Composition, and Culture, 12(3), 405–424. Retrieved from https://core.ac.uk/download/pdf/188106944.pdf
- Golding, G. (2009*). Integrating the Disciplines: Successful Interdisciplinary Subjects*. University of Melbourne. Retrieved March 25,2021 from https://gened.psu.edu/sites/default/files/docs/LOA%20-%20InterdisciplinaryCourse_HowToGuide-Gooding.pdf
- Gandhi, N. (2016). *An Approach to Academic Discipline and subjects*. Indian Journal of Applied Research, pp. 576-578. Retrieved from https://www.worldwidejournals.com/indian-journal-of-applied-research-(IJAR)/recent_issues_pdf/2016/June/June_2016_1464791567__183.pdf
- Jha, A. K. & Dey, N. (2016). BES-125 Understanding Discipline and Subjects. Retrieved from http://egyankosh.ac.in/bitstream/123456789/46622/1/BES-125B1E.pdf
- झा, अ. कु. औरडे, ऐन . (2016). शास्त्रों व्विषयो की समझ. (२०१७). नई दिल्ली: गुली बाबा पब्लिकेशन.
- Krishnan, A. (2009). What are Academic Disciplines? University of Southampton, NCRM E Prints Repository eprints.ncrm.ac.uk/783/1/what_are_academic_disciplines.pdf

- Monsilla, V. B. (2010). *MYP: Guide to interdisciplinary teaching and learning.*International Baccalaureate Organization. Retrieved fromhttps://balimyp.files.wordpress.com/2010/05/myp-guide-to-interdisciplinary-teaching.pdf
- Stengel, B. S. (1997). *"Academic discipline" and "school subject": Contestable curricular Concepts.* Journal of Curriculum Studies, 29(5), 585–602.
- शर्मा, ज. (2017). अनुशासन व वषयो को समझना. आगरा, उत्तर प्रदेश: वनोद पुस्तक मंदिर.
- संह, एच. प. और तिवारी, अ. (2017). अनुशासन व्विषय बोध. दिल्ली: बुकमेन.
- *Understanding Discipline and subjects*. (n.d.). Retrieved March 25, 2021 from https://snscourseware.org/drsnsce/files/1566453535.pdf
- व शष्ठ, र. के. (2018). अध्यन्न क्षेत्रों व वषयो की समझ. नई दिल्ली: लक्ष्मी प्रकाशन.

<table>
<tr><td>Year</td><td>I</td><td rowspan="2">READING AND REFLECTING ON TEXTS
(Practical)</td><td>Credits</td><td>2</td></tr>
<tr><td>Semester</td><td>I</td><td>Course Code</td><td>SOE 02 01 05C0022</td></tr>
<tr><td>Learning Outcomes</td><td colspan="4">At the end of the course, the pupil-teachers will be able to
● Read intensively, organize various vocabulary games, prepare vocabulary-book and assess the reading comprehension.
● Critically appreciate a variety of text.</td></tr>
<tr><td colspan="5">Course Content</td></tr>
<tr><td>Unit -1</td><td colspan="4">Enhancing Reading (NEP 2020)</td></tr>
<tr><td></td><td colspan="4">● Concept of Reading, its components, methodology, levels, types and techniques. (NEP 2020, Online)
● Vocabulary games and Vocabulary book.
● Reading comprehension and question-answers. (NEP 2020, Online)
● Reading beyond the text</td></tr>
<tr><td>Unit -2</td><td colspan="4">Critical Appreciation of the Texts (NEP 2020)</td></tr>
<tr><td></td><td colspan="4">● Critical Appreciation of a short story (NEP 2020, Online)
● Critical Appreciation of newspaper article (NEP 2020, Online)
● Critical Appreciation of research paper
● Critical Appreciation of a book</td></tr>
<tr><td>Transaction Strategies/ Teaching Learning Process</td><td colspan="4">Group work, pair work, Lecture, Discussion, Discussion-cum-Demonstration, Power-point presentations, Games, Exercises, use of audio-visual materials, Exposition, Field visit, reading demonstration, Games, Exercise, e-learning, Reading practice etc.</td></tr>
</table>

Practicum:

- Read a book, a journal Article, or a chapter and write a critical appreciation along with personal responses and summarize.
- Prepare presentations on literary text – Autobiography / ethnographic text.
- Beyond the textbook: reading comprehension and question –answers.
- Prepare a Vocabulary Book 100 words with Meanings, Usage (and also pictures wherever possible)
- Write a book review and critically analyze the Language and the ideas ingrained in the text.
- Any other project/assignment given by the institution.

Suggested Readings:

- Beaumount, M. (1996). *The Teaching of Reading Skills in Second/Foreign Language*. Patras: The Hellenic Open University.
- Glennie, A. (2017). *Reflective reading: engaging and practical ideas for teaching reading comprehension in the primary classroom*. Cranachan Publishing Limited.
- Moje et. al. (2020). *Handbook of reading research: Volume V*. Routledge.
- Perkins, M. (2015). *Becoming a teacher of reading*. Sage.
- Roberts, G.R. (1999). *Learning to teach reading.* London: Chapman.
- Underwood, G. & Batt, V. (1996). *Reading and understanding*. Oxford: Blackwell.

Web Resources

- An introduction to critical analysis of publications in experimental biomedical sciences. Retrieved on 24.03.2021. https://www.science.mcmaster.ca/biopharm/images/files/handouts/critanal.pdf
- Analysing novels and short stories. Retrieved on 24.03.2021. https://writingcenter.tamu.edu/Students/Writing-Speaking-Guides/Alphabetical-List-of-Guides/Academic-Writing/Analysis/Analyzing-Novels-Short-Stories
- Critical Analysis. Retrieved on 24.03.2021. https://www2.southeastern.edu/Academics/Faculty/elejeune/critique.htm

- Critical Analysis of a newspaper article. Retrieved on 24.03.2021. https://medium.com/@garriottmk/critical-analysis-of-a-newspaper-article-the-deadly-fallout-b166d2f44b65
- Goodwyn, J. (2018). 9 Classroom Vocabulary Games to Use with Your Students. *Magoosh*. Retrieved on 24.03.2021. https://schools.magoosh.com/schools-blog/9-classroom-vocabulary-games-to-use-with-your-students
- How to write a critical analysis. Retrieved on 24.03.2021. https://www.indeed.com/career-advice/career-development/how-to-write-a-critical-analysis
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- How to write a critical book review. Retrieved on 24.03.2021. https://txwes.edu/media/twu/content-assets/documents/history/CriticalBookReviewGuide.pdf
- How to write a critical book review. Retrieved on 24.03.2021. https://www.carleton.edu/history/resources/history-study-guides/criticalbookreview/
- How to write a critical review. Retrieved on 24.03.2021. https://writing.wisc.edu/handbook/assignments/crinonfiction/
- NCERT (2014). Learning indicators and learning outcomes. *National Council of Educational Research and Training, New Delhi*. Retrieved on 04.02.2021. http://www.dsek.nic.in/misc/learningoutcome.pdf
- Reading beyond the text: Guiding students to inferential and evaluative levels of comprehension. Retrieved on 24.03.2021. https://content.schoolinsites.com/api/documents/321ef00700254f6686d4626b34aad795.pdf
- Reading Comprehension. Wikipedia. Retrieved on 24.03.2021. https://en.wikipedia.org/wiki/Reading_comprehension
- Reading Comprehension. [Youtube]. Retrieved on 24.03.2021. https://www.youtube.com/watch?v=W7BW9gv_OkU
- Vocabulary games only. *English Club*. Retrieved on 24.03.2021. https://www.englishclub.com/esl-games/vocabulary/
- Word games. *British Council*. Retrieved on 24.03.2021. https://learnenglishkids.britishcouncil.org/word-games
- Writing a Critical Analysis of a Short Story. Retrieved on 24.03.2021.

- https://www.mun.ca/writingcentre/resources/modelessay/index.php

Year	I	UNDERSTANDING THE SELF	Credits	2
Semester	I	(Practical)	Course Code	SOE 02 01 06 C0022

Learning Outcomes	After completion of the course students will be able to: ● Distinguish and explain the multiple ways for exploring the self. ● Conduct self-development activities and stress management.
Course Content	
Unit -1	**Exploring the Self** ● Concept and fundamentals of self-exploration: Self-concept, Self-Identity, Self-Image, Self-Esteem, Self-motivation **(NEP 2020)** ● Factors affecting exploration of self: Heredity and environment **(NEP 2020, Online)** ● Personality: Concept, Dynamic Approaches & Determining a Distinctive Personality **(Online)** ● Exploring, reflecting and sharing one's own aspirations, dreams, concerns and struggles in becoming a teacher **(NEP 2020)**
Unit -2	**Development of Self** ● Techniques of Self Reflection: Introspection, Reflective Diary, Reflective Dialogue, Discussion & social media **(Online)** ● Developing an understanding of one's own philosophical and cultural perspective as a teacher **(NEP 2020)** ● Development of resilience and techniques for Stress Management **(NEP 2020)** ● Professional ethics as a teacher to develop the Group & Social Harmony **(NEP 2020)**
Transaction Strategies/ Teaching	● Audio and Video Lecture, PowerPoint presentations. ● Group Discussions ● Review of various literature available

Learning Process	• Workshops • Collaborative activities • Field Visits

Practicum:

1. Write a self-reflective journal (approx.600-800 words).
2. Elaborate your own values towards self and society.
3. Conduct any two activities for stress management on school students or peers.
4. Review of movies with social messages.
5. Strength, Weakness, Opportunity and Challenges (SWOC) analysis of one's own.
6. Any other activity/assignment suggested by the teacher.

Suggested Readings:

- Feldonan, R. S. (2019). *Essentials of understanding psychology*. (7th edition). New Delhi: Tata McGraw Hill.
- Farrell, T. S. C. (2019). *Reflective practice in action.* Thousand Oaks, CA: Corwin Press, Inc.
- Adair, J., and Allen, M. (2018). *Time management and personal development*. London: Hawksmere.
- Luft J and Ingham H. (2017). *The Johari window: A graphic model for interpersonal relations.* University of California Western Training Lab.
- Hadfield, J. A. (2016). *Psychology and morals*. *London*: Methuen & Co.
- Kubalker, R. (2015). *Know your stress-manage your stress*. New Delhi: Neel Kamal Publishers.
- Snyder, C. R. (2011). *Positive psychology: The scientific and practical explorations of human strengths.* New Delhi: Sage Publishers.
- Gurol, A (2010) *Determining the reflective thinking skills of pre-service teachers in learning and teaching process.* Turkey: Firat

University.

- Lewis, M. & Brooks-Gunn, J. (2009). *Self-knowledge and emotional development*. New York: Plenum Press.
- Rohrer, J. (2008). *ABC of awareness*. Oberurnen: UTD Media.
- Sheorron, B. (2008). *The presentation skills workshop*. New Delhi: Prentice Hall of India.
- Simanowitz, V., and Pearce, P. (2003). *Personality development*. Beckshire: Open University Press.

Web Resources:

- Factors affecting exploration of self
- https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3058678/
- https://www.cambridge.org/core/journals/behavioral-and-brain-sciences/article/abs/heredity-and-environment-how-important-is-the-interaction/FB98E30F10B1A8F5384A6C2A0AB960CA
- Personality: Dynamic Approaches & Determining a Distinctive Personality
- https://www.researchgate.net/publication/331350826_A_dynamic_systems_approach_to_personality_The_Personality_Dynamics_PersDyn_model
- https://www.britannica.com/topic/personality

Elective Courses (DCEC)

Year	I	SCHOOL ADMINISTRATION AND MANAGEMENT	Credits	4
Semester	I		Course Code	SOE 02 01 01 DCEC3104

Learning Outcomes	After completion of the course, students will be able to: ● Explain the various dimensions/aspects of educational administration and management. ● Illustrate the role of various humane and physical resources in the organization of school. ● Elaborate the various dimensions of educational supervision and critically judge the process of decision making. ● Describe various aspects of school management and organize school activities.
Course Content	
Unit -1	**An Overview of Educational Administration and Management** ● Educational Administration: Concept, objectives, scope, types and functions **(NEP 2020, Online)** ● Educational Management: Concept, scope, types and principles **(NEP 2020, Online)** ● Difference Between Educational Administration and Educational Management ● Qualities of a good educational administrator **(Online)**
Unit -2	**School Organization** ● School: Concept, functions and relationship with the society **(NEP 2020)** ● School planning: building, library, various labs, play ground ● Roles and Responsibilities of School Personals: Headmaster, Teachers, supporting Staff ● School Management Committees (SMCs) **(NEP 2020)**
Unit -3	**Educational Supervision**

	● Educational Supervision: Concept, nature and types	**(Online)**
	● Principles and functions of Educational Supervision	**(Online)**
	● Issues in present supervision and inspection.	**(Online)**
	● Conflict management and decision-making dimensions of school planning	**(NEP 2020)**
Unit -4	**School Management System**	
	● **Issues and concern of school Management**	**(NEP 2020, Online)**
	● Timetable: concept, Principles, types and Techniques of Time -table preparation	
	● Preparation of Activity Calendar	**(NEP 2020)**
	● School Discipline: Concept, needs and Approaches	**(NEP 2020)**
Transaction Strategies/ Teaching Learning Process	● E-learning, Lecture and discussion on concept and objectives ● Organization of debates and quiz on issues related to Educational Administration and Management ● Review of existing role & functions of educational administrative bodies ● Content analysis of various reports and other significant documents related to school administration and management ● Field visits	
Practicum: ● Compile articles from newspapers, magazines, and internet discussing present policies and operational strategies of central and state Govt. for secondary education. Prepare a report of the entire activity. ● Review research on educational management of secondary schools which are used in other countries but not in India. ● Examine the effectiveness of any one programme run by central Govt. for secondary students and Present the report in a classroom seminar.		

- Any other activity suggested by the teacher**.**

Suggested Readings:

- Agarwal, J. C. (2006). *School administration.* New Delhi: Arya Book Depot.
- Bhatnagar, R. P., & Verma, I. B. (2000). *Educational Administration*. Meerut: Loyal Book Depot.
- Bush T. L. B. (2003). *The principles and practice of educational management (ETD).* New Delhi: Sage Publications.
- Bush, T. (2013). *Educational management, administration & leadership.* New Delhi: Sage Publications.
- Govinda, R. (2001). Capacity Building for Educational Governance at Local Levels. Paper presented at the International Consultation on Educational Governance at Local Levels, Held at UNESCO, Paris 27-28 February 2001.
- Kimbrough, R. B., & Nunnery, M.Y. (1983). *Educational Administration: An Introduction.* New York: MacMillan Publishing Co. Inc.
- Prasad, A. (2007). *University education administration and the law*. New Delhi: Deep & Deep Publications.
- Punia,V. (2004). *Managerial skills in educational administration*. New Delhi: Deep & Deep Publications Pvt. Ltd.
- Safaya, R. N., & Shaida, B. D. (2000). *School Administration and Organization*. New Delhi: Dhanpat Rai and Sons.
- Chauhan,S.(2012). *Educational management.* New Delhi: Pearson Publication.
- Dhillan, S.S. (2019). *Educational administration: management and leadership*. New Delhi: Gyan Geeta Publications.
- Mohan, M. (2002). *School without Walls*. Heinemann. New Delhi pp 24- 40; 128
- McCaffery, P. (2004). *The higher education manager's handbook.* New York: Routledge.
- Mukerji, S.N. (2007). *Administration of Educational Planning and Finance*. Baroda, Acharya Book Depot. Prentice Hall.
- Nangia, S. B. (2009). *Educational administration*. New Delhi: APH Publishing Corporation Publishing House.
- Sayeed, O. B., & Pareek, U. (2000). *Actualizing managerial roles.* New Delhi: Tata McGraw-Hill Publishing Company Limited.

- Sharma, R. A. (2009). *Educational administration & management*. Meerut: R Lal Book Depot.
- Sindhu, I. S. (2012). *Educational administration & management*. New Delhi: Pearson Publications.
- Srivastav, A. K. (2009). *Educational administration policy, planning and survey*. New Delhi: Kunal Books.

Web Resources:

- Concept and types of educational management, Retrieved from: https://www.yourarticlelibrary.com/educational-management/educational-management-meaning-definition-and-types/63721
- Scope and nature of educational management, Retrieved from: https://onlinenotebank.wordpress.com/2019/08/06/meaning-and-definition-nature-and-scope-of-educational-management/
- concept importance scope and types of educational management, Retrieved from: https://www.preptoz.com/library/educational-management-concept-importance-scope-and-types-of-management/
- headmaster duties and responsibilities, Retrieved from:https://www.slideshare.net/FousiyaOP/head-master-duties-and-responsibilities
- meaning, scope, nature and type of Educational Supervision, Retrieved from: https://www.yourarticlelibrary.com/education/educational-supervision-in-india-meaning-scope-nature-and-type/45235
- Time Table: Principles and types, Retrieved from: https://www.toppr.com/bytes/how-to-make-school-time-table/

Year	**I**	**Art in Education (Visual & Performing Arts)**	**Credits**	**4 (2Theory+ 2 Practical)**
Semester	**I**		**Course Code**	SOE 02 01 02 DCEC 2024
Learning Outcomes	After the completion of the course the pupil-teachers will be able to: ● Appraise the concept of Art and its integration in Education ● Dramatize the various performing skills and in calcite the aesthetic sense ● Use of various tools and techniques of Drama and Narratives Arts ● Demonstrate the various designs of Printing, Painting & Crafting expression			
Course Content				
Unit -1	**Concept of Art and its integration in Education (Theory)** ● Art: Concept, elements, forms, Importance and classification **(NEP 2020, Online)** ● Importance of colours in human life **(NEP 2020, Online)** ● Art in Education: concept, scope and it Significance in pedagogy subjects **(NEP 2020)** ● Folk Art: concept with reference to Madhubani and Warli **(Online)**			
Unit -2	**Aesthetic Sense and Performing Art (Theory)** ● Importance of Aesthetic sense in human life **(NEP 2020, Online)** ● Transformation of art and aesthetic sense through education **(NEP 2020, Online)** ● Introduction of Drama and its types, social and educational relevance of performing art and its place in contemporary Indian society **(NEP 2020, Online)** ● General introduction of classical Dance styles, knowledge of Indian Dance & Drama traditions both in classical and Folk Song **(NEP 2020)**			
Unit -3	**Tool and techniques of Performing Art (Practical)**			

	• Meaning, concept and characteristics of narratives art, puppetry, mime and storytelling **(NEP 2020)** • Stage craft & design, technology and direction of performance • Acting for production, play production process, creative body movement **(NEP 2020)** • Traditional folk and classical Performing arts **(NEP 2020)**
Unit -4	**Method and Material of Printing, Painting & Crafting (Practical)** • Making of Object Art: Still life, Portrait Painting, Clay Modeling, Rangoli, Glass Painting, Poster and Collage **(NEP 2020)** • Making Show-Pieces by Paper-cutting and folding of different objects **(NEP 2020, Online)** • Waste Utilization: New Paper, Cardboard and Plastic bottle **(NEP 2020)** • Block Painting with Ladyfinger, Potato, Onion, stencil and art of calligraphy **(NEP 2020)**
Transaction Strategies/ Teaching Learning Process	Hand-on experience of working in different mediums and materials, preparation and presentation of teaching learning materials, slide/film show, group work planning of a stage-setting, visit, role play, celebrations of Indian festivals and fairs, brain-storming, interaction with artists, lectures and demonstration.
Practicum:	1) Making of Object: Still life, Portrait Painting, Clay Modeling, Rangoli, Glass Painting, Poster, Collage, Calligraphy (Hindi/English), Paper-cutting, Waste Utilization, Folk Art: Madhubani and Warli and Block Painting. 2) Music, Dance, Theater (Performing Art), Mime, storytelling, puppetry and role play.

Suggested Readings:

- Chandok, A. (2016). *Art and education*. Delhi: Bookman.
- Chaturvedi, S. (2016). *Art education*. Delhi: Bookman.

- Chauhan, R. (2016). *Drama, Art and Education*. Agra: Agrawal Publications, Sanjay Place.
- Chawla, S. S. (1986). *Teacher of Art*. Patiala Publication Bureau, Punjabi University.
- Esther, S. M. & Anand, K. P. (2019). *Art in Education*. Hyderabad: Neelkamal Publications.
- Gill, R. (2017). *A textbook of art education*. New Delhi: Paragon International Publishers.
- Gill, R. (2018*). Art Education*. New Delhi: Paragon International Publishers.
- Jain, R. (2016). *Art education*. Delhi: Bookman.
- Kakkar, R. & Makkhar, R. (2018). *Drama, art and aesthetics in education*. Agra: Rakhi Prakashan.
- Kumar, R. (2016). *Drama and art in education*. Rajasthan: Jain Prakashan Mandir.
- Ravikant, R. K., & Ananad, K. P. (2019). *Drama and Art in Education*. Neelkamal Publications.
- Roy, R. (2017). *Perfect art education*. Arya: Publisher Company.
- Saxena, A., Sirth, S. (2016). *Drama, art and aesthetics in education*. Agra:Rakhi Prakashan.
- Sharma, R. P., Sharma, R. K. (2016). *Drama and art in education*. Agra: Radha Prakashan Mandir.
- Sharma, S. & Singh, K. (2016). *Art Education*. Delhi: Bookman.
- Singh, C. (2016). *Drama and art in education*. Agra: Vinod Pustak Mandir.
- Vatsyayan, K. (1977). *Classical India Dance in Literature and the Arts*. New Delhi: Sangeet Natak Akademi.

Web resources:

- NCERT (2015) theme based early childhood care and education programme. National Council of Educational Research and Training, New Delhi https://ncert.nic.in/dee/pdf/deethemebased.pdf
- NCERT (2019) Art Integrated Learning. National Council of Educational Research and Training, New Delhi https://ncert.nic.in/pdf/notice/AIL-Guidelines-English.pdf
- understanding arts and arts education https://www.nios.ac.in/media/documents/dled/Block1_508.pdf

- NCERT (2019) Art Integrated Learning. National Council of Educational Research and Training, New Delhi https://itpd.ncert.gov.in/mss/course_content/Module%203%20-%20Art%20Integrated%20Learning.pdf
- NCERT (2015) Art Education for Primary Teachers Volume II. National Council of Educational Research and Training, New Delhi https://ncert.nic.in/deaa/pdf/tpaev201.pdf
- NCERT (2006) Arts, Music, Dance and Theatre. National Council of Educational Research and Training, New Delhi https://ncert.nic.in/pdf/focus-group/art_education.pdf
- Design and Formatting by David Talbot & Cecilia Tortoledo Printed by the San Bernardino County Superintendent of Schools (2008) Reinvigorating Arts Education in California An Initiative of the California County Superintendents Educational Services Association. Visual and Performing Arts. http://ccsesaarts.org/wp-content/uploads/2015/03/vapa_core_color.pdf
- Centre For Cultural Resources And Training http://ccrtindia.gov.in/package_books.php
- Ministry of Home Affairs (Govt. of India) http://www.dashboard-padmaawards.gov.in/?Year=1981-1981&Award=Padma%20Shri&Field=Art
- Lalit Kala Akademi National Academic of Art, New Delhi https://www.lalitkala.gov.in/
- National gallery of modern Art, New Delhi http://www.ngmaindia.gov.in/
- Vardhaman Mahaveer Open University Kota, Rajasthan, India https://www.researchgate.net/profile/Dr_Akhilesh_Kumar2/publication/281834157_natya_evam_kala_siksa/links/55fa617208ae07629dfe648c/natya-evam-kala-siksa.pdf
- Vardhaman Mahaveer Open University Kota, Rajasthan, India http://assets.vmou.ac.in/BED114.pdf
- SCERT Raipur (2013) http://www.scert.cg.gov.in/pdf/dedfirst2013/kalashikshan.pdf

Year	I	HEALTH AND PHYSICAL EDUCATION	Credits	4
Semester	I		Course Code	SOE 02 01 03 DCEC3104

Learning Outcomes	After the completion of the course, students will be able to: ● Explain the meaning, aims and objectives of health education and classify the communicable disease. ● Use the concept, need and importance of physical education in their day-to-day life. ● Create different aspects of health fitness, wellness programs and practice the posture analysis. ● Organize the various school health programs and identify the nature of injuries and to provide first aid.
Course Content	
Unit -1	**Health and Areas of Concern** ● Health: Concept, definition, dimensions and determinants **(Online)** ● Health Education: Definition, aims and objectives **(Online)** ● Communicable Diseases: Mode of Transmission, Methods of Prevention and Control ● Nutrition: Elements of Balanced Diet, Food habits, Functions of food and Malnutrition
Unit -2	**Physical Education and Integrated Personality** ● Physical Education: Concept, definition, aims and objectives **(Online)** ● Need, scope and Importance of Physical Education Programs at different school levels **(Online)** ● Rules, Regulations and skills of any one of the Games/events: Hockey, Badminton, Volleyball, Football ● Concept of integrated personality and its realization through physical education program
Unit -3	**Health and Wellness** ● Concept of Wellness and measures to ensure wellness **(Online)** ● Postures: Importance of Good Posture, Common Postural Defects and Remedial Exercises.

	• Meaning of mental health - factors of mental health - mental health problem of college students, principles of mental health • Introduction of physical fitness components.
Unit -4	**School Education and Health Services**
	• Recreation: Meaning, Significance and Recreational Programs in Schools and Recreation agencies. • Personal and Environmental Hygiene for schools • Objective of school health service, Role of health education in schools, policies related to health and physical education **(Online)** • Health Services – Care of skin, Nails, Eye health service, Nutritional service, Health appraisal, Health record, Healthful school environment, first- aid and emergency care etc.
Transaction Strategies/ Teaching Learning Process	• Interactive discussion, group-work, sharing of experiences, organizing various activities, analyzing various topics by using charts, photographs and other materials on aspects of health-related issues. • Organizing school health check-ups, practical classes for first aid, self-blood donation, defence, awareness rally in nearby areas. • Lecture, PowerPoint presentations, MOOCs and e-platforms. • Lecture cum discussion, Group Discussions, use of audio and video materials • Review of various literature available
Practicum:	• Prepare a Project Report on: Three types of Sports Grounds. • Write a detailed account of your participation in any team game (hockey, Volleyball and Football) or individual game. • Write a detailed account of your participation in any Self-defense training camp. • Write a detailed account of your participation in any Blood donation camp.

	• Write a detailed account of your participation in Health Check-up camp. • Write a Project Report on Awareness rally for prevention from communicable diseases. • Any other, as decided by the institution.

Suggested Readings:

- Ajmer, S. (2003). *Essentials of physical education*. New Delhi: Kalyani Publishers.
- Chandra, S., Sothi, & Krishnan P. (2005). *Health education and physical education*. Delhi: Surjeet Publications.
- Charles, B. A. (1992). *Foundation of physical education and sport*. New Delhi: B1 Publication.
- John E, Nixon, Ann E. Jewett (9th Ed) (1980). "*An Introduction to Physical Education*. London: Thomson Learning.
- Kanele, B. S., & Kumar, C. P. (1996). *Text book on health and physical education*. Ludhiana: Kalyana Publishers.
- Mangal, S. K. (2005). *Health and physical education*. Ludhiana: Tandon Publication book market.
- Nash T.N. (2006). *Health and physical education*. Hyderabad: Nilkamal Publishers.
- Prasad, Y. V. (2006). *Method of teaching physical education*. New Delhi: Discovery Publishing house.
- Ramachandran, L.T., & Dharmalingam. (1993). Health education. *A new approach*. New Delhi: Vikas Publishers Ltd.
- Reema, K. (1996). *Physical fitness*. New Delhi: Khel Sahitya Sports Publication.

Generic Elective Course (GEC)

Year	**I**	**VALUE BASED EDUCATION (GEC)**	**Credits**	**4**
Semester	**I**		**Course Code**	SOE 02 01 01 GEC 3104
Learning Outcomes	After the completion of the course, students will be able to: ● Describe the concept, need and classifications of values and adopt various values. ● Summarize the importance of value education and critically analyze the need for value education. ● Adopt various aspects of values for personal development. ● Inculcate and develop various social values.			
Course Content				
Unit -1	**Understanding of Values** ● Concept, need and importance of values, classification of Values **(NEP 2020,Online mode)** ● Core values- truth, righteous conduct, peace, love and non-violence **(NEP 2020,Online mode)** ● Challenges of Values Adoption **(NEP 2020,Online mode)** ● Strategies for inculcating values			
Unit -2	**Value Education** ● Concept, need and importance of Value Education **(NEP 2020,Online mode)** ● Values inherent in the preamble of Indian Constitution **(NEP 2020,Online mode)** ● Roll of family, school and society in promoting Values **(NEP 2020,Online mode)** ● Recommendations of Shri Prakash committee on value Education **(NEP 2020,Online mode)**			
Unit -3	**Values for Personal Development** **(NEP 2020)** ● Impact of Religion & Secularism			

	● Values for Character Development ● Integration of values in education ● Methods and approaches of inculcating values
Unit -4	**Values in Society** ● Positive Thinking -Concept, tips to develop positive attitude ● Emotional Maturity- Concept and levels ● Women's Empowerment – Concept and importance **(NEP 2020,Online mode)** ● Environmental Awareness – Concept and importance **(NEP 2020,Online mode)**
Transaction Strategies/ Teaching Learning Process	Lecture cum discussion, Tutorials, Brainstorming Session, Use of PPTs, Assignments on different key areas of Value related issues

Practicum:

- Develop / compile stories with values from different sources and cultures, organize value based co-curricular activities in the classroom and outside the classroom
- Develop value-based lesson plans, integrating values in school subjects.
- Study of any Model of integrated value education – case study of models expressed by Sri SatyaSai, J. Krishnamurti, etc.
- In addition, school and community-based activities may be organized

Suggested Readings:

- Anchukandam, T. and J. Kuttalnimathathll (1995). *Grow free, live free*. Bangalore: Kristu Jyoti Publications,

- Arulsamy, S. (2016). *Peace and value education*. New Delhi: Neel Kamal Publication.
- Barash, P. David (2000). *Approaches to Peace*. New York:Oxford University Press
- Behra, S.K., Duarah, Mouchumi and Mohakud, LalitLalitav (2018). *Value Education in the 21st Century*. New Delhi: New Delhi Publishers.
- Charles, K. (2016). *Value education*. New Delhi: Neel Kamal Publication.
- Charles, K., &Selvi, A. (2016). *Peace and value education*, New Delhi: Neel Kamal Publication.
- Govt of India (1983). *Report on education in human values in teacher training programmes*, New Delhi, and Ministry of Human Resource Development.
- Jacob, M. (2002). *Resource book for value education*. New Delhi: Institute for Value Education
- Kapani, Madhu (2000). *Education in human values – concept and practical implications*, New Delhi: Sterling Publishers.
- S. Ignacimuthu(1991). *Values for life* – Better Yourself Books, Mumbai,
- Sri SathyaSaiBalVikas Education Trust (1985). *Curriculum and methodology for integrating human values education*, PrashanthiNilayam (International Education).
- Sri SathyaSai International Center for Human Values (2009). *Education in human values*. Course Book for Training of Master Trainers, New Delhi.
- *The curriculum framework for quality teacher education* (1998) NCTE, New Delhi.

Year	**I**	**Art in Education (GEC)**	**Credits**	**4 (2Theory+ 2 Practical)**
Semester	**I**		**Course Code**	SOE 02 01 02 GEC 2024
Learning Outcomes	After the completion of the course, students will be able to: ● Explain various dimensions of Art Education and appraise the relevance of art in education ● Critically appraise the various arts and their Educative values ● Organize methods and materials of art and design different forms of art ● Develop Skills to construct various artistic items using various materials			
Course Content				
Unit -1	**Introduction of Art Education (Theory)**			
	● Art: Concept, and Elements and forms **(NEP 2020, Online)** ● Colour wheel: Primary colour, secondary colour, tertiary colour and complementary colour **(NEP 2020, Online)** ● Importance of Art in Life and Education ● Regional Arts & Craft and their relevance in Education **(NEP 2020)**			
Unit -2	**Aesthetic Sense and Art Education (Theory)**			
	● Importance of Aesthetic sense and Role of Education in promoting aesthetic sense **(NEP 2020, Online)** ● Importance of Art Education with other subjects **(NEP 2020, Online)** ● Folk Art: concept with reference to Kalamkari, and Miniature **(Online)** ● Role of art culture in the society **(NEP 2020, Online)**			
Unit -3	**Painting- Methods and Materials (Practical)**			
	● Drawing and Painting: Memory Drawing, Life Study, Collage and Poster **(NEP 2020)** ● Making of Folk Art: Kalamkari, and Miniature			

	● Making of Rangoli ● Class room Decoration
Unit -4	**Painting & Crafting Skills (Practical)**
	● Paper cutting and folding **(NEP 2020)** ● Use of Waste Materials: News Paper, Magazine and Plastic Bottles **(NEP 2020)** ● Block Paintings with vegetables **(NEP 2020, Online)** ● Illustration 2D and 3D Art and Calligraphy **(NEP 2020)**
Transaction Strategies/ Teaching Learning Process	Hand-on experience of working in different mediums and materials, preparation and presentation of teaching learning materials, slide/film show, celebrations of Indian festivals, fairs, brain-storming, interaction with artists, lectures and demonstration.
Practicum:	Memory Drawing, Life Study, Collage, Poster, Making of Kalamkari, Miniature, Rangoli, Paper cutting, Use of Waste Materials, Block Paintings, Illustration 2D and 3D Art and Calligraphy.

Suggested Readings:

- Chandok, Amargeet (2016). *Art and education*. Delhi: Bookman.
- Chaturvedi Snehlata (2016). *Art education*. Delhi: Bookman.
- Gill Rajesh (2017). *A Text book of art education*. New Delhi: Paragon International Publishers 5 Ansari Road, Daryaganj.
- Gill Rajesh (2018). *Art education*. New Delhi: Paragon International Publishers.
- Jain Ritu (2016). *Art education*, Delhi: Bookman.
- Kakkar Rehha & Makkhar Ragini (2018). *Drama, art and aesthetics in education*. Agra: Rakhi Prakashan.

- Kumar Rajender (2016). *Drama and art in education*. Jaipur: Jain Prakashan Mandir.
- Raw K. Ravikant &P. Ananad Kumar (2019). *Drama and art in education*. Hyderabad: Neelkamal.Publications.
- Roy Reeta (2017). *Perfect art education*. New Delhi: Arya Publisher Company.
- Saxena Avnish & Sirth Sushil (2016). *Drama, art and aesthetics in education*. Agra-2: Rakhi Prakashan Raman Tower, Sanjay place.
- Sharma R.K(2018). *Drama and art in education*. New Delhi: Radha Publications.
- Sharma Sudhir& Singh Kuljeet (2016). *Art education*. Delhi: Bookman.
- Suneela M. Esther&Kumar P. Anand (2019). *Art in education*. Hyderabad: Neelkamal Publications.

Web resources:

- NCERT (2015) theme based early childhood care and education programme. National Council of Educational Research and Training, New Delhi https://ncert.nic.in/dee/pdf/deethemebased.pdf
- NCERT (2019) Art Integrated Learning. National Council of Educational Research and Training, New Delhi https://ncert.nic.in/pdf/notice/AIL-Guidelines-English.pdf
- understanding arts and arts education https://www.nios.ac.in/media/documents/dled/Block1_508.pdf
- NCERT (2019) Art Integrated Learning. National Council of Educational Research and Training, New Delhi https://itpd.ncert.gov.in/mss/course_content/Module%203%20-%20Art%20Integrated%20Learning.pdf
- NCERT (2015) Art Education for Primary Teachers Volume II. National Council of Educational Research and Training, New Delhi https://ncert.nic.in/deaa/pdf/tpaev201.pdf
- NCERT (2006) Arts, Music, Dance and Theatre. National Council of Educational Research and Training, New Delhi https://ncert.nic.in/pdf/focus-group/art_education.pdf
- Design and Formatting by David Talbot & Cecilia Tortoledo Printed by the San Bernardino County Superintendent of Schools (2008)

Reinvigorating Arts Education in California An Initiative of the California County Superintendents Educational Services Association. Visual and Performing Arts. http://ccsesaarts.org/wp-content/uploads/2015/03/vapa_core_color.pdf

- Centre For Cultural Resources And Training http://ccrtindia.gov.in/package_books.php
- Ministry of Home Affairs (Govt. of India) http://www.dashboard-padmaawards.gov.in/?Year=1981-1981&Award=Padma%20Shri&Field=Art
- Lalit Kala Akademi National Academic of Art, New Delhi https://www.lalitkala.gov.in/
- National gallery of modern Art, New Delhi http://www.ngmaindia.gov.in/
- Vardhaman Mahaveer Open University Kota, Rajasthan, India https://www.researchgate.net/profile/Dr_Akhilesh_Kumar2/publication/281834157_natya_evam_kala_siksa/links/55fa617208ae07629dfe648c/natya-evam-kala-siksa.pdf
- Vardhaman Mahaveer Open University Kota, Rajasthan, India http://assets.vmou.ac.in/BED114.pdf
- SCERT Raipur (2013) http://www.scert.cg.gov.in/pdf/dedfirst2013/kalashikshan.pdf

SEMESTER-II

Year	I	FOUNDATIONS OF EDUCATION	Credits	4

Semester	**II**		**Course code**	SOE 02 02 07 C 3104
Learning Outcomes	After the completion of the course, students will be able to: ● describe the various dimensions of education. ● review, compare and appraise the various system of Indian education of different era ● explain the aspects of educational philosophy and appraise the contribution of schools of philosophy in education. ● elaborate education from social perspectives and appraise the role of different social institutions in education.			
Course Content				
Unit -1	**Meaning and Functions of Education**			
	● Indian and Western Concept of Education ● Scope and Functions of Education ● Aims of Education: Holistic Development, Cultural and Vocational, Democratic ● Dimensions of Education **(Online mode)** ➢ The Learner– Nature of Learners, Learner-Centered Education ➢ The Teacher-Qualities and Responsibilities ➢ The Curriculum-Meaning, Need and Importance Curriculum and Co-curricular activities			
Unit -2	**History of Indian Education System** **(NEP 2020)**			
	● Education during Vedic Period **(Online mode)** ● Education during Buddhist Period **(Online mode)** ● Education during Islamic Period ● Education during British Period (specify time period)			

Unit -3	**Philosophical Foundations of Education** **(NEP 2020)** ● Concept and Importance of Educational Philosophy **(Online Mode)** ● Scope of Educational Philosophy ● Relationship between Philosophy and Education **(Online Mode)** ● Schools of Philosophy and their impact on Education with specific reference to Aims, Curriculum and Methods of Teaching: Idealism, Naturalism, Pragmatism
Unit -4	**Sociological Foundations of Education** ● Meaning and Nature of Educational Sociology ● Relationship between Sociology and Education ● Social Institutions of Education- Family, School and Society **(Online mode)** ● Concept of Social Mobility – Role of Education in Social Mobility **(Online mode)**
Transaction Strategies/ Teaching Learning Process	Lecture cum Discussion Method, Tutorials, Brainstorming Session Use of audio-visual materials, Use of PPT, assignments on different key areas given in syllabus, debate on role of education in democracy, modernization, globalization and social mobility & panel discussion, brainstorming session and in-depth analysis of various other key aspects.
Practicum: ● Group discussion on the role of different social institutions in education. ● Debate on role of education in democracy, modernization, globalization and social mobility. ● Assignments on different key areas given in syllabus. ● Panel discussion on importance of education for national integration and international understanding.	

- Report on impacts of modernization and globalization on education.
- Any other activity suggested by the teacher.

Suggested Readings:

- Aggarwal, J.C. (2014). *Philosophical and sociological perspective on education*. Delhi: Shipra Publications.
- Aggarwal, J.C. (2018). *Education in emerging India*. New Delhi: Doaba House.
- Chakraborty, A. K. (2003). *Principles and practices of education*. Meerut: Lal Book Depot**.**
- Chandra, S. S., Sharma, R., & Rajendra, K (2002). *Philosophy of education.* New Delhi: Atlantic Publishers.
- Chaube, A., & Chaube, S.P. (2020). *Philosophical and sociological foundations of education*. Agra: Shri Vinod Pustak Mandir.
- Dewey, J. (1916/1977). *Democracy and education: An introduction to the philosophy of education*. New York: Macmillan.
- Dewey, J., (2017). *Democracy and education*. Delhi: Aakar Books Classics.
- Gordon, M., & English, A.R. (2020). John Dewey's democracy and education in an era of globalization (1st ed.). Routledge.
- Goswami, A.C. (2001). *Philosophical and sociological bases of education in emerging India*. Guwahati: Jyoti Prakashan.
- Gupta S. (2005). *Education in emerging India: Teacher's role in society*. New Delhi: Shipra Publication.
- Hemlata, T. (2002). *Sociological foundations of education.* New Delhi: Kanishka Publishers.
- McNergney, R.F., & Herbert, J.M. (1998). *Foundations of education: The challenge of professional practice*. Boston: Allyn & Bacon.
- Murthy, S.K. (2009). *Philosophical and sociological foundation of education*. Ludhiana: Tondan Publication.
- Ozman, H. (2011). *Philosophical foundations of education* (11thed.). New York: Pearson Publishers.
- Raman Behari Lal, & Palod, S. (2016). *Philosophical and sociological perspectives of education* (1sted.). Meerut: R.Lall Publications.
- Rusk, R. R. (2007). *Philosophical bases of education*. Delhi: Surjeet Publications.
- Sharma, R.K., & Chandra, S.S. (2006). *Sociology of education*. New Delhi: Atlantic.
- Singh, K.S. (2011). *Educational philosophies & thinkers* (1sted.). Agra: H.P. Bhargava Book House.

- Singh, K.S. (2011). *Principles and development of education in India* (1st ed.). Agra: Rakhi Prakashan.
- Tubergen's. F.V. (2020). Introduction to sociology (1st ed.). Routledge.

Web Resources:

- National Council of Educational Research & Training. (2020). Equitable and inclusion: Learning for all. *Background Paper for Teacher's Fest*. Retrieved from https://www.education.gov.in/shikshakparv/docs/Inclusive_Education.pdf
- Raheem, A.A., & Muthaiyan, P. (2012). Education for socially and economically disadvantaged groups in India- An assessment. Retrieved from https://www.lap-publishing.com/catalog/details/store/gb/book/978-3-8473-4885-6/education-for-socially-and-economically-disadvantaged-groups-in-india
- Remi, A. L. (2019). Aiming at holistic development. The Progressive school. Retrieved from http://www.progressiveschool.in/aiming-at-holistic-development/
- Watson, S. L., & Reigeluth, C.M. (2008). The learner-centred paradigm of education. *Educational Technology, X*(x), 42-48. Retrieved from https://lidtfoundations.pressbooks.com/chapter/systemic-change/

Year	I	CREATING AN INCLUSIVE SCHOOL	Credits	4

Semester	II		Course code	SOE 02 02 08 C3104
Learning Outcomes	After the completion of the course, students will be able to: ● Discuss the various aspects of inclusion. ● Identify CWSN and explain their diverse needs. ● Compare the national & international policies & programmes with respect to the children with special needs. ● Appraise the role of different specialists and inclusive practices to promote inclusion in the school.			
Course Content				
Unit -1	**Conceptual understanding of Inclusive Education** **(Online)** ● Paradigm shift from segregation to inclusion: Special, Integrated and Inclusive Education ● Inclusive Education: Concept, Nature and Principles **(NEP 2020)** ● Models of Inclusion: Charity Model, Medical Model, Social Model, Human Rights Model ● Role of Stakeholders in Inclusive Education: Teacher, Peers, Parents, and Community			
Unit -2	**An overview of Children with Special Needs (CWSN)** **(NEP 2020)** ● Concept of CWSN ● Classification of CWSN ● Characteristics of CWSN with specific reference to Visual Impairment, Hearing and Speech Impairment, Intellectual Disability, Autism Spectrum Disorder, Cerebral Palsy, Learning Disabilities (Dyslexia, Dyscalculia, Dysgraphia, Dyspraxia) ● Educational Programme of CWSN with specific reference to Visual Impairment, Hearing and Speech Impairment,			

	Intellectual Disability, Autism Spectrum Disorder, Cerebral Palsy, Learning Disabilities (Dyslexia, Dyscalculia, Dysgraphia, Dyspraxia)
Unit -3	**National and International Policies for Inclusive Education**
	• Salamanca Statement, 1994 • Policies guidelines on Inclusive Education, UNESCO, 2009 • RCI Act, 1992 **(NEP 2020)** • PWD Act, 1995 & The Right of Persons with Disabilities Act,2016 **(NEP 2020)**
Unit -4	**Preparing Schools for Inclusion**
	• Infrastructural readiness of School **(NEP 2020, Online)** • Aids, Appliances and Information Communication Technology **(NEP 2020, Online)** • Strategies of Teaching-Learning and Evaluation **(NEP 2020, Online)** • Collaboration of different specialists: Speech Therapist, Braille Instructor, Sign Language Tutor, Counsellor **(NEP 2020)**
Transaction Strategies/ Teaching Learning Process	Lecture-cum-Discussion, Group discussion on various policies and programmes, PowerPoint presentation, Film shows, sharing of experiences of people regarding issues of disabilities, Preparation of projects on various issues related to special education and exclusion.
Practicum: • Collection of data regarding children with special needs from school records.	

- Visit to Inclusive Schools and observe classroom transactions and prepare a report of the same.
- Case study of one mainstreamed (Inclusive) student with respect to :
    1. Role of a parent
    2. Role of a teacher, special school teacher
    3. Role of counsellor
- Any other activity suggested by the teacher

Suggested Readings:

- Alur, M., & Timmons, V. (2009). *Inclusive education across cultures: Crossing boundaries, sharing idea*. New Delhi: Sage Publications India Pvt. Ltd.
- Fimian, M.J., Fafard, M., & Howell, K.W. (1984). *A teacher's guide to human resources in special education: Para professionals, volunteers, and peer tutors.* Boston: Allyn and Bacon Inc.
- Hallahan, D.P., & Kauffman, J.K. (1988). *Exceptional children: Introduction to special Education.* N.J.: Englewood Cliffs.
- Kapoor, S. (2015). *Index of inclusive school quality*. Delhi: Brotherhood Publisher.
- Gargiulo, R.M. (2015). *Special education in contemporary society: An introduction to exceptionality*. Canada: Sage Publications.
- Hallahan, D.P., Kauffman, J.M., & Pullen, P.C. (2018). *Exceptional learners: An introduction to special education.* (14th edition) New Jersey: Pearson Education.
- Kothari, R.G., & Mistry, H.S. (2011). *Problems of students and teachers of the special schools – A study of Gujarat state*. Germany: VDM Publication.
- Messily, K. (2012). *Confronting marginalisation in education: A framework for promoting inclusion*. London: Rutledge Publication.
- Mithu, A., & Michael, B. (2005). *Inclusive education: From rhetoric to reality.* New Delhi: Viva Books Pvt. Ltd.

- NCERT (2006). *National focus group on education of children with special needs.* New Delhi: NCERT.
- Oza, D., & Pandit, R. (2011). *Management of behavioural problems of children with mental retardation.* Germany: VDM Publication.
- Premavathy, V., & Geetha, T. (2006). *Integrated and inclusive educationDSE (VI) Manual*. New Delhi: Krishana Publication.
- Reed, M. (1984). *Educating hearing impaired children.* Milton Keynes: Open University Press.
- Ysseldyke, J.E. (2016). *Special education: A practical approach for teachers* (1st Edition). Kanishka Publishers.
- Frederickson, N., & Cline, T. (2009). *Special educational needs, inclusion and diversity* (2nd edition). New York: McGraw Hill Education Open University Press.

Web Resources

- Consortium for Research on Educational Access, Transitions and Equity. Retrieved from: http://www.createrpc.org/pdf_documents/PTA15.pdf
- IBE-UNESCO (2016). Training Tools for Curriculum Development - Reaching Out to All Learners: a resource pack for supporting Inclusive Education, Ibe.training@unesco.org. Retrieved from: http.//www.ibe.unesco
- The SALAMANCA statement and framework for action on special needs education. Retrieved from: www.unesco.org/education/pdfSALAMA_EPDF
- Video on A World for Inclusion (2007) by UNESCO, directed by David Atrakchi, 20 minutes. Retrieved from: http://www.unesco.org/archives/multimedia/index.php?s=films_details&pg=33&id=213
- Children with Disabilities (2012), by UNESCO, 23 minutes. Retrieved from: http://www.unesco.org/archives/multimedia/index.php?s=films_details&pg=33&id=2758
- Educational Resources for Teaching Special-Needs Students. Retrieved from: https://www.teachervision.com/teachingstrategies/special-needs

- Preparing Teachers for Inclusive Education in Botswana: The Role of Professional Development. Retrieved from: https://www.researchgate.net/publication/282774571_Preparing_Teachers_for_Inclusive_Education_in_Botswana_The_Role_of_Profess ional_Development
- Pedagogy for Inclusive Education. Retrieved from:http://www.rehabcouncil.nic.in/writereaddata/Block2accie.pdf

Year	I	VALUE AND PEACE EDUCATION	Credits	4
Semester	II		Course code	SOE 02 02 09 C3104

Learning Outcomes

After completion of the course, students will be able to:

- Illustrate the concept of values, classify it's various sources and critically appreciate the role of teachers in promoting values.
- Point out the importance of value education and compare the various models of value education.
- Reflect on ideas of distinguished thinkers and explain the challenges, need and role of UNESCO in promoting peace Education.
- Select and employ various approaches and techniques for teaching of value and peace education.

Course Content

Unit -1 **Conceptual understanding of values**

- Concept, sources, classification and selection of values **(NEP 2020)**
- Values inherent in Preamble of the Indian Constitution **(Online)**
- Values prevalent in the contemporary society **(NEP 2020, Online)**
- Role of teacher in calculating the Values **(NEP 2020)**

Unit -2 **An Overview of Value Education**

- Concept of value education **(NEP 2020)**
- Need for and importance of value education in the present scenario **(NEP 2020)**
- Recommendations of Sri Prakash Committee (1959) on value education **(Online)**
- Models of value education: Rationale building model, the consideration model, valuing process and clarification model (**Online)**

Unit -3	**Peace Education in Contemporary Era and its relevance**
	● Concept, importance of Peace, Needs of Peace Education in contemporary Society **(NEP 2020, Online)** ● Ideas of distinguished thinkers about Peace: **(NEP 2020)** ➢ Mahatma Gandhi ➢ J. Krishnamurthy ➢ Swami Vivekananda ➢ Rabindranath Tagore ● Challenges to peace: Stress, conflicts, crimes, terrorism, violence and poor quality of life **(Online)** ● Role of UNESCO in promoting of peace Education **(Online)**
Unit -4	**Approaches and Techniques of Value and Peace Education**
	● Direct approach: Silent sitting, Yoga and Meditation, Value Based Story-Telling ● Group activities (Dramatization, Literary Activities, Games and Sports, Service Activities) ● Organizing value based co-curricular activities ● Guidance and Counselling
Transaction Strategies/ Teaching Learning Process	Lecture cum discussion, Tutorials, Brainstorming Session, Use of PPTs, Assignments on different key areas of Value and Peace related issues.
Practicum:	

- Develop / compile stories with values from different sources and cultures, organize value based co-curricular activities in the classroom and outside the classroom, develop value-based lesson plans, integrating values in school subjects.
- In addition, school and community-based activities may be organized.
- Any other activity suggested by the teacher.

Suggested Readings:

- Arulsamy, S. (2016). *Peace and value education*. New Delhi: Neelkamal Publication.
- Barash, P. David (2000). *Approaches to Peace.* New York:Oxford University Press.
- Behra, S.K., Duarah, Mouchumi and Mohakud, Lalit Lalitav (2018). *Value Education in the 21st Century*. New Delhi:New Delhi Publishers.
- Charles, K., & Selvi, A. (2016). *Peace and value education*, New Delhi; Neelkamal Publication.
- Bernard, Jessie (1957). *The Sociological study of conflict. International Sociological Association, the Nature of Conflict,* UNESCO Paris.
- Galtung, J. (1984). *The Struggle for Peace*. Ahmedabad:Gujarat Vidyapeeth.
- Gandhi, M.K. (1944). *Non-Violence in Peace and War*. Ahmedabad:Navajeevan Publishing House.
- Govt. of India (1983). *Report on Education in Human Values in Teacher Training Programmes*. New Delhi: Ministry of Human Resource Development.
- Harris Ian. M. (1998). *Peace Education*. McFarland& Company, London: Inc. Publisher.
- Howlett, Charles F. (2008). *John Dewey and Peace Education, Encyclopedia of Peace Education*. Teacher College, Columbia University.
- Kapani, Madhu (2000). *Education in Human Values – concept and practical implications.* New Delhi:Sterling Publishers.
- NCERT National Curriculum Framework (2005). *National focus Group on Education for Peace*.NCERT, New Delhi (2006).

- National Curriculum Framework (2005). *National Focus group on Education for Peace*, NCERT, New Delhi.
- NCTE (1998). *Curriculum Framework for Quality Teacher Education*. NCTE, New Delhi.
- Pandey, S. (2004). *Education for Peace, Self-Instructional Package for Teacher Education*. NCERT, New Delhi.
- Sri Sathya Sai Bal Vikas Education Trust (1985). *Curriculum and Methodology for integrating Human Values Education*. Prashanthi Nilayam (International Education).
- Sri SathyaSai International Center for Human Values (2009). *Education in Human Values*: *Course Book for Training of Master Trainers*. New Delhi.
- The Curriculum framework for Quality Teacher Education (1998) NCTE, New Delhi.
- UNESCO (2001). *Learning the way of Peace, "A Teacher Guide to Education for Peace*". UNESCO, New Delhi.

Web resources

- Education for values in schools- a framework, NCERT: http://www.ncert.nic.in/pdf_files/Framework_educationCOMPLETEBOOK.pdf
- Values Education A Handbook for Teachers (2012), CBSE: http://cbseacademic.in/web_material/ValueEdu/Value%20Education%20Kits.pdf
- Position Paper National Focus Group on Education for Peace, NCERT http://www.ncert.nic.in/new_ncert/ncert/rightside/links/pdf/focus_group/education_for_peace.pdf

Year	I	LANGUAGE ACROSS THE CURRICULUM	Credits	2

<table>
<tr><td>Semester</td><td>II</td><td></td><td>Course code</td><td>SOE 02 02 10 C2002</td></tr>
<tr><td>Learning Outcomes</td><td colspan="4">After the completion of the course, students will be able to:
● Critically examine the Language Across the Curriculum (LAC) approach.
● Explain the impact of multilingualism and related aspects.</td></tr>
<tr><td colspan="5">Course Content</td></tr>
<tr><td>Unit -1</td><td colspan="4">Language Across the Curriculum (LAC) Approach</td></tr>
<tr><td></td><td colspan="4">● Concept, nature and functions of language (NEP 2020, Online)
● Concept of Language Across the Curriculum (LAC): Origin and basic tenets (NEP 2020, Online)
● Goals, benefits and difficulties in LAC approach (NEP 2020)
● Role of a teacher and criteria for good teacher’s language in LAC approach (NEP 2020)</td></tr>
<tr><td>Unit -2</td><td colspan="4">Multilingual Classrooms</td></tr>
<tr><td></td><td colspan="4">● ‘Multilingualism & Language Diversity in class’- as a resource and challenges (NEP 2020)
● Language as a determinant of Access & symbol of aspiration in Indian Context (NEP 2020, Online)
● Three-language formula (NEP 2020, Online)
● Role of language in curriculum transaction (NEP 2020)</td></tr>
<tr><td>Transaction Strategies/ Teaching Learning Process</td><td colspan="4">Lecture cum discussion, Tutorials, Brainstorming Session, Use of PPT, Film Shows (selected films), use of audio and video materials, Assignments on different key areas of gender related issues given in syllabus through multimedia approach and Group Discussion. Role plays to demonstrate optional learning, use of e-learning platforms, MOOCs, etc.</td></tr>
<tr><td colspan="5">Practicum:</td></tr>
</table>

- Panel discussion on ways of communication.
- Report on different barriers of communication.
- Any other activity suggested by the teacher.

Suggested Readings:

- Sharma, R.K., Dubey, S.K., Dayal, I. (2019). *Language Across the Curriculum and Reflecting on Texts.*Agra,Radha Prakashan Mandir Pvt. Ltd.
- Akmajian, A. et al. (2018). *Linguistics: Introduction to Language and Communication.* (6thed.). Cambridge: MIT Press.
- Panda, K.P. (2017). *Language Across the Curriculum*. New Delhi, A.P.H. Publishing Corporation.
- Fasold, R. & Connor-Linton, J. (2017). *An Introduction to Language and Linguistics.* (6thed.). Cambridge: Cambridge University Press.
- Floyd, K. (2017). *Interpersonal Communication*. New York: McGraw Hill Companies Inc.
- Rao, P.A. (2016). *Language Across the Curriculum*. New Delhi, Kanishka Publishers.
- Chand, B. (2016). *Language Across Curriculum*. (1st). Neelkamal Publishing Pvt. Ltd.
- Areekkuzhiyil, S. (2016). *Language Across the Curriculum.* (1st). Neelkamal Publishing Pvt. Ltd.
- Pandey, R. (2016). *Language Across the Curriculum*.Meerut, R. Lall Book Depot.
- Fromkin, V., Rodman, R. & Hyms, N. (2016). *Introduction to Language.* (9th Ed.). Canada:Pearson
- J.C. et al (2013). *Human Communication*. (4th ed.). New York: McGraw Hill Companies Inc.

Web Resources

- First and Second Language Acquisition – A Brief Comparison. Retrieved from https://www.unidue.de/ELE/FLA_SLA_brief_comparison.pdf
- Similarities and Differences between First and Second Language Acquisition. Retrieved from:

http://multilingualism.pbworks.com/w/page/21913433/Similarities%20and%20Differences%20between%20First%20and%20Second%20Langu age%20Acquisition

- Activities for Developing Speaking Skill. Retrieved from http://faculty.weber.edu/ppitts/ed4320/Handouts/speakingskills.htmhttp://www.educ.ualberta.ca/staff/olenka.Bilash/best%20of%20bilash/speaking.html
- Activities for Developing Listening Skill. Retrieved from http://www.educ.ualberta.ca/staff/olenka.bilash/best%20of%20bilash/listening.htmlhttps://blog.udemy.com/listening-skills-exercises/
- Learning curves: Language Education (2009), by Azim Premji Foundation http://azimpremjifoundation.org/pdf/LCIssue13.pdf
- Courses on Communication Skills. http://nptel.ac.in/courses/109104030/
- Notes on Communication: Meaning, Nature and Importance https://www.businessmanagementideas.com/notes/management-notes/communication-management-notes/notes-on-communication-meaningnature-and-importance/5183
- Language across the curriculum. https://www.universitas.com.pl/media/File/Fragmenty/TOWARDS/mart_2-3.pdf
- What is Language across the Curriculum? [Youtube] Retrieved from https://www.youtube.com/watch?v=_9HGofqxUKY

Year	I	CRITICAL UNDERSTANDING OF ICT	Credits	2

<table>
<tr><td>Semester</td><td>II</td><td></td><td>Course code</td><td>SOE 02 02 11 C0022</td></tr>
<tr><td>Learning Outcomes</td><td colspan="4">After the completion of the course the pupil-teachers will be able to:
● Acquire knowledge of functionalities of computers and MS-Office.
● Appraise the importance of information & communication technology and work upon online learning platforms, environment and pages.</td></tr>
<tr><td colspan="5">Course Content</td></tr>
<tr><td rowspan="2">Unit -1</td><td colspan="4">Fundamentals of Computer and MS- Office</td></tr>
<tr><td colspan="4">● Computer and its components, Hardware and software, Input and output devices
● MS- Word: Introduction and handling of its various operations
● MS- Excel: Introduction and handling of its various operations
● MS- Power Point: Introduction and handling of its various operations</td></tr>
<tr><td rowspan="2">Unit -2</td><td colspan="4">Conceptual Understanding of Information and Communication Technology and Internet</td></tr>
<tr><td colspan="4">● Information and communication technology; Concept, synchronous and asynchronous communications and Challenges of Integration of ICT in School (NEP 2020, Online Mode)
● Aims and Objectives of National Policy on Information and Communication Technology (ICT) in School Education in India and National Mission on Education through ICT (NMEICT) (NEP 2020)
● Internet: Ways of using the internet in teaching learning process; Google Drive, Google Docs, Google Slides, Google Sheet, Google Classroom, Google Forms, YouTube, Facebook, SWAYAM, Swayam Prabha. (NEP 2020, Online Mode)
● Massive Open Online Courses, their development (NEP 2020, Online Mode)</td></tr>
<tr><td>Transaction Strategies/</td><td colspan="4">● Hands on experience in ICT Lab
● Demonstration on various applications of MS- Office</td></tr>
</table>

Teaching Learning Process	• Discussion on various ICT related issues • Online demonstration of related topics

Practicum: Choose any three from the following and make a soft file of it for final submission

- Making of a resume in MS Word.
- Making of a Lesson Plan in MS Word.
- Making a presentation in MS PowerPoint.
- Making of progress report-card in MS Excel.
- Graphical representation of data.
- Do a short term MOOC.
- Any other project/assignment given by the concerned teacher.

NOTE: External practical will be conducted by external examiner at the end of the semester

Suggested Readings:

- Ara,A, Sujhatha, M. & Ramakrishna(2018). *ICT mediation in teaching learning.* New Delhi: Neelkamal Publications.
- Bansal & Kaur. (2016). *Critical understanding of ICT.* Ludhiana: Tandon Publication.
- Cheema, S.S., Kumar, G. &Preet, K. (2015). *ICT skill development.* Patiala: Twenty first Century Publication.
- Benkler, Y. (2016). *The wealth of networks: How social production transforms markets and freedom*. Yale: University Press.
- Brian K. W. & Stacey, S. (2005). *Using information technology*, 6th Edition Tata McGraw Hill, Curtin.
- Douglas, C. (2007). *The internet book: Everything you need to know about computer networking and how the internet works*,New York: Prentice Hall Publications.
- DSERT, Karnataka (2012). *Position paper on ICT mediation in education*. DSERT.

- MHRD, GOI (2004 revised 2010). *National ICTC schools' scheme, development of education and literacy*. MHRD, New Delhi
- MHRD (2012*). National policy on information and communication technology (ICT) in school education*. MHRD, Government of India.
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Web Resources

- E-book: Getting Started with LibreOffice 3.4 available at http://wiki.documentfoundation.org
- Swayam - Hiralal Khatri - Google Bookshttps://books.google.com/books/about/Swayam.html?id=NVQpMgAACAAJ
- 6 Effective Ways to Use Google Drive in eLearninghttps://elearningindustry.com/6-effective-ways-use-google-drive-in-elearning
- 34 DTH channels | India - Swayam Prabhahttps://www.swayamprabha.gov.in/index.php/about
- Google Forms - A tutorial - SlideSharehttps://www.slideshare.net/andrewpp/google-forms-an
- Google Classroom: A Free Learning Management System For eLearninghttps://elearningindustry.com/google-classroom-a-free-learning-management-system-for-elearning
- Components of a Computerhttps://www.d.umn.edu/~gshute/arch/computer-components.xhtml
- How to install Microsoft Office https://www.youtube.com/watch?v=I0lDau83Cbc
- MS-Excel https://www.youtube.com/watch?v=-ujVQzTtxSg
- Free Software, Free Society: Selected Essays of Richard M. Stallman, digital book available on www.notabug.com/2002/rms-essays.pdf
- Free Software Foundation, www.fsf.org

- Information and Communication Technology Policy in School Education 2010. www.mhrd.gov.in/sites/upload_files/mhrd/files/ReviesICT_School.pdf
- http://en.wikibooks.org/wiki/Computers_for_Beginners. An exhaustive source for beginners
- National Policy on Information and Communication Technology (ICT) In School Education, http://mhrd.gov.in/sites/upload_files/mhrd/files/upload_document/revised_policy%20document%20ofICT.pdf

Year	**I**	**School Internship (Part – I)**	**Credits**	4
Semester	**II**		**Course code**	SOE020212C0044
Learning	After the completion of the course, students will be able to:			

Outcomes

- Classify and Identify with the various pedagogical skills.
- Practice the various pedagogical skills to develop professional competencies.
- Critically evaluate the lesson delivered by peers.
- Observe the school to gain real experiences.

Sr. No.	Total Marks Distribution (100)	Pedagogy-I (50)	Pedagogy-II (50)
1.	Internal Marks	15	15
2.	External Marks	35	35

Schedule of School Internship Programme:

Sr. No.	Activity During Internship	No. of Lesson for Presentation (Minimum)
1.	Basic Skills Lesson Plan (Pedagogy-I)	10
2.	Basic Skills Lesson Plan (Pedagogy-II)	10
3.	Peer Observation (Pedagogy-I)	10
4.	Peer Observation (Pedagogy-II)	10
5.	Model lesson plan based on the integration of teaching skill (Simulated Lesson Plan) (Pedagogy-I)	1
6.	Model lesson plan based on the integration of teaching skill (Simulated Lesson Plan) (Pedagogy-I)	1

	7.	School Observation Profile	1
	8.	Prepare a school report on the basis of gaining real experience of school observation during the school visit.	1

Elective Courses (DCEC)

Year	I	PEDAGOGY OF HINDI	Credits	4
Semester	II		Course code	SOE 02 02 04 DCEC3104

सखने के परिणाम	इस कोर्स को पूरा करने के बाद, छात्र शक्षक कर सकेंगेः ● हिन्दी भाषा अ धगम के आवश्यक तत्व एवम् उद्देश्यों की व्याख्या कर सकेंगे । ● हिन्दी शक्षण के व भन्न भाषाई कौशलों एवम् सहायक सामग्री का प्रयोग कर सकेंगे । ● हिन्दी शक्षण की व भन्न वधाओं की व्याख्या एवम् उनकी पाठ योजना का निर्माण कर सकेंगे। ● हिन्दी शक्षण में मूल्यांकन व धयों एवम् क्रयात्मक अनुसन्धान का वकास कर सकेंगे ।
पाठ्यक्रम की वषयवस्तु	
इकाई -1	हिन्दी भाषा अ धगम के आवश्यक तत्व एवम् उद्देश्य ● हिन्दी भाषा की प्रकृति, महत्व, उद्देश्य एवम् हिन्दी भाषा अ धगम के सामान्य सद्धान्त । **(NEP 2020, Online)** ● मातृभाषा शक्षण का अर्थ, महत्व एवम् उद्देश्य। **(NEP 2020)** ● हिन्दी शक्षण में सूचना तकनीकी की उपयो गता। **(NEP 2020, Online)** ● ब्लूम द्वारा निर्धारित अनुदेशनात्मक उद्देश्य। **(NEP 2020, Online)**
इकाई -2	हिन्दी शक्षण के भाषाई कौशल एवम् सहायक सामग्री ● श्रवण कौशल के उद्देश्य, प्रकार एवम् शै क्षक क्रयाकलाप। **(NEP 2020)** ● मौ खक अ भव्यक्ति कौशल के उद्देश्य, वकास की क्रयाएं एवम् मौ खक अ भव्यक्ति सम्बन्धी त्रुटियों का निवारण। **(NEP 2020)** ● पठन कौशल के उद्देश्य, प्रकार, पठन अ भरू च का वकास, पठन सम्बन्धी त्रुटियों का निवारण। **(NEP 2020)** ● ल खत अ भव्यक्ति कौशल के उद्देश्य, प्रकार, वकास की क्रयाएं, ल खत सम्बन्धी त्रुटियों का निवारण । **(NEP 2020)**
इकाई -3	हिन्दी शक्षण की व भन्न वधाएँ एवम् उनका शक्षण ● हिन्दी शक्षण कौशलों का वकास एवम् प्रारूप : प्रस्तावना कौशल, व्याख्या कौशल, उदाहरण कौशल,उद्दीपन परिवर्तन कौशल और प्रश्न कौशल। **(NEP 2020, Online)**

	• शक्षण सहायक सामग्री: अर्थ, महत्व एवम् प्रकार । **(NEP 2020, Online)** • गद्य एवम् पद्य शक्षण: अर्थ, महत्व, व धयाँ एवम् पाठ-योजना निर्माण । • व्याकरण शक्षण: अर्थ, महत्व, व धयाँ एवम् पाठ-योजना निर्माण ।
इकाई -4	हिन्दी शक्षण में मूल्यांकन एवम् क्रयात्मक अनुसन्धान
	• हिन्दी शक्षण में सतत् एवम् व्यापक मूल्यांकन: अर्थ एवम् महत्व। **(NEP 2020)** • हिन्दी शक्षण में परिक्षण पदों का निर्माण: प्रश्न पत्र एवम् नील पत्र (ब्लू- प्रंट) निर्माण। • 360* समग्र मूल्यांकन : एन. ई. पी. अवलोकन । **(NEP 2020, Online)** • हिन्दी शक्षण में उपचारात्मक शक्षण एवम् क्रयात्मक अनुसंधान : अर्थ, महत्व एवं प्र क्रया । **(NEP 2020, Online)**
कार्य सम्पादन रणनीतियाँ	इकाई-**1** -व्याख्यान, समूह चर्चा, पावरप्वाइंट प्रस्तुतियाँ, एम ओ ओ सी और ई-लर्निंग का उपयोग इकाई-**2** व्याख्यान, समूह चर्चा, स्कूल के अध्ययन के अध्यापन के भाषा के खेल, ऑ डयों और वी डयों सामग्री आदि का उपयोग। इकाई-**3** व्याख्यान व ध-समूह चर्चा, प्रदर्शन व ध का प्रयोग एवं पावरप्वाईंट प्रस्तुति, ई-लर्निंग आदि का उपयोग। इकाई-**4** व्याख्यान व ध- समूह चर्चा, प्रदर्शन व ध का प्रयोग एवं पावरप्वाईंट प्रस्तुति, ई-लर्निंग, एम ओ ओ सी का उपयोग।

व्यवहारिक कार्य:

- छात्रों में संचार की समस्या/आशंका का पता लगाने के लए बाहरी स्कूलों का दौरा।
- श्रवण, मौ खक, पठन और लेखन कौशल वक सत करने के लए खेल और व्यायाम करना।
- श्रवण, मौ खक, पठन और लेखन कौशल वक सत करने पर गति व धयाँ- मौ खक प्रस्तुतियाँ, बहस, भाषण, चर्चा एवं ब्रेनस्टा र्मंग, अनुच्छेद एवं निबंध लेखन।

इसके अतिरिक्त वद्यालय एवं समुदाय आधारित गति व धयाँ भी आयोजित की जायेगी जिसके अन्तर्गत छात्रो को अ धगम एवं शक्षक प्र शक्षण संस्थाओ मे भ्रमण कराया जायेगा। शक्षण प्र शक्षण एवं स्कूल आधारित क्रयात्मक अनुसंधान भी कराये जायेगे ।

संदर्भ ग्रंथ सूची:

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- पालीवाल, एस. (2017). *हिंदी शक्षण शक्षण और प्रवीणता,* राजस्थान प्रकाशन, जयपुर
- शर्मा, आर. (2016). *हिंदी भाषा शक्षण और प्रवीणता,* राधा प्रकाशन मंदिर प्रा. ल.
- पांडेय, आर. एस. (2015). *हिंदी शक्षण,* अग्रवाल पब्लिकेशन्स
- औहरी, एन. (2014). *हिंदी शक्षण,* ए. पी. एच. पब्लि शंग कार्पोरेशन, नई दिल्ली
- पाठक, आर. पी. (2013). *हिंदी भाषा शक्षण,* द् वतीय ए डशन, कनिष्क पब्लिशर, डस्ट्रीब्यूटर, नई दिल्ली
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- बक्शी, एन. एस. (2007). *हिंदी शक्षण,* प्रेरणा प्रकाशन, रोहिणी, दिल्ली
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- राष्ट्रीय पाठ्यचर्चा की रूपरेखा (2005) प्रकाशन वभाग, राष्ट्रीय शै क्षक अनुसंधान और प्र शक्षण परिषद्, नई दिल्ली।
- समझ का माध्यम, राष्ट्रीय शै क्षक अनुसंधान और प्र शक्षण परिषद्, नई दिल्ली।
- आंकलन स्त्रोत पुस्तिका, राष्ट्रीय शै क्षक अनुसंधान और प्र शक्षण परिषद्, नई दिल्ली।
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- बच्चे की भाषा और अध्यापक एवं निर्दे शका, कृष्ण कुमार, एन.बी.टी, नई दिल्ली।
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- ई लच, आई. (1981). प्रीफेसटूपटनायक, मल्टी लंगुए लज्म एंड मदरटंग एजूकेशन, ऑक्सफोर्ड यूनिव र्सटी प्रेस।

Year	I	PEDAGOGY OF ENGLISH	Credits	4
Semester	II		Course code	SOE 02 02 05DCEC3104
Learning	After the completion of the course, pupil-teachers will be able to: • Explain the specificities of the English Language and develop basic language skills among the students.			

Outcomes	● Critically examine and apply various teaching methods, techniques and approaches. ● Design, develop and conduct teaching using effective lesson-plans for various genres such as poetry, prose, grammar and composition incorporating teaching skills. ● Prepare lesson plans and explain various ways of assessment in pedagogy of English.
Course Content	
Unit -1	**An Overview of specificities of the English Language and Basic Language Skills** ● English language: Nature, functions and importance with specific reference to India **(NEP 2020, Online)** ● English Linguistics and Language Teaching- Sound Patterns and Word Formation ● Teaching of basic language skills- Listening, Speaking, Reading, Writing **(NEP 2020, Online)** ● Teaching of Grammar and Vocabulary
Unit -2	**Approaches, Methods and Techniques of Teaching English** ● **Approaches-** Structural, Lexical, Communicative, Constructivist approach **(NEP 2020, Online)** ● **Methods-** Grammar Translation, Direct, Audio-lingual method (**Online)** ● **Techniques-** ICT integration, Discussions and Debates, Role Play, Language Games **(NEP 2020)** ● **Structure of Content and Basic Conceptual Schemes-** Principles, Guidelines, Sapir Whorf Hypothesis and implications of Conceptual Relativism
Unit -3	**Basic Teaching Skills Lesson Planning** ● Micro Teaching Skills: Skills of Introduction, Explanation, probing question, Illustration with examples, Stimulus Variation, Reinforcement, Class-Room Management, Using Writing Board **(NEP 2020, Online)** ● Approaches to Lesson planning: Herbertarian and Constructivist

<table>
<tr><td></td><td>● Revised Bloom's Taxonomy of writing instructional objectives in behavioral terms (NEP 2020, Online)
● Lesson Planning for Teaching of Prose, Poetry, Grammar and Composition: Micro, Simulated and Daily Lesson Plan.</td></tr>
<tr><td rowspan="2">Unit -4</td><td>Assessment</td></tr>
<tr><td>● Formative and Summative Assessment, Continuous and Comprehensive Assessment (NEP 2020)
● Assessment of Listening, Speaking, Reading, Writing, Grammar and Vocabulary (NEP 2020)
● 360° Holistic Assessment: NEP Vision (NEP 2020, Online)
● Remedial Teaching and Action Research (NEP 2020)</td></tr>
<tr><td>Transaction Strategies/ Teaching Learning Process</td><td>Lecture, Discussion, Debates, Games, Exercises, Use of audio-visual materials, Exposition, Reading demonstration, Games, Exercise, short and long lecture, e-learning etc.</td></tr>
<tr><td colspan="2">Practicum:
● Planning and presentation of lesson-plan on any topic demonstrating all the major teaching skills.
● Record of any event organized in schools to develop reading, writing, speaking and listening skills through extempore, declamation and discussion.
● PPT Presentation on given topic of syllabus.</td></tr>
<tr><td colspan="2">Suggested Readings:
● Agnihotri, R.K., Khanna, A.L. (1994) (eds.), Second language acquisition: Socio-cultural and linguistic aspects of English in India (RAL1). New Delhi: Sage Publications
● Brown, H.D. (2010). Language assessment: Principles and classroom practices. Pearson Education.</td></tr>
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- Chapman, D. (2011). *Teaching English as a second language: a guide for teaching children (TESL or TEFL*). Trafford Publishing.
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Year	**I**	**PEDAGOGY OF SOCIAL SCIENCES**	**Credits**	**4**
Semester	**II**		**Course code**	SOE 02 02 06 DCEC3104
	After completion of the course, pupil-teacher will be able to:			

Learning Outcomes	• Summarize the various aspects of social science and point out the objectives of teaching social science at different levels. • Describe, select and demonstrate different pedagogical skills, approach and methods of teaching social science. • Elaborate the process of curriculum design, arrange instructional materials, resource center and appraise the qualities of social science teacher. • Use of various techniques of evaluation and construct achievement test in social science.
Course Content	
Unit -1	**An Overview of Social Science**
	• Social Science: concept, nature and scope • Relationship of Social Science with other School Subjects (History, Sociology, Political Science, Economics, Mathematics, Science and Technology) • Need and Importance of Teaching Social Science • Objectives of Teaching Social Science at School Level: **(NEP 2020)** ◦ Elementary Level ◦ Secondary Level
Unit -2	**Pedagogy and Lesson planning**
	• Pedagogical analysis: concept, importance and steps • Pedagogical Analysis on the following: ➢ The Mughal Empire (class ix) ➢ Constitutional Design (Class vii) ➢ Human Environment: settlement, transport and communication (Class vii)

	➢ Poverty as a challenge (class ix) ➢ Diversity and discrimination (Class vi) ● Teaching skills: Questioning, Introduction, Explanation, Stimulus Variation, Board Writing, Illustration with example and Reinforcement **(NEP 2020, Online mode)** ● Lesson Planning ● Methods: Lecture Cum Discussion, Project Method, Problem Solving, Storytelling, Source Method, Deductive & Inductive
Unit -3	**Curriculum, Teacher and Instructional Materials**
	● Characteristics, types and Principles of designing a good curriculum of Social Science ● Instructional Aids: Importance, Use and limitations **(NEP 2020, Online mode)** ● Need, importance and arrangement of Social Science Resource Centre (**NEP 2020, Online mode)** ● Characteristics and qualities of Social Science teacher **(NEP 2020, Online mode)**
Unit -4	**Evaluation in Social Science**
	● Evaluation: concept, needs and types (**Online mode)** ● Evaluation Tools: Check list, Observation and Interview ● Test, its Types and Construction of Achievement Test (**Online mode)** ● Diagnostic and Remedial Teaching: concept, need and importance **(NEP 2020, Online mode)**
Transaction Strategies/ Teaching Learning	Lecture-cum-discussion along with interactive group discussion, field trips, group discussions, brainstorming and simulation in the form of mock sessions, Bal Panchayat etc.

Process	

Practicum: Arrange any two activities: each out of the following two groups:

1) Educational visit:

- ❖ Historical places
- ❖ Ecological places
- ❖ Political places

2) Organization of Programme

- ❖ Social Awareness
- ❖ Election Awareness
- ❖ Exhibition
- ❖ Preparation of Annual Plan, Unit Plan and Lesson Plan
- ❖ Scrapbook

Suggested Readings

- B.N. Dash, Dr. I.V. Radhakrishna Murthy. (2017). *Methods of teaching social studies*. Neelkamal Publication Pvt. Ltd.
- Binning, A.C. *Teaching Social Studies in Secondary Schools*. New York: McGraw Hill and Co.
- Bhattacharya, S. & Darji, D.R. (1966). *Teaching of Social Studies in Indian Schools*. Baroda: Acharya Book Depot.
- Desai, D.B.: *Samaj Vidyana Shikshan*. Ahmedabad: Balgovind Prakashan.
- Konli, A.S. (1996). *Teaching of Social Studies*. New Delhi: Anmol Publications Pvt. Ltd.
- Mehlinger. Howard, D. (ed.) (1981). *Handbook for the Teaching of Social Studies*. UNESCO, London: Gareem Helm.
- Misra, S. & Ranjan, A. (2011). *Teaching of social science: history, context, challenges in Contemporary Trends in Education*. Delhi: Pearson

- Mangal, S.K. & Mangal, U. (2018). *Pedagogy of social sciences.* New Delhi: Phi learning Pvt. Ltd.
- Mehta, D. D. (2004). *Teaching of social studies.* Ludhiana: Tondon Publishers.
- Sharma, B.L., & Shukla, A.K. (2018). *Teaching of social science.* Meerut: R. Lal Publication.
- Webb, K. (1995). *An introduction to problems in the philosophy of social sciences*. London: Pinter.

Web Resources

- Importance of Social Science **Retrieved from** http://www.progressiveteacher.in/the-importance-of-social-studies-in-the-school-curriculum/
- **Teaching of Social Science Retrieved from** http://www.bdu.ac.in/cde/docs/ebooks/B-Ed/I/TEACHING%20%20OF%20SOCIAL%20SCIENCE.pdf
- Pedagogy of Social Sciences **Retrieved from** http://www.ignouhelp.in/ignou-bes-142-study-material/
- Micro Teaching Skills **Retrieved from** https://www.slideshare.net/JaySingh99/micro-teaching-skills-components
- Aims & Objectives Teaching of Social Science **Retrieved from** http://paleeri.blogspot.com/2017/08/aims-objectives-and-values-of-teaching.html
- Audio, Visual and Audio-visual Aids **Retrieved from** http://studylecturenotes.com/audio-visual-aids-in-education-definition-types-objectives/
- Qualities of a Social Science teacher **Retrieved from** https://jagandhere.wordpress.com/2017/05/21/qualities-of-social-science-teacher/
- Tools of evaluation **Retrieved from** https://www.slideshare.net/jkdange/tools-n-techniques-of-evaluation#:~:text=1)%20Teaching%20dossiers(files%2C,well%20as%20their%20individual%20limitations.&text=26.

- Diagnostic and remedial teaching **Retrieved from** https://sarkarinaukri-wala.blogspot.com/2015/08/diagnostic-and-remedial-teaching.html

Year	**I**	**PEDAGOGY OF MATHEMATICS**	**Credits**	**4**
Semester	**II**		**Course code**	SOE 02 02 07 DCEC3104
	After the completion of the course, students will be able to:			

Learning Outcomes	● Identify a clear perspective of meaning and nature of mathematics for determining objectives of mathematics. ● Explain various approaches and basic teaching skills of mathematics. ● Applying teaching methods and basic teaching skills of mathematics strategies judiciously for transacting the subject contents with a view to realize the objective of mathematics education. ● Select appropriate tools for evaluating mathematics learning.
Course Content	
Unit -1	**Background for Teaching Mathematics**
	● Mathematics- Nature and Scope ● Need and Significance of Mathematics Education ● History of Mathematics **(NEP 2020)** ● Contribution of Indian Mathematicians **(NEP 2020, Online)**
Unit -2	**Aims and Objectives of Teaching Mathematics**
	● Aim and Objectives of Teaching Mathematics **(Online)** ● Error's analysis and related of Learning and Teaching mathematics ● General Objectives of teaching mathematics at the upper and secondary level ● Bloom's taxonomy of writing Instructional objectives in behavioural terms **(NEP 2020, Online)**
Unit -3	**Methods, Techniques and Resources of Teaching Mathematics**
	● Approaches of Formulation of instructional objectives in Behavioural Term: RCEM, Constructivist, Herbart **(NEP 2020, Online)** ● Methods of Teaching Mathematics: Inductive- Deductive Method, Analytic –Synthetic Method, Heuristic Method or Discovery Method, Activity Based Method, Project Method, Problem Solving Method

	• Basic Teaching skills of Mathematics: Introducing the Lesson, Probing Question, Explanation, Illustration with Examples, Stimulus Variation, Board Writing **(NEP 2020)** • Resources of teaching Mathematics: Text Book, Mathematics Labs, Mathematics Club, Mathematics Library, ICT equipped classroom, Mathematics Learning Software, Audio- Visual Aids **(NEP 2020, Online)**
Unit -4	**Planning & Evaluation of Teaching Mathematics**
	• Planning: Yearly, Unit and Period plan • Lesson planning: Herbert and Constructivist 5E model **(NEP 2020, Online)** • Tools and Techniques of Evaluation • Construction of an Achievement Test with Blue Print **(NEP 2020, Online)**
Transaction Strategies/ Teaching Learning Process	Lecture cum Discussion should follow around readings. Students should be given hands-on experiences and appropriate illustrations be made around methods and strategies. Visit to mathematics library and laboratory and hands on experience to students, e-platforms, library assignment. Critical analysis of the school textbook and syllabus will be made
Practicum: • Content Analysis of Position paper of National Focus Group on Teaching of Mathematics • Prepare a report about the contribution of Indian Mathematicians Mathematics. • Prepare a report on the History of Mathematics (Number System & Measurement etc.) • Critically Review of Mathematics Text book and make a report • Observation of children doing everyday Mathematics, community numeracy practices and making a report.	

- Development and trying out a Teaching-learning strategy for teaching particular Mathematical concepts.
- Construction of Mathematical Working and Non-Working 2D and 3D Models
- Development and use of Mathematics laboratory.
- Organizing a 'Mathmela' in a school or a locality and write a report
- Lesson Plan on one topic from secondary school mathematics
- Construction of an achievement test with blue print
- PPT Presentation on give topic of syllabus

Suggested Readings:

- Anice, J. (2016). *Methods of teaching mathematics*. New Delhi: Neelkamal Publications.
- Ang. K.C. (2019). *Mathematical modelling for teachers*. London:Springer.
- Boston, M.L., Kendela, A.G. & Dixon, K.J. (2019). *Making sense for teaching of mathematics*.Bloomington:Solution Tree Press.
- Ediger, M., & Rao, B. (2000). *Teaching mathematics successfully*. New Delhi: Discovery Publishing House.
- Kadler, N., Larkin,K. & Sinclair, N.(2018). *Using mobile technologies in the teaching & learning of mathematics.* London:Springer.
- Kothari, R.G., & Mistry, H.S. (2012). *Diagnosis of learning difficulties on fractions and decimals: A study on the students of upper primary schools*. Germany: Lambert Academic Publishers.
- Kothari, R.G., and Shelat, P.H. (2011). *Mathematical weaknesses among secondary school students.* Germany: VDM Verlag Publishers.
- Kulshrestha, A.K. (ed.) (2016). *Pedagogy of school subject mathematics.* Meerut: R.Lall Publishing house.
- Leonard, J. (2019). *Culturally specific pedagogy in the mathematics classroom: Strategies for teachers and students.* New York: Routledge.

- Mason. J. H.(2016). *Mathematics teaching practice*. New Delhi: Elsevier Science & Technology.
- Nathan, D. L. Raad & Robert, J. M. (2019). *The new art and science of teaching mathematics*: (establish effective teaching strategies in mathematics instruction.Bloomington:Solution Tree Press.
- Raju, B.P.S. & CPS Chouhan, C.P.S. (2012). *Pedagogy of Mathematics*. New Delhi: NCERT.
- Nickson, M. (2006). *Teaching and learning mathematics*: A guide to recent research and its application. London: Continuum.
- Oldridge, M. (2018). *Teaching mathematics through problem solving in K12*. Boulder:Rowman& Littlefield.
- Pandya, B. (2007). *Teaching of mathematics*. Agra: Radha Prakashan Mandir.
- Paul, C. (2008). *Teaching mathematics*: *Developing as a reflective secondary Teacher*. New Delhi: Sage Publication.
- Rao, N.M. (2014). *A manual of mathematics laboratory*. New Delhi: Neelkamal Publications.
- Rock, D. & Brambhaug, D.K. (2013). *Teaching secondary mathematics*. Revised ed. Noida: Vikas Publishing House Pvt. ltd.
- Russel, J. (2007). *Teaching of mathematics*. New Delhi: Campus Books International.
- ingh, H., Avtar, R. & Singh, V.P. (2008). *A handbook for designing Mathematics*.New Delhi: APH Publishing House.
- Siddiqui, M.H . (2009). *Teaching of mathematics*. New Delhi: APH Publishing House.
- Upadhyay, R. (2014). *Teaching of mathematics*. Meerut: R.Lall Publication

Web resources

- https://www.youtube.com/watch?v=2AqXZJD92Ig
- https://www.youtube.com/watch?v=oEMOEjQocgY
- https://www.youtube.com/watch?v=hbDkSaSnbVM
- https://www.youtube.com/watch?v=IO19-MTwThI
- https://www.youtube.com/watch?v=MrIdc-Hs-is
- https://www.youtube.com/watch?v=lhwAMhZQ6kU

- http://mathigon.org/resources/value-of-mathematics.pdf

Year	**I**	**PEDAGOGY OF LIFE SCIENCE**	**Credits**	**4**
Semester	**II**		**Course code**	SOE 02 02 08 DCEC3104

Learning Outcomes	**After completion of the course, the students will be able to:** ● Elaborate the dynamics of teaching of life science and plan instructions for teaching. ● Use various Skills, methods, approaches in teaching of life science and apply them in construction of micro lessons. ● Describe various instructional aids, learning resources for pedagogy of life science. ● Critically analyze the importance of various online and offline assessment tools & techniques in pedagogy of life science.
Course Content	
Unit -1	**Teaching of Life Science (NEP 2020, Online)** ● Life science as a Subject in school Curriculum. and Contribution of Indian biologist; Charak, Susruta, Dr. Hargovinda Khurana, Birbal Sahani ● Interdisciplinary learning of Life Science. ● Aims & Objectives of Teaching of Life Sciences. (As per NCF 2005 &NEP2020). ● Bloom's Taxonomy, Planning (DLP and Unit plan)of writing of instructional Objectives using RCEM Approach.
Unit -2	**Teaching Skill, Method and Approaches (NEP 2020)** ● Teaching Skills: Introducing the lesson, Questioning Skill, Explanation Skill, Stimulus Variation Skill, Board Writing Skill, Reinforcement skill, Illustrations with example skill. ● Approach; Inquiry, Problem Solving constructivist approach, cross curricular pedagogy approach; ● Methods; Lecture cum Demonstration Method, Laboratory Method, Project Method, Heuristic Method. ● Experiential Learning; Hands on activities, art integration Experimentation, flipped learning, blended learning, cooperative learning, Collaborative Learning
Unit -3	**Instructional aids and Learning Sources in Life Science (Online)** ● Instructional Aids; concept, types (Audio/visual/ Audio Visual), importance, selection. Creating Charts using live.arm

<table>
<tr><td></td><td>charts, Interactive Open Board. (NEP 2020)
● Learning Resources: Community Resources, immediate surrounding, E- library, Text book & E books and its critical analysis (NEP 2020)
● Laboratory as a Learning Resource; Importance and Safety measures & precautions, Virtual labs OLABS Online Laboratory, learning biology through online Labs, Go Lab ecosystem. (NEP 2020)
● Role of ICT in teaching of Life Science; Mobile learning. (NEP 2020)</td></tr>
<tr><td rowspan="2">Unit -4</td><td>Assessment in Teaching of Life Science</td></tr>
<tr><td>● Assessment: Concept, need, importance, Types (NEP 2020)
● Online & Offline tools and techniques of Assessment.
● Construction of online assessment test (quizzes) using different apps; google form, google classroom etc. (NEP 2020)
● Assessment of practical work & Project work. (online & offline) (NEP 2020)</td></tr>
<tr><td>Transaction Strategies/ Teaching Learning Process</td><td>Lecture cum discussion, Lecture cum demonstration, Use of PPT, Assignments on various topics, Presentation and discussion, Debate and presentations by Pupil Teachers will be encouraged.</td></tr>
<tr><td colspan="2">Practicum:
● To Prepare and Present a lesson plan using various basic teaching skills.
● Visit nearby 5 schools and prepare a report on the Science Laboratory.</td></tr>
</table>

- presentation on Virtual labs.
- Construction of DLP.
- Construction of online assessment test/quiz.
- Critical analysis of a test paper of Biological Science.
- Critical review of a text book of science/.
- Critically analyze the Practical Aspect /syllabi of science/ life science and prepare a report over that.
- NEP 2020.
- 5 E instructional Model.
- any other topic suggested by the teacher.

Suggested Readings:

- Abraham, I., & Reiss, M. (2016). *Enhancing learning with effective practical science* (Ist ed.). London: Bloomsbury Publishing House.
- Agarwal, K. P., & Bain M. P. (2019). *Powerful teaching: unleash the science of learning.* New Jersey: Wiley publishing House.
- Ahmad, J. (2014). *Teaching of biological science*. Delhi: PHI Learning Private Limited
- Amit (2002). *Teaching of physical sciences.* New Delhi: Anmol Publications.
- Biswas, R. (2021). *Pedagogy of science teaching.* Kolkata: Aaheli publication.
- Gupta, S.K. (1985). *Teaching of physical science in secondary schools*. New Delhi: Sterling Publications (Pvt.) Limited.
- Keith, S. T. (2018). *Master class in science teaching* (1st Ed.). London: Bloomsbury Publishing House.
- Kohli, V.K. (1998): *How to teach science*. Ambala: Vivek Publishers.
- Kootchar, S.K. (2003). *Methods and techniques of teaching*. Sterling Publishers Pvt Limited.
- Kulshrestha, S.P. & Singh, G. (2013). *Teaching of physical science.* Meerut: R. Lall Book Depot.

- Kulshrestha, S. K. (2007). *Teaching of science*. New Delhi: Lotus Press.
- कुलश्रेष्ठ, एस. पी. औरतोमर, डी. (2016). जीव वज्ञान शक्षण. दिल्ली: बुकमेन पब्लिकेशन.
- कुलश्रेष्ठ, ए. के. और कुलश्रेष्ठ,ऐन. के. (२०१६). वज्ञान शक्षण. मेरठ: आर. लाल पब्लिकेशन.
- Kumar,R. & Kumar. (2000). *Teaching of science*. Mangal Deep Publication.
- Kumar, P & Ramaiah, K. & Sreedharacharyulu, K. (2016). *Pedagogy of physical science*. New Delhi: Neelkamal Publication.
- Rajlaxmi, R., Rajammal, S. & Vasudevan, V. (2016). *Pedagogy of biological science.* Retrieved from http://www.tnteu.ac.in/pdf/bs.pdf
- Laxmi, G. B.& Rao, Bhaskara (2004). *Methods of teaching life Science,* New Delhi: Neelkamal Publication.
- Mangal, S.K. (1997). *Teaching of life science*. New Delhi:Discovery Publishing House.
- Nagaraju, M.T. V&Vanaja, M. (2015). *Methods of teaching of physical science.* New Delhi: Neel Kamal Publications.
- Pahuja, S. &Ravikant. (2016). *Pedagogy of school subject biological science.* New Delhi: Neel Kamal Publication.
- Pandey. (2003). *Major issues in science teaching*. New Delhi: Sumit Publications.
- Prasad Janardan. (1999). *Practical aspects in teaching of science*. New Delhi: R. Lall Publication.
- *Pedagogy of biological science.*(n.d.). Retrieved March 25,2021 from http://simindia.co.in/pdf/1st%20sem%20biological%20science-.pdf
- R. vijaylatha, & Sunitha, D. (2016). *Pedagogy of Biological Science.* New Delhi: Kanishka Publication.
- Teaching of Science(n.d.). Retrieved fromhttp://www.ncert.nic.in/departments/nie/dse/activities/advisory_board/PDF/teaching_sc.pdf
- Go Lab ecosystem. (2021). Retrieved from https://www.youtube.com/watch?v=3FSyMb6oeFM
- OLABS Online Laboratory. (2021). Retrieved from https://www.youtube.com/watch?v=LNPcRJwv--U

- Learning biology through online Labs. (2021). Retrieved from https://www.youtube.com/watch?v=vR2x6Hz1QIc
- NCERT. (2006). Position Paper on Teaching of Science. (2006). Retrieved from http://epathshala.nic.in/wp-content/doc/NCF/Pdf/science.pdf
- Creating Mind Map using Mindomo ICT tool (2021). Retrieved from https://www.youtube.com/watch?v=mzsKAd4jEFw
- Formative Assessment using Goformative. (2021). Retrieved from https://www.youtube.com/watch?v=WO0HzkMpyvI
- Creating Charts using live.amcharts. (2021). Retrieved from https://www.youtube.com/watch?v=NdYv60XxD1w
- Interactive Open Board (2020). Retrieved from https://www.youtube.com/watch?v=Rn_x820LT4A
- Creating a Quiz using G-class (2020). Retrieved from; https://www.youtube.com/watch?v=QfVNNbQLAH4
- Creating Assignment using Google Form. Retrieved from https://www.youtube.com/watch?v=QfVNNbQLAH4
- Webinar on ICT Tools; creating interactive Lessons Using Near pod (2020). Retrieved from https://www.youtube.com/watch?v=P6Ju9UcUPV8

Year	I	PEDAGOGY OF PHYSICAL SCIENCE	Credits	4
Semester	II		Course code	SOE 02 02 09 DCEC3104

Learning Outcomes	After the completion of the course, students will be able to: • Develop conceptual understanding of teaching Physical Science and appreciate the contribution of great scientists in the field of Physical Science • Acquaint with the aims, objectives and basic skills of teaching Physical Science • Develop scientific thinking after getting acquainted with different teaching methods, strategies, pedagogical analysis, prepare lesson plan and assessment techniques • Familiarize with the virtual learning resources, instructional aids and action research
Course Content	
Unit -1	**Conceptual Understanding of Teaching Physical Science**
	• Concept, Nature and Importance of Physical Science as a Subject of the School Curriculum • Correlation of Science with subjects (Mathematics, Social Studies, Geography, Health & Physical Education). • Contribution of Great Scientists (C.V.Raman, Isaac Newton, Albert Einstein, Prafulla Chandra Ray, J.C. Bose, Homi Jahangir Bhabha, A.P.J. Abdul Kalam) **(NEP 2020)** • Physical Science Teacher: Qualities and Duties **(NEP 2020)**
Unit -2	**Objectives and Basic Teaching Skills**
	• Aims and Objectives: Meaning and Difference between the terms, aims of teaching Physical Sciences at Middle and Secondary level with special reference to NCF 2005 **(Online)** • Bloom's Taxonomy: Traditional and Revised **(NEP 2020)** • Approaches of writing objectives in behavioral terms: Robert Mager, Miller and RCEM approach

	• Basic teaching skills: Meaning and Components of Skills (Skill of Introducing the Lesson, Skill of Reinforcement, Skill of Probing Questioning, Skill of Illustration with Example, Skill of Explanation, Skill of Stimulus Variation, Skill of Board Writing, Skill of Classroom Management **(NEP 2020, Online)**
Unit -3	**Teaching Methods, Strategies, Pedagogical Analysis, Lesson Plan and Evaluation**
	• Methods and Strategies of Teaching Physical Science: Lecture-Cum Demonstration, Project Method, Heuristic Method, Constructivist Approach, Brainstorming, Team Teaching, Panel Discussion, Field Trips, Science Club, Science Fairs **(NEP 2020, Online)** • Pedagogical Analysis: Steps, Principles, Pedagogical Analysis of any one topic of science from class 6th to 10th referred by NCERT **(Online)** • Lesson Plan: Essential features, Requirement, Construction • Evaluation**:** CCE, meaning and needs, Types, Qualities of a good test, Blue Print (In reference to NEP 2020) **(NEP 2020**, **Online)**
Unit -4	**Instructional material, Textbook and Online Resources of Physical Science**
	• Instructional Aids: Meaning, Need, Types (Charts, Models, Display Boards, Black Board, Computer, Science Kit and their merits & demerits), Virtual teaching aids (Creating Charts using live.arm charts, Interactive Open Board), Improvisation: Meaning, need and importance **(NEP 2020**, **Online)** • Laboratory: Planning, equipping and organization, Virtual Laboratory Applications for Physics and Chemistry (OLABS, Go Lab Ecosystem) **(NEP 2020**, **Online)** • Text book: Meaning, Qualities of a good Science Textbook, Critical Analysis of a Secondary School Physical Science

	Textbook, Procedure of Textbook selection ● Action Research: Concept, Steps and Importance **(NEP 2020)**
Transaction Strategies/ Teaching Learning Process	Lecture cum discussion, Lecture cum demonstration, Use of PPT, Assignments on various topics, Presentation and discussion, Debate and presentations by Pupil Teachers will be encouraged.

Practicum:

- Lesson plan presentation on any topic of Physical Science book from Class VIth -X th by using all (mentioned in syllabus) basic teaching skills.
- Presentation on any topic as suggested by the teacher.

Suggestive Readings:

- Albert, Paul (2017). *Pedagogy of Physical science*. New Delhi: Blue Rose Publishers.
- Kochhar, S.K. (2003). *Methods and techniques of teaching*. New Delhi: Publishers Pvt. Ltd.
- Kohli, V.K. (1998). *How to teach science*. Ambala: Vivek Publishers.
- Kulshrestha, S.P., Singh, Gaya (2013). *Teaching of physical science*. Meerut: Raj Printers.
- Kumar, Pramod, Ramaiah, K., Sreedharacharyulu,K. (2016). *Pedagogy of Physical Science*. Meerut: R.Lall.
- Mangal, S.K., Mangal, Shubhra (2018). *Pedagogy of Physical Sciences.* Meerut: International Publishing House.
- Nagaraju, M.T.V., Vanaja, M. (2015). *Methods of teaching of physical science*. New Delhi: NeelKamal Publications.
- NCF (2005). *National curriculum framework.* New Delhi: NCERT.
- NCERT. (2006). *Position paper on teaching of science.* New Delhi: NCERT.

- Pal, Sangeeta (2016). *Pedagogy of Physical Science*. Agra: Rakhi Prakashan.
- Pandey. (2003). *Major issues in science teaching*. New Delhi: Sumit Publications.
- Praveen, Manoj G., Haseen, Koya. M. P. (2016). *Teaching Science Resources,Methods and Practices - (Physical Science & Natural Science*. New Delhi: Neelkamal Publishers.
- Rahi, Avtar Singh (2018). *Pedagogy of Physical Sciences and Teachers*. Colorado (U.S.A.): Create space Independent Publishing Platform.
- Rajasekar, S. (2016). *Methods of Teaching Physical Science*. New Delhi: Neelkamal Publishers.
- Rao, N. Venkat, Ramulu,Ch. A. (2016). *Pedagogy of Physical Sciences*. New Delhi: Neelkamal Publishers.
- Sharma, R.C. (2006). *Modern science teaching*. New Delhi: Dhanpat Rai Publishing Comp.
- Sharma, R.P. (2010). *Teaching of physical science*. Meerut: R.Lall.
- Sood, J.K. (1992). *New directions in science teaching*. Chandigarh: Kohli Publishers.
- Tolman, Marvin N. (2006). *Hands on Physical Science Activities*. United States: Jossey Bass (Wiley).

Web Resources:

- The role, Education, Qualifications and Professional Development of Science Teachers. (2012). Retrieved from http://sprabhakngce.blogspot.com/
- Go Lab ecosystem. (2021). Retrieved from https://www.youtube.com/watch?v=3FSyMb6oeFM
- OLABS Online Laboratory. (2021). Retrieved from https://www.youtube.com/watch?v=LNPcRJwv--U
- Learning Physics through online Labs. (2021). Retrieved from https://www.youtube.com/watch?v=EE22e2HnFII
- Learning Chemistry through online Labs. (2021). Retrieved from https://www.youtube.com/watch?v=O8wSNjAUxZo
- Creating Charts using live.arm charts. (2020). Retrieve from https://www.youtube.com/watch?v=NdYv60XxD1w
- Interactive Open Board (2020). Retrieved from https://www.youtube.com/watch?v=Rn_x820LT4A

Year	**I**	**PEDAGOGY OF ECONOMICS**	**Credits**	**4**
Semester	**II**		**Course code**	SOE 02 02 10 DCEC3104
Learning Outcomes	After the completion of the course, students will be able to: ● Explain the concept, aims and objectives of Pedagogy Economics. ● Demonstrate the various skills of teaching, special qualities of an Economics teacher and critically analyze the text books of Economics. ● Classify the various methods, techniques of lesson plan and design of instructional aids in Pedagogy of Economics. ● Use of various evaluation techniques in Pedagogy of Economics.			
Course Content				
Unit -1	**Concept, Place, Aims and objectives of Economics in School Curriculum**			
	● Concept, Nature, Scope, Need and Importance of economics. ● Place of Economics in school curriculum at different stages. ● Aims & Objectives of Pedagogy Economics **(NEP 2020, Online)** ● Bloom Taxonomy & Instructional objectives using RCEM Approach **(NEP 2020, Online)**			
Unit -2	**Basic teaching skills, Teacher and Text book of Pedagogy Economics**			
	● Teaching skills: Introductory, Reinforcement, writing board, Stimulus variation, Probing questioning and Illustration with example. **(NEP 2020)** ● Correlation of Economics with other subjects (Mathematics, History, Social Studies, Commerce).			

	● Importance of teacher & Desired qualities of Economics teachers as regard to the subject. ● Text book: Characteristics of a good text book, analysis of text book in Economics.
Unit -3	**Methods, Pedagogic Planning and Aids of Pedagogy Economics** ● Method of Pedagogy Economics (i) Lecture (ii) Project (iii) role-play (iv) Problem solving (v) storytelling **(NEP 2020)** ● Unit Plan: objective, needs and importance. ● Lesson plan: objective, needs and importance. ● Teaching Aids in Economics: Audio, Visual and Audio-visual (meaning, use, merit and limitation). **(NEP 2020, Online)**
Unit -4	**Assessment Techniques of Evaluation** **(Online Mode)** ● Critical understanding of the existing pattern of assessment & 360^0 Holistic Assessment: NEP vision **(NEP 2020)** ● Stages of evaluation: diagnostic, formative and summative. **(NEP 2020)** ● Continuous and Comprehensive Assessment. **(NEP 2020)** ● Objective testing: construction of test items. **(NEP 2020)**
Transaction Strategies/ Teaching Learning Process	Lecture-cum-discussion along with interactive group discussion, field trips, group discussions, brain-storming and simulation in the form of mock session, case study of banks and insurance etc.
Practicum: ● Preparation of Annual plan, Unit plan and Lesson plan ● Identifying and Evaluating ICT resources suitable for teaching Economics ● Develop a Multi-Media lesson using appropriate ICT resources and transacting the same before peers in simulated teaching exercise.	

- Action Research Project Report
- Visits can be organized to

✓ RBI and other Banks

✓ Any Industry or Factory

✓ Finance ministry

*** In addition, school and community-based activities may be organized with provisions for visits to innovative centers of pedagogy and learning, innovative schools, educational resource centers, etc. Action research based on teaching learning and school and community could be conducted.**

Suggested Readings:

- Arora, P.N. And Shorie, J.P. (1986). *Open book examination question in economics*, New Delhi: NCERT.
- Assistant Masters Association (1974). *The Teaching of Secondary School Examinations*, London Cambridge University Press.
- Bawa M. S. (ed.) (1998). *Source Book on Strategies of Teaching Social Sciences*, IASE, Deptt. of Education, Delhi University.
- Bawa, M. S. (ed.) (1995). *Tendering of Economics: Contemporary Methods and Strategies for Secondary and Senior Secondary levels*, IASE, Deptt. of Education, Delhi University.
- Bawa, M. S. (ed.) (1996). *Evaluation in Economics*, IASE, Deptt. of Education, Delhi University.
- Blanchard, O., *Macroeconomics*, 4th Edition, Prentice Hall.
- Chakravorty, S. (1987). *Teaching of Economics in India*, Bombay, Himalaya Publishing.
- Dornbusch, R., Fischer, S & Startz, R., (2015). *Macroeconomics*, 11th edition, McGraw Hill.
- Mishra & Puri, (1995). *Economic development and planning*. Himalaya publishing house.
- Lekhi R.K., (2014). *Economics of Development and Planning*. kalyani Publishers
- Hicks, J.R. (1960). *The social framework- an introduction to economics*, London: Oxford University Press.

- Hodkinson, Steve, Whitehead & David J. (ed) (1986). *Economics Education: Research and Development Issues*, London, New York: Longman.
- Hazlitt, H. (2010). *Economics in one lesson: the shortest and surest way to understand basic economics. Currency.*
- Mishra & Puri (2015). *Indian economy*. Himalaya Publishing house.
- Dutt & Sundaram, (2016). *Indian economy*, S.Chand Publisher.
- Ahuja, H.L.(2016). *Micro economics*. S.Chand Publishers.
- Salvatore, D., and Reed, (2013). *International economics* 11th edition, Wiley.
- Soderston, B.O. (1991). *International economics*, Macmillan.
- Siddiqi, M.H. (1998). *Teaching of economics*, New Delhi: Ashish Publishing House.
- Srivastava, H.S. (1976). *Unit Tests in Economics*, New Delhi, NCERT.
- Verma, S. (2018). *Bhartiya Arthvyavastha*, New Delhi: unique publisher.
- कुमार, राजीव. (2018). अर्थशास्त्र शक्षण, आगरा, साहित्य प्रकाशन |

Web resources

- www.cseindia.org (for documentary films and DVD)
- www.india-seminar.com
- Janchetana.blogspot.com (Hindi and English)
- http://www.ibe.unesco.org/publications/educationalpracticesseries
- 1947PartitionArchive.org
- http://www.indiabudget.nic.in/survey.asp
- dsal.uchicago.edu
- http://bombay.indology.info/mahabharata/statement.html

- http://archive.is/http://www.sdstate.edu/projectsouthasia
- Position Paper National Focus Group on Teaching of Social Sciences, NCERT
  http://www.ncert.nic.in/new_ncert/ncert/rightside/links/pdf/focus_group/social_sciencel.pdf
- Package in social science for professional development of in-service teachers, NCERT
  http://www.ncert.nic.in/departments/nie/dess/publication/prin_material/ITPD%20Final%20june%2014.pdf

Year	I	PEDAGOGY OF COMMERCE	Credits	4
Semester	II		Course code	SOE 02 02 11 DCEC3104
Learning Outcomes	After the completion of the course, students will be able to: ● Explain the concept, aims and objectives of Pedagogy Commerce. ● Demonstrate the various skills of teaching, general qualities of a Commerce teacher and correlation of Commerce with other subjects & critically analyze the text books of Commerce teaching. ● Classify the various methods, techniques of lesson planned design of instructional aids in Pedagogy of Commerce. ● Use of various skills of evaluation techniques in Pedagogy of Commerce.			
Course Content				
Unit -1	**Concept, Aims and objectives of Commerce Teaching** ● Concept, Nature, Scope, Need and Importance of Commerce. ● Place of Commerce in school curriculum at different stages. ● Aims & Objectives Teaching of Commerce Teaching. **(NEP 2020, Online)** ● Bloom Taxonomy & Instructional objectives using RCEM Approach. **(NEP 2020, Online)**			
Unit -2	**Basic teaching skills, Teacher and Textbook of Commerce Teaching** ● Teaching skills: Introductory, Reinforcement, writing board, Stimulus variation, Probing questioning and Illustration with example. **(NEP 2020)** ● Importance and Desired qualities of Commerce teachers. ● Correlation of Economics with other subjects (Mathematics, History, Social Studies, Commerce).			

	• Text book: Characteristics of a good text book, analysis of text book in Commerce.
Unit -3	**Methods, Lesson Planning and Aids of Commerce Teaching** • Method of teaching Commerce (i) Lecture (ii) Project (iii) role-play (iv) Problem solving (v) storytelling **(NEP 2020)** • Unit Plan: objective, needs and importance. • Lesson plan: objective, needs and importance. • Teaching Aids in Commerce: Audio, Visual and Audio-visual (meaning, use, merit and limitation).**(NEP 2020, Online)**
Unit -4	**Assessment Techniques of Evaluation** **(Online)** • Concept and process of evaluation and measurement. **(NEP 2020)** • Difference between Measurement and evaluation & 360^0 Holistic Assessment: NEP vision. **(NEP 2020)** • Tools of evaluation in Commerce (Check list, observation, interview). **(NEP 2020)** • Types of tests (Meaning, Construction, Merit, Limitation). **(NEP 2020)**
Transaction Strategies/ Teaching Learning Process	**Unit I:** Lecture followed by discussion supplemented by searches on MOOCs and augmented by power- point presentation analytical and synthetic discussions. **Unit II:** Lectures, discussions, use of MOOCs, e-platforms, library assignment, **Unit III:** Lectures, discussions, library assignments, PowerPoint presentations on various approaches to lesson planning, discussion on model lesson plan of commerce formulated by RIE's. **Unit IV:** Lecture followed by discussion supplemented by searches on MOOCs and augmented by power- point presentation analytical and synthetic discussions.
Practicum: • Design and deliver a 15 Minutes presentation on any topic by using the Lecture method. • Prepare a report on India's Trade pattern.	

- Prepare PowerPoint presentation on any topic covered in pedagogy of commerce syllabus.
- Sessional work/unit test/practicum/ project-based activities and Terminal Assessments
- Construction of Achievement test in commerce

Suggested Readings:

- Agrawal, J.C. (2018). *Teaching of commerce: A practical Approach.* New Delhi: Vikas publishing House
- Babu, M. (2009). *Teaching of commerce and accountancy*. Centrum Press.
- Bansal, R.R. (1994). *New trends in teaching of commerce; Models of teaching and conceptual learning.* Anmol Publishing House.
- Busham, Y.K. (1991). *Fundamentals of business organization & Management.* New Delhi: Sultan Chand & Sons
- Chandra, S.S. (2017). *Pedagogy of school subject commerce*. Meerut: R. Lall Publications
- Doshi, S. (2009). *Modern methods of teaching commerce*. Paradise Publishers.
- Jawawi, R. (2010). Reflective practices in teaching economics and commerce. VDM Verlag Publications.
- Khan, M.S. (1982). *Commerce education.* New Delhi: Sterling Publications.
- Kumar, M. (2004). *Modern teaching of commerce.* Anmol Publishing House.
- Lloyd V. D. (1972). *Teaching business subjects (3rd Ed.).* New Jersey: Prentice Hall Publications
- Singh, R.P. & Mansoori, I. (2017). *Pedagogy of school subject commerce*. Meerut: R. Lall Publications
- Singh, Y.K. (2018). *Teaching of commerce*. New Delhi: APH Publishing House.
- Tonne, H.A. (1975). *Methods of teaching business subjects*. New York: McGraw Company Ltd.
- Venkateswarlu, K. (1993). *Methods of teaching commerce*. New Delhi: Discovery Publishing House.
- गुप्ता, रेनू (2018). वा णज्य शक्षण, लु धअना ,टंडन पब्लिकेशन
- संह,रामपाल (2017). वा णज्य शक्षण, आगरा, अग्रवाल पब्लिकेशन

Web resources

- https://www.learningclassesonline.com/2020/10/pedagogy-of-commerce.htm
- https://mamtacommerce.blogspot.com/p/blog-page.html
- https://www.researchgate.net/publication/268381623_Teaching_E-Commerce_A_Platform_For_Active_Learning
- https://jilt.com/blog/ecommerce-education-resources/

Generic Elective Courses (GECs)

	Year	**I**	**ESSENTIALS OF GUIDANCE AND COUNSELING**	**Credits**	4 (2 Theory + 2 Practicum)
	Semester	**II**		**Course code**	SOE 02 02 03GEC 2024
Learning Outcomes	After the completion of the course, students will be able to: ● Integrate the fundamental principles and techniques of guidance and counselling as required during the guidance and counselling process; ● Critically analyze the role of a teacher as a guide in guidance programme; ● Identify various qualities of a teacher necessary for a role counsellor; and ● From the practical component they will learn how to administer psychological tests and prepare a case study, guidance programme for school.				
Course Content					
Unit -1	**Conceptual Understanding of Guidance**				
	● Guidance: Concept, functions and fundamental principles of guidance. **(NEP 2020, Online mode)** ● Need for Guidance Services in India. **(NEP 2020, Online mode)** ● Types of Guidance: Educational, vocational and Personal **(NEP 2020, Online mode)** ● Role of a class teacher in Guidance programme **(NEP 2020)**				
Unit -2	**Counselling**				

	• Counselling: Concept, difference between Guidance and Counselling. **(NEP 2020, Online mode)** • Counselling and other allied terms • Types of Counselling: Direct Counselling, Indirect Counselling, Eclectic Counselling **(NEP 2020, Online mode)** • Teacher as a Counsellor in educational institutions **(NEP 2020)**
Transaction Strategies/ Teaching Learning Process	Lecture cum discussion, use of audio-visual learning material, discussion brainstorming reflection, conduct counselling sessions, assignments on various topics, and presentation of case study of students in need of counselling, group participation and group discussions conduct of psychological tests, project work and field.

Practicum: Select any three out of the following

1. Administration and interpretation of any two.
    a) Intelligence Test
    b) Interest Inventory
    c) Aptitude Test
    d) Personality Test
2. Prepare a case study of two students one general and one problem students
3. Planning/Preparing Guidance Programme for School.
4. Plan a Motivational Schedule for enhancing learning
5. Create a School Development Plan for initiating a guidance and counselling programme in schools

Suggested Readings:

- Ajowi, J. O., & Simatwa, E. M. W. (2010). *The role of guidance and counseling in promoting student discipline in secondary*

schools in Kenya:

- A case study of Kisumu district. *Educational research and reviews*, 5(5), 263–272. Retrieved from: http://www.academicjournals.org/ERR
- Barki, B. G., & Mukhopadhyay, B. (2008). *Guidance and counselling: A manual* (10th reprint). New Delhi: Sterling.
- Chadurvethi, R. (2006). *Guidance and counseling techniques*, Chennai: S B A Book.
- Chandanpat (2018). *Guidance and counselling*. ND: Educational Publisher & Distributor.
- Chauhan, S.S. (2007). *Principle and techniques of guidance.* New Delhi: Vikas Publishing House.
- Dev, K. (2005). *Educational guidance*. New Delhi: Pragun Publication.
- Gibson, Robert L. & Mitchell, Marianne, H. (2016). *Introduction to counselling and guidance*. New Delhi: Pearson Prentice Hall in India.
- Gladding, R. (2018). Introduction to counselling. ND: Pearson.
- Hurlock, E. B. (2008). *Developmental psychology* (5th ed.). London: McGraw-Hill.
- Mehdi, B. (1967). *Educational & vocational guidance in India*, New Delhi: NCERT.
- Migel,J.(2001). *Counseling in careers guidance*, U S.: Open University Press.
- Nayak, A. K. (2007). *Guidance and counselling*. New Delhi: APH Publishing.
- Okum, B. F., & Kantrowitz, R. E. (2008). *Effective helping: Interviewing and counseling techniques* (7th ed.). Belmont: Thomson.
- Paterson, C.H. (1962). *Counseling and guidance in schools*, New York: Harper & Bros.
- Perry, W. (2008). *Basic counselling techniques: A beginning therapist's toolkit* (2nd ed.). Bloomington: Author House.
- Pesricha, P. (1976). *Guidance & counseling in indian education*, New Delhi: NCERT.
- Roeber, E. & Smith, G. D. (1955). *Organisation and administration of guidance programmes*, New York:McGraw Hill Book Co.
- Shaffer, D. R., & Kipp, K. (2010). *Developmental psychology: Childhood and adolescence* (8th ed.). Belmont: Wadsworth.

- Traxler, A.E. (1961). *Techniques of guidance*,New York: Harper & Bros.
- Yuksel-Sahin, F. (2009). The evaluation of counselling and guidance services based on teacher views and their prediction based on some variables. *International journal of instruction*, 2(1)

Year	**I**	**PERFORMING AND VISUAL ARTS**	**Credits**	**4 (2Theory+ 2 Practical)**
Semester	**II**		**Course code**	SOE 02 02 04 GEC 2024

Learning Outcomes	After the completion of the course, students will be able to: ● Explain of Visual art and its various dimensions ● Illustrate the different areas of Performing Art and organize various activities ● Plan and design various creative Art ● Organize and dramatize various Performing Art and integrate technology in art
Course Content	
Unit -1	**Introduction of Visual Arts (Theory)**
	● Visual Art: Concept, Scope, Elements, Importance and Aesthetics **(NEP 2020, Online)** ● Colour: Concept and Classification **(NEP 2020, Online)** ● Advertising: Concept of Advertising, its Importance in Indian context ● Understanding of Folk and Tribal Arts **(Online)**
Unit -2	**Introduction of Performing Arts (Theory)**
	● Acting according to Natyashastra **(Online)** ● Concept of Direction and Design **(Online)** ● Introduction of Performing Arts in India (Music, Dance and Drama) **(NEP 2020, Online)** ● Indian Classical Art, Forms and Narratives Arts **(NEP 2020, Online)**
Unit -3	**Creative Art (Practical)**
	● Forms of Painting: Study of still life, Portrait, Poster, Paper Art and Collage **(NEP 2020)** ● Basics of Graphic Design and Calligraphy **(NEP 2020)**

	● Folk and Tribal Arts: Pithora, Kalamkari and Gond Painting ● Making of Advertising ideas & posters
Unit -4	**Acting, Direction, Design Technology and Play Production (Practical)**
	● Acting (Rasa & Bhava), Acting Performance with Voice, speech and Body Movements **(NEP 2020)** ● Dance and use of body movements **(NEP 2020)** ● Stage Craft, Direction & Design Technology ● Performance based on Mime, Storytelling & Role Play **(NEP 2020)**
Transaction Strategies/ Teaching Learning Process	Hand on experience of working in different mediums and materials, preparation and presentation of teaching learning materials, slide/film show, group work planning of a stage-setting, visit, role play, celebrations of Indian festivals and fairs, brain-storming, interaction with artists, lectures and demonstration.
Practicum:	1. Making of Study of still life, Portrait, Poster (Social Activist), Paper Art, Collage, Graphic Design, Calligraphy, Waste Utilization, Folk and Tribal Arts: Pithora, Kalamkari and Gond Painting, Advertising posters. 2. Acting (Integration of Performing Arts in Education), Direction, Stage Craft & Design Technology.

Suggested Readings:

- Chandok Amargeet (2016), *Art and Education*, Delhi: Bookman.
- Chaturvedi Snehlata (2016), *Art Education*, Delhi: Bookman.
- Chauhan Rita (2016), *Drama, Art and Education*, Agra:Agrawal Publications, Sanjay Place.
- Chetan Bharti (2016), *Drama and Art in Education*, Kalyani Publishers.
- Gill Rajesh (2017), *A Textbook of Art Education*, New Delhi: Paragon International Publishers.

- Gill Rajesh (2018), *Art Education*, New Delhi: Paragon International Publishers.
- Jain Ritu (2016), *Art Education*, Delhi: Bookman.
- Kakkar Rekha, Makkhar Ragini (2018), *Drama, Art and Aesthetics in Education*, Agra: Rakhi Prakashan.
- Kumar Rajender (2016), *Drama and art in education*,Rajasthan: Jain Prakashan Mandir.
- Raw K. Ravikant and P. Ananad Kumar (2017), *Drama and Art in Education*, Neelkamal.
- Roy Reeta (2017), *Perfect Art Education*, Arya: Publisher Company.
- Saxena Avnish and Sirth Sushil (2016), *Drama, Art and Aesthetics in Education*, Agra:Rakhi Prakashan Raman Tower, Sanjay place.
- Sharma R. P., Sharma R. K. (2016), *Drama and Art in Education*, Agra: Radha prakashan mandir.
- Singh Chitralekha (2016), *Drama and Art in Education*, Agra: Publisher Shri Vinod Pustak Mandir.
- Singh Yadav Narendra (2010), *Advertising Technical and Theory*, Rajasthan: Rajasthan Hindi Granth Academy, Jaipur.
- Singh Yadav Narendra (2012), *Graphic Design*, Rajasthan: Rajasthan Hindi Granth Academy, Jaipur.
- Tivari Arjun (2010), *Modern Advertising Art and Behaviour*, Uttar Pradesh:Vishwavidyalaya Prakashan, Varanasi.
- Vatsyayan, kapila (1977), *Classical India Dance in literature and the Arts*, New Delhi: Sangeet natak Akademi.

Web resources:

- NCERT (2015) theme based early childhood care and education programme. National Council of Educational Research and Training, New Delhi https://ncert.nic.in/dee/pdf/deethemebased.pdf
- NCERT (2019) Art Integrated Learning. National Council of Educational Research and Training, New Delhi https://ncert.nic.in/pdf/notice/AIL-Guidelines-English.pdf
- understanding arts and arts education https://www.nios.ac.in/media/documents/dled/Block1_508.pdf
- NCERT (2019) Art Integrated Learning. National Council of Educational Research and Training, New Delhi

https://itpd.ncert.gov.in/mss/course_content/Module%203%20-%20Art%20Integrated%20Learning.pdf

- NCERT (2015) Art Education for Primary Teachers Volume II. National Council of Educational Research and Training, New Delhi https://ncert.nic.in/deaa/pdf/tpaev201.pdf
- NCERT (2006) Arts, Music, Dance and Theatre. National Council of Educational Research and Training, New Delhi https://ncert.nic.in/pdf/focus-group/art_education.pdf
- Design and Formatting by David Talbot & Cecilia Tortoledo Printed by the San Bernardino County Superintendent of Schools (2008) Reinvigorating Arts Education in California An Initiative of the California County Superintendents Educational Services Association. Visual and Performing Arts. http://ccsesaarts.org/wp-content/uploads/2015/03/vapa_core_color.pdf
- Centre For Cultural Resources And Training http://ccrtindia.gov.in/package_books.php
- Ministry of Home Affairs (Govt. of India) http://www.dashboard-padmaawards.gov.in/?Year=1981-1981&Award=Padma%20Shri&Field=Art
- Lalit Kala Akademi National Academy of Art, New Delhi https://www.lalitkala.gov.in/
- National gallery of modern Art, New Delhi http://www.ngmaindia.gov.in/
- Vardhaman Mahaveer Open University Kota, Rajasthan, India https://www.researchgate.net/profile/Dr_Akhilesh_Kumar2/publication/281834157_natya_evam_kala_siksa/links/55fa617208ae07629dfe648c/natya-evam-kala-siksa.pdf
- Vardhaman Mahaveer Open University Kota, Rajasthan, India http://assets.vmou.ac.in/BED114.pdf
- SCERT Raipur (2013) http://www.scert.cg.gov.in/pdf/dedfirst2013/kalashikshan.pdf

SEMESTER-III

<table>
<tr><td>Year</td><td>II</td><td rowspan="2">School Internships (Part – II)</td><td>Credits</td><td>16</td></tr>
<tr><td>Semester</td><td>III</td><td>Course code</td><td>SOE020313C001616</td></tr>
<tr><td>Learning Outcomes</td><td colspan="4">After the completion of the course, students will be able to:
● Design the lesson plan using appropriate skill, methods, approaches and techniques in their pedagogy subjects
● Practice of various teaching skills in real classroom situations.
● Classroom management skills at school levels.
● Organize the curricular activities and various community-based Activities to aware the community.
● Use of various tools and techniques to assess the student’s outcomes at school level.
● Design Various instructional aids as per pedagogy subject.
● Construct achievement tests in their pedagogy subject.
● Develop/prepare lesson plan file, reflective diary, peer observation, community-based activities report and school report.
<table>
<tr><td>Sr. No.</td><td>Total Marks Distribution (400)</td><td>Pedagogy-I (200)</td><td>Pedagogy-II (200)</td></tr>
<tr><td>1.</td><td>Internal Marks</td><td>60</td><td>60</td></tr>
<tr><td>2.</td><td>External Marks</td><td>140</td><td>140</td></tr>
</table>
Schedule of School Internship Programme:</td></tr>
</table>

Sr. No.	Activity During Internship	No. of Lesson for Presentation (Minimum)
1.	Lesson Plan (Pedagogy-I)	30 (Simulated - 6, Technology Based - 4, Real lesson - 20)
2.	Lesson Plan (Pedagogy-II)	30 (Simulated - 6, Technology Based - 4, Real lesson - 20)
3.	Reflective Diary of each lesson plan (Pedagogy-I)	30
4.	Reflective Diary of each lesson plan (Pedagogy-II)	30
5.	Peer Observation (Pedagogy-I)	15
6.	Peer Observation (Pedagogy-II)	15
7	Community based Activity any four	4
8	Seminar Report	2

SEMESTER-IV

Year	**II**	**Gender, School and Society**	**Course Credits**	**4**
Semester	**IV**		**Course code**	**SOE 02 04 14 C3104**
Learning Outcomes	At the end of the course, the students will be able to: ● Explain the concept of gender and it's related constructs, differentiate between sex and gender and judge gender roles. ● Point out the gender issues in schools & society level ● Criticize the issues related to women and critically appraise the women role models. ● Critically judge the role of mass media and government pertaining to gender issues.			
Course Content				
Unit -1	**Introduction to Gender**			
	● Gender: Concept, difference between gender and sex ● Gender related concepts: Sexuality, feminism, equity and equality **(NEP 2020,Online mode)** ● Gender stereotyping: Physical appearance, domestic behaviour, occupation and personality traits **(NEP 2020, Online mode)** ● Gender roles through social institutions: Family, community, society **(NEP 2020)**			
`Unit -2	**Gender and School**			
	● Gender bias in school enrolments, dropouts, household responsibilities and societal attitudes towards girls education ● Gender Issues in Schools: Bullying, eve teasing, sexual abuse **(NEP 2020,Online mode)** ● Gender construction through curriculum and hidden curriculum **(NEP 2020)** ● Gender Sensitivity Pedagogy **(NEP 2020,Online mode)**			
Unit -3	**Gender, Society and Media**			

	● Concept of Patriarchy and Matriarchy **(Online mode)** ● Issues related to Women/ Girl Child: Female foeticide and infanticide and, sex ratio, honour killing, dowry, property rights and divorce **(NEP 2020,Online mode)** ● Role model for women: Phogat sisters, Ruma Devi, Dipika Karmakar, Gujan Saxena, Chhavi Rajawat **(NEP 2020,Online mode)** ● Role of Print and Electronic Media in Gender Stereotyping
Unit -4	**Provisions for Developing Gender Parity** **(NEP 2020,Online mode)** ● Domestic Violence Act (2005) ● Reservation for Women (2008) ● Supreme Court Verdict about Transgender (2018) ● National Policy for the Empowerment of Women, 2001
Transaction Strategies/ Teaching Learning Process	Lecture cum discussion, Tutorials, Brainstorming Session, Use of PPT, Film Shows (selected films), Assignments on different key areas of gender related issues given in syllabus through Google Group, Google Classroom and other online resources.
Practicum: ● Organizing debates on equality cutting across gender, class, cast and religion. ● Case study on how students perceive role models in their own lives. ● Debate on women role models in various fields with emphasis on women in unconventional roles. ● Prepare an analytical report on portrayal of women in print and electronic media.	

Suggested Readings:

- Chaudhary, D. R. (2007). *Haryana at cross roads, problems and prospects*. New Delhi: National Trust of India.
- Chowdhary, P. (1994). *The Veiled Women. Shifting gender equations in rural Haryana* (1980-1990). New Delhi: Oxford University Press.
- Chowdhary, P. (2004). Caste panchayats and the policing of marriage in Haryana: Enforcing kinship and territorial exogamy. In *Contribution to Indians Sociology* (Vol. 38, (Jan to Aug 2004).
- Dasgupta, J. (2015). *Gender gap: Men get away with too many privileges*. Available:http://www.dailyo.in/politics/gender-equality-menget-toomany-privileges-no-country-for-women-india-gendergap-index/story/1/1478.html[Accessed 2015, September 14]
- Dhar, A. (2012). *42 per cent of Indian children are underweight*. The Hindu. October 10.
- FAO (2010-11). *The state of food and agriculture 2010-11: Women in agriculture*. Rome: Food and Agriculture Organization of the United Nations.
- Gandhi, R. (2015). *Women in business: Can P2P lending bridge gender gap in access to capital*. The Times of India. June 19.
- Gupta, S., & Dhull, K. (2018). *Gender, school and society.* New Delhi: Sudha Publication.
- International Labour Organization. (2014). *Global employment trends 2014: Risk of jobless recovery.*
- Jammer, V. (1998). Attainment struggle to make healthier food choices: The importance of psychological and social factors. In *Psychological Health* (24 (9): 1003-20. 156)
- Kabir, N. (2014). *What works in reducing gender inequality*. Available : https://oxfamblogs.org/fp2p/whatworks-in-reducing-genderinequality-greatoverview-from-naila-kabeer/ [Accessed 2015, January, 12]
- Lal, N. (2016). *India needs to save its daughters through education and gender equality.* Inter Press Services, March 4.
- Malhotra, S. (2015). *India in the world economic forum global gender gap report 2015*. Business Today, November 23.
- Misra, U. (2015). *How India ranks on gender parity- and why?* Indian Express November 4.

- Nair, S. (2015). *More gender inequality in India than Pakistan and Bangladesh*: UN. Indian Express December 15.
- Pachauri, G. (2018). *Gender, school and society.* Meerut: R. Lal Publication.
- Pulugurtha, S. (2008). How a lack of education adversely affects girls. In*Psychological Health*26 (9): 1005-20. 158 Available: http://empowermentinternational.org/2008/08/01/how-a-lack-of-educationadversely-affects-girls/[Accessed 2015, January 12].
- Salve, P. (2015). #Selfie with Daughter:Can India save 23 million girls? Available http://scroll.in/article/738068/selfiewithdaughter-can-india-save-23-million-girls[Accessed 2015, June 23].
- The World Bank (2014). *Financial inclusion data*. Global Index. Available http://datatopics.worldbank.org/financialinclusion/country/india [Accessed 2014, November 21].
- Wodon, Q. (2014). *Eliminating child marriage to boost girls' education*. The World Bank. Available: http://blogs.worldbank.org/education/eliminating-child-marriageboost-girls-education[Accessed 2015, January 6].

Web Resources:

- *Gender, School and Society.* Retrieved from http://www.bdu.ac.in/cde/docs/ebooks/BEd/II/GENDER,%20SCHOOL,%20SOCIETY%20AND%20INCLUSIVE%20SCHOOL.pdf
- *Ruma Devi Biography.* Retrieved from https://hindi.oneindia.com/news/jaipur/ruma-devi-biography-in-hindi-know-her-journey-from-barmer-hut-to-europe/articlecontent-pf301835-573426.html
- *DipaKarmakar*. Retrieved from https://en.wikipedia.org/wiki/Dipa_Karmakar
- *GunjanSaxena*. Retrieved from https://starsunfolded.com/gunjan-saxena/
- *How can teachers be more gender inclusive in the classroom?*Retrieved from https://www.brookings.edu/blog/education-plus-development/2017/11/02/how-can-teachers-be-more-gender-inclusive-in-the-classroom/
- *Gender-Responsive Life Skills-Based Education.* Retrieved from http://unesdoc.unesco.org/images/0017/001781/178125e.pdf

Year	II	Assessment for Learning	Course Credit	4
Semester	IV		Course code	SOE 02 04 15 C3104
Learning Outcomes	At the end of the course, the students will be able to: ● Elaborate and differentiate the fundamental aspects of evaluation. ● Categorize the domains of knowledge, formulate instructional objectives and construct testing tools. ● Differentiate the various assessment tools, critically examine the trends and issues of evaluation. ● Employ and interpret the statistical techniques to analyze data and restate the properties of NPC.			
Course Content				
Unit -1	**An Overview of Evaluation** ● Concept of the terms: Test, Examination, Measurement, Assessment and Evaluation ● Distinctions between 'Assessment of Learning', Assessment for Learning' and 'Assessment as Learning' **(Online Mode)** ● Types of Evaluation based on Purpose: Placement, Diagnostic, Formative and Summative (**NEP 2020, Online Mode)** ● Continuous and Comprehensive Assessment: Concept, Nature and Process, 360° Holistic Assessment: NEP Vision **(NEP 2020, Online Mode)**			
Unit -2	**Assessment Tools** ● Assessment of Cognitive, Affective and Psychomotor domains of learning (Revised taxonomy of objectives) **(NEP 2020, Online Mode)** ● Characteristics of a Good Test: Reliability, Validity, Objectivity and Usability (only concept and usage). ● Preparation of an Achievement Test **(Online Mode)** ● Different kinds of tools: Project, Assignment, Practical Work & Kinds of Tests- Written and Oral			

<table>
<tr><td rowspan="2">Unit -3</td><td>Trends and Issues in Assessment for Learning</td></tr>
<tr><td>● Reporting students' performance: Progress Report, Cumulative Record, Constructing portfolios
● Feedback – Concept and Purposes (Online Mode)
● Existing practices: Unit test, Semester system, Annual examination, Online Examination, Open Book Examination
● Issues and Problems: Marking Vs. Grading, Choice based Credit System (CBCS), Menace of Coaching (NEP 2020, Online Mode)</td></tr>
<tr><td rowspan="2">Unit -4</td><td>Application of Statistics</td></tr>
<tr><td>● Measures of Central Tendency (Mean, Median, Mode), Measures of Variability (Range, Average Deviation, Quartile Deviation, Standard Deviation)– their uses and limitations.
● Percentile and Percentile Rank
● Correlation: Meaning, uses & calculation of correlation of coefficients by Rank Difference and Product Moment Methods.
● Concept and Properties of Normal Probability Curve (Online Mode)</td></tr>
<tr><td>Transaction Strategies/ Teaching Learning Process</td><td colspan="2">Lecture cum Discussion Method, Use of PPT, Assignments and their presentation. Continuous practice of the computations of statistical techniques, Group discussion, Panel discussion and Brainstorming Sessions will be encouraged. Multimedia approaches namely Google Classroom, Google Drive will also be used.</td></tr>
<tr><td colspan="3">Practicum:
● Preparation of Students' Portfolio
● Designing of Feedback Performa
● Constructing an Achievement Test of any School Subject</td></tr>
</table>

- Collection of Examination Marks of examination of students and apply different statistical techniques to analyze data

Suggested Readings:

- Agarwal, Y.P. (2002). *Statistical methods: concepts, applications and computation*. New Delhi: Sterling Publishers.
- Asthana, B. (2020). *Measurement and evaluation in psychology and education*. Agra (U.P.): Shree Vinod Pustak Mandir.
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- Butler, S. M.,& McMunn, N. D. (2006). *A teacher's guide to classroom assessment: Understanding and using assessment to improve student learning*. Jossey Bass.
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- Marzano, R. J. (2012). *Formative assessment & standards-based grading* (The Classroom Strategies Series). Denver, Colorado: Marzano Research Laboratory.
- Natrajan V., & Kulshreshta, S.P. (1980). *Assessing non-scholastic aspects – Learning behavior*. New Delhi: Association of Indian Universities.
- Nawani, D (2012), Continuously and comprehensively evaluating children. In *Economic & Political Weekly*, Vol. XLVIII, Jan 12, 2013.
- Nawani, D (2015). Re-thinking assessments in schools. In *Economic & Political Weekly*, Jan 17, Vol L, No. 3.
- Nitko, A.J., & Brookhart, S. (2011). *Educational assessment of students*. Boston: Pearson.
- Popham, J.W. (2018). *Classroom assessment: What teachers need to know*. Boston: Allyn & Bacon.
- Reynolds, C.R., Livingston, R. B., Willson, V., & Jha, A.K. (2018). *Measurement and assessment in education* (2nd edition). Noida: Pearson India Education Services Pvt. Ltd.
- Ronald Jay Cohen, Mark, E. Swerdlik, and Medhe M. Kumtheker (2014). *Psychological testing and Assessment*. McGraw Hill Education (India) Private limited.
- Stanley, T. (2014). *Performance-based assessment for 21st-century Skills: Provides real-world examples, breaks down the process into easy steps, contains ready-to-use reproducible*. Prufrock.
- Stiggins, R. (2008). Assessment for learning. *The achievement gap and truly effective schools*. Portland: ETS Assessment Training

Institute. Retrieved January 16, 2012 at http://www.ets.org/Media/Conferences_and_Events/pdf/stiggins.pdf

- Thorndike, R.M., Tracy M. Thorndike-Christ. (2009). *Measurement and evaluation in psychology and education* (8th ed.). Pearson Publishing.
- Waugh, C. K., & K., & Gronlund, N. E. (2012). *Assessment of student achievement*. Pearson Publishing.

Web resources:

- Greenstein, L. (2010). Greenstein demonstrates how to provide specific and concise descriptive feedback on learner's work. Retrieved from https://www.education.vic.gov.au/school/teachers/teachingresources/practice/Pages/insight-feedback.aspx
- Hasan, M., & Parvez, M. (2015). Choice-based credit system in India: Pros and cons. *Journal of Education and Practice, 6*(25), 30-33. Retrieved from https://files.eric.ed.gov/fulltext/EJ1078492.pdf
- Rastogi, H. (2018). Choice based credit system (CBCS) – An innovative concept in Indian higher education. Research Review of International Multidisciplinary, 3(9), 627-633. Retrieved from https://rrjournals.com/wp-content/uploads/2018/09/627-633_RRIJM180309124.pdf
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Year	I	Curriculum Transaction	Course Credits	4

Semester	**IV**		**Course code**	**SOE 02 04 16 C3104**
Learning Outcomes	At the end of the course, the students will be able to: ● Describe the fundamental aspects of the curriculum in education. ● Critically analyze Curriculum frameworks, models of curriculum development and compare them in terms of school curriculum. ● Elaborate the process of Curriculum development, and assess the need of curriculum organization. ● Describe and the process of Implementation, transaction & justify the need of evaluation of curriculum.			
Course Content				
Unit -1	**Introduction To Curriculum (NCF & NEP) (NEP 2020)**			
	● Curriculum: Meaning, Characteristics and Significance. ● Types of Curriculums with special reference to Child-centered curriculum, Subject centered curriculum, Activity curriculum and Hidden Curriculum. ● Principles of Curriculum Construction. ● Foundations of the Curriculum: Philosophical, Sociological, Psychological, and Historical.			
Unit -2	**Curriculum Framework & Models of Curriculum (Online Mode)**			
	● NEP,2020; Recommendations on school Education. ● NCF 2005 & NCFTE 2009 and Recommendations on Curriculum ● Curriculum Approaches; Academic, Behavioral, System approach. ● Models of Curriculum Development; Tylor's Model and Hilda Taba's Model, Wienstien and Fantini Model			
Unit -3	**Process of Curriculum Development**			

	● Meaning, Concept and Significance. ● Process of Curriculum Development. ● Selection of content & Curriculum organization **(NEP 2020)** ● Selection and organization of Learning Experiences. **(NEP 2020)**
Unit -4	**Implementation, Transaction and Evaluation of Curriculum (Online Mode)**
	● Implementation: Concept and Nature & Curriculum Implementation Models: ORC Model and Organizational-Development Model ● Curriculum Transaction: Meaning, Concept and online and offline Modes of Transactions. **(NEP 2020)** ● Curriculum Evaluation: Concept, Need and Sources of Curriculum Evaluation. **(NEP 2020)** ● Types of Curriculum Evaluation: Formative and Summative. **(NEP 2020)**
Transaction Strategies/ Teaching Learning Process	Lecture cum Discussion Method, Assignments on various topics, PPT presentation followed by Discussion, Chart preparation on various Models of Curriculum Development, Group Discussion and Panel Discussion on various aspects of Curriculum Development and Transaction, Reviewing B.Ed. curriculum.
Practicum: ● Reflection on NEP 2020. ● Critical review of any one curriculum framework: NCF, 2005. ● Critical review of any one curriculum framework NCFTE, 2009 ● Practice of Team-Teaching Approach	

- Book Review
- Critical analysis of online mode of transaction.
- Critical Analysis of a School Textbook
- Prepare a report on NCF-2005 with special reference to recommendation for curriculum.
- Prepare a report on NCFTE-2009 with special reference to recommendation for curriculum.
- any other topic approved by the teacher.

Suggested Readings:

- Aggrawal, J.C. & Gupta, S. (2005). *Curriculum development.* New Delhi: Shipra Publisher.
- Alaxander, W.M., & Saylor, J.G. (1966). *Curriculum planning for modern schools*. New York: Holt, Rinhart and Winston Inc.
- Balrara, M. (1999). *Principles of curriculum renewal*. New Delhi: Kanishka Publishers.
- Candra, A. (1977). *Curriculum development and evaluation in education.* New Delhi: Sterling Publishers.
- Curriculum transaction and evaluation. (n.d.). Retrieved March 25, 2021from http://studymaterial.unipune.ac.in:8080/jspui/bitstream/123456789/5091/4/Unit%204%20indd.pdf
- Curriculum transaction and classroom situations. (n.d.). Retrieved March 25, 2021 fromhttp://egyankosh.ac.in/bitstream/123456789/8352/1/Unit-12.pdf
- D'Costa, Agnes, R. (2016). *Knowledge and curriculum.* Mumbai: Himalaya Publishing House.
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- Khan, M.I. & Nigam, B.K. (2007). *Curriculum reform change and continuity*. New Delhi: Kanishka Publication.
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- McKernan, J. (2007). *Curriculum and imagination: Process, theory, pedagogy and action research*. U.K.: Routledge.
- Musgrave, P.W. (1974). *Contemporary studies in the Curriculum*. Australia: Angus and Roberston Publishers.

- National Curriculum Framework (2005): New Delhi: NCERT.
- Nigam, B.K. & Khan, M.I. (1993). *Evaluation and research in curriculum construction*. New Delhi: Kanishka Publishers.
- Ornstein A. C., & Hunkins, F. P. (2009). *Curriculum foundations, principles and issues*. (5th edition). Boston, MA: Allyn and Bacon
- Panday, M. (2007). *Principles of curriculum development*. New Delhi; Rajat Publications.
- Sharma, R. (2002). *Modern methods of curriculum organization*. Jaipur: Book Enclave.
- Sharma, S.R. (1999). *Issues in curriculum administration*. New Delhi: Pearl Publishing House.
- Sockett, H. (1976). *Designing the curriculum.* Britain: Pitman Press.
- Srivastava, H.S. (2006). *Curriculum and methods of teaching*. New Delhi: Shipra Publishers.
- Tala, M. (2012). *Curriculum development-Perspectives, principles and issues.* Delhi: Dorling Kindersley Pvt. Ltd.
- Tata, H. (1962). *Curriculum development theory & practice*. New York: Harcourt, Brace & World Inc.
- Taylor, P. (2003): *How to Design a training course: A guide to participatory curriculum development*. London: Continuum.
- Walker, D. F. (1990). *Fundamentals of curriculum*. Fort Worth. TX: Harcourt Brace College.
- Yadav, S.K (2013). *School curriculum: Structure and practice*. New Delhi: NCERT.
- Yadav, Y.P. (2006). *Fundamentals of curriculum design*. New Delhi: Shri Sai Printographers.

<table>
<tr><td>Year</td><td>II</td><td rowspan="2">Yoga Education</td><td>Course Credits</td><td>2</td></tr>
<tr><td>Semester</td><td>IV</td><td>Course code</td><td>SOE 02 04 17 C0022</td></tr>
<tr><td>Learning Outcomes</td><td colspan="4">At the end of the course, the students will be able to:
• Explain the history of yoga, Ashtanga Yoga and apprise with the recent developments.
• State and demonstrate different types of Yoga Asanas, Pranayama, Kriya, Bandh while observing precautions and practice meditation.</td></tr>
<tr><td colspan="5">Course Content</td></tr>
<tr><td>Unit -1 (Practical)</td><td colspan="4">Introduction to Yoga
• Etymology, Origin, History and Development of Yoga, Patanjali’s Ashtanga Yoga, International Day of Yoga, Common Yoga Protocol (NEP 2020)
• General Guidelines and Preparatory Steps for Yogasana and Pranayama (NEP 2020)
• Loosening Exercices/ Sadilaja /CālanaKriyās /Sithlikaranvyayam (NEP 2020, Online)
• Standing postures-Tadasana, Trikonsana, Vrikashana, Garudasana, ArdhChakrasana, Chakrasana, Natarajasana,Virabhadrasana, ArdhaChandrasana, Utkatasana, Sitting postures- Sukhasana, Siddhasana, Padmasana, Vajrasana, Vakrasana, Paschimottanasana, Matsyasana, Gomukhasana, Ushtrasana, Shalabhasana, Mandukasana,Upside postures-Halasana, Sarvangana, Sheersasana, Laying postures- Uttanpadasana, VipreetKarni, AdhomukhVakrasana, Bhujangasana, Dhanursana, Mayurasana, Savasana, Surya Namskar (NEP 2020, Online)
• Pranayamas-AnulomVilom, Bhramari, Ujjayi, Bhastrika, Kumbhak, NadiShodhan, Shitli, Sheetkari. (NEP 2020)</td></tr>
</table>

	• **Meditation, its preparation, steps and types-** Mantra Chanting, Third Eye, Chakra, Gazing, Kundalini, Naad/Sound, Zen, Vipassana, Mettameditations.
Unit -2 (Practical)	**Introduction to Yoga Education, Yogic practices; their physiological and psychological effect**
	• Concept, Importance, Objectives in Yoga Education and Eight step teaching method and Assessment • Concept of Triguna and Yogic Diet **(ONLINE)** • **Mudras:** Gyaan Mudra, Shunya Mudra, Apaan Mudra, Surya Mura, Varun Mudra, Haakini Mudra. • **Bandh**: Jalandra Bandha, Uddiyana Bandha, Moola Bandha. Tribandh • **Yogic Kriya:** KapalaBhati, Trataka, Neti – Jala Neti, Sutra Neti, Dhouti-Vamana dhouti, Vastradhouti, Basti • **Yog Nidra** **(ONLINE)**
Transaction Strategies/ Teaching Learning Process	**Unit 1** • Lecture cum demonstration • Group discussion and presentation • Demonstration using audio-visual material • Excursion • Practicum **Unit 2** • Lecture cum demonstration • Group discussion and presentation • Demonstration using audio-visual material • Excursion

	• Practicum

Practicum:

1. Surya Namaskar, its steps and benefits
2. International Day of Yoga; (Common Yoga Protocol).
3. Any three Sitting Postures; their, steps, precautions and benefits
4. Any three Standing Postures; their, steps, precautions and benefits
5. Any three Laying Postures; their, steps, precautions and benefits
6. Any three Upside Postures; their, steps, precautions and benefits
7. Any three Pranayamas, their, steps, precautions and benefits
8. Any three Mudras; their, steps, precautions and benefits
9. Bandh; types and benefits
10. Any two Yogic Kriya, Their precautions and benefits
11. Any two Meditations
12. Yog Nidra
13. Any other as suggested by the teacher.

Suggested Readings:

- Besant, A. (2005). *An introduction to yoga*, New Delhi: Cosmo.
- Goel, A. (2007). *Yoga education: Philosophy and practice*. New Delhi: Deep & Deep Publications Pvt. Ltd.
- Gupta, S.K. (2019). *Yoga & concentration,* New Delhi publication, Delhi
- Kaul, H.K. (2013). *Yoga asana for everyone.* Surjeet Publishers.
- Kubalker, R. (2015). *Know your stress-manage*, Neel Kamal Publishers.

- Mangal, S.K., Mangal, U and Mana, S. K.(2009). *Yoga education*, New Delhi: Arya Publication.
- NCERT (2015). *Yoga: A healthy way of living secondary stage*, New Delhi. (Also available in Hindi)
- NCERT (2015). *Yoga: A healthy way of living upper primary stage*, New Delhi (Also available in Hindi)
- Omand, S. (2006). *Patanjali yoga*, Pradeep Gorakhpur: Gita Press.
- Pramanik, T.N. (2018). *Yoga education.* New Delhi: Sports Publication.
- Yadav, Y.P. and Yadav, R. (2003). *Art of yoga*, New Delhi: Friends.
- Yogacharya, O. S. (2007). *Freedom of body and mind: yogasanas, pranayam and meditation*, New Delhi: Rawat..

Web resources:

- Ashish. (2019, July 18). Trigunas (Sattva, Rajas, Tamas): 3 Gunas to Know Your Personality. *FITSRI*. Retrieved on 07.01.2021 https://fitsri.com/yoga/trigunas
- Basavaraddi, I.V. (2015, April 23). Yoga: Its Origin, History and Development. *Ministry of External Affairs: Government of India.* Retrieved on 07.01.2021 https://mea.gov.in/in-focus-article.htm?25096/Yoga+Its+Origin+History+and+Development
- Carrico, M. (2007, August 28). A beginners' guide to meditation. *Yoga Journal.* Retrieved on 07.01.2021. https://www.yogajournal.com/meditation/let-s-meditate.
- Giovanni (n.d.). Types of Meditation: An overview of 23 Meditation Techniques. Retrieved on 24.01.2021 https://liveanddare.com/types-of-meditation/
- Krishna Kanta Handiqui State Open University, Assam (n.d.). *Introduction to Yoga*. Retrieved on 04.02.2021. http://www.kkhsou.in/4mobile/deledunits/Course9Eng/unit1.pdf
- Ministry of AYUSH: GoI (2019, May). International Day of Yoga: Common Yoga Protocol. 4th Ed. New Delhi: Morarji Desai National Institute of Yoga. Retrieved on 02.02.2021. http://mea.gov.in/images/pdf/common-yoga-protocol-english.pdf
- Sandhu, D. (2019, March 24). Yoga Mudra and All Its Benefits: 8 Basic Mudras. *Book Yoga Teacher Training Blog.* Retrieved on

24.01.2021 https://www.bookyogateachertraining.com/news/yoga-mudra-and-all-its-benefits

- Sree, Y.V. (2018, November 21). How to teach Yoga in a group by using 8 step method. *Yogic Life Souls*. Retrieved on 07.01.2021 https://www.yogiclifesouls.com/how-to-teach-yoga-by-using-8-step-method/
- Woodyard, C. (2011). Exploring the therapeutic effects of yoga and its ability to increase quality of life. *International Journal of Yoga.* 4(2), 49–54. https://dx.doi.org/10.4103%2F0973-6131.85485 Retrieved on 07.01.2021
- Yogaholic Tribe. (2018, January 21). Shithilikaran vyayam or loosening exercises. [Video] *YouTube*. Retrieved on 07.01.2021. https://www.youtube.com/watch?v=zzZ4DemVXDw
- Yoga Vini (2017, July 22). How to do 12 Surya Namaskar postures – You should practice every morning. *Yoga Vini*. Retrieved on 07.01.2021 https://yogavinirishikesh.com/12-surya-namaskar-postures-practice/

Year	**I**	**Environmental Education**	**Course Credits**	**2**
Semester	**IV**		**Course code**	**SOE 02 04 18 C2002**

Learning Outcomes	At the end of the course, the students will be able to: ● Differentiate environment & environmental education and discuss various dimensions of it in terms of human life and society. ● Critically analyze various issues, concerns and threats to environment and interpret different initiatives taken by govt to protect them.
Course Content	
Unit -1	**Conceptual Understanding of Environment and Its Education.** ● Environment: Meaning, component and its types. ● Ecological System; Concept, Structure (Biotic and abiotic factors) its Function and Human interaction and dependency on the Environment. ● Concept, Components, Scope & need to promote of Environmental Education. ● Role of Education, School and Teacher in Environment Conservation. **(NEP 2020)**
Unit -2	**Issues, Concerns and Conservation of Environment. (Online Mode)** ● Air, Water, Soil and Noise Pollution; Causes, Preventions and its impact on health, ozone depletion & Greenhouse effect. ● Threats to natural resources and their conservation (Deforestation, Biodiversity & Wildlife), National River Conservation Plan (NRCP), NRLCP, Project Elephant, and Project Tiger, Forest conservation. ● Sustainable Development **(NEP 2020)** ● Contribution of Prominent Indian Environmentalist: Sundarlal Bahuguna, M.S. Swaminathan **(NEP 2020)**
Transaction Strategies/ Teaching Learning	Lecture cum discussion, Lecture cum demonstration, use of laptop as audio-visual aid, Assignments on various topics, Presentation and group discussion, and presentations by Pupil Teachers will be encouraged.

Process	

Practicum:

1. Organize environmental awareness activities and prepare a video.
    - how to use a dustbin.
    - Road safety.
    - Forest as a life line
    - Plantation
    - use of first aid
    - Polythene.
2. Organize environmental conservation activity and prepare a video.
3. Prepare a report on the present status of climate change.
4. Prepare a report on recycling of non-decomposable material.
5. Prepare a report on the environment protection act.
6. Prepare a report on environmental standards.
7. Prepare a report on environmental issues that you see in your surroundings.
8. Action Plan for Vulture Conservation, 2020-2025.
9. To prepare a report on the State of forest.
10. To prepare a report on administrative bodies in India working for Protection of Environment/Forest/Wildlife.
11. To prepare a report on Govt. Initiatives for preservation of Natural Resources.
12. Govt. Initiatives for saving Rivers.
13. National Green Tribunal Act.

14. To prepare a report on science and technological advancement and degradation of Environment.
15. To organize at least two activities nearby your areas to sensitize people, children, peers etc to preserve and conserve natural Resources.
16. Any topic suggested by the teacher.

Suggested Readings:

- Aggarwal, J. C.(2010). *Education for values, environment and human rights*. Delhi: Shipra Publications.
- Ardoin, N. M. (2009). *Environmental Education: A Strategy for the future*. New York: EGMA. Retrieved, from https://nmardoin.people.stanford.edu/sites/g/files/sbiybj4916/f/documents/EE_Strategy_for_the_Future.pdf
- Briceno, S. & Pitt, C.D. (Ed.). (2018). *New ideas in environmental education.* U.K: Routledge Publication.
- Catherine, J. (2011). *Environmental education.* New Delhi: Neel Kamal Publication.
- Gopal Dutt, N. H. (2014). *Environmental education*. New Delhi: Neel Kamal Publication.
- Jain, K.C., & Garg, R. (2016). *Environment education.* Ludhiana: Vijaya Publication.
- Krishnamacharyulu, V. et al. (2017). *Environmental education*. New Delhi: Neel Kamal Publication.
- Nagarjan, K. (2017). *Environmental education*. Chennai: Sriram Publisher.
- Govt. of India. Ministry of Environment and Forest National, Environment Policy. (2006). Retrieved from http://moef.gov.in/wpcontent/uploads/2017/07/introduction-nep2006e.pdf
- Govt. of India. Ministry of Environment and Forest. (2018). Retrieved from, http://moef.gov.in/wp-content/themes/moef-green/ebook/AR_2017-2018/AR_2017-2018.html
- Packiam, S. (2018). *Education for sustainable development.* New Delhi: Neel Kamal Publication
- Palmer, P., & Neal, P. (2003). *The handbook of environmental education.* UK: Routledge Publication.
- Reddy, V. Purushotham et al. (2013). *Environmental education*. New Delhi: Neel Kamal Publication.
- Ravinder, Ch. & Ramakrishna, A. (2017). *Environmental education issues and concerns*. New Delhi: Neel Kamal Publication.

- Ramchandra, T. V. (2015). Environment Management. Bangalore: Energy & Wetlands Research Group Centre for Ecological Sciences Indian Institute of Science. Retrieved from https://nptel.ac.in/courses/120108004/module1/lecture1.pdf
- Sharma, R. A. et. al. (2012). *Environmental education*. New Delhi: Surya Publication.
- Sharma, S. (2016). *Environment Education.* New Delhi: R. Lall Publication.
- Saminathan, B. (2015). *Environmental education.* Retrieved from http://www.bdu.ac.in/cde/docs/ebooks/B-Ed/II/ENVIRONMENTAL%20EDUCATION.pdf
- United Nations. *Transforming Our world: The 2030 Agenda for sustainable Development.* New York City. Retrieved from https://sustainabledevelopment.un.org/content/documents/21252030%20Agenda%20for%20Sustainable%20Development%20web.pdf
- Verma, K. & Kaur, G. & Singh, P. (2010). *Introduction to environment*. New Delhi: Indira Gandhi National Open University.

Year	II	Art, Craft and Aesthetics	Credits	2 Practical
Semester	I		Course code	SOE 02 04 19 C0022

	V			
Learning Outcomes	At the end of the course, the students will be able to: ● Illustrate the process of creative art and develop interest and skills of design various art work ● Critically appreciate the importance of play in teaching- learning process and enhance the skills of dramatization			
Course Content				
Unit -1	**Painting, Crafting and Creative Art**			
	● Forms of Painting: Still life, Landscape, Collage, Poster and Illustration Art **(NEP 2020)** ● Printing: Block Painting, Calligraphy and 2d-3d graphic design **(NEP 2020, Online)** ● Construction (Using Waste Materials), Paper Crafts **(NEP 2020, Online)** ● Preparation of Flash Cards, Charts, Map and Models **(NEP 2020)**			
Unit -2	**Play and Design Production Process**			
	● Production Design, Direction and Stage Craft **(Online)** ● Acting, Mime, Storytelling, Role play, Traditional Performing Arts **(NEP 2020)** ● Play / Drama – distinctions & their role as teaching method **(NEP 2020)** ● Application of theatre Art in Education **(NEP 2020, Online)**			
Transaction Strategies/ Teaching Learning Process	Hand on experience of working in different mediums and materials, preparation and presentation of teaching learning materials, slide/film show, group work planning of a stage-setting, visit, role play, celebrations of Indian festivals and fairs, brain-storming, interaction with artists, lectures and demonstration.			
Practicum:	1. Making of Still life, Landscape, Collage, Poster, Illustration 2d-3d Art, Block Painting, Calligraphy, graphic design, Paper			

	Crafts, Flash Cards, Charts, Map and Models 2. Acting (Integration of Performing Arts in Education), Direction, Stage Craft & Design Technology.

Suggested Readings:

- Gill Rajesh (2017). *A Textbook of Art Education*. New Delhi: Paragon International Publishers.
- Gill Rajesh (2018). *Art Education*. New Delhi: Paragon International Publishers.
- Kakkar Rekha, Makkhar Ragini (2018). *Drama, Art and Aesthetics in Education*. Agra: Rakhi Prakashan.
- Raw K. Ravikant and P. Ananad Kumar (2017). *Drama and Art in Education*. Neelkamal Publishers.
- Roy Reeta (2017). *Perfect Art Education*. Arya: Publisher Company.
- Saxena Avnish and Sirth Sushil (2016). *Drama, Art and Aesthetics in Education*. Agra:Rakhi Prakashan Raman Tower, Sanjay place.
- Sharma R. P., Sharma R. K. (2016). *Drama and Art in Education*. Agra: Radha Prakashan Mandir.
- Singh Chitralekha (2016). *Drama and Art in Education*. Agra: Publisher Shri Vinod Pustak Mandir.
- Singh Yadav Narendra (2010). *Advertising Technical and Theory*. Jaipur: Rajasthan Hindi Granth Academy.
- Singh Yadav Narendra (2012). *Graphic Design*. Jaipur: Rajasthan Hindi Granth Academy.
- Tivari Arjun (2010). *Modern Advertising Art and Behaviour*. Varanasi:Vishwavidyalaya Prakashan.

Web resources:

- NCERT (2015) theme based early childhood care and education programme. National Council of Educational Research and Training, New Delhi https://ncert.nic.in/dee/pdf/deethemebased.pdf
- NCERT (2019) Art Integrated Learning. National Council of Educational Research and Training, New Delhi https://ncert.nic.in/pdf/notice/AIL-Guidelines-English.pdf
- understanding arts and arts education https://www.nios.ac.in/media/documents/dled/Block1_508.pdf
- NCERT (2019) Art Integrated Learning. National Council of Educational Research and Training, New Delhi

https://itpd.ncert.gov.in/mss/course_content/Module%203%20-%20Art%20Integrated%20Learning.pdf

- NCERT (2015) Art Education for Primary Teachers Volume II. National Council of Educational Research and Training, New Delhi https://ncert.nic.in/deaa/pdf/tpaev201.pdf
- NCERT (2006) Arts, Music, Dance and Theatre. National Council of Educational Research and Training, New Delhi https://ncert.nic.in/pdf/focus-group/art_education.pdf
- Design and Formatting by David Talbot & Cecilia Tortoledo Printed by the San Bernardino County Superintendent of Schools (2008) Reinvigorating Arts Education in California An Initiative of the California County Superintendents Educational Services Association. Visual and Performing Arts. http://ccsesaarts.org/wp-content/uploads/2015/03/vapa_core_color.pdf
- Centre For Cultural Resources And Training http://ccrtindia.gov.in/package_books.php
- Ministry of Home Affairs (Govt. of India) http://www.dashboard-padmaawards.gov.in/?Year=1981-1981&Award=Padma%20Shri&Field=Art
- Lalit Kala Akademi National Academy of Art, New Delhi https://www.lalitkala.gov.in/
- National gallery of modern Art, New Delhi http://www.ngmaindia.gov.in/
- Vardhaman Mahaveer Open University Kota, Rajasthan, India https://www.researchgate.net/profile/Dr_Akhilesh_Kumar2/publication/281834157_natya_evam_kala_siksa/links/55fa617208ae07629dfe648c/natya-evam-kala-siksa.pdf
- Vardhaman Mahaveer Open University Kota, Rajasthan, India http://assets.vmou.ac.in/BED114.pdf
- SCERT Raipur (2013) http://www.scert.cg.gov.in/pdf/dedfirst2013/kalashikshan.pdf

Year	**II**	**Guidance and Counselling**	**Course Credits**	**4 (2 Theory + 2 Practical)**
Semester	**IV**		**Course code**	**SOE 020412 DCEC3104**
Learning Outcomes	At the end of the course, the students will be able to: ● Elaborate the concept of guidance and it's various aspects. ● Categories multiple Counselling Services and use various ethics, techniques and approaches of counselling.			

	● Organize Counselling programmes at school level and critically appraise & prepare a case study. ● Learn how to administer the psychological tests for guidance and counselling services.
Course Content	
Theory Unit -1	**Fundamentals of Guidance**
	● Guidance: Concept, need, importance and basic principles **(NEP 2020,** ● Types of Guidance: Educational, Vocational, Social & Personal Guidance **(Online)** ● Types of necessary guidance services **(NEP 2020)** ● Role of parents and teachers in Guidance **(NEP 2020)**
Theory Unit -2	**Counselling Services & Ethics**
	● Counsellor: Characteristics, Functions & Professional Ethics **(NEP 2020, Online)** ● Importance & Dimensions of Counselling in schools ● Skills and Approaches of Counselling ● Organization of Counselling Programmes in schools **(NEP 2020)**
Practical Unit -3	**Administration of Psychological tools for Guidance and Counselling**
	● Administration and Interpretation of (any two) Psychological tools : a) Personality Test b) Intelligence Test c) Interest Test d) Aptitude Test e) Achievement Test
Practical	**Counselling at School Level**

Unit -4	● Conduct any two activities for Guidance Plan on school students or peers: a) Prepare techniques/procedure of Counselling for school level students b) Prepare a case study of two students: normal & problematic child at High schools' level c) Prepare Counselling plan for special children **(NEP 2020)** d) Prepare Counselling plan for drug addicts e) Guidance & Counselling in Promoting Mental Health **(NEP 2020)** f) Preparatory steps of Guidance in stress-management **(NEP 2020)**
Transaction Strategies/ Teaching Learning Process	Lecture cum discussions, presentation of case study of students in need of counselling, use MOOCs and e-platforms. Group discussion and presentation, Lecture, Conduct of Psychological Tests**,** Assignments on various types of knowledge, presentation and discussion, Lecture cum demonstration, Ask pupil teachers to prepare write up on various maxims of education, Preparation of activity based curriculum in groups and discussion, observation of students, conducting career guidance in the schools, counsel students by identifying their mental health problems such as lack of concentration, anxiety, anger etc, Audio and Video Lecture, Group Discussions by online softwares, use of audio and video materials, Review of various literature available, Providing reading material to students, Organizing tutorials if needed.

Practicum:

- Draw a plan for the assessment of ability, aptitude, interest or personality of students. Explore two tests.
- One each for the assessment of intelligence and aptitude at the elementary and secondary stage through different sources and prepare critical writeups.
- Prepare a script of a session with a client student communicating either low ability or high ability scores highlighting the skills used by you in the session.
- Prepare a sociometric test. Administer the test on a group of students. Draw a sociogram and describe in detail the group climate.

- Any other project/assignment prescribed by the teacher.

Suggested Readings:

- Mathur, S. S. (2018). *Fundamentals of guidance & counselling*, (2nded.). Agra: Aggarwal Publication.
- Chandanpat (2018). *Guidance and counselling*. ND: Educational Publisher & Distributor.
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- Snyder, C.R. (2011). *Positive Psychology: The Scientific and Practical Explorations of Human Strengths*. Sage Publishers.
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- Naik, D. (2007). *Fundamentals of guidance and counselling*. New Delhi: Adhyayan publishers.
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- Varky, B. G. & Mukhopadhyay, M. (2006). *Guidance and Counselling*. New Delhi: Sterling Publications.
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- Rao, S N. (2006). *Counselling and guidance*. Delhi: McGraw hill Publication.
- Pandey, V.C. (2006). *Educational guidance & counselling*. Delhi: Isha Books.
- Kochhar, S. K. (2006). *Educational and vocational guidance in secondary education*. Delhi: Sterling Publications.
- Sharma, Y.K. (2005). *Principles of educational & vocational guidance*. New Delhi: Kanishka Publishers.

Year	**II**	**Comparative Education**	**Course Credits**	**4**
Semester	**IV**		**Course code**	**SOE 020413 DCEC3104**
Learning Outcomes	At the end of the course, the students will be able to: ● Build perspective and understanding of concepts, approaches and scope of comparative education;			

	● Compare the primary, secondary and higher education system and its implications in India, U.K. and U.S.A.; ● Analyze the need of distance education in India, U.K. and U.S.A.; and ● Identify and resolve the defects and issues of the prevalent system of education in India.
Course Content	
Unit -1	**Conceptual Understanding of Comparative Education**
	● Comparative Education: Concept, history and developmental stages of comparative education, aims and scope of comparative education. ● Comparison of National Policy of Education, 1986 and National Education Policy, 2020**. (NEP 2020, Online mode)** ● Approaches to Comparative Education: Historical, philosophical, sociological and problem approach ● Factors affecting the education system. **(Online mode)**
Unit -2	**Primary/Elementary Education in India, U.K. and U.S.A.**
	● Primary Education: Concept, origin and development of primary education in India. ● Pre-Primary Education with reference to National Education Policy, 2020. **(NEP 2020, Online mode)** ● Concept of Universalization of Elementary education in India and its implications ● Comparison of primary education of India with U.K. and U.S.A. (Aims, salient features, content, methods & instruction and evaluation system) **(Online mode)**
Unit -3	**Secondary Education in India, U.K. and U.S.A.**
	● Secondary education: Concept, meaning, structure, need and importance. ● National Policy of Education 2020 with reference to secondary education. **(NEP 2020, Online**

	mode) ● Comparison of Secondary education in India, U.K. and U.S.A. (Aims, salient features, content, methods & instruction and evaluation system) **(Online mode)** ● Problems of secondary education in India and suggest their solutions
Unit -4	**Higher Education in India, U.K. and U.S.A.** ● Higher education- meaning, aims, features, content, methods & instruction and evaluation system with reference to NEP,2020. **(NEP 2020, Online mode)** ● Comparison of higher education of India with U.K. and U.S.A. (Aims, salient features, content, methods & instruction and evaluation system) ● Defects of the prevalent system of higher education in India. **(Online mode)** ● Online education mode: its needs and importance in light of NEP,2020. **(NEP 2020)**
Transaction Strategies/ Teaching Learning Process	Lecture cum discussion, use of PPT, assignments on various topics, Lecture cum demonstration, ask pupil teachers to prepare write up on various factors influencing of education system and Comparative Education, debate on aims, content, methods & instruction and evaluation system in India, U.K. and U.S.A., chart preparation on education system in India, U.K. and U.S.A., In depth analysis of various education system by the student teachers and presentations will be encouraged.
Practicum: ● Write up on various factors influencing the education system. ● Chart preparation on the education system in India.	

- Reflections on secondary and higher education in India, U.K. and U.S.A.

Suggested Readings:

- Andrey, A. & Howard N. (1978). *Developing curriculum: A practical guide*. London: George Allen and Unwin.
- Baradey, G.Z.F. (1964). *Comparative methods in education*. New Delhi: Oxford and IBH Publishing Co.
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- Sodhi T.S. (1988). *A text book of comparative education.* New Delhi: Association of Indian Universities, IGNOU.
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Year	**II**	**Life Skills Education**	**Course Credits**	**4**
Semester	**IV**		**Course code**	**SOE020414 DCEC3104**
Learning Outcomes	At the end of the course, the students will be able to: ● Explain the concept of life skills and the role of education in promoting life skills. ● Classify and use the thinking skills. ● Explain and develop coping skills related to emotions & stress.			

	● Hypothesize and choose social and negotiation skills in various spheres of life.
Course Content	
Unit -1	**An Overviews of Life Skills**
	● Life Skills: Genesis of the concept (National and International) **(NEP 2020,Online mode)** ● Need and Significance of Life Skills **(NEP 2020,Online mode)** ● Life Skills Education in the Indian Context ● Role of teacher in encouraging core life skills to practice
Unit -2	**Thinking Skills** **(NEP 2020,Online mode)**
	● Nature and Elements of Thought ● Types of Thinking: Creative and Critical Thinking ● Problem Solving: Concept, Factors affecting and Steps in Problem Solving ● Decision Making: Concept, Process, Need, Consequences, Models of Decision Making and Goal Setting
Unit -3	**Coping Skills** **(NEP 2020)**
	● Emotions: Concept types of emotions, causes and effects of different emotions ● Strategies of coping with emotions: Classroom discussion; brainstorming; role-playing, audio and visual activities (arts, music, theatre, dance; case studies, storytelling, debates) **(NEP 2020,Online mode)** ● Coping with Stress: Concept, types and sources of stress ● The General Adaptation Syndrome Model of Stress and coping strategies
Unit -4	**Social and Negotiation Skills** **(NEP 2020)**
	● Self-Awareness: Concept and types of self -self-concept, body image, self-esteem and techniques for developing Self-Awareness: Johari Window, SWOT Analysis **(Online mode)**

	• Empathy –Concept, importance and teacher's role in developing empathy among learners • Effective Communication - Concept, functions, models and barriers • Interpersonal Relationship - Concept and factors affecting relationships
Transaction Strategies/ Teaching Learning Process	Lecture cum discussion, Group discussion and presentation, Brainstorming Session, Use of PPT, Assignments on various topics, Lecture cum demonstration, Preparation of activity based on the strategies of life skills development in groups and discussion, Debate on various problems, panel discussion, in depth analysis of various life skills by the student teachers and presentations will be encouraged.

Practicum:

- Activities related to the various skills described.
- Organizing workshops on developing social and negotiation skills, thinking skills etc.
- Organize collaborative activities under the guidance of the teacher.
- Case Study in any of the areas.
- Any other activity as assigned by the teacher.

Suggested Readings:

- A Life Skills Program for Learners in Senior Phase. (2002). University of Pretoria: Chapter in Thesis. Retrieved from; http://www2.ed.gov/offices/OVAE/AdultEd/OCE/SuccessStories/success.pdf
- Dakar Framework for Action, (2000). Education for All: Meeting our Collective Commitments, Dakar, Senegal. 17
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- WHO (1999). *Partners in Life Skills Education.* Geneva: Conclusions from a United Nations Inter-Agency Meeting, WHO.

Year	**II**	**Web Technologies in Education**	**Course Credits**	**4**
Semester	**IV**		**Course code**	**SOE 02 04 15 DCEC3104**
Learning Outcomes	After the completion of the course the pupil-teachers will be able to: ● Explain the concept of web technology. ● Critically analyze and discuss various issues associated with using web-based learning platforms. ● Use web-based learning platforms, environment and pages. ● Elaborate the various web-based pages.			

Course Content	
Unit -1	**Introduction to Web Technology**
	● Concept, Meaning and forms of Web Technology ● Aim and importance of Web Technology ● Contribution of Web Technology in teaching ● Constraints in the use of Web Technology
Unit -2	**Web based learning: Issues and Challenges**
	● Security and privacy issues in using web-based learning sites and platforms ● Technical support and infrastructure requirements of web-based learning ● Administrative support and structure for web-based learning ● Psychological aspects of using web-based technologies in teaching learning process.
Unit -3	**An overview of Web based Learning Platforms**
	● SWAYAM ● Unacademy ● NPTEL ● Swayam Prabha ● E-pathshala ● Diksha ● Coursera
Unit -4	**An Introduction to Web based Environment and Pages**
	● Virtual classroom

	● Forum ● Blogs ● Bulletin Board
Transaction Strategies/ Teaching Learning Process	Lecture cum discussion, Lecture cum demonstration, Use of PPT, Assignments on various topics, Presentation and discussion, Debate and presentations by Pupil Teachers will be encouraged.

Practicum:

- Assignments on various topics given in the syllabus.
- Visits in ICT Lab.
- First-hand experience of virtual learning.
- Panel discussion on issues related to Web based Learning.

Suggested Readings:

- UNESCO (2006*) Introduction to Information, Communication and Technologies: Teacher's Guide - Module 1*, Available at Introduction to information and communication Technology accessed on 4th Jan, 2016.
- Matt (2007 August 24) *Evolution of ICT*, a blog post retrieved from ICT in Ireland accessed on 4th Jan, 2016.
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Year	**II**	**Human Rights in Education**	**Course Credits**	**4**
Semester	**IV**		**Course code**	**SOE020416 DCEC3104**
Learning Outcomes	At the end of the course, the students will be able to: ● Illustrate the concept of human rights, human rights education and restate the corresponding approaches and policies. ● Organize debates and discussion on emerging human rights issues. ● Elaborate human rights perspective in education at school level. ● Critically judge the various human rights issues and appraise the role of various agents for the promotion of human			

	rights.
Course Content	
Unit -1	**Human Rights and Human Rights Education** **(NEP 2020)**
	● Human Rights and Human Rights Education: Concept and importance in present context ● Human Rights Education with reference to philosophical, psychological, political, and sociological perspective **(Online mode)** ● Approaches to Human Rights: Western political liberalism, Socialism and social welfare principles, Cross-cultural rights traditions, The UN instruments **(Online mode)** ● Policies on Human Rights **(Online mode)**
Unit -2	**Emerging Concerns in Human Rights**
	● Debates in the Human Rights discourse: Rights versus Human rights, Universal versus Relativism, Legal versus Ethical demands, Individual rights versus Collective, West versus Rest **(Online mode)** ● Methods of Human Rights Research and Human Rights as pedagogy ● Critical review of Democracy with reference to Human rights **(NEP 2020)** ● Inclusion and Exclusion **(NEP 2020)**
Unit -3	**Human Rights Perspective at School Education**
	● Human Rights perspective in curriculum ● Human Rights perspective in teaching-learning Processes ● Human Rights Perspectives in Assessment ● Human Right Perspective and school ethos and culture

Unit -4	**Issues and Promotion of Human Rights** ● Human Rights issues with specific reference to children, women, minorities, dalits, differently abled and homosexuals. **(NEP 2020, Online mode)** ● Role of Government, Non-Government organizations, Education, Family and Self in promotion of Human Rights. **(NEP 2020, Online mode)** ● Critical review of Human Right in globalized world ● Revisiting of Indian Constitution with reference to Human Rights (**Online mode)**
Transaction Strategies/ Teaching Learning Process	Lecture-cum-discussion along with interactive group discussion, field trips, group discussions, brainstorming and simulation in the form of mock sessions, Bal Panchayat etc.
Practicum: Learner may take any two tasks from the following: ● Workshop/Seminar/Class presentation on Human rights in a socio-cultural context. ● Poster Presentation reflecting Human right issues. ● Identification of discriminatory practices at school level (Gender, Caste, Disability). ● Awareness Campaign to promote educational rights. ● Any other assignment given by the teacher.	
Suggested Readings ● Alam, Aftab (2000). *Human Rights in India: Issues and Challenges*. Delhi: Raj Publication.	

- Bajpai, Asha (2010). *Child Rights in India: Law, Policy and Practice.* New Delhi: Oxford University Press.
- Baxi, Upendra (2010). *The Future of Human Rights.* New Delhi: Oxford University Press.
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- Kothari, Rajni (1989). Human Rights – A movement in Search of Theory.In*Smitu Kothari and Harsh Sethi (eds.) Rethinking Human Rights: Challenges for theory and action.* New York: New Horizons Press and Delhi: Lokayan.
- Kothari, Smitu (1989). The Human Rights Movement In India: A critical overview.In*Smitu Kothari and Harsh Sethi (eds.) Rethinking Human Rights: Challenges for theory and action*. New York: New Horizons Press and Delhi: Lokayan.
- Krishanmurthy, J. (2001). *The First and Last Freedom.* Chennai: Krishanmurthy Foundation.
- Kumar, Sandeep (2012). *Human Rights and Pedagogy.* Delhi: Discovery publishing House.
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Year	**II**	**Education for Mental Health**	**Course Credits**	**4**
Semester	**IV**		**Course code**	**SOE020417 DCEC3104**

Learning Outcomes	At the end of the course, the students will be able to: ● Define the concept of mental health and recall the symptoms of bad mental health. ● Explain the importance of mental hygiene ● Illustrate the methods of adjustment/Adjustment mechanism. ● Develop the understanding of the role of home and school in mental health.
Course Content	
Unit -1	**Mental Health**
	● Concept, factors affecting mental health **(Online)** ● Characteristics of a mentally healthy person **(Online)** ● Symptoms and causes of bad mental health ● Role of the parents in developing mental health of their children **(Online)**
Unit -2	**Mental Hygiene**
	● Concept, aspects, goals and principles of mental hygiene. **(Online)** ● Nature and scope of mental hygiene, principles of guidance and counselling for mental health and hygiene. ● Need, importance and functions of mental hygiene. ● Principles of curriculum construction from a mental hygiene point of view. **(NEP 2020)**
Unit -3	**Adjustment or mal-adjustment**
	● Concept, process and perspective for adjustment **(NEP 2020)** ● Methods of adjustment/adjustment mechanism **(NEP 2020)** ● Concept and causes of maladjustment **(Online)**

	● Effects of maladjustment on children/student's mental health
Unit -4	**Mental health in schools** **(NEP 2020)** ● Mental illness/disorder (personality disorder, anxiety, mood disorder, substance related addictive disorder): types, symptoms and causes ● Assessment of mental health status ● Stress: types, symptoms of stress and Stress management for students **(Online)** ● Role of teacher in fostering mental health, ways and means of improving mental health **(Online)**
Transaction Strategies/ Teaching Learning Process	E-learning, Lecture-cum-discussion, Tutorials, Brainstorming Session, Recorded/live Video and Audio lectures, Use of PPT, Assignments on different key areas given in syllabus through Google Group, Google classroom and other appropriate online apps.
Practicum: ● Case Study of Mentally Healthy and Mentally Retarded individual. ● Individualized Education Plan for Mentally Healthy and Mentally Retarded individual. ● Visit a nearby School, gather information and prepare a report on healthy mental habits adopted by school teachers for students.	
Suggested Readings: ● Aggarwal, R. (2010). *Elementary Guidance and Counselling*. New Delhi: Shipra Publication. ● Arkoff Abe (1968). *Adjustment and Mental health*. New York: McGraw Hill Company. ● Bernard, Harold, W. (1952). *Mental hygiene for class-room teachers*. New York: McGraw Hill book Co. ● Bonny, M. E. (1960). *Mental Health in Education*. Boston: Allyn and Bacon.	

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Year	**II**	**Educational Management and Leadership**	**Course Credits**	**4**
Semester	**IV**		**Course code**	**SOE 02 04 05 GEC 3104**

Learning Outcomes	After the completion of the course the pupil-teachers will be able to: ● Explain the concept and various functions of Educational Management. ● Use effective methods of communication in their life. ● Analyse traits, skills and styles of leadership. ● Compare roles and importance of educational administration in India at local, state and central level**.**
Course Content	
Unit -1	**Educational Management: Conceptual Understanding**
	● Meaning, Concept and importance of Educational Management ● Objectives & Scope of Educational Management ● Educational Manager: Characteristics, Functions and Roles ● Managerial Ethics and creativity
Unit -2	**School Management and Communication**
	● Role and functions of Headmaster, Principal and Teacher ● Process, Human Relations Approach to Management. ● Communication: Types, methods and devices ● Barriers of Communication
Unit -3	**Educational Leadership: traits and skills**
	● Leadership: Concept, functions and roles ● Theories of leadership and management in educational organization ● Leadership Traits and Skills ● Functions and Styles of Leadership

Unit -4	**Educational Administrative Bodies in India at National Level: Roles & Functions** ● University Grant Commission (UGC) ● National Council of Educational Research and Training (NCERT) ● National Institute of Educational Planning and Administration (NIEPA) ● Ministry of Human Resource Development (MHRD) ● National Council for Teacher Education (NCTE)
Transaction Strategies/ Teaching Learning Process	Lecture cum discussion, Tutorials, Brainstorming Session, Recorded/ live Video and Audio lectures, Use of PPT, Film Shows (selected films), assignments on different key areas given in syllabus through Google Group, Google Classroom etc.
Practicum: ● Compile articles from newspapers, magazines, and internet discussing present policies and operational strategies of central and state Govt. for secondary education. Prepare a report of the entire activity. ● Review research on educational management or management of secondary schools which are used in other countries but not in India ● Examine the effectiveness of any one programme run by central Govt. for secondary students. Present the report in a classroom seminar. ● Any other activity/assignment suggested by the teacher.	
Suggested Readings: ● Altrichter, H. and Elliot, J. (2000). *Images of Educational Change*. England: Buckingham Open University. ● Bhattacharya, D.K. (2001). *Managing People*. New Delhi: Excel Books.	

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Year	**II**	**Peace Education**	**Course Credits**	**4**
Semester	**IV**		**Course code**	**SOE 02 04 06 GEC 3104**

Learning Outcomes	After completion of the course, the students will be able to: ● Explain the concept of peace from different perspectives and critically appraise the ideas of thinkers pertaining to peace. ● Explain the concept of peace education and critically appraise the role of various agents in promoting peace education. ● Explain the various aspects of conflict and evaluate the role of peace education in conflict management. ● Select various techniques and approaches for teaching peace Education.
Course Content	
Unit -1	**Introduction to Peace**
	● Concept, importance and Approaches of Peace **(NEP 2020, Online)** ● Ideas of distinguished thinkers about Peace: Mahatma Gandhi, J. Krishnamurthy, Swami Vivekananda, Rabindranath Tagore ● Challenges to peace: Stress, conflicts, crimes, terrorism, violence and poor quality of life **(NEP 2020, Online)** ● Peace in the context of individual, Social, National and International perspectives **(NEP 2020, Online)**
Unit -2	**An Overview of Peace Education**
	● Peace Education: Concept and Scope **(NEP 2020, Online)** ● Needs and Importance of Peace Education in contemporary Society **(NEP 2020, Online)** ● Role of Family, school and Society in the development of values for Peaceful coexistence ● Role of UNESCO in promoting Peace Education **(NEP 2020, Online)**
Unit -3	**Conflict Management and Peace Education**
	● Conflict: Concept, Types and Process ● Conditions of conflicts: limited resources, poverty, socio economic conditions ● Techniques of conflict Resolution

	• Role of Peace Education in Conflict Management **(NEP 2020, Online)**
Unit -4	**Approaches and Techniques of Teaching Peace Education** • Yoga and Meditation • Role Playing, Storytelling • Group activities (literary activities, games & sports, service activities) • Counseling and co-curricular activities
Transaction Strategies/ Teaching Learning Process	Lecture cum discussion, Tutorials, Brainstorming Session, Use of PPTs, Assignments on different key areas of Peace related issues.
Practicum: • Seminar and group discussion on importance peace in the class. • Chart preparation on various Peace Education topics. • Reflection on various conflicts in day-to-day life. • Organize mock activities on working of UNO for Peace Education.	
Suggested Readings: • Arulsamy, S. (2016). *Peace and value education.*New Delhi: Neelkamal Publication. • Barash, P. David (2000). A*pproaches to peace*. New York: Oxford University Press. • Charles, K., &Selvi, A. (2016). *Peace and value education.*New Delhi: Neelkamal Publication. • Gandhi, M.K. (1944). *Non-violence in peace and war*. Ahmedabad: Navajivan Publishing House.	

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Web resources

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- *Peace Education.* Retrieved from www.bdu.ac.in/cde/docs/ebooks/B-Ed/II/PEACE%20EDUCATION.pdf
- *The Five Steps to Conflict Resolution.* Retrieved from https://www.amanet.org/training/articles/the-five-steps-to-conflict resolution.aspx
- *Conflict management.* Retrieved from https://www.managers.org.uk/knowledge-bank/conflict-management
- *Importance of Peace* Retrieved from *cejsh.icm.edu.pl/cejsh/element/bwmeta1.element.ojs-doi.../10472-10011.pdf*
- *शांतिकामहत्व.* Retrieved from *https://www.jagran.com/editorial/apnibaat-the-importance-of-peace 10751783.htmlhttps://www.quora.com/What-is-the-importance-ofpeace-in-our-life-Why-and-how-do-you-achieve-it*
- *Peace education: definition, approaches, and future directions.* Retrieved from *http://www.eolss.net/sample-chapters/c04/e1-39a-06.pdfhttps://unesdoc.unesco.org/ark:/48223/pf0000150262https://dialog1.webs.com/sejv2i1/samwaad_2.pdf*

Annexure-VII

Learning Outcomes-Based Curriculum Framework (LOCF)

School of Education

M.Ed. Programme

Central University of Haryana

Mahendergarh

NCTE Regulation-2014/NEP-2020/UGC-LOCF Based Curriculum (2021 -2023)

1. Background
2. Vision and Mission
3. Programme Educational Objectives (PEOs)
4. Program Specific Outcomes (PSO's)
5. Program Outcomes (PO) with Graduate Attributes
6. Structure of program
7. Learning Outcome Index
8. Semester-wise courses and credit distribution
9. Course Level Learning outcome
10. Teaching- Learning process
11. Blended Learning
12. Assessment and Evaluation
13. Keywords
14. References
15. Appendices

Background

Considering the curricular reforms as instrumental for desired learning outcomes, all the academic departments of Central University of Haryana made a rigorous attempt to revise the curriculum of undergraduate and postgraduate programmes in alignment with National Education Policy-2020 and UGC Quality Mandate for Higher Education Institutions-2021. The process of revising the curriculum could be prompted with the adoption of "Comprehensive Roadmap for Implementation of NEP-2020" in the 32nd meeting of the Academic Council of the University held on April 23, 2021. The Roadmap identified the key features of the Policy and elucidated the Action Plan with well-defined responsibilities and indicative timeline for major academic reforms.

The process of revamping the curriculum started with the series of webinars and discussions conducted by the University to orient the teachers about the key features of the Policy, enabling them to revise the curriculum in sync with the Policy. Proper orientation of the faculty about the vision and provisions of NEP-2020 made it easier for them to appreciate and incorporate the vital aspects of the Policy in the revised curriculum focused on 'creating holistic, thoughtful, creative and well-rounded individuals equipped with the key 21st century skills' for the 'development of an enlightened, socially conscious, knowledgeable, and skilled nation'.

With NEP-2020 in background, the revised curricula articulate the spirit of the policy by emphasising upon—integrated approach to learning; innovative pedagogies and assessment strategies; multidisciplinary and cross-disciplinary education; creative and critical thinking; ethical and Constitutional values through value-based courses;

21st century capabilities across the range of disciplines through life skills, entrepreneurial and professional skills; community and constructive public engagement; social, moral and environmental awareness; Organic Living and Global Citizenship Education (GCED); holistic, inquiry-based, discovery-based, discussion-based, and analysis-based learning; exposure to Indian knowledge system, cultural traditions and classical literature through relevant courses offering 'Knowledge of India'; fine blend of modern pedagogies with indigenous and traditional ways of learning; flexibility in course choices; student-centric participatory learning; imaginative and flexible curricular structures to enable creative combination of disciplines for study; offering multiple entry and exit points initially in undergraduate programmes; alignment of Vocational courses with the International Standard Classification of Occupations maintained by the International Labour Organization; breaking the silos of disciplines; integration of extra-curricular and curricular aspects; exploring internships with local industry, businesses, artists and crafts persons; closer collaborations between industry and higher education institutions for technical , vocational and science programmes; and formative assessment tools to be aligned with the learning outcomes, capabilities, and dispositions as specified for each course. In case of UG programmes in Engineering and Vocational Studies, it was decided that the departments shall incorporate pertinent NEP recommendations while complying with AICTE, NBA, NSQF, International Standard Classification of Occupations, Sector Skill Council and other relevant agencies/sources. The University has also developed consensus on adoption of Blended Learning with 40% component of online teaching and 60% face to face classes for each programme.

The revised curricula of various programmes could be devised with concerted efforts of the faculty, Heads of the Departments and Deans of Schools of Study. The draft prepared by each department was discussed in series of

discussion sessions conducted at Department, School and the University level. The leadership of the University has been a driving force behind the entire exercise of developing the uniform template and structure for the revised curriculum. The Vice Chancellor of the University conducted series of meetings with Heads and Deans to deliberate upon the vital parameters of the revised curriculum to formulate a uniform template featuring Background, Programme Outcomes, Programme Specific Outcomes, Postgraduate Attributes, Structure of Masters Course, Learning Outcome Index, Semester-wise Courses and Credit Distribution, Course-level Learning Outcomes, Teaching-Learning Process, Blended Learning, Assessment and Evaluation, Keywords, References and Appendices. The experts of various Boards of Studies and School Boards contributed to a large extent in giving the final shape to the revised curriculum of each programme.

To ensure the implementation of curricular reforms envisioned in NEP-2020, the University has decided to implement various provisions in a phased manner. Accordingly, the curriculum may be reviewed annually.

Programme Name: M.Ed., School of Education

Vision and Mission of Central University of Haryana

UNIVERSITY VISION

To develop enlightened citizenship of a knowledge society for peace and prosperity of individuals, nation and the world, through promotion of innovation, creative endeavours, and scholarly inquiry.

UNIVERSITY MISSION

To serve as a beacon of change, through multi-disciplinary learning, for creation of knowledge community, by building a strong character and nurturing a value-based transparent work ethics, promoting creative and critical thinking for holistic development and self-sustenance for the people of India. The University seeks to achieve this objective by cultivating an environment of excellence in teaching, research and innovation in pure and applied areas of learning.

Objectives of School of Education

in consonance with vision and mission of University School of Education has framed following objectives

1. To prepare outstanding teacher educators for transforming lives of individuals and lead to national development.
2. To prepare teacher educators who have a sound knowledge base, essential professional skills and humanitarian values and ethics.
3. To impart skills among teachers in Information & Communication Technology with experiential learning for education.
4. To develop research skills in the pupil teachers with moral and ethical development.
5. To build self disciplined individuals who appreciate work and manage time efficiently.

Mapping of University Vision and Mission to Department Vision and Mission

Acclaimed as modal Centre of Learning and Research by

University Vision and Mission	**Objectives of School**

High quality knowledge society creation for peace and prosperity of individuals, nation and the world, through and scholarly inquiry	**Yes**
Promotion of innovation, creative endeavours, research and development	**Yes**
Students excellence through multi-disciplinary learning, value-based transparent work ethics, creative and critical thinking	**Yes**
Environment of excellence in teaching, research and innovation in pure and applied areas of learning	**Yes**

1. PROGRAMME OUTCOMES (POs), SCHOOL OF EDUCATION

After successful completion of the programme:

PO1 Learners will be able to comprehend the acquired knowledge during the Programme of study.

PO2 Learners will be able to reflect on the problems relating to discipline and society with ethical guidelines.

PO3 Learners will be able to exhibit the professional skills and competencies acquired during the Programme of study.

PO4 Learners will be able to show scientific & research capabilities in their academic, professional and general life pursuits.

PO5 Learners will be able to apply the knowledge and skills acquired in academic management and resource management according to predetermined objectives/outcomes.

PO6 Learners will be able to work as a member or a leader in various teams and multidisciplinary & diverse settings.

2 PROGRAMME SPECIFIC OUTCOMES (PSOs), M.Ed. Programme

The M.Ed Two-Year Teacher Education Programme aims at:

PSO-1. Acquiring conceptual understanding of educational philosophy, sociology, psychological and other educational aspects with experiential learning.

PSO-2. Reflections on various learning practices and legislative provisions related to Indian Education system for providing integrated learning experiences in the context of socio-cultural milieu of the learners and inclusive setting.

PSO-3. Nurturing professional competencies and 21st Century skills of learners.

PSO-4. Providing exposure to student-teachers for digital literacy, integrated pedagogy, and training for various awareness programmes related to gender, environment, health and contemporary issues.

PSO-5. Providing real experience of all activities of teacher training institutions activities through engaging student-teachers as learners.

PSO-6. Developing research competencies with statistical techniques, research ethics and evaluation strategies to address the contemporary educational problems.

Structure and Syllabus

M. Ed.
(Master of Education)

School of Education

w.e.f. Academic Session 2021-22

M.Ed. Semester- I

S. No.	Course Credit	Course Code	Course Title	Credits (Theory)	Credits (Tutorial/ Practicum)	Credits (Practical)	Class Teaching / Field Based Activity Hours per week
1	**4**	SOE 01 01 01 C3104	Psychology of Learning and Development	3	1	0	4
2	**4**	SOE 01 01 02 C3104	Historical, Political and Economic Foundations of Education	3	1	0	4
3	**4**	SOE 01 01 03 C3104	Introduction to Educational Research	3	1	0	4
4	**2**	SOE01 01 04 C0022	ICT in Education	0	0	2	4
5	**2**	SOE 01 01 05 C0022	Development of Self: Yoga Education	0	0	2	4
Elective Courses							
6	**4**	SOE 01 01 01 DCEC 3104	Personality Development and Communication Skills	3	1	0	4
7	**4**	SOE 01 01 02 DCEC 3104	Educational Administration, Management and Leadership	3	1	0	4
8	**4**	SOE 01 01 03 DCEC 3104	Distance and Open Learning	3	1	0	4
9	**4**		**Taken from other Department/ MOOC**				

Total	**24**						

M.Ed. Semester- II

S. No.	Course Credit	Course Code	Course Title	Credits (Theory)	Credits (Tutorial/ Practicum)	Credits (Practical)	Class Teaching / Field Based Activity Hours per week
10	**4**	SOE 01 02 06 C3104	Philosophical Foundations of Education	3	1	0	4
11	**4**	SOE 01 02 07 C3104	Sociological Foundations of Education	3	1	0	4
12	**4**	SOE 01 02 08 C3104	Advance Research Methodology	3	1	0	4
13	**4**	SOE 01 02 09 C3104	Curriculum Studies	3	1	0	4
14	**2**	SOE 01 02 10 C0022	Academic Writing	0	0	2	4
15	**2**	SOE 01 02 11 C0022	Internship and Field Attachment	0	0	2	4
16	**2**	SOE 01 02 12 C0022	Dissertation (Part-I)	0	0	2	4
Elective Courses							
17	**4**	SOE 01 01 04 DCEC 3104	Guidance and counselling	3	1	0	4
18	**4**	SOE 01 01 05 DCEC 3104	Gender, School and Society	3	1	0	4
19	**4**	SOE 01 01 06 DCEC 3104	Education of the Disadvantaged Groups	3	1	0	4
20	**4**	SOE 01 01 07 DCEC 3104	Comparative Education	3	1	0	4

Total	**26**						

M.Ed. Semester- III

S. No.	Course Credit	Course Code	Course Title	Credits (Theory)	Credits (Tutorial/ Practicum)	Credits (Tutorial/ Practicum Practical)	Class Teaching / Field Based Activity Hours per week
21	**4**	SOE 01 03 12 C3104	Teacher Education	3	1	0	4
22	**4**	SOE 01 03 13 C3104	Inclusive Education	3	1	0	4
23	**4**	SOE 01 03 14 C0044	Internship in Specialized Area	0	0	4	8
24	**4**	SOE 01 03 15 C0044	Dissertation Part-II	0	0	4	8
Elective Courses							
25	**2**	SOE 01 01 08 DCEC 2002	Institutions, Systems and Structures at Elementary Stage	2	0	0	2
26	**2**	SOE 01 01 09 DCEC 2002	Institutions, Systems and Structures at Secondary Stage	2	0	0	2
27	**2**	SOE 01 01 10 DCEC 2002	Stage Specific Status, Issues and Concerns at Elementary Stage	2	0	0	2
28	**2**	SOE 01 01 11 DCEC 2002	Stage Specific Status, Issues and Concerns at Secondary Stage	2	0	0	2

29	4*		**Taken from other Department/ MOOC**				
Total	**24**						

M. Ed. Semester- IV

S. No.	Course Credit	Course Code	Course Title	Credits (Theory)	Credit (Tutorial/ Practicum)	Credit (Practical)	Class Teaching / Field Based Activity Hours per week
30	**4**	SOE 01 04 16 C3104	Recent Trends in Teacher Education	3	1	0	4
31	**4**	SOE 01 04 17 C3104	Educational Studies	3	1	0	4
32	**4**	SOE 01 04 19 C3104	Educational Technology	3	1	0	4
33	**2**	SOE 01 04 20 C2002	Environmental Education	2	0	0	2
34	**4**	SOE 01 04 21 C0044	Dissertation	4	0	4	8
Elective Courses							
35	**2**	SOE 01 01 12 DCEC 2002	Practice Relating to Curriculum, Pedagogy and Assessment at Elementary Stage	2	0	0	2
36	**2**	SOE 01 01 13 DCEC 2002	Practice Relating to Curriculum, Pedagogy and Assessment at Secondary Stage	2	0	0	2
37	**2**	SOE 01 01 14 DCEC 2002	Educational Policy, Economics and Planning at Elementary Level	2	0	0	2

38	**2**	SOE 01 01 15 DCEC 2002	Educational Policy, Economics and Planning at Secondary Level	2	0	0	2
Total	**22**						

List of Generic Elective Courses (GEC)

Sr. No.	Semester	Course Code	Course Title	Credits
1	**First**	**SOE 01 01 01 GEC 3014**	Life Skills in Education	4
2	**First**	**SOE 01 02 02 GEC 3014**	Introduction to Academic Writing	4
3	**Second**	**SOE 01 02 03 GEC 3014**	Educational Leadership	4
4	**Third**	**SOE 01 03 04 GEC 3014**	Art of Teaching	4
5	**Fourth**	**SOE 01 04 05 GEC 3014**	Introduction to Counselling	4

Matching of Programme outcomes with Programme Specific outcomes

PO PSO	PO1	PO2	PO3	PO4	PO5	PO6
PSO-1	x	x	x	x	x	x
PSO-2	x	x	x	x		
PSO-3	x	x	x	x	x	x
PSO-4	x		x	x	x	x
PSO-5	x	x	x		x	x
PSO-6	x	x	x	x	x	x
Total	6	5	6	5	5	5

Matching of Programme outcomes with Programme Specific outcomes

PO	CC-1	CC-2	CC-3	CC-4	CC-5	CC-6	CC-7	CC-8	CC-9	CC-10	CC-11	CC-12	CC-13	CC-14	CC-15	CC-16	CC-17	CC-18	CC-19	CC-20	CC-21
PO-1	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
PO-2	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
PO-3	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
PO-4			x					x			x	x			x	x	x		x		x
PO-5	x			x		x	x					x	x							x	
PO-6		x			x				x		x			x	x	x					x

PO	EC-1	EC-2	EC-3	EC-4	EC-5	EC-6	EC-7	EC-8	EC-9	EC-10	EC-11	EC-12	EC-13	EC-14	EC-15
PO-1	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
PO-2	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
PO-3	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
PO-4				x		x						x	x		
PO-5	x	x	x		x	x		x	x	x	x	x	x	x	x
PO-6				x			x								

PO	GEC-1	GEC-2	GEC-3	GEC-4 Art of Teaching	GEC-5
PO-1	X	x	x		x
PO-2	x	x	x		x
PO-3	X	x	x		x
PO-4		x			
PO-5					
PO-6	x	x	x		x

Learning Outcome/ Course Outcome Index, Core Courses (M.Ed.)

PSO	CC-1	CC-2	CC-3	CC-4	CC-5	CC-6	CC-7	CC-8	CC-9	CC-10	CC-11	CC-12	CC-13	CC-14	CC-15	CC-16	CC-17	CC-18	CC-19	CC-20	CC-21
PSO-1	x	x	x	x	x	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x
PSO-2		x				x	x		x					x		x	x	x			
PSO-3	x		x	x	x				x	x		x	x		x		x		x	x	
PSO-4		x		x			x	x	x				x	x			x		x	x	x
PSO-5	x				x	x				x	x				x						
PSO-6			x					x				x				x					x

Learning Outcome Index, Elective Courses (M.Ed.)

PSO	EC-1	EC-2	EC-3	EC-4	EC-5	EC-6	EC-7	EC-8	EC-9	EC-10	EC-11	EC-12	EC-13	EC-14	EC-15
PSO-1	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
PSO-2		x				x		x	x					x	x
PSO-3	x	x		x						x	x				
PSO-4					x			x	x	x	x			x	x
PSO-5	x														
PSO-6															

Learning Outcome Index, Generic Elective Courses (M.Ed.)

PSO	GEC-1	GEC-2	GEC-3	GEC-4	GEC-5	GEC-6
PSO-1	X				x	
PSO-2						
PSO-3	X	x			x	
PSO-4						
PSO-5						
PSO-6						

Year	I	PSYCHOLOGY OF LEARNING AND DEVELOPMENT	Credits	4
Semester	I		Course code	SOE 01 01 01 C3104
Learning Outcomes	**At the end of the course, the students will be able to:** ● Identify the biological and the cultural processes of development and explain how the two are dynamically intertwined. ● Describe the major theories of child development and critically examine the theories as they apply to the lives of culturally diverse children and their families. ● Exhibit appropriate design and methods for carrying out research with children ● Observe children in their natural environments and describe their development in the social, emotional, physical, language, and cognitive domain.			
Course Content				
Unit -1	**Developmental Aspects of the Learner (NEP)**			
	● Growth and development: Concept and principles and its implication (online mode) ● Stages of growth and development across various stages from infancy to adolescence (online mode) ● Piaget cognitive development theory ● Erikson psycho-social development theory			
Unit -2	**Theoretical Frameworks of Learning**			

	• Learning: Concept, characteristics, learning process and factors affecting learning (Online mode) • Vygotsky Sociocultural theory • Bandura Social learning theory **(NEP)** • Motivation: Concept, Types, motivational cycle and its Educational implications (online mode)
Unit -3	**Creativity and Intelligence**
	• Creativity: Meaning, characteristics, components • Role of teachers in fostering creativity (online mode) **(NEP)** • Intelligence: Concept, emotional intelligence and factors affecting intelligence (Online mode) • Theories of intelligence: Sternberg, & Gardner
Unit -4	**Personality and Well Being (NEP)**
	• Personality: Meaning, concept, and nature • Theories of personality: Freud, Carl Rogers, Allport • Mental health and Well being (Online mode) • Defense Mechanisms
Teaching learning process/Transactional Strategies	Lecture cum discussion, PowerPoint presentations, assignments, school observation and report, case study, and problem solving, brainstorming
Practicum	• Identify and prepare a case study of underachieving students. • Identify five students showing maladjustment behaviour. List the adjustment problems from which they are suffering and explain their causes • Visit a school, observe X class students and prepare a report on it. Any other task and assignment given by the institution

Suggested Readings:

- Alexander, R. (2009). Pedagogy, culture and power of comparison. In H. D. (Eds.), *Educational Theories, Culture and Learning: A Critical Perspective* (pp. 10-26). New York: Routledge.
- Anastasi, A. (1990). *Psychological testing.* New York: MacMillan Co.
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- Balagopalan, S. (2011). *Introduction: Children's lives and the Indian context. Childhood, 18*(3), 291-297.
- Bandura, A. (1986). *Social foundations of thought and action.* Englewood Cliffs, NJ: Prentice Hall.

- Beilin, H. & Pufull, P. (1992). *Piaget's theory: Prospects and possibilities.* Hillsdale, NJ: Erlbaum. .
- Bose, P. (1995). Sons of the nation: Childrearing in the new family. In P. Chatterjee, *Texts of power: Emerging Disciplines in Colonial Bengal.* (pp. 118-144). Minneapolis: University of Minnesota Press.
- Brysbaert, M. & Rastle, K. (2013). *Historical and conceptual issues in psychology* (2nd ed.). Harlow: Pearson.
- Corr, P. & Gerald, G. (2009). *The Cambridge handbook of personality psychology.* Cambridge: Cambridge University Press.
- Dalal, A. & Misra, G. (2010). The core and context of Indian psychology. *Psychology and Developing Societies, 22*(1), 121-155.
- Dandapani, S. (2004). *Advanced educational psychology.* New Delhi: Anmol Publications Pvt. Ltd.
- Dowling, M. (2018). *Young children's personal, social and emotional development.* New Delhi: Sage publications.
- Driscoll, M. (2004). *Psychology of learning for instruction* (3rd ed.). MA: Pearson Education.
- Engler, B. (2006). *Personality theories: An introduction.* Boston: Houghton and Mifflin.
- Folk, A. W. (2004). *Educational psychology*. *MA:* Pearson Education.
- Gardner, H. E. (2006). *Multiple intelligences*. New Horizons, NY: Basic Books.
- Gopnik, A. (2012). *What's wrong with the teenage mind*. Retrieved from http://online.wsj.com/article/SB10001424052970203806504577181351486558984.html
- Gottlieb, A. (2012). Promoting an anthropology of infants: Some personal reflections. Retrieved, from Anthopo Children, 2012, 1, Gottlieb: http://popups.ulg.ac.be/AnthropoChildren/document.php?id=926
- Kellogg, R. (2007). *Fundamentals of Cognitive Psychology*. New Delhi: Sage Publications.
- Newman, B. M. (2007). *Theories of Human Development,* Lawrence: Erlbaum Associates, Inc.
- Paul, C. (2018). *Psychology for teachers.* New Delhi: Sage publications.
- Sharma, D. (2003). *Childhood, family and socio-cultural change in India.* Reinterpreting the inner world. New Delhi: Oxford University Press.
- Whitebread, D. (2009). *The SAGE handbook of developmental psychology and early childhood education.* New Delhi: Sage publications.
- Verma, S. & D. (2003). Cultural continuity amid social change: Adolescents' use of free time in India. In S. Verma and R. W. Larson (Eds.), *Examining adolescent leisure time across cultures.* (pp. 37 – 51). San Francisco: Jossey-Bass.

Year	I	HISTORICAL, POLITICAL AND ECONOMIC FOUNDATIONS OF EDUCATION	Credits	4
Semester	I		Course code	SOE 01 01 02 C3104

Learning Outcomes	**At the end of the course, the students will be able to:** ● Reflect on education during Vedic, Buddhist and Medieval period. ● Describe the historical political and economic perspectives of education. ● Specify and Critically analyse the main recommendations made by various Education Commissions/ Reports/ Schemes during pre and post-Independence Period. ● Reflection on contemporary issues in education.

Course Content	
Unit -1	**Historical Foundations of Education: Pre-Independence Period**
	● **Development of education in India during Vedic, Buddhist and Medieval period.(ONLINE)** ● Development of education in India during British period: Lord Macaulay Minutes (1834), Wood's Dispatch (1854), Hunter Commission (1882), Wardha Scheme of Education (1937).
Unit -2	**Historical Foundations of Education: Post-Independence Period**

	• Secondary Education Commission (1953) • Indian Education Commission (1964-66) • **National Policy on Education (1986)** • Programme of Action (1992) • National Curriculum Framework (2009) • **National Education Policy (2020)- (both NEP and Online)**
Unit -3	**Political Foundations of Education**
	• **Educational provisions in Indian constitution (ONLINE)** • Education and human rights • Role of State in education under Panchayti Raj, State Govt and Central Govt • Education for political development and socialization • **Motives behind various policies of education: NPE-1986, NCTE,-2014, RTE Act, 2009. (ONLINE)**
Unit -4	**Economic Foundations of Education**
	• **Concept of Economics of education (ONLINE)** • **Linkage between educational policy and national development (ONLINE)** • Contribution of education in the economic development of a country. • **Education and employment: investment in education, skill based education. (ONLINE)** • Youth unemployment & education. • Privatization,Globalization and Liberalization in education
Teaching learning process/Transaction Strategies	Lecture cum Discussion Method, Brainstorming Sessions, E-learning, assignments on different key areas, debate & panel discussion, Power Point presentations.

Practicum :	● Critique of any one :NCF-2005 / RTE Act,2009 / NEP 2020 (NEP) ● Visit to a school, observation of implementation of educational schemes in school and prepare a report on it. ● Any other task and assignment given by the institution

Suggested Readings:

- Altekar, A. S. (1944). *Education - In Ancient India.*Benaras: Nand Kishore & Bros.
- Education & National Development (n.d.). *Report of the Kothari commission on Education* (1964-66). New Delhi.
- Ghosh S. C. (2007). *History of Education in India.* New Delhi: Eastern Book Corporation.
- Govt. of India (n.d.). *Programme of Action-National policy on Education*. New Delhi: Ministry of Human Resources Development, 1986.
- GOI. (1966). *Report of the education commission: Education and national development*. New Delhi: Ministry of Education.
- GOI. (1986). National policy of education. GOI. (1992, 1998). *National policy on education, 1986 (As modified in 1992).* Retrieved fromhttp://mhrd.gov.in/sites/upload_files/mhrd/files/NPE86-mod92.pdf
- GOI. (2009). *The right of children to free and compulsory education act, 2009.* Retrieved from http://mhrd.gov.in/sites/upload_files/mhrd/files/rte.pdf
- GOI. (2011). *Sarva Shiksha Abhiyan- Framework for implementation based on the right of children to free and compulsory education act, 2009.* GOI. Retrieved from http://www.upefa.com/upefaweb/admin/myuploads/SSA_Frame_work_(revised)_ 9-6- 2011.pdf
- Joshi, K. L. (1977). *Problems of higher Education in India.* Bombay: Popular Prakashan.
- Kaul, J. N. (1975). *Higher education, social change & national development.* Shimla: Indian Institute of Advanced Study.
- Kneller, G. F. (1993). *Foundation of Education.* New York: John Wiley & Sons, Inc.
- Lall, M. (2005). *The Challenges for India's Education System.* London: Chatham House.
- Ministry of Education (1978). *Report of the Education Commission* (1964-66). New Delhi: Govt. of India.
- NCERT (2005). *National curriculum framework-200.* Sri AurobindoMarg, New Delhi: NCERT.
- Taneja, V. R. (2005). *Foundation of Education*. Chandigarh: Abhishek Publishers.

Web References:

- **https://kkhsou.ac.in/eslm/E-SLM-for-Learner/3rd%20Sem/Master%20Degree/Sociology%203rd/SOCIOLOGY%20OF%20EDUCATION/Education%20Block%20-%202/PDF/Unit-12.pdf**
- **https://www.ijrar.org/papers/IJRAR19D1183.pdf http://uafulucknow.ac.in/wp-content/uploads/2020/03/B.Ed_.-II-UNIT-I-converted.pdf**
- **https://www.hillsroad.ac.uk/docs/default-source/summer-word-2020/politics-ideologies.pdf?sfvrsn=2**
- **https://www.sunypress.edu/pdf/60700.pdf**
- **https://www.researchgate.net/publication/319007951_Liberalism_in_Education**
- **https://www.researchgate.net/publication/227888552_Five_Critical_Stances_Towards_Liberal_Philosophy_of_Education_in_Britain**
- **https://liberal-arts.eu/wp-content/uploads/2017/10/Dirksen-Kontowski-Kretz-Eds.-2017-What-is-Liberal-Education-and-what-could-it-be.pdf**

- https://www.researchgate.net/publication/263809277_Conservatism
- https://www.researchgate.net/publication/227585013_Conservative_Ideology_and_Curriculum
- https://www.researchgate.net/publication/319266838_Critical_perspectives_in_education_Introduction_to_the_Special_Issue
- https://www.researchgate.net/publication/255982603_On_Critical_Theory_and_Educational_Practice
- https://pages.gseis.ucla.edu/faculty/kellner/essays/towardcriticaltheoryofed.pdf
- https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.1002.9463&rep=rep1&type=pdf
- http://cerc.edu.hku.hk/wp-content/uploads/2013/11/Education-and-National-Development-Priorities-Policies-and-Planning.pdf
- https://core.ac.uk/download/pdf/55754.pdf
- http://libdcms.nida.ac.th/thesis6/2011/b171170.pdf
- http://www.igntu.ac.in/eContent/IGNTU-eContent-344137278034-MA-PoliticalScience-4-Dr.GeorgeT.Haokip-Paper401PublicPolicyandDevelopmentinIndia-Unit1.pdf
- https://www.researchgate.net/publication/336927323_The_Policy_Formulation_Process
- https://papers.ssrn.com/sol3/papers.cfm?abstract_id=2832904
- https://nroer.gov.in/home/file/readDoc/59835ea816b51cc4c4db275d/constitutional-provisions-governing-educational-administration-in-india-sharing-of-powers.pdf
- http://egyankosh.ac.in/bitstream/123456789/8531/1/Unit-9.pdf
- https://www.ei-ie.org/media_gallery/The_Privatization_of_Education.pdf

Year	I	INTRODUCTION TO EDUCATIONAL RESEARCH	Credits	4
Semester	I		Course Code	SOE 01 01 03 C3104

Learning Outcomes	After the completion of the course, the students will be able to: ● Explain and differentiate among several types of educational research ● Identify the research problem and construct a coherent research proposal ● Uses of appropriate type of sampling and tests for data collection ● Perform basic statistical techniques for data analysis and interpret their results
Course Content (The course is as per recommendations of NEP)	
Unit-I	**Conceptual understanding of Educational Research** ● Educational research: Meaning, nature, scope including multidisciplinary research, and types (fundamental, applied and action) ● Scientific method: meaning, steps, characteristics (replicability, precision, falsifiability and parsimony), methods of acquiring knowledge ● Types of scientific method: Exploratory, explanatory and descriptive (online) ● Approaches to educational research: Quantitative and qualitative (online)
Unit -2	**Development of research proposal** ● Research problem: Concept, sources, and identification of research problem. ● Review of the literature- meaning, purpose, sources (primary and secondary) and resources used for searching latest review of literature ● Variables: meaning of concepts, constructs, and variables; Types of variables- independent, dependent, extraneous (online) ● Research proposal: Concept, types, steps of writing research proposal (including formulation of research questions, objectives and hypotheses)

Unit-3	**Methodology of Educational Research (online)** • Methods of educational research: Descriptive, historical and experimental (meaning, significance, steps) • Population and sample: Concept, types and characteristics of a good sample • Techniques of sampling- • Probability (simple random sampling, systematic sampling, stratified random sampling, cluster sampling, and multi-stage sampling) • Non-probability (convenience, purposive, quota and snowball sampling)
Unit-IV	**Basic Statistical Techniques (online)** • Types of measurement scale: Nominal, ordinal, interval, and ratio • Descriptive Measures: Types and graphical representation of data Measures of Central Tendency: Mean, median and mode Measures of Dispersion: Range, Quartile Deviation, Mean Deviation and Standard Deviation • Normal Probability Curve (NPC): Meaning, characteristics and applications • Correlation: Meaning, assumptions, computation and uses of:- **a.** Rank difference correlation **b.** Product Moment Correlation **c.** Partial and Multiple Correlations
Teaching learning process/Transaction Strategies	Lecture-cum-discussion, brain-storming, group discussion, presentations, panel discussions, seminar presentations, demonstration and practical exercise of statistical problems, research based activities, and case studies.
Practicum	• Preparation of a Research Proposal • Review 5 Research Articles related to selected topic of research

Suggested Readings:

- Alan Agresti, Barbara, Finlay (2018). *Statistical methods for the social sciences*. Delhi: Pearson Publisher.
- Aggarwal, Y.P. (1998). *Statistical methods.* New Delhi: Sterling Publisher.
- Best, J. W. and Kahn, J. V. (1995). *Research in education.* Delhi: Prentice Hall.

- Burns, R. B. (1991).*Introduction to research in education.* New Delhi: Prentice Hall.
- Creswell, J. W. (2014). *Research design: Qualitative, quantitative, and mixed methods approaches* (4). Thousand Oaks, California: (4) SAGE Publications.
- Edward, A. L. (1968). *Experimental designs in psychological research.* New York: Holt, Rinehart and Winston.
- Ferguson, G. A. (1976). *Statistical analysis in psychology and education.* New York: McGraw Hill.
- Fox, D. J. (1969). *The research process in education*. New York: Holt, Rinchart and Winston Inc.
- Garrett, H. E. (1973). *Statistics in psychology and education.* Bombay: Vakils, Feiffer and Simon.
- Geoffrey E. Mills and L. R. Gay (2019). *Educational research: Competencies for analysis and applications*. Delhi: Pearson Publication.
- Guilford, J. P. and Benjamin, F. (1973). *Fundamental statistics in psychology and education.* New York: McGraw Hill.
- Gupta, S. P. (2017). *Statistical methods.* New Delhi: Sultan Chand and Sons.
- Kerlinger, F. N. (1973). *Foundation of behavioural research.* New York: Holt, Rinehart and Winston.
- Koul, Lokesh (2011). *Methodology of educational research.* New Delhi: Vikas Publishing House.
- Kurtz, A. K. and Mayo, S. T. (1980). *Statistical methods in psychology and education.* New Delhi: Narela Publication.
- Mangal, S. K. (2002). *Statistics in psychology and education.* New Delhi: Prentice Hall of India.
- Neuman, W. L. (1997). *An introduction to educational research methods: Qualitative and quantitative approaches.* Boston: Allyn and Bac
- Mann, P. S. (1995). *Introductory statistics*. New York: Wiley.
- Salkind, N. J. (2014). *Statistics for people who (think they) hate statistics* (5^{th} ed.). Thousand Oaks, CA: SAGE Publications, Inc.
- Springer, K. (2010). *Educational research: A contextual approach.* Hoboken, NJ: Wiley.
- Travers, R. M. (1978). *An introduction to educational research.* New York: Macmillan.

Year	**I**	**ICT IN EDUCATION** (Practical)	**Credits**	**2**
Semester	**I**		**Course Code**	SOE01 01 04 C0022
Learning Outcomes	After completion of the course, students will be able to: • Demonstrate effective use of ICT tools, software applications and digital resources in learning process and research. • Create online learning content and assessment using online tools.			
Course Content				
Unit-I	• MS WINDOWS: Basic concept of an operating system and its functions; introduction of windows & basic components of a window ; MS Office • MS Word: Concept, Features and creation of academic documents • MS Excel: Introduction to spreadsheets, concept of worksheets and their operations • MS PowerPoint: Basic features of MS PowerPoint, creation and online presentation of the slides using various features.			
Unit -2 **(Whole Unit is based on NEP)**	• Critically examine the digital learning initiatives by MHRD, GOI like NMEICT, SWAYAM, national repository of open educational resources, swayam prabha, e-shodhsindhu etc. (online mode) • Technologies for creating interactive content, collaborative learning and online courses. (online mode) • Ethical use of web sites and search engines to locate, retrieve and manage content, tools and resources. (online mode) • Web as a space for continuous/lifelong learning: exploring use of OER and MOOCs.(online mode)			
Teaching Learning Process/ Transaction Strategies	Seminars, Assignments Lecture , Group Discussion			

Practicum	**Any two of the following:** • Preparing a research proposal in MS Word. • Preparation of presentation using MS PowerPoint and sharing on Google slides. • Making of progress report-card and annual results in MS Excel. • Critical review of any three digital initiatives of MHRD. • Preparation of e content using free tools and OER's. • Any other project/assignment given by the institution. **Note** • The student will maintain a file of the record related to activities performed. • Mode of transaction of this course will be a workshop.

Suggested Readings:

- Cox, J. & Urban, P. (1999). *Quick courses in microsoft office.* New Delhi: Galgotia Publications.
- Hahn, H.(1998). *The internet-complete reference.* New Delhi: Tata McGraw Hill Publication.
- Intel Education, NCTE. (2007). *Hand book for teacher educators.* Bangalore.
- James, K. L. (2003). *The internet: A user's guide.*New Delhi: Prentice Hall of India Pvt. Ltd.
- Jain, S. (1990). *Introduction to computer science and basic programming.* New Delhi: Prentice Hall of India.
- Leao, A. M. (2001). *Computer for everyone.* New Delhi: Vikas Publishing house.
- Saxena, S. (1998). *A first course in computer.* New Delhi: Vikas Publications.
- Sinha, P. K. (1990). *Computer fundamentals.* New Delhi: BPB Publications.
- Srinivasam, T. M.(2002). *Use of computers and multimedia in education.* Jaipur: Aavisakar Publication.
- Tanenbaum, A. S. (1998). *Computer networks.* New Delhi: Prentice-Hall of India.
- Intel (2003). *Intel innovation in education.* New Delhi: Student Work Book.

Web resources:

- **https://en.unesco.org/themes/building-knowledge-societies/oer**
- https://www.oercommons.org/
- **https://www.cccoer.org/learn/find-oer/**
- **https://hewlett.org/strategy/open-education/**
- **https://h5p.org/node/add/h5p-content**
- **https://www.col.org/news/news/online-course-open-educational-resources**
- **https://tacomacc.libguides.com/oer_computers/starting_points**

- https://educationblog.microsoft.com/en-us/2017/10/introducing-education-resources-a-source-of-open-educational-resources-within-office-365-2/
- https://swayam.gov.in/nd2_cec20_cs11/preview

Year	I	DEVELOPMENT OF SELF: YOGA EDUCATION (Practical)	Credits	2
Semester	I		Course code	SOE 01 01 05 C0022
Learning Outcomes	After completion of the course, students will be able to: ● Demonstrate and judge the strength, weakness, opportunity and threats through SWOT. ● Compare and perform various Yogasans and also explain their uses			

Unit -1	**Introduction: Self**
	● Self: Meaning, nature, and functional model of the self ● Components of Self-Concept ● SWOT analysis: Strength, weakness, opportunity and threats (ONLINE) ● Spirituality and its roles in self-development. ● Yoga education and stress management.(ONLINE)
Unit -2	**Yoga Education**

	• Yoga Education: Historical perspective, concept, aims, scope, and importance of yoga education.(ONLINE) • Yogasans: Meaning, importance, and advantages. **Types of Yogasans:** • **Standing posture asans** (Sukhasan, Siddhasan, Padmasan, Yoga Mudra, Matsyasan, Gomukhasan, ArdhMatsyendrasan, Bajrasan, SuptaVajrasan, Sinhasan, Ustrasan, etc.); • **Standing posture asans** (Tadasan, Trikonasan, Vrikshasan, UrdhvaHastotanasan, Kati Chakrasan, Garudasan, etc.); • **Lying posture asans** (UttanPadasan, Halasan, KarnPidasan, Bhujangasan, Salabhasan, Dhanurasan, Paschimotanasan, Chakarasan, Mayurasan, Shavasan, etc.) and Upside posture Asans (Sarvangasan, Sirsasan, etc.). • Pranayam: Meaning, process, and types of pranayama
Teaching learning process/Transaction Strategies	Lecture cum Discussion Method, Brainstorming Sessions, E-learning specially Videos, Yoga Shivir and practice demonstration of various Yogasans.
Practicum :	• The students shall prepare a file related to various yogasans, highlighting the usefulness and importance of yogasans. • Teach 2-3 Days Yoga classes at your nearby school. Practical examination will be conducted by an external examiner at the end of the Semester including Viva-Voce and performance /demonstration of various yogasans.

Suggested Readings:

- Agochiya, D. (2010). *Life competencies for adolescents-training manual for facilitators, teachers and parents.* New Delhi: Sage Publications Pvt. Limited.
- Bahadur, K. P. (1977). *The wisdom of yoga*. Delhi: Sterling Publishers.
- Basavaraddi, I. V., Dagar, B. S., and Nagarajan, K. (2015). *Yoga education (Master of education-M.Ed.).* New Delhi: National Council for Teacher Education.
- Dalal, A. S. (2001). *A greater psychology – an introduction to the psychological thoughts of Sri Aurobindo.* Puducherry: Sri Aurobindo Ashram Pub.
- Delors, J. (1996). *Learning the treasure within –Twenty first century education.* UNESCO Education Commission Report.
- Iyengar, B. K. S. (1977). *Light on yoga*. London: Allen & Unwin.
- Joseph & Lilian, L. P. (2013). *Mudras for healing and transformation.* USA: Integrative Yoga Therapy.
- Krishna, G. (1981). *The secret of yoga*. London: Turnstone press.
- Krishnamurti, J. (1998). *On Self- knowledge..*Chennai P: Krishnamurti Foundation India.
- Krishnamurti, J. (2000). *Education and significance of life.* Chennai: Krishnamurti Foundation India.
- Palmer, J. A. (ed) (2001). *Fifty modern thinkers of education.* UK:Routledge Publishers.
- Rukmani T. S. (1999). *Yoga vrttika of vijnanabhiksu*. Delhi: Mushiram Manohar.
- Santrock, John W. (2007). *A topical approach to life span development.* New Delhi: Tata McGraw- Hill Publishing Company Limited.
- Saraswati, Y. (1981). *Science of soul*. Rishikesh: Yoga Niketan trust.
- Stephens, M. (2010). *Teaching yoga: Essential foundations and techniques*. California: North Atlantic Books.
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- Schneider, F. W., Gruman, J. A. & Coutts, L. M. (Eds.) (2012). *Applied social psychology-understanding and addressing social and practical problems* (2nd ed.). : New Delhi: Sage Publications Pvt. Limited.
- Swami Vivekananda (1988). *Selections from the complete works of Swami Vivekananda.* Mayavathi: Advaita Ashrama.
- UNICEF (2006). *Life skills modules-adolescence education program.* New Delhi: UNICEF House.
- Venkateshamurthy, C. G. & Govinda Rao, A.V. (2005). *Life skills education training package.* R.I.E.: Mysore.
- Wood, E. (1988). *Great system of yoga.* Mumbai: D.B. Taraporevala Sons & Co.

Web resources

- https://www.annualreviews.org/doi/pdf/10.1146/annurev.ps.38.020187.001503
- https://www.oercommons.org/courseware/lesson/57475
- https://www.oercommons.org/courseware/lesson/23043
- https://www.oercommons.org/courseware/lesson/68128

- https://www.oercommons.org/authoring/48444-foundations-of-physical-education-fitness-beginner
- https://www.oercommons.org/courses/yoga-minds-writing-bodies-contemplative-writing-pedagogy

Elective Courses (DCEC)

Year	I	PROFESSIONAL DEVELOPMENT AND COMMUNICATION SKILLS	Credits	4
Semester	I		Course code	SOE 01 01 01 DCEC 3104
Learning Outcomes	**After completion of the course, students will be able to:** • Acquire knowledge of various communication skills • Practice Emotional Competency, Self Competency and Confidence • Develop Professional Competency • Exhibit professional and socio emotional skills in context of society			
Course Content **(Whole course content is derived from NEP)**				
Unit-1	**Communication Skills** • Listening, Speaking • Reading • Effective use of Social Media • Non-verbal communication			
Unit-2	**Professional Skills: Career Skills** • Resume Skills • Interview Skills • Group Discussion Skills • Personality and Career choice (Teaching)			
Unit-3	**Professional Skills: Team Skills** **(Online)** • Presentation Skills • Trust and Collaboration • Brainstorming • Social and Cultural Etiquettes			

Unit-4	**Ethics and Integrity** ● Ethics of teaching as a profession ● Importance of ethics ● Ethical decision making ● Personal and professional moral codes of conduct
Teaching learning process/Transaction Strategies	Discussions, debates, research trends analysis, case studies, flipped classroom approach that leverages project- based learning, demonstration, group discussion, simulations etc.
Practicum	● Case study of one student with adjustment problems ● Studying the personality characteristics of some successful individuals. ● Visiting institutes dealing with mental health problems of individuals, interaction with faculty and preparation of report ● Project work on identified themes. ● Visit to schools and classroom located in rural/urban/tribal contexts- exposure, observation, critical analysis of events and presentation before a small group

Suggested Readings:

- Ashokan, M. S. (2015). *Karmayogi: A biography of E. Sreedharan*. UK: Penguin.
- Brown, R. (2000). *Group processes: Dynamics within and between groups*. (2) New York: Blackwell Publishers.
- Brown, T. (2012). *Change by design.* Harper Business
- Elkington, J., & Hartigan, P. (2008). *The power of unreasonable people: how social entrepreneurs create markets that change the world*. Harvard Business Press.
- Goleman, D. (1995). *Emotional intelligence*. Bloomsbury Publishing India Private Limited
- Kalam, A. A. (2003). *Ignited minds: Unleashing the power within India*. Penguin Books India
- Kelly, T., & Kelly, D. (2014). *Creative confidence: Unleashing the creative potential within us all.* William Collins
- Kurien, V., & Salve, G. (2012). *I too had a dream*. Roli Books Private Limited
- Livermore, D. A. (2010). *Leading with cultural intelligence: The new secret to success*. New York: American Management Association
- McCormack, M. H. (1986). *What they don't teach you at Harvard business school: notes from a street-smart executive*. RHUS
- O'Toole, J.(2019).*The enlightened capitalists: Cautionary tales of business pioneers who tried to do well by doing good.* Harpercollins
- Sinek, S. (2009). *Start with why: How great leaders inspire everyone to take action*. Penguin
- Sternberg, R. J., & Baltes, P. B. (Eds.). (2004). *International handbook of intelligence*. Cambridge University Press

- Sen, M. (2010). *An Introduction to critical thinking*. Delhi: Pearson.
- Silvia, P. J. (2007). *How to read a lot*. Washington DC: American Psychological Association.

Web-Resources

- Fries, K. (2019). 8 Essential Qualities That Define Great Leadership. *Forbes*. Retrieved 2019- 02-15 from https://www.forbes.com/sites/kimberlyfries/2018/02/08/8-essential- qualities-that-define-great-leadership/#452ecc963b63. *How to Build Your Creative Confidence*, Ted Talk by David Kelly - https://www.ted.com/talks/david_kelley_how_to_build_your_creative_confidence
- India's Hidden Hot Beds of Invention Ted Talk by Anil Gupta - https://www.ted.com/ talks/anil_gupta_india_s_hidden_hotbeds_of_invention
- Knowledge@Wharton Interviews Former Indian President APJ Abdul Kalam - . "A Leader Should Know How to Manage Failure" https://www.youtube.com/ watch?v=laGZaS4sdeU
- Martin, R. (2007). How Successful Leaders Think. *Harvard Business Review*, *85*(6),60.
- NPTEL Course on Leadership - https://nptel.ac.in/courses/122105021/9

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Year	I	Educational Management and Leadership	Credits	4
Semester	I		Course code	SOE 01 01 02 DCEC 3104
Learning Outcomes	**After completion of the course, students will be able to:** ● Know and understand the concepts of educational management, administration and leadership ● Understand various styles of leadership ● Develop some leadership qualities in themselves ● Understand educational administration in India at local, state and central level			
Course Content				
Unit-1	**Educational Management, Educational Planning and Supervision** ● Concept, Needs, Objectives, Scope and approaches of Educational Management, Educational Management Human Beings as inputs, Process & Product inputs ● Managerial Creativity, Managerial Ethics, Role and functions of Headmaster/ Principal/ Teacher: Basic functions of Administration, Planning, Organizing, Directing and Controlling in School Management & Administration ● Meaning, Nature and Approaches of Educational Planning (online) ● Meaning , Nature and Scope of Educational Supervision, Educational Supervision as : Service Activity, Process, Functions, Planning, Organizing and Implementing Supervisory Programmes (online)			
Unit-2	**Communication in Educational Management** ● Types of Communication, Methods and Devices of Communication ● Models of communication (online) ● Selection of Appropriate Communication Strategies (online) ● Barriers of Communication (online) ● Methods and Devices of Communication ● Selection of Appropriate Communication Strategies ● Barriers of Communication			
Unit-3	**Leadership in Education & Theories of Leadership (NEP)** ● Concept of Leadership, Leader and Manager, ● Leadership Traits and Styles of Leadership ● Approaches of Leadership: Trait, Transformational, Transactional, Value-Based, Cultural, Psychodynamic, Charismatic, Community based and Social.			

	• Blake and Mouton's Managerial Grid, Fiedler's Contingency Model, Tridimensional Model and Hersey and Blanchard's Situational Theory
Unit-4	**Role & Functions of Educational Administrative Bodies in India** • State Bodies: State Council of Educational Research & Training (SCERT), • State Institute of Education Technology (SIET), • District Institute of Education& Training (DIET), • Institute of Advance Studies in Education (IASE).
Teaching learning process/Transaction Strategies	Lectures, field visits to various educational institutions, case studies, assignments, discussions
Practicum	• Compile articles from newspapers, magazines, and internet discussing present policies and operational strategies of central & state Govt. for Elementary Education. Prepare a report of entire activity. • Review research on educational management or management of elementary schools • Evaluation of management of SSA activities in a district. • Collect data from relevant sources on student & teachers ratio at elementary level. Is it according to provision of RTE act? Prepare a report on it. • Examine the effectiveness of any one programme run by central Govt. for elementary students. Present the report in a classroom seminar. • Analyze the quality & quantity of Mid-day meals in any rural school.

Suggested Readings:

- Altrichter, H. & Elliot, J. (2000). *Images of educational change. England*: Buckingham Open University.
- Bhattacharya, D.K. (2001). *Managing people*, New Delhi: Excel Books.
- Bush T., L. B. (2003). The *principles and practice of educational management*, (Eds.). New Delhi: Sage Publications.
- Bush, T. (2013). *Educational management, administration & leadership*. New Delhi: Sage Publications.
- Chauhan,S.(2012). *Educational management.* New Delhi: Pearson Publication.
- Dawra, S. (2003). *Management thought*. New Delhi: Mohit Publication.
- Dhillan, S.S. (2019). *Educational administration: management and leadership*. New Delhi: Gyan Geeta Publications.
- Harigopal, K. (2001). *Management of organizational change*. New Delhi: Response Books.
- Lunenburg, F.C. & Orenstein, A.C. (2012).*Educational administration- Concept & practices*. Canada, USA: Wadsworth, Cengage Learning Solutions.
- Luthans, F. (2005). *Organisational behavior*. New York: McGraw-Hills Inc.

- McCaffery, P. (2004). *The higher education manager's handbook*. New York and Canada: Routledge.
- Nair, S.R. (2004).*Organizational behaviour- Texts and cases*. Mumbai: Himalaya Publication.
- Nangia, S.B. (2009). *Educational administration*. New Delhi: APH Publishing Corporation Publishing House.
- Northouse, P. (2018). *Leadership theory and practice*. New Delhi: Sage Publications.
- Owens, R.C. (2001). *Organizational behaviour in education*, Boston: Allyn and Bacon.
- Prasad, A. (2007). *University education administration and the law*. New Delhi: Deep& Deep Publications.
- Punia,V. (2004). *Managerial skills in educational administration*. New Delhi: Deep& Deep Publications Pvt. Ltd.
- Rita, S. (2004). *Assessment and accreditation in higher education*. New Delhi: Association of Indian Universities.
- Sayeed, O. B. and Pareek, U. (2000). *Actualizing managerial roles*. New Delhi: Tata McGraw-Hill Publishing Company Limited.
- Sharma, R. A. (2009). *Educational administration & management*. Meerut: R Lal Book Depot.
- Sindhu, I.S. (2012). *Educational administration & management*. New Delhi: Pearson Publications.
- Srivastav, A.K. (2009). *Educational administration policy, planning and survey*. New Delhi: Kunal Books.

Year	I	DISTANCE AND OPEN LEARNING	Credits	4
Semester	I		Course code	SOE 01 01 03 DCEC 3104
Learning Outcomes	After completion of the course, students will be able to: ● Understand the philosophy of open and distance learning. ● Differentiate different modes of learning. ● Develop the understanding of management and technological tools in open and distance learning. ● Reflect on various evaluation techniques in distance education.			
Course Content				
Unit-1	**Philosophy of Distance Education and Open Learning (Online)** ● Concept, nature and importance of distance and open learning. ● Need, scope, advantages and limitations of distance and open learning. ● Philosophy of distance education and open learning – International and National. ● Correspondence and open education: Development, objectives modes and Indian Perspective of open learning..			
Unit-2	**Communication aspects of Distance & Open Learning** ● Communication Technology for Distance Education ● Audio Technology, Video Technology, satellite based communication system, Mobile Technology ● Role of Mass Media ● Computer Technology			
Unit-3	**Instructional Process of Distance & Open Learning** ● Instructional process in distance and open learning, ● Content Development for distance education and Open Learning ● Technology use and integration in Distance education and open learning ● Professional Development of staff with reference to Distance Education and open learning			

Unit-4	**Evaluation Procedure in Distance Education and Open Learning (Online)** • Learner Support Services and Learning Management System • Recommendations of NPE (1986) ,NKC (2005) and NEP 2020 regarding distance education and open learning (NEP) • Evaluation techniques in Distance Education and Open Learning, • Comprehensive and continuous evaluation in Distance Education & Open Learning.
Teaching learning process/Transaction Strategies	Web based learning, Lectures, Debates, Assignments, Projects, PowerPoint Presentations, and Demonstration.
Practicum	• Review of a book on distance education. • Assignment on the need and relevance of distance education system, in India at elementary/secondary/higher levels. • Review of CIET/UGC/IGNOU TV Programmes, and preparation of report.

Suggested Readings:

- Crompton, H. (2018). *Mobile learning and higher education: challenges and context*. India: Routledge.
- Criscito Pat (2004). *Barron's guide to distance learning.* London: Barron's E. Publisher.
- Garrison, D. R. (1989).*Understanding distance education framework for future*. Chapman and Hall, London: Routledge.
- Holmberg, B. (1985).*Status and structure of distance education* (2nd Ed.). Lector Publishing.
- IGNOU (1988). *Growth and philosophy of distance education, (*Block 1, 2 & 3*)*. New Delhi: IGNOU.
- Mohanty, J. (2001). *Studies in distance education*. New Delhi: Deep & Deep Publication.
- Nandra, I.S. (2010): *Distance and open education*; Patiala: Century Publication.
- Pandey, U. (2017). Optimizing open and distance learning in higher education institutions. New Delhi. IPI Global.
- Prarad D. Chandra (2007). *Distance education*. New Delhi: K.S.K. Publishers.
- Race, Phil (1994).*The open learning handbook*, Second Edition. London: Kogan Page.
- Rathore, H.C.S. (1993).*Management of distance education in India*. New Delhi: Ashish Publishing House.
- Sharma S. (2002).*Modern methods of lifelong learning and distance education*. Meerut: International Publishing House.
- Sharma, R.A. (2008). *Distance Education*. Meerut: International Publishing House.

Generic Elective Course (GEC)

<table>
<tr><td>Year</td><td>I</td><td rowspan="2">LIFE SKILLS IN EDUCATION</td><td>Credits</td><td>4</td></tr>
<tr><td>Semester</td><td>I</td><td>Course code</td><td>SOE 01 01 01 GEC 3014</td></tr>
<tr><td colspan="2">Learning Outcomes</td><td colspan="3">After completion of the course, students will be able to:
Explain the concept of life skills, social and emotional learning and value education.
Describe the concept of thinking skills; strategies of coping with emotions
Design lesson plans to teach social and emotional learning
Reflect on the importance of communication skills, empathy, team building and interpersonal skills in educational settings.</td></tr>
<tr><td colspan="5">Course Content (This course is based on NEP recommendations)</td></tr>
<tr><td>Unit-1</td><td colspan="4">Concepts related to Life Skills (NEP)
Concept of life skills and importance of life skills in present context (online mode)
Classification of life skills: Generic, Problem specified and area specific skills
Life Skills Education in Indian context
Contribution of various national and international organizations to life skill education.</td></tr>
<tr><td>Unit-2</td><td colspan="4">Thinking Skills (NEP)
Thinking
Nature, elements of thought , types of thinking, creative and critical thinking
Problem Solving
Definition, steps in problem solving
Factors influencing problem solving
Decision Making
Consequences, models of decision making, goal setting</td></tr>
</table>

Unit-3	**Coping Skills (NEP)** • **Coping with Emotions** • Definition, characteristics, types of emotions - causes and effects of different emotions • Strategies of coping with emotions and managing emotions: Classroom discussion; brainstorming; role-plays, audio and visual activities e.g arts, music, theatre, dance; case studies, storytelling, debates **Teaching Social and Emotional Learning(SEL)** (online mode) • SEL frameworks and teaching approaches for SEL • Lesson Planning for SEL, Assessment strategies for SEL
Unit-4	**Life Skills** (online mode) (NEP) • Communication skills • Empathy building • Cooperation and Team building • Interpersonal skills
Teaching learning process/Transaction Strategies	Lecture Method, Activity based Method, Survey Method, Cooperative Learning, Blended Learning
Practicum	Under the Life Skills Project, the students are expected to design activities to develop the following ten life skills. 1. Self-Awareness 2. Empathy 3. Problem Solving 4. Decision Making 5. Effective Communication 6. Interpersonal Relationships / Friendships 7. Creative Thinking 8. Critical Thinking 9. Coping with Emotions and 10. SEL The following strategies are suggested to design activities: Role-plays, Arts, Music, Theatre, Dance, Storytelling, Debates etc. on diverse issues in the form of workshops.

Suggested Readings :

- Braisby, N., & Gellatly, A. (2012). *Cognitive psychology*. Oxford: Oxford University Press
- Dahama O.P., Bhatnagar O.P, (2005). *Education and Communication for Development.* (2). New Delhi: Oxford& IBH Publishing Co. Pvt. Ltd. Debra McGregor, (2007).*Developing Thinking; Developing Learning - A guide to thinking skills in education*. New York, USA: Open University Press.

- Delors, J. (1997). *Learning: The Treasure Within*. Paris: UNESCO
- Karen, G. D. & Eastwood, A. (2008). *Psychology for Living Adjustment, Growth and Behaviour Today.* (8).New Delhi: Pearson Education Inc.
- Hockenbury (2010). *Discovering Psychology*. New York: Worth Publishers.
- Halonen, S. J., Santrock, W. J. (2009).*Psychology: Context & Application.*USA: McGraw-Hill Companies Inc., (3).
- Moore, B. N., & Parker, R. (2016). *Critical thinking*. Dubuque, IA: McGraw-Hill Education.
- Rajasenan, V. N. (2010). *Life Skills, Personality and Leadership*. Tamil Nadu: Rajiv Gandhi National Institute of Youth Development.
- Cottrell, S. (2005). *Critical Thinking Skills: Developing Effective Analysis and Argument*. New York: Palgrave Macmillan Ltd.
- Sternberg, R. J., & Mio, J. S. (2009). *Cognitive psychology*. Belmont (CA): Wadsworth.
- UNESCO (1999). *Adult Education: The Hamburg Declaration*. Paris: UNESCO.
- UNESCO (2005). *Quality Education and Life Skills: Darkar Goals*. Paris: UNESCO.
- WHO (1999). *Partners in Life Skills Education: Conclusions from a United Nations Inter-Agency Meeting*. Geneva: WHO.
- Santrock, W. J. (2006). *Educational Psychology*. New Delhi: Tata McGraw-Hill Publishing Company Ltd. (2).
- Dakar Framework for Action. (2000). *Education for All: Meeting our Collective Commitments*. Dakar, Senegal.
- Life Skills Resource Manual, Schools Total Health Program. (2006). Chennai: Health Education and Promotion International Inc.
- Kumar .J. Keval. (2008).*Mass Communication in India.* JAICO Publication India Pvt. Ltd.
- Morgan & King. (1993). *Introduction to Psychology*. New Delhi. Tata McGraw-Hill Publishing Company Ltd.
- Rao. P.L. (2008). *Enriching Human Capital through Training and Development.* Delhi: Excel Books.
- Singh, M. (2003). *Understanding Life Skills*. Background paper prepared for Education for All: The Leap to Equality
- UNESCO and Indian National Commission for Cooperation with UNESCO (2001). *Life Skills in Non-formal Education: A Review*.
- *YUVA School Life Skills Programme: Handbook for Teacher.* (2008).Delhi: Department of Education and State Council of Educational Research and Training. *I – IV.*

Web-Resources

- Tull, M., Post Traumatic Stress (PTSD). (2010, January 30th). *How to Monitor Your Emotions and Increase Emotional Awareness.* Retrieved from. http://ptsd.about. com/
- *A Life Skills Program for Learners in Senior Phase*. (2002). University of Pretoria. Chapter in Thesis. Retrieved from: http://www2.ed.gov/offices/OVAE/AdultEd/OCE/SuccessStories/success.pdf ·
- *Life Skills Based Education*. (2011). Wikipedia. Retrieved from: http://en.wikipedia.org/wiki/Life_skills-based_educaion ·
- *Life Skills Based Education CCE*. (2009). CBSE. Retrieved from: http://www.cbse.nic.in/cce/life_skills_cce.pdf ·
- Ministry of Education. (2006). *Senior Secondary Phase*. Republic of Namibia. Retrieved from: http://www.nied.edu.na/publications
- https://canvas.instructure.com/courses/1879941

- https://www.unicef.org/india/media/2571/file/Comprehensive-lifeskills-framework.pdf
- https://www.unodc.org/pdf/youthnet/action/message/escap_peers_07.pdf
- https://canvas.instructure.com/courses/2700844

Semester-II

<table>
<tr><td>Year</td><td>I</td><td rowspan="2">PHILOSOPHICAL FOUNDATIONS OF EDUCATION</td><td>Credits</td><td>4</td></tr>
<tr><td>Semester</td><td>II</td><td>Course code</td><td>SOE 01 02 06 C3104</td></tr>
<tr><td colspan="2">Learning Outcomes</td><td colspan="3">After completion of the course, students will be able to:
● State the meaning of education philosophy and illustrate its branches and categorize various types and sources of Knowledge.
● Explain constitutional values, Aims of education and Modern Concept of Philosophy.
● Classify Western and Indian Schools of Philosophy
● Reflect on the contribution of various educational thinkers (Indian and Western).</td></tr>
<tr><td colspan="5">Course Content</td></tr>
<tr><td colspan="2">Unit-1</td><td colspan="3">Conceptual Understanding of Educational Philosophy
● Concept and nature of Educational Philosophy, Relationship between Education and Philosophy.
● Branches of Philosophy: Metaphysics, Epistemology and Axiology and their educational implications. (ONLINE)
● Knowledge: Concept, nature and types of knowledge.</td></tr>
<tr><td colspan="2">Unit-2</td><td colspan="3">Indian Schools of Philosophy
● Indian Schools of Philosophy and their educational implications: Sankhya, Vedanta, (Buddhism, Jainism-ONLINE).</td></tr>
<tr><td colspan="2">Unit-3</td><td colspan="3">Western Schools of Philosophy
● Western Schools of Philosophy and their educational implications: Idealism, (Naturalism, Pragmatism-ONLINE), Existentialism.</td></tr>
</table>

Unit-4	**Contribution of Educational Thinkers** • J. Krishnamurthy • Rabindranath Tagore (ONLINE) • John Dewey (ONLINE) • Paulo Friere.
Teaching learning process/Transaction Strategies	Projects, Debates, illustrations, presentations, Lecture cum Discussion Method, E-learning, assignments on different key areas, panel discussion, brainstorming sessions.
Practicum	• Group discussion on the role of values in our life. • Assignments on different key areas given in the syllabus. • Panel discussion on importance of educational philosophies. • Any other activity suggested by the teacher.

Suggested Readings:

- Aggarwal, J.C. (2013). *Basic ideas in education*. New Delhi: Shipra Publications.
- Bailey, Richardet. al. (2010). *Philosophy of education*. U.S.A.: Sage Publication Ltd.
- Barrow, R. (2010). Schools of Thought in Philosophy of Education. In Bailey, R. Barrow, Carr, D., & McCarthy, C.(ed.), *The SAGE Handbook of Philosophy of Education*. London: Sage Publications.
- Bharathy, V., & Rao, D. B. (2015). *Educational philosophies of Swami Vivekananda and John Dewey*. New Delhi: APH Publications Corporation.
- Carr, D. (2010). *The Philosophy of Education and Educational Theory*. In Bailey, R. Barrow, Carr, D., & McCarthy, C. (ed.), *The SAGE Handbook of Philosophy of Education*. London: Sage Publications.
- Chand, J. (2010). *Philosophical foundation of education*. New Delhi: Anshah publishing house.
- Coulby, D. & Zambeta, G. (2005). *Globalization & nationalism in education*. New York: Routledge.
- Deshpande, S. (2004). *Contemporary India: a sociological view*. New Delhi: Penguin.
- Gupta, R. (2011). *Philosophical, sociological and economic bases of education*. Ludhiana: Tondon Publications.
- Gupta, R. (2012). *Shiksha ke darshnik, samajshastriya aurarthik adhar*. Ludhiana:Tondon Publications.
- Kaur. (2018). *Philosophical and sociological perspectives in education.* New Delhi: ABD Publishers.
- Kenkel, W.F. (1980).*Society in action: Introduction to sociology*. New York: Harper and Row.
- Kumar, A. (2015). *Philosophical perspective of education*. New Delhi: APH Publishing Corporation.
- Mathur S.S. (2008). *A Sociological approach to Indian Education*. Agra: Vinod Pustak Mandir.
- Ministry of Education (1985). *Challenges of Education-A policy perspective.* New Delhi: Govt. of India.
- Ministry of Education (1993). *Education for all: The Indian Scene*. New Delhi: Govt. of India.
- Ozmon, H. A. (2017). *Philosophical foundations of education*. New Jersey: Pearson Publication
- Pandey, R.S. (1997). *East west thoughts on education*. Allahabad: Horizon Publishers.

- Phillips, D.C. (2010). *What is Philosophy of Education?* In Bailey, R. Barrow, Carr, D., & McCarthy, C. (ed.), *The SAGE Handbook of Philosophy of Education*. London: Sage Publications.
- Pring, R. (2010). *The philosophy of education and educational practice*. In the sage handbook of philosophy of education. Bailey, R. Barrow, Carr, D., & McCarthy, C. (ed.). London: Sage Publications.
- Siegel, H. (2010). *Knowledge and truth*. In Bailey, R. Barrow, Carr, D., & McCarthy, C. (ed.), *The sage handbook of philosophy of education*. London: Sage Publications.
- Singh, Y. K. (2014). *Education philosophy of Mahatma Gandhi*. New Delhi: APH Publishing Corporation.
- Sodhi T.S. & Suri A. (1998). *Philosophical and sociological foundation of education*. Patiala: Bawa Publications.
- Vallikkat, S. (2015). *Philosophy of education*. New Delhi: APH Publishing Corporation.
- Vashishtha, U. C. (2011). *Educational philosophy*. New Delhi: APH Publishing Corporation.
- Walia, J.A. (2011).*Modern Indian education and its problems*. Gopal Nagar, Jalandhar City: Paul Publishers

Web Resources

- **https://www.cukashmir.ac.in/departmentdocs_16/WESTERN%20SCHOOLS%20OF%20PHILOSOPHY%20-%20Dinesh%20Kumar%20K.pdf, https://shodhganga.inflibnet.ac.in/bitstream/10603/68349/7/07_chapter%202.pdf**
- **http://www.ibe.unesco.org/sites/default/files/krishnamurtie.pdf**
- **http://www.ijcrar.com/vol-4/T.%20Pushpanathan.pdf**
- **https://files.eric.ed.gov/fulltext/ED564712.pdf, https://files.eric.ed.gov/fulltext/EJ1158258.pdf, http://sabarishedn.blogspot.com/2014/02/educational-philosophy-of-paulo.html**

Year	I	SOCIOLOGICAL FOUNDATIONS OF EDUCATION	Credits	4
Semester	II		Course code	SOE 01 02 07 C3104
Learning Outcomes	After completion of the course, students will be able to: ● Explain the concept & nature of educational sociology and sociology of education, relationship of sociology and education. ● Classify the social Institutions, list agencies of socialization and their functions in education. ● Discuss the socialization cultural change & Social Stratification ● Reflect on the social Changes, Social Mobility and National Values enshrined in the Indian constitution.			
Course Content				
Unit-1	**Concept of Educational Sociology and Sociology of Education** ● Educational Sociology, Sociology of education, Relationship of Sociology and Education. (ONLINE) ● Social foundations of education. ● Education as a socially contrived system influenced by social, cultural, political, economical			
Unit-2	**Social Institutions and types, Social Group and Social interaction.** ● **Concept and types of social Institutions and their functions in education (family, school and society). (ONLINE)** ● **Meaning, Definition, Characteristics and Types of Social Groups, (ONLINE)** ● Meaning, Characteristics and Factors of Social Interaction, Educational Implications of Social Interaction, ● Concept and Definition of Group Dynamics, Educational Significance of Group Dynamics.			
Unit-3	**Socialization and Education, Education and Culture** ● **Concept and Meaning of Socialization, Agencies of Socialization; Home, School and Community. (ONLINE)** ● **Social Stratification; Concept and educational implications. (ONLINE)** ● Role of education in cultural context, Education and cultural changes.			

Unit-4	**Social Changes, Social Mobility and National Values** ● Social changes: Concept and educational Implications, constraints to social changes in India. ● **Social Mobility and education. (ONLINE)** ● National Values as enshrined in the Indian Constitution – Socialism, secularism, justice, liberty, democracy, equality, freedom with special reference to education.
Teaching learning process/Transaction Strategies	Lecture cum Discussion, Debates, illustrations, presentations, Projects Method, E-learning, assignments on different key areas, panel discussion, brainstorming sessions.
Practicum	● Group discussion on social changes and its role in our life. ● Assignments on different key areas given in the syllabus. ● Panel discussion on education and its cultural context. ● Any other activity suggested by the teacher.

Suggested Readings:

- Abrahan F. &Margan, J. (2002). *Sociological thought.* New Delhi: *MC Millian India Ltd.*
- *Banks (2018). An Introduction to Multicultural Education.* New Delhi*: Pearson.*
- *Gore, M.S. (1984). Education and modernization in India.* Jaipur: *Rawat Publishers.*
- Hanighurst, R. (1995). *Society and education.* Boston: Allyn and *Bacon.*
- Harlambos, M. (1997).*Sociology theme and perceptive.* New Delhi: *OUP.*
- Havighurst, Robert et al. (1995). *Society and Education*. Baston: Allyen and Bacon.
- Inkeles, Alex. (1987). *What is Sociology?* New Delhi: Prentice Hall of India.
- Jayapalan N. (2001). *Sociological theories*. New Delhi: Atlantic Publishers and Distributers.
- Kamat, A.R. (1985). *Education and social change in India.* Bombay: Samaiya Publishing Co.
- Lal, R.B. & Palod, S. (2016*). Philosophical & Sociological perspectives of education.* Meerut: R.Lall Publications.
- M.H.R.D. (1990). *Towards an enlightened and human society. New Delhi: Department of Education.*
- Mathur, S.S. (1966). *Sociological approach to Indian education. Agra: Vinod Pustak Mandir.*
- Maubnhein K. (1962). *An introduction to sociology of education. London: Routledge.*
- Mossish, Loor (1972). *Sociology of Education: An Introduction.* London: George Lalen and Unwin.
- Mukerjee, R. K. (1969). *Ancient Indian Education*. Varanasi: Motilal Banarsidas.
- Narvane, V. S. (1978). *Modern Indian Thought*. New York: Orient Longmans Ltd.
- Pandey, K.P. (1983). *Perspective in Social Foundations of Education. Gaziabad: Amita Prakashan.*

- Rao, Shanker, C.N. (2002*). Sociology, primary principles. New Delhi: S. Chand & Co.*
- Saxena, S. (2001). *Philosophical and sociological foundation of education. Meerut: Surya Publications.*
- Singh, A.(2018). *Emerging trends in education and future vision. New Delhi: Omega Publications*
- Singh, B.N. (2005). *Education: social change and economic development. Jaipur: RBSA Publishers.*
- Snedden, D. (2018*). A digest of educational sociology. Australia: Trestie Publications*
- Sodhi, T.S. & Suri, A. (1998). *Philosophical and sociological foundation of education.* Patiala: Bawa Publication.

Web- Resources

- ***http://www.beykon.org/dergi/2016/SPRING/2016XI.I.10.A.Sen.pdf***
- ***https://www.bmartin.cc/pubs/90psa2/90psa2_Rootes.pdf***
- ***https://www.cliffsnotes.com/study-guides/sociology/the-sociological-perspective/three-major-perspectives-in-sociology***
- ***https://www.ebscohost.com/uploads/imported/thisTopic-dbTopic 1248.pdf***
- ***https://laulima.hawaii.edu/access/content/user/kfrench/sociology/The%20Three%20Main%20Sociological%20Perspectives.pd***
- ***https://study.com/academy/lesson/sociologys-four-theoretical-perspectives-structural-functional-social-conflict feminismsymbolic-interactionism.html***
- ***https://en.wikibooks.org/wiki/Introduction_to_Sociology/Sociological_Theory***
- ***http://shiacollege.org/uploads/econtent/Basic%20Concept%20of%20Social%20Groups%20.pdf***
- ***https://files.eric.ed.gov/fulltext/EJ1201477.pdf***

<table>
<tr><td>Year</td><td>I</td><td rowspan="2">ADVANCE RESEARCH METHODOLOGY</td><td>Credits</td><td>4</td></tr>
<tr><td>Semester</td><td>II</td><td>Course code</td><td>SOE 01 02 08 C3104</td></tr>
<tr><td colspan="2">Learning Outcomes</td><td colspan="3">After completion of the course, students will be able to:
● Acquire and illustrate with examples the use of quantitative and qualitative research designs.
● Select suitable good data collection instruments in quantitative and qualitative research.
● Describe the meaning and assumptions of parametric and non-parametric tests.
● Choose and apply appropriate parametric or non-parametric tests for hypothesis testing</td></tr>
<tr><td colspan="5">Course Content / Syllabus (Whole course is available on University LMS)</td></tr>
<tr><td colspan="2">Unit-1</td><td colspan="3"><u>Research Designs</u>

Quantitative Research Designs:
● Descriptive Research
● Experimental Research: Experimental Designs
Qualitative Research Designs:
● Ethnography
● Case Study
● Grounded Theory
Mixed Method Designs: Concept and Types</td></tr>
<tr><td colspan="2">Unit-2</td><td colspan="3"><u>Tools and Techniques of Data Collection</u>

● Tools of data collection and their Characteristics of a good data collection instrument
● Quantitative data collection: Characteristics and uses of Questionnaire, Psychological Tests, Rating Scales and Socio-metric Techniques in Research
● Quantitative Data Collection: Characteristics and uses of Observations, Interview, Focus Group, Documents, Secondary Data
● Properties of a good measurement tool: Reliability, Validity; concept of standardized tests.</td></tr>
</table>

Unit-3	**Inferential Statistics (Parametric Tests)** ● Meaning and assumptions of parametric tests. ● Concepts related to Hypothesis Testing: Standard Error , Confidence Limits , Levels of Significance , Null Hypothesis ● One tailed and two tailed test; Two types of Error ● Hypothesis Testing: • t-Test: Concept, Assumptions, Computation and Uses • ANOVA (One Way and Two Way): Concept, Assumptions, Computation and Uses.
Unit-4	**Inferential Statistics (Non-Parametric Tests)** ● Meaning and assumptions of Non Parametric tests ● Concept, Computation and Uses of: • Chi-Square Test of Equality and Independence • Sign Test ● Mann Whitney U Test
Teaching learning process/Transaction Strategies	Discussion on qualitative and quantitative research studies , practice on data with various statistical methods, case studies and assignments
Practicum	1. Writing of a term paper on the given course contents. 2. Planning and Development of instructional design for online modules using appropriate approach. 3. Development of e portfolios and online assessment 4. Critical review of online education initiatives(any two) 5. Interface with the educational technology industry (through excursion).

Suggested Readings:

- Best, J. W. and Kahn, J. V. (1995). *Research in education.* New Delhi: Prentice Hall.
- Burns, R. B. (1991). *Introduction to Research in education.* New Delhi: Prentice Hall.
- Adward, Allen Literacy. (1968). *Experimental designs in psychological research*. New York: Holt, Rinehart and Winston.
- Creswell, J. W. (2017). *Educational research: Planning, conducting, and evaluating quantitative and qualitative research.* India: Pearson.
- Ferguson, G. A. (1976). *Statistical analysis in psychology and education*. New York: McGraw Hill.
- Garrett, H. E. (1973). *Statistics in psychology and education.* Bombay: Vakils, Feiffer and Simon.

- Guilford, J.P. and Benjamin, F. (1973). *Fundamental statistics in psychology and education.* New York: McGraw Hill.
- Johnson, B., & Christensen, L.B. (2020). *Educational research: Quantitative, qualitative, and mixed approaches*. USA: Sage
- Kerlinger, F. N. (1973). *Foundation of behavioural research.* New York: Holt, Rinehart and Winston.
- Koul, L. (1988). *Methodology of research.* New Delhi: Vikas.
- Kurtz, A.K. and Mayo S.T. (1980). *Statistical methods in psychology and education.* New Delhi: Narela.
- Lindquist, E.F. (1970). *Statistical analysis in educational research.* New Delhi, Oxford and IBH publishing House.
- Mangal, S.K. (2002). *Statistics in psychology and education.* New Delhi: Prentice Hall of India.
- Mann, P.S. (2015). *Introductory statistics.* NewYork: Wiley.
- Neuman, W.L. (1997). *An introduction to educational research methods: Qualitative and quantitative approaches*. Boston: Allyn and Bacon.
- Sharma, S.R. (2003). *Problems of educational research.* New Delhi: Anmol Publications Pvt. Ltd.
- Siegel, S. (1986). *Non-parametric Statistics*. New York: McGraw Hill.
- Travers, R.M. W. (1978). *An introduction to educational research*. New York: Macmillan.
- Springer, K. (2010). *Educational research: A contextual approach*. Hoboken, N.J: Wiley.

Year	I	CURRICULUM STUDIES	Credits	4
Semester	II		Course code	SOE 01 02 09 C3104
Learning Outcomes	**After completion of the course, students will be able to:** ● Describe the concept, scope and principles of curriculum development ● Get sensitized to curriculum as a process, product and praxis. ● Acquaint students with the different aspects of curriculum evaluation. ● Explain the models of curriculum evaluation			
Course Content				
Unit-1	**Conceptual framework of Curriculum** ● Meaning, definition and elements of curriculum ● Types of curriculum-hidden curriculum, integrated curriculum ● Determinants of curriculum (Philosophical, Sociological and Psychological)			
Unit-2	**The Evaluation of Curriculum (NEP, 2020)** ● Formative Evaluation: feedback and guidance for shaping the curriculum ● Summative Evaluation : appraisal of the emergent curriculum ● Models in Curriculum Evaluation: CIPP, Tyler			

Unit-3	**Curriculum Transaction (NEP, 2020), Online** • Flipped classroom • Collaborative learning • Team teaching • Factors influencing Curriculum Transaction
Unit-4	**Trends in Curriculum Development in India (Online)** • Mudaliar Commission • Basic education • Kothari Commission • National Curriculum Framework, 2005
Teaching learning process/Transaction Strategies	Assignments and workshop on curriculum development and evaluation
Practicum	• Identify curriculum perspectives in the literature and develop an annotated bibliography • Identify issues and methods in your own discipline by supporting with relevant literature review on a curriculum topic of your choice. • Assignment on critically reflecting on the issues discussed on the theoretical foundations of curriculum construction and commenting on the future of curriculum theory.

Suggested Readings:

- NCERT. (2006). *Position paper: National focus group on aims of education*. National Council of Educational Research and Training, Delhi, India.
- Kumar, K. (1992). *What is worth teaching? In what is worth teaching*. (1 – 22). Delhi: Orient Longman
- Dhankar, R. (2003). *Aims of Education: Policy documents and demands of democracy.*
- Glickman C. D. (2011). *Dichotomizing educational reform*. In Ornstein.
- Pajak, & Ornstein (Eds.). *Contemporary issues in curriculum*. Pearson. *32*(5), 328-335.
- Egan, K. (2003). *What is curriculum? Journal of the Canadian Association for Curriculum Studies*. 1(1), 66-72.
- Haggerson, N. L. Jr. (2000). *Expanding curriculum research and understanding: A mytho- poetic perspective*. New York: Peter Lang.
- Jackson, P. W. (1992). *Handbook of Research on Curriculum.* NY: Macmillan Publishing Co.
- Marsh, C.J. (2009). *Key Concepts for understanding curriculum.* Taylor and Francis.

- Young, M. (2007). *What are schools for? Education Sociology. 28* (101), 1287-1302.
- Kumar, Krishna. (1999). *Listening to Gandhi. What is worth teaching?* New Delhi: Orient Longman. 111 - 128. (or Kumar, K. (1998). Buniyadi Shikshaki prasangigkta. Shikshavimarsha)
- Tagore, R. (1951/2000). *What is real education? In Devi Prasad* (Ed.) *Rabindranath Tagore philosophy of education and painting*. New Delhi: NBT. 43 – 50.
- National Council of Educational Research and Training. (2005). *National Curriculum Framework.* (Yash Pal, Chairman). National Council of Educational Research and Training, Delhi, India. (Foreword, acknowledgement, executive summary and the steering committee description)
- National Council of Educational Research and Training. (2006). *Position paper: National focus group on curriculum syllabus and textbook,* (Rohit Dhankar, Chairman). National Council of Educational Research and Training, Delhi, India.
- Posner, G. J. (1998). *Models of curriculum planning.* In L. E. and M. W. Apple (Eds.) *The curriculum: Problems, politics and possibilities.* New York: Sunny Press. *2*, 79-91.
- Anderson, L. W., & Krathwohl, D.R. (2001). *A taxonomy for learning, teaching and assessing: a revision of bloom's taxonomy of educational objectives*. Addison Wesley Longman.
- Apple, M. W. (1993). *The politics of official knowledge: Does a national curriculum make sense? Teachers college record*. Winter, Teachers College, Columbia University. *95*(2).
- Kumar, K. (1988). *Origins of India's "textbook culture".* Comparative Education Review. 2 (4), 452-464.
- Ahvaan trust & Ambedkar University, Delhi. (Forthcoming). *Teachers in conversation proceedings of two focus group discussions with teachers.*
- Apple, M.W. and Beane, J. A. (2007). *Democratic schools: Lessons in powerful education.* (2). Heinmann.
- Pathak, A. (2002). *Mirambika: An alternative school. In Social implications of schooling: Knowledge, pedagogy and consciousness*. Noida: Rainbow Publishers. 166 – 235.
- Vineeta, Sood. (2012). Foreword to Indian edition. In Gatto, J. T., *Weapons of mass instruction: A school teacher's journey through the dark world of compulsory schooling.* Indore: Banyan Tree. vii-xiv.
- Documentaries: Summerhill; HSTP
- Kelly, A.V. (2009). *The curriculum theory and practice*. Sage.
- Marsh, C. J. (2004). *Key concepts for understanding curriculum* (3). London: RoutledgeFalmer.
- Flinders, D. J. and Thorton, S. J. (Eds.). (2009). The curriculum studies reader (3). New York: Routledge.
- MHRD (2012). *Vision of Teacher Education in India Quality and Regulatory Perspective* (Report of the High-Powered Commission on Teacher Education constituted by Hon'ble Supreme Court of India), Department of School Education & Literacy, MHRD, Government of India, New Delhi.
- James, K.Mc. (2007): *Curriculum and Imagination: Process, Theory, Pedagogy and Action Research.* Routledge. U.K.
- National Curriculum Framework (2005): New Delhi: NCERT.
- Ornstein, A.C & Hunkins, F.P, (2018). *Curriculum: Foundations, Principles and Issues* (7). New York: Pearson
- Ornstein, P. & Ornstein. A.C. (2011). *Contemporary Issues in Curriculum* (5). New York: Pearson

- Slattery, P. (2006). *Curriculum Development in the postmodern Era* (2). Routledge .

Year	I	ACADEMIC WRITING	Credits	2
Semester	II		Course code	SOE01 02 09 C3104
Learning Outcomes	**After completion of the course, students will be able to:** ● Describe the essential requirements of academic writing and distinguish a good academic writing from others. ● Build capacities for self-criticism and facilitate self- growth.			
Course Content	● Introduction to the Writing Process (online) ● Writing in one's own words: Summarizing and Paraphrasing (online) ● Write a professional report of any workshop and seminar (online) ● Critically analyze two research papers on the topic of your interest and write a report on it. ● Book Review: Any Text Book/Novel/Book			
Teaching learning process/Transaction Strategies	Workshop, Assignments, Organizing seminars			
Practicum	● Workshop on listening, conversing, speaking, presenting, explaining and expositing ideas in groups and before an audience. ● Write a paragraph on any topic of interest, then acknowledge the source & edit one's own writing. Prepare a report on the entire programme. ● Attend a seminar/workshop or conference and write a report on the entire programme. ● Workshop on academic writing skill and report writing.			

Suggested Readings:

- *Academic English: Writing Specialization* (2019). Retrieved from https:// www.coursera.org/specializations/academic-english.

- Bailey. S. (2015). *Academic writing: A Handbook for International Students.* London and New York: Rutledge.
- Eric Hayot (2014). *The elements of academic style: Writing for the humanities.* US: Columbia University Press.
- Labaree, R.V. (2009). *Organizing your social sciences research paper: Academic writing style.* Retrieved from libguides.usc.edu/writing guide/academic writing
- Murray, N. (2012). *Writing essays in english language and linguistics*. UK: Cambridge University Press.
- Olivia, V. (2019). *An introduction to academic writing: Characteristics and common mistakes to avoid.* Retrieved from https:// www.thoughtco.com /what-is -academic-writing-1689052

Year	**I**	**INTERNSHIP AND FIELD ENGAGEMENT**	**Credits**	**2**
Semester	**II**		**Course code**	**SOE 01 02 11 C0022**
Learning Outcomes		• Internship program is aimed at providing practice of the concepts and skills learned in theoretical papers in the field of education such as schools, teacher education institutes apart from where the scholar is studying.		

Plan of Activities:

Sr. No.	**Phase**	**Name of Activity**	**Duration**
1	Part -One	Pre Internship training (Each student is required to deliver at least one lecture to B.Ed. students of School of Education)	01 Week
2	Part - Two	Observation of Internship Activities of B.Ed. students	01 Week
3	Part-Three	Attachment in Teacher Training Institution.	02 Week

Total Duration of Internship	**04 Week**

Part-A:

This phase is preparatory in nature aimed at providing students with necessary guidance and skills enriching their field based engagement. In this phase each M.Ed. a student is required to take a minimum of One Pedagogy paper class in the B.Ed. course of the Department.

Part-B:

Each student is required to observe the internship activities of B.Ed. students attached to a high school / higher secondary school for school based internship programme. The students are required to observe at-least five lessons of B.Ed. students and should maintain a separate observation record. The students are also expected to familiarize themselves with the school practices including school administration, organization of curricular and co-curricular activities.

Part-C:

Each M.Ed. a student is required to take a minimum of 06 classes in B.Ed. college/DIET either in core papers or in optional papers or both taken together under the close mentorship of teacher educators of the institution selected for internship related activities. The students are also expected to familiarize themselves with the college practices including administration, organization of curricular and co-curricular activities. The students are also expected to collectively organize at least one activity.

The suggestive list are as follows:

- Teaching learning material making competition
- Drawing / poster making competition on themes related to education
- Organize an innovative teaching learning material making workshop.
- Debate/ Essay writing/ Slogan competition.
- Nukkad Natak
- Cleanliness Drive
- Workshop on Micro-teaching Skills

Year	I	DISSERTATION-I	Credits	2
Semester	II		Course code	SOE 01 02 12 C0022
Learning Outcomes		**After completion of the course, students will be able to:** ● Understand the process of conducting research and preparing the research proposal. ● Apply the steps of writing review of related literature and identification of research gap.		
Course Content		● Research problem: Concept, identification and specification of the research problem ● Review of related literature: Concept, importance and identification of the research gaps ● Introduction to various referencing styles ● Research proposal: Concept and preparation of research proposal		

(Note: In this part of Dissertation each student is required to undertake the aforesaid activities under the guidance of their respective supervisors)

Departmental Elective Courses

Year	I	GUIDANCE & COUNSELLING	Credits	4
Semester	II		Course code	SOE 01 01 04DCEC 3104
Learning Outcomes	**After completion of the course, students will be able to:** ● Explain the meaning and concept of guidance and counselling in India. ● Exhibit various techniques for guidance and counselling. ● Develop competencies for various approaches of counselling. ● Encourage practices to promote group activities for addressing factors affecting mental health.			
Course Content				
Unit-1	**Introduction to Guidance** ● Guidance: Concept, Principles and Functions ● Types of Guidance: Educational, Vocational, Social, Personal, health and Social Guidance(Online) ● Role of teachers in guidance ● Contemporary Models of Guidance: Mathewson			
Unit-2	**Introduction to Counselling (NEP)** ● Concept, Principles, Techniques & Procedure of Counseling ● Counselor: Characteristics, Functions (Online) ● Ethics of counsellor ● Skills of Counseling: Building Trust, Listening, Observation & Empathy			
Unit-3	**Approaches and theories of counselling** ● Approaches of Counseling: Directive, Non-Directive, Eclectic Counseling ● Cognitive-behavioural approach (CBT): Aaron T. Beck ● Rational emotive behaviour approach (REBT): Albert Ellis (Online) ● Theories of Counseling: Psychoanalytic, Behaviouristic			

Unit-4	**Mental Health and Well Being (NEP)** ● Concept of Well Being(Online) ● Concept of Mental Health ● Factor Affecting Mental Health ● Promoting Positive Mental Health at Work Place
Teaching learning process/Transaction Strategies	Lectures, discussions, use of psychological tests, observation of students, conducting career guidance in the schools, counsel students by identifying their mental health problems such as lack of concentration, anxiety, anger etc.
Practicum	1. Prepare an interview schedule for an effective Counseling 2. Visit a guidance Centre and Write a report about its organization and functions. 3. Write a research report on – Issues and trends in Guidance and Counseling

Suggested Readings:

- Aggarwal, J.C. (2005). *Career information in career guidance theory & practice*. Delhi: Doaba House.
- Aggarwal, R. (2010).*Elementary guidance and counselling*. New Delhi: Shipra Publication.
- Bala, Rajni. (2007).*Guidance and counselling: Modern Review*. New Delhi: Afa Publication.
- Burnard, P. (2005). *Counselling Skills Training*. New Delhi: Viva Book Private Limited.
- Chandra, R. (2009). *Career information and guidance and counselling*. Delhi: Isha Books.
- Chandanpat (2018). *Guidance and counselling*. ND: Educational Publisher & Distributor.
- Chauhan, S.S. (2007). *Principle and techniques of guidance.* New Delhi: Vikas Publishing House.
- Dev, K. (2005). *Educational guidance*. New Delhi: Pragun Publication.
- Gibson, R. L. & Mitchell, M. (2008). *Introduction counselling and guidance*. New Delhi: PHI Learning Pvt. Ltd.
- Gibson, Robert L. & Mitchell, Marianne, H. (2016). *Introduction to counselling and guidance*. New Delhi: Pearson Prentice Hall in India.
- Gladding, R. (2018). *Introduction to counselling.* ND: Pearson.
- Gupta, M. (2005). *Effective guidance & counselling.* Jaipur: Mangaldeep publications.
- Kochhar, S. K. (2006). *Educational and vocational guidance in secondary education*. Delhi: Sterling Publications.
- Kochhar, S.K. (2009). *Guidance & counselling in colleges & universities*. New Delhi: Sterling Publishers Pvt Ltd.

- Koshy, J. (2007). *Guidance and counselling*. New Delhi: Dominant Pub. & Distributors.
- Kottler, J. A. & Shepard, D. S. (2008). *Counselling theories & practices*. Cenage Learning: 1st Edition.
- Madhukumar, I. (2007). *Guidance and counselling***.** New Delhi: Authors Press.
- Mathur, S. S. (2008). *Fundamentals of guidance & counselling, (*2). Agra: Aggarwal Publication.
- Mishra, R.C. (2004). *Guidance & counselling*. New Delhi: APH Publishing Corporation.
- Naik, D. (2007). *Fundamentals of guidance and counselling*. New Delhi: Adhyayan publishers.
- Pandey, V.C. (2006). *Educational guidance & counselling*. Delhi: Isha Books.
- Rao, S N. (2006). *Counselling and guidance.* Delhi: McGraw hill Publication.
- Rao, S. N. &Hari, H. S. (2004).*Guidance and counselling*. New Delhi: Discovery Pub. House.
- Safaya, B.N. (2002). *Guidance & counselling.* Chandigarh: Abhishek Publications.
- Saxena, A. (2006). *Organization of Guidance Service*. Delhi: Rajat Publications.
- Saxena, A. (2007). *Introduction to educational & vocational guidance*. Delhi: Rajat Publications.
- Sexena, A. (2007). *Modern techniques of counselling*. New Delhi: Rajat Publications.
- Sharma, R. A.(2011).*Fundamentals of guidance and counselling*. Meerut: R. Lal Book Depot.
- Sharma, S.P. (2008). *Career guidance & counselling*. New Delhi: Kanishka Publishers & Distributors.
- Sharma, T.C. (2002). *Modern methods of guidance & counselling*. New Delhi: Sarup& Sons.
- Sharma, Y.K. (2005). *Principles of educational & vocational guidance*. New Delhi: Kanishka Publishers.
- Shrivastava, K.K. (2003). *Principles of guidance & counselling*. New Delhi: Kanishka Publishers.
- Singh, R. (2002). *Educational & vocational guidance*. New Delhi: Commonwealth Publishers.
- Varky, B. G. & Mukhopadhyay, M. (2006). *Guidance and Counselling*. New Delhi: Sterling Publications.
- Vashist, S.R. (2004). *Evaluation of Guidance.* New Delhi: Anmol Publications Pvt. Ltd.
- Yadav, R.H. (2012). *Guidance & Counselling*. New Delhi: APH Publishing Corporation.

Year	I	Gender, School and Society	Credits	4
Semester	II		Course code	SOE 01 01 05 DCEC 3104
Learning Outcomes	**After completion of course students will be able to:** ● Explain the key concepts-gender, gender bias, gender stereotype, empowerment, describe the policies, plans and schemes of the government for addressing all forms of disparities and inequalities existing in the society ● Reflect on gender issues in school, curriculum, textual materials across disciplines, pedagogical processes and its intersection with class, caste, religion and region; and ● Develop professional competencies to address gender based violence in all social spaces and evolve strategies for addressing it. ● Exhibit practices and strategies to create gender inclusive classrooms.			
Course Content				
Unit-1	**Gender Issues: Key Concepts** ● Gender and Sex ● Gender roles ● Socio-economic and cultural aspects of gender ● Gender identities and socialization			
Unit-2	**Gender and Media (Online)** ● Portrayal of Women in Mass Media (Cinema, TV, Print media), ● Autobiography ● Women in Folk culture ● Alternative media- Street play and Theatre **(NEP)**			

Unit-3	**Creating Gender Inclusive Classroom (NEP)** • Gendered texts: Curriculum, Textbooks • Teacher attitude and classroom processes • Producing the Gendered Self, Nurturing Masculinities and Femininities • Teacher as an agent of change
Teaching learning process/Transaction Strategies	Lecture, Brainstorming sessions,
Practicum	• Conduct a study to understand how power is used for sexual harassment in work place • Critically analyse different movies to understand the portrayal of women in cinema. • Visit different schools and by interacting with principals and supervisors find out the various conflict faced by them in institution and the ways they resolve them • Visit the educational institutions to understand the motivation strategies used by leaders to motivate their employees

Suggested Readings:

- Desai, Neera and Thakkar, Usha. (2001). *Women in Indian Society*. National Book Trust, New Delhi
- Geetha, V. (2002). *Gender.* Calcutta: Stree.1-10, 38-50 & 89-109.
- Menon, N. (2012). *Family, in idem seeing like a feminist.* New Delhi: Zubaan.1-50.
- Vincent, C. (2010).*The Sociology of Mothering.* In Michael W. Apple, Stephen J. Ball (Eds.) The Routledge International Handbook of the Sociology of Education, New York: Routledge. 109-120.
- Martin, J. R. (1986). *Redefining the Educated Person: Rethinking the Significance of Gender, Educational Researcher*. Special Issue: The New Scholarship on Women in Education. *15*(6) 6-10.
- Kumar, K. (2010). *Culture, State and Girls: An Educational Perspective', Economic & Political Weekly. 45*(17), 75-84.
- Manjrekar, N. (2003). *Contemporary Challenges to Women's Education: Towards an Elusive Goal.* Economic and Political Weekly. *38(43)*, 4577-4582.
- Kumar, K., & Gupta, L. (2008). '*What Is Missing in Girls' Empowerment?*. Economic & Political Weekly. *43* (26/27), 19-24.
- Balagopalan, Sarada (2010). '*Rationalizing Seclusion: A Preliminary Analysis of a Residential Schooling Scheme for Poor Girls in India'.* Feminist Theory. *11*(3), 295-308.
- Kalia, NarendraNath (1986). '*Women and Sexism: Language of Indian School Textbooks'.* Economic and Political Weekly. *21* (18), 794-797.
- Bhog, D. et al (2009). *Textbook Regimes: A Feminist Critique of Nation and Identity*. New Delhi: Nirantar, Selected Excerpts.
- Leach, F. (2003). *Practicing Gender Analysis in Education*. Oxfam

- NCERT 2006, National Curriculum Framework 2005: Position Paper, National Focus Group on Gender Issues in Education, New Delhi
- Chanana, K. (1988). *Socialization, education and women.* Nehru Memorial Museumand Library: New Delhi.
- Conway, J. K., et al .(1987). '*Introduction: The Concept of Gender',* Daedalus. Learning about Women: Gender, Politics, and Power (Fall): *116*(4), XXI-XXX
- Asghar, A. (1994). *'Status of Muslim Women',* Economic and Political Weekly. *29*(6), 297-300.
- Erikson, E. H. (1964). *'Inner and Outer Space: Reflection on Womanhood'*, Daedalus. The Woman in America: Spring. *93*(2), 582-606
- Ganesh, K. 1994. 'Crossing the Threshold of Numbers: The Hierarchy of Gender in the Family in India', Indian Journal of Social Science, 7(3 & 4): 355-62
- Ganesh, K. (1999). '*Patrilineal structure and agency of women: issues in gendered socialization'* in T. S.Saraswathi (ed.), Culture, Socialization and Human Development Delhi: Sage Publication India Pvt. Ltd.
- Government of India. (1975). *Towards Equality: Report of the Committee on the Status of Women in India*(Delhi: Department of Social Welfare, Government of India)
- Government of India. (1994).*The girl child and the family: an action research study*. Department of Women and Child Development Delhi: HRD Ministry,
- Kumar, K.(2010, April 24th). *'Culture, State and Girls: An Educational Perspective*. Economic and Political Weekly. *XLV* (17).
- Ridgeway, C. L., & Correll, S. J. (2004). *'Unpacking the Gender System: A Theoretical Perspective on Gender Beliefs and Social Relations'*. Gender and Society. *18*(4).

Year	I	Education of Disadvantaged Groups	Credits	4
Semester	II		Course code	SOE 01 01 06 DCEC 3104
Learning Outcomes		**After completion of course students will be able to:** ● Reflect on the policy perspectives related to education of socially disadvantaged section in India, ● Analyze the status of education of the socially disadvantaged children in the country ● Illustrate the educational opportunities required to meet the diverse needs of children- socio-cultural and linguistic. ● Discuss the skill to address social group inequality in school and, society,		
Course Content				
Unit-1		**Conceptual Understanding of Education of the Disadvantaged Groups:** ● Disadvantaged Sections of India: Scheduled Castes, Scheduled Tribes, Educationally backward minorities, girls, children from rural and slum children. ● Constitutional Provisions for social group equity and education of socially disadvantaged sections of India (online) ● National Policy on Education (1986), POA (1992), and National Curriculum Framework, 2005, NEP 2020 (online) ● International initiatives: Dakar Framework of Action (2000) and Millennium Development Goals (2000). (online)		
Unit-2		**Status of School Education of Disadvantaged Section in India** ● Status of enrollment at elementary and secondary stage with reference to social group equity, different access in habituations, class, caste, tribe and other disadvantaged groups. ● Achievement of disadvantaged children (Intelligent question, early identification) (online) ● Education of gifted and underachievers of disadvantaged group (NEP) (online) ● Remedial measures for disadvantaged section of society (NEP) (online)		

Unit-3	**Problems in education of disadvantaged section and addressing inequality** ● Problems in education of socially disadvantaged children, Social Empowerment and economic empowerment ● Multicultural education, multi-grade teaching in rural context. ● Organization and management of school to address socio-cultural diversity, bias in textbooks, hidden curriculum (teacher attitude, expectations). ● Teaching learning process and support materials, addressing language issues, curriculum and curricular activities for meeting diverse needs of children- socio-cultural and linguistic.
Unit-4	**Research priorities in the area of education of disadvantaged section (NEP)** ● Evaluation of centrally sponsored schemes of education of SCs, STs, girls and Minorities. ● Status study of education of SCs, STs, girls, and Minorities and other marginalized groups. ● Study of teaching learning practices and social inclusion. ● Case studies on innovative institutional practices-NVS, KGVBs, Madrassas etc.
Teaching learning process/Transaction Strategies	Discussions, debates, research trends analysis, case studies
Practicum	1. Visit to a Inclusive school and prepare a report 2. A study of inclusive school plant and compare with high excellent school. 3. Design and evaluate an Inclusive education programme. 4. Draft a counseling program for special need child in Secondary School. (Inclusive classroom child)

Suggested Readings:

- Bank, B.J. (2007).*Gender and education: An encyclopedia*. Westport, London: Praeger.
- Bhatt, B.D. & Sharma, S.R. (1992). *Women's education and social development*. Delhi: Kanishka.
- Fredman, S. (2018). *Human rights and equality in education: comparative perspectives on right to education of minorities and disadvantaged groups*. Germany: Lambart publications.
- Government of India (1986). *National policy on education*. New Delhi. Department of Education.
- Government of India (1992). *Programme of action*, New Delhi: MHRD, Department of Education.
- Mehrotra, S. (2006). Child malnutrition and gender discrimination in south Asia. *Economics and political weekly*.
- NCERT (2005): *National curriculum framework*. New Delhi: NCERT.
- NCERT (2006). *National focus group report on education of SCs and STs*. New Delhi: NCERT.
- Ramchandran, V. (1998). *Girls and women education: policies and implementation mechanism*. Case study: India, Bangkok, UNESCO.

- Scot Danforth& Terry J.S. (2005). *Engaging troubling students-A constructivist approach*.
- Sharma, M.C. & Sharma, A.K. (2003). *Discrimination based on sex, caste, religion and disability: Addressing through educational interventions; A handbook for sensitizing teacher and teacher educators*. New Delhi: NCTE & NHRC.
- ShehV. P. (1982). The *educational problems of scheduled caste and scheduled tribe school and college students in India*

Year	I	Comparative Education	Credits	4
Semester	II		Course code	SOE 01 01 06 DCEC 3104

Learning Outcomes	**After the completion of this course the students will be able to:** • Explain the concept, need, history and development of Comparative Education. • Reflection on the various contemporary issues in comparative education. • Compare and contrast the elementary and secondary education of the U.K., U.S.A. and India. • Describe the aims, content, methods of instructions and evaluation strategies related to teacher education and vocationalization courses in Finland and India.
Course Content	
Unit-1	**Conceptual Understanding of Comparative Education & Historical Development (online)** • Concept, scope, principles and aims of Comparative Education • Historical development of comparative Education • Approaches to Comparative Education: Historical, Philosophical, Sociological and Problem Approach • Factors influencing Education system in any country
Unit-2	**Elementary Education and secondary Education (U.K., U.S.A. and India)** • Elementary Education in UK, USA and India with reference to concept, aims, content, methods of instructions and evaluation strategies • Secondary Education in UK, USA and India with reference to concept, aims, content, methods of instructions and evaluation strategies • Concept of Universalization of Elementary Education in India and its implementation (DPEP, SSA and RTE Act, 2009) Concept of universal access and quality secondary education and its implementation(RastriyaMadyamikSikhshaAbhiyan) • Educational Administration in UK, USA and India

Unit-3	**Higher Education , Distance Education and Continuing Education** ● Higher Education in UK, USA and India: • Aims and objectives • Methods of Instructions and Evaluation strategies ● Distance and continuing Education in UK, Australia and India: • Aims and objectives • Methods of Instructions and Evaluation strategies
Unit-4	**Teacher Education and Vocational Education (online)** ● Teacher Education in Finland and India: Aims, content, Methods of Instructions and Evaluation strategies ● Salient Features of Vocationalization of Education in UK, USA and India • Meaning and Needs of Vocationalization of Education • Aims, Content, Methods of Instructions and Evaluation strategies ● Research trends in Comparative Education
Teaching learning process/Transaction Strategies	Discussions, debates, research trends analysis,
Practicum	1. Collect information regarding the education institutions in medieval period. 2. Collect information and make presentation on different types of universities.

Suggested Readings:

- Cramer, J.F. & Browne, C.S. (1965). *Contemporary education: A comprehensive study of national system.* New York: Brace and world, Inc.
- Humbersone, T.H. (2018). *A short history of education in great Britain and Ireland*. England: Forgotten books.
- Karen M., Kathy B. & Hayhoe R. (2017). *Comparative and international education, (2)*. Canada: Canadian Scholars' Press
- Naseema, C. &Jibin, V.K. (2012). *Comparative education*. Shipra Publication.
- Sharma, Y. K. (2004). *Comparative education-Comparative study of educational system*. Guwahati: Eastern Book House.
- Sodi, T.S. (2018). *Textbook of Comparative Education (6thEd.)*, New Delhi: Vikas Publication.
- UNESCO (1971). *Developing of Education in Asia*.Paris: Unesco, Mineda's.
- Young, D. (1995).*Introduction of American public education*. New York: McGraw-Hills Inc.
- Tulanatmak Shikshan – Dr. Seeteram Jaiswal, Dr. Ramdas Barkale, Dr, Nalini Pichad

GEC offered in Semester II

Year	I	Introduction to Academic Writing	Credits	4
Semester	II		Course code	SOE 01 02 02 GEC 3014

Learning Outcomes	**After completion of course students will be able to**: ● Reflect on communicative behaviour. ● Describe and improve report writing skills ● Build capacities for self-criticism and facilitate self- growth. ● Enhance listening & observation skills.
Course Content	
Unit-1	**Report writing** • Workshop on listening, conversing, speaking, presenting, explaining and expositing ideas in groups and before an audience • Write a paragraph on any topic of your interest, then acknowledge the source • Edit one's own writing • Prepare a report on the academic program.
Unit-2	**Writing Skills (Online)** ● Writing Skills: Essential components of writing skills, writing standard ● Email drafting and Etiquettes ● making notes on any academic conversations, ● Attend a seminar/workshop or conference and write a report on entire programme

Unit-3	**Career Skills (NEP)** • Career Skills: Applying for job, covering letters, resume and effective profiling, • group discussion intra personal/ interpersonal skills problem solving, • reflective thinking, critical thinking, • negotiation skill • Prepare your resume/effective profile for an interview.
Unit-4	**Book Review** • Components of book review • Review of any text book/book
Teaching learning process/Transaction Strategies	Lecture-cum-discussion, workshop sessions, assignments, presentations by students
Practicum	• Workshop on academic writing skill. • Workshop on listening, conversing, speaking, presenting, explaining and expositing ideas in groups and before an audience. • Write a paragraph on any topic of your interest, then acknowledge the source & edit one's own writing. Prepare a report on the entire program.

Suggested Readings:

- http//gujarat-education gov.in/education-citizen act-rules. htm
- www.ugc.ac.in
- www.ncte-india.org
- www.ngu.ac.in
- www.education.nic.in
- www.scribid.com
- HNGU Handbook-I
- HNGU Handbook-II

Year	I	Educational Leadership	Credits	4
Semester	II		Course code	SOE 01 02 02 GEC 3015

Learning Outcomes	**After completion of course students will be able to:** ● Reflect on emerging trends in Educational Leadership ● Develop an understanding of functions and dynamics of leadership ● Exhibit various school leadership activities and qualities in their daily life. ● Acquaint the students with research and innovation in leadership.
Course Content	
Unit-1	**Leadership in Education & Theories of Leadership (NEP)** ● Concept of Leadership, Leader and Manager, ● Leadership Traits ● Styles of Leadership ● Approaches of Leadership: Trait, Transformational, Transactional, Value-Based, Cultural, Psychodynamic, Charismatic, Community based and Social.
Unit-2	**Leadership: Functions and Dynamics** ● Concept and functions of Leadership ● Theories of leadership and management in educational organizations ● Theories of leadership and management styles including emotional intelligence ● Theories and models of educational leadership (including curriculum, professional, academic, instructional and student-cantered leadership)
Unit-3	**School Leadership** ● Curriculum framework, outline key areas for leadership development in secondary schools:- (capacity building to transform function at managers to school leaders) ● Leading partnership, developing self, Transforming teaching learning process, building and leading teams and

	leading Innovation. • School leadership:- Multiple Roles, Identities & grass root level (field) administrators working closely with schools at cluster, block and district levels. • School & Community: - Inter-linkage, Role and responsibilities.
Unit-4	**Research and Innovation & Leadership (NEP)** • Innovation and research in leadership: school developmental plan towards better schooling. • Culture of innovation in school:- At all levels of school, at classroom, student & teacher as innovators. • Professional development of teachers:-Issues, concerns, programmes and practices at International, National & Local level. • Leadership programs of MHRD, NUEPA, NCSL with reference to goal, vision and strategy.
Teaching learning process/Transaction Strategies	Lecture, Discussions, Debates, Analysis of plans and policies.
Practicum	• Detailed study of any one PPP model in Education • Case study of a Global School from the Educational Management perspective. • Study the Quality Control Practices in Educational Institutions

Suggested Readings:

- Harbison, I.F. (1967). *Educational planning and human resource development.* Paris: UNESCO.
- Harding, H. (1987). *Management appreciation*. London: Pitman Publishing.
- Hatehy, H.J. (1968). *Educational planning, programming, budgeting – a systems approach*. New Jesry: Printice Hall.
- Kingrough, R.B. & Nunnery, M.Y. (1983). *Educational administration – an introduction.* N.Y.: MacMillan.
- Ravishankar, S., Mishra, R.K. & Sharma, M.L. (1988). *Human resource development.* Bombay: Dhruv& Deep.
- Shukla, P.D. (1983). *Administration of education in India.* New Delhi: Vikas.
- Sinha, P.S.N. (2002). *Management and administration in govt*. New Delhi: Commonwealth Publishers.
- Spears, H. (1955). *Improving the supervision of instruction.* N.Y.: Prentice Hall.
- Wiles Kimbal (1955). *Supervision for better schools.* N.Y.: Prentice Hall.
- Ediger, Morlow & Rao, B.D. (2006). *School organization.* Discovery Publishing House, New Delhi-110002
- Sindhu, I.S.(2008). *Educational administration and management.* International Publishing House, Meerut
- Mishra, R.C, (2010). *Classroom management.* APH Publishing Corporation Darya Gang, New Delhi-110002.

SEMESTER-III

Year	II	TEACHER EDUCATION	Credits	4
Semester	III		Course code	SOE 01 03 12 C 3104

Learning Outcomes

After the completion of this course the students will be able to:

- Explain the Concept, Need and Importance and development of Teacher Education.
- Understand the structure, Curriculum and Modes of Pre-Service Teacher Education
- Exhibit the various components of Professional Growth of Teachers.
- Reflect on various Agencies of Teacher Education and categorise various Challenges in teaching profession

Course Content

Unit-1

Introduction to Teacher Education

- Meaning, Nature and Scope of Teacher Education; Types of Teacher Education Programs. (ONLINE)
- Committees and Commissions contribution to Teacher Education: Kothari Commission Report (1964-66), NCF (2005) and NCFTE (2009), Justice Verma Commission Report (2012). (Both NEP and Online)

Unit-2

Structure, Curriculum and Modes of Pre-Service Teacher Education

- Pre- Service Teacher Education: Concept, Nature, Objectives at different levels. (online)
- Components of Pre-Service Teacher Education: Foundation Courses, Subject Specialization and Pedagogy, School based Practicum and Internship.
- Reflective Teaching and Strategies for promoting reflective teaching.

Unit-3

Structure and Modes of In-service Teacher Education

- In-service Teacher Education; concept, Need, Objectives and areas of Professional development.
- **Types of In-Service courses for Teachers; Orientation and refresher Courses, workshops, seminars, Internship and Summer Institutes. (online)**
- Modes of In-service teacher education; Induction, Cascade, School based, Face to face, Distance and online mode.

Unit-4	**Teaching as a Profession, Agencies of Teacher Education** • **Agencies of Teacher Education and their functions: DIET, SCERT, NCERT, NCTE.(Both online and NEP)** • Profession and Professionalism, Teaching as a profession, Professional ethics of a teacher. • Challenges of teacher education in the 21st Century.
Teaching learning process/Transaction Strategies	Lecture cum Discussion, Debates, illustrations, presentations, Projects Method, E-learning, assignments on different key areas, panel discussion, brainstorming sessions.
Practicum	**Assignment on any one of the following:** • Prepare a report on the role of various central and state agencies in Teacher Education. • Visit DIET/SCERT/NCERT and prepare a note on its functions. • Attend any program related to in-service teacher education programs and write a report on it.

Suggested Readings:

- Batra, P. (2014). Problematizing teacher education practice in India: Developing a research agenda. *Education as Change. 18*, 5- 18.
- Behari, A. & Menon, S. (2009). *National Curriculum Framework 2005: Implications for Teacher Education.*
- Cochran, S. M. (2008). *Handbook of research on teacher education: Enduring questions in changing contexts* (3). New York: Routledge.
- Devedi, P. (1980). *Teacher education- A resource book*. New Delhi: NCERT.http://www.ejtn.eu/Documents/Collaborative_experiential_ learning.pdf
- Govt. of India (1966). *Education and national development*. New Delhi. Report of Education Commission.
- Govt. of India (1986). *National policy of education.* New Delhi: Ministry of Human Resource and Development.
- Govt. of India (1992). *Report of C.A.B.E.* New Delhi: Committee Department of Education.
- Giroux, H. (1988). *Teachers as intellectuals*. USA: Bergin & Garvey Publishers Inc.
- Giroux, H. (2012). *Paulo Freire and the pedagogy of bearing witness in education and the crisis of public values.* New York: Peter Lang Publication.https://www.infodev.org/infodev-files/resource/InfodevDocuments_294.pdf
- Kohli, V.K. (1992). *Teacher education in India.* Ambala: Vivek Publishers.\
- Kumar, K. (2005). *Political agenda of education: A study of colonialist and nationalist ideas* (2nd ed.). New Delhi: Sage Publications.
- Linda D. H. & John B. (2005). *Preparing teachers for a changing world*. Jossey-Bass, San Francisco.
- Mangla, S. (2000). *Teacher Education: Trends and Strategies*. New Delhi: Radha Publishing.
- MHRD (1985). *Report of the National Commission on Teachers* (1983-85). New Delhi: Govt. of India.
- MHRD (1986). *National Policy of Education and Program of Action*. New Delhi: Govt. of India.
- MHRD (1992). *Program of Action*. New Delhi: Department of Education, Govt. of India.
- MHRD (2012). *Vision of teacher education in India: quality and regulatory perspective*. New Delhi: Govt. of India.1 & 3.

- M. A. Siddiqui, A. K. Sharma & G. L. Arora (Eds). *Teacher Education: Reflections towards Policy Formulation*. New Delhi: NCTE.
- NCERT (2006). *Position paper on teacher education*. New Delhi: National Council for Educational Research and Training.
- NCTE (2009). *National curriculum framework for teacher education: Towards preparing professional and humane teachers*. New Delhi: NCTE.
- Null, J. W. & Bohan, C.H. (2005). Teacher education curriculum: what, how and why. *Curriculum and teaching dialogue* pp.39-49.
- National Curriculum Framework (2005), NCERT, New Delhi.
- National Curriculum Frameworks for Teacher Education (2009). *Towards preparing professional and humane teachers*. NCTE, New Delhi. Retrieved fromhttps://ncte.gov.in/Website/PDF/NCFTE_2009.pdf.
- National Policy on Education (1986), Govt. of India, Department of Education, MHRD,
- New Delhi retrieved from https://mhrd.gov.in/sites/upload_files/mhrd/files/document- reports/NPE86-mod92.pdf.
- NCERT (2006). *The reflective teacher: Organisation of in-service training of the teachers of elementary schools under SSA, Guidelines.*
- NCTE (1998). *Competency based and commitment oriented teacher education for quality school education: Pre-service education*. NCTE, New Delhi.
- NCTE (1998). *Policy perspective in teacher education- critique and documentation*. NCTE, New Delhi
- Pollard, A. (2002). *Reflective teaching: Effective and evidence informed professional practice*. London: Continuum.
- Purnima, K. (2018). *Teacher education in 21st century. ND:* APH Publishing Corporation.
- Sharma (2017). *Teaching effectiveness. ND:* APH Publishing Corporation.
- Sharma, R.A. (2005). *Teacher Education*. Meerut: Loyal Book Depot.
- Sharma, S.P. (2005). *Teacher Education*. New Delhi: Kanishka Publishers.
- Shrimali .K.L (1954). *Better teacher education*. New Delhi: Ministry of Education Govt. of India.
- Sikula, J., Buttery, T. J. & Guyton, E. (Ed.) (1996). *Handbook of Research on Teacher Education*. USA: Macmillan.http://tanvirdhaka.blogspot.com/2011/01/models-of-teacher-education.html
- Udyaveer (2006). *Modern Teacher Training*. New Delhi: Anmol Publications.

Web-Resources

- **https://nroer.gov.in/home/file/readDoc/59835ecf16b51cc4c4db285a/academic-support-structures-like-nuepa-ncert-scert-siemat-diet.pdf**
- **https://files.eric.ed.gov/fulltext/EJ1056080.pdf**
- **http://dspace.vpmthane.org:8080/jspui/bitstream/, https://schooleducation.mizoram.gov.in/uploads/attachments/http://ddceutkal.ac.in/Syllabus/MA_Education/Paper-4.pdf**
- **https://www.researchgate.net/publication/248607615pdf**
- **http://www.ncert.nic.in/rightside/links/pdf/framework/english/nf2005.pdf**
- **https://ncte.gov.in/Website/PDF/NCFTE_2009.pdf**

Year	II	Inclusive Education	Credits	4
Semester	III		Course code	SOE0103 13 C3014
Learning Outcomes	**After the completion of this course, the students will be able to:** ● Explain the concept of inclusive education ● Describe the role of various agencies on inclusive education ● Evaluation of various resources for children with special abilities and needs for inclusion ● Reflect on the implementations of policies and program for children with special needs and abilities			
Course Content				
Unit-1	**Inclusive Education for Children with Diverse needs** ● Introduction to Inclusive Education: Definition, concept and importance of Inclusive Education. • Concept of Access, Equity, Diversity, Human Rights & Social Justice. • Evolution of the Philosophy of Inclusive Education: Special, Integrated, Inclusive Education • Readiness of School, Principles and Models of Inclusion ● Definition and characteristics of children with sensory (hearing, visual and physically challenged) ● Intellectual (gifted, talented and children mentally challenged children), ● Developmental disabilities (autism, cerebral palsy, learning disabilities), social and emotional problems, scholastic backwardness, under-achievers, slow learners and other marginal groups.			
Unit-2	**Provisions, Trends and Issues in Inclusive Education: -(online)** ● The World Declaration on the Survival, Protection and Development of Children and the Plans of action (Outcome of the UNICEF World Summit for Children, (1990). ● The Asian and Pacific decade of Disabled Persons, 1993-2002, The World Conference on Special needs Education and the Salamanca Statement and framework for action on Special Needs Education. • Legal Provisions: Policies and Legislations (National Policy of Education (1986), Programme of Action (1992) Persons with Disabilities Act (1995), National Policy of Disabilities (2006), National Curriculum Framework (2005). • Rehabilitation Council of India Act (1992), Inclusive Education under SarvaShikshaAbhiyan (SSA). • The National Trust for the welfare of Persons with autism, cerebral palsy, mental retardation and Multiple			

	Disabilities Act, 1999.
Unit-3	**Identification of Diverse Learners, Planning and Management of Inclusive Education (NEP)** ● Approaches to Evaluation and Identification of Diverse Learners for Inclusion ● Educational Evaluation : Meaning, Methods, Tools and Techniques ● Planning and Management of Inclusive Classrooms: material resources, Human Resource and Instructional Practices, Curriculum and Curricular Adaptations for Diverse Learners ● Practices and Classroom Management: Seating arrangement, whole class teaching, collaborative Teaching, activity based Learning, Pear tutorial and cooperative Learning.
Unit-4	**Resources and Facilitators of Inclusion- Assistive /Adaptive Technology:-** ● Assistive and Adaptive Technology for Diverse learners: Product (Aids and Appliances) and Process (Individualized Education Plan (IEP), Remedial Teaching). ● Therapeutic Interventions: Need and Scope, Use of Information Communication Technology (ICT) in inclusive classroom) Facilitators for Inclusive Education ● Parent – Professional Partnership: Role of Parents, Peers, Professionals, School Management & Community. ● Role Responsibilities of General, Special and Resource Teachers, Skills & Competencies among Inclusive school teachers.
Teaching learning process/Transaction Strategies	Field visits and projects, discussions on policies and programs, action research, observation schedules to observe various institutions for provision of inclusive education , designing awareness programs
Practicum	**Tasks and Assignments : The students may undertake any two of the following activities:** ● Field visit to school/institutions promoting inclusive practices and discussion with teachers and observation and analysis of teaching learning practices. ● Analysis of policy document (national, international) related to diversity. ● Critical review of policy and practice and panel discussion by a group of students. ● Visit to special, integrated and inclusive classrooms .Reflective journal writing. ● Make a list of existing resources in the local area and discuss their use and limitations based on survey of five inclusive schools.

Suggested Readings:

- Ainscow, M., Booth, T. (2003). *The index for inclusion: developing learning and participation in schools*. Bristol: Center for Studies in

Inclusive Education.

- Ahuja. A; Jangira, N.K. (2002). *Effective teacher training; cooperative learning based approach.* New Delhi National Publishing house.
- Bartlett, L. D. and Weisentein, G. R. (2003). *Successful inclusion for educational leaders.* New Jersey: Prentice Hall.
- Daniels, H. (1999). *Inclusive Education*. London: Koegan.
- Deiner, P. L. (1993). *Resource for teaching children with diverse abilities*. Florida: Harcourt Brace and Company.
- Gartner, A. &Lipsky, D. D. (1997). *Inclusion and school reform transferring 97ehavio's classrooms*. Baltimore: P. H. Brookes Publishers.
- Gore, M. C. (2004). *Successful inclusion strategies for secondary and middle school teachers,* Crowin Press: Sage Publications.
- Hegarthy, S. & Alur, M. (2002). *Education of children with special needs: from segregation to inclusion.* Corwin Press: Sage Publishers.
- Hollahan and 97ehavior (1978). *Exceptional Children: An Introduction to Special Education.* India: Prentice Hall.
- Jha, M. M. (2002). *School without walls: inclusive education for all.* Oxford: Heinemann Education.
- Jangira N.K. and Mani, M.N.G. (1990). *Integrated education for visually handicapped.* Gurgaon, Old Subjimandi, Academic Press.
- Karten, T. J. (2007). *More inclusion strategies that work*. Corwin Press, Sage Publications.
- King Sears, M. (1994). *Curriculum based assessment in special education.* California, Singular Publications.
- Panda, K. C. (1997). Education of Exceptional Children. New Delhi: Vikas Publications.
- Rangasayee, R.& Gathoo, V. (2007). *Towards inclusive education of children with hearing impairment*: *a hand book for regular school teachers.* AYJNIHH Publishers.
- Rayner, S. (2007). *Managing special and inclusive education*. Sage Publications.
- Ryandak, D. L. &Alper, S. (1996). *Curriculum content for students with moderate and severe disabilities in inclusive* Setting.
- Sedlak, R. A. & Schloss, P. C. (1986). *Instructional methods for students with learning and 97ehavior problems*.
- Allyn, Bacon, Stow L. & Selfe, L. (1989). *Understanding Children with Special Needs.* London Unwin Hyman.
- Sharma, P.L. (1990). *Teachers handbook on helping children with special needs.* N.C.E.R.T Publication.
- Sharma P.L (2003). *Planning inclusive education in small schools*. RIE. Mysore
- Turnbull, A., Turnbull, R. Turnbull, M., & Shank, D. L. (1995). *Exceptional lives: special education in today's schools.* (2). New Jersey Prentice Hall. Inc.
- Vlachou D. A. (1997). *Struggles for inclusive education: an ethnographic study*. Philadelphia, Open University Press.

Year	II	Internship	Credits	4
Semester	III		Course code	SOE 01 03 14 C0044
Learning Outcomes	**After the completion of this course, the students will be able to:** ● Develop nuanced understanding of pedagogical practices and programme structures in institutes and other sites. ● Understanding about children's thinking and learning processes, and their relationships. ● Refine skills of interpersonal interactions with young children. ● Critically reflect upon the field experiences and link them with theoretical constructs.			
Course Content				
Brief description of internship:	Internship have been designed to deepen students' engagement with education as praxis and to develop professionals who understand the interrelationship between the theory and practice in the 'field' which includes development sector, state functionaries, centrally sponsored schemes and initiatives among others. During this field attachment, students will be placed at a field site for three weeks. This prolonged engagement will enable students to gain an "insider-outsider" perspective to the field and critically engage with questions around equity, quality and social justice related to learning and development of young children.			
Assessment Details: **Suggested Internship activities**	**Concerned supervisor will evaluate the internship activities of students. The activities will depend upon the situation of COVID-19. If a normal situation prevails then students will do internships related to teacher training institutes. Otherwise students will do online internship activities.** 1. Collaborative small projects in community 2. Action Research 3. Study of one Moodle/ LMS 4. One course of their interest on swayam 5. preparing small module related to their subjects 6. Observation of B. Ed Plan 7. Interview of teachers working in schools 8. Webinar			

	9. Content review of website 10. Attend live lectures on facebook or any other social media 11. Video analysis of NCERT of content 12. Analysis of website of innovative schools- Doon School, Digenter, Rishi Valley- Compulsory 13. Challenges and Opportunity in COVID-19- interview of 5 people 14. Video presentation – on any relevant topic of teacher education 15. Challenges and Opportunity in COVID-19- for study- interview of 5 students of schools/university

Year	II	Dissertation Part-II	Credits	4
Semester	III		Course code	SOE 01 03 15 C0044
Learning Outcomes	After the completion of this course, the students will be able to: ● Critically read, understand and evaluate the latest literature and research process ● Exhibit skills for selecting appropriate research methods ● Demonstrate a comprehensive understanding of techniques critical to scholarship in the field ● Communicate clearly and effectively to specialist and non-specialist research			

ELECTIVE COURSES

Year	II	INSTITUTIONS, SYSTEMS AND STRUCTURES	Credits	4
Semester	III	(ELEMENTARY LEVEL)	Course code	SOE01 03 08 DCEC 2002
Learning Outcomes	**After completion of the course, students will be able to:** ● Explain the role of various institutions and institutional planning in education at the elementary stage ● Reflection on the recommendations of various commissions and committees.			
Course Content				
Unit-1	**Introduction: Elementary Education** ● Indigenous system of Elementary Education, Objectives of Elementary Education ● Recommendations of various committees and commissions: Secondary Education Commission, Kothari commission, NPE – '1986, POA 92, Rama Murthy Committee, Yashpal, Committee and NCF-2005., NEP 2020: Pedagogical and curricular structuring (online & NEP)			
Unit-2	**Educational Management and Institutional planning at Elementary level** ● National Level , State Level and District Level Ministry of Education (MoE) CABE-NCERT-RIE NIEPA, NCTE, CIET State Level and District Level : Ministry of School Education ii. Directorate of School Education iii. Board of Education iv. SCERT – SSA – SIET – SRC – SIEMAT ,District Education Administration –DEO, Dy. DPO (SSA) . ● Concept, scope and nature of Institution Planning ,Need and importance of Institution Planning Types of Institution Planning (online)			
Teaching learning process/Transaction Strategies	Lecture cum discussion, Use of PPT, Assignments on various topics, Lecture cum demonstration, In depth analysis of various education commissions, debate on elementary Education.			

Practicum	• Conduct a play to illustrate recommendations of various committees on elementary education. • Organize a Seminar on indigenous system of elementary education. • Visit any two schools and find out innovative teachers. Prepare a detailed report on their innovation. • Prepare a yearly plan for school after reviewing all the activities of the school. • Design an instructional plan of a unit in a subject at elementary level.

Suggested Readings:

- Celin R. (1984). *The study of elementary education and resource book.* Vol. I.
- Government of India (1986). *National policy on education*. New Delhi: MHRD.
- Government of India (1987). *Programme of action*. New Delhi: MHRD
- Government of India (1987). *Report of the committee for review of national policy on education.* New Delhi: MHRD.
- Hayes, Denis (2008). *Elementary teaching today: an introduction.* Routledge Publications,
- U.K. Hurlock, E. (1995). *Child development*. USA Kabra: McGraw Hill Book Company.
- K.M. (1977). *Planning process in a district*. New Delhi: Indian Institute of Public Administration.
- Kurrian, J. (1993). *Elementary education in India.* New Delhi: Concept Publication.
- Lewis, R. (2008). *Understanding pupil 103ehavior*. U.K: Routledge Publications.
- Mohanty, J. N. (2002). *Elementary and elementary education.* Deep & Deep Publications. New Delhi
- National Curriculum Framework (NCF)-2005 NCERT New Delhi.
- Rao, V.K. (2007). *Universalization of elementary education*. New Delhi: Indian Publishers.
- Rita Chemicals (2008). *Engaging pupil voice to ensure that every child matters: A practical guide*. David Fultan Publishers.
- Singhal, R.P. (1983). *Revitalizing school complex in India.* New Delhi.
- Sharma, R. N. (2002): *Indian education at the cross road*. Shubhi Publications.
- Tilak, J.B. (1992). *Educational planning at gross roots.* New Delhi.
- NCERT (1987). *In-service teacher education package for elementary school teachers.* New Delhi.
- NCERT (1991). *Elementary teacher education curriculum, guidelines and syllabi*. New Delhi.
- NCERT (2005). *National curriculum framework*, New Delhi.
- NCTE, (2004). *Teacher education curriculum*. New Delhi.
- Singh, L.C. (Ed.) (1987). *Teacher education – a resource book.* NCERT, New Delhi.
- The Study of Elementary Education – A Source Book. (1984). Volume I & II, 1984.
- Victor & Learner. (1971). *Readiness in science education for the elementary school*, McMillan Co., N.Y.
- UNESCO (2006). *Teachers and educational quality: monitoring global needs for 2015*. UNESCO Publication. Montreal

Year	II	INSTITUTIONS, SYSTEMS AND STRUCTURES (SECONDARY LEVEL)	Credits	4
Semester	III		Course code	SOE01 03 09 DCEC 2002
Learning Outcomes		**After completion of the course, students will be able to:** ● Understand the system of secondary and senior secondary education in India. ● Critically evaluate the role of teacher in institutional planning and execution		
Course Content				
Unit-1		**System and Structure of Secondary Education in India** ● Meaning, aims ,objective of Secondary education ● Structure of secondary education in India in the overall structure of education ● System of Secondary Education in India – Pre and Post independence • Macaulay's Minute of 1835 • The Dispatch of 1854 • Sargent Report 1944 ● Nai Talim **(online)** ● Secondary Education Commission (1952-53) **(online)** • Kothari commission (1964-66) ● Secondary Education and National Policy on education(1986) **(online)**		
Unit-2		**Conceptual Understanding of Institution Planning** ● Meaning, nature and scope of Institution Planning ● Purposes of Institution Planning ● Need and importance of Institution Planning ● Steps for preparing an effective Institution Plan ● Role of a teacher in Institution Planning		

Teaching learning process/Transaction Strategies	Lecture cum discussion, Use of PPT, Assignments on various topics, Lecture cum demonstration,
Practicum	**Tasks and Assignment: any two of the following:** In depth analysis of various education commissions, debate on Secondary Education and National Policy on education, Ask pupils to prepare an effective Institution Plan for secondary school by the student teachers and presentations will be encouraged. • **In addition, school and community based activities may be 105rganized**

Suggested Readings:

- Aggarwal. J., C., (2018). *Landmarks in the history of modern indian education.* New Delhi: Vikas Publishing house.
- Buch, M.B (1969), *Institutional planning for improvement and development*, RCE: Bhopal.
- Dash & Dash (2008). *School management.* New Delhi: Atlantic Publishers and Distributers Pvt. Ltd.
- Govt. of India (1953). *Report of secondary education commission.* New Delhi
- Govt. of India (1996). *Indian education commission*. (1964-66) Report. New Delhi
- Govt. of India – (1986/1992). *National policy of education*. 1992 Modification and their POA's, MHRD, Dept. of Education
- Govt. of India, MHRD (2005). *Universalisation of secondary education: report of the CABE committee.* New Delhi
- Government of India, (2005). Report of the Council of Advisory Board on Education (CABE) Committee on '*Universalizing secondary education'*. Retired from www.education.nic
- Kochhar, S.K (2007).*Secondary School Administration*, New Delhi: Sterling Publishers Pvt. Ltd.
- Lewin, K.M. (2008b). *Secondary education in India: Managing expansion with affordable costs*. Policy Guidance Note for MHRD, GOI, New Delhi
- Malhotra, P.L. (1986). *School education in India: present status and future needs* NCERT, New Delhi.
- Malhotra, P.L. (1986). *School education in India: Present status and future needs*, New Delhi:NCERT.
- MHRD Government of India (2010). *Centrally sponsored schemes in secondary education*. Retired fromhttp://education.nic.in/105rgani/secondary.htm.
- Mishra, A., D., (2015). *Mahatma Gandhi on education.* New Delhi: Vikas Publishing house.
- Mishra, V. & Pundir, V. (2011). Institutional planning: The working principles. *International Journal of Multidisciplinary Research;* 1(6), 238 – 252.
- Mohanty, J. (1990). *Educational administration, supervision and school management.* Deep & Deep Publications F-159, Rajouri Garden, New Delhi-110.
- Mudhopadyay, S. & Kumar K. A. (2001). *Quality profiles of secondary schools.* NIEPA, New Delhi
- MacBeth, J. (1999). *Schools must speak for themselves.* Routledge, UK

- Naik, J.P (1968). *The role of teachers in educational planning and development*, RCE Bhopal.
- NSSO (2010). *Education in India: 2007-08–Participation and Expenditure*. 64thRound (July 2007-June 2008), Ministry of Statistics and Programme Implementation, GOI, New Delhi.
- Planning and Development Department [PPD]. (2016). *About the planning and development department* [PPD]. Retired from: http://mak.ac.ug/university-services/planning-and-development-department.
- National Policy of Education 1986/1992.
- National Curriculum Framework on school education, (2005).
- Report of the Education Commission (1964-66).
- Report of the Delors Commission, UNESCO, 1996
- Yadav, M.S. & Lakshmi, T.K.S. (2003). *Conceptual inputs for secondary teacher education: the instructional role*. India, NCTE.

Web-Resources

- https://www.oercommons.org/courseware/lesson/60861
- https://www.oercommons.org/courses/careers-in-education-model
- https://www.oercommons.org/courses/curriculum-standards
- https://www.oercommons.org/courses/ict-essentials-unit-02-ict-curriculum
- https://www.oercommons.org/courses/curriculum-studies
- https://www.oercommons.org/courses/curriculum-video-collection
- https://www.oercommons.org/courses/goopen-phase-3-putting-in-place-a-robust-infrastructure-for-learning
- https://www.jstor.org/stable/1503555

Year	II	STAGE SPECIFIC STATUS, ISSUES AND CONCERNS (ELEMENTARY LEVEL)	Credits	2
Semester	III		Course code	SOE010318C2002
Learning Outcomes	**After completion of the course, students will be able to:** ● Understand the historical perspective of elementary education and reflection on various programmes implemented in India in context of school education ● Analyse the various issues and concerns at elementary level			
Course Content				
Unit-1	**Elementary school education in India: Aims, historical perspective and structure** ● Historical perspective of elementary education system in India, Aims and objectives of elementary school education ● School – concept, need & role and structures of school education ● UEE, District Elementary Education Programme & RTE Act,2009. (ONLINE) ● EFA Global Monitoring Report (UNESCO, 2005: 142) (ONLINE)			
Unit-2	**Major issues in elementary school education** ● Students strength , Mid-Day meal, PTA ,SMC, Role of head of institution and teacher ● Infrastructure: school building, sport ground ,NEP 2020: Vocationalisation, Tackling the issues of elementary education (ONLINE & NEP)			
Teaching learning process/Transaction Strategies	Lecture cum discussion, Use of PPT, Assignments on various topics, Lecture cum demonstration, In depth analysis of various education commissions, debate on elementary Education.			
Practicum	**Tasks and Assignment: any two of the following** ● Study of Annual report of annual report or any Govt. school to identify issues of elementary education in India ● Prepare a report on major obstacles and challenges in elementary education. ● Prepare an annual school calendar for elementary education.			

	• In a recent book, journal, or article available on the internet, find a proposal for a basic reform or restructuring in the public/Govt./private elementary education. • Organize a Debate on the best approach to planning and Skill for effective management in elementary education. • Any other suggestions by teacher education.

Suggested Readings:

- Government of India (1986). *National policy on education*. New Delhi: MHRD.
- Government of India (1987). *Programme of action.* New Delhi: MHRD
- Government of India (1987). *Report of the committee for review of national policy on education*. New Delhi: MHRD.
- Hayes, D. (2008). *Elementary teaching today: An introduction.* Routledge Publications,
- K.M. (1977). *Planning process in a district.* New Delhi: Indian Institute of Public Administration.
- Kurrian, J. (1993). *Elementary education in India.* New Delhi: Concept Publication.
- Lewis, Ramón (2008). *Understanding pupil 108rganize*. U.K: Routledge Publications.
- Mohanty, J. N. (2002). *Elementary and elementary education.* Deep & Deep Publications. New Delhi
- National Curriculum Framework (NCF)-(2005) NCERT New Delhi.
- NCERT (1987). *In-service teacher education package for elementary school teachers.* New Delhi.
- NCERT (1991). *Elementary teacher education curriculum, guidelines and syllabi*. New Delhi.
- NCERT (2005). *National curriculum framework.* New Delhi.
- NCTE, (2004). *Teacher education curriculum.* New Delhi.
- Rao, V.K. (2007). *Universalization of elementary education*. New Delhi: Indian Publishers.
- Rita Chemicals (2008). *Engaging pupil voice to ensure that every child matters: a practical guide*. David Fultan Publishers.
- Singhal, R.P. (1983). *Revitalizing school complex in India,* New Delhi.
- Sharma, R. N. (2002). *Indian education at the cross road.* Shubhi Publications. .
- Singh, L.C. (1987). *Teacher education – A resource book.* NCERT, New Delhi
- Tilak, J.B. (1992). *Educational planning at gross roots.* New Delhi
- U.K. Hurlock, E. (1995). *Child development*. USA Kabra: McGraw Hill Book Company.

Year	II	STAGE SPECIFIC STATUS, ISSUES AND CONCERNS (SECONDARY LEVEL)	Credits	2
Semester	III		Course code	SOE010319C2002
Learning Outcomes	**After completion of the course, students will be able to:** ● Explain the status and structure of secondary education in India ● Reflection on various contemporary issues and concerns in secondary education in India			
Course Content				
Unit-1	**Status of Secondary Education in India** ● Aims and objectives of Secondary school education ● Historical perspective of Secondary stage education system in India ● Constitutional obligation related to Education (With special reference to Secondary Education) **(online)** ● Present status of Secondary Education **(online)**			
Unit-2	**Issues and concerns of Secondary Education** ● Vocationalisation of Secondary Education ● Quality issues and concerns of Secondary Education ● Problem and reforms in examination system **(online)** ● Role of PTA and SMC's in Secondary Education. **(online)** ● Role of Principal and Teachers in the development of Secondary Education **(online)**			
Teaching learning process/Transaction Strategies	Lecture cum discussion, Use of PPT, Assignments on various topics, Lecture cum demonstration			
Practicum	, In depth analysis of various education commissions, debate on issues and concerns of Secondary Education,. *** In addition, school and community based activities may be organized.**			

Suggested Readings:

- Aggarwal. J., C., (2018).*Landmarks in the history of modern Indian education.* New Delhi: Vikas Publishing house.
- Buch, M.B (1969). *Institutional planning for improvement and development*, RIE: Bhopal.

- Dash & Dash (2008). *School Management*, New Delhi: Atlantic Publishers and Distributers Pvt. Ltd.
- Govt. of India (1953). *Report of secondary education commission.* New Delhi
- Govt. of India (1996). *Indian education commission* (1964-66) Report. New Delhi
- Govt. of India - (1986/1992). *National policy of education.* Modification and their POA's, MHRD, Dept. of Education
- Govt. of India, MHRD (2005). *Universalisation of secondary education : Report of the CABE committee*, New Delhi
- Government of India, (2005). *Report of the council of advisory board on education (CABE) committee on universalizing secondary education.* Retired from: www.education.nic
- Kochhar, S.K (2007).*Secondary School Administration*. New Delhi: Sterling Publishers Pvt. Ltd.
- Lewin, K.M. (2008b). *Secondary education in India: Managing expansion with affordable costs*. Policy Guidance Note for MHRD, GOI, New Delhi
- Malhotra, P.L. (1986) School Education in India: Present Status and Future Needs NCERT, New Delhi.
- Malhotra, P.L. (1986). *School education in India: Present status and future needs,* New Delhi:NCERT.
- MHRD Government of India (2010). *Centrally sponsored schemes in secondary education*. Retired from: http://education.nic.in/secedu/secondary.htm.
- Mishra, A. D. (2015). *Mahatma Gandhi on education.* New Delhi: Vikas Publishing house.
- Mishra, V. & Pundir, V. (2011). Institutional planning: The working principles. *International Journal of Multidisciplinary Research;* 1(6), 238 – 252.
- Mohanty J. (1990). *Educational administration, supervision and school management.* Deep & Deep Publications F-159, Rajouri Garden, New Delhi-110.
- Mudhopadyay, S., & Kumar, K. A. (2001). *Quality profiles of secondary schools.* NIEPA, New Delhi
- MacBeth, J. (1999). *Schools must speak for themselves.* Routledge, UK
- Naik, J.P (1968). *The role of teachers in educational planning and development*, RCE Bhopal.
- NSSO (2010). *Education in india: 2007-08–participation and expenditure*. 64thRound (July 2007-June 2008), Ministry of Statistics and Programme Implementation, GOI,New Delhi.
- Planning and Development Department [PPD]. (2016). *About the planning and development department* [PPD]. Retired from: http://mak.ac.ug/university-services/planning-and-development-department.
- National Policy of Education 1986/1992.
- National Curriculum Framework on school education, 2005.
- Report of the Education Commission (1964-66).
- Report of the Delors Commission, UNESCO, 1996
- Yadav, M.S. & Lakshmi, T.K.S. (2003). *Conceptual inputs for secondary teacher education: the instructional role.* India, NCTE.

E-Resources

- https://www.oercommons.org/courseware/lesson/60861
- https://www.oercommons.org/courses/careers-in-education-model
- https://www.oercommons.org/courses/curriculum-standards
- https://www.oercommons.org/courses/ict-essentials-unit-02-ict-curriculum
- https://www.oercommons.org/courses/curriculum-studies

- https://www.oercommons.org/courses/curriculum-video-collection
- https://www.oercommons.org/courses/goopen-phase-3-putting-in-place-a-robust-infrastructure-for-learning
- https://www.jstor.org/stable/1503555

Generic Elective Course (GEC)

Year	II	ART OF TEACHING	Credits	4
Semester	III		Course code	SOE010304GEC3014
Learning Outcomes	**After completion of the course, students will be able to:** ● Understand the concept, principles, maxims of teaching and factors influence the teaching- learning process. ● Acquainted with the concept of communication process and its elements, types and barriers ● Gain knowledge of various teaching aids and also their significance in transaction of the relevant content. ● Comprehend the characteristics of an effective teacher and realize teaching as a profession.			
Course Content				
Unit-1	**Understanding of Teaching - Learning Process** ● Teaching: Concept, principles, types, and maxims of teaching ● Learning: Concept, and prerequisite relationship of Teaching-Learning and Characteristics of Teaching ● Characteristics of Learning and Factors influencing Teaching & Learning ● Phases of Teaching			
Unit-2	**Communication** ● Communication: Meaning and Concept ● Elements of Communication ● Process of Communication ● Types of Communication: Verbal Communication & Non-verbal Communication, Interpersonal, Intra-personal communication, Group and Mass, etc. ● General barriers to Communication ● Ways and means of developing communication			

Unit-3	**Techniques and Practices of Teaching** ● Motivation: Concept and its need and Importance and Types ● Ways and Techniques of Enhancing Learner's Motivation ● Role of Motivation in Teaching – Learning Process ● Micro Teaching: Concept, Objectives, and its need and Importance ● Preparation of lesson plan, and Practices of Skills (Skill of Questioning, and Explanation). ● Need and importance of Aids and its types ● Preparation and use of Teaching aids, Traditional: Black Board, Charts, Models, etc. ● Modern Teaching Aids: ICT, web and video conferences, Power Point Presentation, Presentation Tube, etc. ● Preparation and Presentation of Teaching aids (Practical)
Unit-4	**Teaching as a Profession** ● Teaching as a Profession; Characteristics of an effective teacher () ● Role, Accountabilities and Ethics of a teacher towards teaching Profession ● Approaches of Teaching: Learner centered and teacher centered, various methods and techniques employed in teaching (Group discussion; Brain storming, Collaborative and cooperative teaching, etc.) ● Classroom Management: Teacher as Facilitator (Heterogeneous classroom, Styles of learning, etc.)
Teaching learning process/Transaction Strategies	The content of the course would be transacted through lectures, group discussion, self-study, and seminar/presentations by students.
Practicum	**Each student has to undertake the following activities:** ● Preparation of Teaching aids ● Preparing a lesson plan on any topic and also presented in the class ● Preparation and Presentation of Micro lessons under certain skills ● Group Discussion and seminars presentation through collaboratively

Suggested Readings:

- Anderson, J.R. (1983). *Rules of the mind*. Hillsdale, NJ: Erlbaum
- Barry and Johnson (1964). *Classroom Group Behaviour*. New York: Macmillan.
- Bower, G.H. and Hilgard, E.R. (1981). *Theories of learning*. New Jersey: Prentice Hall Inc. Englewood Cliffs.
- Dash, B.N. (2014). *Psychology of teaching learning process*. New Delhi: Dominant Publishers & Distributors Pvt. Ltd.
- Dececo, J.P. (1977). *The Psychology of learning and instruction*. Delhi: Prentice Hall

- Eason, M.E. (1972). *Psychological foundation of education*. New York: Holt Rincehart and Winston
- Grammage, P. (1990). *Teacher and pupil: some socio-psychological principles and applications* (3rd Edition) Illinois: Scott. Pressman Little, Brown Higher Education.
- Guilford, J.P. (1967). *Nature of human intelligence. New York*: McGraw Hill

SEMESTER IV

Year	II	RECENT TRENDS IN TEACHER EDUCATION	Credits	4
Semester	IV		Course Code	SOE01 04 16 C 3104
Learning Outcomes	**After the completion of the course, the students will be able to:** ● Explain the Historical Development of Teacher Education in India. ● Categorize the Initiatives for Professional Development of Teachers ● Develop the Ethics, Competency and Accountability among teachers ● Construct ideas to tackle the emerging issues in teacher education and demonstrate the uses of various Digital initiatives			
Course Content				
Unit-I	**Historical overview of Teacher Education** ● Development of Teacher Education Pre-Independence: Hunter Commission (1882), Sadlar Commission (1917-19) and Sargent Report (1944). ● Development of Teacher Education Post-Independence: Kothari Commission (1964-66), NCFTE (2009), NCTE Regulations (2014) and New Education Policy (2020)- (both online and NEP)			
Unit -2	**Initiatives for Professional Development of Teachers** ● Policies and Programmes:SSA, RMSA, and SAMAGRA ● Digital Initiatives:-MOOCs, SWAYAM, SWAYAM Prabha-e-Pathshala, e-PG Pathshala, (both online and NEP) • Faculty Development through online programmes			
Unit-3	**Teacher Ethics, Teacher Competency and Accountability** ● Teaching as a profession and Teacher as a reflective practitioner ● Professional ethics for teacher educators (online) ● Competency based teacher education and Core competencies of teacher educators(NEP) • Roles and accountability of teacher educators and characteristics of effective teacher educators (ONLINE)			

Unit-4	**Emerging Issues in Teacher Education** • Personal and contextual factors affecting the teacher development • Innovative practices/approaches in teacher education: Constructivist, ICT based approach, Integrated approach– School cantered teacher education and Teacher cantered approach to community development. (ONLINE) • Quality concerns in teacher education, Research priorities in teacher education (NEP)
Teaching learning process/Transaction Strategies	Lecture cum Discussion, Debates, illustrations, presentations, Projects Method, E-learning, assignments on different key areas , panel discussion, brainstorming sessions, hands on practice.
Practicum	**Assignment on any one of the following:** • Write on Historical development of Teacher Education . • Prepare a report on Digital Initiatives by Govt. of India in Education. • Attend any in-service teacher education program and write a report on it. • Critically evaluate New Education Policy (2020)

Suggested Readings:

- Arora, G.L. (2002). *Teachers and their teaching*. Delhi: Ravi Books.
- Adam, D. M. (1985). *Computers and Teacher Training: A Practical Guide*. N.Y.: The Haworth Pren, Inc.
- Anand, C. L. (1988). *Aspects of Teacher Education*. Delhi: S. Chand and Co.
- CABE (1992). *Report of the CABE Committee on Policy Perspectives*. New Delhi: Govt. of India, MHRD.
- Dunkin, J. Michal (1987). *The International Encyclopedia of Teaching and Teacher Education*. Pergamon Press.
- Chaurasia G. (2000).*Teacher education and professional organizations*. Delhi: Authors Press.
- Chauhan, S.S. (2018). *Professional ethics and accountability in education*. New Delhi: APH Publications
- Day, C. & J. Sachs, J. (2004). *International handbook on the continuing professional development of teachers*. Maidenhead: Brinks Open University Press.
- Dillon J. & Maguire, M. (1997). *Becoming a teacher: Issues in secondary teaching*. Buckingham: Open University Press.
- Dunking, Michael, J. (1987). *The international encyclopedia of teaching and teacher education*. Oxford: Pergamon Press.
- Elahi, N. (1997). *Teacher's education in India*. New Delhi: APH Publishing Corporation.
- Husen, Tosten& Postlethwaite (1994). *The International Encyclopedia of Education* (Ed.), Vol. 1-12. New York: Pergamon Press.
- Indian Education Commission (1964-66). *Report of Indian Education Commission on Education and National Development*. Ministry of Education, Govt. of India.
- Kundu, C.L. (1998). *Indian year book on teacher education.* New Delhi: Sterling Publishers Privatization Ltd.
- McNergney, Robert F. & Joanne M. H. (2001). *Foundations of education*: *The challenge of professional practice*. Boston: Allyn and Bacon.
- Misra, K.S. (1993). *Teachers and their education*. Ambala Cantt.: The Associated Publishers.

- Mohammad Miyan (2004). *Professionalization of teacher education*. New Delhi: Mittal Publications.
- Murray, Frank B. (1996). *Teacher educator's handbook: Building a base for preparation of teachers*. San Francisco: Jossey-Bass Publishers.
- Mangla, Sheela (2000). *Teacher Education: Trends & Strategies*. New Delhi: Radha Publishing.
- MHRD (1986). *National Policy on Education and Programme of Action*. New Delhi: Govt. of India.
- MHRD (1992). *Programme of Action*. New Delhi: Department of Education, Govt. of India.
- Mukherjee, S. N. (1988). *Education of the Teacher in India – I & II*. Delhi: S. Chand and Co.
- National Council for Teacher Education (1998). NCTE Document. New Delhi: Member Secretary, NCTE.
- NCTE. (1998). *Policy perspective in teacher education-Critique and documentation.* New Delhi: NCTE.
- NCERT. (2019). *Continuous and Comprehensive Evaluation Guidelines*. New Delhi: NCERT.
- NCERT. (1988). *In-Service Teacher Education Package for Primary and Secondary Teachers – I & II*. New Delhi: NCERT.
- Reimers, E.V. (2003). *Teacher professional development: An international review of the literature.* UNESCO Paris: IIEP.
- Siddiqui, M.A. (1993). *In-service education of teachers*. New Delhi: NCERT.
- Sen.S. (2018). *Teachers in 21st century characteristics and role performance*. New Delhi: APH Publishing House.
- Sharma, S. P. (2004). *Teacher Education in India*. New Delhi: Vikas Publications.
- Singh, L. C. (1990). *Teacher Education in India* (Ed.) - Source Book. New Delhi: NCERT.
- Smith, E. R. (1962). *Teacher Education: A Re-appraisal* (Ed.). New York: Harper & Row Publishers.
- Soder, R. (1991). *The Ethics of the Rhetoric of Teacher Professionalism*. Teaching and Teacher Education, 7(3).
- Stiles, L. J. & Parker, R. (1969). *Teacher Education Programme: Encyclopedia of Educational Research*, 4th Edition. New York: McMillan.
- Wasnik (2018). *Skilling training: A complete guide for trainers and learners.* New Delhi: APH Publications.

Web-References

- https://www.researchgate.net/publication/329528233_Teacher_Education_in_Pre-Independence_India#:~:text=In%20pre%2Dindependence%20India%2C%20the,well%2Dbeing%20of%20the%20community.
- http://www.gcoekmr.org/pdf/MED15042CR_HistoricalDevelopmentofTE_Unit2.pdf
- http://www.vidyawarta.com/04/wp-content/uploads/2015/10/Teacher-Education-in-Pre-Independence-India.pdf
- https://dera.ioe.ac.uk/14020/1/1009_Accountability_of_teachers_Literature_review.pdf
- https://www.researchgate.net/publication/334459316_Development_of_21_St_Century_School_Teachers'_Teaching_Competencies_in_India
- http://irjrr.com/irjrr/March2014/1.pdf

Year	II	EDUCATIONAL STUDIES	Credits	4
Semester	IV		Course Code	SOE01 04 17 C 3104

Learning Outcomes	**After the completion of the course, the students will be able to:** ● Acquainted concepts involved in education as a discipline ● Establish relationship of education with other disciplines ● Application of education in society ● Analyse thoughts of great scholars, thinkers and educators on education
Course Content	
Unit-I	**Theoretical Perspective of Education as a Discipline** ● Education as a socially contrived system influenced by social, cultural, political, economic, and technological factors. ● Aims of Indian Education in the context of a democratic, secular, egalitarian and a humane society. ● Procedure of bridging gap in the process of knowledge construction between: • Content knowledge and Pedagogy knowledge, • School knowledge and out of the school knowledge, • Experiential knowledge and empirical knowledge, • Knowledge on action and reflection on outcome of action, • Theoretical knowledge and practical knowledge, • Universal knowledge and contextual knowledge. ● Transformation of national aspirations into educational goals/aims of education, its linkage with curricular decision, teaching-learning process and pedagogy for different stages of education. ● Analysis and synthesis of thoughts of great educators: Acharya Vinoda Bhave, Tagore, Shri Aurobindo, Maria Montessori.
Unit -2	**Education as Interdisciplinary Knowledge** ● Interdisciplinary nature of education; relationships with philosophy, psychology, sociology, management, economics, anthropology etc. ● Contribution of science and technology in education and challenges ahead. ● Axiological issues in education: role of peace and other values, aesthetics in education. ● Dynamic relationship of education with the political process. .

	• Interrelation between education and development.
Unit-3	**Socio-cultural Context of Education** • Social purpose of education. • Understanding Indian society-with reference to multilingual and multicultural and other diversity, approaches for teaching young children in the context of diversity. • Process of socialization and acculturation of the child: role of school, parents, peer group and the community. • Equality in educational opportunity-critical analysis of the ways in which schooling, teaching-learning and curriculum contribute to social inequality. • Education of socio-economically deprived groups based on gender, local (rural/urban), income differential and different disabilities as reflected in society.
Unit-4	**School Context** • Multiple schools contexts-rural/urban, tribal etc. • School management: Role of teachers, headmasters, and administrators. • Nurturing learner friendly school environment. • School as site of curricular engagement. • Teacher's autonomy and professional independence. • Participation of different stakeholders in school education-role of media, use of technology, NGOs, Civil society groups, Teacher organizations, family and local community. • Monitoring and evaluation of schools.
Teaching learning process/Transaction Strategies	Lectures, discussions, reflections on biographies, case studies of various types of schools
Practicum	**Assignment on any one of the following:** • Readings of original texts of Rabindranath Tagore/M.K. Gandhi/Sri Aurobindo etc. and presentation on linkage of various theoretical concepts with pedagogy and practices. • Assignment based on policy perspectives and status of education of socio-economically disadvantaged children of India/of a particular State, vision of school education in India. • Visit to a school, observation of activities and preparation of a reflective report. • Any other task/assignment given by the institution.
Suggested Readings: • Banrs, J.A. (1996). *Cultural diversity and education: Foundations curriculum and teaching* (4)Boston: Alynand, Becon. • Beyer, L.E. (Ed.) (1996). *Creating democratic classrooms: The struggle to integrate theory and Practice*. New York: Teachers College Press. • Bruner, J.S. (1996). *The culture of education.* Cambridge, M.A.: Harward University Press.	

- Dearden R. F. (1984). *Theory and practice in Education*. London, Routledge K Kegan & Paul.
- Heyes, D., Hills, M., Chistien, P. & Lingard, B. (2007). *Teachers and schooling: Making a Difference*. Australia Allen and Unwin,.
- Delors, J., et al; (1996). *Learning: The Treasure within report of the international commission on education for 21st century*, UNESCO.
- Dewey, J. (1916/1977). *Democracy and Education: An introduction to the philosophy of education*. New York: Macmillan.
- Govt. of India (1992). *National policy on education* (revised) New Delhi.
- Govt. of India (1992*). Programme of Action*. Govt. of India, New Delhi.
- International Encyclopedia of Education. (1994) 2nd edition.Vol.10. Perganon Press.
- Matheson, David (2004). *An Introduction to the study of education* (2nd edition). David Fulton Publishers.
- NCERT (2005).National curriculum framework, New Delhi.
- Palmer, Joy A, (2001). *Fifty Modern thinkers on education: From Piaget to the present Day*. London: Routledge Flamer.
- Wall, Edmund (2001).*Educational theory: philosophical and political Perspectives*. Prometheus Books.
- Winch, C. (1st edition).(1996). *Key Concepts in the philosophy of education*. London, Routledge.
- Winch, C. (1986). *Philosophy of human learning*. London Routledge.

Year	II	EDUCATIONAL TECHNOLOGY	Credits	4
Semester	IV		Course Code	SOE01 04 19 C 3104

Learning Outcomes

After the completion of the course, the students will be able to:

- Explain the concept, nature, forms and historical development of educational technology.
- Elaborate the steps of instructional designing on the basis of models of Instructional design
- Analyse the implications of digital initiatives by the Government of India for promoting learning
- Explore the integration of ICT in education.

Course Content

Unit-I

Educational Technology: An Overview

- Educational Technology: Concept, nature, components (hardware & software) and scope (Online mode)
- Historical development of Educational Technology (Online mode)
- Application of educational technology in Formal, Non-formal (open and distance learning) and Informal Education systems

Systems approach to education: concept, characteristics and application in education

Unit -2

Instructional Design

- Overview of Behaviourist, Cognitive, and Constructivist theories and their implications to instructional design
- Instructional design: Concept, significance, process and stages of development of Instructional Design. (Online mode)
- Overview of models of instructional design: ADDIE, ASSURE, DICK and CAREY Model. (Online mode) Gagne's Nine events of instruction and 5 E's instructional model based on constructivist instructional design (Online mode)

Unit-3

Emerging Trends in e-learning (NEP)

- Concept of e- learning and approaches to e-learning (Offline, Online, Synchronous, Asynchronous, Blended Learning, Flipped learning). (Online mode)
- National initiative for Digital education- DIKSHA, SWAYAM PRABHA, SWAYAM, On Air, E content for inclusive education,Open Educational Resources (OERs), National digital Library and other significant

	initiatives. (Online mode) • Approaches for development of learner centric MOOC: LCM approach, Four quadrant approach (Online mode) • Learning Management Systems (Online mode)
Unit-4	**ICT in Education (NEP)** • ICT in Education: Concept, significance and applications of ICT tools • Social learning- Concept, use of web 2.0 tools for learning, social networking sites, blogs, chats, video conferencing, discussion forum. • E-portfolios and Online Assessment- concept and development. (Online mode) • E- inclusion- Concept, Assistive technology in e-learning and disruptive technologies.
Teaching learning process/Transaction Strategies	Lecture-cum- demonstration and hands on experiences on the production of audio-visual material; observation of various modes of training programmes by the different organizations / institutions and analyzing the different instructional design.
Practicum	Writing of a term paper on the given course contents. Planning and Development of instructional design for online modules using appropriate approach. Development of e portfolios and online assessment Critical review of online education initiatives(any two) Interface with the educational technology industry (through excursion).

Suggested Readings:

- Apple, M. (1991). *The new technology: Is it part of the solution or part of the problem in education? Computers in the Schools*. 8(2), 59-81.
- Ahuja, M. (2007). *Mastery learning- A practical approach*. Meerut: Vivek Publishers.
- Behera, S.C. (1991). *Educational television programmes.* New Delhi: Deep and Deep Publications.
- Bhushan, A & Ahuja, M. (1992). *Educational technology*. Meerut: Vikas Publication.
- Bloom, B.S. (1972). *Taxonomy of educational objectives. A hand book- I (cognitive domain).* New York: DevidMokeay Campo.
- Das, R.C. (1993). *Educational technology– A basic text*. New Delhi: Sterling Publishers Pvt. Ltd.
- Flanders, Ned A. (1978). *Analyzing teacher behavior.* London: Addison Wesley Publishing Co.
- Goel, S. (2019). *ICT waves in education: challenges for 21st century teachers*. New Delhi; Atlantic publishers
- Haas, K.B. and Packer, H.Q. (1990). *Preparation and use of audio visual aids.* New York: Prentice Hall.
- Jena, S.S. (2018). *ICT in Education.* New Delhi: Shipra Publication.

- Joyce, B. Weil, M. & Showers, B. (1985). *Models of Teaching.* New Delhi: Prentice Hall of India Pvt. Ltd.
- Kumar, K.L. (2008). *Educational technology*. New Delhi: New Age International Pvt. Ltd. Publishers.
- Kumar, N. & Chandiram, J. (1967). *Educational television in India*, New Delhi: Arya Book Depot.
- Ledford, B.R. & Sleeman, P.J. (2001). Instructional Design: A Primer. Greenwich: Information Age Publishing.
- Mohanty, J. (2007). *Modern trends in educational technology*. Hyderabad: Neelkamal Publications.
- Mukhopadhyay, M. (1990). *Educational technology challenging issues.* New Delhi*:* Sterling Publishers Pvt. Ltd.
- Mukhopadhyay, M. (1990). *Educational technology.* New Delhi: Shipra Publication.
- Narang, V.K. (2015). *Modern trends in educational technology*. New Delhi: Astha Publishers.
- Pandey, S. (2018). *A textbook of educational technology*.New Delhi: Pearson
- Pathak, R. P. (2007): *Shaikshik Prodyogiki Kein Nay eAayaam*. Delhi: S. M. Books.
- Ray, P.K.S. (2012). *Educational technology*. Delhi: Dominant Publishers.
- Roy, R. (2011). *Educational technology in changing society*. Delhi: Shipra Publication.
- *Saxena, P. K. (2008): Shaikshik Prodyogiki evam KakshaPrabandh. Delhi: KK Publications.*
- *Sharma, S. & Gupta, N. (2007): Shaishik Takniki Avam KakshaKaksh Prabandhan. Jaipur: ShyamPrakashan.*
- *Spector, J.M. (2012. Foundations of Educational Technology: Integrative Approaches and Interdisciplinary Perspectives.* Routledge, NY, 2012.
- Pragyata: Guidelines for Digital Education by MHRD. Available at : https://www.education.gov.in/sites/upload_files/mhrd/files/pragyata-guidelines_0.pdf

Year	II	ENVIRONMENTAL EDUCATION	Credits	4
Semester	IV		Course Code	SOE01 04 20 C 3104
Learning Outcomes	**After the completion of the course, the students will be able to:** ● Develop competencies to examine the intrinsic relationship between biological sciences and Environmental Education vis-à-vis the possibilities and challenges within. ● Explain the role of professionals and ethics in environmental management..			
Course Content				
Unit-I	**Environmental Education:** ● Environmental Education: Concept, guiding principles, significance (Online) ● Environmental hazards: pollution, global warming and human health (Online) ● Sustainable development goals: Guiding principles and strategies (Online) ● Place of Environmental Education in National Curricular Framework (2000) given by NCERT and Environmental Education Curriculum Framework For Teachers and Teacher Educators (2005) given by NCTE.			
Unit -2	**Environmental Management** ● Characteristics and Functions of Environment management ● Teaching – Learning Strategies For Environmental Education: Field visits, Demonstration, Observation, Group- Discussion and Dramatization. ● Strategies for evaluating environmental education-Use of Observation, Self-reporting techniques (attitude scale, interview and questionnaire) in Environmental Education (Online) ● Relationship between Men and Environment: Ecological and Psychological Perspective			
Teaching learning process/Transaction Strategies	**Lectures, Debates, Assignments, Projects, PowerPoint Presentations, Demonstration**			

Practicum	Tasks and Assignments : Any two of the following
	• Project on Any Environmental Issue • Field Experience in a polluted Environmental area. • Celebrations/observation of different environmentally important days. • Preparation and Use of a strategy for teaching Environmental Education at school level / college level

Suggested Readings:

- Goleman, D. (2010). *Ecological Intelligence.* Penguin Books, London
- Bodzin, A., Klein, B. & Weaver, S. (2010). *The inclusion of environmental education in science teacher education.* Springer, London.
- Bonnet, M. (2002a). *Education for sustainability as a frame of mind. environmental education research*, 8(1), 9-20. Taylor & Francis Ltd.
- Fien, J. (2000). *Education for the environment: a critique—an analysis, environmental education research*, 6(2), pp.179-192. Taylor & Francis Ltd.
- Gough, S. & Reid, A. (2000). *Environmental Education Research as Profession, as Science, as Art and as Craft: implications for guidelines in qualitative research.* Environmental Education Research. 6(1): Taylor & Francis Ltd.
- Gough, S. & Scott, W. (2006). *Promoting environmental citizenship through learning: toward a theory of change*.
- A. Dobson &D. Bell (Eds.) *Environmental Citizen ship,* Cambridge and London: The MIT Press.
- Kulkarni, V., & Ramachandra, T V. (2009). *Environmental Management*, TERI Press, New Delhi
- NCERT, (2000). National Curriculum Framework 2000. New Delhi: NCERT Press.
- NCTE, (2005). *Environmental education curriculum frame working for teacher & teacher education*. New Delhi: NCERT.
- SAUVEÂ , L. (1999). *Environmental education-between modernity and postmodernity- searching for an integrating education framework.* Canadian Journal of Environmental Education, 4, 9-35
- Grace M. & Sharp, J. (2000). *Exploring the actual and potential rhetoric-reality gaps in environmental education and their implications for pre-service teacher training*. Environmental Education Research. 6(4), 331-45. Routledge
- Kaushik,A. & Kaushik, C.P.(2004). *Perspectives in environmental studies*, New Age International (P) Ltd. Publishers, New Delhi
- Kim, M. and Diong, C.H. (Eds.) (2012). *Biology education for social and sustainable development.* Sense Publishers. The Netherlands.
- Kohli, V.K. and Kohli, V (2000). *Environmental pollution and management*. Vivek Publishers, Ambala
- Lovelock, James (1979). *Gaia: a new look at life on earth*. Oxford: Oxford University Press.
- NCERT (2004). *Environmental education in schools.* NCERT, New Delhi.112.
- NCERT (2011). *Teachers' handbook on environmental education for the higher secondary stage*, DESM, NCERT, New Delhi, Pp.316.
- Powers, A.L. (2004). *Teacher preparation for environmental education: faculty perspectives on the infusion of environmental education into pre-service methods courses.* The Journal of Environmental Education. Taylor & Francis Ltd.
- Palmer, J. (1998). Theory of Environmental Education. Routledge.
- Rathore, H.C.S., Bhattacharya, G. C., Singh, S.K., Singh, M. & Gardia, A.(2008). *Society and environmental ethics*, Seema Press, Varanasi, Pp. 242.
- Sharma, R.C., Mahajan, B., Premi, K.K., Nuna, S.C., Menon, P.(1994). *Source book on environmental education for elementary teacher educators.* NIEPA, New Delhi.pp.278.
- Singh, S.K. (2010). *Fundamentals of environmental education*. Sharda Pustak Bhawan ,Allahabad ,Pp.175

- Stevenson, R.B. (2007). *Schooling and environmental education: contradictions in purpose and practice*. Environmental Education Research. Vol. 13(2) pp. 139-153.
- Revisioning Environmental Education through Whole Systems Thinking http://www.bath.ac.uk/cree/sterling/sterlingpartd.pdf
- The World Summit on Sustainable Development: Agenda 21 Chapter 36, UNESCO 2002 http://habitat.igc.org/agenda21/a21-36.htm. (20 June 2004)
- Aggarwal, J.C. (2007). *Education for values, environment and human rights*. Shipra Publications, Delhi.
- Reddy, K.P. and Reddy, D.N. (2002). *Environmental Education.* Neelkamal Publications Pvt. Ltd. Hyderabad.
- Sungosh, S.M. (2006). *An introduction to environmental education.* Akashi Book Depot, Shillong.

Year	II	DISSERTATION	Credits	4
Semester	IV		Course Code	SOE 01 04 21 C0044
Learning Outcomes	After the completion of the course, the students will be able to: ● Demonstrate comprehensive knowledge of the data analysis techniques ● Critically evaluate the process of report writing. ● Communicate clearly and effectively to specialist and non-specialist research ● Contribute new knowledge and skills for welfare of society and academia.			

Year	II	PRACTICE RELATING TO CURRICULUM, PEDAGOGY AND ASSESSMENT (ELEMENTARY LEVEL)	Credits	2
Semester	IV		Course Code	SOE01 01 12 DCEC 2002
Learning Outcomes	**After the completion of the course, the students will be able to:** ● Understanding about development of curriculum in teaching and learning, and assessment practices at elementary level. ● Analyse and reflect on the new developments in the area of curriculum development in elementary level			
Course Content				
Unit-I	**Curriculum development in elementary level:** ● Meaning, principles of curriculum development and need of curriculum development ● Selection of content and learning experiences and their organization ● Pedagogy, Pedagogical Analysis-Concept and Stages; Organising teaching: Memory level (Herbatian model), Understanding level (Morrison teaching model), Reflective level (Bigge and Hunt teaching model) Online			
Unit -2	**Assessment and evaluation in elementary school level** ● Assessment-Meaning, nature, perspective (Assessment for learning, Assessment of learning and assessment learning);Relation between Objectives and outcomes ● Types of Assessment (Placement, Formative, Diagnostic, Summative); Assessment of cognitive (Anderson and Krathwohl)			

	Affective (Krathwohl) and Psychomotor domains (R.H. Dave) of learning (Online) ● New trends in evaluation-grading, internal assessment, semester system, CCE, On demand examination system, online examination Critical appraisal of the present evaluation system at secondary school level in context to the alignment between the curriculum and forms of assessment with special reference to Learning Outcomes Based Curriculum(LOCF)
Teaching learning process/Transaction Strategies	Lectures, Brainstorming, Group Discussion and Self-study Projects
Practicum	1. Seminar on one of the topic Assigned 2. Critical Analysis of any Existing Curricula in Constructive Alignment view point. 3. Adapting Kirkpatrick's model of evaluation to your Teaching-Learning situation and submit report of your work. 4. Apply any Alignment model to.

Suggested Readings:

- Beauchamp, G.A (1981). *Curriculum theory* (4th edition.). Itasca, II: Peacock Publishers
- Bruner. J.S. (1966). *Towards a theory of instruction.* Cambridge. Harvard University Press.
- Henson, Kenneth.T (1978). *Curriculum development for education reform*. Harper Collins College publishers.
- Davies, Ivan, K. (1976). *Objectives in curriculum design*. Mcgraw Hill Book Company Limited, England.
- Gakhar, S.C.(2009). *curriculum development*, Panipat, N.M. Publications
- Joseph Schwab, (1969). *The Practical: A language for curriculum*. School Review, November.
- Kelley, A.B. (1996). *The curricular theory and practice*. Harper and Row, US.
- Nirantar (1997). *Developing a curriculum for rural women*, Nirantar, New Delhi.
- Padma M. S. (2003). *Constructing school knowledge, an ethnography of learning in an Indian village*, Sage Publication Inc., New Delhi.
- Pratt, David (1980). *Curriculum design and development*. Harcourt Brace and World Inc., New York.
- Romiszowski, A.J. (1986). *Designing instructional system-decision making in course planning & design*.

- Saylor,J.G. & Alexander, W.M.(1966). *Curriculum planning for modern schools*. New York: Holt, Rinehart & Winston.
- Taba, H. (1962). *Curriculum development. Theory and practice*. Har Court, Brace and Wald. New York.
- Tyler, R.W. (1949). *Basic principles of curriculum and instruction*. Chicago: University of Chicago Press.
- Wheeler: curriculum process Zias, R S. (1976). *Curriculum principles and foundations*. New York: Harper & Row.

Year	**II**	**POLICY AND PRACTICE RELATING TO CURRICULUM, PEDAGOGY AND ASSESSMENT** **(SECONDARY LEVEL)**	**Credits**	**2**
Semester	**IV**		**Course Code**	**SOE01 01 13 DCEC 2002**
Learning Outcomes		**After the completion of the course, the students will be able to:** ● Understanding about development of curriculum in teaching and learning, and assessment practices. ● Analyse and reflect on the new developments in the area of curriculum development.		
Course Content				
Unit-I		**Curriculum development in secondary level:** ● Meaning, principles of curriculum development and need of curriculum development ● Selection of content and learning experiences and their organization ● Pedagogy, Pedagogical Analysis-Concept and Stages; Critical pedagogy- meaning, need and its implications in teacher education ● Organising teaching: Memory level (Herbatian model), Understanding level (Morrison teaching model), Reflective level (Bigge and Hunt teaching model) Online		
Unit -2		**Assessment and evaluation in secondary school level** ● Assessment-Meaning, nature, perspective (Assessment for learning, Assessment of learning and assessment		

	learning);Relation between Objectives and outcomes • Types of Assessment (Placement, Formative, Diagnostic, Summative); Assessment of cognitive (Anderson and Krathwohl) Affective (Krathwohl) and Psychomotor domains (R.H. Dave) of learning (Online) • New trends in evaluation-grading, internal assessment, semester system, CCE, On demand examination system, online examination Critical appraisal of the present evaluation system at secondary school level in context to the alignment between the curriculum and forms of assessment with special reference to Learning Outcomes Based Curriculum(LOCF)
Teaching learning process/Transaction Strategies	Lectures, Brainstorming, Group Discussion and Self-study Projects
Practicum	1. Seminar on one of the topic Assigned 2. Critical Analysis of any Existing Curricula in Constructive Alignment view point. 3. Adapting Kirkpatrick's model of evaluation to your Teaching-Learning situation and submit report of your work. 4. Apply any Alignment model to.

Suggested Readings:

- Beauchamp, G.A (1981): *Curriculum theory* (4th edition.). Itasca, II: Peacock Publishers
- Bruner. J.S. (1966). *Towards a theory of Instruction*. Cambridge. Harvard University Press.
- Henson, Kenneth.T (1978). *Curriculum development for Education reform*. Harper Collins College publishers.
- Davies, Ivan, K. (1976). "*Objectives in curriculum design*", Mcgraw Hill Book Company Limited, England.
- Gakhar, S.C.(2009): *Curriculum development*, Panipat, N.M. Publications
- Joseph Schwab, (1969). *The practical: A language for curriculum*. School Review, November.
- Kelley, A.B. (1996). *The curricular theory and practice*. Harper and Row, US.
- Nirantar (1997). *Developing a Curriculum for Rural Women.* Nirantar, New Delhi.
- Padma M. S. (2003). *Constructing school knowledge, an ethnography of learning in an indian village*, Sage Publication Inc., New Delhi.
- Pratt, David (1980). "*Curriculum design and development*", Harcourt Brace and World Inc., New York.
- Romiszowski, A.J. (1986). "*Designing instructional system-decision making in course planning & design*".

- Saylor,J.G& Alexander, W.M.(1966). *Curriculum planning for modern schools*, New York: Holt, Rinehart & Winston.
- Taba, Hilda (1962). *Curriculum development*. Theory and Practice, Har Court, Brace and Wald. New York.
- Tyler, R.W. (1949). *Basic principles of curriculum and instruction*. Chicago: University of Chicago Press.
- Wheeler: curriculum process Zias, R S. (1976). *Curriculum principles and foundations*. New York: Harper & Row.

Year	II	EDUCATIONAL POLICY, ECONOMICS AND PLANNING AT (ELEMENTARY LEVEL)	Credits	4
Semester	IV		Course Code	SOE01 01 14 DCEC2002

Learning Outcomes	**After the completion of the course, the students will be able to:** ● Understand the financing of education in India. ● Understand the concept and nature of educational planning. ● Define education as an investment ● Critically analyze some governmental plans and policies of education
Course Content	
Unit-I	**Educational Policy at Elementary Level (NEP)** ● Concept, Need and Importance ● Types of Educational Policy- State level Institutional ,Short –term, Long- term at Elementary Level ● Linkage between national Educational Policy and State Development Policy at Elementary Level ● Government Initiatives and constitutional provisions: NPE (1986); POA (1992); DPEP (1994); SSA; RTE Act
Unit -2	**Economics of Education** ● Meaning, Significance and Scope of economics of education ● Education and Economic Development, Financing of Education in India: Center- State relationship, mobilization of resources ● Financial Contribution of community to school. ● Models of development based on free market economies
Unit -3	**Educational Planning at Elementary Level** ● Concept, needs and goals of Educational Planning ● Principles of Educational Planning.

	● Approaches of Educational Planning ● Educational Planning in India since independence at elementary stage
Unit- 4	**Inspection, Supervision and Monitoring** ● Monitoring and Supervision at Elementary Level ● Research and Evaluation of specific schemes like Mid-Day Meals, establishments of Village Education Committee and different incentive schemes and achievement levels ● Quality concern at elementary Education and assessment of quality ● Factors affecting quality and literacy achievement
Teaching learning process/Transaction Strategies	Discussions, debates, analysis of plans and policies, suggestions for improvement
Practicum :	● Preparation of research design on a theme, discipline and RTE act. 2009 ● Visit a school for reporting on access, and enrolment/ retentions of girl students and give suggestions for improvement. ● Critical Analysis of Research Studies on programs and policies related to elementary education (Survey a Govt. school nearby and Prepare of report on critically analyze the SSA and Mid May Meal programme) ● Any other assignment/ project given by the Institute. ● Annual Status of Education Report (ASER); Achievement surveys; PROBE; Pratichi Report on Education; Global Monitoring; Report of UNESCO

Suggested Readings:

- Althusser, L. (1971). *Ideology and ideological state apparatuses*, in L. Althusser (eds), *Lenin and philosophy and other essays.* London: New Left Review.
- Apple, M. (2004). *Ideology and curriculum*. New York: Routledge Falmer.
- Banerjee, S. Cole, E. Duflo and L. Linden. (2003). *Improving the quality of education in India: Evidence from three randomized experiments.* NBER mimeo.
- Becker, Gary (1993). Nobel Lecture: The Economic Way of Looking at Behavior. *Journal of Political Economy* 101, pp. 385-409.
- Becker, Gary S. (1964). Human capital (eds).*Investment in Human Capital: Effects on Earning*. NBER: New York.
- Belfield. Clive. (2000). *Economic principles for education.* Edward Elgar.
- Blaug, Mark. (1970). Where are we now in Economics of Education?. *Economics of Education Review*.
- Blaug, Mark. (1972). *An introduction to economics of education*. London: Penguin.
- Caplin, B. (2018). *The case against education: why education is waste of time and money.* USA: Princeton university press.
- Chattopadhyay, S. (2012) .*Education and Economics*. London: Oxford University Press.
- Clarke, S. (2005). The neoliberal theory of society, In A. Saad-Filho& D. Johnston (eds.) *Neoliberalism: A Critical Reader*. Ann

Arbour, MI: Pluto Press, 50-59.
- Coombs, P.H. (1969). *What is Educational Planning?*. Paris: International Institute of Educational Planning (IIEP).
- Fereeti, R. (2018). *Teachers, teaching and reforms; perspectives on reforms to improve educational outcomes*. India: Routledge.
- Giroux, H. (2005). *The terror of neoliberalism: cultural politics and the promise of democracy.* Boulder: Paradigm Publishers.
- H. Levin.(1987). Education as a Public and Private Good. *Journal of Policy Analysis and Management*, Summer.
- Harvey, D. (2005). *A brief history of neoliberalism*. New York: Oxford University Press.
- Hayek, F. A. (1979). *Law, legislation and liberty: a new statement of the liberal principles and political economy*; *the political order of a free people*,(3rd ed.).. London: Routledge.
- Naik, J.P.(1975) .*Equality, quality and quantit: The elusive triangle in Indian education.*Bombay:Allied.
- Oreopoulos, P.,&Kjell S. (2011). Priceless: the non-pecuniary benefits of schooling. *Journal of Economic Perspectives* 25(1), 159-184.
- Padmanabhan,C.B.(1986). *Economics of Educational planning in India*. New Delhi: Arya Book Depot.
- Palley, T.I. (2005). From Keynisianism to Neoliberalism: shifting paradigms in economics,' in A. Saad-Filho& D. Johnston (eds.,) *Neoliberalism: A critical Reader*. Ann Arbour, MI: Pluto Press.
- Parkash S. (1999). *Educational planning*. New Delhi: Gyan Publishing House.
- Prakash, V. &K. B. (2008). *Perspectives on Education and Development*. Delhi: NUEPA.
- Psacharapoulos, George. (1996). *The profitability of investment in education: Concepts and methods*, *human development and operations policy*, working Paper No. 15280. Washington, DC: The World Bank.
- Psacharopolous, G. (1985). *Planning of education: Where do we stand*?. Washington: World Bank.
- Saad-Filho, A. & D. Johnston. (eds.) (2005). *Neoliberalism: A critical reader*. Ann Arbour, MI: Pluto Press.

Year	II	EDUCATIONAL POLICY, ECONOMICS AND PLANNING AT (SECONDARY LEVEL)	Credits	4
Semester	IV		Course Code	SOE01 01 15 DCEC2002

Learning Outcomes	**After the completion of the course, the students will be able to:** ● Understand the financing of education in India. ● Differentiate between education as an investment and education as consumption. ● Discuss the application of economic theories in the educational field. ● Analyse governmental plans and policies related to education.
Course Content	
Unit-I	**Educational Policy at Secondary Level (NEP) (Online)** ● Concept, need and importance of educational policies. ● Types of educational policies- National and State Level, Short and long term ● Relationship between policies and education, Linkage between Educational Policy and National Development Policy ● Planning of policy implementation, policy impact assessment and subsequent policy cycles.
Unit -2	**Economics of Education** ● Education as Consumption and Investment ● Cost Benefit Analysis Vs Cost Effective Analysis in Education. ● Education and Economic Development; ● Signalling theory Vs Human Capital theory
Unit -3	**Educational Planning at Secondary Level** ● Concept, needs, goals and principles of Educational Planning at Secondary Level (online) ● Features of NITI Aayog (online) ● Perspective planning at central, state and local levels: Concepts of Macro, and Micro level planning. ● Priorities to be given at Central and State level, Recent initiatives in educational planning.
Unit- 4	**Educational Expenditure** ● Availability of educational statistics at central, state and district levels.

	● Educational Expenditure and its Source of finance: Government grants (Central, State, Local), School Budgetary and accounting procedure. ● Allocation of grants by U.G.C. Grant-in-aid policy, Monitoring of expenditure control and utilization of funds, Central-State Relationship in Financing of Education. ● Financial estimates by Tapas Mazumdar Committee (GoI, 1998)
Teaching learning process/Transaction Strategies	Lecture**,** Discussions, Debates, Analysis of plans and policies.
Practicum :	**Any one of the Following:** ● Preparation of research design on a theme, discipline and RTE act. 2009 ● Estimation of opportunity cost on a sample of working school age children. ● Preparation of a blue-print for expenditure control in a school ● Preparation of a school budget ● Any other given assignment by the teacher educators

Suggested Readings:

- Becker, Gary (1993). Nobel Lecture: The Economic Way of Looking at Behavior. *Journal of Political Economy* 101, pp. 385-409.
- Becker, Gary S. (1964). Human capital (eds).*Investment in Human Capital: Effects on Earning*. NBER: New York.
- Belfield. Clive. (2000). *Economic principles for education.* Edward Elgar.
- Blaug, Mark. (1970). Where are we now in Economics of Education?. *Economics of Education Review*.
- Blaug, Mark. (1972). *An introduction to economics of education*. London: Penguin.
- Caplin, B. (2018). *The case against education: why education is waste of time and money.* USA: Princeton university press.
- Chattopadhyay, Saumen. (2012) .*Education and Economics.* London: Oxford University Press.
- Clarke, S. (2005). The neoliberal theory of society,in A. Saad-Filho& D. Johnston (eds.) *Neoliberalism: A Critical Reader*. Ann Arbour, MI: Pluto Press, 50-59.
- Coombs, P.H. (1969). *What is Educational Planning?*. Paris: International Institute of Educational Planning (IIEP).
- Fereeti, R. (2018). *Teachers, teaching and reforms; perspectives on reforms to improve educational outcomes*. India: Routledge.
- Giroux, H. (2005). *The terror of neoliberalism: cultural politics and the promise of democracy.* Boulder: Paradigm Publishers.
- H. Levin.(1987). Education as a Public and Private Good. *Journal of Policy Analysis and Management*. Summer.
- Harvey, D. (2005). *A brief history of neoliberalism*. New York: Oxford University Press.
- Hayek, F. A. (1979). *Law, legislation and liberty: a new statement of the liberal principles and political economy*; *the political order of a free people*,(3rd ed.).. London: Routledge.
- Naik, J.P.(1975) .*Equality, quality and quantity: The elusive triangle in Indian education.*Bombay:Allied.
- Oreopoulos, P.,&Kjell S. (2011). Priceless: the non-pecuniary benefits of schooling.*Journal of Economic Perspectives* 25(1), 159-184.
- Padmanabhan,C.B.(1986). *Economics of Educational planning in India*. New Delhi: Arya Book Depot.
- Palley, T.I. (2005). From Keynisianism to Neoliberalism: shifting paradigms in economics,' in A. Saad-Filho& D. Johnston (eds.,)

Neoliberalism: A critical Reader. Ann Arbour, MI: Pluto Press.

- Parkash S. (1999). *Educational planning*. New Delhi: Gyan Publishing House.
- Prakash, V. &K. B. (2008). *Perspectives on Education and Development*. Delhi: NUEPA.
- Psacharapoulos, George.(1996). *The profitability of investment in education: Concepts and methods, human development and operations policy,*working Paper No. 15280. Washington, DC: The World Bank.
- Psacharopolous, G. (1985). *Planning of education: Where do we stand*?. Washington: World Bank.
- Saad-Filho, A. & D. Johnston. (eds.) (2005). *Neoliberalism: A critical reader*. Ann Arbour, MI: Pluto Press.
- Schultz, T.W. (1961). Investment in Human Capital, *American Economic Review*.
- Sen, Amartya and Dreze. (1996). *India: Economic development and social opportunity*. Oxford: University Press.
- Tilak, Jandhyala B. G. (2002). Education and Poverty. *Journal of Human Development (New York: UNDP)*,3 (2), 191-207.
- Tilak, Jandhyala B.G. (2006). Economics of Human Capital in India.*Indian Economic Journal*, 3(20).
- Tilak, Jandhyala B.G. (2008). "Education, Growth and Development, Keynote Address". 91stIEA Annual Conference 705 (19).

GEC

Year	II	INTRODUCTION TO COUNSELLING	Credits	4
Semester	IV		Course Code	SOE010405GEC3014
Learning Outcomes	**After the completion of the course, the students will be able to:** ● Explain the meaning and concept of counselling in India. ● Understand various models and approaches adopted for and counselling. ● Apply various techniques of counselling in real life. ● Identify the factors affecting mental health.			
Course Content				
Unit-I	**Introduction to Counselling** ● Introduction to Counselling and Characteristics of a Counsellor (online) ● Process of Counselling (online) ● Theoretical Approaches to Counselling (online) ● Ethics in Counselling			
Unit -2	**Counselling: Models and Approaches (online)** ● Psychoanalysis, Psychodynamic and Psychotherapy ● Behavioural Therapy, Cognitive Behaviour Therapy and Approaches to Counselling ● Drama and Art Therapy in Counselling ● Other Therapies (Persons Center Counselling and Solution Focus Counselling)			
Unit -3	**Types of Counselling** ● HIV/AIDS Counselling ● Educational and Vocational Counselling ● Child Protection and Child Rights Counselling			

	• Addiction/Anxiety Counselling
Unit- 4	**Counselling for Mental Disorders** • Depression (online) • Personality Disorder • Gender Identity Disorder • Eating Disorder
Teaching learning process/Transaction Strategies	Lectures, discussions, use of psychological tests, observation of students, conducting career guidance in the schools, counsel students by identifying their mental health problems such as lack of concentration, anxiety, anger etc.
Practicum	1. Prepare an interview schedule for an effective Counseling 2. Visit a guidance Centre and Write a report about its organization and functions. 3. Write a research report on – Issues and trends in Guidance and Counseling.

Suggested Readings:

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- Varky, B. G. & Mukhopadhyay, M. (2006). *Guidance and counselling*. New Delhi: Sterling Publications.
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Teaching Learning Process

- **Lectures**
- **Brainstorming**
- **Cooperative Learning**
- **Project**
- **Techno-pedagogical inclusion**
- **Role Playing**
- **Interactive Sessions**
- **Seminars**
- **Research-based Learning/Dissertation or Project Work**

Blended learning

The National Education Policy has given a rare glimpse of what can be achieved through the transformation of education. The new NEP clearly states that it is time to take on a policy that is undoubtedly student centric, or what can be safely put down as Education 4.0! The time has indeed come to recognize the fact that the student is the main stakeholder and that efforts must be taken to make the system respond to their dreams and aspirations. In this line of thinking the new policy gives the acceptability of many modes of learning including that of face to face learning, online learning and distance or virtual mode. It also promotes use of vocational courses, multi-disciplinary courses and multi-modal approaches there by focussing on Blended teaching-learning. This pedagogical approach will lead to educational transformation as it will change the whole scenario of education system.

The important features of Blended Learning pedagogy are:

- **Increased student engagement in learning.**
- **Enhanced teacher and student interaction.**
- **Responsibility for learning.**
- **Time management and flexibility**
- **Improved student learning outcomes**

- **Enhanced institutional reputation.**
- **More flexible teaching and learning environment**
- **More amenable for self and continuous learning**
- **Better opportunities for experiential learning**

Assessment and Evaluation

- **Continuous Comprehensive Evaluation at regular internal for assessing course outcomes.**
- **Formative Assessment for understanding skills and lacuna of students regularly to provide remedial solutions.**
- **Oral Examinations to test presentation and communication skills**
- **Open Book Examination for enhancing analysis and application domain among students.**
- **Seminar/ Research Colloquium Presentations**
- **Research based projects**
- **Collaborative Assignments for inculcating life skills and teamwork among students.**

Keywords

- **Learning Outcome curriculum Framework (LOCF)**
- **National Education Policy (NEP-2020)**
- **Blended Learning**
- **Vision**
- **Mission**
- **Programme Outcomes (PO)**
- **Programme educational objectives (PEO)**

- **Programme Specific Outcomes (PSO)**
- **Course-level Learning Outcomes (CO)**

References

- **National Education Policy-2020. https://www.education.gov.in/sites/upload_files/mhrd/files/NEP_Final_English_0.pdf**
- **The draft subject specific LOCF templates available on UGC website.**

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- **Draft Blended Mode of Teaching and Learning: Concept Note available on UGC website.**

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शारीरिक शिक्षा एवं खेल विभाग

Department of Physical Education and Sports

हरियाणा केन्द्रीय विश्वविद्यालय, महेन्द्रगढ़

Central University of Haryana, Mahendergarh

(संसद के अधिनियम संख्या 25 (2009) के तहत स्थापित, नैक से 'ए' ग्रेड प्राप्त)

(Established vide Act No. 25 (2009) of Parliament, Accredited 'A' Grade by NAAC)

CUH/2021/PHY.EDU/

Minutes of Meeting of B.O.S.

A meeting of the Board of Studies (B.O.S.) Department of Physical Education & Sports, constituted vide notification no. CUH/2020/A&C/334 dated 12.06.2020, was held on 26th August, 2021 at 11.00A.M. through both Online and Offline mode. The organizational structure of the Meeting of BOS, Dept. of Physical Education & Sports is as under:

1. Prof. Ravinder Pal Ahlawat — Chairperson
   Head, Dept. of Physical Education & Sports, CUH
2. Dr. Anil Kalkal — External Member
   Director, Delhi University Sports Council, University Sports Complex, University of Delhi.
3. Prof. Nishan Singh Deol — External Member
   Professor & Head, Dept. of Physical Education, Punjabi University, Patiala (Punjab)
4. Dr. Jai Prakash Bhukar — Internal Member
   Associate Professor, Dept. of Physical Education & Sports, CUH
5. Dr. Sandeep Dhull — Internal Member
   Assistant Professor, Dept. of Physical Education & Sports, CUH

The meeting resolved the following agenda-items:

A. Considered and approved the minutes of Departmental Research Committee meeting held on 16.07.21.

B. Considered and approved the topics of Ph.D research scholars enrolled in session (2020-21) (Annexure-I)

C. Considered and approved the panel of External Examiners for M.P.E.S. (Annexure-II)

D. Considered and approved the panel of External Examiners for M.P.Ed. (Annexure-III)

E. Considered and approved the recommendations of the Staff Council regarding implementation of LOCF as per New Education Policy-2020 in M.P.E.S & M.P.Ed programme in the Dept. of Physical Education & Sports, CUH.

F. Considered and approved the revised Scheme and Syllabus of M.P.E.S. programme (2-year) as per New Education Policy-2020. (Annexure-IV)

G. Considered and approved the Scheme and Syllabus of M.P.Ed programme (2-year) as per New Education Policy-2020. (Annexure-V)

H. Considered the recommendations of Staff Council regarding introducing B.P.Ed (4-Year Integrated Course) as per the recommendations of New Education Policy 2020 in the Dept. of Physical Education & Sports, CUH and to forward the application for Course recognition to N.C.T.E.

I. Considered and approved the Scheme and Syllabus of B.P.Ed (4-Year Integrated Course) as per New Education Policy-2020. (Annexure-VI)

The Meeting ended with a vote of thanks to all the members.

26/8/21

Dr. Sandeep Dhull
(Internal Member)

26/8/21

Dr. Jai Prakash Bhukar
(Internal Member)

(Attended Online)

Prof. Nishan Singh Deol
(External Member)

Dr. Anil Kalkal
(External Member)

26/08/21

Prof. Ravinder Pal Ahlawat
(Convener)

A copy of the Minutes of the meeting of the Board of Studies of the Department of Physical Education & Sports is forwarded to the following for information and necessary action.

1. Dr. Anil Kalkal, Director, Delhi University Sports Council, University Sports Complex, University of Delhi.
2. Prof. Nishan Singh Deol, Professor & Head, Dept. of Physical Education, Punjabi University, Patiala (Punjab).
3. A.R., Academic Branch, CUH.

Learning Outcomes-Based Curriculum Framework (LOCF)

School of Education

M.P.E.S. Programme

Central University of Haryana

Mahendergarh

NCTE Regulation-2014/NEP-2020/UGC-LOCF Based Curriculum (2021 -2022)

1. Background
2. Programme Outcomes (PEOs)
3. Programme Specific Outcomes (PSO's)
4. Program Outcomes (PO) with Graduate Attributes
5. Structure of Undergraduate Engineering program
6. Learning Outcome Index
7. Semester-wise courses and credit distribution
8. Course Level Learning outcome
9. Teaching- Learning process
10. Blended Learning
11. Assessment and Evaluation
12. Keywords
13. References
14. Appendices

1. Background

The implementation of the curricular reforms envisioned in National Education Policy-2020 on consequent decisions taken in the Academic Council of the University to annually review and reform the curriculum of all the Under Graduate and Post Graduate programmes in alignment with the NEP-2020 and UGC quality mandate for Higher Education Institutions 2021, the curriculum of Master of Physical Education and Sports (M.P.E.S) is revised accordingly.

The process of revamping the curriculum was initiated with the series of webinars and discussions conducted by the University to orient the teachers about the key features of the Policy, enabling them to revise the curriculum in sync with the Policy. Orientation of the faculty about the vision and provisions of NEP-2020 made it easier for them to appreciate and incorporate the vital aspects of the Policy in the revised curriculum focused on 'creating holistic, thoughtful, creative and well-rounded individuals equipped with the key 21st century skills' for the 'development of an enlightened, socially conscious, knowledgeable, and skilled nation'.

The Department of Physical Education and Sports is committed towards preparing Physical Education Teachers by ensuring quality and excellence in its programme. The present curriculum Framework is based on NCTE Regulation-2014, UGC-LOCF and NEP-2020. Physical education and sports are an integral part of life, from school to higher education and community participation. It is the education which focuses on wholesome development of personality through physical, cognitive and functional development. Master of physical education provide opportunity to students at post graduate level toward specialized knowledge in physical education, seeking a broad based spectrum of study that crosses discrete portions of physical, biological, psychological and social science in an integrated, orderly and logical sequence. The curriculum focuses on horizontal integration of multi-facet discipline aiming at physical education specialist who can develop and promote physical education at schools, colleges and universities across the nation. The programme structure consists of formal courses and related experiences which focus on human involvement in physical education and related aspects.

Programme Name: Master of Physical Education and Sports (M.P.E.S),

Department of Physical Education and Sports,

School of Education.

Vision and Mission of Central University of Haryana

UNIVERSITY VISION

To develop enlightened citizenship of a knowledge society for peace and prosperity of individuals, nation and the world, through promotion of innovation, creative endeavors, and scholarly inquiry.

UNIVERSITY MISSION

To serve as a beacon of change, through multi-disciplinary learning, for creation of knowledge community, by building a strong character and nurturing a value-based transparent work ethics, promoting creative and critical thinking for holistic development and self-sustenance for the people of India. The University seeks to achieve this objective by cultivating an environment of excellence in teaching, research and innovation in pure and applied areas of learning.

OBJECTIVES OF DEPARTMENT OF PHYSICAL EDUCATION AND SPORTS, SCHOOL OF EDUCATION

1. To prepare outstanding Physical Education Teachers for a global platform
2. To prepare physical education professionals, who can lead to transformation of the lives of individuals and lead to the national development.
3. To develop positive attitude towards physical education and sports.
4. To train teachers in making teaching-learning healthful and joyful.
5. To prepare physical education teachers/ trainers/ educators who have a sound knowledge base, essential professional skills and humanitarian values and ethics.
6. To train teachers in Information & Communication Technology for physical education and sports.
7. To develop research and innovation aptitude in pupil teachers.
8. To build an environment for all round development of the individual.

Mapping of University Vision and Mission to Department Vision and Mission

Acclaimed as modal Centre of Learning and Research by

University Vision and Mission	**Objectives of School**
High quality knowledge society creation for peace and prosperity of individuals, nation and the world, through and scholarly inquiry	**Yes**
Promotion of innovation, creative endeavors, research and development	**Yes**
Students excellence through multi-disciplinary learning, value-based transparent work ethics, creative and critical thinking	**Yes**
Environment of excellence in teaching, research and innovation in pure and applied areas of learning	**Yes**

1. PROGRAMME OUTCOMES (POs), SCHOOL OF EDUCATION

After successful completion of the programme:

PO1 Learners will be able to comprehend the acquired knowledge during the Programme of study.

PO2 Learners will be able to reflect on the problems relating to health, discipline and society with ethical guidelines.

PO3 Learners will be able to exhibit the professional skills and competencies acquired during the Programme of study.

PO4 Learners will be able to show scientific & research capabilities in their academic, professional and general life pursuits.

PO5 Learners will be able to apply the knowledge and skills acquired in academic management and resource management according to predetermined objectives/outcomes.

PO6 Learners will be able to work as a member or a leader in various teams and multidisciplinary & diverse settings.

1. PROGRAMME SPECIFIC OUTCOMES (PSOs), M.P.E.S. Programme

The M.P.E.S. Two-Year Teacher Education Programme aims at:

PSO-1. Acquiring conceptual understanding of sports exercise physiology, kinesiology, psychology and other physical educational aspects with experiential learning.

PSO-2. Developing competencies in motor skills and movement analysis needed to perform variety of physical activities and reducing the risk of chronic disease and injuries.

PSO-3. To enable the students for acquiring relevant skills for entrepreneurship in contemporary fitness industry, self-defence, community development and physical literacy.

PSO-4. Providing exposure to student-teachers for digital literacy, integrated pedagogy, and training for various awareness programmes related to gender, environment, health and contemporary issues.

PSO-5. Enabling the students to develop a high level of understanding of physical education practice and policy providing with a basis for life-long learning and successful career development in physical education.

PSO-6. Developing research competencies with statistical techniques, effective way of teaching and curriculum design in physical education.

Structure and Syllabus

M. P.E.S

(Master of Physical Education and Sports)

School of Education

w.e.f. Academic Session 2021-22

M.P.E.S. Semester- I

S. No.	Course Credit	Course Code	Course Title	Credits (Theory)	Credits (Tutorial/ Practicum)	Credits (Practical)	Class Teaching / Field Based Activity Hours per week
1	3	SOE PES 010101 C3003	Research Methodology in Physical Education	3	0	0	3
2	3	SOE PES 010102 C3003	Physiology of Exercise	3	0	0	3
3	3	SOE PES 010103 C3003	Tests, Measurement and Evaluation in Physical Education	3	0	0	3
Practicum							
4	3	SOE PES 010104 C0143	Teaching of Athletics-Track Events	0	1	4	3
5	3	SOE PES 010105 C0143	Teaching of Games and Intramural-I	0	1	4	3
6	3	SOE PES 010106 C0143	Sports Specialization-I	0	1	4	3
7	1	SOE PES 010107 C0021	Classroom Teaching and Practical of the Core Theory Subjects-I	0	0	2	1
Discipline Centric Elective Courses (DCEC)*							
8	**3**	SOE PES 010101 DCEC3003	Sports Management and Curriculum Design in Physical Education	3	0	0	3

9	**3**	SOE PES 010102 DCEC3003	Adapted Physical Education	3	0	0	3
10	**4***		**Taken from other Department/ MOOC**				
Total	**26**						

Note: - Minimum Students required for opting a particular Game shall be 10

Generic Elective Courses (GEC)

Sr. No.	Semester	Course Code	Course Title	Credits (Theory)	Credits (Tutorial/ Practicum)	Credits (Practical)	Class Teaching / Field Based Activity Hours per week
1	**First**	SOE PES 010101 GEC4004	Wellness through Games and Sports	4	0	0	4

M.P.E.S. Semester- II

S. No.	Course Credit	Course Code	Course Title	Credits (Theory)	Credits (Tutorial/ Practicum)	Credits (Practical)	Class Teaching / Field Based Activity Hours per week
11	3	SOE PES 010208 C3003	Applied Statistics in Physical Education	3	0	0	3
12	3	SOE PES 010209 C3003	Sports Medicine, Athletic care and Rehabilitation	3	0	0	3
13	3	SOE PES 010210 C3003	Information and Communication Technology (ICT) in Physical Education	3	0	0	3
Practicum							
14	3	SOE PES 010211 C0143	Teaching of Athletics-Field Events	0	1	4	3
15	**3**	SOE PES 010212 C0143	Advance Teaching, Coaching and Officiating of the Games-I	0	1	4	3
16	**3**	SOE PES 010213 C0143	Sports Specialization-II	0	1	4	3
17	**1**	SOE PES 010214 C0021	Classroom Teaching and Practical of the Core Theory Subjects-II	0	0	2	1

Discipline Centric Elective Courses (DCEC)							
18	**3**	SOE PES 010203 DCEC3003	Value and Environmental Education in Physical Education	3	0	0	3
19	**3**	SOE PES 010204 DCEC3003	Sports Engineering	3	0	0	3
Total	**22**						

M.P.E.S. Semester- III

S. No.	Course Credit	Course Code	Course Title	Credits (Theory)	Credits (Tutorial/ Practicum)	Credits (Tutorial/ Practicum Practical)	Class Teaching / Field Based Activity Hours per week
20	**3**	SOE PES 010315 C3003	Science of Sports Training	3	0	0	3
21	**3**	SOE PES 010316 C3003	Yogic Science	3	0	0	3
22	**3**	SOE PES 010317 C3003	Sports Biomechanics and Kinesiology	3	0	0	3
Practicum							
23	**3**	SOE PES 010318 C0143	Coaching and Officiating of Athletics-Track Events	0	1	4	3
24	**3**	SOE PES 010319 C0143	Teaching of Games and Intramural-II	0	1	4	3
25	**3**	SOE PES 010320 C0143	Sports Specialization-III	0	1	4	3
26	**1**	SOE PES 010321 C0021	Classroom Teaching and Practical of the Core Theory Subjects-III	0	0	2	1
Discipline Centric Elective Courses (DCEC)*							
27	**3**	SOE PES 010305 DCEC3003	Research Proposal and Preparation of Synopsis.	3	0	0	3

28	**3**	SOE PES 010306 DCEC3003	Sports Journalism and Mass Media	3	0	0	3
29	4*		**Taken from other Department/ MOOC**				
Total	**26**						

Generic Elective Courses (GEC)

Sr. No.	Semester	Course Code	Course Title	Credits (Theory)	Credits (Tutorial/ Practicum)	Credits (Practical)	Class Teaching / Field Based Activity Hours per week
1	**Third**	SOE PES 010302 GEC4004	Physical Fitness and Conditioning	4	0	0	4

Note: -

1. Minimum Students required for opting a particular Game shall be 10.

2. The students opting for Research Proposal as Discipline Centric Elective Course will be encouraged to take Dissertation as a Discipline Centric Elective Course (DCEC) in the fourth semester.

3. Research Proposal and Dissertation would be evaluated as per the University Ordinance No-XV.

M.P.E.S. Semester- IV

S. No.	Course Credit	Course Code	Course Title	Credits (Theory)	Credit (Tutorial/ Practicum)	Credit (Practical)	Class Teaching / Field Based Activity Hours per week
30	**3**	SOE PES 010422 C3003	Sports Psychology	3	0	0	3
31	**3**	SOE PES 010423 C3003	Health Education and Sports Nutrition	3	0	0	3
32	**3**	SOE PES 010424 C3003	Theory of Athletics	3	0	0	3
Practicum							
33	**3**	SOE PES 010425 C0143	Coaching and Officiating of Athletics-Field Events	0	1	4	3
34	**3**	SOE PES 010426 C0143	Advance Teaching, Coaching and Officiating of the Games-II	0	1	4	3
35	**3**	SOE PES 010427 C0143	Sports Specialization-IV	0	1	4	3
36	**1**	SOE PES 010428 C0021	Classroom Teaching and Practical of the Core Theory Subjects-IV	0	0	2	1

Discipline Centric Elective Courses (DCEC)							
37	**3**	SOE PES 010407 DCEC0303	Dissertation	0	3	0	3
38	**3**	SOE PES 010408 DCEC3003	Physical Fitness and Wellness	3	0	0	3
Total	**22**						

***Note:** For more details regarding Credit and other Academic requirements Ordinance No-XV of the University may be referred.

Number of credits per semester

Semester	Core Course	Practicum Course	Discipline Centric Elective Courses (DCEC)	Taken from other Department/ MOOC [Generic Elective Courses (GEC)]	Total
I	9	10	3	4	26
II	9	10	3		22
III	9	10	3	4	26
IV	9	10	3		22
				Total	96

Matching of Programme outcomes with Programme Specific outcomes

PO PSO	PO1	PO2	PO3	PO4	PO5	PO6
PSO-1	x	x	x	x	x	x
PSO-2	x	x	x	x	x	x
PSO-3	x	x	x	x	x	x
PSO-4	x		x	x	x	x
PSO-5	x	x	x	x	x	x
PSO-6		x	x	x	x	
Total	5	5	6	6	6	5

Matching of Programme outcomes with Programme Specific outcomes, Core Courses (M.P.E.S.)

PO	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6
CC-1	X	X	X	X	X	X
CC-2	X		X		X	X
CC-3		X	X	X	X	
CC-4	X		X		X	X
CC-5	X		X			X
CC-6	X				X	X
CC-7	X	X	X		X	X
CC-8	X	X	X	X	X	X
CC-9	X	X	X		X	X
CC-10	X		X	X	X	X
CC-11	X		X		X	X
CC-12	X	X				X
CC-13	X		X		X	X
CC-14	X	X	X		X	X
CC-15			X	X	X	X
CC-16	X		X	X	X	X
CC-17	X		X	X	X	X
CC-18		X	X		X	X
CC-19	X		X		X	X
CC-20	X		X		X	X
CC-21	X	X	X		X	X
CC-22	X	X	X	X		
CC-23	X	X	X	X	X	
CC-24	X	X		X	X	
CC-25	X		X		X	X
CC-26	X		X		X	X
CC-27	X		X		X	X
CC-28	X	X	X		X	X

Matching of Programme outcomes with Programme Specific outcomes, Elective Courses (M.P.E.S.)

PSO	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6
EC1	X		X	X	X	
EC2		X	X		X	X
EC3	X		X	X	X	
EC4	X	X		X	X	X
EC5	X		X	X	X	
EC6	X	X				X
EC7			X	X	X	
EC8	X		X	X	X	

Matching of Programme outcomes with Programme Specific outcomes, Generic Elective Courses (M.P.E.S.)

PSO	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6
GEC-1	X	X	X		X	X
GEC-2	X		X	X	X	X

Learning Outcome/ Course Outcome Index, Core Courses (M.P.E.S.)

PSO	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6
CC-1	X			X	X	X
CC-2	X	X		X	X	
CC-3				X	X	X
CC-4	X	X		X	X	
CC-5	X	X		X	X	
CC-6	X	X		X	X	
CC-7	X		X		X	
CC-8			X		X	X
CC-9		X	X		X	
CC-10			X	X		X
CC-11	X	X		X	X	
CC-12	X	X		X	X	
CC-13	X	X		X	X	
CC-14	X		X		X	
CC-15	X	X		X	X	X
CC-16	X	X		X	X	
CC-17	X	X			X	
CC-18	X	X		X	X	
CC-19	X	X		X	X	
CC-20	X	X		X	X	
CC-21	X		X		X	X
CC-22	X		X		X	
CC-23	X		X	X		
CC-24	X	X		X		
CC-25	X	X		X	X	
CC-26	X	X		X	X	X
CC-27	X	X		X	X	
CC-28	X		X		X	

Learning Outcome Index, Elective Courses (M.P.E.S.)

PSO	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6
EC1			X		X	X
EC2		X	X	X		
EC3			X	X	X	
EC4	X		X	X	X	
EC5		X		X	X	X
EC6	X		X	X	X	
EC7				X	X	X
EC8		X	X		X	

Learning Outcome Index, Generic Elective Courses (M.P.E.S.)

PSO	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6
GEC-1	X		X	X	X	
GEC-2			X	X	X	X

Semester-I

Year	I	RESEARCH METHODOLOGY IN PHYSICAL EDUCATION	Credits	3
Semester	I		Course Code	SOE PES 010101 C3003
Learning Outcomes	At the end of the course, the students will be able to: • Explain the meaning, nature and scope of research in physical education. • Classify and formulate the different methods of research. • Choose the right techniques for data collection. • Prepare the research proposal and summarize the thesis writing.			
Course Content				
Unit -1	**Introduction of Research** • Meaning and Definition of Research – Need, Nature and Scope of research in Physical Education, Scientific and Unscientific method of Problem Solving. (Online) • Review of Related Literature. (Online) • Identification of Research Problem and Criteria for selecting research problem. • Characteristics of a good research and good researcher. (Online)			
Unit -2	**Classification of Research** • Formulation and Classification of Research Hypothesis. (Online) • Limitations and Delimitations. (Online) • Classification of Research. • Analytical Research, Descriptive Research and Case Study.			
Unit -3	**Sampling and Population** • Meaning and Definition of Sample and Population. (Online) • Types of Sampling Techniques: a) Probability Sampling Techniques. b) Non-Probability Sampling Techniques. • Construction and Development of Questionnaire. • Data Collection Tools & Techniques.			

Unit -4	**Development of Research Proposal** • The Proposal Process and Research Process. (Online) • Preparation and uses of tables and figures and Guidelines for Writing Research Report. • Writing Formats: a) Traditional Format. b) Journal Format. • Format of writing abstracts, Oral and poster presentation.
Teaching learning process/Transactional Strategies	Lecture cum discussion, PowerPoint presentations, assignments, school observation and report, case study, and problem solving, brainstorming.
Suggested Readings	• Ahlawat, R. P. (2016). Research Process in Physical Education& Sports Sciences. Friends Publication. • Flick, U. (2017). Introducing Research Methodology. Sage Publications. • Flick, U. (2019). An Introduction to Qualitative Research. Sage Publications. • Kahn, J. V. (2016). Research in Education (Vol. 10). Pearson Education Inc. • Kamlesh, D. M. (2019). Methodology of Research in Physical Education and Sports. Sports Publication. • Kothari, C. (2019). Research Methodology: Methods and Techniques. New Age International Publishers. • Mishra, P. D. (2018). Research and Statistics in Physical Education. Sports Publication. • Thomas, J. R. (2016). Research Method in Physical Activity. US: Human Kinetics.

Year	I	PHYSIOLOGY OF EXERCISE	Credits	3
Semester	I		Course Code	SOE PES 010102 C3003
Learning Outcomes	At the end of the course, the students will be able to: • Explain the meaning of Exercise Physiology in Physical Education and Sports. • Classify the different energy systems of body. • Illustrate the effect of exercise on various systems of body. • Explain the effect of Ergogenic aids and Doping in Sports.			
Course Content				
Unit -1	**Introduction to Exercise Physiology**			
	• Meaning and Definition of Exercise & exercise physiology. (Online) • Role & Importance of Exercise Physiology in the field of Physical Education & Sports. (Online) • Impact of Exercise on work at cellular level. • Muscle- its types, characteristics and functions. Microscopic structure of muscle fiber. Sliding filament theory of muscular contraction. Types of muscle fibers and sports performance. Muscular adaptations to exercise.			
Unit -2	**Energy System and Recovery Process**			
	• The basic energy systems (carbohydrate metabolism). • Bio-chemical aspects of exercise a) Metabolism of food products. b) Direct and indirect methods of measuring energy cost of exercise. • Recovery process – Physiological aspects of fatigue and Restoration of energy stores. (Online) • Electrolyte balance & Water balance.			

Unit -3	**Effect of Exercise on Various System**
	• Work capacity under different environmental conditions a) Hot, Humid and Cold. b) High Altitude. • Immediate effect of exercise/work on various systems of body. (Online) • Cardio-respiratory, muscular and thermo-regulatory systems, Alveolar ventilation & second wind. • Physiological Factors influencing Sports Performance. (Online)
Unit -4	**Ergogenic Aids in Sports**
	• Ergogenic aids and Doping in Sports. (Online) • Effect of drugs & doping on athletic performances. (Online) • Diet before, during & after the athletic performance. • Exercise and training in females and older people, physiological aspects of development of strength, endurance, speed, agility & coordination.
Teaching learning process/Transactional Strategies	Lecture cum discussion, PowerPoint presentations, assignments, school observation and report, case study, and problem solving, brainstorming.
Practicum	• Measurement of heart rate and Estimation of Target Heart Rate. • Body composition analysis with various methods. • Measurement of VO2 Max (Field and Laboratory Method). • Blood Pressure measurement (Sphygmomanometer). • Anthropometric equipment's. • Measurement of various lung volumes through spirometer, peak flow meter.
Suggested Readings	• Brown, R. G.(2015). *Fundamentals of Exercise Physiology.* Friends Publication. • Chandi, C. C. (2018). *Human Physiology* (Vol. 12). CBS Publishers. • Fox Stuart Ira (2016). *Human Physiology* (15th Edition). McGraw-Hill Education. • Porcari, J., Bryant, C., & Comana, F. (2015). *Exercise Physiology*. FA Davis. • Varshney & Mona Bedi (2018). *Ghai's Textbook of Practical Physiology*. Jaypee Brothers Medical Publishers. • William D. McArdle (2014). *Exercise Physiology: Nutrition, Energy, And Human Performance* (8th Edition). Lippincott Williams and Wilkins.

Year	I	TESTS, MEASUREMENT AND EVALUATION IN PHYSICAL EDUCATION	Credits	3
Semester	I		Course Code	SOE PES 010103 C3003
Learning Outcomes		At the end of the course, the students will be able to: • Explain the meaning and principles of Test, Measurement and Evaluation. • Construct knowledge and specific fitness test. • Illustrate various physical fitness and motor fitness test. • Explain the difference Anthropometric Measurements.		
Course Content				
Unit -1		**Concept of Test and Measurement and Evaluation in Physical Education.** • Meaning of Test, Measurement and Evaluation. (Online) • Principles of Measurement and Evaluation. (Online) • Domains of Human Performance - cognitive, affective and psychomotor. (Online) • Meaning and establishing Validity, Reliability and Objectivity, Norm referenced and Criterion referenced standards.		
Unit -2		**Guidelines for construction of test.** • Criteria of test selection. (Online) • Factors Affecting Scientific Authenticity. (Online) • Procedure to Establish Scientific Authenticity. (Online) • Guidelines for constructing knowledge test and steps for construction of skill test / specific fitness test.		
Unit -3		**Assessment through Various Skill Tests** • Concepts and Assessment of Physical Fitness: a) AAHPERD Health Related Fitness Test and Tuttle Pulse ratio test, b) Roger's PFI. • Test for fitness components- strength, endurance, speed, flexibility and coordinative abilities. • Motor Fitness Test, Motor Ability Test and Motor Educability Test. • Skill Test of various Games/ Sports.		

Unit -4	**Individual Assessment Methods** • Basic Concept of Psychological Traits. (Online) • Basic concept of Anthropometric Measurements. • Assessment of Body Composition. • Self-Assessment.
Teaching learning process/Transactional Strategies	Lecture cum discussion, Power Point presentations, assignments, school observation and report, case study, and problem solving, brainstorming.
Practicum	The conducted practical's should be written in a Practical Note-Book and must be signed by the Supervisor. For practical's there will be a Practical Test and Viva-Voce Examination. • Assessment of endurance through-twelve minute run/walk test; six hundred yards run walk test; Harvard step test. • Assessment of resting physiological parameters- Heart rate, Respiratory rate. • Anthropometric measurement. • Somatotyping, somato charts & indices. • Various Sports / Games (Basketball, Volleyball, Hockey, Football, Badminton, Tennis).
Suggested Readings	• Alan C. Lacy & Skip M. Williams (2018). *Measurement and Evaluation in Physical Education and Exercise Science* (Ed. 8). Routledge. • American College of Sports Medicine (2013). *ACSM's Health-Related Physical Fitness Assessment Manual*. Lippincott Williams & Wilkins. • American College of Sports Medicine (2017). *ACSM's Health-Related Physical Fitness Assessment Manual*. Lippincott Williams & Wilkins. • Karad, P.L. (2017). *Test, Measurement and Evaluation in Physical Education.* Khel Sahitya Kendra. • Lacy, A. C., & Williams, S. M. (2018). *Measurement and Evaluation in Physical Education and Exercise Science*. Routledge. • Miller, D. (2019). *Measurement by the Physical Educator Why and How* (8th Edition). McGraw-Hill Higher Education. • Yobu, A. (2010). *Test, Measurement and Evaluation in Physical Education in Physical Education and Sports*. Friends Publications.

<table>
<tr><td>Year</td><td>I</td><td rowspan="2">TEACHING OF ATHLETICS-TRACK EVENTS</td><td>Credits</td><td>3</td></tr>
<tr><td>Semester</td><td>I</td><td>Course Code</td><td>SOE PES 010104 C0143</td></tr>
<tr><td colspan="2">Learning Outcomes</td><td colspan="3">At the end of the course, the students will be able to:
Describe the fundamentals of short, medium and long distance race events.
Design the make-up of standard athletic track.
Demonstrate the starting and finishing positions of different race events.</td></tr>
<tr><td colspan="2" rowspan="2">Course Content</td><td colspan="3">General out-line of the contents of Teaching of Athletic (Track Events)</td></tr>
<tr><td colspan="3">Introduction of the game/sport and historical development with special reference to India, Orientation of the students to the play area and equipment used in the game/sport, Important tournaments held at National and International levels, Distinguished sports awards and personalities related to the Game/sport. Warming-up- General free hand exercises, specific work out using equipment. Fundamental skills, Lead up activities, General rules and their interpretations, Duties of officials, officiating in class competencies and Intramurals, Marking of the play area. Fundamentals of the events, rules and regulations, measurements of fields.

Each student teacher is expected to take at least five lessons on track events during the course of the semester. The lessons will be supervised by the faculty members and experts who would discuss the merits and demerits of the concerned lesson and guide them for the future. In these lessons, the duration should slowly increase and all the parts of the lesson covered progressively.</td></tr>
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<table>
<tr><td>Year</td><td>I</td><td rowspan="2">TEACHING OF GAMES AND INTRAMURAL-I</td><td>Credits</td><td>3</td></tr>
<tr><td>Semester</td><td>I</td><td>Course Code</td><td>SOE PES 010105 C0143</td></tr>
<tr><td colspan="2">Learning Outcomes</td><td colspan="3">At the end of the course, the students will be able to:
• Explain the fundamentals of any two games opted by the student.
• Sketch the ground markings of specific games.
• Demonstrate and describe the rules and regulations of specific games.</td></tr>
<tr><td colspan="2" rowspan="2">Course Content</td><td colspan="3">General out-line of the contents of teaching of theory of Games and Sports</td></tr>
<tr><td colspan="3">Introduction of the game/sport and historical development with special reference to India, Orientation of the students to the play area and equipment used in the game/sport, Important tournaments held at National and International levels, Distinguished sports awards and personalities related to the Game/sport. Warming-up- General free hand exercises, specific work out using equipment. Fundamental skills, Lead up activities, General rules and their interpretations, Duties of officials, officiating in class competitions and Intramurals, Marking of the play area.

Each student teacher is expected to take at least five lessons from any two games opted from (Basketball, Volleyball, Kabaddi, Kho-Kho, Football, and Table Tennis) during the course of the semester. The lessons will be supervised by the faculty members and experts who would discuss the merits and demerits of the concerned lesson and guide them for the future. In these lessons, the duration should slowly increase and all the parts of the lesson covered progressively.

Note: students have to select any two games from the above mentioned games</td></tr>
</table>

<table>
<tr><td>Year</td><td>I</td><td rowspan="2">SPORTS SPECIALIZATION-I</td><td>Credits</td><td>3</td></tr>
<tr><td>Semester</td><td>I</td><td>Course Code</td><td>SOE PES 010106 C0143</td></tr>
<tr><td colspan="2">Learning Outcomes</td><td colspan="3">At the end of the course, the students will be able to:
• Explain the fundamentals of the game/event opted by the student.
• Sketch the ground markings of specific game/event.
• Demonstrate the specific skills and techniques of the selected game/event.</td></tr>
<tr><td colspan="2" rowspan="2">Course Content</td><td colspan="3">General out-line of the contents of sports specialization</td></tr>
<tr><td colspan="3">Introduction of the game/sport and historical development with special reference to India, Orientation of the students to the play area and equipment used in the game/sport, Important tournaments held at National and International levels, Distinguished sports awards and personalities related to the Game/sport. Warming-up- General free hand exercises, specific work out using equipment. Fundamental skills, Lead up activities, General rules and their interpretations, Duties of officials, officiating in class competencies and Intramurals, Marking of the play area.

Each student teacher is expected to take at least five lessons during the course of the semester. Each students is expected to opt for a particular game/event. The student teacher should develop proficiency towards theory part of the particular game/events in this semester. The lessons will be supervised by the faculty members and experts who would discuss the merits and demerits of the concerned lesson and guide them for the future. In these lessons, the duration should slowly increase and all the parts of the lesson covered progressively.

Course contents in the game of specialization should be chalked out internally considering advance level of students and suitable to their age and gender. The students shall be encouraged to opt for a particular game/event on the availability of specialized faculty.</td></tr>
</table>

Year	I	CLASSROOM TEACHING AND PRACTICAL OF THE CORE THEORY SUBJECTS-I	Credits	1
Semester	I		Course Code	SOE PES 010107 C0021
Learning Outcomes		At the end of the course, the students will be able to: • Practice of various teaching skills in real classroom situations and develop professional competencies for profession.		
Course Content		**General out-line of the contents of classroom teaching and practical of the core subjects**		
		Each student teacher is expected to take at least five lessons during the course of the semester. The lessons will be supervised by the faculty members and experts who would discuss the merits and demerits of the concerned lesson and guide them for the future. In these lessons, the duration should slowly increase and all the parts of the lesson covered progressively. **The Students shall demonstrate teaching ability using various teaching methods. These Lessons should include practical teaching of the core subjects of the semester.**		
Teaching learning process/Transactional Strategies		Lecture cum discussion, PowerPoint presentations, assignments, school observation and report, case study, and problem solving, brainstorming		

Elective Courses (DCEC)

Year	I	SPORTS MANAGEMENT AND CURRICULUM DESIGN IN PHYSICAL EDUCATION	Credits	3
Semester	I		Course Code	SOE PES 010101 DCEC3003
Learning Outcomes		At the end of the course, the students will be able to: • Explain the scope, principles and functions of sports management and identity the roles of manager. • Describe the role of financial and class management. • Describe different types of tournaments. • Formulate curriculum development and define the role of a teacher in curriculum development.		
Course Content				
Unit -1		**Introduction of Sports Management** • Sports Management: Meaning, Definition, Scope and Principles. (Online) • Functions of management. Planning, Organizing, Staffing, Directing, Coordinating, Reporting, and Budgeting (POSDCORB). (Online) • Roles of manager: Interpersonal roles, Informational roles, Decisional roles. (Online) • Qualities of a manager and Decision Making Process: Individual Decision Making, Rational Decision Making, Decision making Styles, Creativity in Decision Making, Participative Decision Making, Group decision making.		
Unit -2		**Planning and Management** • Programme Planning, Steps in programme planning, Principles of programme planning, Evaluation of physical education programme. (Online) • Public Relations: Meaning, Definitions, Principles, Planning and organizing public relations programme. (Online) • Financial management: Need for financial management, Principles of financial Management, preparation of budget, Sources of funds, Expenditure. • Class management: Meaning, Principle, Steps in class management: Strength of class, Place and time, Uniform, Class formation, Safety measures and Discipline.		

Unit -3	**Tournament and Competitions**
	• Facilities and Equipment management: Types of facility/infrastructure-indoor, outdoor, Purchase, Care and Maintenance. • Tournament organization: Types of tournament-Knock out or Elimination, League or Round Robin, Combination, Consolation, Challenge Tournaments. • Intramural Competitions: Meaning and Importance of Intramural, Objectives of Intramural, Conduct of Intramural. (Online) • Process of organizing sports events, Notifications, Invitations, Selection of officials, Monitoring, Writing reports, maintaining records.
Unit -4	**Framework of Curriculum Development**
	• Meaning and importance of Curriculum Development. • Principles of Curriculum Construction: Students centered, Activity centered, Community centered, Forward looking principle, Principles of integration. • The Role of the teacher in curriculum development. (Online) • Approaches to Curriculum; Subject centered, Learner centered and Community centered, Curriculum Framework and Evaluation of Curriculum.
Teaching learning process/Transactional Strategies	Lecture cum discussion, PowerPoint presentations, assignments, school observation and report, case study, and problem solving, brainstorming.
Suggested Readings:	• Dhull, D. S. & Goel, M. (2015). *Handbook of Sports Management and Administration*. Friends Publications. • Lisa P. M. (2018). *Principles and Practice of Sport Management* (6th Edition). Jones & Bartlett Learning. • NCERT (2018). *National Curriculum Framework for School Education.* NCERT. • Pargaonkar, G. V. (2016). *Sports Management.* Friends Publications. • Sahil K. (2017). *Organization and Administration in Physical Education.* Sports Publication. • Singh, D. (2015). *Sports Management and Curriculum Designs in Phy Edu.* Friends Publications. • Vandana Meshram (2017). *Sports Management and Curriculum Designs in Physical Education.* Khel Sahitya Kendra.

Year	I	ADAPTED PHYSICAL EDUCATION	Credits	3
Semester	I		Course Code	SOE PES 010102 DCEC3003
Learning Outcomes		At the end of the course, the students will be able to: • Explain the various aspects of Adapted Physical Education and develop understanding on different types of disability. • Articulate special adapted programs for various categories of physical disability. • Explain the use of various aquatic activity programme for disabled. • Classify different rehabilitation programs.		
Course Content				
Unit -1		**Role of Adapted Physical Education** • Meaning & definitions, Aims and objectives, Need and Importance of Adapted Physical Education. (Online) • Role of physical education in adapted physical education. (Online) • Specific learning disabilities: Common types of learning disabilities their causes, treatment and intervention. • Recreational Sports Opportunities, Competition Opportunities - Special Olympics, Paralympics and Deaf Olympics. Inclusive Education: Meaning, Definition, Aim and Objectives.		
Unit -2		**Understanding and Managing the Disability** • Physical education programme for disabled of: - Elementary School, Middle School and High School. (Online) • Class organization strategies: identifying the cause, embrace special needs, setting high expectations and goals. (Online) • Managing individual programmes and Special adapted programme for various types and categories of physical disability. • Classification of Disability: Visual, auditory, Neuro-Muscular, Mental and Emotional Specific Guidelines for: Visual Impairment, Hearing Impairment, Intellectually challenged, Orthopedically Handicapped – Parent Teacher Association – Parents Advisory Committee, Unified Sports.		

Unit -3	**Value of Disability Events**
	• History of Paralympics, Special Olympics and their events. • Aquatic activity programme for disabled. • Importance of Young Athletic Programme (YAP). (Online) • Orientation of Types of Equipment- Minimum equipment, Additional Equipment, Evaluation of Equipment.
Unit -4	**Concept of Rehabilitation and Adapted Games.**
	• Meaning, Aims & objectives and Functions of rehabilitation. (Online) • Classification of rehabilitation- Occupational rehabilitation, Psychological rehabilitation. • Provisions of special rights and privilege for disabled through legislations. (Online) • Various Adapted Games for different disabilities.
Teaching learning process/Transactional Strategies	Lecture cum discussion, PowerPoint presentations, assignments, school observation and report, case study, and problem solving, brainstorming.
Suggested Readings:	• Auxter, H. (2001). *Adapted Physical Education and Reactions.* Morbey- St: Louis Mirrauri. • Auxter, D., & Pyfer, J. (1989). *Principles and Methods of Adapted Physical Education and Recreation.* Times Mirror Magazine. • Clarke, H. H., & Clarke, D. H. (1978). *Developmental and Adapted Physical Education.* • Kasser, Susan (2013). *Inclusive Physical Activity* (2nd Edition). Knowledge Warehouse Khel. • Kumar, P., Singh, R. M., & Ratnakar, A. (2018). "Role of physical education research activities and their impact in modern day life". *Asian Journal of Multidimensional Research*, 7(2), 420-425. • Sahitya Kendra (2017). *A Text Book of Adapted Physical Education & Sports.* • Sharma, S.R (2019). *Adapted Physical Education*, Friends Publication. • Thind, M. N. (2010), *Special Olympics Bharat Trainer Manuel*. Special Olympics Bharat. • Winnick, J., & Porretta, D. L. (2016). *Adapted Physical Education and Sport* (Ed. 15). Human Kinetics.

Generic Elective Course (GEC)

Year	I	WELLNESS THROUGH GAMES AND SPORTS	Credits	4
Semester	I		Course Code	SOE PES 010101 GEC4004
Learning Outcomes		At the end of the course, the students will be able to: • Explain the concept of Wellness, Recreation and develop understanding of various games organized at global platforms. • Define the facilities of different games and design the make-up of track and field events. • Classify warming-up and cooling down, distinguish aerobic and anaerobic exercises. • Define ergogenic aids and summarize the effects of doping and its types.		
Course Content				
Unit -1		**Introduction to Wellness and Olympic Games** • Meaning, definition and dimension of Health and Wellness. (Online) • Meaning, definition, Need and Importance of Physical Education and Recreation. (Online) • Meaning of the Physical Culture, Physical Training, Drill, Gymnastics, Athletics, and Aquatics. • Introduction of Olympic Games, Asian Games, Commonwealth games.		
Unit -2		**Facilities and Measurement of Sports and Games** • Introduction to track and field events. (Online) • Facilities and measurement of Track and fields. • Introduction to Sports and Games. (Online) • Facilities and measurement of play field: hockey, football, Volleyball, Basketball and badminton.		

Unit -3	**Concept of Aerobic and Anaerobic Training**
	• Meaning and methods of Warming-up and cooling down. • Aerobic and Anaerobic training. • Different methods of Aerobic and Anaerobic training. • Facilities required for Aerobic and Anaerobic training.
Unit -4	**Doping and Ergogenic aids**
	• Introduction of Ergogenic aids, Doping and its types. • Physiological and Psychological Effects of Doping. • Advantage and disadvantage of narcotics and drugs. (Online) • Role of doping agencies to control the use of drugs in sports. (Online)
Teaching learning process/Transactional Strategies	Lecture cum discussion, PowerPoint presentations, assignments, school observation and report, case study, and problem solving, brainstorming.
Suggested Readings:	• Brymer, E. (2009). "The role of extreme sports in lifestyle enhancement and wellness". *In Proceedings of the 26th Achper International Conference: Creating Active Futures* (pp. 285-299). Australia: School of Human Movement Studies, Queensland University of Technology, Brisbane, QLD 4059. • Campbell, B. (2013). *Sports Nutrition: Enhancing Athletic Performance*. CRC Press. • Katz, L., Parker, J., Tyreman, H., Kopp, G., Levy, R., & Chang, E. (2006). "Virtual Reality in Sport and Wellness: Promise and Reality". *International Journal of Computer Science in Sport*, 4(1), 4-16. • Reaburn, P. R. (2014). *Nutrition and Performance in Masters Athletes*. CRC Press. • Sharma, O.P. (2010). *Handbook of Health Education & Sports*. Khel Sahitya Kendra.

Semester-II

Year	I	APPLIED STATISTICS IN PHYSICAL EDUCATION	Credits	3
Semester	II		Course Code	SOE PES 010208 C3003
Learning Outcomes		At the end of the course, the students will be able to: • Explain the importance of statistics in the field of physical education and illustrate the graphical representation of data. • Compute Mean, Median and Mode for grouped and ungrouped data, compute parametric statistical techniques to solve various problems. • Computation of correlation matrix and regression. • Calculation of the One Way ANOVA with equal & unequal sample sizes and define type-I and Type-II errors.		
Course Content				
Unit -1		**Importance of Statistics and types of data** • Meaning of Statistics and Importance of Statistics in Physical Education. (Online) • Type of statistical process – descriptive, inferential, comparative, relationship and predictive. (Online) • Parametric and Non parametric statistics, Four Levels of Data – Nominal, Ordinal, Interval & Ratio. (Online) • Meaning of raw data, single score, grouped data and Discrete & continuous Variables. Graphical representation of Data: Line Diagram, Pie Diagram and Bar Diagram, Frequency Polygon, Frequency Curve, Histogram and Ogives.		
Unit -2		**Data distribution and Construction of norms** • Construction of frequency table – Range of score, Number of intervals, intervals size, tabulation of frequency table. (Online) • Application of Measures of Central tendency- Mean, Median and Mode and Application of Measures of Variability- Range, Quartile deviation, Mean deviation, Standard deviation and absolute & relative variability. • Meaning and Properties of Normal Curve and relationship of normal curve to binomial distribution and divergence from normality – Skewness and Kurtosis. • Developing norms in the form of grading, Percentile Scale, T- Scale, Scales based on difficulty ratings		

Unit -3	**Introduction of Correlation & Regression**
	• Concept of correlation & regression: Scatter diagram, linear correlation, rank correlation. (Online) • Partial correlation coefficients of first and second order. (Online) • Multiple correlation coefficients involving three variables. • Sampling Distribution of Means, Standard Error of Mean, Interval estimates and Point estimates; Coefficients interval for mean.
Unit -4	**Application of different statistical tools**
	• Testing of Hypothesis : Region of Acceptance & Region of Rejection null & alternative Hypotheses: Level of Significance, type I & Type II errors, one tailed & two tailed Tests, degrees of freedom, procedure in testing of hypothesis. (Online) • Large Sample test (z-test) for means for one sample and two samples; Small sample test (t-test) for means for one sample and two samples – dependent and independent samples**,** F-test and interpretation of results. • Chi- Square Test for goodness of fit and testing independence of attributes with interpretation of results. • One way Analysis of Variance (ANOVA), One Way Analysis of Co-variance (ANCOVA) Post- hoc Tests – LSD & Scheffe with interpretation of results using SPSS.
Teaching learning process/Transactional Strategies	Lecture cum discussion, PowerPoint presentations, assignments, school observation and report, case study, and problem solving, brainstorming

Practicum	• To prepare the class intervals & write the frequencies by using the tally counts. • Computation of Correlation matrix. • Calculation of partial correlation and multiple correlation. • Calculation of t- ratio for related and unrelated groups. • Calculation of Z- ratio for testing the hypothesis. • Preparing the Percentile Scale. • Calculation of Chi-Square. • Calculation of the One Way ANOVA with equal & unequal sample sizes. • Calculation of the One Way ANCOVA.
Suggested Readings:	• Bhunia, A. (2013). "Statistical methods for practice and research (A guide to data analysis using SPSS)". *South Asian Journal of Management*, 20(1), 154. • Cooke, D., & Clarke, G. M. (1989). *A Basic Course in Statistics*. Arnold. • De Muth, J. E. (2014). *Basic Statistics and Pharmaceutical Statistical Applications.* CRC Press. • Dhinu, M.R. (2017). *Applied Statistics in Physical Education & Sports*. Friends Publications. • Gaur Ajai S & Sanjaya S (2009). *Statistical Methods for Practice and Research: A Guide to Data Analysis Using SPSS.* SAGE Publications Pv.t Ltd. • Gupta, B. C., & Walker, H. F. (2005). *Applied Statistics for the Six Sigma Green Belt.* ASQ Press. • Kaur, S. (2017). *Research & Statistics in Physical Education*. Friends Publications. • Rajalakshmi, D. (2018). *Advanced Statistics for Physical Education*. Friends Publications. • Verma, J.P. (2011). *Statistical Methods for Sports and Physical Education*. Tata McGraw Hill Education.

Year	I	SPORTS MEDICINE, ATHLETIC CARE AND REHABILITATION	Credits	3
Semester	II		Course Code	SOE PES 010209 C3003
Learning Outcomes		At the end of the course, the students will be able to: • Explain the concept, meaning and significance of sports medicine and rehabilitation. • Develop the concept and usage of various therapeutic modalities. • List out different massage techniques and their effects on Sports performance. • Explain the management of sports injuries and demonstrate various therapeutic exercises.		
Course Content				
Unit -1		**Introduction to Sports Medicine and Rehabilitation** • Definition, Need & importance and Concept of Sports Medicine. (Online) • Role of Sports Physician and Athletic Trainer in Sports Medicine. (Online) • Categories of Athletic Injuries: Traumatic and Overuse and Signs and Symptoms of Inflammation and Stages of Healing. • Introduction to Athletic Rehabilitation, Role of Therapeutic Exercises in Rehabilitation of musculo-skeletal athletic injuries. (Online)		
Unit -2		**Concept of Therapeutic Modalities** • Meaning and Concept of Therapeutic Modalities. (Online) • Therapeutic effects, uses, and contraindications of following therapeutic modalities- Cryotherapy (Ice Therapy) and Short wave Diathermy. • Ultra sound Therapy, Transcutaneous Nerve Stimulation (TNS), and LASER Therapy. • Contrast Bath and Paraffin. (Online)		

Unit -3	**Massage and its Importance**
	• Meaning, Definition and the role of massage in treatment and rehabilitation of sports injuries. (Online) • Massage and Prevention of sports injuries. • Massage and Sports Performance, Pre-Competition, during and Post-Competition phase. • Psychological Aspect of Sports Massage. (Online)
Unit -4	**Tools for Rehabilitation**
	• Importance of rehabilitation equipment (Traction units, sliding sheet, shoulder wheel, quadriceps table, wrist rotators, leg curl, wall pulley, finger board). • Bandage –Types of Bandages –strapping/tapping - Application of strapping/tapping and bandage for major joints and body parts. • Low back pain, Common causes, General Care, Stretching and strengthening exercises for low back pain. • Classification of Therapeutic exercise- Active and passive exercise and Balance training, gait training, gym bell exercise.
Teaching learning process/Transactional Strategies	Lecture cum discussion, PowerPoint presentations, assignments, school observation and report, case study, and problem solving, brainstorming
Practicum	• Visit to Physiotherapy center and Orientation of most commonly used Therapeutic Modalities (Ultrasound, Short wave Diathermy, TNS, and LASER Therapy). • Orientation of most commonly used Massage Techniques in the treatment of sports injuries.

Suggested Readings	• American College of Sports Medicine (2019). ACSM's Body Composition Assessment with Web Resource. Knowledge Warehouse. • Bindal, V.D. (2016). *Therapeutic and Sports Massage*. Agra: Associated Publishing House. • Johnson, J. C. (2011). *Postural Assessment.* Human Kinetics. • Kumar, P. (2019). "Management of Obesity Induced Forward Head Posture Deformities Through Sports". *International Journal of Physical Education, Sports and Health* 6(3): 106-107. • Madden, C. & Netter, F. (2010). *Netter's Sports Medicine*. PA: Philadelphia. Saunders/Elsevier. • Norris, C. M. (2018). *Sports and Soft Tissue Injuries: A Guide for Students and Therapists*. Routledge. • Singh, A. (2014). *Complete Guide to Sports Injuries*. Friends Publications. • Singh, A. (2016). *Athletic Care and Rehabilitation*. Friends Publications. • Uppal, A. K. (2015). *Posture, Athletic Care and First Aid.* Friends Publications.

Year	I	INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) IN PHYSICAL EDUCATION	Credits	3
Semester	II		Course Code	SOE PES 010210 C3003
Learning Outcomes		At the end of the course, the students will be able to: • Acquire knowledge of functionalities of computers in terms of its hardware and software. • Appraise the importance of information & teaching learning process. • Explain the usage of MS-Word, MS-Excel and MS- PowerPoint. • Formulate E-Learning and web-based learning programs.		
Course Content				
Unit -1		**Communication through ICT** • Concept, Elements, Process & Types of Communication and its Barriers & Facilitators. (Online) • Communicative skills of English-Listening, Speaking, Reading & Writing. (Online) • Scope, Concept, Need & Importance of ICT in Physical Education. (Online) • Administration Challenges in Integrating ICT in Physical Education. (Online)		
Unit -2		**Computer Networks and its applications** • Introduction to various Generation of Computers. • Applications of Computers Software & hardware, Input, Output & Storage Devices of Computer: • Computer Memory: Concept & Types Viruses & its Management. • Types and Functions of Computer Networks, Applications of Web Browsers, Search Engines, Legal & Ethical Issues.		

Unit -3	**Introduction of MS Office and Windows Accessories**
	• MS Word, MS Excel Power Point: Main Features & it's Uses in Physical Education. • MS Access: Creating a Database, Creating a Table, Queries, Forms & Reports on Tables and its Uses in Physical Education. • MS Publisher: Newsletter & Brochure. • Windows Accessories: Notepad, Word pad, Paint and Calculator. (Online)
Unit -4	**Web Based Learning & E-Facilities**
	• E-Learning & Web Based Learning (LMS , MOOC ,SWYAM and E-Library) • Video-communication service-Online Class Room (Google Meet, Zoom, WebEx, Microsoft Teams) • Google Applications (Google Doc, Google Sheet, Google Slides, Google Form, Jam Board, Google Drive and Google Earth). (Online) • Using grammar, Plagiarism, spell check utilities and printing a document. (Online)
Teaching learning process/Transactional Strategies	Lecture cum discussion, PowerPoint presentations, assignments, school observation and report, case study, and problem solving, brainstorming.
Suggested Readings:	• Ambekar, A. (2019). Advanced Computing & ICT in Physical Education. Friends Publication. • Gupta, R. (2019). Education Technology in Physical Education. Friends Publication. • Gupta, R. (2019). Information & Communication Technology (ICT) in Physical Education. Friends Publication. • Singh, D. (2019). Educational Technologies and Methods of Teaching in Physical Education. Friends Publication. • Singh, T. N. (2019). Computer Application in Physical Education. Friends Publication.

Year	I	TEACHING OF ATHLETICS-FIELD EVENTS	Credits	3
Semester	II		Course Code	SOE PES 010211 C0143
Learning Outcomes		At the end of the course, the students will be able to: • Describe the fundamentals of field and throwing events in Athletics. • Prepare the sketch of various field events. • Demonstrate the holding and releasing stances in various throwing events, and takeoff and landing position in various jumping events of Athletics.		
Course Content				
		Introduction of the game/sport and historical development with special reference to India, Orientation of the students to the play area and equipment used in the game/sport, Important tournaments held at National and International levels, Distinguished sports awards and personalities related to the Game/sport. Warming-up- General free hand exercises, specific work out using equipment. Fundamental skills, Lead up activities, General rules and their interpretations, Duties of officials, officiating in class competencies and Intramurals, Marking of the play area. Fundamentals of the events, rules and regulations, measurements of fields. Each student teacher is expected to take at least five lessons on athletic field events during the course of the semester. The lessons will be supervised by the faculty members and experts who would discuss the merits and demerits of the concerned lesson and guide them for the future. In these lessons, the duration should slowly increase and all the parts of the lesson covered progressively.		

<table>
<tr><td>Year</td><td>I</td><td rowspan="2">ADVANCE TEACHING, COACHING AND OFFICIATING OF THE GAMES-I</td><td>Credits</td><td>3</td></tr>
<tr><td>Semester</td><td>II</td><td>Course Code</td><td>SOE PES 010212 C0143</td></tr>
<tr><td colspan="2">Learning Outcomes</td><td colspan="3">At the end of the course, the students will be able to:
• Illustrate and interpret the rules and regulations of the two games.
• Mentor, officiate and perform other duties for the two games.
• Prepare the coaching lesson plan and design the coaching schedule.</td></tr>
<tr><td colspan="2" rowspan="2">Course Content</td><td colspan="3">General out-line of the contents of Advance Teaching, Coaching and Officiating of the Games and Sports</td></tr>
<tr><td colspan="3">The students of M.P.E.S II Semester need to develop sports theory and skill proficiency in taking officiating lesson on selected above discipline. In view of this, the students shall be provided with advance mechanism of officiating in selected discipline. The duration of the lesson to be conducted by these students shall be in the range of 30 to 40 minutes depending on the class time they are going to handle at school and college level.

Each student teacher is expected to take at least five lessons of Advance Teaching, Officiating and Coaching during the course of the semester. The lessons will be supervised by the faculty members and experts who would discuss the merits and demerits of the concerned lesson and guide them for the future. In these lessons, the duration should slowly increase and all the parts of the lesson covered progressively.

Note: The Students shall be encouraged to opt for the same games as opted in the First Semester.</td></tr>
</table>

<table>
<tr><td>Year</td><td>I</td><td rowspan="2">SPORTS SPECIALIZATION-II</td><td>Credits</td><td>3</td></tr>
<tr><td>Semester</td><td>II</td><td>Course Code</td><td>SOE PES 010213 C0143</td></tr>
<tr><td colspan="2">Learning Outcomes</td><td colspan="3">At the end of the course, the students will be able to:
• Demonstrate advance skills and techniques of the selected game/event.
• Prepare the coaching lesson plan and design the coaching schedule.
• Exhibit performance of the particular game/event.</td></tr>
<tr><td colspan="2" rowspan="2">Course Content</td><td colspan="3">General out-line of the contents of sports specialization</td></tr>
<tr><td colspan="3">Introduction of the game/sport and historical development with special reference to India, Orientation of the students to the play area and equipment used in the game/sport, Important tournaments held at National and International levels, Distinguished sports awards and personalities related to the Game/sport. Warming-up- General free hand exercises, specific work out using equipment. Fundamental skills, Lead up activities, General rules and their interpretations, Duties of officials, officiating in class competencies and Intramurals, Marking of the play area.

Each student teacher is expected to take at least five lessons during the course of the semester. Each students is expected to opt for a particular game/event. The student teacher should develop proficiency towards practical part of the particular game/events in this semester. The lessons will be supervised by the faculty members and experts who would discuss the merits and demerits of the concerned lesson and guide them for the future. In these lessons, the duration should slowly increase and all the parts of the lesson covered progressively.

Course contents in the game of specialization should be chalked out internally considering advance level of students and suitable to their age and gender. The students shall be encouraged to opt for a particular game/event on the availability of specialized faculty.</td></tr>
</table>

<table>
<tr><td>Year</td><td>I</td><td rowspan="2">CLASSROOM TEACHING AND PRACTICAL OF THE CORE THEORY SUBJECTS-II</td><td>Credits</td><td>1</td></tr>
<tr><td>Semester</td><td>II</td><td>Course Code</td><td>SOE PES 010214 C0021</td></tr>
<tr><td colspan="2">Learning Outcomes</td><td colspan="3">At the end of the course, the students will be able to:
• Demonstrate the class room teaching ability to teach different topics of the core subjects using various teaching methods.</td></tr>
<tr><td colspan="2" rowspan="2">Course Content</td><td colspan="3">General out-line of the contents of classroom teaching and practical of the core subjects</td></tr>
<tr><td colspan="3">Each student teacher is expected to take at least five lessons during the course of the semester. The lessons will be supervised by the faculty members and experts who would discuss the merits and demerits of the concerned lesson and guide them for the future. In these lessons, the duration should slowly increase and all the parts of the lesson covered progressively.

The Students shall demonstrate teaching ability using various teaching methods. These Lessons should include practical teaching of the core subjects of the semester.</td></tr>
<tr><td colspan="2">Teaching learning process/Transactional Strategies</td><td colspan="3">Lecture cum discussion, PowerPoint presentations, assignments, school observation and report, case study, and problem solving, brainstorming</td></tr>
</table>

Elective Courses (DCEC)

Year	I	VALUE AND ENVIRONMENTAL EDUCATION IN PHYSICAL EDUCATION	Credits	3
Semester	II		Course Code	SOE PES 010203 DCEC3003
Learning Outcomes		At the end of the course, the students will be able to: • Explain the meaning, objectives and importance of value education. • Define personal and communal value system and explain the concept of commitment to values. • Restate the background of environmental education and sustainable development in schools. • Classify and appraise the rural and urban health problems.		
Course Content				
Unit -1		**Introduction of Value Education** • Meaning and Definition, Need, Importance and Objectives of Value Education. (Online) • Need and Theories of Moral Values. (Online) • Human Value foundation. • Classification of Values: Basic Values of Religions.		
Unit -2		**Value System** • Meaning and Definition of Value System. (Online) • Personal Values - Consistency, Internally consistent, internally in consistent, Judging Value System. • Communal Values - Consistency, Internally consistent, internally in consistent, Judging Value System. • Commitment and commitment to values. (Online)		
Unit -3		**Environmental Education** • Historical background, Meaning, Definition, Scope and Importance of Environmental Education. (Online) • Celebration of various days in relation with environment. • Plastic recycling & prohibition of plastic bag/cover. • Role of school in environmental conservation and sustainable development, Pollution free eco- system. (Online)		

Unit -4	**Concept of Rural and Urban areas** • Rural and Urban Health Problems and improvement of Rural Sanitation. (Online) • Education Activity and Services of Urban and Rural Area. • Fairs & Festivals of Rural and Urban Area. • Meaning, Causes and Prevention of various pollutions.
Teaching learning process/Transactional Strategies	Lecture cum discussion, PowerPoint presentations, assignments, school observation and report, case study, and problem solving, brainstorming
Suggested Readings:	• Athman, J., & Monroe, M. (2004). The Effects of Environment-Based Education on Students' Achievement Motivation. *Journal of Interpretation Research*. 9(1), 9-25. • Jadhav, H., & Bhosale, V. M. (1995). *Environmental Protection and Laws*. Himalaya Pub. House. • Jitendra Kumar Thakur (2019). *Value and Environmental Education.* Sports Publication. • Mohit Chakrabarti (2008). *Value Education: Changing Perspective.* Kanishka Publication. • Singh, B. (2018). *Value and Environmental Education.* Friends Publications. • Vandana MeshramIngle (2017). *Value and Environmental Education.* Educational Publishers and Distributors.

Year	I	SPORTS ENGINEERING	Credits	1
Semester	II		Course Code	SOE PES 010204 DCEC3003
Learning Outcomes		At the end of the course, the students will be able to: • Explain sports engineering, equipment and facility designing of sports related instruments in Physical Education. • Define the mechanical principles in general body movements. • Define Kinematics and Kinetics of particles and develop understanding of theoretical analysis of various components of cost and taxation. • Formulate the design and development, requirements, building process, and maintenance policy of the sports infrastructure.		
Course Content				
Unit -1		**Introduction to Sports Engineering and Technology:** • Meaning of sports engineering. (Online) • Human motion detection and recording. (Online) • Human performance, assessment, equipment and facility designing. (Online) • Sports related instrumentation and measurement. (Online)		
Unit -2		**Mechanics of Engineering:** • Concept of internal force, axial force, shear force, bending movement, torsion. • Energy method to find displacement of structure and strain energy. • Biomechanics of daily and common activities – Gait, Posture, Body levers and Ergonomics. • Mechanical principles in movements such as lifting, walking, running, throwing, jumping, pulling, pushing etc.		
Unit -3		**Sports Dynamics and Facility life cycle costing:** • Introduction to Statics, Dynamics and Kinematics motion. • Introduction to particles – rectilinear and plane curvilinear motion coordinate system. • Kinetics of particles – Newton's laws of Motion, Work, Energy, Impulse and momentum. • Basics of theoretical analysis of cost, total life cost concepts, maintenance costs, energy cost, capital cost and taxation.		

Unit -4	**Building and Maintenance:** • Sports Infrastructure- Gymnasium, Pavilion, Swimming Pool, Indoor Stadium, Out-door Stadium, Play Park, Academic Block, Administrative Block, Research Block, Library, Sports Hostels, etc. (Online) • Requirements: Air ventilation, Day light, Lighting arrangement, Galleries, Store rooms, Office, Toilet Blocks (M/F), Drinking Water, Sewage and Waste Water disposal system, Changing Rooms (M/F), Sound System (echo-free), Emergency provisions of lighting, fire and exits, Eco-friendly outer surrounding. (Online) • Building process: - design phase (including brief documentation), construction phase functional (occupational) life, Re-evaluation, refurnish, demolish. (Online) • Maintenance staff, financial consideration, Maintenance policy, preventive maintenance, corrective maintenance, record and register for maintenance.
Teaching learning process/Transactional Strategies	Lecture cum discussion, PowerPoint presentations, assignments, school observation and report, case study, and problem solving, brainstorming
Suggested Readings:	• Charles J.A. Crane, F.A.A. and Furness, J.A.G. (1987). *Selection of Engineering Materials*. Butterworth Heiremann. • Eric C. (2010). *Sports Facility Operations Management* . Routledge. • Finn, R.A. and Trojan P.K. (1999). *Engineering Materials and Their Applications*. Jaico Publisher. • Franz K. F (2007). *The Impact of Technology on Sports II*. Springer Science & Business Media. • Franz K. F(2013). *Routledge Handbook of Sports Technology and Engineering.* Routledge. • Jenkins M.,(2003). *Materials in Sports Equipment* (Vol. I). Elsevier. • Steve Hake, (1996). *The Engineering of Sport*. CRC Press. • Verma, A.(2015). *Sports Engineering*. Friends Publications. • White, C. (2010). *Projectile Dynamics in Sport: Principles and Applications*. Routledge.

Semester-III

Year	II	SCIENCE OF SPORTS TRAINING	Credits	3
Semester	III		Course Code	SOE PES 010315 C3003
Learning Outcomes		At the end of the course, the students will be able to: • Define the concept of sports training and explain the causes, symptoms and remedial measures of overload. • Recall the characteristics, types, determining factors and development of various physical fitness components. • Distinguish technique and skill and classify tactical and technical training. • Define the concept of periodization, types of competition and talent identification at early stage.		
Course Content				
Unit -1		**Introduction of Sports Training** • Sports training- its characteristics and principles. (Online) • Training load, its features, principles and adaptation process. (Online) • Means and methods of executing training load. • Overload its Causes, symptoms and remedial measures. (Online)		
Unit -2		**Training Components** • Strength- its characteristics, types of strength, factors determining strength and strength development. • Endurance- its characteristics, types of endurance, factors determining endurance and endurance development. • Speed- its characteristics, types of Speed, factors determining Speed and speed development. • Flexibility and Coordinative abilities- its characteristics, types, factors determining and development.		
Unit -3		**Technique , Skill and Planning** • Technique and skill- its characteristics and importance. • Different stages of technique development and technique training. (Online) • Tactics and strategy. • Planning principles and importance. (Online)		

Unit -4	**Periodization and Competition** • Periodization- its importance, types and different phases (Preparatory, Competition and Transitional). • Competition and types of competition. (Online) • Talent identification- process and procedure. • Preparation of training schedule. (Online)
Teaching learning process/Transactional Strategies	Lecture cum discussion, PowerPoint presentations, assignments, school observation and report, case study, and problem solving, brainstorming
Suggested Readings:	• Bompa, T. O., & Buzzichelli, C. (2018). *Periodization-: Theory and Methodology of Training*. Human kinetics. • Bompa, T., Bompa, T. O., & Carrera, M. (2005). *Periodization Training for Sports*(Ed. 2). Human Kinetics. • Jesudoss,S. J. (2015). *Principles of Sports Training.* Friends Publications. • Kurz, T. (2001). *Science of Sports Training: How to Plan and Control Training for Peak Performance*. Stadion. • Loehr, J. E. (1995). *PDF The New Toughness Training for Sports: Mental Emotional Physical Conditioning From One of the Worlds Premier Sports Psychologists Online Book.* • OBE, F. W. D. (2014). *Sports Training Principles: An Introduction to Sports Science*. Bloomsbury Publishing. • Singh, H. (1984). *Sports Training: General Theory & Methods*. Netaji Subhas. Nat. Inst. of Sports. • Viru, A. (2017). *Adaptation in Sports Training*. Routledge.

<table>
<tr><td>Year</td><td>II</td><td rowspan="2">YOGIC SCIENCE</td><td>Credits</td><td>3</td></tr>
<tr><td>Semester</td><td>III</td><td>Course Code</td><td>SOE PES 010316 C3003</td></tr>
<tr><td colspan="2">Learning Outcomes</td><td colspan="3">At the end of the course, the students will be able to:
State and exemplify the concept of ashtang yogic practices and relaxation techniques.
Demonstrate different types of asana and Pranayama Techniques.
Classify and exhibit various Kriyas and Mudras.
Utilize yoga for psychological and physiological preparation of an athlete.</td></tr>
<tr><td colspan="5">Course Content</td></tr>
<tr><td colspan="2" rowspan="2">Unit -1</td><td colspan="3">Introduction to Sports Medicine and Rehabilitation</td></tr>
<tr><td colspan="3">History, Meaning, Definition, Need and Importance of Yoga. (Online)
Various types of Yoga. (Online)
Limbs of Yoga -Yama, Niyama, Aasna, Pranayama, Prathyahara, Dharana, Dhyana, Samadhi.
Concept of Yogic Practices; Principles of Breathing– Awareness – Relaxation, Sequence – Counter pose – Time – Place – Clothes – Bathing – Emptying the bowels – Stomach – Diet – No Straining – Age – Contra- Indication – Inverted asana – Sunbathing.</td></tr>
<tr><td colspan="2" rowspan="2">Unit -2</td><td colspan="3">Asanas and Pranayama</td></tr>
<tr><td colspan="3">Loosening exercise: Techniques and benefits. (Online)
Asanas: Types- Techniques and Benefits, Surya Namaskar: Methods and benefits.
Pranayama: Types- Methods and benefits.
Nadis and Chakaras Meaning, methods and benefits.</td></tr>
</table>

Unit -3	**Kriyas, Bandhas and Mudras**
	• *Shat Kriyas*- Meaning, Techniques and Benefits of *Neti – Dhati – Kapalapathi- Trataka –Nauli – Basti.* • *Bandhas:* Meaning, Techniques and Benefits of *Jalendra Bandha, Jihva Bandha, Uddiyana Bandha, Mula Bandha.*Meaning, Techniques and Benefits of *Hasta.* • *Mudras, Asamyuktahastam, Samyuktahastam , Mana Mudra, Kaya Mudra, Banda Mudra, Adhara Mudra.* • Meditation: Meaning, Techniques and Benefits of Meditation – Passive and active, *Saguna* Meditation and *Nirguna* Meditation.
Unit -4	**Application of Yoga Exercise**
	• Yoga Supplemental Exercise – Yoga Compensation Exercise – Yoga Regeneration Exercise. (Online) • Role of Yoga in Psychological Preparation of athlete. (Online) • Effect of Yoga on Physiological System. (Online) • Role of Yoga in holistic and spiritual life. (Online)
Teaching learning process/Transactional Strategies	Lecture cum discussion, PowerPoint presentations, assignments, school observation and report, case study, and problem solving, brainstorming
Practicum	**Note:** Laboratory Practicals be designed and arranged internally.

Suggested Readings	• Anatharaman, T.N., (1996). *Ancient Yoga and Modern Science.Project of History of Indian Sciences Philosophy & Culture*. • Arya, K. (2011). *Yogic Science*. Friends Publication. • Arya, K. (2013). *Yogic Education*. Friends Publication. • Debnath, K. K. (2010). *Yogic Sciences*. Friends Publication. • Horovitz, E. G., & Elgelid, S. (2015). *Yoga Therapy: Theory and Practice*. Routledge. • Kotecha, Vaidya Rajesh. (2016). *A Beginner's Guide to Ayurveda.* Chakrapani Publications. • Kumar, Dr. Kamakhya, (2008). *Super Science of Yoga.* Standard Publications. Leslie Kamin off & Amy Matthews (2011). *Yoga Anatomy*. Human Kinetics. • Nathial, M. S. (2013). *Yogic Education*. Friends Publication. • Niranjanananda Saraswati, Swami (2012). *Gherenda Samhita*. • Pramod Kumar Sethi (2017). *Yoga and Skin Diseases*. Sports Publication. • Saini, N. (2011). *Yogic and Stress Management.* Friends Publication. • Swami Vivekananda, (2019). *The Complete Book of Yoga : Karma Yoga, Bhakti Yoga, Raja Yoga, Jnana Yoga*. Fingerprint! Publishing. • Tarak Nath Pramanik (2018). *Yoga Education*. Sports Publication.

Year	II	SPORTS BIOMECHANICS AND KINESIOLOGY	Credits	3
Semester	III		Course Code	SOE PES 010317 C3003
Learning Outcomes		At the end of the course, the students will be able to: • Explain the meaning, scope and importance of applied kinesiology and sports biomechanics. • Categorize and explain the action of muscles and forces. • Classify lever according to its types and define guiding principles of stability. • Explain the methods for the analysis of human movements.		
Course Content				
Unit -1		**Introduction of Kinesiology and Sports Biomechanics** • Meaning, nature, role and scope of applied kinesiology and Sports Biomechanics. (Online) • Meaning of Axis, Planes, Plane of the body and axis of motion. (Online) • Static, Dynamics, Kinematics, Kinetics, Centre of gravity & Line of gravity. (Online) • Meaning and definition of Motion and its types (Linear motion, angular motion, circular motion, uniform motion). (Online)		
Unit -2		**Muscle Action and force** • Origin, Insertion and action of upper and lower extremities muscles. (Online) • Meaning and definition of force and its type. (Online) • Muscle size, shape and its force production. • Force applied at an angle Pressure -Friction -Buoyancy, Spin.		
Unit -3		**Projectile and Lever** • Freely falling bodies and projectiles -equation of projectiles stability. • Factors influencing equilibrium - Guiding principles for stability -static and dynamic stability. (Online) • Meaning of work, power, energy, kinetic energy and potential energy. • Leverage -classes of lever - practical application and water resistance, air resistance & aerodynamics.		

Unit -4	**Methods of Analysis of Human Movements** • Analysis of static positions of the body -Sitting, Standing. • Analysis of static positions of the body –Lying. • Analysis of Locomotion- Walking, Running. • Analysis of Locomotion - Jumping, Throwing.
Teaching learning process/Transactional Strategies	Lecture cum discussion, PowerPoint presentations, assignments, school observation and report, case study, and problem solving, brainstorming
Practicum	• Determination of center of Gravity, Centre of gravity, line of gravity. • Anatomical standing position and fundamental standing position. • Handling of various equipment and software related to Sports Biomechanics. • Mechanical analysis of techniques skills of major sports/games. • Action of muscles of upper and lower extremities by palpations method. • Stick diagram (basic techniques; anatomical posture, walking, push up, sit ups etc). • Goniometry – measurement of joint ROM / Elgon.

Suggested Readings	• Ackland, T. R., Elliott, B., & Bloomfield, J. (2009). *Applied Anatomy and Biomechanics in Sport*. Human Kinetics. • Bartlett, R. (2014). *Introduction to Sports Biomechanics: Analysing Human Movement Patterns*. Routledge. • Chapman, A. E. (2008). *Biomechanical Analysis of Fundamental Human Movements*. Human Kinetics. Knowledge Warehouse. • Kumar, P. (2019). "Biomechanical Analysis of Forward Head Posture among Pondicherry University Research Scholars Based On the Laptop Working Hours: An Analytical Study". *International Journal Of Emerging Technologies And Innovative Research*, 6 (6), 463-466. • Kumar, P., & Singh, R. R. M. (2019). "Biomechanical analysis of anisomelia among the young children's in Puducherry". *Discrepancy (LLD)*, 330, 19. • Singh, R. R. M. (2019). "Biomechanical Analysis of Footprint Measurement among School Boys: A Positive Approach to Posture". *Journal of the Gujarat Research Society*, 21(1), 167-169. • Uppal, A. K. (2018). *Kinesiology and Biomechanics*. Friends Publications.

Year	II	COACHING AND OFFICIATING OF ATHLETICS-TRACK EVENTS	Credits	3
Semester	III		Course Code	SOE PES 010318 C0143
Learning Outcomes		At the end of the course, the students will be able to: • Demonstrate advance skills and techniques of track events. • Mentor, officiate and perform various duties of track events in Athletics. • Prepare the advance coaching lesson plans for track events.		
Course Content		**General out-line of the contents of Coaching and Officiating of Athletic**		
		The students of M.P.E.S. – III Semester need to develop sports theory and skill proficiency in taking officiating lesson on selected above discipline. In view of this, the students shall be provided with advance mechanism of officiating in selected discipline. The duration of the lesson to be conducted by these students shall be in the range of 30 to 40 minutes depending on the class time they are going to handle at school and college level. Each student teacher is expected to take at least five lessons during the course of the fourth semester. The lessons will be supervised by the faculty members and experts who would discuss the merits and demerits of the concerned lesson and guide them for the future. In these officiating lessons, the duration should slowly increase and all the parts of the lesson covered progressively.		
Teaching learning process/Transactional Strategies		Lecture cum discussion, PowerPoint presentations, assignments, school observation and report, case study, and problem solving, brainstorming		

Year	II	TEACHING OF GAMES AND INTRAMURAL-II	Credits	3
Semester	III		Course Code	SOE PES 010319 C0143
Learning Outcomes		At the end of the course, the students will be able to: • Explain the fundamentals of any two games opted by the student. • Sketch the ground markings of specific games. • Demonstrate and describe the rules and regulations of specific games.		
Course Content		**General out-line of the contents of teaching of theory of Games and Sports**		
		Introduction of the game/sport and historical development with special reference to India, Orientation of the students to the play area and equipment used in the game/sport, Important tournaments held at National and International levels, Distinguished sports awards and personalities related to the Game/sport. Warming-up- General free hand exercises, specific work out using equipment. Fundamental skills, Lead up activities, General rules and their interpretations, Duties of officials, officiating in class competitions and Intramurals, Marking of the play area. Each student teacher is expected to take at least five lessons of any two games opted from (handball, wrestling, gym training, badminton, hockey, and cricket) during the course of the semester. The lessons will be supervised by the faculty members and experts who would discuss the merits and demerits of the concerned lesson and guide them for the future. In these lessons, the duration should slowly increase and all the parts of the lesson covered progressively. **Note: students have to select any two games from the above mentioned games**		

<table>
<tr><td>Year</td><td>II</td><td rowspan="2">SPORTS SPECIALIZATION-III</td><td>Credits</td><td>3</td></tr>
<tr><td>Semester</td><td>III</td><td>Course Code</td><td>SOE PES 010320 C0143</td></tr>
<tr><td colspan="2">Learning Outcomes</td><td colspan="3">At the end of the course, the students will be able to:
Demonstrate advance skills and techniques of the selected game/event.
Prepare the coaching lesson plan and design the coaching schedule.
Exhibit performance of the particular game/event.</td></tr>
<tr><td colspan="2" rowspan="2">Course Content</td><td colspan="3">General out-line of the contents of sports specialization</td></tr>
<tr><td colspan="3">Introduction of the game/sport and historical development with special reference to India, Orientation of the students to the play area and equipment used in the game/sport, Important tournaments held at National and International levels, Distinguished sports awards and personalities related to the Game/sport. Warming-up- General free hand exercises, specific work out using equipment. Fundamental skills, Lead up activities, General rules and their interpretations, Duties of officials, officiating in class competencies, Marking of the play area.

Each student teacher is expected to take at least five lessons during the course of the semester. Each students is expected to opt for a particular game/event. The student teacher should develop proficiency towards officiating of the particular game/events in this semester. The lessons will be supervised by the faculty members and experts who would discuss the merits and demerits of the concerned lesson and guide them for the future. In these lessons, the duration should slowly increase and all the parts of the lesson covered progressively.

Course contents in the game of specialization should be chalked out internally considering advance level of students and suitable to their age and gender. The students shall be encouraged to opt for a particular game/event on the availability of specialized faculty.</td></tr>
</table>

Year	II	CLASS ROOM TEACHING AND PRACTICAL OF THE CORE THEORY SUBJECTS-III	Credits	1
Semester	III		Course Code	SOE PES 010321 C0021
Learning Outcomes		At the end of the course, the students will be able to: • Demonstrate the class room teaching ability using various teaching methods.		
Course Content		**General out-line of the contents of classroom teaching and practical of the core subjects** Each student teacher is expected to take at least five lessons during the course of the semester. The lessons will be supervised by the faculty members and experts who would discuss the merits and demerits of the concerned lesson and guide them for the future. In these lessons, the duration should slowly increase and all the parts of the lesson covered progressively. **The Students shall demonstrate teaching ability using various teaching methods. These Lessons should include practical teaching of the core subjects of the semester.**		
Teaching learning process/Transactional Strategies		Lecture cum discussion, PowerPoint presentations, assignments, school observation and report, case study, and problem solving, brainstorming		

Elective Courses (DCEC)

Year	II	RESEARCH PROPOSAL AND PREPARATION OF SYNOPSIS	Credits	3
Semester	III		Course Code	SOE PES 010305 DCEC3003
Learning Outcomes		At the end of the course, the students will be able to: • Critically think, reflect and analyze and identify an appropriate methodology for a research problem. • Understand the importance of limitation and delimitation for the research. • Formulation and classification of research hypothesis. • Utilize various library resources for review and research proposal and prepare a research proposal.		
Course Content		**Outline of Syllabus** • Identifying an appropriate methodology for a research problem. (Online) • Effective use of library resources for research. • Developing a conceptual model relevant to research. • Construction of tools for different types of research. (Online) • Formulation and classification of research hypothesis. (Online) • Developing a research proposal. • Different writing format in preparing the research proposal. (Online) • Identifying and reducing/eliminating barriers which may interfere with the development of a high quality thesis/dissertation. • Developing and following an appropriate timeline for completion of the thesis/dissertation. • Format for writing abstract. • Oral and poster presentation. • Academic dishonesty. (Online)		

Suggested Readings	• Kamlesh, D. M. (2019). Methodology of Research in Physical Education and Sports. Sports Publication. • Klopper, H. (2008). The Qualitative Research Proposal. Curationis, 31(4), 62-72. • Kothari, C. (2019). Research Methodology: Methods and Techniques. New Age International Publishers. • Mishra, P. D. (2018). Research and Statistics in Physical Education. Sports Publication. • Vivar, C. G., McQueen, A., Whyte, D. A., & Armayor, N. C. (2007). Getting Started With Qualitative Research: Developing a Research Proposal. Nurse researcher, 14(3).

Year	II	SPORTS JOURNALISM AND MASS MEDIA	Credits	3
Semester	III		Course Code	SOE PES 010306 DCEC3003
Learning Outcomes	At the end of the course, the students will be able to: • Explain the meaning, definition, mode and news agencies of sports journalism. • Critically analyse the importance of media in sports. • Construct reviews and articles for Sports Journals, and articulate commenting and interviewing of Sports personalities. • Explain the role of advertisement in Sports Journalism.			
Course Content				
Unit -1	**Introduction of Sports Journalism**			
	• Sports Journalism: Meaning, Definition and Historical Background. (Online) • National and International Sports News Agencies. (Online) • Mode of Sport Journalism: Print, Electronic and Informal Media. • Canons and Ethics of Journalism. (Online)			
Unit -2	**Event Organization and Coverage**			
	• News: Definition, basic news elements, organization of sports news desk, Pitfalls in use of language, Proof Reading. (Online) • Qualities and responsibilities of sports news reporters. (Online) • Organization of Pre & Post Sports Event Press Meet. • Coverage: Covering Local / National/ International sports competitions and writing of press release.			

Unit -3	**Art of Review Writing, Commentating and Interviewing**
	• Review Writing: Brief review of Olympic Games, Asian Games, Common Wealth Games, World Cup, National Games and Indian Traditional Games. (Online) • Writing Sports Features: Types of sports features, sports personalities and their thumb nail sketches, Writing Sports Editorials, Blogs & Column. • Art of Commentating: Commentating sports for radio and television channels. • Art of interviewing: Interview with and elite Players and Coaches.
Unit -4	**Role and Career in Sports Journalism**
	• Amateurism v/s professionalism: Invasion of private life, emphasis on winning, sports for charity. • Role of Advertisement in Sports Journalism. (Online) • Career in Sports Photography: Equipment's, Editing and Publishing. • Structure of Sports Bulletin and its types.
Teaching learning process/Transactional Strategies	Lecture cum discussion, PowerPoint presentations, assignments, school observation and report, case study, and problem solving, brainstorming
Suggested Readings	• Dhananjay Joshi (2010). *Value Education in Global Perspective*. Lotus Press. • Kathryn T. Stofer, James R. Schaffer (2019). *Sports Journalism: An Introduction to Reporting And Writing*. Rowman & Littlefield Publishers. • Koak, S & Sharma, R. (2015). *Media and Career in Phy Edu*. Friends Publications. • Lal, R. (2013). *Sports Journalism*. Friends Publications. • Malik, (2010). *Sports Journalism and Mass Media*. Friends Publications. • Phil Andrews (2013). *Sports Journalism* (Ed. 2). SAGE Publications Ltd.

Generic Elective Course (GEC)

Year	II	PHYSICAL FITNESS AND CONDITIONING	Credits	4
Semester	III		Course Code	SOE PES 010302 GEC4004
Learning Outcomes	At the end of the course, the students will be able to: • Define the concept of warming up, cool down and calisthenics exercise. • Give a demonstration of weight training, Swiss ball training, medicine ball, thera-band, and tubing exercises for various body parts. • Classify anthropometric measurements for assessing body composition. • Choose and suggest appropriate exercises for back pain and neck pain, and role of exercise during pregnancy.			
Course Content				
Unit -1	**Concept of Physical Fitness and Conditioning** 1. Introduction of Physical Fitness variables and Conditioning. (Online) 2. Assessment of Health Related Fitness 3. Warming up and cool down exercise for body. (Online) 4. Aerobic and anaerobic exercise and its differences. (Online)			
Unit -2	**Importance of Training** • Variation of sets and repetitions and Intensity for weight training. (Online) • Exercise with Swiss & medicine ball, thera-band and tubing. • Different Types of Exercise for upper body and lower body. • Various Methods, Principles and Types of training.			

Unit -3	**Body types and Assessment**
	• Anthropometric measurement for somatotyping body type. • Assessing body composition, BMI. • Introduction of Posture and its type. (Online) • Posture Deformities and its treatment.
Unit -4	**Importance of Exercise in day today life**
	• Flexibility development Exercises. • Exercise during pregnancy and Exercise for Back and Neck pain Management. • Method for determining 1-RM. (Online) • Concept of designing different fitness training programme for different age group. (Online)
Teaching learning process/Transactional Strategies	Lecture cum discussion, PowerPoint presentations, assignments, school observation and report, case study, and problem solving, brainstorming

Suggested Readings	• American Alliance for Health, Physical Education, Recreation and Dance (1999). *Physical Education for Lifelong Fitness, The Physical Best Teacher's Guide.* Human Kinetics, P.O. Box 5076, Champaign, IL 61825-5076 • Emily R. Foster, Karyn Hartiger & Katherine A. Smith.(2002). *Fitness Fun*, Human Kinetics Publishers. • Fahey D. Thomas (2005). *Weight Training Basis, A Complete Guide for Men and Women.* Mcgraw- Hill Companies.Getchell, B. (1979). *Physical Fitness: A Way of Life.* • Lawrence, Debbie. (1999). *Exercise to Music.* A & C Black Publishers Ltd. 37, Sohe Square. • Miller, D. K., & Allen, T. E. (1990). *Fitness: A Lifetime Commitment*. Macmillan Publishing Company. • Robert Malt. (2001). *90-Day Fitness Plan.* D.K. publishing, Inc. 95, Madison Avenue. • The National Association for Sport and Physical Education (1900). *Concepts of Physical Education, What Every Student Needs to Know.* Association Drive Reston, VA 20191-1599 (703) 476-3410.

***Note: -**

1. In Part-B, Minimum strength required of the students selecting any of the game will be 10 Students.

2. The students opting for Research Proposal as Discipline Centric Elective Course will be encouraged to take Dissertation in Discipline Centric Elective Course (DCEC) in the fourth semester.

3. Research Proposal and Dissertation would be evaluated as per the University Ordinance No-XV.

Semester-IV

Year	II	SPORTS PSYCHOLOGY	Credits	3
Semester	IV		Course Code	SOE PES 010422 C3003
Learning Outcomes	At the end of the course, the students will be able to: • Explain the concept, meaning, importance and scope of sports psychology. • Recall various learning theories and describe the types, theories and techniques of motivation. • Illustrate and identify the psychological factors affecting sports performance. • Appraise and measure team cohesion, group dynamics and leadership capabilities.			
Course Content				
Unit -1	**Role of Sports Psychology** • History, Meaning, Definition, Scope and Importance of Sports Psychology. (Online) • Meaning and types of Motivation – Theories and Techniques for Development of motivation. (Online) • Introduction to various psychological variables. (Online) • Goal Setting Interventions, Principles, Program			
Unit -2	**Psychological Learning** • Meaning and Definition of Motor Learning, Activity & Skill. (Online) • Meaning of Learning -Theories of Learning and there implication in teaching Learning Process. (Online) • Stages of Motor Learning and Plateau effect. • Meaning of Psychological Skill Training (PST) its uses and Myths.			
Unit -3	**Importance of Personality** • Meaning and Definition of Personality and Personality Traits. (Online) • Theories and Role of Personality in Sports and Exercise. • Measurement of Personality. • Areas of Individual Difference and its types.			

Unit -4	**Leadership and Cohesion** • Concept of Group Dynamics of Sports Performance and Team Cohesion. (Online) • Meaning of Leadership, Component of Effective Leadership and its Measurement. • Problems and issues working with Individual and Team Sports. • Career Transition in Athletes and Retirement Issues, Developing Life Skills in Athletes.
Teaching learning process/Transactional Strategies	Lecture cum discussion, PowerPoint presentations, assignments, school observation and report, case study, and problem solving, brainstorming
Practicum	• Assessment of Reaction Time (Hard-Eye). • Assessment of Coordination (Foot-Eye). • Analysis of Personality (Eysenck Personality Questionnaire), Big Five Personality Test. • Assessment of Achievement Motivation. • Assessment of Sport competitive anxiety test. • Inventory for factors influencing sports. • Assessment of Sociometry Questionnaire.
Suggested Readings	• Horn, Thelma (2008). *Advances in Sport Psychology*. Champaign IL : Human Kinetics Publishers, Inc. • Huber, Jeffrey (2012). *Applying Educational Psychology in Coaching Athletes*. Knowledge Warehouse. • Kamlesh, M.L. (2011). *Psychology in Physical Education and Sport* (Ed. 3). Delhi : Metropolitan Book Co. Pvt. Ltd. • Pargonkar, G. V (2015). *Sports Psychology*. Friends Publications. • Taylor, Jim (2017). *Assessment in Applied Sport Psychology*. Knowledge Warehouse. • Weinberg, R.S & Gould, Daniel (2015). *Foundations of Sport and Exercise Psychology* (Ed. 6). Champaign IL: Human Kinetics Publishers, Inc.

Year	II	HEALTH EDUCATION AND SPORTS NUTRITION	Credits	3
Semester	IV		Course Code	SOE PES 010423 C3003
Learning Outcomes	At the end of the course, the students will be able to: • Explain the meaning, aims and objectives of health education and classify communicable disease, their transmission and prevention. • Recall the concept of Non-communicable diseases and list out various programs for controlling diseases. • List out various school health services and define the role of International Organization in the Development of Health. • Plan and prepare a nutritional diet intake for various games and sports.			
Course Content				
Unit -1	**Introduction of Health Education** 1. Concept of Health and Health Education. (Online) 2. Dimension of health and wellness. (Online) 3. Latest trends in Health Education and global strategy in the field of Health. (Online) 4. Role of physical Education Professional on Individual and family in relation to Health and Health Education. (Online)			
Unit -2	**Epidemiology of Diseases** • Epidemiology of Communicable Diseases: Agent factor, Host factor, Environment factors, Mode of Transmission and Prevention of following diseases: • Health Hazards and its types. (Online) • Epidemiology of Non Communicable Diseases : Risk factors and Prevention of following diseases : • Personal Health & Hygiene care system.			

Unit -3	**School Health Services**
	• Meaning & Objective of School Health Service and Health Problem of School Child. (Online) • Role of health education in schools. (Online) • Health record, Healthful school environment, first- aid and emergency care, Mid-day School Programme. • Role of National and International Organization in the Development of Health.
Unit -4	**Nutrition for various games and sports**
	• Nutrition, Training Adaptations and Immune Function in Athletes. • Nutrition for popular team sports (Basketball, Hockey, Football, Volleyball, Kabaddi and Cricket). • Nutrition for Athletics and Endurance Sports (Long distance Swimming, Cycling and Marathon). • Nutrition for Strength and Combat sport (Wrestling, Weightlifting, Judo, Boxing, Taekwondo and Fencing).
Teaching learning process/Transactional Strategies	Lecture cum discussion, PowerPoint presentations, assignments, school observation and report, case study, and problem solving, brainstorming
Suggested Readings	• Campbell, B. (2013). *Sports Nutrition: Enhancing Athletic Performance*. CRC Press. • Eberle, S. G. (2013). *Endurance Sports Nutrition* (Ed. 3). Human Kinetics. • Fink, H. H., & Mikesky, A. E. (2017). *Practical Applications in Sports Nutrition*. Jones & Bartlett Learning. • Kumar.P (2020). "Changing The Lifestyle of Present Health Care: A Much Required Step for A Secured Future The Transmission or Reminder of Ancestor's Way of Life once again".*AlochanaChakra Journal*. Vol. IX. Issue-V. Pg-2789-2793. doi:10.01011.ACJ.2020.V9I5.00068749.01683. • Maughan, R. J., & Shirreffs, S. M. (Eds.). (2013). *Food, Nutrition and Sports Performance Iii*. Routledge. • Reaburn, P. R. (Ed.). (2014). *Nutrition and Performance In Masters Athletes*. CRC Press. • Ryan, M. (2012). *Sports Nutrition for Endurance Athletes*. Velo Press. • Sharma, O.P., (2010). *Handbook of Health Education & Sports*. Khel Sahitya Kendra . • Zinner, C., & Sperlich, B. (Eds.). (2016). *Marathon Running: Physiology, Psychology, Nutrition and Training Aspects* (pp. 1-171). Springer.

Year	II	THEORY OF ATHLETICS	Credits	3
Semester	IV		Course Code	SOE PES 010424 C3003
Learning Outcomes	At the end of the course, the students will be able to: • Explain the general rules and regulations of Athletics defined by IAAF. • Draw a sketch of the standard and non-standard track with the markings of the different track and field events. • Explain and demonstrate the rules and regulations of various race events. • Explain and demonstrate the rules and regulations of various field events.			
Course Content				
Unit -1	**Introduction of Track and Fields** • Introduction and history of athletics. (Online) • World Athletics / IAAF General Rules and regulation of Track Events. (Online) • World Athletics / IAAF General Rules and regulation of Field Events. (Online) • World Athletics / IAAF General Rules and regulation of Combined Events. (Online)			
Unit -2	**Standard and non-standard Track Marking procedure** • Total Area. • Stagger. • Diagonal excess. • Relay Zone Marking.			
Unit -3	**Track events marking procedure** • Sprinting, Middle and Long Distance Events. • Cross country races and Race Walking. (Online) • Hurdles (Online) • Steeplechase races marking. (Online)			

Unit -4	**Field events marking procedure** • High jump and Pole vaulting • Long Jump and Triple Jump • Shot-put and Hammer • Discuss throw and Javelin throw.
Teaching learning process/Transactional Strategies	Lecture cum discussion, PowerPoint presentations, assignments, school observation and report, case study, and problem solving, brainstorming
Practicum	• Track and Field Lay out and marking. • Track and Field Rules and Regulation. • Track and Field Performance.
Suggested Readings	• Schneider, R. C. (2009). *Ethics of Sport and Athletics: Theory, Issues, and Application*. Wolters Kluwer Health/Lippincott Williams & Wilkins, xxi, 392 p.: ill.; 24 cm. • Zeigler, E. F., & Spaeth, M. J. (1975). *Administrative Theory and Practice in Physical Education and Athletics*. **Website** • https://www.worldathletics.org/about-iaaf/documents/book-of-rules • https://sportsauthorityofindia.nic.in/showimg.asp?ID=580

<table>
<tr><td>Year</td><td>II</td><td rowspan="2">COACHING AND OFFICIATING OF ATHLETICS-FIELD EVENTS</td><td>Credits</td><td>3</td></tr>
<tr><td>Semester</td><td>IV</td><td>Course Code</td><td>SOE PES 010425 C0143</td></tr>
<tr><td colspan="2">Learning Outcomes</td><td colspan="3">At the end of the course, the students will be able to:
Demonstrate advance skills and techniques of field events.
Mentor, officiate and perform various duties of field events in Athletics.
Prepare the advance coaching lesson plans for field events.</td></tr>
<tr><td colspan="2" rowspan="2">Course Content</td><td colspan="3">General out-line of the contents of Coaching and Officiating of Athletics- Field Events</td></tr>
<tr><td colspan="3">The students of M.P.E.S. – IV Semester need to develop sports theory and skill proficiency in taking officiating lesson on selected above discipline. In view of this, the students shall be provided with advance mechanism of officiating in selected discipline. The duration of the lesson to be conducted by these students shall be in the range of 30 to 40 minutes depending on the class time they are going to handle at school and college level.

Each student teacher is expected to take at least five lessons during the course of the fourth semester. The lessons will be supervised by the faculty members and experts who would discuss the merits and demerits of the concerned lesson and guide them for the future. In these officiating lessons, the duration should slowly increase and all the parts of the lesson covered progressively.</td></tr>
</table>

<table>
<tr><td>Year</td><td>II</td><td rowspan="2">ADVANCE TEACHING, COACHING AND OFFICIATING OF THE GAMES-II</td><td>Credits</td><td>3</td></tr>
<tr><td>Semester</td><td>IV</td><td>Course Code</td><td>SOE PES 010426 C0143</td></tr>
<tr><td colspan="2">Learning Outcomes</td><td colspan="3">At the end of the course, the students will be able to:
• Illustrate and interpret the rules and regulations of the two games.
• Mentor, officiate and perform other duties for the two games.
• Prepare the coaching lesson plan and design the coaching schedule.</td></tr>
<tr><td colspan="2" rowspan="2">Course Content</td><td colspan="3">General out-line of the contents of Advance Teaching, Coaching and Officiating of the Games and Sports</td></tr>
<tr><td colspan="3">The students of M.P.E.S – IV Semester need to develop sports theory and skill proficiency in taking officiating lesson on selected above discipline. In view of this, the students shall be provided with advance mechanism of officiating in selected discipline. The duration of the lesson to be conducted by these students shall be in the range of 30 to 40 minutes depending on the class time they are going to handle at school and college level.
Each student teacher is expected to take at least five lessons during the course of the semester. The lessons will be supervised by the faculty members and experts who would discuss the merits and demerits of the concerned lesson and guide them for the future. In these lessons, the duration should slowly increase and all the parts of the lesson covered progressively.
Note: The Students shall be encouraged to opt for the same games as opted in the third semester.</td></tr>
</table>

<table>
<tr><td>Year</td><td>II</td><td rowspan="2">SPORTS SPECIALIZATION-IV</td><td>Credits</td><td>3</td></tr>
<tr><td>Semester</td><td>IV</td><td>Course Code</td><td>SOE PES 010427 C0143</td></tr>
<tr><td colspan="2">Learning Outcomes</td><td colspan="3">At the end of the course, the students will be able to:
• Demonstrate advance skills and techniques of the selected game/event.
• Prepare the coaching lesson plan and design the coaching schedule.
• Exhibit performance of the particular game/event.</td></tr>
<tr><td colspan="2" rowspan="2">Course Content</td><td colspan="3">General out-line of the contents of sports specialization</td></tr>
<tr><td colspan="3">Introduction of the game/sport and historical development with special reference to India, Orientation of the students to the play area and equipment used in the game/sport, Important tournaments held at National and International levels, Distinguished sports awards and personalities related to the Game/sport. Warming-up- General free hand exercises, specific work out using equipment. Fundamental skills, Lead up activities, General rules and their interpretations, Duties of officials, officiating in class competencies and Intramurals, Marking of the play area.

Each student teacher is expected to take at least five lessons during the course of the semester. Each students is expected to opt for a particular game/event. The student teacher should develop proficiency towards coaching part of the particular game/events in this semester. The lessons will be supervised by the faculty members and experts who would discuss the merits and demerits of the concerned lesson and guide them for the future. In these lessons, the duration should slowly increase and all the parts of the lesson covered progressively.

Course contents in the game of specialization should be chalked out internally considering advance level of students and suitable to their age and gender. The students shall be encouraged to opt for a particular game/event on the availability of specialized faculty.</td></tr>
</table>

<table>
<tr><td>Year</td><td>II</td><td rowspan="2">CLASS ROOM TEACHING AND PRACTICAL OF THE CORE THEORY SUBJECTS-IV</td><td>Credits</td><td>1</td></tr>
<tr><td>Semester</td><td>IV</td><td>Course Code</td><td>SOE PES 010428 C0021</td></tr>
<tr><td colspan="2">Learning Outcomes</td><td colspan="3">At the end of the course, the students will be able to:
• Demonstrate the class room teaching ability to teach different topics of the core subjects using various teaching methods.</td></tr>
<tr><td colspan="2" rowspan="2">Course Content</td><td colspan="3">General out-line of the contents of classroom teaching and practical of the core subjects</td></tr>
<tr><td colspan="3">Each student teacher is expected to take at least five lessons during the course of the semester. The lessons will be supervised by the faculty members and experts who would discuss the merits and demerits of the concerned lesson and guide them for the future. In these lessons, the duration should slowly increase and all the parts of the lesson covered progressively.
The Students shall demonstrate teaching ability using various teaching methods. These Lessons should include practical teaching of the core subjects of the semester.</td></tr>
</table>

Elective Courses (DCEC)

Year	II	*DISSERTATION	Credits	3
Semester	IV		Course Code	SOE PES 010407 DCEC0303
Learning Outcomes	At the end of the course, the students will be able to: **Develop competency in the process of conducting research** • A candidate shall have dissertation for M.P.E.S. – IV Semester and must submit his/her Synopsis in department and get it approved by the D.R.C. (Departmental Research Committee). • A candidate selecting dissertation must submit his/her dissertation not less than one week before the beginning of the IVth Semester Examination. • The candidate has to face the Viva-Voce conducted by D.R.C. (Departmental Research Committee) with external examiner.			

Year	II	PHYSICAL FITNESS AND WELLNESS	Credits	3
Semester	IV		Course Code	SOE PES 010408 DCEC3003
Learning Outcomes	At the end of the course, the students will be able to: • Define the concept of physical fitness and wellness, and identify the components, techniques and principles of physical fitness. • Recall the importance of nutrition and calories requirements, and explain the influence of food on social cultural values. • Illustrate stress assessment and management techniques, and the concept of designing a fitness training programme. • Explain the Establishment and Management of Fitness Centre and describe the Qualification and qualities for a fitness trainer.			
Course Content				
Unit -1	**Introduction of Physical Fitness and Wellness** • Meaning & Definition, Principles and Components of Physical Fitness and Wellness. (Online) • Leisure time physical activity for community development. • Current trends in fitness and conditioning. (Online) • Relationship between physical activity and lifelong wellness.			
Unit -2	**Importance of Nutrition** • Meaning and Definition of Nutrition. (Online) • Food Guide Pyramid and Daily calories intake & burning. • Influences of food on social cultural values. (Online) • Exercise and metabolism & burning.			

Unit -3	**Stress Management**
	• Stress assessment & its management, prominent health problem associated with inactivity. • Safety techniques (Spotting, proper body alignment, lifting techniques, spatial, awareness. and proper breathing techniques). (Online) • Concept of free weight vs. machine, variation of sets and repetitions, Exercise with Swiss & Medicine Ball, Thera-band and Tubing. • Concepts of designing fitness training programme and Measurement of Body Composition.
Unit -4	**Fitness Management**
	• Establishment and Management of Fitness Centre. • Principles of starting a fitness center environment, location, policy, offer of programmes, record keeping, and public relation. • Fitness center membership and its types. (Online) • Safety aspects in a fitness center and Qualification and qualities for a fitness trainer. (Online)
Teaching learning process/Transactional Strategies	Lecture cum discussion, PowerPoint presentations, assignments, school observation and report, case study, and problem solving, brainstorming
Practicum	• Orientation and management of fitness center, various equipment's and wet zone. • Different methods of measuring Body Composition (BMI, Waist Hip Ratio, Skinfold Caliper). • Different Fitness Test (Cardio-respiratory Endurance, Strength, Strength Endurance, Flexibility, Body Composition, Anthropometric Measurements and Grip Dynamometer).

Suggested Readings	• Agrawal, M.(2016). *Aerobics Fitness & Style.* Friends Publications. • Corbin, C. (2011). *Concepts of Physical Fitness*. McGraw-Hill Higher Education. • Fahey D. Thomas(2005). *Weight Training Basis, A Complete Guide for Men and Women.* Mcgraw- Hill Companies. • Greenberg, J., Dintiman, G., & Myers Oakes, B. (2004). *Physical Fitness and Wellness.* Champaign, IL: Human Kinetics. • Hoeger, W., & Hoeger, S. (2013). *Fitness & Wellness*. Wadsworth, Cengage Learning. • Prabha, S.(2015). *Basic Fitness Assessment.* Friends Publications. • Rathee, S.(2017). *Physical Fitness and Wellness.* Friends Publications. • Robert Malt.(2001). *90-Day Fitness Plan*. D.K. publishing, Inc. 95, Madison Avenue. • The National Association for Sport and Physical Education (1900). *Concepts of Physical Education, What Every Student Needs to Know.* Association Drive Reston, VA 20191-1599 (703) 476-3410. • Uppal, A.K. (2016). *Physical Fitness and Wellness.* Friends Publications.

Annexure-IX

Learning Outcomes-Based Curriculum Framework (LOCF)

School of Education

M.P.Ed. Programme

Central University of Haryana

Mahendergarh

NCTE Regulation-2014/NEP-2020/UGC-LOCF Based Curriculum (2021 -2022)

1. Background
2. Programme Outcomes (PEOs)
3. Programme Specific Outcomes (PSO's)
4. Program Outcomes (PO) with Graduate Attributes
5. Structure of Undergraduate Engineering program
6. Learning Outcome Index
7. Semester-wise courses and credit distribution
8. Course Level Learning outcome
9. Teaching- Learning process
10. Blended Learning
11. Assessment and Evaluation
12. Keywords
13. References
14. Appendices

1. Background

The implementation of the curricular reforms envisioned in National Education Policy-2020 on consequent decisions taken in the Academic Council of the University to annually review and reform the curriculum of all the Under Graduate and Post Graduate programmes in alignment with the NCTE, NEP-2020 and UGC quality mandate for Higher Education Institutions 2021, the curriculum of Master of Physical Education (M.P.Ed.) is revised accordingly.

The process of revamping the curriculum was initiated with the series of webinars and discussions conducted by the University to orient the teachers about the key features of the Policy, enabling them to revise the curriculum in sync with the Policy. Orientation of the faculty about the vision and provisions of NEP-2020 made it easier for them to appreciate and incorporate the vital aspects of the Policy in the revised curriculum focused on 'creating holistic, thoughtful, creative and well-rounded individuals equipped with the key 21st century skills' for the 'development of an enlightened, socially conscious, knowledgeable, and skilled nation'.

The Department of Physical Education and Sports is committed towards preparing Physical Education Teachers by ensuring quality and excellence in its programme. The present curriculum Framework is based on NCTE Regulation-2014, UGC-LOCF and NEP-2020. Physical education and sports are an integral part of life, from school to higher education and community participation. It is the education which focuses on wholesome development of personality through physical, cognitive and functional development. Master of physical education provide opportunity to students at post graduate level toward specialized knowledge in physical education, seeking a broad based spectrum of study that crosses discrete portions of physical, biological, psychological and social science in an integrated, orderly and logical sequence. The curriculum focuses on horizontal integration of multi-facet discipline aiming at physical education specialist who can develop and promote physical education at schools, colleges and universities across the nation. The programme structure consists of formal courses and related experiences which focus on human involvement in physical education and related aspects.

Programme Name: Master of Physical Education (M.P.Ed),

Department of Physical Education and Sports,

School of Education.

Vision and Mission of Central University of Haryana

UNIVERSITY VISION

To develop enlightened citizenship of a knowledge society for peace and prosperity of individuals, nation and the world, through promotion of innovation, creative endeavors, and scholarly inquiry.

UNIVERSITY MISSION

To serve as a beacon of change, through multi-disciplinary learning, for creation of knowledge community, by building a strong character and nurturing a value-based transparent work ethics, promoting creative and critical thinking for holistic development and self-sustenance for the people of India. The University seeks to achieve this objective by cultivating an environment of excellence in teaching, research and innovation in pure and applied areas of learning.

OBJECTIVES OF DEPARTMENT OF PHYSICAL EDUCATION AND SPORTS, SCHOOL OF EDUCATION

1. To prepare outstanding Physical Education Teachers for a global platform
2. To prepare physical education professionals, who can lead to transformation of the lives of individuals and lead to the national development.
3. To develop positive attitude towards physical education and sports.
4. To train teachers in making teaching-learning healthful and joyful.
5. To prepare physical education teachers/ trainers/ educators who have a sound knowledge base, essential professional skills and humanitarian values and ethics.
6. To train teachers in Information & Communication Technology for physical education and sports.
7. To develop research and innovation aptitude in pupil teachers.
8. To build an environment for all round development of the individual.

Mapping of University Vision and Mission to Department Vision and Mission

Acclaimed as modal Centre of Learning and Research by

University Vision and Mission	**Objectives of School**
High quality knowledge society creation for peace and prosperity of individuals, nation and the world, through and scholarly inquiry	**Yes**
Promotion of innovation, creative endeavors, research and development	**Yes**
Students excellence through multi-disciplinary learning, value-based transparent work ethics, creative and critical thinking	**Yes**
Environment of excellence in teaching, research and innovation in pure and applied areas of learning	**Yes**

1. PROGRAMME OUTCOMES (POs), SCHOOL OF EDUCATION

After successful completion of the programme:

PO1 Learners will be able to comprehend the acquired knowledge during the Programme of study.

PO2 Learners will be able to reflect on the problems relating to health, discipline and society with ethical guidelines.

PO3 Learners will be able to exhibit the professional skills and competencies acquired during the Programme of study.

PO4 Learners will be able to show scientific & research capabilities in their academic, professional and general life pursuits.

PO5 Learners will be able to apply the knowledge and skills acquired in academic management and resource management according to predetermined objectives/outcomes.

PO6 Learners will be able to work as a member or a leader in various teams and multidisciplinary & diverse settings.

1. PROGRAMME SPECIFIC OUTCOMES (PSOs), M.P.Ed Programme

The M.P.Ed Two-Year Teacher Education Programme aims at:

PSO-1. Acquiring conceptual understanding of sports exercise physiology, kinesiology, psychology and other physical educational aspects with experiential learning.

PSO-2. Developing competencies in motor skills and movement analysis needed to perform variety of physical activities and reducing the risk of chronic disease and injuries.

PSO-3. To enable the students for acquiring relevant skills for entrepreneurship in contemporary fitness industry, self-defence, community development and physical literacy.

PSO-4. Providing exposure to student-teachers for digital literacy, integrated pedagogy, and training for various awareness programmes related to gender, environment, health and contemporary issues.

PSO-5. Enabling the students to develop a high level of understanding of physical education practice and policy providing with a basis for life-long learning and successful career development in physical education.

PSO-6. Developing research competencies with statistical techniques, effective way of teaching and curriculum design in physical education.

Scheme and Syllabus

M.P.Ed
(Master of Physical Education)

School of Education

Academic Session 2021-22

M.P.Ed Semester- I

S. No.	Course Credit	Course Code	Course Title	Credits (Theory)	Credits (Tutorial/ Practicum)	Credits (Practical)	Class Teaching / Field Based Activity Hours per week
1	3	SOE PES 030101 C3003	Research Methodology in Physical Education	3	0	0	3
2	3	SOE PES 030102 C3003	Theory of Athletics	3	0	0	3
3	3	SOE PES 030103 C3003	Test, Measurement and Evaluation in Physical Education	3	0	0	3
Practicum							
4	3	SOE PES 030104 C0143	Teaching of Athletics-Track Events	0	1	4	3
5	3	SOE PES 030105 C0143	Teaching of Games and Intramural-I	0	1	4	3
6	3	SOE PES 030106 C0143	Sports Specialization-I	0	1	4	3
7	1	SOE PES 030107 C0021	Classroom Teaching and Practical of the Core Theory Subjects-I	0	0	2	1
Discipline Centric Elective Courses (DCEC)							
8	**3**	SOE PES 030101 DCEC3003	Yogic Science	3	0	0	3

9	**3**	SOE PES 030102 DCEC3003	Adapted Physical Education	3	0	0	3
10	**4***		**Taken from other Department/ MOOC**				
Total	**26**						

Note: - Minimum Students required for opting a particular Game shall be 10.

Generic Elective Courses (GEC)

Sr. No.	Semester	Course Code	Course Title	Credits (Theory)	Credits (Tutorial/ Practicum)	Credits (Practical)	Class Teaching / Field Based Activity Hours per week
1	**First**	**SOE PES 030101 GEC4004**	Wellness through Games and Sports	4	0	0	4

M.P.Ed Semester- II

S. No.	Course Credit	Course Code	Course Title	Credits (Theory)	Credits (Tutorial/ Practicum)	Credits (Practical)	Class Teaching / Field Based Activity Hours per week
11	3	SOE PES 030208 C3003	Applied Statistics in Physical Education	3	0	0	3
12	3	SOE PES 030209 C3003	Sports Medicine, Athletic care and Rehabilitation	3	0	0	3
13	3	SOE PES 030210 C3003	Information and Communication Technology (ICT) in Physical Education	3	0	0	3
Practicum							
14	3	SOE PES 030211 C0143	Teaching of Athletics-Field Events	0	1	4	3
15	**3**	SOE PES 030212 C0143	Advance Teaching, Coaching and Officiating of the Games-I	0	1	4	3
16	**3**	SOE PES 030213 C0143	Sports Specialization-II	0	1	4	3
17	**1**	SOE PES 030214 C0021	Classroom Teaching and Practical of the Core Theory Subjects-II	0	0	2	1

Discipline Centric Elective Courses (DCEC)							
18	**3**	SOE PES 030203 DCEC3003	Value and Environmental Education in Physical Education	3	0	0	3
19	**3**	SOE PES 030204 DCEC3003	Sports Engineering	3	0	0	3
Total	**22**						

M.P.Ed Semester- III

S. No.	Course Credit	Course Code	Course Title	Credits (Theory)	Credits (Tutorial/ Practicum)	Credits (Tutorial/ Practicum Practical)	Class Teaching / Field Based Activity Hours per week
20	**3**	SOE PES 030315 C3003	Science of Sports Training	3	0	0	3
21	**3**	SOE PES 030316 C3003	Sports Management and Curriculum Design in Physical Education	3	0	0	3
22	**3**	SOE PES 030317 C3003	Sports Biomechanics and Kinesiology	3	0	0	3
Practicum							
23	**3**	SOE PES 030318 C0143	Coaching and Officiating of Athletics-Track Events	0	1	4	3
24	**3**	SOE PES 030319 C0143	Teaching of Games and Intramural-II	0	1	4	3
25	**3**	SOE PES 030320 C0143	Sports Specialization-III	0	1	4	3
26	**1**	SOE PES 030321 C0021	Classroom Teaching and Practical of the Core Theory Subjects-III	0	0	2	1
Discipline Centric Elective Courses (DCEC)							
27	**3**	SOE PES 030305 DCEC3003	Research Proposal and Preparation of Synopsis.	3	0	0	3

28	**3**	SOE PES 030306 DCEC3003	Sports Journalism and Mass Media	3	0	0	3
29	4*		**Taken from other Department/ MOOC**				
Total	**26**						

Generic Elective Courses (GEC)

Sr. No.	Semester	Course Code	Course Title	Credits (Theory)	Credits (Tutorial/ Practicum)	Credits (Practical)	Class Teaching / Field Based Activity Hours per week
1	**Third**	SOE PES 030302 GEC4004	Physical Fitness and Conditioning	4	0	0	4

Note: -

1. Minimum Students required for opting a particular Game shall be 10.

2. The students opting for Research Proposal as Discipline Centric Elective Course will be encouraged to take Dissertation as a Discipline Centric Elective Course (DCEC) in the fourth semester.

3. Research Proposal and Dissertation would be evaluated as per the University Ordinance No-XV.

M.P.Ed Semester- IV

S. No.	Course Credit	Course Code	Course Title	Credits (Theory)	Credit (Tutorial/ Practicum)	Credit (Practical)	Class Teaching / Field Based Activity Hours per week
30	**3**	SOE PES 030422 C3003	Sports Psychology	3	0	0	3
31	**3**	SOE PES 030423 C3003	Health Education and Sports Nutrition	3	0	0	3
32	**3**	SOE PES 030424 C3003	Physiology of Exercise	3	0	0	3
Practicum							
33	**3**	SOE PES 030425 C0143	Coaching and Officiating of Athletics-Field Events	0	1	4	3
34	**3**	SOE PES 030426 C0143	Advance Teaching, Coaching and Officiating of the Games-II	0	1	4	3
35	**3**	SOE PES 030427 C0143	Sports Specialization-IV	0	1	4	3
36	**1**	SOE PES 030428 C0021	Classroom Teaching and Practical of the Core Theory Subjects-IV	0	0	2	1

Discipline Centric Elective Courses (DCEC)							
37	**3**	SOE PES 030407 DCEC0303	Dissertation	0	3	0	3
38	**3**	SOE PES 030408 DCEC3003	Physical Fitness and Wellness	3	0	0	3
Total	**22**						

Note: For more details regarding Credit and other Academic requirements Ordinance No-XV of the University may be referred.

Number of credits per semester

Semester	Core Course	Practicum Course	Discipline Centric Elective Courses (DCEC)	Taken from other Department/ MOOC [Generic Elective Courses (GEC)]	Total
I	9	10	3	4	26
II	9	10	3		22
III	9	10	3	4	26
IV	9	10	3		22
				Total	96

Matching of Programme outcomes with Programme Specific outcomes

PO PSO	PO1	PO2	PO3	PO4	PO5	PO6
PSO-1	x	x	x	x	x	x
PSO-2	x	x	x	x	x	x
PSO-3	x	x	x	x	x	x
PSO-4	x		x	x	x	x
PSO-5	x	x	x	x	x	x
PSO-6		x	x	x	x	
Total	5	5	6	6	6	5

Matching of Programme outcomes with Programme Specific outcomes, Core Courses (M.P.Ed.)

PO	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6
CC-1	X	X	X	X	X	X
CC-2	X		X		X	X
CC-3		X	X	X	X	
CC-4	X		X		X	X
CC-5	X		X			X
CC-6	X				X	X
CC-7	X	X	X		X	X
CC-8	X	X	X	X	X	X
CC-9	X	X	X		X	X
CC-10	X		X	X	X	X
CC-11	X		X		X	X
CC-12	X	X				X
CC-13	X		X		X	X
CC-14	X	X	X		X	X
CC-15			X	X	X	X
CC-16	X		X	X	X	X
CC-17	X		X	X	X	X
CC-18		X	X		X	X
CC-19	X		X		X	X
CC-20	X		X		X	X
CC-21	X	X	X		X	X
CC-22	X	X	X	X		
CC-23	X	X	X	X	X	
CC-24	X	X		X	X	
CC-25	X		X		X	X
CC-26	X		X		X	X
CC-27	X		X		X	X
CC-28	X	X	X		X	X

Matching of Programme outcomes with Programme Specific outcomes, Elective Courses (M.P.Ed.)

PSO	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6
EC1	X		X	X	X	
EC2		X	X		X	X
EC3	X		X	X	X	
EC4	X	X		X	X	X
EC5	X		X	X	X	
EC6	X	X				X
EC7			X	X	X	
EC8	X		X	X	X	

Matching of Programme outcomes with Programme Specific outcomes, Generic Elective Courses (M.P.Ed.)

PSO	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6
GEC-1	X	X	X		X	X
GEC-2	X		X	X	X	X

Learning Outcome/ Course Outcome Index, Core Courses (M.P.Ed.)

PSO	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6
CC-1	X			X	X	X
CC-2	X	X		X	X	
CC-3				X	X	X
CC-4	X	X		X	X	
CC-5	X	X		X	X	
CC-6	X	X		X	X	
CC-7	X		X		X	
CC-8			X		X	X
CC-9		X	X		X	
CC-10			X	X		X
CC-11	X	X		X	X	
CC-12	X	X		X	X	
CC-13	X	X		X	X	
CC-14	X		X		X	
CC-15	X	X		X	X	X
CC-16	X	X		X	X	
CC-17	X	X			X	
CC-18	X	X		X	X	
CC-19	X	X		X	X	
CC-20	X	X		X	X	
CC-21	X		X		X	X
CC-22	X		X		X	
CC-23	X		X	X		
CC-24	X	X		X		
CC-25	X	X		X	X	
CC-26	X	X		X	X	X
CC-27	X	X		X	X	
CC-28	X		X		X	

Learning Outcome Index, Elective Courses (M.P.Ed.)

PSO	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6
EC1			X		X	X
EC2		X	X	X		
EC3			X	X	X	
EC4	X		X	X	X	
EC5		X		X	X	X
EC6	X		X	X	X	
EC7				X	X	X
EC8		X	X		X	

Learning Outcome Index, Generic Elective Courses (M.P.Ed.)

PSO	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6
GEC-1	X		X	X	X	
GEC-2			X	X	X	X

Semester-I

Year	I	RESEARCH METHODOLOGY IN PHYSICAL EDUCATION	Credits	3
Semester	I		Course Code	SOE PES 030101 C3003
Learning Outcomes	At the end of the course, the students will be able to: • Explain the meaning, nature and scope of research in physical education. • Classify and formulate the different methods of research. • Choose the right techniques for data collection. • Prepare the research proposal and summarize the thesis writing.			
Course Content				
Unit -1	**Introduction of Research** • Meaning and Definition of Research – Need, Nature and Scope of research in Physical Education, Scientific and Unscientific method of Problem Solving. (Online) • Review of Related Literature. (Online) • Identification of Research Problem and Criteria for selecting research problem. • Characteristics of a good research and good researcher. (Online)			
Unit -2	**Classification of Research** • Formulation and Classification of Research Hypothesis. (Online) • Limitations and Delimitations. (Online) • Classification of Research. • Analytical Research, Descriptive Research and Case Study.			
Unit -3	**Sampling and Population** • Meaning and Definition of Sample and Population. (Online) • Types of Sampling Techniques: a) Probability Sampling Techniques. b) Non-Probability Sampling Techniques. • Construction and Development of Questionnaire. • Data Collection Tools & Techniques.			

Unit -4	**Development of Research Proposal** • The Proposal Process and Research Process. (Online) • Preparation and uses of tables and figures and Guidelines for Writing Research Report. • Writing Formats: a) Traditional Format. b) Journal Format. • Format of writing abstracts, Oral and poster presentation.
Teaching learning process/Transactional Strategies	Lecture cum discussion, PowerPoint presentations, assignments, school observation and report, case study, and problem solving, brainstorming.
Suggested Readings	• Ahlawat, R. P. (2016). Research Process in Physical Education& Sports Sciences. Friends Publication. • Flick, U. (2017). Introducing Research Methodology. Sage Publications. • Flick, U. (2019). An Introduction to Qualitative Research. Sage Publications. • Kahn, J. V. (2016). Research in Education (Vol. 10). Pearson Education Inc. • Kamlesh, D. M. (2019). Methodology of Research in Physical Education and Sports. Sports Publication. • Kothari, C. (2019). Research Methodology: Methods and Techniques. New Age International Publishers. • Mishra, P. D. (2018). Research and Statistics in Physical Education. Sports Publication. • Thomas, J. R. (2016). Research Method in Physical Activity. US: Human Kinetics.

Year	I	THEORY OF ATHLETICS	Credits	3
Semester	I		Course Code	SOE PES 030102 C3003
Learning Outcomes	At the end of the course, the students will be able to: • Explain the general rules and regulations of Athletics defined by IAAF. • Draw a sketch of the standard and non-standard track with the markings of the different track and field events. • Explain and demonstrate the rules and regulations of various race events. • Explain and demonstrate the rules and regulations of various field events.			
Course Content				
Unit -1	**Introduction of Track and Fields** • Introduction and history of athletics. (Online) • World Athletics / IAAF General Rules and regulation of Track Events. (Online) • World Athletics / IAAF General Rules and regulation of Field Events. (Online) • World Athletics / IAAF General Rules and regulation of Combined Events. (Online)			
Unit -2	**Standard and non-standard Track Marking procedure** • Total Area. • Stagger. • Diagonal excess. • Relay Zone Marking.			
Unit -3	**Track events marking procedure** • Sprinting, Middle and Long Distance Events. • Cross country races and Race Walking. (Online) • Hurdles (Online) • Steeplechase races marking. (Online)			

Unit -4	**Field events marking procedure** • High jump and Pole vaulting • Long Jump and Triple Jump • Shot-put and Hammer • Discuss throw and Javelin throw
Teaching learning process/Transactional Strategies	Lecture cum discussion, PowerPoint presentations, assignments, school observation and report, case study, and problem solving, brainstorming
Practicum	• Track and Field Lay out and marking. • Track and Field Rules and Regulation. • Track and Field Performance.
Suggested Readings	• Schneider, R. C. (2009). *Ethics of Sport and Athletics: Theory, Issues, and Application*. Wolters Kluwer Health/Lippincott Williams & Wilkins, xxi, 392 p.: ill.; 24 cm. • Zeigler, E. F., & Spaeth, M. J. (1975). *Administrative Theory and Practice in Physical Education and Athletics*. **Website** • https://www.worldathletics.org/about-iaaf/documents/book-of-rules • https://sportsauthorityofindia.nic.in/showimg.asp?ID=580

Year	I	TEST, MEASUREMENT AND EVALUATION IN PHYSICAL EDUCATION	Credits	3
Semester	I		Course Code	SOE PES 030103 C3003
Learning Outcomes	At the end of the course, the students will be able to: • Explain the meaning and principles of Test, Measurement and Evaluation. • Construct knowledge and specific fitness test. • Illustrate various physical fitness and motor fitness test. • Explain the difference Anthropometric Measurements.			
Course Content				
Unit -1	**Concept of Test and Measurement and Evaluation in Physical Education**			
	• Meaning of Test, Measurement and Evaluation. (Online) • Principles of Measurement and Evaluation. (Online) • Domains of Human Performance - cognitive, affective and psychomotor. (Online) • Meaning and establishing Validity, Reliability and Objectivity, Norm referenced and Criterion referenced standards.			
Unit -2	**Guidelines for construction of test**			
	• Criteria of test selection. (Online) • Factors Affecting Scientific Authenticity. (Online) • Procedure to Establish Scientific Authenticity. (Online) • Guidelines for constructing knowledge test and steps for construction of skill test / specific fitness test.			

Unit -3	**Assessment through Various Skill Tests**
	• Concepts and Assessment of Physical Fitness: a) AAHPERD Health Related Fitness Test and Tuttle Pulse ratio test, b) Roger's PFI. • Test for fitness components- strength, endurance, speed, flexibility and coordinative abilities. • Motor Fitness Test, Motor Ability Test and Motor Educability Test. • Skill Test of various Games/ Sports.
Unit -4	**Individual Assessment Methods**
	• Basic Concept of Psychological Traits. (Online) • Basic concept of Anthropometric Measurements. • Assessment of Body Composition. • Self-Assessment.
Teaching learning process/Transactional Strategies	Lecture cum discussion, Power Point presentations, assignments, school observation and report, case study, and problem solving, brainstorming.
Practicum	The conducted practical's should be written in a Practical Note-Book and must be signed by the Supervisor. For practical's there will be a Practical Test and Viva-Voce Examination. • Assessment of endurance through-twelve minute run/walk test; six hundred yards run walk test; Harvard step test. • Assessment of resting physiological parameters- Heart rate, Respiratory rate. • Anthropometric measurement. • Somatotyping, somato charts & indices. • Various Sports / Games (Basketball, Volleyball, Hockey, Football, Badminton, Tennis).

Suggested Readings	• Alan C. Lacy & Skip M. Williams (2018). *Measurement and Evaluation in Physical Education and Exercise Science* (Ed. 8). Routledge. • American College of Sports Medicine (2013). *ACSM's Health-Related Physical Fitness Assessment Manual*. Lippincott Williams & Wilkins. • American College of Sports Medicine (2017). *ACSM's Health-Related Physical Fitness Assessment Manual*. Lippincott Williams & Wilkins. • Karad, P.L. (2017). *Test, Measurement and Evaluation in Physical Education.* Khel Sahitya Kendra. • Lacy, A. C., & Williams, S. M. (2018). *Measurement and Evaluation in Physical Education and Exercise Science*. Routledge. • Miller, D. (2019). *Measurement by the Physical Educator Why and How* (8th Edition). McGraw-Hill Higher Education. • Yobu, A. (2010). *Test, Measurement and Evaluation in Physical Education in Physical Education and Sports*. Friends Publications.

<table>
<tr><td>Year</td><td>I</td><td rowspan="2">TEACHING OF ATHLETICS-TRACK EVENTS</td><td>Credits</td><td>3</td></tr>
<tr><td>Semester</td><td>I</td><td>Course Code</td><td>SOE PES 030104 C0143</td></tr>
<tr><td colspan="2">Learning Outcomes</td><td colspan="3">At the end of the course, the students will be able to:
• Describe the fundamentals of short, medium and long distance race events.
• Design the make-up of standard athletic track.
• Demonstrate the starting and finishing positions of different race events.</td></tr>
<tr><td colspan="2" rowspan="2">Course Content</td><td colspan="3">General out-line of the contents of Teaching of Athletic (Track Events)</td></tr>
<tr><td colspan="3">Introduction of the game/sport and historical development with special reference to India, Orientation of the students to the play area and equipment used in the game/sport, Important tournaments held at National and International levels, Distinguished sports awards and personalities related to the Game/sport. Warming-up- General free hand exercises, specific work out using equipment. Fundamental skills, Lead up activities, General rules and their interpretations, Duties of officials, officiating in class competencies and Intramurals, Marking of the play area. Fundamentals of the events, rules and regulations, measurements of fields.

Each student teacher is expected to take at least five lessons on track events during the course of the semester. The lessons will be supervised by the faculty members and experts who would discuss the merits and demerits of the concerned lesson and guide them for the future. In these lessons, the duration should slowly increase and all the parts of the lesson covered progressively.</td></tr>
</table>

<table>
<tr><td>Year</td><td>I</td><td rowspan="2">TEACHING OF GAMES AND INTRAMURAL-I</td><td>Credits</td><td>3</td></tr>
<tr><td>Semester</td><td>I</td><td>Course Code</td><td>SOE PES 030105 C0143</td></tr>
<tr><td colspan="2">Learning Outcomes</td><td colspan="3">At the end of the course, the students will be able to:
Explain the fundamentals of any two games opted by the student.
Sketch the ground markings of specific games.
Demonstrate and describe the rules and regulations of specific games.</td></tr>
<tr><td colspan="2" rowspan="2">Course Content</td><td colspan="3">General out-line of the contents of teaching of theory of Games and Sports</td></tr>
<tr><td colspan="3">Introduction of the game/sport and historical development with special reference to India, Orientation of the students to the play area and equipment used in the game/sport, Important tournaments held at National and International levels, Distinguished sports awards and personalities related to the Game/sport. Warming-up- General free hand exercises, specific work out using equipment. Fundamental skills, Lead up activities, General rules and their interpretations, Duties of officials, officiating in class competitions and Intramurals, Marking of the play area.

Each student teacher is expected to take at least five lessons from any two games opted from (Basketball, Volleyball, Kabaddi, Kho-Kho, Football, and Table Tennis) during the course of the semester. The lessons will be supervised by the faculty members and experts who would discuss the merits and demerits of the concerned lesson and guide them for the future. In these lessons, the duration should slowly increase and all the parts of the lesson covered progressively.

Note: students have to select any two games from the above mentioned games</td></tr>
</table>

<table>
<tr><td>Year</td><td>I</td><td rowspan="2">SPORTS SPECIALIZATION-I</td><td>Credits</td><td>3</td></tr>
<tr><td>Semester</td><td>I</td><td>Course Code</td><td>SOE PES 030106 C0143</td></tr>
<tr><td colspan="2">Learning Outcomes</td><td colspan="3">At the end of the course, the students will be able to:
• Explain the fundamentals of the game/event opted by the student.
• Sketch the ground markings of specific game/event.
• Demonstrate the specific skills and techniques of the selected game/event.</td></tr>
<tr><td colspan="2" rowspan="2">Course Content</td><td colspan="3">General out-line of the contents of sports specialization</td></tr>
<tr><td colspan="3">Introduction of the game/sport and historical development with special reference to India, Orientation of the students to the play area and equipment used in the game/sport, Important tournaments held at National and International levels, Distinguished sports awards and personalities related to the Game/sport. Warming-up- General free hand exercises, specific work out using equipment. Fundamental skills, Lead up activities, General rules and their interpretations, Duties of officials, officiating in class competencies and Intramurals, Marking of the play area.

Each student teacher is expected to take at least five lessons during the course of the semester. Each students is expected to opt for a particular game/event. The student teacher should develop proficiency towards theory part of the particular game/events in this semester. The lessons will be supervised by the faculty members and experts who would discuss the merits and demerits of the concerned lesson and guide them for the future. In these lessons, the duration should slowly increase and all the parts of the lesson covered progressively.

Course contents in the game of specialization should be chalked out internally considering advance level of students and suitable to their age and gender. The students shall be encouraged to opt for a particular game/event on the availability of specialized faculty.</td></tr>
</table>

Year	**I**	**CLASSROOM TEACHING AND PRACTICAL OF THE CORE THEORY SUBJECTS-I**	**Credits**	**1**
Semester	**I**		**Course Code**	**SOE PES 030107 C0021**
Learning Outcomes		At the end of the course, the students will be able to: • Practice of various teaching skills in real classroom situations and develop professional competencies for profession.		
Course Content		**General out-line of the contents of classroom teaching and practical of the core subjects**		
		Each student teacher is expected to take at least five lessons during the course of the semester. The lessons will be supervised by the faculty members and experts who would discuss the merits and demerits of the concerned lesson and guide them for the future. In these lessons, the duration should slowly increase and all the parts of the lesson covered progressively. **The Students shall demonstrate teaching ability using various teaching methods. These Lessons should include practical teaching of the core subjects of the semester.**		
Teaching learning process/Transactional Strategies		Lecture cum discussion, PowerPoint presentations, assignments, school observation and report, case study, and problem solving, brainstorming		

Elective Courses (DCEC)

Year	I	YOGIC SCIENCE	Credits	3
Semester	I		Course Code	SOE PES 030101 DCEC3003
Learning Outcomes	At the end of the course, the students will be able to: • State and exemplify the concept of ashtang yogic practices and relaxation techniques. • Demonstrate different types of asana and *Pranayama Techniques*. • Classify and exhibit various *Kriyas* and *Mudras*. • Utilize yoga for psychological and physiological preparation of an athlete.			
Course Content				
Unit -1	**Introduction to Sports Medicine and Rehabilitation** • History, Meaning, Definition, Need and Importance of Yoga. (Online) • Various types of Yoga. (Online) • Limbs of Yoga -*Yama, Niyama, Aasna, Pranayama, Prathyahara, Dharana, Dhyana, Samadhi*. • Concept of Yogic Practices; Principles of Breathing– Awareness – Relaxation, Sequence – Counter pose – Time – Place – Clothes – Bathing – Emptying the bowels – Stomach – Diet – No Straining – Age – Contra- Indication – Inverted asana – Sunbathing.			
Unit -2	**Asanas and Pranayama** • Loosening exercise: Techniques and benefits. (Online) • *Asanas*: Types- Techniques and Benefits, *Surya Namaskar*: Methods and benefits. • *Pranayama:* Types- Methods and benefits. • *Nadis and Chakaras Meaning, methods and benefits.*			

Unit -3	**Kriyas, Bandhas and Mudras**
	• *Shat Kriyas*- Meaning, Techniques and Benefits of *Neti – Dhati – Kapalapathi- Trataka –Nauli – Basti.* • *Bandhas:* Meaning, Techniques and Benefits of *Jalendra Bandha, Jihva Bandha, Uddiyana Bandha, Mula Bandha.*Meaning, Techniques and Benefits of *Hasta.* • *Mudras, Asamyuktahastam, Samyuktahastam , Mana Mudra, Kaya Mudra, Banda Mudra, Adhara Mudra.* • Meditation: Meaning, Techniques and Benefits of Meditation – Passive and active, *Saguna* Meditation and *Nirguna* Meditation.
Unit -4	**Application of Yoga Exercise**
	• Yoga Supplemental Exercise – Yoga Compensation Exercise – Yoga Regeneration Exercise. (Online) • Role of Yoga in Psychological Preparation of athlete. (Online) • Effect of Yoga on Physiological System. (Online) • Role of Yoga in holistic and spiritual life. (Online)
Teaching learning process/Transactional Strategies	Lecture cum discussion, PowerPoint presentations, assignments, school observation and report, case study, and problem solving, brainstorming
Practicum	**Note:** Laboratory Practical be designed and arranged internally.

Suggested Readings	• Anatharaman, T.N., (1996). *Ancient Yoga and Modern Science.Project of History of Indian Sciences Philosophy & Culture*. • Arya, K. (2011). *Yogic Science*. Friends Publication. • Arya, K. (2013). *Yogic Education*. Friends Publication. • Debnath, K. K. (2010). *Yogic Sciences*. Friends Publication. • Horovitz, E. G., & Elgelid, S. (2015). *Yoga Therapy: Theory and Practice*. Routledge. • Kotecha, Vaidya Rajesh. (2016). *A Beginner's Guide to Ayurveda.* Chakrapani Publications. • Kumar, Dr. Kamakhya, (2008). *Super Science of Yoga.* Standard Publications. Leslie Kamin off & Amy Matthews (2011). *Yoga Anatomy*. Human Kinetics. • Nathial, M. S. (2013). *Yogic Education*. Friends Publication. • Niranjanananda Saraswati, Swami (2012). *Gherenda Samhita*. • Pramod Kumar Sethi (2017). *Yoga and Skin Diseases*. Sports Publication. • Saini, N. (2011). *Yogic and Stress Management.* Friends Publication. • Swami Vivekananda, (2019). *The Complete Book of Yoga : Karma Yoga, Bhakti Yoga, Raja Yoga, Jnana Yoga*. Fingerprint! Publishing. • Tarak Nath Pramanik (2018). *Yoga Education*. Sports Publication.

Year	I	ADAPTED PHYSICAL EDUCATION	Credits	3
Semester	I		Course Code	SOE PES 030102 DCEC3003
Learning Outcomes		At the end of the course, the students will be able to: • Explain the various aspects of Adapted Physical Education and develop understanding on different types of disability. • Articulate special adapted programs for various categories of physical disability. • Explain the use of various aquatic activity programme for disabled. • Classify different rehabilitation programs.		
Course Content				
Unit -1		**Role of Adapted Physical Education** • Meaning & definitions, Aims and objectives, Need and Importance of Adapted Physical Education. (Online) • Role of physical education in adapted physical education. (Online) • Specific learning disabilities: Common types of learning disabilities their causes, treatment and intervention. • Recreational Sports Opportunities, Competition Opportunities - Special Olympics, Paralympics and Deaf Olympics. Inclusive Education: Meaning, Definition, Aim and Objectives.		
Unit -2		**Understanding and Managing the Disability** • Physical education programme for disabled of: - Elementary School, Middle School and High School. (Online) • Class organization strategies: identifying the cause, embrace special needs, setting high expectations and goals. (Online) • Managing individual programmes and Special adapted programme for various types and categories of physical disability. • Classification of Disability: Visual, auditory, Neuro Muscular, Mental and Emotional Specific Guidelines for: Visual Impairment, Hearing Impairment, Intellectually challenged, Orthopedically Handicapped – Parent Teacher Association – Parents Advisory Committee, Unified Sports.		

Unit -3	**Value of Disability Events**
	• History of Paralympics, Special Olympics and their events. • Aquatic activity programme for disabled. • Importance of Young Athletic Programme (YAP). (Online) • Orientation of Types of Equipment- Minimum equipment, Additional Equipment, Evaluation of Equipment.
Unit -4	**Concept of Rehabilitation and Adapted Games**
	• Meaning, Aims & objectives and Functions of rehabilitation. (Online) • Classification of rehabilitation- Occupational rehabilitation, Psychological rehabilitation. • Provisions of special rights and privilege for disabled through legislations. (Online) • Various Adapted Games for different disabilities.
Teaching learning process/Transactional Strategies	Lecture cum discussion, PowerPoint presentations, assignments, school observation and report, case study, and problem solving, brainstorming.
Suggested Readings	• Auxter, H. (2001). *Adapted Physical Education and Reactions.* Morbey- St: Louis Mirrauri. • Auxter, D., & Pyfer, J. (1989). *Principles and Methods of Adapted Physical Education and Recreation.* Times Mirror Magazine. • Clarke, H. H., & Clarke, D. H. (1978). *Developmental and Adapted Physical Education.* • Kasser, Susan (2013). *Inclusive Physical Activity* (2nd Edition). Knowledge Warehouse Khel. • Kumar, P., Singh, R. M., & Ratnakar, A. (2018). "Role of physical education research activities and their impact in modern day life". *Asian Journal of Multidimensional Research*, 7(2), 420-425. • Sahitya Kendra (2017). *A Text Book of Adapted Physical Education & Sports.* • Sharma, S.R (2019). *Adapted Physical Education*, Friends Publication. • Thind, M. N. (2010), *Special Olympics Bharat Trainer Manuel*. Special Olympics Bharat. • Winnick, J., & Porretta, D. L. (2016). *Adapted Physical Education and Sport* (Ed. 15). Human Kinetics.

Generic Elective Course (GEC)

Year	I	WELLNESS THROUGH GAMES AND SPORTS	Credits	4
Semester	I		Course Code	SOE PES 030101 GEC4004
Learning Outcomes		At the end of the course, the students will be able to: • Explain the concept of Wellness, Recreation and develop understanding of various games organized at global platforms. • Define the facilities of different games and design the make-up of track and field events. • Classify warming-up and cooling down, distinguish aerobic and anaerobic exercises. • Define ergogenic aids and summarize the effects of doping and its types.		
Course Content				
Unit -1		**Introduction to Wellness and Olympic Games** • Meaning, definition and dimension of Health and Wellness. (Online) • Meaning, definition, Need and Importance of Physical Education and Recreation. (Online) • Meaning of the Physical Culture, Physical Training, Drill, Gymnastics, Athletics, and Aquatics. • Introduction of Olympic Games, Asian Games, Commonwealth games.		
Unit -2		**Facilities and Measurement of Sports and Games** • Introduction to track and field events. (Online) • Facilities and measurement of Track and fields. • Introduction to Sports and Games. (Online) • Facilities and measurement of play field: hockey, football, Volleyball, Basketball and badminton.		

Unit -3	**Concept of Aerobic and Anaerobic Training** • Meaning and methods of Warming-up and cooling down. • Aerobic and Anaerobic training. • Different methods of Aerobic and Anaerobic training. • Facilities required for Aerobic and Anaerobic training.
Unit -4	**Doping and Ergogenic aids** • Introduction of Ergogenic aids, Doping and its types. • Physiological and Psychological Effects of Doping. • Advantage and disadvantage of narcotics and drugs. (Online) • Role of doping agencies to control the use of drugs in sports. (Online)
Teaching learning process/Transactional Strategies	Lecture cum discussion, PowerPoint presentations, assignments, school observation and report, case study, and problem solving, brainstorming.
Suggested Readings	• Brymer, E. (2009). "The role of extreme sports in lifestyle enhancement and wellness". *In Proceedings of the 26th Achper International Conference: Creating Active Futures* (pp. 285-299). Australia: School of Human Movement Studies, Queensland University of Technology, Brisbane, QLD 4059. • Campbell, B. (2013). *Sports Nutrition: Enhancing Athletic Performance*. CRC Press. • Katz, L., Parker, J., Tyreman, H., Kopp, G., Levy, R., & Chang, E. (2006). "Virtual Reality in Sport and Wellness: Promise and Reality". *International Journal of Computer Science in Sport*, 4(1), 4-16. • Reaburn, P. R. (2014). *Nutrition and Performance in Masters Athletes*. CRC Press. • Sharma, O.P. (2010). *Handbook of Health Education & Sports*. Khel Sahitya Kendra.

Semester-II

Year	I	APPLIED STATISTICS IN PHYSICAL EDUCATION	Credits	3
Semester	II		Course Code	SOE PES 030208 C3003
Learning Outcomes		At the end of the course, the students will be able to: • Explain the importance of statistics in the field of physical education and illustrate the graphical representation of data. • Compute Mean, Median and Mode for grouped and ungrouped data, compute parametric statistical techniques to solve various problems. • Computation of correlation matrix and regression. • Calculation of the One Way ANOVA with equal & unequal sample sizes and define type-I and Type-II errors.		
Course Content				
Unit -1		**Importance of Statistics and types of data**		
		• Meaning of Statistics and Importance of Statistics in Physical Education. (Online) • Type of statistical process – descriptive, inferential, comparative, relationship and predictive. (Online) • Parametric and Non parametric statistics, Four Levels of Data – Nominal, Ordinal, Interval & Ratio. (Online) • Meaning of raw data, single score, grouped data and Discrete & continuous Variables. Graphical representation of Data: Line Diagram, Pie Diagram and Bar Diagram, Frequency Polygon, Frequency Curve, Histogram and Ogives.		
Unit -2		**Data distribution and Construction of norms**		
		• Construction of frequency table – Range of score, Number of intervals, intervals size, tabulation of frequency table. (Online) • Application of Measures of Central tendency- Mean, Median and Mode and Application of Measures of Variability- Range, Quartile deviation, Mean deviation, Standard deviation and absolute & relative variability. • Meaning and Properties of Normal Curve and relationship of normal curve to binomial distribution and divergence from normality – Skewness and Kurtosis. • Developing norms in the form of grading, Percentile Scale, T- Scale, Scales based on difficulty ratings		

Unit -3	**Introduction of Correlation and Regression**
	• Concept of correlation & regression: Scatter diagram, linear correlation, rank correlation. (Online) • Partial correlation coefficients of first and second order. (Online) • Multiple correlation coefficients involving three variables. • Sampling Distribution of Means, Standard Error of Mean, Interval estimates and Point estimates; Coefficients interval for mean.
Unit -4	**Application of different statistical tools**
	• Testing of Hypothesis : Region of Acceptance & Region of Rejection null & alternative Hypotheses: Level of Significance, type I & Type II errors, one tailed & two tailed Tests, degrees of freedom, procedure in testing of hypothesis. (Online) • Large Sample test (z-test) for means for one sample and two samples; Small sample test (t-test) for means for one sample and two samples – dependent and independent samples**,** F-test and interpretation of results. • Chi- Square Test for goodness of fit and testing independence of attributes with interpretation of results. • One way Analysis of Variance (ANOVA), One Way Analysis of Co-variance (ANCOVA) Post- hoc Tests – LSD & Scheffe with interpretation of results using SPSS.
Teaching learning process/Transactional Strategies	Lecture cum discussion, PowerPoint presentations, assignments, school observation and report, case study, and problem solving, brainstorming

Practicum	• To prepare the class intervals & write the frequencies by using the tally counts. • Computation of Correlation matrix. • Calculation of partial correlation and multiple correlation. • Calculation of t- ratio for related and unrelated groups. • Calculation of Z- ratio for testing the hypothesis. • Preparing the Percentile Scale. • Calculation of Chi-Square. • Calculation of the One Way ANOVA with equal & unequal sample sizes. • Calculation of the One Way ANCOVA.
Suggested Readings	• Bhunia, A. (2013). "Statistical methods for practice and research (A guide to data analysis using SPSS)". *South Asian Journal of Management*, 20(1), 154. • Cooke, D., & Clarke, G. M. (1989). *A Basic Course in Statistics*. Arnold. • De Muth, J. E. (2014). *Basic Statistics and Pharmaceutical Statistical Applications.* CRC Press. • Dhinu, M.R. (2017). *Applied Statistics in Physical Education & Sports*. Friends Publications. • Gaur Ajai S & Sanjaya S (2009). *Statistical Methods for Practice and Research: A Guide to Data Analysis Using SPSS.* SAGE Publications Pv.t Ltd. • Gupta, B. C., & Walker, H. F. (2005). *Applied Statistics for the Six Sigma Green Belt.* ASQ Press. • Kaur, S. (2017). *Research & Statistics in Physical Education*. Friends Publications. • Rajalakshmi, D. (2018). *Advanced Statistics for Physical Education*. Friends Publications. • Verma, J.P. (2011). *Statistical Methods for Sports and Physical Education*. Tata McGraw Hill Education.

Year	I	SPORTS MEDICINE, ATHLETIC CARE AND REHABILITATION	Credits	3
Semester	II		Course Code	SOE PES 030209 C3003
Learning Outcomes		At the end of the course, the students will be able to: • Explain the concept, meaning and significance of sports medicine and rehabilitation. • Develop the concept and usage of various therapeutic modalities. • List out different massage techniques and their effects on Sports performance. • Explain the management of sports injuries and demonstrate various therapeutic exercises.		
Course Content				
Unit -1		**Introduction to Sports Medicine and Rehabilitation** • Definition, Need & importance and Concept of Sports Medicine. (Online) • Role of Sports Physician and Athletic Trainer in Sports Medicine. (Online) • Categories of Athletic Injuries: Traumatic and Overuse and Signs and Symptoms of Inflammation and Stages of Healing. • Introduction to Athletic Rehabilitation, Role of Therapeutic Exercises in Rehabilitation of musculo-skeletal athletic injuries. (Online)		
Unit -2		**Concept of Therapeutic Modalities** • Meaning and Concept of Therapeutic Modalities. (Online) • Therapeutic effects, uses, and contraindications of following therapeutic modalities- Cryotherapy (Ice Therapy) and Short wave Diathermy. • Ultra sound Therapy, Transcutaneous Nerve Stimulation (TNS), and LASER Therapy. • Contrast Bath and Paraffin. (Online)		

Unit -3	**Massage and its Importance**
	• Meaning, Definition and the role of massage in treatment and rehabilitation of sports injuries. (Online) • Massage and Prevention of sports injuries. • Massage and Sports Performance, Pre-Competition, during and Post-Competition phase. • Psychological Aspect of Sports Massage. (Online)
Unit -4	**Tools for Rehabilitation**
	• Importance of rehabilitation equipment (Traction units, sliding sheet, shoulder wheel, quadriceps table, wrist rotators, leg curl, wall pulley, finger board). • Bandage –Types of Bandages –strapping/tapping - Application of strapping/tapping and bandage for major joints and body parts. • Low back pain, Common causes, General Care, Stretching and strengthening exercises for low back pain. • Classification of Therapeutic exercise- Active and passive exercise and Balance training, gait training, gym bell exercise.
Teaching learning process/Transactional Strategies	Lecture cum discussion, Power Point presentations, assignments, school observation and report, case study, and problem solving, brainstorming.
Practicum	• Visit to Physiotherapy Centre and Orientation of most commonly used Therapeutic Modalities (Ultrasound, Short wave Diathermy, TNS, and LASER Therapy). • Orientation of most commonly used Massage Techniques in the treatment of sports injuries.

Suggested Readings	• American College of Sports Medicine (2019). ACSM's Body Composition Assessment with Web Resource. Knowledge Warehouse. • Bindal, V.D. (2016). *Therapeutic and Sports Massage*. Agra: Associated Publishing House. • Johnson, J. C. (2011). *Postural Assessment.* Human Kinetics. • Kumar, P. (2019). "Management of Obesity Induced Forward Head Posture Deformities Through Sports". *International Journal of Physical Education, Sports and Health* 6(3): 106-107. • Madden, C. & Netter, F. (2010). *Netter's Sports Medicine*. PA: Philadelphia. Saunders/Elsevier. • Norris, C. M. (2018). *Sports and Soft Tissue Injuries: A Guide for Students and Therapists*. Routledge. • Singh, A. (2014). *Complete Guide to Sports Injuries*. Friends Publications. • Singh, A. (2016). *Athletic Care and Rehabilitation*. Friends Publications. • Uppal, A. K. (2015). *Posture, Athletic Care and First Aid.* Friends Publications.

Year	I	INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) IN PHYSICAL EDUCATION	Credits	3
Semester	II		Course Code	SOE PES 030210 C3003
Learning Outcomes		At the end of the course, the students will be able to: • Acquire knowledge of functionalities of computers in terms of its hardware and software. • Appraise the importance of information & teaching learning process. • Explain the usage of MS-Word, MS-Excel and MS- PowerPoint. • Formulate E-Learning and web-based learning programs.		
Course Content				
Unit -1		**Communication through ICT** • Concept, Elements, Process & Types of Communication and its Barriers & Facilitators. (Online) • Communicative skills of English-Listening, Speaking, Reading & Writing. (Online) • Scope, Concept, Need & Importance of ICT in Physical Education. (Online) • Administration Challenges in Integrating ICT in Physical Education. (Online)		
Unit -2		**Computer Networks and its applications** • Introduction to various Generation of Computers. • Applications of Computers Software & hardware, Input, Output & Storage Devices of Computer: • Computer Memory: Concept & Types Viruses & its Management. • Types and Functions of Computer Networks, Applications of Web Browsers, Search Engines, Legal & Ethical Issues.		

Unit -3	**Introduction of MS Office and Windows Accessories**
	• MS Word, MS Excel Power Point: Main Features & it's Uses in Physical Education. • MS Access: Creating a Database, Creating a Table, Queries, Forms & Reports on Tables and its Uses in Physical Education. • MS Publisher: Newsletter & Brochure. • Windows Accessories: Notepad, Word pad, Paint and Calculator. (Online)
Unit -4	**Web Based Learning & E-Facilities**
	• E-Learning & Web Based Learning (LMS , MOOC ,SWYAM and E-Library) • Video-communication service-Online Class Room (Google Meet, Zoom, WebEx, Microsoft Teams) • Google Applications (Google Doc, Google Sheet, Google Slides, Google Form, Jam Board, Google Drive and Google Earth). (Online) • Using grammar, Plagiarism, spell check utilities and printing a document. (Online)
Teaching learning process/Transactional Strategies	Lecture cum discussion, PowerPoint presentations, assignments, school observation and report, case study, and problem solving, brainstorming.
Suggested Readings	• Ambekar, A. (2019). Advanced Computing & ICT in Physical Education. Friends Publication. • Gupta, R. (2019). Education Technology in Phy Edu, Friends Publication. Friends Publication. • Gupta, R. (2019). Information & Communication Technology (ICT) in Physical Education. Friends Publication. • Singh, D. (2019). Educational Technologies and Methods of Teaching in Physical Education. Friends Publication. • Singh, T. N. (2019). Computer Application in Physical Education. Friends Publication.

<table>
<tr><td>Year</td><td>I</td><td rowspan="2">TEACHING OF ATHLETICS-FIELD EVENTS</td><td>Credits</td><td>3</td></tr>
<tr><td>Semester</td><td>II</td><td>Course Code</td><td>SOE PES 030211 C0143</td></tr>
<tr><td colspan="2">Learning Outcomes</td><td colspan="3">At the end of the course, the students will be able to:
• Describe the fundamentals of field and throwing events in Athletics.
• Prepare the sketch of various field events.
• Demonstrate the holding and releasing stances in various throwing events, and takeoff and landing position in various jumping events of Athletics.</td></tr>
<tr><td colspan="2" rowspan="2">Course Content</td><td colspan="3">General out-line of the contents of Teaching of Athletic (Field Events)</td></tr>
<tr><td colspan="3">Introduction of the game/sport and historical development with special reference to India, Orientation of the students to the play area and equipment used in the game/sport, Important tournaments held at National and International levels, Distinguished sports awards and personalities related to the Game/sport. Warming-up- General free hand exercises, specific work out using equipment. Fundamental skills, Lead up activities, General rules and their interpretations, Duties of officials, officiating in class competencies and Intramurals, Marking of the play area. Fundamentals of the events, rules and regulations, measurements of fields.

Each student teacher is expected to take at least five lessons on athletic field events during the course of the semester. The lessons will be supervised by the faculty members and experts who would discuss the merits and demerits of the concerned lesson and guide them for the future. In these lessons, the duration should slowly increase and all the parts of the lesson covered progressively.</td></tr>
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<table>
<tr><td>Year</td><td>I</td><td rowspan="2">ADVANCE TEACHING, COACHING AND OFFICIATING OF THE GAMES-I</td><td>Credits</td><td>3</td></tr>
<tr><td>Semester</td><td>II</td><td>Course Code</td><td>SOE PES 030212 C0143</td></tr>
<tr><td colspan="2">Learning Outcomes</td><td colspan="3">At the end of the course, the students will be able to:
Illustrate and interpret the rules and regulations of the two games.
Mentor, officiate and perform other duties for the two games.
Prepare the coaching lesson plan and design the coaching schedule.</td></tr>
<tr><td colspan="2" rowspan="2">Course Content</td><td colspan="3">General out-line of the contents of Advance Teaching, Coaching and Officiating of the Games and Sports</td></tr>
<tr><td colspan="3">The students of M.P.Ed II Semester need to develop sports theory and skill proficiency in taking officiating lesson on selected above discipline. In view of this, the students shall be provided with advance mechanism of officiating in selected discipline. The duration of the lesson to be conducted by these students shall be in the range of 30 to 40 minutes depending on the class time they are going to handle at school and college level.

Each student teacher is expected to take at least five lessons of Advance Teaching, Officiating and Coaching during the course of the semester. The lessons will be supervised by the faculty members and experts who would discuss the merits and demerits of the concerned lesson and guide them for the future. In these lessons, the duration should slowly increase and all the parts of the lesson covered progressively.

Note: The Students shall be encouraged to opt for the same games as opted in the First Semester.</td></tr>
</table>

<table>
<tr><td>Year</td><td>I</td><td rowspan="2">SPORTS SPECIALIZATION-II</td><td>Credits</td><td>3</td></tr>
<tr><td>Semester</td><td>II</td><td>Course Code</td><td>SOE PES 030213 C0143</td></tr>
<tr><td colspan="2">Learning Outcomes</td><td colspan="3">At the end of the course, the students will be able to:
• Demonstrate advance skills and techniques of the selected game/event.
• Prepare the coaching lesson plan and design the coaching schedule.
• Exhibit performance of the particular game/event.</td></tr>
<tr><td colspan="2" rowspan="2">Course Content</td><td colspan="3">General out-line of the contents of sports specialization</td></tr>
<tr><td colspan="3">Introduction of the game/sport and historical development with special reference to India, Orientation of the students to the play area and equipment used in the game/sport, Important tournaments held at National and International levels, Distinguished sports awards and personalities related to the Game/sport. Warming-up- General free hand exercises, specific work out using equipment. Fundamental skills, Lead up activities, General rules and their interpretations, Duties of officials, officiating in class competencies and Intramurals, Marking of the play area.

Each student teacher is expected to take at least five lessons during the course of the semester. Each students is expected to opt for a particular game/event. The student teacher should develop proficiency towards practical part of the particular game/events in this semester. The lessons will be supervised by the faculty members and experts who would discuss the merits and demerits of the concerned lesson and guide them for the future. In these lessons, the duration should slowly increase and all the parts of the lesson covered progressively.

Course contents in the game of specialization should be chalked out internally considering advance level of students and suitable to their age and gender. The students shall be encouraged to opt for a particular game/event on the availability of specialized faculty.</td></tr>
</table>

Year	I	CLASSROOM TEACHING AND PRACTICAL OF THE CORE THEORY SUBJECTS-II	Credits	1
Semester	II		Course Code	SOE PES 030214 C0021
Learning Outcomes		At the end of the course, the students will be able to: • Demonstrate the class room teaching ability to teach different topics of the core subjects using various teaching methods.		
Course Content		**General out-line of the contents of classroom teaching and practical of the core subjects** Each student teacher is expected to take at least five lessons during the course of the semester. The lessons will be supervised by the faculty members and experts who would discuss the merits and demerits of the concerned lesson and guide them for the future. In these lessons, the duration should slowly increase and all the parts of the lesson covered progressively. **The Students shall demonstrate teaching ability using various teaching methods. These Lessons should include practical teaching of the core subjects of the semester.**		
Teaching learning process/Transactional Strategies		Lecture cum discussion, PowerPoint presentations, assignments, school observation and report, case study, and problem solving, brainstorming		

Elective Courses (DCEC)

Year	I	VALUE AND ENVIRONMENTAL EDUCATION IN PHYSICAL EDUCATION	Credits	3
Semester	II		Course Code	SOE PES 030203 DCEC3003
Learning Outcomes		At the end of the course, the students will be able to: • Explain the meaning, objectives and importance of value education. • Define personal and communal value system and explain the concept of commitment to values. • Restate the background of environmental education and sustainable development in schools. • Classify and appraise the rural and urban health problems.		
Course Content				
Unit -1		**Introduction of Value Education** • Meaning and Definition, Need, Importance and Objectives of Value Education. (Online) • Need and Theories of Moral Values. (Online) • Human Value foundation. • Classification of Values: Basic Values of Religions.		
Unit -2		**Value System** • Meaning and Definition of Value System. (Online) • Personal Values - Consistency, Internally consistent, internally in consistent, Judging Value System. • Communal Values - Consistency, Internally consistent, internally in consistent, Judging Value System. • Commitment and commitment to values. (Online)		

Unit -3	**Environmental Education**
	• Historical background, Meaning, Definition, Scope and Importance of Environmental Education. (Online) • Celebration of various days in relation with environment. • Plastic recycling & prohibition of plastic bag/cover. • Role of school in environmental conservation and sustainable development, Pollution free eco- system. (Online)
Unit -4	**Concept of Rural and Urban areas**
	• Rural and Urban Health Problems and improvement of Rural Sanitation. (Online) • Education Activity and Services of Urban and Rural Area. • Fairs & Festivals of Rural and Urban Area. • Meaning, Causes and Prevention of various pollutions.
Teaching learning process/Transactional Strategies	Lecture cum discussion, PowerPoint presentations, assignments, school observation and report, case study, and problem solving, brainstorming
Suggested Readings	• Athman, J., & Monroe, M. (2004). The Effects of Environment-Based Education on Students' Achievement Motivation. *Journal of Interpretation Research*. 9(1), 9-25. • Jadhav, H., & Bhosale, V. M. (1995). *Environmental Protection and Laws*. Himalaya Pub. House. • Jitendra Kumar Thakur (2019). *Value and Environmental Education.* Sports Publication. • Mohit Chakrabarti (2008). *Value Education: Changing Perspective.*Kanishka Publication. • Singh, B. (2018). *Value and Environmental Education.* Friends Publications. • Vandana MeshramIngle (2017). *Value and Environmental Education.* Educational Publishers and Distributors.

Year	I	SPORTS ENGINEERING	Credits	3
Semester	II		Course Code	SOE PES 030204 DCEC3003
Learning Outcomes		At the end of the course, the students will be able to: • Explain sports engineering, equipment and facility designing of sports related instruments in Physical Education. • Define the mechanical principles in general body movements. • Define Kinematics and Kinetics of particles and develop understanding of theoretical analysis of various components of cost and taxation. • Formulate the design and development, requirements, building process, and maintenance policy of the sports infrastructure.		
Course Content				
Unit -1		**Introduction to Sports Engineering and Technology** • Meaning of sports engineering. (Online) • Human motion detection and recording. (Online) • Human performance, assessment, equipment and facility designing. (Online) • Sports related instrumentation and measurement. (Online)		
Unit -2		**Mechanics of Engineering** • Concept of internal force, axial force, shear force, bending movement, torsion. • Energy method to find displacement of structure and strain energy. • Biomechanics of daily and common activities – Gait, Posture, Body levers and Ergonomics. • Mechanical principles in movements such as lifting, walking, running, throwing, jumping, pulling, pushing etc.		

Unit -3	**Sports Dynamics and Facility life cycle costing**
	• Introduction to Statics, Dynamics and Kinematics motion. • Introduction to particles – rectilinear and plane curvilinear motion coordinate system. • Kinetics of particles – Newton's laws of Motion, Work, Energy, Impulse and momentum. • Basics of theoretical analysis of cost, total life cost concepts, maintenance costs, energy cost, capital cost and taxation.
Unit -4	**Building and Maintenance:**
	• Sports Infrastructure- Gymnasium, Pavilion, Swimming Pool, Indoor Stadium, Out-door Stadium, Play Park, Academic Block, Administrative Block, Research Block, Library, Sports Hostels, etc. (Online) • Requirements: Air ventilation, Day light, Lighting arrangement, Galleries, Store rooms, Office, Toilet Blocks (M/F), Drinking Water, Sewage and Waste Water disposal system, Changing Rooms (M/F), Sound System (echo-free), Emergency provisions of lighting, fire and exits, Eco-friendly outer surrounding. (Online) • Building process: - design phase (including brief documentation), construction phase functional (occupational) life, Re-evaluation, refurnish, demolish. (Online) • Maintenance staff, financial consideration, Maintenance policy, preventive maintenance, corrective maintenance, record and register for maintenance.
Teaching learning process/Transactional Strategies	Lecture cum discussion, PowerPoint presentations, assignments, school observation and report, case study, and problem solving, brainstorming

Suggested Readings	• Charles J.A. Crane, F.A.A. and Furness, J.A.G. (1987). *Selection of Engineering Materials*. Butterworth Heiremann. • Eric C. (2010). *Sports Facility Operations Management* . Routledge. • Finn, R.A. and Trojan P.K. (1999). *Engineering Materials and Their Applications*. Jaico Publisher. • Franz K. F (2007). *The Impact of Technology on Sports II*. Springer Science & Business Media. • Franz K. F(2013). *Routledge Handbook of Sports Technology and Engineering.* Routledge. • Jenkins M.,(2003). *Materials in Sports Equipment* (Vol. I). Elsevier. • Steve Hake, (1996). *The Engineering of Sport*. CRC Press. • Verma, A.(2015). *Sports Engineering*. Friends Publications. • White, C. (2010). *Projectile Dynamics in Sport: Principles and Applications*. Routledge.

Semester-III

Year	II	SCIENCE OF SPORTS TRAINING	Credits	3
Semester	III		Course Code	SOE PES 030315 C3003
Learning Outcomes	At the end of the course, the students will be able to: • Define the concept of sports training and explain the causes, symptoms and remedial measures of overload. • Recall the characteristics, types, determining factors and development of various physical fitness components. • Distinguish technique and skill and classify tactical and technical training. • Define the concept of periodization, types of competition and talent identification at early stage.			
Course Content				
Unit -1	**Introduction of Sports Training** • Sports training- its characteristics and principles. (Online) • Training load, its features, principles and adaptation process. (Online) • Means and methods of executing training load. • Overload its Causes, symptoms and remedial measures. (Online)			
Unit -2	**Training Components** • Strength- its characteristics, types of strength, factors determining strength and strength development. • Endurance- its characteristics, types of endurance, factors determining endurance and endurance development. • Speed- its characteristics, types of Speed, factors determining Speed and speed development. • Flexibility and Coordinative abilities- its characteristics, types, factors determining and development.			

Unit -3	**Technique , Skill and Planning**
	• Technique and skill- its characteristics and importance. • Different stages of technique development and technique training. (Online) • Tactics and strategy. • Planning principles and importance. (Online)
Unit -4	**Periodization and Competition**
	• Periodization- its importance, types and different phases (Preparatory, Competition and Transitional). • Competition and types of competition. (Online) • Talent identification- process and procedure. • Preparation of training schedule. (Online)
Teaching learning process/Transactional Strategies	Lecture cum discussion, PowerPoint presentations, assignments, school observation and report, case study, and problem solving, brainstorming
Suggested Readings	• Bompa, T. O., & Buzzichelli, C. (2018). *Periodization-: Theory and Methodology of Training*. Human kinetics. • Bompa, T., Bompa, T. O., & Carrera, M. (2005). *Periodization Training for Sports*(Ed. 2). Human Kinetics. • Jesudoss,S. J. (2015). *Principles of Sports Training.* Friends Publications. • Kurz, T. (2001). *Science of Sports Training: How to Plan and Control Training for Peak Performance*. Stadion. • Loehr, J. E. (1995). *PDF The New Toughness Training for Sports: Mental Emotional Physical Conditioning From One of the Worlds Premier Sports Psychologists Online Book.* • OBE, F. W. D. (2014). *Sports Training Principles: An Introduction to Sports Science*. Bloomsbury Publishing. • Singh, H. (1984). *Sports Training: General Theory & Methods*. Netaji Subhas. Nat. Inst. of Sports. • Viru, A. (2017). *Adaptation in Sports Training*. Routledge.

Year	II	SPORTS MANAGEMENT AND CURRICULUM DESIGN IN PHYSICAL EDUCATION	Credits	3
Semester	III		Course Code	SOE PES 030316 C3003
Learning Outcomes		At the end of the course, the students will be able to: • Explain the scope, principles and functions of sports management and identity the roles of manager. • Describe the role of financial and class management. • Describe different types of tournaments. • Formulate curriculum development and define the role of a teacher in curriculum development.		
Course Content				
Unit -1		**Introduction of Sports Management** • Sports Management: Meaning, Definition, Scope and Principles. (Online) • Functions of management. Planning, Organizing, Staffing, Directing, Coordinating, Reporting, and Budgeting (POSDCORB). (Online) • Roles of manager: Interpersonal roles, Informational roles, Decisional roles. (Online) • Qualities of a manager and Decision Making Process: Individual Decision Making, Rational Decision Making, Decision making Styles, Creativity in Decision Making, Participative Decision Making, Group decision making.		
Unit -2		**Planning and Management** • Programme Planning, Steps in programme planning, Principles of programme planning, Evaluation of physical education programme. (Online) • Public Relations: Meaning, Definitions, Principles, Planning and organizing public relations programme. (Online) • Financial management: Need for financial management, Principles of financial Management, preparation of budget, Sources of funds, Expenditure. • Class management: Meaning, Principle, Steps in class management: Strength of class, Place and time, Uniform, Class formation, Safety measures and Discipline.		

Unit -3	**Tournament and Competitions**
	• Facilities and Equipment management: Types of facility/infrastructure-indoor, outdoor, Purchase, Care and Maintenance. • Tournament organization: Types of tournament-Knock out or Elimination, League or Round Robin, Combination, Consolation, Challenge Tournaments. • Intramural Competitions: Meaning and Importance of Intramural, Objectives of Intramural, Conduct of Intramural. (Online) • Process of organizing sports events, Notifications, Invitations, Selection of officials, Monitoring, Writing reports, maintaining records.
Unit -4	**Framework of Curriculum Development**
	• Meaning and importance of Curriculum Development. • Principles of Curriculum Construction: Students centered, Activity centered, Community centered, Forward looking principle, Principles of integration. • The Role of the teacher in curriculum development. (Online) • Approaches to Curriculum; Subject centered, Learner centered and Community centered, Curriculum Framework and Evaluation of Curriculum.
Teaching learning process/Transactional Strategies	Lecture cum discussion, PowerPoint presentations, assignments, school observation and report, case study, and problem solving, brainstorming.
Suggested Readings	• Dhull, D. S. & Goel, M. (2015). *Handbook of Sports Management and Administration*. Friends Publications. • Lisa P. M. (2018). *Principles and Practice of Sport Management* (6th Edition). Jones & Bartlett Learning. • NCERT (2018). *National Curriculum Framework for School Education.* NCERT. • Pargaonkar, G. V. (2016). *Sports Management.* Friends Publications. • Sahil K. (2017). *Organization and Administration in Physical Education.* Sports Publication. • Singh, D. (2015). *Sports Management and Curriculum Designs in Phy Edu.* Friends Publications. • Vandana Meshram (2017). *Sports Management and Curriculum Designs in Physical Education.* Khel Sahitya Kendra.

Year	II	SPORTS BIOMECHANICS AND KINESIOLOGY	Credits	3
Semester	III		Course Code	SOE PES 030317 C3003
Learning Outcomes	At the end of the course, the students will be able to: • Explain the meaning, scope and importance of applied kinesiology and sports biomechanics. • Categorize and explain the action of muscles and forces. • Classify lever according to its types and define guiding principles of stability. • Explain the methods for the analysis of human movements.			
Course Content				
Unit -1	**Introduction of Kinesiology and Sports Biomechanics** • Meaning, nature, role and scope of applied kinesiology and Sports Biomechanics. (Online) • Meaning of Axis, Planes, Plane of the body and axis of motion. (Online) • Static, Dynamics, Kinematics, Kinetics, Centre of gravity & Line of gravity. (Online) • Meaning and definition of Motion and its types (Linear motion, angular motion, circular motion, uniform motion). (Online)			
Unit -2	**Muscle Action and force** • Origin, Insertion and action of upper and lower extremities muscles. (Online) • Meaning and definition of force and its type. (Online) • Muscle size, shape and its force production. • Force applied at an angle Pressure -Friction -Buoyancy, Spin.			
Unit -3	**Projectile and Lever** • Freely falling bodies and projectiles -equation of projectiles stability. • Factors influencing equilibrium - Guiding principles for stability -static and dynamic stability. (Online) • Meaning of work, power, energy, kinetic energy and potential energy. • Leverage -classes of lever - practical application and water resistance, air resistance & aerodynamics.			

Unit -4	**Methods of Analysis of Human Movements** • Analysis of static positions of the body -Sitting, Standing. • Analysis of static positions of the body –Lying. • Analysis of Locomotion- Walking, Running. • Analysis of Locomotion - Jumping, Throwing.
Teaching learning process/Transactional Strategies	Lecture cum discussion, PowerPoint presentations, assignments, school observation and report, case study, and problem solving, brainstorming
Practicum	• Determination of center of Gravity, Centre of gravity, line of gravity. • Anatomical standing position and fundamental standing position. • Handling of various equipment and software related to Sports Biomechanics. • Mechanical analysis of techniques skills of major sports/games. • Action of muscles of upper and lower extremities by palpations method. • Stick diagram (basic techniques; anatomical posture, walking, push up, sit ups etc). • Goniometry – measurement of joint ROM / Elgon.

Suggested Readings	• Ackland, T. R., Elliott, B., & Bloomfield, J. (2009). *Applied Anatomy and Biomechanics in Sport*. Human Kinetics. • Bartlett, R. (2014). *Introduction to Sports Biomechanics: Analysing Human Movement Patterns*. Routledge. • Chapman, A. E. (2008). *Biomechanical Analysis of Fundamental Human Movements*. Human Kinetics. Knowledge Warehouse. • Kumar, P. (2019). "Biomechanical Analysis of Forward Head Posture among Pondicherry University Research Scholars Based On the Laptop Working Hours: An Analytical Study". *International Journal Of Emerging Technologies And Innovative Research*, 6 (6), 463-466. • Kumar, P., & Singh, R. R. M. (2019). "Biomechanical analysis of anisomelia among the young children's in Puducherry". *Discrepancy (LLD)*, 330, 19. • Singh, R. R. M. (2019). "Biomechanical Analysis of Footprint Measurement among School Boys: A Positive Approach to Posture". *Journal of the Gujarat Research Society*, 21(1), 167-169. • Uppal, A. K. (2018). *Kinesiology and Biomechanics*. Friends Publications.

Year	II	COACHING AND OFFICIATING OF ATHLETICS-TRACK EVENTS	Credits	3
Semester	III		Course Code	SOE PES 030318 C0143
Learning Outcomes		At the end of the course, the students will be able to: • Demonstrate advance skills and techniques of track events. • Mentor, officiate and perform various duties of track events in Athletics. • Prepare the advance coaching lesson plans for track events.		
Course Content		**General out-line of the contents of Coaching and Officiating of Athletic**		
		The students of M.P.Ed III Semester need to develop skill proficiency in taking officiating lesson on selected above discipline. In view of this, the students shall be provided with advance mechanism of officiating in selected discipline. The duration of the lesson to be conducted by these students shall be in the range of 30 to 40 minutes depending on the class time they are going to handle at school and college level. Each student teacher is expected to take at least five lessons during the course of the fourth semester. The lessons will be supervised by the faculty members and experts who would discuss the merits and demerits of the concerned lesson and guide them for the future. In these officiating lessons, the duration should slowly increase and all the parts of the lesson covered progressively.		
Teaching learning process/Transactional Strategies		Lecture cum discussion, PowerPoint presentations, assignments, school observation and report, case study, and problem solving, brainstorming		

Year	II	TEACHING OF GAMES AND INTRAMURAL-II	Credits	3
Semester	III		Course Code	SOE PES 030319 C0143
Learning Outcomes		At the end of the course, the students will be able to: • Explain the fundamentals of any two games opted by the student. • Sketch the ground markings of specific games. • Demonstrate and describe the rules and regulations of specific games.		
Course Content		**General out-line of the contents of teaching of theory of Games and Sports**		
		Introduction of the game/sport and historical development with special reference to India, Orientation of the students to the play area and equipment used in the game/sport, Important tournaments held at National and International levels, Distinguished sports awards and personalities related to the Game/sport. Warming-up- General free hand exercises, specific work out using equipment. Fundamental skills, Lead up activities, General rules and their interpretations, Duties of officials, officiating in class competitions and Intramurals, Marking of the play area. Each student teacher is expected to take at least five lessons of any two games opted from **(Handball, Wrestling, Gym Training, Badminton, Hockey, and Cricket)** during the course of the semester. The lessons will be supervised by the faculty members and experts who would discuss the merits and demerits of the concerned lesson and guide them for the future. In these lessons, the duration should slowly increase and all the parts of the lesson covered progressively. **Note: students have to select any two games from the above mentioned games**		

<table>
<tr><td>Year</td><td>II</td><td rowspan="2">SPORTS SPECIALIZATION-III</td><td>Credits</td><td>3</td></tr>
<tr><td>Semester</td><td>III</td><td>Course Code</td><td>SOE PES 030320 C0143</td></tr>
<tr><td colspan="2">Learning Outcomes</td><td colspan="3">At the end of the course, the students will be able to:
Demonstrate advance skills and techniques of the selected game/event.
Prepare the coaching lesson plan and design the coaching schedule.
Exhibit performance of the particular game/event.</td></tr>
<tr><td colspan="2" rowspan="2">Course Content</td><td colspan="3">General out-line of the contents of sports specialization</td></tr>
<tr><td colspan="3">Introduction of the game/sport and historical development with special reference to India, Orientation of the students to the play area and equipment used in the game/sport, Important tournaments held at National and International levels, Distinguished sports awards and personalities related to the Game/sport. Warming-up- General free hand exercises, specific work out using equipment. Fundamental skills, Lead up activities, General rules and their interpretations, Duties of officials, officiating in class competencies, Marking of the play area.

Each student teacher is expected to take at least five lessons during the course of the semester. Each students is expected to opt for a particular game/event. The student teacher should develop proficiency towards officiating of the particular game/events in this semester. The lessons will be supervised by the faculty members and experts who would discuss the merits and demerits of the concerned lesson and guide them for the future. In these lessons, the duration should slowly increase and all the parts of the lesson covered progressively.

Course contents in the game of specialization should be chalked out internally considering advance level of students and suitable to their age and gender. The students shall be encouraged to opt for a particular game/event on the availability of specialized faculty.</td></tr>
</table>

Year	II	CLASSROOM TEACHING AND PRACTICAL OF THE CORE THEORY SUBJECTS-III	Credit	1
Semester	III		Course Code	SOE PES 030321 C0021
Learning Outcomes		At the end of the course, the students will be able to: • Demonstrate the class room teaching ability using various teaching methods.		
Course Content		**General out-line of the contents of classroom teaching and practical of the core subjects** Each student teacher is expected to take at least five lessons during the course of the semester. The lessons will be supervised by the faculty members and experts who would discuss the merits and demerits of the concerned lesson and guide them for the future. In these lessons, the duration should slowly increase and all the parts of the lesson covered progressively. **The Students shall demonstrate teaching ability using various teaching methods. These Lessons should include practical teaching of the core subjects of the semester.**		
Teaching learning process/Transactional Strategies		Lecture cum discussion, PowerPoint presentations, assignments, school observation and report, case study, and problem solving, brainstorming		

Elective Courses (DCEC)

Year	II	RESEARCH PROPOSAL AND PREPARATION OF SYNOPSIS	Credits	3
Semester	III		Course Code	SOE PES 030305 DCEC3003
Learning Outcomes		At the end of the course, the students will be able to: • Critically think, reflect and analyze and identify an appropriate methodology for a research problem. • Understand the importance of limitation and delimitation for the research. • Formulation and classification of research hypothesis. • Utilize various library resources for review and research proposal and prepare a research proposal.		
Course Content		**Outline of Syllabus** • Identifying an appropriate methodology for a research problem. (Online) • Effective use of library resources for research. • Developing a conceptual model relevant to research. • Construction of tools for different types of research. (Online) • Formulation and classification of research hypothesis. (Online) • Developing a research proposal. • Different writing format in preparing the research proposal. (Online) • Identifying and reducing/eliminating barriers which may interfere with the development of a high quality thesis/dissertation. • Developing and following an appropriate timeline for completion of the thesis/dissertation. • Format for writing abstract. • Oral and poster presentation. • Academic dishonesty. (Online)		

Suggested Readings	• Kamlesh, D. M. (2019). Methodology of Research in Physical Education and Sports. Sports Publication. • Klopper, H. (2008). The Qualitative Research Proposal. Curationis, 31(4), 62-72. • Kothari, C. (2019). Research Methodology: Methods and Techniques. New Age International Publishers. • Mishra, P. D. (2018). Research and Statistics in Physical Education. Sports Publication. • Vivar, C. G., McQueen, A., Whyte, D. A., &Armayor, N. C. (2007). Getting Started With Qualitative Research: Developing a Research Proposal. Nurse researcher, 14(3).

Year	II	SPORTS JOURNALISM AND MASS MEDIA	Credits	3
Semester	III		Course Code	SOE PES 030306 DCEC3003
Learning Outcomes	At the end of the course, the students will be able to: • Explain the meaning, definition, mode and news agencies of sports journalism. • Critically analyse the importance of media in sports. • Construct reviews and articles for Sports Journals, and articulate commenting and interviewing of Sports personalities. • Explain the role of advertisement in Sports Journalism.			
Course Content				
Unit -1	**Introduction of Sports Journalism** • Sports Journalism: Meaning, Definition and Historical Background. (Online) • National and International Sports News Agencies. (Online) • Mode of Sport Journalism: Print, Electronic and Informal Media. • Canons and Ethics of Journalism. (Online)			
Unit -2	**Event Organization and Coverage** • News: Definition, basic news elements, organization of sports news desk, Pitfalls in use of language, Proof Reading. (Online) • Qualities and responsibilities of sports news reporters. (Online) • Organization of Pre & Post Sports Event Press Meet. • Coverage: Covering Local / National/ International sports competitions and writing of press release.			

Unit -3	**Art of Review Writing, Commentating and Interviewing**
	• Review Writing: Brief review of Olympic Games, Asian Games, Common Wealth Games, World Cup, National Games and Indian Traditional Games. (Online) • Writing Sports Features: Types of sports features, sports personalities and their thumb nail sketches, Writing Sports Editorials, Blogs & Column. • Art of Commentating: Commentating sports for radio and television channels. • Art of interviewing: Interview with and elite Players and Coaches.
Unit -4	**Role and Career in Sports Journalism**
	• Amateurism v/s professionalism: Invasion of private life, emphasis on winning, sports for charity. • Role of Advertisement in Sports Journalism. (Online) • Career in Sports Photography: Equipment's, Editing and Publishing. • Structure of Sports Bulletin and its types.
Teaching learning process/Transactional Strategies	Lecture cum discussion, PowerPoint presentations, assignments, school observation and report, case study, and problem solving, brainstorming
Suggested Readings	• Dhananjay Joshi (2010). *Value Education in Global Perspective*. Lotus Press. • Kathryn T. Stofer, James R. Schaffer (2019). *Sports Journalism: An Introduction to Reporting And Writing*. Rowman & Littlefield Publishers. • Koak, S & Sharma, R. (2015). *Media and Career in Phy Edu*. Friends Publications. • Lal, R. (2013). *Sports Journalism*. Friends Publications. • Malik, (2010). *Sports Journalism and Mass Media*. Friends Publications. • Phil Andrews (2013). *Sports Journalism* (Ed. 2). SAGE Publications Ltd.

Generic Elective Course (GEC)

Year	II	PHYSICAL FITNESS AND CONDITIONING	Credits	4
Semester	III		Course Code	SOE PES 030302 GEC4004

Learning Outcomes	At the end of the course, the students will be able to: • Define the concept of warming up, cool down and calisthenics exercise. • Give a demonstration of weight training, Swiss ball training, medicine ball, thera-band and tubing exercises for various body parts. • Classify anthropometric measurements for assessing body composition. • Choose and suggest appropriate exercises for back pain and neck pain, and role of exercise during pregnancy.
Course Content	
Unit -1	**Concept of Physical Fitness and Conditioning** • Introduction of Physical Fitness variables and Conditioning. (Online) • Assessment of Health Related Fitness • Warming up and cool down exercise for body. (Online) • Aerobic and anaerobic exercise and its differences. (Online)
Unit -2	**Importance of Training** • Variation of sets and repetitions and Intensity for weight training. (Online) • Exercise with Swiss & medicine ball, thera-band and tubing. • Different Types of Exercise for upper body and lower body. • Various Methods, Principles and Types of training.

Unit -3	**Body types and Assessment**
	• Anthropometric measurement for somatotyping body type. • Assessing body composition, BMI. • Introduction of Posture and its type. (Online) • Posture Deformities and its treatment.
Unit -4	**Importance of Exercise in day today life**
	• Flexibility development Exercises. • Exercise during pregnancy and Exercise for Back and Neck pain Management. • Method for determining 1-RM. (Online) • Concept of designing different fitness training programme for different age group. (Online)
Teaching learning process/Transactional Strategies	Lecture cum discussion, PowerPoint presentations, assignments, school observation and report, case study, and problem solving, brainstorming

Suggested Readings	• American Alliance for Health, Physical Education, Recreation and Dance (1999). *Physical Education for Lifelong Fitness, The Physical Best Teacher's Guide.* Human Kinetics, P.O. Box 5076, Champaign, IL 61825-5076 • Emily R. Foster, Karyn Hartiger & Katherine A. Smith.(2002). *Fitness Fun*, Human Kinetics Publishers. • Fahey D. Thomas (2005). *Weight Training Basis, A Complete Guide for Men and Women.* Mcgraw- Hill Companies.Getchell, B. (1979). *Physical Fitness: A Way of Life.* • Lawrence, Debbie. (1999). *Exercise to Music.* A & C Black Publishers Ltd. 37, Sohe Square. • Miller, D. K., & Allen, T. E. (1990). *Fitness: A Lifetime Commitment*. Macmillan Publishing Company. • Robert Malt. (2001). *90-Day Fitness Plan.* D.K. publishing, Inc. 95, Madison Avenue. • The National Association for Sport and Physical Education (1900). *Concepts of Physical Education, What Every Student Needs to Know.* Association Drive Reston, VA 20191-1599 (703) 476-3410.

***Note: -**

1. In Part-B, Minimum strength required of the students selecting any of the game will be 10 Students.

2. The students opting for Research Proposal as Discipline Centric Elective Course will be encouraged to take Dissertation in Discipline Centric Elective Course (DCEC) in the fourth semester.

3. Research Proposal and Dissertation would be evaluated as per the University Ordinance No-XV.

Semester-IV

Year	II	SPORTS PSYCHOLOGY	Credits	3
Semester	IV		Course Code	SOE PES 030422 C3003
Learning Outcomes	At the end of the course, the students will be able to: • Explain the concept, meaning, importance and scope of sports psychology. • Recall various learning theories and describe the types, theories and techniques of motivation. • Illustrate and identify the psychological factors affecting sports performance. • Appraise and measure team cohesion, group dynamics and leadership capabilities.			
Course Content				
Unit -1	**Role of Sports Psychology** • History, Meaning, Definition, Scope and Importance of Sports Psychology. (Online) • Meaning and types of Motivation – Theories and Techniques for Development of motivation. (Online) • Introduction to various psychological variables. (Online) • Goal Setting Interventions, Principles, Program			
Unit -2	**Psychological Learning** • Meaning and Definition of Motor Learning, Activity & Skill. (Online) • Meaning of Learning -Theories of Learning and there implication in teaching Learning Process. (Online) • Stages of Motor Learning and Plateau effect. • Meaning of Psychological Skill Training (PST) its uses and Myths.			
Unit -3	**Importance of Personality** • Meaning and Definition of Personality and Personality Traits. (Online) • Theories and Role of Personality in Sports and Exercise. • Measurement of Personality. • Areas of Individual Difference and its types.			

Unit -4	**Leadership and Cohesion** • Concept of Group Dynamics of Sports Performance and Team Cohesion. (Online) • Meaning of Leadership, Component of Effective Leadership and its Measurement. • Problems and issues working with Individual and Team Sports. • Career Transition in Athletes and Retirement Issues, Developing Life Skills in Athletes.
Teaching learning process/Transactional Strategies	Lecture cum discussion, PowerPoint presentations, assignments, school observation and report, case study, and problem solving, brainstorming
Practicum	• Assessment of Reaction Time (Hard-Eye). • Assessment of Coordination (Foot-Eye). • Analysis of Personality (Eysenck Personality Questionnaire), Big Five Personality Test. • Assessment of Achievement Motivation. • Assessment of Sport competitive anxiety test. • Inventory for factors influencing sports. • Assessment of Sociometry Questionnaire.
Suggested Readings	• Horn, Thelma (2008). *Advances in Sport Psychology*. Champaign IL : Human Kinetics Publishers, Inc. • Huber, Jeffrey (2012). *Applying Educational Psychology in Coaching Athletes*. Knowledge Warehouse. • Kamlesh, M.L. (2011). *Psychology in Physical Education and Sport* (Ed. 3). Delhi : Metropolitan Book Co. Pvt. Ltd. • Pargonkar, G. V (2015). *Sports Psychology*. Friends Publications. • Taylor, Jim (2017). *Assessment in Applied Sport Psychology*. Knowledge Warehouse. • Weinberg, R.S & Gould, Daniel (2015). *Foundations of Sport and Exercise Psychology* (Ed. 6). Champaign IL: Human Kinetics Publishers, Inc.

Year	II	HEALTH EDUCATION AND SPORTS NUTRITION	Credits	3
Semester	IV		Course Code	SOE PES 030423 C3003
Learning Outcomes	At the end of the course, the students will be able to: • Explain the meaning, aims and objectives of health education and classify communicable disease, their transmission and prevention. • Recall the concept of Non-communicable diseases and list out various programs for controlling diseases. • List out various school health services and define the role of International Organization in the Development of Health. • Plan and prepare a nutritional diet intake for various games and sports.			
Course Content				
Unit -1	**Introduction of Health Education** • Concept of Health and Health Education.(Online) • Dimension of health and wellness. (Online) • Latest trends in Health Education and global strategy in the field of Health. (Online) • Role of physical Education Professional on Individual and family in relation to Health and Health Education.(Online)			
Unit -2	**Epidemiology of Diseases** • Epidemiology of Communicable Diseases: Agent factor, Host factor, Environment factors, Mode of Transmission and Prevention of following diseases: • Health Hazards and its types. (Online) • Epidemiology of Non Communicable Diseases : Risk factors and Prevention of following diseases : • Personal Health & Hygiene care system.			

Unit -3	**School Health Services**
	• Meaning & Objective of School Health Service and Health Problem of School Child. (Online) • Role of health education in schools. (Online) • Health record, Healthful school environment, first- aid and emergency care, Mid-day School Programme. • Role of National and International Organization in the Development of Health.
Unit -4	**Nutrition for various games and sports**
	• Nutrition, Training Adaptations and Immune Function in Athletes. • Nutrition for popular team sports (Basketball, Hockey, Football, Volleyball, Kabaddi and Cricket). • Nutrition for Athletics and Endurance Sports (Long distance Swimming, Cycling and Marathon). • Nutrition for Strength and Combat sport (Wrestling, Weightlifting, Judo, Boxing, Taekwondo and Fencing).
Teaching learning process/Transactional Strategies	Lecture cum discussion, PowerPoint presentations, assignments, school observation and report, case study, and problem solving, brainstorming
Suggested Readings	• Campbell, B. (2013). *Sports Nutrition: Enhancing Athletic Performance*. CRC Press. • Eberle, S. G. (2013). *Endurance Sports Nutrition* (Ed. 3). Human Kinetics. • Fink, H. H., & Mikesky, A. E. (2017). *Practical Applications in Sports Nutrition*. Jones & Bartlett Learning. • Kumar.P (2020). "Changing The Lifestyle of Present Health Care: A Much Required Step for A Secured Future The Transmission or Reminder of Ancestor's Way of Life once again".*AlochanaChakra Journal*. Vol. IX. Issue-V. Pg-2789-2793. doi:10.01011.ACJ.2020.V9I5.00068749.01683. • Maughan, R. J., & Shirreffs, S. M. (Eds.). (2013). *Food, Nutrition and Sports Performance Iii*. Routledge. • Reaburn, P. R. (Ed.). (2014). *Nutrition and Performance In Masters Athletes*. CRC Press. • Ryan, M. (2012). *Sports Nutrition for Endurance Athletes*. Velo Press. • Sharma, O.P., (2010). *Handbook of Health Education & Sports*. Khel Sahitya Kendra . • Zinner, C., & Sperlich, B. (Eds.). (2016). *Marathon Running: Physiology, Psychology, Nutrition and Training Aspects* (pp. 1-171). Springer.

Year	II	PHYSIOLOGY OF EXERCISE	Credits	3
Semester	IV		Course Code	SOE PES 030424 C3003
Learning Outcomes	At the end of the course, the students will be able to: • Explain the meaning of Exercise Physiology in Physical Education and Sports. • Classify the different energy systems of body. • Illustrate the effect of exercise on various systems of body. • Explain the effect of Ergogenic aids and Doping in Sports.			
Course Content				
Unit -1	**Introduction to Exercise Physiology**			
	• Meaning and Definition of Exercise & exercise physiology. (Online) • Role & Importance of Exercise Physiology in the field of Physical Education & Sports. (Online) • Impact of Exercise on work at cellular level. • Muscle- its types, characteristics and functions. Microscopic structure of muscle fiber. Sliding filament theory of muscular contraction. Types of muscle fibers and sports performance. Muscular adaptations to exercise.			
Unit -2	**Energy System and Recovery Process**			
	• The basic energy systems (carbohydrate metabolism). • Bio-chemical aspects of exercise a) Metabolism of food products. b) Direct and indirect methods of measuring energy cost of exercise. • Recovery process – Physiological aspects of fatigue and Restoration of energy stores. (Online) • Electrolyte balance & Water balance.			

Unit -3	**Effect of Exercise on Various System** • Work capacity under different environmental conditions a) Hot, Humid and Cold. b) High Altitude. • Immediate effect of exercise/work on various systems of body. (Online) • Cardio-respiratory, muscular and thermo-regulatory systems, Alveolar ventilation & second wind. • Physiological Factors influencing Sports Performance. (Online)
Unit -4	**Ergogenic Aids in Sports** • Ergogenic aids and Doping in Sports. (Online) • Effect of drugs & doping on athletic performances. (Online) • Diet before, during & after the athletic performance. • Exercise and training in females and older people, physiological aspects of development of strength, endurance, speed, agility & coordination.
Teaching learning process/Transactional Strategies	Lecture cum discussion, PowerPoint presentations, assignments, school observation and report, case study, and problem solving, brainstorming.
Practicum	• Measurement of heart rate and Estimation of Target Heart Rate. • Body composition analysis with various methods. • Measurement of VO2 Max (Field and Laboratory Method). • Blood Pressure measurement (Sphygmomanometer). • Anthropometric equipment's. • Measurement of various lung volumes through spirometer, peak flow meter.

Suggested Readings	• Brown, R. G.(2015). *Fundamentals of Exercise Physiology.* Friends Publication. • Chandi, C. C. (2018). *Human Physiology* (Vol. 12). CBS Publishers. • Fox Stuart Ira (2016). *Human Physiology* (15th Edition). McGraw-Hill Education. • Porcari, J., Bryant, C., & Comana, F. (2015). *Exercise Physiology*. FA Davis. • Varshney & Mona Bedi (2018). *Ghai's Textbook of Practical Physiology*. Jaypee Brothers Medical Publishers. • William D. McArdle (2014). *Exercise Physiology: Nutrition, Energy, And Human Performance* (8th Edition). Lippincott Williams and Wilkins.

Year	II	COACHING AND OFFICIATING OF ATHLETICS-FIELD EVENTS	Credits	3
Semester	IV		Course Code	SOE PES 030425 C0143
Learning Outcomes		At the end of the course, the students will be able to: • Demonstrate advance skills and techniques of field events. • Mentor, officiate and perform various duties of field events in Athletics. • Prepare the advance coaching lesson plans for field events.		
Course Content		**General out-line of the contents of Coaching and Officiating of Athletics- Field Events** The students of M.P.Ed. – IV Semester need to develop sports theory and skill proficiency in taking officiating lesson on selected above discipline. In view of this, the students shall be provided with advance mechanism of officiating in selected discipline. The duration of the lesson to be conducted by these students shall be in the range of 30 to 40 minutes depending on the class time they are going to handle at school and college level. Each student teacher is expected to take at least five lessons during the course of the fourth semester. The lessons will be supervised by the faculty members and experts who would discuss the merits and demerits of the concerned lesson and guide them for the future. In these officiating lessons, the duration should slowly increase and all the parts of the lesson covered progressively.		

Year	II	ADVANCE TEACHING, COACHING AND OFFICIATING OF THE GAMES-II	Credits	3
Semester	IV		Course Code	SOE PES 030426 C0143
Learning Outcomes		At the end of the course, the students will be able to: • Illustrate and interpret the rules and regulations of the two games. • Mentor, officiate and perform other duties for the two games. • Prepare the coaching lesson plan and design the coaching schedule.		
Course Content		**General out-line of the contents of Advance Teaching, Coaching and Officiating of the Games and Sports** The students of M.P.Ed. – IV Semester need to develop sports theory and skill proficiency in taking officiating lesson on selected above discipline. In view of this, the students shall be provided with advance mechanism of officiating in selected discipline. The duration of the lesson to be conducted by these students shall be in the range of 30 to 40 minutes depending on the class time they are going to handle at school and college level. Each student teacher is expected to take at least five lessons during the course of the semester. The lessons will be supervised by the faculty members and experts who would discuss the merits and demerits of the concerned lesson and guide them for the future. In these lessons, the duration should slowly increase and all the parts of the lesson covered progressively. **Note: The Students shall be encouraged to opt for the same games as opted in the third semester.**		

<table>
<tr><td>Year</td><td>II</td><td rowspan="2">SPORTS SPECIALIZATION-IV</td><td>Credits</td><td>3</td></tr>
<tr><td>Semester</td><td>IV</td><td>Course Code</td><td>SOE PES 030427 C0143</td></tr>
<tr><td colspan="2">Learning Outcomes</td><td colspan="3">At the end of the course, the students will be able to:
• Demonstrate advance skills and techniques of the selected game/event.
• Prepare the coaching lesson plan and design the coaching schedule.
• Exhibit performance of the particular game/event.</td></tr>
<tr><td colspan="2" rowspan="2">Course Content</td><td colspan="3">General out-line of the contents of sports specialization</td></tr>
<tr><td colspan="3">Introduction of the game/sport and historical development with special reference to India, Orientation of the students to the play area and equipment used in the game/sport, Important tournaments held at National and International levels, Distinguished sports awards and personalities related to the Game/sport. Warming-up- General free hand exercises, specific work out using equipment. Fundamental skills, Lead up activities, General rules and their interpretations, Duties of officials, officiating in class competencies and Intramurals, Marking of the play area.

Each student teacher is expected to take at least five lessons during the course of the semester. Each students is expected to opt for a particular game/event. The student teacher should develop proficiency towards coaching part of the particular game/events in this semester. The lessons will be supervised by the faculty members and experts who would discuss the merits and demerits of the concerned lesson and guide them for the future. In these lessons, the duration should slowly increase and all the parts of the lesson covered progressively.

Course contents in the game of specialization should be chalked out internally considering advance level of students and suitable to their age and gender. The students shall be encouraged to opt for a particular game/event on the availability of specialized faculty.</td></tr>
</table>

Year	II	CLASSROOM TEACHING AND PRACTICAL OF THE CORE THEORY SUBJECTS-IV	Credit	1
Semester	IV		Course Code	SOE PES 030428 C0021
Learning Outcomes		At the end of the course, the students will be able to: • Demonstrate the class room teaching ability to teach different topics of the core subjects using various teaching methods.		
Course Content		**General out-line of the contents of classroom teaching and practical of the core subjects** Each student teacher is expected to take at least five lessons during the course of the semester. The lessons will be supervised by the faculty members and experts who would discuss the merits and demerits of the concerned lesson and guide them for the future. In these lessons, the duration should slowly increase and all the parts of the lesson covered progressively. **The Students shall demonstrate teaching ability using various teaching methods. These Lessons should include practical teaching of the core subjects of the semester.**		

Elective Courses (DCEC)

Year	II	DISSERTATION	Credits	3
Semester	IV		Course Code	SOE PES 030407 DCEC0303
Learning Outcomes	At the end of the course, the students will be able to: **Develop competency in the process of conducting research** • A candidate shall have dissertation for M.P.Ed– IV Semester and must submit his/her Synopsis in department and get it approved by the D.R.C. (Departmental Research Committee). • A candidate selecting dissertation must submit his/her dissertation not less than one week before the beginning of the IVth Semester Examination. • The candidate has to face the Viva-Voce conducted by D.R.C. (Departmental Research Committee) with external examiner.			

Year	II	PHYSICAL FITNESS AND WELLNESS	Credits	3
Semester	IV		Course Code	SOE PES 030408 DCEC3003
Learning Outcomes	At the end of the course, the students will be able to: • Define the concept of physical fitness and wellness, and identify the components, techniques and principles of physical fitness. • Recall the importance of nutrition and calories requirements, and explain the influence of food on social cultural values. • Illustrate stress assessment and management techniques, and the concept of designing a fitness training programme. • Explain the Establishment and Management of Fitness Centre and describe the Qualification and qualities for a fitness trainer.			
Course Content				
Unit -1	**Introduction of Physical Fitness and Wellness** • Meaning & Definition, Principles and Components of Physical Fitness and Wellness. (Online) • Leisure time physical activity for community development. • Current trends in fitness and conditioning. (Online) • Relationship between physical activity and lifelong wellness.			
Unit -2	**Importance of Nutrition** • Meaning and Definition of Nutrition. (Online) • Food Guide Pyramid and Daily calories intake & burning. • Influences of food on social cultural values. (Online) • Exercise and metabolism & burning.			

Unit -3	**Stress Management** • Stress assessment & its management, prominent health problem associated with inactivity. • Safety techniques (Spotting, proper body alignment, lifting techniques, spatial, awareness. and proper breathing techniques). (Online) • Concept of free weight vs. machine, variation of sets and repetitions, Exercise with Swiss & Medicine Ball, Thera-band and Tubing. • Concepts of designing fitness training programme and Measurement of Body Composition.
Unit -4	**Fitness Management** • Establishment and Management of Fitness Centre. • Principles of starting a fitness center-environment, location, policy, offer of programmes, record keeping, and public relation. • Fitness center membership and its types. (Online) • Safety aspects in a fitness center and Qualification and qualities for a fitness trainer. (Online)
Teaching learning process/Transactional Strategies	Lecture cum discussion, PowerPoint presentations, assignments, school observation and report, case study, and problem solving, brainstorming
Practicum	• Orientation and management of fitness center, various equipment's and wet zone. • Different methods of measuring Body Composition (BMI, Waist Hip Ratio, Skinfold Caliper). • Different Fitness Test (Cardio-respiratory Endurance, Strength, Strength Endurance, Flexibility, Body Composition, Anthropometric Measurements and Grip Dynamometer).

Suggested Readings	• Agrawal, M.(2016). *Aerobics Fitness & Style.* Friends Publications. • Corbin, C. (2011). *Concepts of Physical Fitness*. McGraw-Hill Higher Education. • Fahey D. Thomas(2005). *Weight Training Basis, A Complete Guide for Men and Women.* Mcgraw- Hill Companies. • Greenberg, J., Dintiman, G., & Myers Oakes, B. (2004). *Physical Fitness and Wellness.* Champaign, IL: Human Kinetics. • Hoeger, W., & Hoeger, S. (2013). *Fitness & Wellness*. Wadsworth, Cengage Learning. • Prabha, S.(2015). *Basic Fitness Assessment.* Friends Publications. • Rathee, S.(2017). *Physical Fitness and Wellness.* Friends Publications. • Robert Malt.(2001). *90-Day Fitness Plan*. D.K. publishing, Inc. 95, Madison Avenue. • The National Association for Sport and Physical Education (1900). *Concepts of Physical Education, What Every Student Needs to Know.* Association Drive Reston, VA 20191-1599 (703) 476-3410. • Uppal, A.K. (2016). *Physical Fitness and Wellness.* Friends Publications.

Annexure-X

कार्यालय जिला बेसिक शिक्षा अधिकारी, जनपद– अमेठी।

पत्रांकः–बेसिक/अना0प्रमा0/18497–98 /2020–21 दिनांक–04/03/21

अनापत्ति प्रमाण पत्र

श्री राहुल यादव, सहायक अध्यापक, प्रा0वि0 सण्डिला, वि0क्षे0 भेटुआ, जनपद अमेठी द्वारा प्रार्थना पत्र के माध्यम से हरियाणा केन्द्रीय विश्वविद्यालय, महेन्द्रगढ़, हरियाणा में दिनांक–07.07.2018 को प्रवेश लिया गया है। पी0एच0डी0 में शोध कार्य जारी रखने हेतु अनापत्ति प्रमाण पत्र की मांग की गयी है।

अतः श्री राहुल यादव, सहायक अध्यापक, प्रा0वि0 सण्डिला, वि0क्षे0 भेटुआ, जनपद अमेठी को हरियाणा केन्द्रीय विश्वविद्यालय, महेन्द्रगढ़, हरियाणा में जारी रखने हेतु अनापत्ति इस आशय से प्रदान की जाती है कि उक्त हेतु श्री राहुल यादव, को अलग से कोई अवकाश देय नहीं होगा।

(विनोद कुमार मिश्र)
जिला बेसिक शिक्षा अधिकारी,
जनपद–अमेठी।

पृष्ठांकन संख्या, पत्रांक व दिनांक उपरोक्तानुसार।

प्रतिलिपिः– निम्नलिखित को सूचनार्थ एवं आवश्यक कार्यवाही हेतु प्रेषित–

1. खण्ड शिक्षा अधिकारी, भेटुआ, जनपद अमेठी।
2. श्री राहुल यादव, सहायक अध्यापक, प्रा0वि0 सण्डिला, वि0क्षे0 भेटुआ, जनपद अमेठी।

जिला बेसिक शिक्षा अधिकारी,
जनपद–अमेठी

Self declaration Date - 04-03-2021

I am Rahul Yadav, Research scholar, School of Education, Central University of Haryana. I have joined a government job in Dept of Basic Education, Govt. of Uttar Pradesh. I have taken NOC from concerned authority to continue my Ph.D. and I will join the course on the basis of leave without Pay, whenever the authority of Central University of Haryana give the permission.

NOC Reference No. -
पत्रांक:- बेसिक/अना०शाखा/18497-98/2020-21 दिनांक- 04/03/2021
Dated - 04/03/2021

NAME - RAHUL YADAV

Sign - Rahul yadav

CENTRAL UNIVERSIY OF HARYANA

School of Humanities and Social Sciences

Minutes of the Online/Offline Meeting of the School Board

(Sept. 9, 2021)

An online/offline meeting of the School Board of the School of Humanities and Social Sciences was held at 11:00 AM on Sept. 9, 2021. Following members/special invitees joined the meeting online/offline:

1. Prof. C.R. Darolia	: External Member
2. Prof. Vikram Kaushik	: External Member
3. Prof. Rajbir Dalal	: Member
4. Dr. Vishwanand Yadav	: Member
5. Dr. Payal Kanwar Chandel	: Member
6. Dr. Rinu	: Member
7. Dr. Arvind Singh Tejawat	: Member
8. Dr. Narender Singh	: Member
9. Dr. Rajeev Kumar Singh	: Member
10. Dr. Pradeep Kumar	: Member
11. Dr. Surender	: Member
12. Prof. Ranvir Singh	: Special Invitee
13. Dr. Amit Kumar	: Special Invitee
14. Dr. Tanvi Bhati	: Special Invitee
15. Mr Alekha Sachidananda Nayak	: Special Invitee
16. Dr. Abhiranjan Kumar	: Member
17. Dr. Sanjiv Kumar	: Chairperson

At the outset, the Chairperson welcomed all the members and special invitees, and briefed about the agenda points. After thorough deliberations, the School Board of the School of Humanities and Social Sciences considered and approved as under:

- Minutes of the Board of Studies of various departments and revised curriculum of the academic programmes of the following departments **(as attached):**

i. Department of English and Foreign Languages
ii. Department of Hindi
iii. Department of History and Archaeology
iv. Department of Journalism and Mass Communication
v. Department of Political Science
vi. Department of Psychology
vii. Department of Sanskrit
viii. Department of Sociology

The copy of the approved minutes and the revised curriculum is attached herewith.

- The School Board also recommended that the respective department may make grammatical/structural corrections, wherever required, before submission to the Academic Council.

The meeting ended with the vote of thanks by the Chairperson.

Sml 10/9/2021

(SANJIV KUMAR)
Dean, School of Humanities and Social Sciences

CENTRAL UNIVERSITY OF HARYANA
Department of English and Foreign Languages

Minutes of the Online Board of Studies (English and Foreign Languages)
August 21, 2021

Following members were present:

1. Prof. Anup Beniwal, **External Expert**
2. Prof. Anil Aneja, **External Expert**
3. Dr. Sanjiv Kumar, Head of the Department
4. Dr. Rinu, Member
5. Dr. Snehsata, Special Invitee
6. Dr. Sudeep Kumar, Special Invitee
7. Dr. Manoj Kumar Vidyalankar, Special Invitee
8. Dr. Pinki Arora, Special Invitee

The Board of Studies of the department discussed and resolved as under:

i. Confirmation of admissions to the various academic programmes for the session 2020-21:

The department reported to the Board of Studies the list of students admitted in the academic session 2020-21 to Ph.D, M.Phil and M.A. English programmes as per the seat-matrix notified by the University, for confirmation, as under:

M.A. (English)

Sr. No	Class Roll No.	Name	Remarks
1.	200829	Anshid Ali	Admission Withdrawn
2.	200830	Bidyut Basumatary	
3.	200831	Dipjyoti Medhi	
4.	200832	Dheeraj	
5.	200833	Dipesh	
6.	200835	Felicita S Martin	
7.	200836	Jatin	
8.	200837	Manish Kumar	Admission Withdrawn
9.	200838	Manish Kumar Yadav	
10.	200839	Mohammed Aslam K	
11.	200840	Navdeep	Admission Withdrawn
12.	200841	Neeru Bumrah	
13.	200842	Nibedita Das	
14.	200843	Pavitar Bulla	
15.	200844	Prashant	
16.	200845	Praveen Kumar	
17.	200846	Priti	
18.	200847	Saranya Sasikumar	
19.	200848	Shyamalima Dutta	
20.	200849	Vandana	
21.	200850	Vinita	
22.	200852	Andrea Rose Antony	

23.	200853	Aparna M B	
24.	200854	Daniel David	
25.	200855	Deepak Kumar	
26.	200857	Priya	
27.	200858	Priya Roy	
28.	200859	Saleema Ismail K.V.	
29.	200860	Aarzoo Malik	
30.	200861	Aditya Kumar Singh	
31.	200862	Deepak Saini	
32.	200863	Harsha Grover	
33.	200864	Niranjan P	
34.	200865	Sajal Kumar Jha	
35.	200866	Saket Kumar	
36.	200867	Sarika Yadav	
37.	200868	Satyabrata Behera	
38.	200869	Sumedha	

Ph.D. (English)

Sr. No	Roll No.	Name	Remarks
1.	200887	Alka Nanda Amethia	
2.	200888	Chitra Pegu	
3.	200889	Deepak	
4.	200890	Devika	
5.	200891	Diksha Mor	
6.	200892	Josephine Sebastian	
7.	200893	Kanika Godara	
8.	200894	Laksheyata Yadav	

M.Phil. (English)

Sr. No	Roll No.	Name	Remarks
1.	200877	Abhilasha	Admission Withdrawn
2.	200878	Ashi Thakran	
3.	200879	Firdous Nazir	
4.	200880	Geeta Rani	
5.	200881	Neha Seotra	Admission Withdrawn
6.	200882	Priyanka Bisht	
7.	200883	Surender	

Resolution: Confirmed

ii. To consider and approve the minutes of the meeting of the Departmental Research Committee held on 26.07.2021:

The committee considered and approved the Minutes of the meeting of the Departmental Research Committee held on July 26, 2021 in its entirety. **(Minutes of the DRC Meeting attached)**

However, the Board of Studies suggested minor rephrasing of the topics of M.Phil and Ph.D research as highlighted below:

Sr.	Name and Roll No.	Supervisor	Topic Recommended by DRC	Topic Approved by BoS
M.Phil:				
1	Ashi Thakran Roll No: 200878	Dr. Rinu	Revisionist Mythmaking and Dialogism in Madeline Miller's *Circe* and *The Song of Achilles*	Revisionist Mythmaking in Madeline Miller's *Circe* and *The Song of Achilles*: A Study
2	Surender Roll No: 200883	Dr. Pinki Arora	Love in Shakespeare: A Study of Selected Women Characters	Love and Gender in Shakespeare: A Study of Select Women Characters
3	Geeta Rani Roll No : 200880	Dr. Sudeep Kumar	Rewriting of History and Feminism in India: A Study of *Dus Dware Ka Peenjara* by Anamika	Rewriting History and Feminism in India: A Study of *Dus Dware Ka Peenjara*
4	Firdous Nazir Roll No: 200879	Dr. Snehsata	Arundhati Roy's *The Ministry of Utmost Happiness*: An Allegory of Modern India	*The Ministry of Utmost Happiness* as an Allegory of Modern India: A Study
5	Priyanka Bisht Roll No: 200882	Dr. Manoj Kumar	Postcolonial Analysis of Oral Narratives: A Study of Kumaoni Holi and Ramlila	Postcolonial Analysis of Oral Narratives: A Study of Kumaoni Holi and Ramlila
Ph.D.				
1	Devika Roll No: 200890	Dr. Manoj Kumar	Ecocritical Exploration of the Select works of Temsula Ao and Jeannette Armstrong	Ecocritical Study of the Selected Works of Temsula Ao and Jeannette Armstrong
2	Diksha Mor Roll No: 200891	Dr. Pinki Arora[#]	Recommended for the fresh research proposal to be submitted in the	Recommended for the fresh research proposal to be submitted in the

			forthcoming meeting of DRC.	forthcoming meeting of DRC.
3	Josephine Sebastian Roll No: 200892	Dr. Pinki Arora	Performance of Violence in 'Uchabali' (A Ritual Art of North Kerala): A Cultural Analysis *The student has requested for cancellation of admission. Ref. email of the student dated July 29, 2021.*	Admission Withdrawn
4	Laksheyata Yadav Roll No.: 200894	Dr. Sanjiv Kumar	Writing Resistance: A Study of Selected Contemporary Dalit Narratives	Dalit Aesthetics and its Contexts: A Study of Selected Contemporary Dalit Narratives
5	Kanika Godara Roll No.: 200893	Dr. Sudeep Kumar	Theorizing Anthropocene and Climate-Fiction: A Study of Selected Literary Works	Theorizing Anthropocene and Climate-Fiction: A Study of Selected Literary Works
6	Alka Nanda Amethia Roll No: 200887	Dr. Manoj Kumar	Thread and Circuses: Performing in the Spaces of City and Nation in the Fiction of Rohinton Mistry	Thread and Circuses: Performing in the Spaces of City and Nation in the Fiction of Rohinton Mistry
7	Chitra Pegu Roll No: 200888	Dr. Snehsata	A Critical Study of Poile Sengupta's Art And Thought	Poile Sengupta's Art and Thought: A Critical Study
8	Deepak Roll No: 200889	Dr. Sanjiv Kumar	Existential Crisis in Pandemic Literature: A Study of Select Literary Narratives	Pandemic Literature— Past and Present: A Study of Select Literary Narratives

After thorough discussion and deliberations, it was resolved that the amended topics may be communicated to the DRC, students and the concerned branches. The students may be advised to make necessary corrections in the research proposals in consultation with their supervisors under intimation to the department.

iii. To consider and approve the revised structure and syllabus of M.A. (English) to be effective from the academic session 2021-22.

After detailed deliberations on the revised scheme, structure and the syllabus of M.A. English prepared by the department in consultation with scholars and outside experts, the

Board of Studies approved the draft as enclosed. **(The revised NEP and Outcome-based Curriculum of M.A. English enclosed)**

Resolution: Confirmed

iv. To consider and approve the panel of experts for the Departmental Research Committee, paper-setting, evaluation, moderation and dissertation viva voce.

In view of the requirements of the University Ordinance to empanel the external experts for the Departmental Research Committee, the Board of Studies approved the panel in its meeting held on 16.09.2021. The two-year term of the panel shall expire on 15.09.2021. Therefore, the Board of Studies discussed and approved the following panel of experts for DRC:

1. Prof. Rajkumar, Head, Department of English, University of Delhi.
2. Prof. Jaibir Hooda, Maharshi Dayanand University, Rohtak
3. Prof. Rekha, Deenbandhu Chhotu Ram University of Science and Technology, Murthal
4. Prof. Shrawan K. Sharma, Gurukul Kangri University, Hardwar
5. Prof. Simi Malhotra, Jamia Millia Islamia University, New Delhi
6. Prof. P.C. Pattnaik, University of Delhi
7. Prof. Satish Harit, Jai Narain Vyas University, Jodhpur
8. Prof. Devender Kumar, Banaras Hindu University, Varanasi

Regarding the panel of experts for paper-setting, evaluation, moderation, and M.A. dissertation viva voce, the Board of Studies approved the panel as enclosed herewith. **(The Relevant Enclosed)**

The Board of Studies authorised the department to form the panel of examiners, paper-setters and other experts for the First and Second Semesters after approval of the revised syllabus by the Academic Council. The same may be reported in the forthcoming meeting of the Board of Studies.

v. To consider and approve the minutes of the previous meetings and 'approvals through Circulation':

The committee considered and confirmed the Minutes of the meeting held on Sept. 16, 2019 and approvals 'through email circulation' of DRC Minutes (meeting dated 17.09.2020), panel of paper setters and panel of examiners for Masters and Research Programmes. The approval of the recommendations of the DRC/ the department (through circulation) in response to email dated Oct. 9, 2020, March 18, 2021 and June 18, 2021 was also reported for confirmation. **(Relevant files attached)**

vi. As there was no other item for consideration, the meeting ended with the Vote of Thanks by the Chairperson.

Note: Approval of BoS members received through email.

(Anup Beniwal)	**(Anil Aneja)**	**(Rinu)**
(Snehsata)	**(Manoj Kumar)**	**(Sudeep Kumar)**
(Pinki Arora)	**(Sanjiv Kumar)**	

NEP and Learning Outcome-based Curriculum Framework (LOCF)

For

M.A. in English

(To be effective from the Academic Session 2021-22)

Department of English and Foreign Languages
School of Humanities and Social Sciences

Central University of Haryana

{Approved by the Board of Studies on 21 August 2021 and School Board on September 9, 2021}

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Background

Considering the curricular reforms as instrumental for desired learning outcomes, all the academic departments of Central University of Haryana made a rigorous attempt to revise the curriculum of undergraduate and postgraduate programmes in alignment with National Education Policy-2020 and UGC Quality Mandate for Higher Education Institutions-2021. The process of revising the curriculum could be prompted with the adoption of "Comprehensive Roadmap for Implementation of NEP-2020" in 32nd meeting of the Academic Council of the University held on April 23, 2021. The Roadmap identified the key features of the Policy and elucidated the Action Plan with well-defined responsibilities and indicative timeline for major academic reforms.

The process of revamping the curriculum started with the series of webinars and discussions conducted by the University to orient the teachers about the key features of the Policy, enabling them to revise the curriculum in sync with the Policy. Proper orientation of the faculty about the vision and provisions of NEP-2020 made it easier for them to appreciate and incorporate the vital aspects of the Policy in the revised curriculum focused on 'creating holistic, thoughtful, creative and well-rounded individuals equipped with the key 21st century skills' for the 'development of an enlightened, socially conscious, knowledgeable, and skilled nation'.

With NEP-2020 in background, the revised curricula articulate the spirit of the policy by emphasising upon— integrated approach to learning; innovative pedagogies and assessment strategies; multidisciplinary and cross-disciplinary education; creative and critical thinking; ethical and Constitutional values through value-based courses; 21st century capabilities across the range of disciplines through life skills, entrepreneurial and professional skills; community and constructive public engagement; social, moral and environmental awareness; Organic Living and Global Citizenship Education (GCED); holistic, inquiry-based, discovery-based, discussion-based, and analysis-based learning; exposure to Indian knowledge system, cultural traditions and classical literature through relevant courses offering 'Knowledge of India'; fine blend of modern pedagogies with indigenous and traditional ways of learning; flexibility in course choices; student-centric participatory learning; imaginative and flexible curricular structures to enable creative combination of disciplines for study; offering multiple entry and exit points initially in undergraduate programmes; alignment of Vocational courses with the International Standard Classification of Occupations maintained by the International Labour Organization; breaking the silos of disciplines; integration of extra-curricular and curricular

aspects; exploring internships with local industry, businesses, artists and crafts persons; closer collaborations between industry and higher education institutions for technical , vocational and science programmes; and formative assessment tools to be aligned with the learning outcomes, capabilities, and dispositions as specified for each course. In case of UG programmes in Engineering and Vocational Studies, it was decided that the departments shall incorporate pertinent NEP recommendations while complying with AICTE, NBA, NSQF, International Standard Classification of Occupations, Sector Skill Council and other relevant agencies/sources. The University has also developed consensus on adoption of Blended Learning with 40% component of online teaching and 60% face to face classes for each programme.

The revised curricula of various programmes could be devised with concerted efforts of the faculty, Heads of the Departments and Deans of Schools of Study. The draft prepared by each department was discussed in series of discussion sessions conducted at Department, School and the University level. The leadership of the University has been a driving force behind the entire exercise of developing the uniform template and structure for the revised curriculum. The Vice Chancellor of the University conducted series of meetings with Heads and Deans to deliberate upon the vital parameters of the revised curriculum to formulate a uniform template featuring Background, Programme Outcomes, Programme Specific Outcomes, Postgraduate Attributes, Structure of Masters Course, Learning Outcome Index, Semester-wise Courses and Credit Distribution, Course-level Learning Outcomes, Teaching-Learning Process, Blended Learning, Assessment and Evaluation, Keywords, References and Appendices. The experts of various Boards of Studies and School Boards contributed to a large extent in giving the final shape to the revised curriculum of each programme.

To ensure the implementation of curricular reforms envisioned in NEP-2020, the University has decided to implement various provisions in a phased manner. Therefore, the curriculum may be reviewed annually by the department so as to gradually include all relevant provisions of NEP-2020. The Department shall review the curriculum periodically to assess the relevance and feasibility of Discipline Specific/Generic Electives, and the courses may be added or dropped, accordingly. The decision taken by the department to add or drop the electives shall be reported to the BoS/School Board.

Programme Outcomes

On completing M. A. Programme, the students shall be able to realise following programme outcomes:

PO	Description
PO-1	Demonstrate holistic understanding of life in varied manifestations.
PO-2	Discuss and apply various social, political and literary trends in real life situations.
PO-3	Understand and discuss contemporary socio-political, cultural and literary context through multidisciplinary approach.
PO-4	Demonstrate an ability to use relevant theoretical concepts in real-life situations.
PO-5	Ability to integrate the traditional knowledge with latest advances in social sciences and humanities.
PO-6	Formulate valid propositions on the basis of multidisciplinary and cross-disciplinary understanding of disciplines.
PO-7	Appreciate and analyse regional, national and international scenario.
PO-8	Demonstrate the ability to interpret and analyse realities of life from social perspective.
PO-9	Propose solutions to the existing human problems as a well-informed and competent individual.

Programme Specific Outcomes

On completing M. A. in English Programme, the students shall be able to realise following outcomes:

PSO	Description
PSO-1	Demonstrate critical understanding of English Literature in its varied forms.
PSO-2	Discuss various literary genres, terms and movements with clarity.
PSO-3	Develop creative and critical insights, aesthetic sensibility, and analytical skills.
PSO-4	Demonstrate an ability to use English language proficiently and correctly, both in speech and writing.
PSO-5	Compare the literary trends in literature produced in different contexts and age.
PSO-6	Locate and analyse the literary texts with appropriate theoretical framework.
PSO-7	Appreciate regional and world literatures in the light of different literary and cultural traditions.
PSO-8	Demonstrate the ability to interpret realities of life from literary perspective.
PSO-9	Exhibit skill and competency for conducting research in literature.

Postgraduate Attributes

- Disciplinary Knowledge
- Creative and Critical Thinking
- Reflective Thinking
- Problem Solving
- Analytical Reasoning
- Communication Skills
- Research Skills
- Life Skills
- Multicultural Competence
- Moral and Ethical Values
- Life-long Learning
- Global Competency

Structure of Programme

Semester-I						
Sr.	**Course Title**	**Course Code**	**L**	**T**	**P**	**Credits**
Core Courses						
1	Literary Criticism-I	SHSS ENG 01 01 C 01 3104	3	1	0	4
2	Major Trends and Movements in English Literature-I	SHSS ENG 01 01 C 02 3104	3	1	0	4
3	British Poetry-I	SHSS ENG 01 01 C 03 3104	3	1	0	4
4	British Novel-I	SHSS ENG 01 01 C 04 3104	3	1	0	4
5	British Drama-I	SHSS ENG 01 01 C 05 3104	3	1	0	4
Elective Courses						
1	Communication Skills in English **(Generic Elective)**	SHSS ENG 01 01 E 01 3104	3	1	0	4
2	Bhakti Literature	SHSS ENG 01 01 E 02 3104	3	1	0	4
3	American Literature	SHSS ENG 01 01 E 03 3104	3	1	0	4
4	English Language Teaching	SHSS ENG 01 01 E 04 3104	3	1	0	4
Semester-II						
Sr.	**Course Title**	**Course Code**	**L**	**T**	**P**	**Credits**
Core Courses						
1	Literary Theory and Criticism –I	SHSS ENG 01 02 C 06 3104	3	1	0	4
2	Major Trends and Movements in English Literature-II	SHSS ENG 01 02 C 07 3104	3	1	0	4
3	British Poetry-II	SHSS ENG 01 02 C 08 3104	3	1	0	4
4	British Novel-II	SHSS ENG 01 02 C 09 3104	3	1	0	4
5	British Drama-II	SHSS ENG 01 02 C 10 3104	3	1	0	4
Elective Courses						
1	Introduction to Translation: Theory and Practice **(Generic Elective)**	SHSS ENG 01 02 E 05 3104	3	1	0	4
2	Indian Classical Literature	SHSS ENG 01 02 E 06 3104	3	1	0	4
3	Dalit Literature and Aesthetics	SHSS ENG 01 02 E 07 3104	3	1	0	4
4	Canadian Literature	SHSS ENG 01 02 E 08 3104	3	1	0	4
Semester-III						
Sr.	**Course Title**	**Course Code**	**L**	**T**	**P**	**Credits**
Core Courses						
1	Literary Theory and Criticism –II	SHSS ENG 01 03 C 11 3104	3	1	0	4
2	Postcolonial Theory and Literature	SHSS ENG 01 03 C 12 3104	3	1	0	4
3	Indian Writings in English	SHSS ENG 01 03 C 13 3104	3	1	0	4
4	Introduction to Linguistics	SHSS ENG 01 03 C 14 3104	3	1	0	4

Elective Courses						
1	Creative Writing **(Generic Elective)**	SHSS ENG 01 03 E 09 3104	3	1	0	4
2	Contemporary South Asian Fiction in English	SHSS ENG 01 03 E 10 3104	3	1	0	4
3	Literature of Protest	SHSS ENG 01 03 E 11 3104	3	1	0	4
4	Gender and Literature	SHSS ENG 01 03 E 12 3104	3	1	0	4
5	Disability Studies and Literature	SHSS ENG 01 03 E 13 3104	3	1	0	4

Semester-IV

Sr.	Course Title	Course Code	L	T	P	Credits
Core Courses						
1	Literary Criticism in India	SHSS ENG 01 04 C 15 3104	3	1	0	4
2	Research Methodology	SHSS ENG 01 04 C 16 3104	3	1	0	4
3	Dissertation	SHSS ENG 01 04 C 17 012012	0	12	0	12
Elective Courses						
1	Modern Indian Literature in English Translation **(Generic Elective)**	SHSS ENG 01 04 E 14 3104	3	1	0	4
2	Modern World Literature	SHSS ENG 01 04 E 15 3104	3	1	0	4
3	Existentialism and Literature	SHSS ENG 01 04 E 16 3104	3	1	0	4
4	Literature and Human Rights	SHSS ENG 01 04 E 17 3104	3	1	0	4

Note:

i. Mobility of Credits earned by the students from GIAN (Global Initiative of Academic Networks) courses/ MOOCs (Massive Open Online Courses)/ SWAYAM (Study Webs of Active –Learning for Young Aspiring Minds)/ Swachh Bharat Internship Programme/ etc. shall be credited in accordance with the provisions made under the respective schemes, as amended from time to time; subject to compatibility of course content & assessment process with the prior approval of the Board of Studies/ School Board of the concerned department.

ii. The Department may not offer all the elective courses listed in the scheme as it will depend upon the availability of faculty and feasibility of the course.

iii. In addition to the electives marked as Generic Elective, the Department may offer any elective as a Generic Elective if there is a popular demand and a student of M.A. English may also opt for an elective marked as Generic Elective for broader choice.

Learning Outcome Index

I. Programme Outcomes and Programme Specific Outcomes

PO	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6	PSO-7	PSO-8	PSO-9
PO-1	√	-	√	√	√	√	√	√	√
PO-2	√	√	√	-	√	√	√	√	-
PO-3	√	√	√	-	√	√	√	√	√
PO-4	√	-	√	-	√	√	√	√	√
PO-5	√	√	√	-	√	√	√	√	√
PO-6	√	√	√	-	√	√	√	√	√
PO-7	√	√	√	√	√	√	√	√	√
PO-8	-	√	√	√	√	√	√	√	√
PO-9	√	-	√	√	-	√	√	√	√

II. Core Courses (CC):

PSO	CC-1	CC-2	CC-3	CC-4	CC-5	CC-6	CC-7	CC-8	CC-9	CC-10	CC-11	CC-12	CC-13	CC-14	CC-15	CC-16	CC-17
PSO-1	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
PSO-2	√	√	√	√	√	√	√	√	√	√	√	√	√	-	√	√	√
PSO-3	√	√	√	√	√	√	√	√	√	√	√	√	√	-	√	√	√
PSO-4	-	√	√	√	√	-	√	√	√	√	-	√	√	√	-	√	√
PSO-5	√	√	√	√	√	√	√	√	√	√	√	√	√	-	√	√	√
PSO-6	√	√	√	√	√	√	√	√	√	√	√	√	√	-	√	√	√
PSO-7	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
PSO-8	√	√	√	√	√	√	√	√	√	√	√	√	√	-	√	√	√
PSO-9	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√

III. Elective Courses (EC):

PSO	EC-1	EC-2	EC-3	EC-4	EC-5	EC-6	EC-7	EC-8	EC-9	EC-10	EC-11	EC-12	EC-13	EC-14	EC-15	EC-16	EC-17
PSO-1	-	-	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
PSO-2	-	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
PSO-3	-	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
PSO-4	√	-	√	√	√	√	√	√	√	√	√	-	√	√	-	-	√
PSO-5	-	√	√	-	√	√	√	√	√	√	√	√	√	√	√	√	√
PSO-6	-	√	√	-	-	√	√	√	√	√	√	√	√	√	√	√	√
PSO-7	-	√	√	-	√	√	√	√	√	√	√	√	√	√	√	√	√
PSO-8	-	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
PSO-9	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√

Syllabus

SEMESTER-I

Course Title: Literary Criticism-I

Course Code: SHSS ENG 01 01 C 01 3104

Course Objective: To provide a critical understanding of the developments in literary criticism from Greek era to beginnings of 20th century. Moreover, some selected texts/critics are prescribed for detailed study whose contribution to this area constitutes a significant benchmark in each era.

Course Level Learning Outcomes:

Some of the learning outcomes that the students of this course are expected to demonstrate are listed as follows:

1. Develop a historical understating of how literary criticism has evolved over the years.
2. Detail study of some of the canonical texts written by established names in the field of literary criticism.
3. Explain the meaning, nature and definition of important critical traditions of the period.
4. Trace the evolution of Classical, Neo-Classical, Romantic and Modern Literary Criticism along with their socio-historical and political background.
5. Provide a conceptual framework for developing an understanding of the function and practice of traditional modes of literary criticism.

Course Content:

Unit - I

Aristotle: *Poetics* (Chapters i-xvi, xxvi), translation by S.H. Butcher

Unit - II

Philip Sidney: *The Defence of Poesy*

Unit -III

William Wordsworth: *Preface to Lyrical Ballads* (1802 edition)

Unit - IV

Matthew Arnold: “The Function of Criticism at the Present Time”

T. S. Eliot: “Tradition and the Individual Talent”

Suggested Readings:

Abrams, M.H. and Geoffrey Galt Harpham. *A Glossary of Literary Terms* (11th Edition). Cengage Learning, 2015.

Arnold, Matthew. *Essays in Criticism*. New York: MacMillan and company, 1865.

Blamire, Harry. *A History of Literary Criticism.* Macmillan, 2001.

Daiches, David. *Critical Approaches to Literature*, 2nd ed. Orient Longman, 1970.

Lodge, David ed. *20th Century Literary Criticism: A Reader*. Longman, 1989.

---. *Criticism and Theory: A Reader*. Pearson Education, Ist Indian Rpt., 2003.

Habib, M. A. R. *A History of Literary Criticism: From Plato to the Present.* Blackwell, 2005.

Lucas, F. L. *Tragedy in Relation to Aristotle's Poetics.* Allied Publishers, 1970.

Nagarajan, M.S. *English Literary Criticism & Theory: An Introductory History.* Orient Longman, 2006.

Waugh, Patricia. *Literary Theory & Criticism: An Oxford Guide.* OUP, 2006.

Wellek, Rene. *A History of Modern Criticism: 1750-1950,* Vols. I-IV. Yale University Press, 1958.

Course Title: Major Trends and Movements in English Literature-I

Course Code: SHSS ENG 01 01 C 02 3104

Course Objective: To study important socio-political, cultural and literary developments to develop a chronological understanding of the major trends and movements of English Literature from Anglo-Saxon to Neo-classical Age.

Course Level Learning Outcomes:

Some of the learning outcomes that the students of this course are expected to demonstrate are listed as follows:

1. Develop a historical understating of English language and literature from Anglo-Saxon period to Neo-classical Age.
2. Trace the evolution of literary writings, their contexts, genres and prominent themes during the period under study.
3. Explain the meaning, nature and definition of popular literary genres of the period.
4. Elaborate, analyse and appreciate the literary beauty of important literary texts of the period.

Course Content:

Unit-I: Anglo-Saxon Period to Age of Chaucer

Evolution of English Language and Literature

First known Generation of Poets and their Poetry

Literature of the Anglo-Norman Period

Chaucer and his Contemporaries

Important Writers and Major Literary texts

Unit-II: Renaissance and Elizabethan Period

Renaissance and Reformation

Evolution of Drama

University Wits

Shakespeare and His Works

Edmund Spenser, Philip Sydney, Ben Jonson and other Important Writers

Unit-III: Jacobean and Puritan Age

Jacobean Drama

Metaphysical Poets

Cavalier and Caroline Poets

Francis Bacon and other Prose Writers

Puritan Movement and Poets

Unit-IV: Restoration and Neo-classical Age

Restoration Age and Literature

Comedy of Manners and Comedy of Morals

Neo-Classical Age and Literature

Periodical Essays and Essayists

Rise of Novel and Important Novelists

Suggested Readings:

Abrams, M.H. and Geoffrey Galt Harpham.*A Glossary of Literary Terms* (9th Edition). Cengage Learning, 2008.

Dahiya, Bhim S. *A New History of English Literature*. New Delhi: Doaba Publications, 2006.

Daiches, David. *A Critical History of English Literature*. Vol. I-IV. New Delhi: Allied Publishers, 2005.

Ford, Boris. Ed. *The New Pelican Guide to English Literature, Vol. 1-7*. Penguin Books, 1991.

Hudson, William Henry. *An Outline History of English Literature*. New Delhi: Atlantic Publishers.

Long, William J. *English Literature: Its History and Significance*. New Delhi: Kalyani Publishers, 2009.

Richetti, John. Ed. *The Cambridge History of English Literature*.Cambridge University Press, 2005.

Course Title: British Poetry-I

Course Code: SHSS ENG 01 01 C 03 3104

Course Objective: To generate an understanding of poetry as a genre and language form by reading and analyzing poetical works from Anglo-Saxon to Neo-Classical period.

Course Level Learning Outcomes: Some of the learning outcomes of this course are listed as follows:

1. Students will develop the understanding of British/ English Literary culture.
2. They will appreciate and analyze the texts in the larger socio-political and religious contexts of the time.
3. Students will be in position to extend the knowledge of life in literature and lived situations.
4. Students will extend their knowledge of different forms of Poetry through reading of different poetical texts.

Course Content:

Unit-I

Geoffrey Chaucer's 'The Prologue' to *The Canterbury Tales*

Unit-II

(i) John Donne: "A Valediction: Forbidding Mourning" and Holy Sonnet XIV: "Batter My Heart, Three-Person'd God"

(ii) Andrew Marvel: "To His Coy Mistress"

Unit-III

John Milton: *The Paradise Lost (*Book-I)

Unit-IV

Alexander Pope: *The Rape of the Lock*

Suggested Readings:

Abrams, M.H., and Geoffrey Galt Harpham. *A Glossary of Literary Terms*.10th ed., Cengage, 2012.

Bennett, Joan. *Five Metaphysical Poets*. Cambridge University Press, 1964.

Bowden, Muriel A. *A Reader's Guide to Geoffrey Chaucer*. Thames & Hudson, 1964.

Brewer, Derek S. *New Readings of Chaucer's Poetry (Chaucer Studies)*.Edited by Robert G. Benson and Susan J. Ridyard, D.S. Brewer, 2003.

David Aers. *Chaucer (New Readings*). The Harvester Press, 1986.

Donaldson, E Talbot, ed. *Chaucer's Poetry: An Anthology for the Modern Reader*. 2nd ed., Pearson, 1998.

Fuller, John, editor. *Alexander Pope (Poet to Poet)*. Faber & Faber, 2008.

Gardner, Helen. ed. *John Donne: A Collection of Critical Essays (Twentieth Century Views Series).* Prentice Hall India Ltd., 1979.

Grosart, Alexander B. *The Complete Poems of Andrew Marvell*. Digireads, 2014.

Milton, John. *John Milton (Oxford Poetry Library)*. Edited by Stephen Orgel and Jonathan Goldberg, Oxford Paperback, 1994.

Ricks, Christopher, and Ilona Bell, eds. *John Donne: Collected Poetry*. Revised ed., Penguin Classics, 2012.

Course Title: British Novel-I
Course Code: SHSS ENG 01 01 C 04 3104

Course Objective: The primary objective of the course is to introduce the students with novel as a literary genre and provide an in-depth understanding of 18th and 19th century British novel by familiarizing them with the celebrated novelists and their works.

Course Level Learning Outcomes:

Some of the learning outcomes that the students of this course are expected to demonstrate are listed here.

1. Ability to trace the socio-historical reasons for the origin and development of novel as a genre.
2. Skill in critical analysis of the given novels focusing on their structural and thematic aspects.
3. Understanding of the stylistic and thematic experiments carried out in the prescribed novels.
4. Appreciation of novel as a vehicle for social change.
5. Ability to do textual analysis of the texts.

Course Content:

Unit-I

Daniel Defoe – *Moll Flanders*

Unit-II

Emily Bronte – *Wuthering Heights*

Unit-III

Charles Dickens – *A Tale of Two Cities*

Unit-IV

Thomas Hardy – *Jude the Obscure*

Suggested Readings:

Allen, Walter. *The English Novel: A Short Critical History*. Books Way, 2015.

Bakhtin, Mikhail. *The Dialogic Imagination*. U of Texas P, 1982.

Booth, Wayne C. *The Rhetoric of Fiction*. 2nd ed., U of Chicago P, 1983.

Boulton, Marjorie. *The Anatomy of the Novel*. Routledge, 1975.

Chesterton, G.K. *Charles Dickens*. House of Stratus, 2001.

Chitham, Edward. *The Birth of Wuthering Heights: Emily Bronte at Work*. Macmillan, 2001.

Collins, Philip. *Charles Dickens: The Critical Heritage*. Routledge, 2005.

Eagleton, Terry. *The English Novel:An Introduction*. Wiley-Blackwell, 2013.

Forster, E.M. *Aspects of the Novel*.Penguin, 1927.

Gardner, John. *The Art of Fiction*. Alfred A. Knopf, 1984.

Harvey, Geoffrey. *The Complete Critical Guide to Thomas Hardy*. Routledge, 2003.

Kettle, Arnold.*An Introduction to the English Novel Vol. I*. Hutchinson, 1974.

Lubbock, Percy. *The Craft of Fiction*. Create Space, 2010.

Lukacs, Georg. *The Theory of Novel*. Merlin Press, 1971.

Milligan, Ian. *The Novel in English: An Introduction*. Macmillan Education UK, 1983.

Seager, Nicholas. *The Rise of Novel*. Macmillan, 2012.

Course Title: British Drama -I
Course Code: SHSS ENG 01 01 C 05 3104

Course Statement: Drama combines the literary arts of storytelling and poetry with the world of live performance. As a form of ritual as well as entertainment, it has served to unite communities and challenge social norms by vitalizing its audiences. In order to understand this rich art form more fully, a sampling of plays, which exemplify different kinds of dramatic structure, will be examined. Students will be encouraged to read widely for enrichment and enjoyment.

Objective(s): This course aims to—

- Introduce students to the tradition of British Drama from fourteenth to nineteenth century;
- Explore the key writers and texts within their historical and intellectual contexts;
- Offer a perspective on the history of British Drama.

Course Level Learning Outcomes

Some of the learning outcomes that the students of this course are expected to demonstrate, are listed as follows:

1. Understand the tradition of British Drama from 14th to 19th centuries.
2. Develop a clear understanding of the texts suggested
3. Engage with the major genres and forms of drama and develop fundamental skills required for close reading and critical thinking of the texts and concepts
4. Appreciate and analyze the plays in the larger socio-political and religious contexts of the time.

Course Content:

Unit-I

Christopher Marlowe: *Doctor Faustus*

Unit-II

William Shakespeare: *Othello*

Unit-III

R.B. Sheridan: *The School for Scandal*

Unit-IV

William Congreve: *The Way of the World*

Suggested Readings:

Abrams, M.H. and Geoffrey Galt Harpham. *A Glossary of Literary Terms* (11th Edition). Cengage Learning, 2015.

Anderson, Michael. *Anger and Detachment: A Study of Arden, Osborne and Pinter*. London: Pitman, 1976.

Baldick, Chris. *The Oxford Dictionary of Literary Terms*. USA: OUP, 2009 (3ed.).

Bentley, Eric. *Bernard Shaw*. London: Limelight Editions, 1985.

Bradley, A.C. *Shakespearean Tragedy: Lectures on Hamlet, Othello, King Lear, Macbeth*. New Delhi: Dodo Press, 2009.

Brooks, Cleanth, and Robert B. Heilman. *Understanding Drama: Twelve Plays*. Holt, Rinehart and Winston, 1948.

Chandler, Frank Wadleigh. *Aspects of Modern Drama*. New York: Macmillan, 1914.

Harbage, Alfred. *Shakespeare: The Tragedies (A Collection of Critical Essays)*. New Delhi: Pearson, 2005.

Hayman, Ronald. *John Osborne (Contemporary Playwrights Series)*. London: Heinemann Educational, 1970.

Innes, Christopher, ed. *Cambridge Companion to George Bernard Shaw*. Cambridge: Cambridge University Press, 2006.

Loftis, J. *Comedy and Society from Congreve to Fielding*. Stanford: Calif, 1959.

Loomba, Ania. *Post-colonial Shakespeare*. London: Routledge, 1998.

Course Title: Communication Skills in English
Course Code: SHSS ENG 01 01 E 01 3104

Course Statement:
The aim of this course is to help students become familiar with nuances of grammar and build confidence in them that grammar is 'learnable'. The course also helps the learners become aware of language, its dependence on grammar and the variety it exhibits.

Objective(s): This course aims to

- Develop the basic understanding of grammar and communication skills among the students;
- Enhance the listening, speaking, reading and writing skills of the students.

Course Level Learning Outcomes: Some of the learning outcomes that the students of this course are expected to demonstrate are listed as follows:

1. Identify deviant use of English both in written and spoken forms;
2. Recognize the errors of usage and correct them;
3. Understand and appreciate English spoken by people from different regions;
4. Use language for speaking with confidence in an intelligible and acceptable manner;
5. Understand the importance of basic communication skills for life.

Course Content:

Unit-I: Phonetics
The Organs of Speech
Phonetic Symbols
Speech Sounds – Vowels and Consonants

Unit-II: **Functional Grammar**
Articles, Parts of Speech, Question Tags, Tenses, Preposition, Common Errors and Usage

Unit-III: Conversational English
Language and Society, Styles and Registers
Situational Communication

Unit-IV: Presentation Skills
Presentation Skills, Interviews, Public Speaking, Preparing the Speech, Organising the Speech, Special Occasion Speeches.

Suggested Readings:

Adair, John. *Effective Communication*. London: Pan Macmillan Ltd., 2003.

Ajmani, J. C. *Good English: Getting it Right*. New Delhi: Rupa Publications, 2012.

Amos, Julie-Ann. *Handling Tough Job Interviews*. Mumbai: Jaico Publishing, 2004.

Bonet, Diana. *The Business of Listening*. Third Edition. New Delhi: Viva Books, 2004.

Bovee, Courtland L, John V. Thill & Barbara E. Schatzman. *Business Communication Today*. Tenth Edition. New Jersey: Prentice Hall, 2010.

Brown, Michele & Gyles Brandreth. *How to Interview and be Interviewed*. London: Sheldon Press, 1994.

Carnegie, Dale. *The Quick and Easy Way to Effective Speaking*. New York: Pocket Books, 1977.

Collins, Patrick. *Speak with Power and Confidence*. New York: Sterling, 2009.

Fitikides, T. J. *Common Mistakes in English*. London: Orient Longman, 1984.

Guffey, Mary Ellen. *Essentials of Business Writing*. Ohio: South Western College Pubg., 2000.

Hall, Edward, T. *The Silent Language*. Greenwich, Conn, Fawcett, 1959.

---. *Beyond Culture*. Garden City, N.Y.: Doubleday, 1976.

Hasson, Gill. *Brilliant Communication Skills*. Great Britain: Pearson Education, 2012.

Hughes, Shirley. *Professional Presentations: A Practical Guide to the Preparation and Performance of Successful Business Presentations*. Sydney: McGraw-Hill, 1990.

Kalish, Karen.*How to Give a Terrific Presentation*. New York: AMACOM, 1996.

Kratz, Abby Robinson. *Effective Listening Skills*. Toronto: ON: Irwin Professional Publishing, 1995.

Kroehnert, Gary. *Basic Presentation Skills*. Sidney: McGraw Hill, 2010.

Lesikar, Raymond V and Marie E. Flatley. *Basic Business Communication: Skills for Empowering the Internet Generation*. Ninth Edition. New Delhi: Tata McGraw-Hill, 2002.

Lesikar, Raymond V., & John D. Pettit, Jr. *Report Writing for Business*. Tenth Edition. Delhi: McGraw-Hill, 1998.

Morgan, Dana. *10 Minute Guide to Job Interviews*. New York: Macmillan, 1998.

Prasad, H. M. *How to Prepare for Group Discussion and Interview*. New Delhi: Tata McGraw-Hill Publishing Company Limited, 2001.

Pease, Allan. *Body Language*. Delhi: Sudha Publications, 1998.

Raman, Meenakshi&Sangeeta Sharma.*Technical Communication: Principles and Practice*. Second Edition. New Delhi: Oxford University Press, 2011.

Rogers, Natalie. *How to Speak Without Fear*. London: Ward Lock, 1982.

Rutherford, Andrea J. *Basic Communication Skills for Technology*. Second Edition. Delhi: Pearson Education, 2007.

Seely, John. *Writing Reports*. New York: Oxford University Press, 2002.

Sharma, R. C. & Krishna Mohan. *Business Correspondence and Report Writing*. Third Edition. New Delhi: Tata McGraw-Hill Publishing Company Limited, 2007.

Thill, John V. & Courtland L. Bovée. *Excellence in Business Communication*.10th edition. Boston: Pearson, 2013.

Thorpe, Edgar &Showick Thorpe. *Winning at Interviews*.2nd Edition. Delhi: Dorling Kindersley, 2006.

Turton, N. D. & J. B. Heaton. *Longman Dictionary of Common Errors*. Essex: Longman, 1987. First Indian Edn. 1998.

Course Title: Bhakti Literature

Course Code: SHSS ENG 01 01 E 02 3104

Objective: To introduce students to rich and diverse Bhakti literature of India.

Course Learning Outcomes: Some of the learning outcomes of this course are listed as follows:

1. The students will develop the understanding for Indian aesthetics and devotional poetry.
2. The students will appreciate and analyze the texts of poems in relation to Bhakti traditions.
3. The student will be able to develop interest in Indian history and beliefs by revisiting historical poems.
4. The students will be able to focus on Indian art and culture through poetic texts.

Prescribed Texts:

Unit-A: Bhakti Movement and its Traditions

Unit-B: **South**- Nakkirar (4-7), Antal (9-17), Basavanna (37-42), Mahadeviyakka (42-50) from *The Oxford Anthology of Bhakti Literature*, ed. Andrew Schelling, OUP, 2011.

Unit –C: West and North- Tukaram (90-103), Lal Dad (103-16), Kabir (106-115), Mirabai (137-149) from *The Oxford Anthology of Bhakti Literature*, ed. Andrew Schelling, OUP, 2011.

Unit-D: East- Jayadev (161-171), Ramprasad Sen (216-227) from *The Oxford Anthology of Bhakti Literature*, ed. Andrew Schelling, OUP, 2011.

Suggested Readings:

Chitre, Dilip. *Tukaram*. Penguin books, 1990.

Dharwadker, Vinay. *Kabir: The Weaver's Songs*. Penguin Random House, 2003.

Easwaran, Eknath. *Love is God: Nurturing Devotion for God Everyday*. Jaico, 2003.

Hawley, S. John. *Three Bhakti Voices*. OUP, 2005.

Schelling, Andrew. Ed. *An Oxford Anthology of Bhakti Literature*. OUP, 2011.

Subramaniam, Arundhati. *Eating God: A Book of Bhakti Poetry*. Penguin, 2014.

Hawley, John. *Three Bhakti Voices -Mirabai, Surdas, and Kabir in Their Time and Ours*. OUP, 2005

Course Title: American Literature

Course Code: SHSS ENG 01 01 E 03 3104

Course Objectives: To introduce American literature as a distinct branch of English literature through critical study of thematic and stylistic aspects of prescribed texts.

Course Level Learning Outcomes: Some of the learning outcomes of this course are listed as follows:

1. The students will develop the understanding of American literary culture.
2. The students will be able to demonstrate an understanding of different genres of literature in America through reading of different texts.
3. The students will appreciate and analyze the texts in the larger socio-political and cultural context of the time.

Course Content

Unit-I: Essays

(i) Ralph Waldo Emerson: "The American Scholar"

(ii) Henry David Thoreau: "Civil Disobedience"

Unit-II: Poetry

(i) Walt Whitman "There was a Child Went Forth", "When Lilacs Last in the Dooryard Bloom'd"

(ii) Emily Dickinson: "Success is Counted Sweetest", "Because I could not stop for Death"

(iii) Robert Frost: "Mending Wall", "The Road Not Taken"

Unit-III: **Drama**

Arthur Miller: *Death of a Salesman*

Unit-IV: **Fiction**

Toni Morrison: *Beloved*

Suggested Readings:

Bennett, Michael Y. *The Cambridge Introduction to Theatre and Literature of the Absurd*. Cambridge University Press, 2015.

Bloom, Harold. *Ernest Hemingway's "The Old Man and the Sea" (Bloom's Notes).*Chelsea House Publishers, 1999.

Dickinson, Emily. *100 Selected Poems*. Collectable Hardbound ed. Fingerprint Publishing, 2019.

Emerson, R.W. *Ralph Waldo Emerson: A Collection of Critical Essays*. Ed. Lawrence Buell. Pearson Publication, 1992.

Esslin, Martin. *An Anatomy of Drama*. Hill and Wang, 1977.

Fisher, William J. *The American Literature of the Nineteenth Century: An Anthology.* Eurasia Publishing House Pvt Ltd, 1970.

Ford, Boris. *The New Pelican Guide to English Literature: 9. American Literature*. Penguin Books, 1988.

Frost, Robert. *The Collected Poems*. Vintage classics publication, 2013.

Jacob, J. *History of American Literature.* Sublime Publishers, 2005.

Roudané, Matthew. *Edward Albee: A Critical Introduction*. Cambridge University Press, 2017.

Schneider, Dorothy Schneidercarl J. *An Eyewitness History of Slavery in America.* Checkmark, 2000.

Thoreau, Henry David. *Civil Disobedience and Other Essays.* Digireads.com publication, 2005.

Whitman, Walt. *Leaves of Grass and Selected Poems and Prose*. Edited by Peter M. Coviello, Penguin Books, 2014.

Course Title: English Language Teaching

Course Code: SHSS ENG 01 01 E 04 3104

Objective: The primary objective of the course is to provide the students with relevant knowledge of and training in methods and skills of English language teaching.

Course Level Learning Outcomes:

Some of the learning outcomes that the students of this course are expected to demonstrate, are listed here:

1. Knowledge of various approaches and techniques of language teaching.
2. Skills of listening, reading, speaking, and writing language.
3. Skills in developing lesson plans.
4. Understanding of various ways of language testing and evaluation.

Course Content:

Unit-I Language Teaching Methodology

a) English Language Teaching—Present Scenario
b) Traditional and Modern Approaches to ELT
c) Methods and Techniques
d) Innovative Strategies for Enhanced Outcomes
e) Teaching Language through Literature

Unit-II Teaching Language Systems

a) Teaching Pronunciation
b) Teaching Vocabulary
c) Teaching Grammar
d) Teaching Usage

Unit-III Teaching Language Skills: Receptive Skills and Productive Skills

a) Listening Skills
b) Speaking Skills
c) Reading Skills
d) Writing Skills

Unit-IV Planning Lessons, Testing and Evaluation

a) Principles of Lesson Planning
b) Summative and Formative Assessment
c) Qualities of a Good Test
d) Types of Tests and Test-Items
e) Writing and Marking Test

Suggested Readings:

Burgess, Fally, and Katie Head. *How to Teach for Exams*. Pearson, 2005.

Dudeney, Gavin, and Nicky Hockly. *How to Teach English with Technology.* Pearson, 2007.

Harmer, Jeremy. *The Practice of English Language Teaching*. Pearson, 5th ed., 2015.

---. *How to Teach Writing*. Pearson, 2004.

---. *How to Teach English.* Pearson, 2007.

Hughes, A. *Testing for Language Teachers*. Cambridge UP, 2002.

Kelly, Gerald. *How to Teach Pronunciation*. Pearson, 2000.

Larsen-Freeman, Diane and Marti Anderson. *Techniques and Principles in Language Teaching.* 3rd ed., Oxford UP, 2012.

McNamara, T. *Language Testing*. Oxford UP, 2000.

Richards, Jack C., and Theodore Rogers. Approaches and Methods in Language Teaching. 3rd ed., Cambridge UP, 2014.

Richards, Jack C., and Theodore S. Rodgers. *Approaches and Methods in Language Teaching.* Cambridge University Press, 3rd ed., 2014.

Stern, H. H. *Fundamental Concepts of Language Teaching*. Oxford UP, 1983.

Thornbury, Scoott. *How to Teach Speaking.* Pearson, 2005.

Wilson, J. J. *How to Teach Listening.* Pearson, 2008.

Woodward, Tessa. *Planning Lessons and Courses*. Cambridge UP, 2001.

---. *How to Teach Grammar*. Pearson, 1999.

---. *How to Teach Vocabulary*. Pearson, 2002.

SEMESTER-II

Course Title: Literary Theory and Criticism –I
Course Code: SHSS ENG 01 02 C 06 3104

Objective: The course intends to provide a textual, historical and critical study of the developments in literary criticism from the beginning of 20th century to the present times. The course undertakes to offer a survey of all the major developments in literary criticism from the beginning of 20th century up to the present times.

Course Level Learning Outcomes:

Some of the learning outcomes that the students of this course are expected to demonstrate are listed below.

1. Historical understating of how literary criticism and theory has evolved over these years.
2. Knowledge of some of the canonical texts written by established theorists in the field of literary theory and criticism.
3. Ability to explain the meaning, nature and definition of important critical traditions of the period.
4. Ability to trace and establish relationship between the evolution of critical theory and its socio-historical and political background.
5. Skill in using literary criticism and theory in practice to analyse and interpret literature and culture.

Course Content:

Unit-I Russian Formalism and New Criticism

a) Viktor Shklovsky – "Art as Technique"
b) Cleanth Brooks – "Irony as a Principle of Structure"

Unit-II Psychoanalytical Criticism

a) Sigmund Freud – "Creative Writers and Day-dreaming"
b) Jacques Lacan – "The Symbolic Order"

Unit-III Feminist Criticism

a) Simone de Beauvoir – "Myth and Reality"
b) Elaine Showalter – "Feminist Literary Criticism in the Wilderness"

Unit-IV Sociological/Marxist Criticism

a. Raymond Williams – "Base and Superstructure in Marxist Cultural Theory"
b. Louis Althusser – "Ideology and Ideological State Apparatuses"

Suggested Readings

Barry, Peter. Beginning Theory: An Introduction to Literary & Cultural Theories, 2nd ed., Manchester University Press, 2004.

Bertens, Hans. Literary Theory: The Basics. Routledge, 2003.

Blamires, Harry. A History of Literary Criticism. Macmillan, 2001.

David Lodge (ed.), Modern Criticism and Theory: A Reader. Longman, 1988.

Eagleton, Terry. Marxism and Literary Criticism. University of California Press, 1976.

Freud, Sigmund. Trans. Alix Strachey. "The 'Uncanny." The Norton Anthology of Theory and Criticism. Ed. Vincent B. Leitch. W.W. Norton & Company, 2001.

Habib, M.A.R. A History of Literary Criticism: From Plato to the Present. Blackwell, 2005.

Ransom, John Crowe. The New Criticism. New Directions, 1941.

Richards, I. A. Practical Criticism. Routledge & Paul, 1964.

Robey, David and Ann Jefferson, Modern Literary Theory. Batsford, 1986.

Waugh, Patricia. Literary Theory & Criticism: An Oxford Guide. Oxford University Press, 2006.

Wimsatt and Brooks. Literary Criticism: A Short History. Oxford & IBH Pub. Co., 1974.

Course Title: Major Trends and Movements in English Literature-II

Course Code: SHSS ENG 01 02 C 07 3104

Objective(s):

To study important socio-political, cultural and literary developments to develop a chronological understanding of the major trends and movements of English Literature from Romantic Age to Twentieth Century.

Course Level Learning Outcomes:

Some of the learning outcomes that the students of this course are expected to demonstrate are listed below.

1. Historical understating of English literature from Romantic Age to Twentieth Century.
2. Knowledge of the development of literary writings, their contexts, genres and prominent themes during the period under study.
3. Ability to explain the meaning, nature and definition of popular literary trends of the period.
4. Skill in analyzing and appreciating the important literary texts of the period.

Course Content:

Unit-I: Romantic Period

a) Romanticism— Origin and Development of the Literary Movement
b) Socio-political and Cultural Context
c) Poets and Poetry of the Period
d) Novelists and Novels of the Period
e) Important Literary Trends and Texts

Unit-II: Victorian Age

a) Socio-Political and Cultural Background
b) Victorian Compromise
c) Major Victorian Poets—Early and Later Victorian Poets
d) Major Victorian Novelists
e) Important Literary Trends and Texts

Unit-III: Modern English Literature

a) Socio-Political, Aesthetic and Cultural Background
b) Major Modern Poets
c) Playwrights and Novelists
d) Modernist Criticism
e) Important Literary Trends and Texts

Unit-IV: Postcolonial Literature

a) Postcolonialism— Socio-Political, Cultural and Literary Background
b) Major Postcolonial writers and Theorists
c) Important Postcolonial Literatures
d) Key Concepts on Postcolonialism
e) Literary Trends and Texts

Suggested Readings:

Abrams, M.H. and Geoffrey Galt Harpham. *A Glossary of Literary Terms* (9th Edition). Cengage Learning, 2008.

Ashcroft, Bill et al. *Post-Colonial Studies: The Key Concepts*. Routledge, 2013.

Dahiya, Bhim S. *A New History of English Literature*. New Delhi: Doaba Publications, 2006.

Daiches, David. *A Critical History of English Literature*. Vol. I-IV. New Delhi: Allied Publishers, 2005.

Ford, Boris. Ed. *The New Pelican Guide to English Literature, Vol. 1-7*. Penguin Books, 1991.

Gandhi, Leela. *Postcolonial Theory: A Critical Introduction*. Routledge, 2020.

Hudson, William Henry. *An Outline History of English Literature*. New Delhi: Atlantic Publishers.

Long, William J. *English Literature: Its History and Significance*. New Delhi: Kalyani Publishers, 2009.

Richetti, John. Ed. *The Cambridge History of English Literature*. Cambridge University Press, 2005.

Course Title: British Poetry-II

Course Code: SHSS ENG 01 02 C 08 3104

Objective: This course intends to generate in the students an understanding of poetry as a genre and introduce them to the major English poets and poetry from Romantic Age to Modern Age (19^{th} to 20^{th} Century).

Course Level Learning Outcomes: Some of the learning outcomes that the students of this course are expected to demonstrate are listed below.

1. Understanding of the socio-political, religious and historical background of 19^{th} and 20^{th} century English poetry.
2. Knowledge of the major trends and features of romantic and modern poetry.
3. Ability to critically analyse and appreciate poetry.

Course Content:

Unit-I

a) William Wordsworth – "Ode: Intimations of Immortality from Recollections of Early Childhood" and "Tintern Abbey"
b) John Keats – "Ode to Nightingale" and "Ode on a Grecian Urn"

Unit-II

a) Lord Alfred Tennyson – "Ulysses"
b) Matthew Arnold – "Dover Beach"
c) Robert Browning – "The Last Ride Together", "My Last Duchess"
d) Elizabeth Barrett Browning: "How do I love thee?"(Sonnet 43)

Unit-III

a) W.B. Yeats – "The Second Coming" and "Sailing to Byzantium"
b) T. S. Eliot – "The Love Song of J. Alfred Prufrock" and "The Hollow Men"

Unit-IV

a) Philip Larkin – "Toads Revisited"
b) Seamus Heaney – "Digging"
c) Dylan Thomas – "Do not Go Gently into the Goodnight"
d) Ted Hughes: "The Jaguar" and "Hawk Roosting"

Suggested Readings

Abrams, M.H., and Geoffrey Galt Harpham. *A Glossary of Literary Terms*. 10th ed., Cengage, 2012.

Bate, Walter Jackson. *John Keats*. OUP, 1996.

Brooks, Cleanth. *The Well Wrought Urn: Studies in the Structure of Poetry*. Dobson Books Ltd., 1960.

Brooks, Cleanth, and Robert Penn Warren. *Understanding Poetry: An Anthology for College Students*. Henry Holt Company, 1939.

Browning, Elizabeth Barrett. *Sonnets from the Portuguese.* Random House Value Publishing, 1997.

Browning, Robert. *Men and Women and Other Poems.* Macmillan Publication, 2010.

Fraser, G.S. ed., *Keats: The Odes*. Macmillan, 1971.

Gifford, Terry. *The Cambridge Companion to Ted Hughes*. Cambridge University Press, 2011.

Heaney, Seamus. *Death of a Naturalist*. Faber & Faber, 2006.

Jeflares, A. Norman. *A Commentary on the Collected Poems of W.B. Yeats*. Stanford University Press, 1968.

Larkin, Philip. *The Complete Poems.* Edited by Archie Burnett. Farrar, Straus and Giroux, 2013.

Maxwell, D.E.S. *The Poetry of T.S. Eliot*. Routledge and Keagon Paul, 1960.

Pritchard, William H. *W.B. Yeats: A Critical Anthology*. Penguin, 1972.

Ricks, Christopher. *Selected Poems: Tennyson*. Penguin Classics, 2007

Thomas, Dylan. *In Country Sleep and Other Poems*. New Directions Publications, 1952.

Vendler, Helen. *The Odes of John Keats*. Harvard UP, 2003.

Wordsworth, William. *William Wordsworth: Selected Poems.* Penguin Classics, 2004.

Course Title: British Novel-II

Course Code: SHSS ENG 01 02 C 09 3104

Objective: The primary objective of the course is to introduce the students with major 20th century British novelists and their works.

Course Level Learning Outcomes:

Some of the learning outcomes that the students of this course are expected to demonstrate are listed here:

1. Understanding of the socio-historical environment of the 20th century and its impact on the development of novel.
2. Exhibition of knowledge of various trends and characteristics of modern British novel.
3. Ability to compare and contrast the thematic and technical experiments carried out by modern novelists.
4. Skill in textual analysis of the texts.
5. Appreciation of novel as a vehicle for social and cultural change.

Course Content:

Unit-I

D. H. Lawrence – *Sons and Lovers*

Unit-II

Virginia Woolf – *Mrs Dalloway*

Unit-III

Anthony Burgess – *A Clockwork Orange*

Unit–IV

John Fowles – *The French Lieutenant's Woman*

Suggested Readings:

Acheson, James. *John Fowles*. Macmillan, 1998.

Biswell, Andrew. *The Real Life of Anthony Burgess*. Picador, 2005.

Bradbury, Malcolm. *The Modern British Novel*. Penguin, 1993.

Clarke, Jim. *The Aesthetics of Anthony Burgess*. Palgrave Macmillan, 2017.

Draper, R. P. *D. H. Lawrence.* Routledge, 1997.

Goldman, Jane. *The Cambridge Introduction to Virginia Woolf*. Cambridge University Press, 2006.

Humphrey, Robert. *Stream of Consciousness in Modern Novel*. University of California, 1954.

Boulton, James T. Ed. *D. H. Lawrence: Late Essays and Articles.* Cambridge University Press, 2004.

Lawrence, D. H., and Bruce Steele. *Psychoanalysis and the Unconscious and Fantasia of the Unconscious.* Cambridge University Press, 2004.

MacKay, Marina, and Lyndsey Stonebridge. *British Fiction after Modernism: The Novel at Mid-Century* by. Palgrave Macmillan, 2007.

Norris, Nanette. *Modernist Myth: Studies in H.D., D.H. Lawrence, and Virginia Woolf*. Dreamridge Publishing, 2010.

Page, Norman. *Muriel Spark*. Macmillan, 1990.

Woolf, Virginia. *The Collected Essays of Virginia Woolf*. Ingram Short Title, 2011.

---. *A Room of One's Own and Three Guineas.* Oxford University Press, 2014.

Parsons, Deborah. *Theorists of Modern Novel: James Joyce, Dorothy Richardson, Virginia Woolf.* Routledge, 2006.

Course Title: British Drama- II
Course Code: SHSS ENG 01 02 C 10 3104

Objective: This course aims to introduce students to modern and post-modern British drama, its historical and intellectual contexts, and major modern and post-modern dramatists.

Course Level Learning Outcomes:
Some of the learning outcomes that the students of this course are expected to demonstrate are listed here:

1. Understanding of major trends and developments in British Drama from 20th century to till date.
2. Knowledge of the major genres and forms of drama and fundamental skills in closely reading and appreciating drama.
3. Ability to appreciate and analyze the plays in the larger socio-political and religious contexts.
4. Skill in dialogue delivery and dramatic performance.

Course Content:

Unit-I

George Bernard Shaw: *Candida*

Unit-II

T.S. Eliot – *Murder in the Cathedral*

Unit-III

John Osborne – *Look Back in Anger*

Unit-IV

Samuel Beckett – *Waiting for Godot*

Suggested Readings:

Abrams, M.H. and Geoffrey Galt Harpham. *A Glossary of Literary Terms* (11th Edition). Cengage Learning, 2015.

Bachner, Saskia. *The Omnipresent Emptiness in Samuel Beckett's "Waiting for Godot"*. Germany: GRIN Verlag, 2008.

Baldick, Chris. *The Oxford Dictionary of Literary Terms*. (3rd Ed.) USA: OUP, 2009. Behan, Tom. Dario Fo: Revolutionary Theatre. London: Pluto, 2000.

Bloom, Harold. *Berthold Brecht*. USA: Chelsa House, 2002.

Brecht, Bertolt. *Brecht on Theater: The Development of an Aesthetic, edited and translated by John Willett*. London: Methuen, 1992.

Chandler, Frank Wadleigh. *Aspects of Modern Drama*. New York: Macmillan, 1914.

Cornwel, Neil. *The Absurd in Literature*. Manchester: Manchester University Press, 2006.

Esslin, Martin. *The Theatre of the Absurd*. London: Penguin, 1980.

Northam, John. *Ibsen's Dramatic Method*. London: Fabor, 1953.

Williams, Raymond. Drama: *From Ibsen to Eliot*. London: Chatto & Windus, 1952.

Course Title: Introduction to Translation: Theory and Practice
Course Code: SHSS ENG 01 02 E 05 3104

Course Objectives: The course intends to introduce the students with Translation Studies as an emerging discipline. They will get an opportunity to be familiar with the main issues involved in the process of translation. The focus shall be on literary translation and the way it is different from other translations. The course coordinator shall demonstrate how the translation process is highly cultural specific. The course is designed as a blend of theory and practice of translation. The students will have an assignment where they have to translate a piece of prose to English.

Course Level Learning Outcomes:

Some of the learning outcomes that the students of this course are expected to demonstrate are listed as follows:

1. Appreciate the process of translation
2. Begin translation from one language to another
3. Learn skills of translation that may help them become translators later on
4. Appreciate diverse writings and cultures which will enable them to connect with these cultures in a diverse country like India and become socially aware citizens

Unit-I: Introduction to Translation

Language and Culture

History of Translation

Types of Translation

Essential Components of Translation

Unit-II: Translation Studies

Emergence of the Discipline

Theories of Translation

Cultural Issues in Translation

Future of Translation

Unit-III: Literary Translation

Literature and Translation

Translating Poetry

Translating Prose

Translating Dramatic Texts

Untranslatability and Problem of Equivalence

Unit-IV: Translation and Indian Context

Krishnamurthy, Ramesh. “Translation: The Indian Tradition.” Routledge Encyclopedia of Translation Studies. ed. Mona Baker. London and New York: Routledge, 1998.

Premchand, Munshi. "Kafan" (Three different translations)

Practice Assignments on Various Types of Translation

Suggested Readings

Baker, Mona and Gabriela Saldanha. *Routledge Encyclopedia of Translation Studies*. Routledge, 2020.

Bassnet, Susan. *Translation Studies*. Routledge, 2002.

Bassnett, Susan and Harish Trivedi. *Post-Colonial Translation: Theory and Practice*. Routledge, 1999.

Choudhury, Indranath. "Towards an Indian Theory of Translation." *Indian Literature,* September-October 2010, 113-123.

Kumar, Akshaya. “Translating Bhakti: Versions of Kabir in Colonial/Early Nationalist Period". *Indian Literature*, vol. 50, no. 1 (231), January-February 2006, 149-165.

Malmkjær, Kirsten and Kevin Windle. *The Oxford Handbook of Translation Studies*. Oxford UP, 2011.

Millán, Carmen and Francesca Bartrina. *The Routledge Handbook of Translation Studies*. Routledge, 2012.

Munday, Jeremy. *Introducing Translation Studies: Theories and Applications*. Routledge, 2016.

Palumbo, Giuseppe. *Key Terms in Translation Studies*. Continuum, 2009.

Phukan, Shibani. "Towards an Indian Theory of Translation." n.d. 20 August 2016.

http://www.tandfonline.com/doi/pdf/10.1080/02690050308589864?needAccess=true

Shuttleworth, Mark. *Dictionary of Translation Studies*. Routledge, 1997.

Simon, Sherry. *Gender in Translation: Cultural Identity and the Politics of Transmission*. Routledge, 1996.

Spivak, Gayatri Chakravarty. “The Politics of Translation.” *Outside the Teaching Machine*. Routledge, 1993.

Venuti, Lawrence. *The Translation Studies Reader*. Routledge, 2000.

Course Title: Indian Classical Literature

Course Code: SHSS ENG 01 02 E 06 3104

Objective: To introduce the students to the rich and diverse classical literature of India and also to Indian poetics and aesthetics.

Course Learning Outcomes: Some of the learning outcomes the students are expected to demonstrate are listed here.

- Understanding of Indian aesthetics and Classical literature.
- Ability to understand and interpret relevant theory and Indian classical texts.
- Ability to appreciate and analyze the stories, epic(s) and plays in relation to their cultural and historical contexts.
- Literary and research interest in Indian classical literature and poetics.
- Ability to appreciate Indian art and culture.

Course Content:

Unit-I Essence of Indian Poetics

On syntax and poetic meaning, structure of poetic meaning, figures of Speech & thought, epic poetry, *Nātya* and *Rasa* from Bharatamuni's *Nātyasāstra,* Bhāmaha's *kāvyālaṁkāra,* Kuntaka's *Vakroktijīvitam,* Anandavardhana's *Dhvanyāloka*

Unit-II: Selections from *The Mahabharata*

a) 'The Dicing' and 'Sequel to Dicing', Book 2, Sabha Parva Section XLVI-LXXII

b) 'The Temptation of Karna', Book 5, Udyog Parva, Section CXL-CXLVI

c) 'Dhritrashtra and Gandhari's Wrath', Book 11, Section XI-XV

Unit –III:

Ilango Adigal, *The Cilappatikaram*, Cantos 1, 2, 7, 18, 19, 20, 21, 22, 24, 26, 30, trans. R. Parthasarathy (Columbia University Press, 1993; Penguin India, 2004)

Unit-IV:

Sudraka's *Mrichchhakatika*

Suggested Readings:

Bharata. *Nāṭyaśāstra*. Ed. Manomohan Ghosh. The Royal Asiatic Society of Bengal, 1950.

Bhāmaha. *Kāvyālaṁkāra.* Ed. P.V. Nāganātha Sāstrī. Delhi: Motilal Banarsidasa, 1991.

Bhartṛhari.*Vākyapdi.* Delhi: Motilal Banarsidass, 1971.

Kalidasa, *Abhijnanasakuntalam*, trans. Chandra Rajan, in *Kalidasa: The Loom of Time*, Penguin Classics, 1989.

Kapoor, Kapil. *Literary Theory, Indian Conceptual Framework.* East-West Press Pvt. Ltd., 1998.

Krishnamoorthi, K. *Essays in Sanskrit Criticism.* Karnataka University, 1964.

--- . *Ānandavardhana's Dhvanyāloka.* Poona Oriental Series, 1952.

--- . Kuntaka. *Vakroktijīvitam.* Ed. K. Krishnamoorthy. Karnataka University, 1977.

Sudraka. *The Mrichchhakatika of Sudraka*, trans. M. R. Kale. Motilal Banarsidas Publishers, 1924, reprint 2013.

Vyas. *The Mahabharata of Krishna-Dwaipayana Vyasa*, trans. K. M. Ganguli. Munshiram Manoharlal Publishers, 2012.

Warder, A.K. *Indian Kavya Literature: Literary Criticism.*Vol.1. Motilal Banarsidas Publishers, 2009.

Course Title: Dalit Literature and Aesthetics

Course Code: SHSS ENG 01 02 E 07 3104

Course Objective: The course intends to make the students familiar with the intent and contents of Dalit literature and aesthetics. The prescribed texts represent different genres to provide comprehensive understanding of Dalit context and the paradigms of Dalit literature.

Course Level Learning Outcomes:

Some of the learning outcomes that the students of this course are expected to demonstrate are listed as follows:

1. Develop a historical understating of how Dalit literature and aesthetics has evolved over the years.
2. Detail study of some of the canonical texts written by established names in the field of Dalit literature and aesthetics.
3. Explain the meaning, nature and definition of important critical terms.
4. Discuss the socio-historical and political background of Dalit literature and aesthetics.
5. Provide a conceptual framework for developing an understanding of the function and practice of alternative aesthetics.

Course Content:

Unit-I: Autobiography

Om Prakash Valmiki's *Joothan: An Untouchable's Life*

Unit-II: Novel

G. Kalyana Rao's *Untouchable Spring*

Unit-III: Poetry

Namdeo Dhasal's "Hunger"

Challapali SwarupaRani's "Wild Flower"

Bama's "The Scent of Mother"

M.R. Renu Kumar's "The Poisoned Fruit"

Unit-IV: Short Stories

Bandhumadhav's "The Poisoned Bread"

Shyamal Kumar Pramanik's "Survival"

Suggested Readings:

Ahmad, Imtiaz and Upadhyay. *Dalit Assertion in Society Literature and History*. Orient Blackswan, 2010.

Ambedkar, B.R. *Annihilation of Caste: The Annotated Critical Edition*. Navayana, 2014.

Bama. *Karukku*. OUP, 2004.

---. *Sangati: Events.* OUP, 2008.

---. *Vanmam (Vendetta)*. OUP, 2008.

Chakravorty, Uma. *Gendering Caste*. Popular Prakashan, 2003.

Dangle, Arjun, ed. *Poisoned Bread*. Orient Blackswan, 2009.

Gajarawala, ToralJatin. *Untouchable Fictions: Literary Realism and the Crisis of Caste*. Fordham University Press, 2012.

Ganguly, Debjani. *Caste and Dalit Lifeworlds: Postcolonial Perspectives*. Orient Longman, 2008.

Ilaiah, Kancha. *Why I am Not a Hindu: A Sudra Critique of Hindutva Philosophy, Culture and Political Economy*. Samya, 2005.

Jaffrelot, Christopher. *Dr. Ambedkar and Untouchability: Analysing and Fighting Caste*. C. Hurst & Co. Publishers, 2005.

Kumar, Raj. *Dalit Personal Narratives*. Orient Blackswan, 2010.

---. *Dalit Literature and Criticism*. Orient BlackSwan, 2019.

Kumar, Ravi and Azhagarasan. *The Oxford India Anthology of Tamil Dalit Writing*. OUP, 2012.

Limbale, Sharankumar. *Towards an Aesthetic of Dalit Literature*. Translated by Alok Mukherjee, Orient Blackswan, 2004.

---. Hindu: A Novel. Samya Publications, 2010.

Nagaraj, D R. *The Flaming Feet and Other Essays: The Dalit Movement in India*. University of Chicago Press, 2011.

Omvedt, Gail. *Dalit Visions.* Orient Blackswan, 2006.

---. *Ambedkar: Towards an Enlightened India*. Penguin, 2008.

Purushotham, Gita Ramaswamy, Gogu Shayamala et al. *The Oxford India Anthology of Telegu Dalit Writing*. OUP, 2016.

Rao, Anupama. *The Caste Question: Dalits and the Politics of Modern India*. Permanent Black, 2009.

Rege, Sharmila. *Writing Caste/ Writing Gender*. Zubaan 2006.

Singha, Sankar Prasad and Indranil Acharya. *Survival and Other Stories: Bangla Dalit Fiction in Translation.* Orient Blackswan, 2012.

Course Title: Canadian Literature
Course Code: SHSS ENG 01 02 E 08 3104

Objective: This course aims to provide a broad historical survey of Canadian writing and introduce students to some of the major authors of Canadian literature.

Course Level Learning Outcomes
Some of the learning outcomes that the students of this course are expected to demonstrate are listed here.

1. Historical understating of Canadian literature

2. Understanding of some of the canonical texts written by established Canadian authors.

3. Ability to discuss the social, historical, political, and cultural background of Canadian literature.

Course Content:

Unit–I

a) F.R. Scott: "The Canadian Authors Meet"
"Lakeshore"
"Laurentian Shield"

b) Margaret Atwood: "This is a Photograph of Me"
"The Circle Game"
"The Animals in that Country"
"The Explorer"
"The Settler"

Unit-II
Yann Martel: *Life of Pi*

Unit-III
Morris Panych: *7 Stories*

Unit-IV
Northrop Frye: "Conclusion to A Literary History of Canada"

Suggested Readings:

Atwood, Margret. *Survival: A Thematic Guide to Canadian Literature*. Anansi, 1984.

Brown, E. K. *On Canadian Poetry*. Tecumesh Press, 1973.

Frye, Northrop. *The Bush Garden: Essays on Canadian Imagination*. Anansi, 1971.

New, H. W., ed. *Literary History of Canada*. Vol 4 Toronto: Univ. of Toronto Press, 1990.

Rao, T Nageshwar. *Inviolable Air Canadian Poetic Modernism in Perspective*. Delhi: B. R. Publication, 1994.

Sharma, Shrawan K. *Phases of Canadian Poetic Culture*. Meerut: Shalabh Publishing House, 2001.

SEMESTER-III

Course Title: Literary Theory and Criticism –II
Course Code: SHSS ENG 01 03 C 11 3104

Objective(s): The course proposes to study literary theory as an intellectual and critical activity in the 20th Century. The purpose of the course is the analysis of some of the major essays that are central to the understanding of these literary and critical theories. The course takes up major strands of modern literary theory and provides a conceptual context for an understanding of the function and practice of modern literary and cultural criticism.

Course Level Learning Outcomes:

Some of the learning outcomes that the students of this course are expected to demonstrate are listed as follows:

1. Develop a historical understating of how literary criticism and theory has evolved over these years.
2. Detail study of some of the canonical texts written by established theorists in the field of literary theory and criticism.
3. Explain the meaning, nature and definition of important critical traditions of the period.
4. Trace the evolution of Critical Theory with its socio-historical and political background.
5. Provide a conceptual framework for developing an incisive understanding of the function and practice of different literary methodologies available to a student.

Course Content:

Unit- I: Structuralism

Ferdinand de Saussure: “The Nature of Linguistic Sign” in David Lodge (ed.) *Modern Criticism and Theory: A Reader*. Longman, 1988: 10-14.

Claude Levi Strauss: "Structural Analysis in Linguistics and in Anthropology" in *Structural Anthropology*. Trans by Claire Jacobson. Basic Books Inc., 1963. 31-54.

Unit- II: Poststructuralism and Deconstruction

Roland Barthes: “The Death of the Author” from Roland Barthes, *Image, Music, Text*. Flamingo, 1977: 142-48.

Jacques Derrida: "Structure, Sign & Play in the Discourse of Human Sciences" in J. Derrida. *Writing and Difference*. Translated by Alan Bass, University of Chicago Press, 1978: 278-93.

Unit-III: Postmodernism

Jean Francois Lyotard: "Answering the Question: What is Postmodemism?" translated by Regis Durand in *The Postmodern Condition*. Manchester University Press, 1984.

Jean Baudrillard: "The Spirit of Terrorism," Translated by Chris Turner in *The Spirit of Terrorism and Other Essays*. Verso, 2003.

Unit- IV: New Historicism and Cultural Materialism

Stephen Greenblatt: "Introduction" in *Renaissance Self –Fashioning.* University of Chicago Press, 1980. 1-9.

Alan Sinfield and Jonathan Dollimore: "Foreword" and "Introduction" in *Political Shakespeare: New Essays in Cultural Materialism.* Cornell, 1985. vii-viii & 2-17.

Suggested Readings:

Bertens, Hans. *Literary Theory: The Basics*. Routledge, 2017.

Bishop, Ryan (ed.). *Baudrillard Now: Current Perspectives in Baudrillard Studies*. Polity, 2009.

Connor, Steven. *The Cambridge Companion to Postmodernism*. Cambridge University Press, 2004.

Culler, Jonathan. *Barthes*. Fontana, 1983.

Derrida, Jacques. *Positions*. Translated by Alan Bass, University of Chicago Press, 1981.

Derrida, Jacques. *Speech and Phenomena and Other Essays on Husserl's Theory of Signs*. Translated by David B. Allison, Northwestern UP, 1973.

During, Simon. *Foucault and Literature: Towards a Genealogy of Writing*. Routledge, 2013.

Eagleton, Terry. *After Theory*. Penguin UK, 2004.

Goulimari, Pelagia. *Literary Criticism and Theory: From Plato to Postcolonialism*. Routledge, 2014.

Guerin, Wilfred L. *A Handbook of Critical Approaches to Literature*. Oxford University Press, 2005.

Habib, M.A.R. *A History of Literary Criticism: From Plato to the Present*. Blackwell, 2005.

Hawthorn, Jeremy. *A Concise Glossary of Contemporary Literary Theory*. Edward Arnold, 1992.

Hayes, Bruce, et al. Victoria A. Fromkin (ed.) *Linguistics: An Introduction to Linguistic Theory* (John Wiley & Sons, 2013)

Jefferson, Ann and David Robey, eds. *Modern Literary Theory.* Barnes and Noble, 1982.

Klages, Mary. *Key Terms in Literary Theory*. A&C Black, 2012.

Leitch, Vincent B and William E Cain. *Norton Anthology of Theory and Criticism*. W. W. Norton & Company, 2010.

Makaryk, Irene Rima. *Encyclopedia of Contemporary Literary Theory: Approaches, Scholars, Terms.* University of Toronto Press, 1993.

Rivkin, Julie and Michael Ryan. *Literary Theory: An Anthology*. John Wiley & Sons, 2017.

Tyson, Lois. *Critical Theory Today*. Routledge, 2014.

Waugh, Patricia. *Literary Theory and Criticism: An Oxford Guide*. Oxford UP, 2005.

Woods, Tim. *Beginning Postmodernism*. Manchester University Press, 1999.

Course Title: Postcolonial Theory and Literature

Course Code: SHSS ENG 01 03 C 12 3104

Objective(s): To introduce the students with the Postcolonial theory and literature so as to help them develop appreciation for literatures from different regional and national contexts.

Course Level Learning Outcomes:

Some of the learning outcomes, that the students of this course are expected to demonstrate, are listed as follows:

1. Develop understanding of the key concepts of Postcolonial Literature and theory.
2. Elaborate, analyse and appreciate the important Postcolonial approaches, texts and the writers from diverse contexts.
3. Discuss the concept of Postcolonial Literature vis-à-vis regional/national literatures.
4. Elaborate the relevance of Postcolonial Literature and theory vis-à-vis regional literatures.

Course Content:

Unit-I: Postcolonial Theory and Literature—Definition and Key Concepts

Postcolonial Theory and Literature

Key Concepts in Postcolonial Literature

Edward Said: "Introduction" to *Orientalism*

Major Postcolonial Writers and Works

Unit-II:

Doris Pilkington

Rabbit Proof Fence

Unit-III:

Jean Rhys

Wide Sargasso Sea

Unit-IV:

Chinua Achebe

Things Fall Apart

Suggested Readings:

Bill Ashcroft, Gareth Griffiths and Helen Tiffin, eds. *The Post-Colonial Studies Reader*. Routledge, 2006.

---. *Key Concepts in Post-Colonial Studies*. Routledge, 1998.

Bhabha, Homi. *The Location of Culture*. Routledge, 1994.

Gikandi, Simon. *The Cambridge History of African and Caribbean Literature*. CUP, 2004.

King, Bruce, ed. *The New National and Postcolonial Literatures: An Introduction*. Clarendon Press, 1998.

Loomba, Ania. *Colonialism/ Postcolonialism*. Routledge, 1998.

Quayson, Ato, ed. *The Cambridge History of Postcolonial Literature*. Cambridge University Press, 2012.

Said, Edward. "Introduction" to *Orientalism*. Routledge, 1978. 1-28.

Wheeler, Belinda (Ed.). *A Companion to Australian Aboriginal Literature*. Camden House, 2013.

Williams Patrick and Laura Chrisman. *Colonial Discourse and Post-Colonial Theory A Reader*. Routledge, 1994.

Course Title: Indian Writings in English
Course Code: SHSS ENG 01 03 C 13 3104

Course Objectives: To introduce literary texts from a range of cultural, social, political and regional locations within India and inculcate an in-depth understanding of some of the major issues shaping this literary production.

Course Level Learning Outcomes: Some of the learning outcomes of this course are listed as follows:

1. Students will develop the understanding of Indian English Literature and its oeuvre through selected literary texts across genres.
2. They will appreciate and analyze the texts in relation to the colonialism, nationalism and globalization.
3. They will be able to approach and demonstrate the textual understanding from the perspectives of multiple Indian subjectivities.
4. Students will be in position to extend the knowledge of life in literature and lived situations.

Course Content:

Unit-I: Poetry

(i) A.K. Ramanujan -"The Striders" and "Love Poem for a Wife, I"

(ii) Nissim Ezekiel – "Night of the Scorpion" and "Poet, Lover and Birdwatcher"

(iii) Jayanta Mahapatra – "Hunger" and "A Rain of Rites"

Unit-II: Novel

Raja Rao's *Kanthapura*

Unit-III: Drama

Mahesh Dattani's *Tara*

Unit-IV: Short Stories

(i) R.K. Narayan's "An Astrologer's Day" from *Malgudi Days*

(ii) Mulk Raj Anand's "The Lost Child" from *The Lost Child and Two Lyrical Stories*

(iii) Shashi Deshpande's "The Intrusion" from *The Intrusion and Other Stories*

(iv) Temsula Ao's "Soaba" from *These Hills Called Home: Stories from a War Zone.*

Suggested Readings:

Damodhar, G. *"Search for Identity: An Estimate of Ezekiel's Poetry." Nissim Ezekiel: A Critical Companion*. Ed. G. S. Balarama Gupta. Pencraft, 2012. 79-85.

Deshpande, Shashi. *The Intrusion and Other Stories*. Penguin India, 1993.

Iyengar, K.R.S. *Indian Writing in English*. Sterling, 1985.

King, Bruce. *Modern Indian Poetry in English*. Oxford University Press, 1987.

Kumar, Akshay. *A.K. Ramanujan: In Profile and Fragment*. Rawat Publications, 2004.

Lal, E.N. *The Poetry of Encounter: Dom Moraes, A.K. Ramanujan and Nissim Ezekiel*. Sterling, 1983.

Mehrotra, A. K. ed. *An Illustrated History of Indian Literature in English*. Permanent Black, 2003.

Mukherjee, Meenakshi. *Twice Born Fiction*. New Delhi: Heinemann, 1971.

---. *The Perishable Empire: Essays on Indian Writing in English.* Oxford University Press, 2000.

Naik, M.K. *Raja Rao*. Twayne Publishers Inc., 1972.

---. ed. *Aspects of Indian Writing in English*. Macmillan, 1979.

Parthasarathy, R. ed. *Ten Twentieth Century Indian Poets*, Oxford University Press, 1976.

Shyamala, A. Narayan: *Raja Rao (Man and His Works).* New Delhi: Sterling, 1988.

Tharu, S. and K. Lalitha. *Women Writing in India*: 600 BC to the Present, 2 vols. New Delhi: Oxford University Press, 1995.

Course Title: Introduction to Linguistics

Course Code: SHSS ENG 01 03 C 14 3104

Objective: The primary objective of the course is to familiarize the students with the basic concepts of language and linguistics and provide them a theoretical as well as practical knowledge of modern English structure.

Course Level Learning Outcomes:

Some of the learning outcomes that the students of this course are expected to demonstrate are listed here.

1. Understanding of language and linguistics and various branches of linguistics.
2. Knowledge of speech sounds, the process of their production, and their classification.
3. Understanding and application of English grammar to use language correctly.

Course Content:

Unit-I Introduction

a) Definitions of Language

b) Origin of Language

c) Properties of Human Language

d) Branches of Linguistics

Unit-II Phonetics and Phonology

a) Articulatory, Auditory, Acoustic Phonetics

b) Consonants and Vowels

1) Consonants: Voiced and Voiceless; Place and Manner of Articulation

2) Vowels: Monophthongs and Diphthongs

c) Phonemes, Phones, and Allophones

d) Syllables

e) Co-articulation Effects: Assimilation, Nasalization and Elision

Unit-III Grammar: Morphology and Syntax

a) Morphemes

1) Free and Bound

2) Lexical and Functional

3) Derivational and Inflectional

b) Morphs and Allomorphs

c) Word-Formation: Coinage, Borrowing, Compounding, Back-Formation, Clipping etc.

d) Structural and Constituent Analysis of Sentences

e) Surface and Deep Structure, and Tree-diagrams

Unit-IV Semantics and Pragmatics

a) Semantic Features and Semantic Roles

b) Lexical Relations: Synonymy Antonymy, Hyponymy, Homonymy, Polysemy, Metonymy

c) Context, Reference and Presupposition: Deixis, Inference, Anaphora, Cataphora

d) Speech-Acts: Direct and Indirect

Suggested Readings:

Aitchison, Jean. *The Articulate Mammal*. Routledge, 2011.

Cowie, A. P. *Semantics*. OUP, 2009.

Hurford, James. *The Origins of Language*. OUP, 2014.

Jespersen, Otto. *Language: Its Nature, Development and Origin.* George Allen & Unwin, 1922.

Kroeger, Paul. *Analysing Grammar: An Introduction*. Cambridge UP, 2005.

Ladefoged, Peter. *A Course in Phonetics*. 7th ed., Cengage Learning, 2015.

Lyons, John. *Language and Linguistics: An Introduction*. Cambridge UP, 1981.

Payne, Thoman E. *Exploring Language Structure: A Student's Guide*. Cambridge UP, 2006.

Robins, R. H. *General Linguistics*. 4th ed., Routledge, 1989.

Tallerman, Mageie. *Understanding Syntax*. 4th ed., Routledge, 2014.

Yule, George. *Pragmatics*. Oxford UP, 1996.

---. *The Study of Language*. 7th ed., Cambridge UP, 2020.

Course Title: Creative Writing
Course Code: SHSS ENG 01 03 E 09 3104

Objective(s): This course aims to—

- Apply critical and theoretical approaches to the reading and analysis of literary texts in multiple genres;
- Identify, analyze, interpret and describe critical ideas, themes, values that consist of literary texts and perceive the ways to evaluate how ideas, themes and values create an impact on societies, both in the past and present;
- Become capable of producing poems or literary non-fictional pieces that are original and engaging;
- Articulate an awareness of the relationship between the individual works and conventional literary work;
- Become capable of passing judgment whether a journal or a press is better venue for publishing literary work.

Course Level Learning Outcomes
Some of the course learning outcomes that students of this course are required to demonstrate are:

1. Develop creativity in writing and discern the difference between academic/non creative and creative writing;
2. Develop a thorough knowledge of different aspects of language such as figures of speech, language codes and language registers so that they can both, identify as well as use these; in other words, they must learn that creative writing is as much a craft as an art
3. Develop a comprehensive understanding of some specific genres such as fiction, poetry, drama and newspaper writing
4. Distinguish between the sub divisions within each genre(such as in poetry, different forms like sonnets, ballads, haiku, *ghazal*, etc)

Course Content:

Unit-I

What is Creative Writing?

The Art and Craft of Writing

Unit-II

Modes of creative Writing

Poetry

Fiction

Drama

Unit-III

Writing for the Media

Print Media

Broadcast Media

New Media

Advertising

Unit-IV

Preparing for Publication

Suggested Readings:

Dev, Anjana Neira. *Creative Writing: A Beginner's Manual*. Pearson, Delhi, 2009.

Morley, David. *The Cambridge Introduction to Creative Writing*. Cambridge, New York, 2007.

Course Title: Contemporary South Asian Fiction in English

Course Code: SHSS ENG 01 03 E 10 3104

Objective(s): To introduce the students with major trends in South Asian Literature and writers so as to help them develop appreciation for literatures from different South Asian countries.

Course Level Learning Outcomes:

Some of the learning outcomes, that the students of this course are expected to demonstrate, are listed as follows:

1. Develop critical understanding of the socio-historical and cultural ethos reflected in South Asian literature.
2. Elaborate, analyse and appreciate the important South Asian texts and the writers from diverse contexts.
3. Discuss the concept of South Asian Literature vis-à-vis regional/national literatures.
4. Elaborate the relevance of South Asian Literature vis-à-vis popular British Literature.

Course Content:

Unit-I:

Monica Ali: *The Brick Lane*

Unit-II:

Khaled Hosseini: *The Kite Runner*

Unit-III:

Michael Ondaatje: *Anil's Ghost*

Unit-IV:

Kamila Shamsie: *Home Fire*

Suggested Readings:

Brians, Paul. *Modern South Asian Literature in English*. Greenwood Press, 2003.

Ghosh, Amitav. *Jungle Nama: A Story of the Sundarban*. HarperCollins India, 2021.

Hosseini, Khaled. *The Kite Runner*. Bloomsbury, 2013.

Ondaatje, Michael. *Anil's Ghost*. Vintage, 2001.

Pollock, Sheldon (Ed). *Literary Cultures in History: Reconstructions from South Asia*. University of California Press, 2003.

"Literature of South Asia and Indian Diaspora". http://sasialit.org/.

Raychaudhuri, Anindya. *South Asian Partition: Oral History, Literature, Cinema*. OUP, 2019.

Roy, Rituparna. South Asian Partition Fiction in English. Amsterdom University Press, 2010.

Shamsie, Kamila. *Home Fire*. Bloomsbury, 2017.

Course Title: Literature of Protest

Course Code: SHSS ENG 01 03 E 11 3104

Objective(s): The purpose here is to introduce our students with the revolutionary potential of literature. The way literature can work as a progressive force in the society and assumes the role of a vehicle of protest against hegemonic elements will be really interesting. This course assures a sound imagination to the students along with enjoyment and learning.

Course Level Learning Outcomes:

Some of the learning outcomes that the students of this course are expected to demonstrate, are listed as follows:

1. Develop a historical understating of how literature has contributed to the progressive changes in the human society over these years.
2. Trace the evolution of Protest Writings with its socio-historical and political background in South Asia.
3. Provide a conceptual framework for developing an understanding of the function and practice of Protest Writings as a counter discourse to hegemonic tendencies within a society.
4. Detail study of some of the texts written by established writers and thinkers in the relevant areas.

Course Content:

Unit-I

Faiz Ahmad Faiz: "We Shall See"
Agha Shahid Ali: "Postcard from Kashmir"
Namdeo Dhasal: "Kamatipura"
Arun Kolatkar: "The Shit Sermon"
Kamala Das: "The Looking Glass"
Meena Kandasamy: "Backstreet Girls"

Unit-II

Ismat Chughtai : "The Quilt"

Saadat Hasan Manto: "Nowhere Land"

Unit-III

U.R. Ananthamurthy: *Samskara: A Rite for a Dead Man*

Unit- V

Dakxinkumar Bajrange: *Bhudhan: A Play by Denotified Chharas* (translated by Sonal Baxi)

Suggested Readings:

Ali, Agha Shahid. *The Country without a Post Office*. Penguin, 2013.

Ananthamurthy, U R. *Samskara: A Rite for a Dead Man*. OUP, 1997.

Chughtai, Ismat. *The Quilt and Other Stories*. Women Unlimited, 2004.

Das, Kamala. *Selected Poems*. Penguin, 2014.

Devy, G N. *Painted Words: An Anthology of Tribal Literature*. Penguin India, 2003.

Dhasal, Namdeo. *Poet of the Underworld*. Lavanaya Pub, 2000.

Kandasamy, Meena. *Ms. Militancy*. Navayana, 2010.

Kolatkar, Arun. *Reading Together: Kala Ghoda Poems*. Pras Pub., 2004.

Kumar, Akshaya. *Poetry, Politics and Culture: Essays on Indian Texts and Contexts*. Routledge, 2009.

Manto, Saadat Hassan. *Manto: Selected Short Stories*. Vintage, 2012.

Schwartz, Henry. *Constructing the Criminal Tribe in Colonial India: Acting Like a Thief*. Wiley Pub. 2010.

Course Title: Gender and Literature

Course Code: SHSS ENG 01 03 E 12 3104

Objective: The primary objective of this course is to introduce the students with the concept of gender and its relationship with literature at multiple levels like representation, production, evaluation etc., and acquaint them with various debates and theories related to gender issues.

Course Level Learning Outcomes:

After studying the course, students are expected to—

1. Demonstrate an understanding of themes and issues related to gender and their representation in literature.
2. Analyse, discuss, and evaluate texts critically.
3. Connect issues of race and third gender with literary themes.
4. Construct and synthesize ideas and produce them as coherent arguments.

Course Content:

Unit-I

Mahasweta Devi – *Breast Stories*

Unit-II

Alice Walker – *The Color Purple*

Unit-III

A. Revathi – *The Truth about Me: A Hijra Life Story*

Unit-IV

Ursula K. Le Guin – *The Left Hand of Darkness*

Suggested Readings:

Butler, Judith. *Gender Trouble: Feminism and the Subversion of Identity*. Routledge, 2010.

Cummins, Elizabeth. *Understanding Ursula K. Le Guin*. University of South Carolina, 1993.

Donnelly, Mary. *Alice Walker: The Color Purple and Other Works*. Marshall Cavendish Benchmark, 2010.

Evans, Mary and Carolyn H. Williams, editors *Gender: The Key Concepts*. Routledge, 2013.

Gilbert, Sandra and Susan Gubar: *The Madwoman in the Attic*. Yale University Press, 2020.

Glover, David and Cora Kaplan. *Genders*. Routledge, 2005.

Pomeroy, B. Sarah. *Goddesses, Whores, Wives, and Slaves: Women in Classical Antiquity*. Schocken Books, 1995.

Rege, Sharmila. *Writing Caste: Writing Gender*. Zubban, 2006.

Revathi, A. *Our Lives, Our Words: Telling Aravani Lifestories.* Yoda Press, 2011.

Ruthwen, K.K. *Feminist Literary Studies*: *An Introduction*. Cambridge University Press, 1984.

Showalter, Elaine. *A Literature of Their Own*. Virago, 2009.

Sterling, Anne Fausto. *Sex/ Gender: Biology in a Social World*. Routledge, 2012.

Stubbs, Patricia. *Women and Fiction*. Harvester Press, 1979.

Supreme Court Verdict on Third Gender (WRIT PETITION (CIVIL) NO.400 OF 2012). http://supremecourtofindia.nic.in/outtoday/wc40012.pdf.

Course Title: Disability Studies and Literature

Course Code: SHSS ENG 01 03 E 13 3104

Course Objectives:

1. To promote sensitivity and understanding regarding disability amongst the students and researchers in various disciplines by engaging them with a relatively fresh interdisciplinary domain of Disability Studies in relation to literature.
2. To familiarize students with historical outlooks, disability theories and issues in relation to socio-cultural context and disability representations in literature.

Course Level Learning Outcomes:

Some of the learning outcomes that the students of this course are expected to demonstrate are listed as follows:

1. Understanding of issues and concerns of persons with disabilities who are fast being included in the mainstream higher education system, both in terms of numbers, as resources and also as voices in the academic curriculum.
2. Ability to explore Disability Studies as a relatively fresh area of study and research.
3. Sensitivity towards issues concerning differently-abled population.
4. Creative interpretation of disability from literary perspective.

Course Content:

Unit I: Basics of Disability Studies

Michael Oliver: *Understanding Disability: From Theory to Practice*

Unit II: Autobiography

Helen Keller: *The Story of My Life*

Unit III:

Munshi Premchand: *Rangbhoomi*

Unit IV: Short Stories and Poems

Raymond Carver: "Cathedral"

Rabindranath Tagore: "Subha"

Wilfred Owen: "Disabled"

Sylvia Plath: "Lady Lazarus"

Suggested Readings:

Addlakha, Renu. *Disability Studies in India: Global Discourses, Local Realities*. Taylor & Francis, 2013.

Barnes, Colin, Geoffrey Mercer and Tom Shakespeare. *Exploring Disability: A Sociological Introduction*. Cambridge; Malden, MA: Polity Press. 1999.

Carver, Raymond. "Cathedral". *Cathedral: Stories by Raymond Carver*, Knopf. 1983.

Davis, Lennard J. *The Disability Studies Reader*. Routledge, 1997.

Keller, Helen. *The Story of My Life* (1903). New York: Doubleday, 1954.

McRuer, Robert. *Crip Theory: Cultural Signs of Queerness and Disability*. New York University Press, 2006.

Mitchell, David T and Sharon L. Snyder. *Narrative Prosthesis: Disability and the Dependencies of Discourse*. University of Michigan Press, 2000.

Oliver, Michael. *Understanding Disability: From Theory to Practice*. Palgrave MacMillan, 1996.

Owen, Wilfred. "Disabled", Wilfred Owen: Selected Poetry and Prose. Routledge, 1988.

Plath, Sylvia. "Lady Lazarus", Sylvia Plath: The Collected Poems. ed. Ted Hughes. Harper Perennial Modern Classics, 2018.

Premchand, Munshi. *Rangbhoomi*. trans. Manju Jain. Penguin. 2012.

Tagore, Rabindranath. 'Subha', Selected Stories of Rabindranath Tagore. Fingerprint! Publishing, 2020.

SEMESTER-IV

Course Title: Literary Criticism in India

Course Code: SHSS ENG 01 04 C 15 3104

Objective(s): The purpose of this course is to introduce our students with indigenous criticism and critical theories. Here the selection of texts is carried out keeping in mind two vital Objective(s): first, antiquity and contemporary are brought together; second, various schools of criticism provide contestation grounds for each other. It will also provide the students an opportunity to study criticism available in translation from other Indian languages.

Course Level Learning Outcomes:

Some of the learning outcomes that the students of this course are expected to demonstrate are listed as follows:

1. Develop a historical understating of how literary criticism and theory has evolved in India.
2. Detail study of some of the canonical texts written by established theorists in the field of literary theory and criticism.
3. Explain the meaning, nature, and definition of important critical traditions of the period.
4. Trace the evolution of Literary Criticism and Theory in India with its socio-historical and political background.
5. Provide a conceptual framework for developing an incisive understanding of the function and practice of different literary methodologies available to a student in Indian classroom.

Course Content:

Unit - I Sanskrit Aesthetics

Introduction to various schools of Sanskrit Criticism: Rasa, Dhvani, Alamkara, Riti, Vakrokti and Auchitya.

Bharata: *Natyashastra,* tr. Manomohan Ghosh (chapter 6: 'Sentiments) revd. 2nd ed. (Calcutta: Granthalaya, 1967), vol. I, pp 100-18.

Unit - II Nativism

G.N. Devy: "Tradition and Amnesia" in *After Amnesia*.

Bhalchander Nemade: "*Sahityateel Desiyata"* (Nativism in Literature) in *Nativism: Essays in Criticism*. Sahitya Akademi, 1997. 233-254.

Unit - III Postcolonial Theory in India

Namwar Singh: "Decolonising the Indian Mind" translated by Harish Trivedi and published in *Indian Literature*. Vol. 35, No. 5, 1992. 145-157.

Ania Loomba: "Challenging Colonialism" in *Colonialism / Postcolonialism.* Routledge, 1998. 154 – 212. (Selected excerpts)

Unit - IV Marxism in India

Munshi Premchand: "The Aim of Literature", Presidential Speech given at the First Progressive Writers' Conference, Lucknow, 9 April 1936, tr. Francesca Orsini, in *The Oxford India Premchand*. OUP, 2004.

Aijaz Ahmad: "Literary Theory and 'Third World Literature': Some Contexts" in *In Theory: Classes, Nations, Literatures*. OUP, 1992. Print. (Selected excerpts)

Suggested Readings:

Bharata. *Natyashastra,* tr. Manomohan Ghosh. Calcutta: Granthalaya, 1967, vol. I, pp 100-18.

Chari, V.K. *Sanskrit Criticism*. Motilal Banarsidass Pvt. Ltd., 1993.

Chaitananya, Krishna. *New History of Sanskrit Literature*. 2nd. ed. Manohar, 1977.

Devy, Ganesh N. *After Amnesia*. Orient Longman, 1992.

---. "Swa and Para". *Of Many Heroes*. Orient Longman, 1998.

Kane, P. V. *History of Sanskrit Poetics*. 3rd. ed. Motilal Banararsidas, 2002.

Kapoor, Kapil and Nalini M. Ratnam. *Literary Theory: Indian Conceptual Framework*. Affiliated East-West Press, 1998.

Loomba, Ania. *Colonialism/ Postcolonialism*. 2nd ed. London and New York: Routledge, 2005. Print.

Ahmad, Aijaz. *In Theory: Classes, Nations, Literatures*. OUP, 1992.

Nemade, Bhalchander. "Nativism in Literature." Trans. and ed. by Arvind Dixit and Makarand Paranjape. *Nativism: Essays in Criticism*. Sahitya Akademi, 1997. 233-254.

Rayan, Krishna. *Sahitya, A Theory: For Indian Critical Practice*. Sterling Publishers, 1987.

Sharma, Shrawan K. *Indian Poetics: Theory and Practice*. Creative Books, 2019.

Shastri, Gaurinath. *A Concise History of Classical Sanskrit Literature*. Motilal Banarsidass, 1998.

Course Title: Research Methodology

Course Code: SHSS ENG 01 04 C 16 3104

Objective: The primary objective of this course is to provide the students an understanding of literary research and various methods used in it. The course also aims at introducing basic composition and writing skills for academic purposes.

Course Level Learning Outcomes:

Some of the learning outcomes that the students of this course are expected to demonstrate, are listed here:

1. An Understanding of the basics of research and academic writing
2. An ability to conduct research and use various research methods appropriately
3. Skills in essay composition and research writing
4. Knowledge and application of MLA style in research writing

Course Content:

Unit I. Introduction to Research

a. Purpose and Uses of Literary Research
b. Identifying Research Interest and Selection of Topic
c. Incorporating Review of Literature and Formulating the Objective(s)/Hypothesis
d. Citing the print and online sources, Bibliography and End-notes
e. Plagiarism and Ethics of Research

Unit II: Structuring the thought and Developing the Draft

a. Organizing the thought
b. Quoting, Paraphrasing, & Summarizing
c. Introduction, Discussion, & Conclusion
d. Developing the art of argument building
e. Incorporating Theoretical, Critical and Interpretive Issues

Unit III: Research Methods, Techniques and Approaches

a) Methods and Techniques of Literary Research

b) Discourse Analysis

c) Textual/Intertextual Analysis: Verbal & Visual

d) Multidisciplinary/Interdisciplinary Approach

e) Creative Writing as Research Method

Unit IV: MLA Handbook and MLA Style

a) Formatting Research Project

b) Mechanics of Prose

c) Drafting and Documenting

d) Grammar and Punctuation

e) Proof-reading and Editing

Suggested Readings:

Altick, Richard D. and John J. Fenstermaker. *The Art of Literary Research*. 4th ed., W. W. Norton & Company, 1992.

Altick, Richard D. *The Scholar Adventures*. Ohio State UP, 1987.

Bateson, F. W. *The Scholar-Critic: An Introduction to Literary Research*.

Booth, Wayne C., et al. *The Craft of Research*. 4th ed., U of Chicago P, 2016.

Collins English Dictionary. 13th ed., Harper Collins, 2018.

Correa, Delia da Sousa and W. R. Owens. *The Handbook to Literary Research*. 2nd ed.,

Gowers, Rebecca and Ernest Gowers. *Plain Words: A Guide to the Use of English*. Penguin, 2015.

Greetham, David C. *Textual Scholarship: An Introduction*. Routledge, 1994

Griffin, Gabriele, editor. *Research Methods for English Studies*. Edinburgh UP, 2013.

Harner, James L. *Literary Research Guide: An Annotated Listing of Reference Sources in English Literary Studies*. 9th ed., Modern Language Association of America, 2008.

Huddleston, Rodney and Geoffrey Pullum. *A Student's Introduction to English Grammar*. Cambridge UP, 2005.

MLA Handbook. 9th ed., Modern Language Association of America, 2021.

Partridge, Eric. *Usage & Abusage*. Penguin, 2005.

Swan, Michael. *Practical English Usage*. 4th ed., Oxford UP, 2017.

The Chambers Dictionary. 13th ed., Chambers, 2014.

The Oxford English Dictionary. 2nd ed., Clarendon Press, 1989, 20 Vols.

Toulmin, Stephen, et al. *An Introduction to Reasoning*. Macmillan Publishing Company, 1984. (On 3, chapter "Arguing about the Arts")

Trask, R. L. *The Penguin Guide to Punctuation*. Penguin, 1997.

Course: Dissertation

Course Code: SHSS ENG 01 04 C 17 012012

Objective(s): To familiarize the students with the art of academic writing and exposing them to the practical understanding of research, research methodology, referencing, different types of citations and other important aspects of MLA Handbook. It will also help the students to develop their area of interest and perform a mini research on the same.

Course Level Learning Outcomes:

Some of the learning outcomes, that the students of this course are expected to demonstrate, are listed as follows:

1. Identify the area of interest and select the topic for minor research.
2. Elaborate, analyse and appreciate the important concepts relating to the topic of dissertation.
3. Discuss and analyse the texts and authors under study.
4. Demonstrate the skill to apply appropriate research methodology and Style Manual.

Length of the Dissertation: 40 to 50 pages in 8000-10000 words.

Supervisors: Students will be assigned Supervisors from amongst the faculty of the department depending upon the specialization to guide them to write the dissertation.

Evaluation and Viva-Voce: The dissertation will be evaluated by the examiner(s) and Viva-Voce shall be conducted on having the satisfactory report from the examiner(s).

Duration: Students will have to submit the dissertation before the commencement of end-semester examinations of the fourth semester.

Course Title: Modern Indian Literature in English Translation

Course Code: SHSS ENG 01 04 E 14 3104

Objective: The different language clusters in India are distinctive but share a common heritage and core identity. Nurturing its plural and diverse traditions, emergent India is engaged in an act ofconstant and ongoing cultural translation and interpretation. This course introduces students to a wide range of Indian Writings in English Translation.

Course Level Learning Outcomes: Some of the learning outcomes of this course are listed as follows:

1. Develop the ability to read and interpret literary texts in terms of genre and contexts.
2. Understand and write cogently on issues specific to Indian context and culture.
3. Appreciate and analyze the use of translation for the understanding of Indian texts.

Course Content:

Unit-I:

Bhism Sahni's *Tamas*

Unit-II:

Vijay Tendulkar's *Silence! The Court is in Session*

Unit-III:

(i) Rabindranath Tagore: "Where the Mind is without Fear" "Brink of Eternity" "A Moment's Indulgence"

(ii) Suryakant Tripathi 'Nirala': "Breaking Stones", "Remembering Saroj"

Unit-IV:

(i) Vaikom Muhammad Basheer: "The Rightful Inheritors of the Earth", "The Invaluable Moment" and "The World Renowned Nose"

(ii) C.S. Lakshmi 'Ambai': "A Kitchen in the Corner of the House" from A Purple Sea, "Parasakti and Others in a Plastic Box" and "A Rose-coloured Sari Woven with Birds and Swans" from *In a Forest, a Deer*

Suggested Readings:

Alien, Richard and Harish Trivedi. Eds. *Literature and Nation: Britain and India, 1800-1990*. Routledge, 2000.

Ambai. *A Purple Sea*. Trans. Lakshmi Holmstrom. East -West Press, 1992.

Basheer, Vaikom Muhammad. *Basheer Fictions*: *Short Stories.* Ed. Vanajam Ravindran. Katha, 1996.

Das, S. K. *History of Indian Literature*. Sahitya Akademi, 1991.

Dharwadker, Vinay and A. K. Ramanujan. Eds. *The Oxford Anthology of Modern Indian Poetry*. Oxford University Press, 1994.

Dharwadker, Vinay. Ed & Trans. *Kabir: The Weaver's Songs*. Penguin Books, 2003.

Mukherjee, Sujit. *Towards a Literary History of India*. IIAS, 1975.

Nirala, Suryakant Tripathi. *A Season on the Earth: Selected Poems of Nirala*. Trans. David Rubin. Oxford University Press, 2003.

Ramakrishnan, E. Y. *Locating Indian Literature: Texts, Traditions, Translations*. Orient Blackswan Pvt. Ltd, 2011.

Sadana, Rashmi. *English Heart, Hindi Heartland: The Political Life of Literature in India*. Permanent Black, 2012.

Satchidanadan, K, Ed. *Signatures: One Hundred Indian Poets*. NBT, 2000.

Course Title: Modern World Literature

Course Code: SHSS ENG 01 04 E 15 3104

Objective(s): To introduce the students with the concept of World Literature and select literary texts by the celebrated authors so as to help them develop appreciation for literatures from different regional and national contexts.

Course Level Learning Outcomes:

Some of the learning outcomes, that the students of this course are expected to demonstrate, are listed as follows:

1. Develop understanding of the concept of World Literature from the perspective of Goethe and Tagore.
2. Elaborate, analyse and appreciate the important literary texts and the writers from diverse contexts.
3. Discuss the concept of World Literature vis-à-vis regional/national literatures.
4. Elaborate the inherent link between World Literature and Translation.

Course Content:

Unit-I: Concept of World Literature

Goethe's Concept of *Weltliteratur*

Rabindranath Tagore's Concept of *Visva Sahitya*

World Literature vis-à-vis Comparative Literature

World Literature and Translation

Unit-II:

Gabriel Garcia Marquez: *Love in the Time of Cholera*

Unit-III:

Mo Yan: *The Garlic Ballads*

Unit-IV:

Kalidasa: *Abhijnana Shakuntalam*

Suggested Readings:

Apter, Emily. *Against World Literature: On the Politics of Untranslatability*: *On the Politics of Untranslatability*. Penguin, 2013.

David, Damrosch. *What Is World Literature?* Princeton U. P., 2003.

D'haen, Theo. *The Routledge Concise History of World Literature*. London: Routledge, 2011.

Kalidas. *Abhijnanashakuntalam: The Recognition of Shakuntala*. Penguin India, 2016.

King, Bruce, ed. *The New National and Postcolonial Literatures: An Introduction,* Oxford: Clarendon, 1996.

Tagore, Rabindranath. "Visva Sahitya". *Rabindranath Tagore in the 21st Century*. Ed. D. Banerji. Springer India, 2015.

Course Title: Existentialism and Literature

Course Code: SHSS ENG 01 04 E 16 3104

Objective: The primary objective of this course is to introduce the students with the major existentialist philosophers and their literary and philosophical works. Concerned with the human condition itself, existentialism is a philosophy raising serious ethical questions, and one of the main objectives of this course is to bring the students face to face with those questions and provide an interactive atmosphere to discuss and answer them.

Course Level Learning Outcomes:

Some of the learning outcomes that the students of this course are expected to demonstrate are listed here.

1. Understanding of existentialist philosophy and its relevance to life.
2. Ability to trace the socio-historical reasons for the origin and development of existentialism.
3. Knowledge of the relationship between philosophy and literature.
4. Specialized research interest in studying and analyzing existentialist literature.
5. Understanding of existentialist ethics and ability to explain with reference to other important ethical traditions.

Background Concepts: "The Single Individual"; Facticity and Transcendence; Alienation; Authenticity; Anxiety; Nothingness; The Absurd; Nihilism; "Existence precedes Essence"; Choice and Freedom; Responsibility; Ideality of Values; Decisionism; etc.

Course Content:

Unit-I

a) Soren Kierkegaard**:** "Preface", "Exordium" and Eulogy on Abraham" from *Fear and Trembling*

b) Fyodor Dostoevsky: *Crime and Punishment*

Unit-II

a) Iris Murdoch: "The Sovereignty of Good Over Other Concepts" from *The Sovereignty of Good*

b) Jean Paul Sartre – *Nausea*

Unit-III

a) Albert Camus – "An Absurd Reasoning" and "The Myth of Sisyphus" from *The Myth of Sisyphus*

b) Franz Kafka – *The Trial*

Unit-IV

1. Friedrich Nietzsche – "Preface" and "'Good and Evil', 'Good and Bad'" from *On the Genealogy of Morals*

2. Andre Gide – *The Immoralist*

Suggested Readings:

Bakewell, Sarah. *At the Existentialist Café: Freedom, Being, and Apricot Cocktails.* Random House, 2017.

Barrett, William. *Irrational Man: A Study in Existential Philosophy*. Anchor Books/Doubleday, 2011.

Camus, Albert. *The Rebel*. Trans. Anthony Bower. Penguin, 2000.

Cooper, E. David. *Existentialism: A Reconstruction*. Wiley-Blackwell, 1999.

Dostoevsky, Fyodor. *The Idiot*. Trans. Eva Martiny. Vintage Classics, 2003.

Ferreira, M. Jamie. *Kierkegaard*. Wiley-Blackwell, 2008.

Flynn, Thomas. *Existentialism: A Very Short Introduction.* Oxford University Press, 2006.

Foley, John. *Albert Camus: From the Absurd to Revolt*. Acumen, 2008.

Frank, Joseph. *Dostoevsky: A Writer in His Time*. Princeton University Press, 2009.

Frankl, E. Viktor. *Man's Search for Meaning*. Beacon Press, 2000.

Gide, Andre. *Dostoevsky*. New Directions, 1961.

Graham, Gordon. *In Search of Authenticity: From Kierkegaard to Camus*. Routledge, 1995.

Kafka, Franz. *The Essential Kafka: The Castle; The Trial; Metamorphosis and Other Stories.* Wordsworth Classics, 2014.

Kaufmann, Walter. *Existentialism from Dostoevsky to Sartre.* Penguin, 1975.

Murdoch, Iris. *Metaphysics as a Guide to Morals*. Penguin, 1994.

---. *Sartre: Romantic Rationalist*. Vintage, 1999.

---. *Existentialists and Mystics: Writings on Philosophy and Literature*. Penguin, 1999.

Nietzsche, Friedrich. *Beyond Good and Evil: Prelude to a Philosophy of the Future.* Trans. Walter Kaufmann. Vintage Classics, 2010.

Sartre, J. Paul. *No Exit and Three Other Plays*. Trans. S. Gilbert and L. Abel. Vintage Books, 1989.

Sartre, J. Paul and Richard Moran. *Being and Nothingness: An Essay in Phenomenological Ontology*. Routledge, 2018.

Simone, de Beauvoir. *What is Existentialism*? Penguin Classics, 2020.

Course Title: Literature and Human Rights

Course Code: SHSS ENG 01 04 E 17 3104

Objective(s):

1. To familiarize students with the history and evolution of human rights.
2. To develop understanding of literary texts that narrate the situations concerning human rights.
3. To study human rights representation in various genres of literature.

Course Level Learning Outcomes:

Some of the learning outcomes that the students of this course are expected to demonstrate are listed as follows:

1. Understanding regarding the ontology of human rights.
2. Ability to critically interpret the nuances of human rights in literary representations.
3. Exposure with important literary representations concerning human rights.
4. Application of literary understanding on day to day issues involving human rights.

Course Content:

Unit – I:

Lynn Hunt: *Inventing Human Rights: A History*

Unit - II

Anne Frank: *The Diary of a Young Girl*

Unit -III

Harper Lee: *To Kill a Mockingbird*

Unit - IV

Amrita Pritam: *Pinjar*

Charlotte Perkins Gilman: "The Yellow Wallpaper"

Ismat Chugtai: "Lihaaf"

Suggested Readings:

25 + Human Rights Documents. Columbia Centre for the Study of Human Rights, Columbia University, 2005.

Chugtai, Ismat. trans. M. Asaduddin "Lihaaf" (1942). *Lifting the Veil*. Penguin India, 2009.

Donnelly, Jack. *Universal Human Rights in Theory and Practice*. Cornell University Press, 1989.

Frank, Anne. *The Diary of a Young Girl* (1952). Maple Press Pvt. Ltd., 2013.

Freedom: Stories Celebrating the Universal Declaration of Human Rights. Ed. Amnesty International USA. 2011

Gilman, Charlotte Perkins. "The Yellow Wallpaper" (1892). *The Yellow Wallpaper*. Dover Publications Inc., 1997.

Hunt, Lynn. *Inventing Human Rights: A History*. W. W. Norton & Company, 2008.

Ishay, Micheline. *The Human Rights Reader: Major Political Essays, Speeches and Documents from Ancient Times to the Present*. Second edition, Routledge, 2007.

King John, trans. David A. Carpenter. *Magna Carta*. Penguin Classics, 2015.

Lee, Harper. *To Kill a Mockingbird* (1969). RHUK; Special edition, 2010.

Nayar, Pramod K. *Writing Wrongs: The Cultural Construction of Human Rights in India*. Routledge India, 2012.

---. *Human Rights and Literature: Writing Rights*. Palgrave Macmillan, 2016.

Pritam, Amrita. trans. by Khushwant Singh. *Pinjar* (1950). *The Skeleton*. Dynamic Publications, 2013.

Rousseau, Jean-Jacques trans. John T. Scott. *The Major Political Writings of Jean-Jacques Rousseau: The Two "Discourses" and the "Social Contract"*. University of Chicago Press, 2014.

The Cambridge Companion to Human Rights and Literature. ed. Crystal Parikh, Cambridge University Press, 2019.

The Routledge Companion to Literature and Human Rights. ed. Alexandra Schultheis Moore & Sophia A. McClennen, Routledge, 2015.

Teaching Learning Process

- LOCF
- NEP-2020
- Blended Learning
- Face to face (F to F) Learning
- Programme Outcomes
- Programme Specific Outcomes
- Course-level Learning Outcomes
- Postgraduate Attributes
- Learning Outcome Index
- Formative Assessment and Evaluation
- Comprehensive and Continuous Evaluation
- Multidisciplinary Approach

Blended Learning

Concept: Blended Learning is a pedagogical approach that combines face to-face classroom methods with computer-mediated activities in the process of teaching and learning. It implies nice blend of face-to-face and online activities to make the learning processes more interesting and engaging. It focuses on integration of traditional classroom activities and innovative ICT-enabled strategies. It emphasises student-centric learning environment where the teacher is the facilitator for productive and measurable learning outcomes. It optimises and compliments the face to face learning, giving ample freedom and flexibility to the students and teachers to access and explore the wide range of open-access sources such as video lectures, podcasts, recordings and articles through digital platforms. It gives freedom and autonomy to the teachers in selection of appropriate digital platforms, resources and time-slots to complement and supplement face to face learning. The Blended Learning doesn't undermine the role of the teacher, rather it gives him/her an opportunity to explore the unexplored in accordance with the requirements of the curriculum.

Key Features of Blended Learning:

- Student-Centric Pedagogical Approach focusing on flexibility in timing, quality content, needs and interests of students and freedom to study through the mode of his/her choice;
- Freedom to Select variety of mediums and techniques;
- Increased student engagement in learning;
- Enhanced teacher and student interaction;
- Improved student learning outcomes;
- More flexible teaching and learning environment;
- More responsive for self and continuous learning;
- Better opportunities for experiential learning;
- Increased learning skills;
- Greater access to information, improved satisfaction and learning outcomes.

Assessment and Evaluation

- Continuous Comprehensive Evaluation to assess each Course-level learning outcome
- Formative Assessment instead of one-time summative assessment
- Oral Examinations to test presentation and communication skills
- Moving towards Open Book Examination for better understanding and application of the knowledge acquired
- Assessment tools aligned with specific learning outcomes for each course
- Collaborative Assignments and Group Examinations on Problem solving
- Seminar Presentations
- Review of Literature

Key Features of Revised Curriculum

- Wide Range of Core and Elective Courses
- Properly Spelled Out Measurable Outcomes for Each Course
- Integration of Indian culture, heritage and literature with domain knowledge;
- One Course on Indian Literature in Each Semester
    - Indian Classical Literature
    - Bhakti Poetry
    - Indian Writings in English
    - Modern Indian Literature in English Translation
    - Literary Criticism in India
    - Contemporary South Asian Fiction in English
    - Dalit Literature and Aesthetics
- Multidisciplinary Courses
    - Gender and Literature
    - Literature of Protest
    - Dalit Literature and Aesthetics
    - Existentialism and Literature
    - Literature and Human Rights
    - Disability Studies and Literature
- Skill-oriented curriculum and pedagogy
    - Communication Skills
    - Creative Writing
    - Introduction to Translation: Theory and Practice
    - Introduction to Linguistics
    - English Language Teaching
- Compatibility between Programme Outcomes, Programme-specific Outcomes and Course-Level Learning Outcomes
- Wider flexibility in selection of courses

Keywords

- LOCF
- NEP-2020
- Blended Learning
- Face to face (F to F) Learning
- Programme Outcomes
- Programme Specific Outcomes
- Course-level Learning Outcomes
- Postgraduate Attributes
- Learning Outcome Index
- Formative Assessment and Evaluation
- Comprehensive and Continuous Evaluation

References

- National Education Policy-2020. https://www.education.gov.in/sites/upload_files/mhrd/files/NEP_Final_English_0.pdf
- The draft subject specific LOCF templates available on UGC website. https://www.ugc.ac.in/ugc_notices.aspx?id=MjY5OQ==
- Draft Blended Mode of Teaching and Learning: Concept Note available on UGC website. https://www.ugc.ac.in/pdfnews/6100340_Concept-Note-Blended-Mode-of-Teaching-and-Learning.pdf

Appendix

Curricular Reforms— Extracts from National Education Policy-2020

I. National Education Policy: Vision of Higher Education:

- Enabling the development of an enlightened, socially conscious, knowledgeable, and skilled nation
- The basis for knowledge creation and innovation thereby contributing to a growing national economy.
- The key to more vibrant, socially engaged, cooperative communities and a happier, cohesive, cultured, productive, innovative, progressive, and prosperous nation.
- Contributing towards sustainable livelihoods and economic development of the nation
- Creating holistic, thoughtful, creative and well-rounded individuals equipped with the key 21st century skills.

II. NEP: Emphasis on Integrated Approach:

- An integrated higher education system, including professional and vocational education;
- Enabling and encouraging high-quality multidisciplinary and cross-disciplinary education;
- 21st century capacities in fields across the arts, humanities, languages, sciences, social sciences, and professional, technical, and vocational fields;
- Even engineering institutions, such as IITs, to move towards more holistic and multidisciplinary education with more arts and humanities.
- Students of arts and humanities will aim to learn more science
- Efforts to incorporate more vocational subjects and soft skills in general education
- Integration of the humanities and arts with STEM for positive learning outcomes.

III. NEP: Recommendation on Curricular Aspects:

- Revamping curriculum, pedagogy, assessment, and student support for enhanced student experiences;
- Developing real understanding and learning how to learn - away from the culture of rote learning.
- Developing character, ethical and Constitutional values, intellectual curiosity, scientific temper, creativity, spirit of service
- Prepare the students for more meaningful and satisfying lives and work roles
- Identifying specific sets of skills and values across domains, while enabling the students to become economically independent.

IV. NEP: Recommended Skills

- 21st century capabilities across the range of disciplines;
- Personal accomplishment and enlightenment;
- Constructive public engagement;
- Productive contribution to the society;
- Scientific temper and evidence-based thinking;
- Creativity and innovativeness;
- Critical thinking and higher-order thinking capacities,
- Communication skills,
- Current affairs and knowledge of critical issues facing local communities, States, country and the world.
- In-depth learning and mastery of curricula across fields
- Social and moral awareness,

- Sense of aesthetics and art;
- Oral and written communication;
- Health and nutrition;
- Physical education, fitness, wellness, and sports;
- Collaboration and teamwork;
- Problem solving and logical reasoning;
- Environmental awareness, water/resource conservation, sanitation and hygiene
- In-depth learning and mastery of curricula across fields
- Social and moral awareness,
- Sense of aesthetics and art;
- Oral and written communication;
- Health and nutrition;
- Physical education, fitness, wellness, and sports;
- Collaboration and teamwork;
- Problem solving and logical reasoning;
- Environmental awareness, water/resource conservation, sanitation and hygiene

V. NEP: Recommended Reforms

- Introduction of contemporary subjects such as Artificial Intelligence, Design Thinking, Holistic Health, Organic Living, Environmental Education, Global Citizenship Education (GCED), etc. to develop various important skills among students.
- Skills and values to be imbibed through engaging processes of teaching and learning
- Curriculum content to be reduced to make space for critical thinking and more holistic, inquiry-based, discovery-based, discussion-based, and analysis-based learning
- Content will focus on key concepts, ideas, applications, and problem solving
- Experiential learning including hands-on learning, arts-integrated and sports-integrated education,
- Story-telling-based pedagogy in each subject.
- Various aspects and forms of art and culture as the basis for learning of concepts across subjects
- Imbibing the Indian ethos through integration of Indian art and culture in teaching and learning process
- Curriculum and pedagogy to be strongly rooted in the Indian and local context and ethos in terms of culture, traditions, heritage, customs, language, philosophy, geography, ancient and contemporary knowledge, societal and scientific needs, indigenous and traditional ways of learning etc.
- Empowering the students through flexibility in course choices
- Imaginative and flexible curricular structures to enable creative combinations of disciplines for study
- Offering multiple entry and exit points by removing currently prevalent rigid boundaries and creating new possibilities for life-long learning.
- Indian standards will be aligned with the International Standard Classification of Occupations maintained by the International Labour Organization.
- No hard separation among ‘curricular’, ‘extracurricular ’, or ‘co-curricular’, among ‘arts’, ‘humanities’, and ‘sciences’, or between ‘vocational’ or ‘academic’ streams.
- Exposure to Indian knowledge system, cultural traditions and classical literature through promotion of multilingualism and reverence for Indian classical languages
- Weaving the cultural aspects of the languages - such as films, theatre, storytelling, poetry, and music with various relevant subjects and real-life experiences
- “Knowledge of India” to educate the students about knowledge from ancient India and its contributions to modern India

- Basic ethical reasoning, traditional Indian values and human and Constitutional values to be developed in all students.
- Credit-based courses and projects in the areas of community engagement and service, environmental education, and value-based education.
- Opportunities for internships with local industry, businesses, artists, crafts persons, etc. so that students engage with the practical side of their learning to improve their employability.
- Focus areas for vocational education will be chosen based on skills gap analysis and mapping of local opportunities.
- Focus on research and innovation through start-up incubation centres; technology development centres; and greater industry-academic linkages;
- Technical Education requires closer collaborations between industry and higher education institutions to drive innovation in curricular planning for desired outcomes.
- Technical education should have a renewed focus on opportunities to engage deeply with other disciplines for enhancing the employability of the youth.
- Continuous formative assessment to further the goals of each programme.
- Moving away from high-stakes examinations towards more continuous and comprehensive evaluation.
- Assessing the student achievement based on the learning goals for each programme, making the system fairer and outcomes more comparable.
- All programmes, courses, curricula, and pedagogy across subjects, including those in-class, online, and in ODL modes to achieve global standards of quality.
- Faculty be given the freedom to design their own curricular and pedagogical approaches within the approved framework, including textbook and reading material selections, assignments, and assessments.
- Empowering the faculty to conduct innovative teaching, research, and service as they see best.
- Classroom transactions to shift towards competency-based learning and education
- The assessment tools to be aligned with the learning outcomes, capabilities, and dispositions as specified for each subject

हरियाणा केंद्रीय विश्वविद्यालय

(संसद अधिनियम संख्या 25 (2009) के तहत स्थापित)
राष्ट्रीय मूल्यांकन एवं प्रत्यायन परिषद से 'ए' ग्रेड प्राप्त विश्वविद्यालय
महेंद्रगढ़-123031 (हरि.)

कार्यवृत्त

हिंदी विभाग के अध्ययन मंडल की ऑनलाइन बैठक दिनांक 02.09.2021, दिन-वीरवार, पूर्वाह्न 11:00 बजे आयोजित हुई। इसमें निम्नलिखित सदस्य उपस्थित हुए-

1. प्रो. एम.पी. शर्मा, पूर्व आचार्य, हिंदी विभाग, जामिया मिल्लिया इस्लामिया, नई दिल्ली
2. प्रो. माया मलिक, अध्यक्ष, हिंदी विभाग, महर्षि दयानंद विश्वविद्यालय, रोहतक
3. डॉ. अमित कुमार, सहायक प्रोफ़ेसर एवं प्रभारी, हिंदी विभाग, हकेवि.
4. डॉ. अरविन्द सिंह तेजावत, सहायक प्रोफ़ेसर, हिंदी विभाग, हकेवि.

समिति के सदस्यों के स्वागतोपरांत कार्यसूची के निम्नलिखित बिंदु पर विचार किया और निर्णय लिए गए :

1. **एम.ए. एवं पीएच.डी. (कोर्स वर्क) के पाठ्यक्रमों का अनुमोदन। (अनुलग्नक-'क' तथा 'ख')।**
संस्तुति : अध्ययन मंडल ने एम.ए. एवं पीएच.डी. (कोर्स वर्क) के पाठ्यक्रमों को विस्तारपूर्वक चर्चा के उपरांत अनुमोदित एवं पारित किया। साथ ही, किसी भी अपेक्षित संशोधन हेतु प्रभारी/अध्यक्ष, हिंदी विभाग को अधिकृत किया।

विचारार्थ अन्य कोई विषय न होने की स्थिति में धन्यवाद ज्ञापन के साथ बैठक संपन्न हुई।

(प्रो. एम.पी. शर्मा) (प्रो. माया मलिक)

(डॉ. अमित कुमार) (डॉ. अरविंद सिंह तेजावत)

HOD Hindi <hodhindi@cuh.ac.in>

अध्ययन मंडल के कार्यवृत्त के अनुमोदन हेतु.

8 messages

HOD/TIC Hindi <hodhindi@cuh.ac.in> Fri, Sep 3, 2021 at 10:46 PM
To: sharmamp@hotmail.com, maya malik <mayamalik7@gmail.com>, Arvind Singh Tejawat <arvindtejawat@cuh.ac.in>, "Dr. Amit Kumar" <amitkumar@cuh.ac.in>
Cc: "Dr. Sanjiv Kumar" <sanjivkumar@cuh.ac.in>

महोदय(या),
सादर नमस्ते.
दिनांक 03 सितंबर, 2021, दिन-वीरवार को ऑनलाइन संपन्न हुई अध्ययन मंडल की बैठक का कार्यवृत्त आपके अनुमोदनार्थ सादर प्रस्तुत है.

--

सादर / with regards

अध्यक्ष/प्रभारी / HoD/TIC
हिंदी विभाग / Dept. of Hindi
हरियाणा केंद्रीय विश्वविद्यालय, महेंद्रगढ़
Central University of Haryana, Mahender Garh

3 attachments

कार्यवृत्त_अध्ययन मंडल_बैठक_03 सितंबर, 2021.pdf
165K

अनुलग्नक-'क'_पाठ्यक्रम_एम.ए. (हिंदी)_2020-21 से प्रभावी.pdf
1682K

अनुलग्नक-'ख'_पाठ्यक्रम_पीएच.डी. (हिंदी)_कोर्स वर्क_2020-21 से प्रभावी.pdf
952K

HOD/TIC Hindi <hodhindi@cuh.ac.in> Sat, Sep 4, 2021 at 5:31 AM
To: sharmamp@hotmail.com, maya malik <mayamalik7@gmail.com>, Arvind Singh Tejawat <arvindtejawat@cuh.ac.in>, "Dr. Amit Kumar" <amitkumar@cuh.ac.in>
Cc: "Dr. Sanjiv Kumar" <sanjivkumar@cuh.ac.in>

महोदय (या)
अनुगामी ई.मेल के तारतम्य में सूचित करना है कि अध्ययन मंडल की बैठक दिनांक 02.09.2021, दिन-वीरवार को संपन्न हुई थी. टंकण की त्रुटि के कारण कार्यवृत्त में 03.09.2021 तिथि अंकित हो गयी है. कृपया उसे 02.09.2021 ही समझने का कष्ट करें.
[Quoted text hidden]
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[Quoted text hidden]

कार्यवृत्त_अध्ययन मंडल_बैठक_02 सितंबर, 2021.pdf
165K

Mahendra Sharma <sharmamp@hotmail.com> Mon, Sep 6, 2021 at 11:05 AM
To: HOD/TIC Hindi <hodhindi@cuh.ac.in>

मैं अनुमोदन करता हूँ.
प्रो. महेंद्र पाल शर्मा

Sent from my iPhone

On 04-Sep-2021, at 5:31 AM, HOD/TIC Hindi <hodhindi@cuh.ac.in> wrote:

[Quoted text hidden]
<कार्यवृत्त_अध्ययन मंडल_बैठक_02 सितंबर, 2021.pdf>

Mahendra Sharma <sharmamp@hotmail.com> Mon, Sep 6, 2021 at 11:08 AM
To: HOD/TIC Hindi <hodhindi@cuh.ac.in>

अनुमोदन करता हूँ.
प्रो. एम. पी. शर्मा

Sent from my iPhone

On 06-Sep-2021, at 11:05 AM, Mahendra Sharma <sharmamp@hotmail.com> wrote:

मैं अनुमोदन करता हूँ.
[Quoted text hidden]

---

maya malik <mayamalik7@gmail.com> Mon, Sep 6, 2021 at 12:05 PM
To: HOD/TIC Hindi <hodhindi@cuh.ac.in>

मैं उपर्युक्त कार्यवाही का अनुमोदन करती हूं।

On Saturday, September 4, 2021, HOD/TIC Hindi <hodhindi@cuh.ac.in> wrote:
महोदय (या)
अनुगामी ई.मेल के तारतम्य में सूचित करना है कि अध्ययन मंडल की बैठक दिनांक 02.09.2021, दिन-वीरवार को संपन्न हुई थी. टंकण की त्रुटि के कारण कार्यवृत्त में 03.09.2021 तिथि अंकित हो गयी है. कृपया उसे 02.09.2021 ही समझने का कष्ट करें.

On Fri, Sep 3, 2021 at 10:46 PM HOD/TIC Hindi <hodhindi@cuh.ac.in> wrote:
महोदय(या),
सादर नमस्ते.
दिनांक 03 सितंबर, 2021, दिन-वीरवार को ऑनलाइन संपन्न हुई अध्ययन मंडल की बैठक का कार्यवृत्त आपके अनुमोदनार्थ सादर प्रस्तुत है.

--

सादर / with regards

अध्यक्ष/प्रभारी / HoD/TIC
हिंदी विभाग / Dept. of Hindi

हरियाणा केंद्रीय विश्वविद्यालय, महेंद्रगढ़
Central University of Haryana, Mahender Garh

--
--

सादर / with regards

अध्यक्ष/प्रभारी / HoD/TIC
हिंदी विभाग / Dept. of Hindi
हरियाणा केंद्रीय विश्वविद्यालय, महेंद्रगढ़
Central University of Haryana, Mahender Garg

--
Sent from Gmail Mobile

Dr. Amit Kumar <amitkumar@cuh.ac.in> Mon, Sep 6, 2021 at 12:12 PM
To: HOD/TIC Hindi <hodhindi@cuh.ac.in>
Cc: sharmamp@hotmail.com, maya malik <mayamalik7@gmail.com>, Arvind Singh Tejawat <arvindtejawat@cuh.ac.in>, "Dr. Sanjiv Kumar" <sanjivkumar@cuh.ac.in>

महोदय(या)
मेरी ओर से संबंधित कार्यवृत्त अनुमोदित है.
[Quoted text hidden]
--

सादर

डॉ. अमित कुमार / Dr. Amit Kumar
सहायक प्रोफ़ेसर एवं प्रभारी
Asst. Professor & Teacher-In-Charge
हिंदी विभाग / Deptt. of Hindi
हरियाणा केंद्रीय विश्वविद्यालय
Central University of Haryana
जांट-पाली, महेंद्रगढ़ / Jant-Pali, Mahender Garh-123029
(हरियाणा) / (Haryana)
Mob. +91 9992885959, +91 9416907290
e-mail amitkumar@cuh.ac.in
amitmanoj2018@gmail.com

Arvind Singh Tejawat <arvindtejawat@cuh.ac.in> Tue, Sep 7, 2021 at 3:57 AM
To: HOD/TIC Hindi <hodhindi@cuh.ac.in>
Cc: sharmamp@hotmail.com, maya malik <mayamalik7@gmail.com>, "Dr. Amit Kumar" <amitkumar@cuh.ac.in>, "Dr. Sanjiv Kumar" <sanjivkumar@cuh.ac.in>

1. पीएच.डी. (कोर्स वर्क) का पाठ्यक्रम अनुमोदित।

2. एम.ए. (हिंदी) का पाठ्यक्रम मेरे द्वारा दिनाँक 02 सितंबर 2021 को अधिष्ठाता (मानविकी एवं सामाजिक विज्ञान) को प्रेषित ईमेल के आलोक में अनुमोदित। (ईमेल अध्ययन मंडल से सभी सदस्यों के साथ साझा की जा चुकी है)

सुझाव: 1. एम.ए. (हिंदी) के पाठ्यक्रम में अपेक्षित सुधार जल्द हो।
2. अध्ययन मंडल में पाठ्यक्रम प्रस्तुति से पूर्व आवश्यक प्रक्रियाओं का पालन किया जाए तथा पाठ्यक्रम से संबंधित विभागीय एवं पाठ्यक्रम निर्माण समिति के सदस्यों की लिखित सहमति प्राप्त कर ली जाए।
[Quoted text hidden]

HOD/TIC Hindi <hodhindi@cuh.ac.in> Tue, Sep 7, 2021 at 1:11 PM
To: sharmamp@hotmail.com, maya malik <mayamalik7@gmail.com>, "Dr. Sanjiv Kumar" <sanjivkumar@cuh.ac.in>, Arvind Singh Tejawat <arvindtejawat@cuh.ac.in>, "Dr. Amit Kumar" <amitkumar@cuh.ac.in>

महोदय(या)
अध्ययन मंडल के सदस्य डॉ. अरविंद सिंह तेजावत द्वारा प्रदत्त सुझावों को सम्मिलित करने के उपरांत आपके संदर्भ हेतु एम.ए. (हिंदी) का पाठ्यक्रम अनुलग्नक के रूप में प्रेषित है.
[Quoted text hidden]
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[Quoted text hidden]

अनुलग्नक-'क'_पाठ्यक्रम_एम.ए. (हिंदी)_2021-22 से प्रभावी.pdf
1699K

Arvind Singh Tejawat <arvindtejawat@cuh.ac.in> Tue, Sep 7, 2021 at 3:01 PM
To: HOD/TIC Hindi <hodhindi@cuh.ac.in>
Cc: sharmamp@hotmail.com, maya malik <mayamalik7@gmail.com>, "Dr. Sanjiv Kumar" <sanjivkumar@cuh.ac.in>, "Dr. Amit Kumar" <amitkumar@cuh.ac.in>

कार्यवृत अनुमोदित
[Quoted text hidden]



पाठ्यक्रम

एम.ए. (हिंदी)

(2021-22 से प्रभावी)

नयी शिक्षा नीति और अधिगम परिणाम आधारित पाठ्यचर्या



एम.ए. (हिंदी)

हिंदी विभाग

मानविकी एवं समाज विज्ञान पीठ

हरियाणा केंद्रीय विश्वविद्यालय, महेंद्रगढ़

(2021-22 से प्रभावी)

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पृष्ठभूमि

हरियाणा केंद्रीय विश्वविद्यालय के सभी शैक्षणिक विभागों ने नयी शिक्षा नीति-2020 एवं उच्च शिक्षण संस्थान हेतु विश्वविद्यालय अनुदान आयोग गुणवत्ता जनादेश-2021 की तारतम्यता में, वांछित अधिगम परिणामों हेतु पाठ्यक्रम सुधार को आवश्यक मानते हुए, स्नातक और स्नातकोत्तर के समस्त पाठ्यक्रमों को अथक प्रयास के द्वारा संशोधित किया है। पाठ्यक्रम संशोधन की प्रक्रिया 23 अप्रैल, 2021 को विश्वविद्यालय की शैक्षणिक परिषद् की 32वीं बैठक में ग्रहित 'नयी शिक्षा नीति-2020 के क्रियान्वयन हेतु व्यापक दिशा-निर्देश' से अनुप्रेरित है। इस दिशा-निर्देश ने नीति की प्रमुख विशेषताओं की पहचान की और प्रमुख शैक्षणिक सुधारों के लिए अच्छी तरह से परिभाषित जिम्मेदारियों एवं सांकेतिक समय-रेखा के साथ कार्य-योजना को स्पष्ट किया। इस नीति की प्रमुख विशेषताओं के बारे में शिक्षकों को उन्मुख करने के लिए विश्वविद्यालय द्वारा आयोजित वेबिनार और चर्चाओं की शृंखला के साथ पाठ्यक्रम में सुधार की प्रक्रिया शुरू हुई, जिससे वे नीति के साथ पाठ्यक्रम को संशोधित करने में सक्षम हो सकें। नयी शिक्षा नीति-2020 की दूरदर्शिता और प्रावधानों के बारे में शिक्षकों के उचित उन्मुखीकरण ने उनके लिए नीति के महत्वपूर्ण पहलुओं की महत्ता को समझने व उन्हें संशोधित पाठ्यक्रम में शामिल करना आसान बना दिया है, जो कि 'एक प्रबुद्ध, सामाजिक रूप से जागरूक, ज्ञानवान और कौशल-संपन्न राष्ट्र के विकास' के लिए '21वीं सदी के कौशलों की कुंजी के साथ सम्पूर्ण, विचारशील, रचनात्मक और अच्छी तरह से सुसज्जित व्यक्तियों के निर्माण' पर केंद्रित है।

नयी शिक्षा नीति-2020 के परिप्रेक्ष्य में संशोधित पाठ्यक्रम अग्रलिखित बिन्दुओं पर बल दते हुए इस नीति की आत्मा को प्रस्तुत करता है- अधिगम का समेकित दृष्टिकोण; नवीन शिक्षण प्रविधि और आकलन-पद्धति; बहु-विषयी और अंतर-अनुशासनिक शिक्षा; रचनात्मक और आलोचनात्मक चिंतन; मूल्य-आधारित पाठ्यक्रम के माध्यम से नैतिक एवं संवैधानिक मूल्य; पेशेवर कौशल, उद्यमिता और जीवन कौशल के माध्यम से अनुशासनों से निर्बंध 21वीं सदी की क्षमताएँ; सामुदायिक और रचनात्मक जनसहयोग; सामाजिक, नैतिक और पर्यावरणीय जागरूकता; जैविक रहवास और वैश्विक नागरिकबोध की शिक्षा; परिपूर्ण, जिज्ञासामूलक, अन्वेषणमूलक, विमर्शमूलक और विश्लेषणमूलक अधिगम; 'भारत-ज्ञान' संबंधी प्रासंगिक कार्यक्रम के माध्यम से भारतीय ज्ञान-पद्धति, सांस्कृतिक परम्पराओं और शास्त्रीय साहित्य की पड़ताल; अधिगम के भारतीय एवं परम्परागत विधियों के साथ आधुनिक शिक्षण पद्धति का समुचित मिश्रण; पाठ्यक्रम चयन की स्वतंत्रता; विद्यार्थी केंद्रित भागीदारीमूलक अधिगम; अध्ययन हेतु अनुशासनों के रचनात्मक संयोजन को प्रभावी करने के लिए कल्पनाशील और लचीली पाठ्यचर्या संरचना; प्रथमत: स्नातक कार्यक्रमों में बहुविकल्पीय प्रवेश एवं निकास का प्रस्ताव; अंतरराष्ट्रीय श्रम संगठन द्वारा बनाए गए व्यवसायों के अंतरराष्ट्रीय मानक वर्गीकरण के साथ व्यावसायिक पाठ्यक्रमों का सरेखण; अनुशासनों को निर्बंध करना; पाठ्यचर्या और पाठ्येतर पहलुओं का समवाय; स्थानीय उद्योग, व्यवसायों, कलाकारों और शिल्पकारों के साथ प्रशिक्षण के अवसर; तकनीकी, व्यावसायिक और विज्ञान कार्यक्रमों के लिए उद्योग और उच्च शिक्षा संस्थानों के बीच घनिष्ठ सहयोग और प्रत्येक पाठ्यक्रम के लिए निर्दिष्ट सीखने के परिणामों, क्षमताओं व स्वभाव के साथ गठबंधन करने के लिए रचनात्मक मूल्यांकन उपकरण, अभियांत्रिकी और व्यावसायिक अध्ययन में स्नातक कार्यक्रमों के मामले में, यह निर्णय लिया गया था कि विभाग एआईसीटीई, एनबीए, एनएसक्यूएफ, व्यवसायों के अंतरराष्ट्रीय मानक वर्गीकरण, सेक्टर कौशल परिषद और अन्य संबंधित एजेंसियों/स्रोतों का अनुपालन करते हुए प्रासंगिक नयी शिक्षा नीति की संस्तुतियों को शामिल करेंगे। विश्वविद्यालय ने प्रत्येक कार्यक्रम हेतु पाठ्य-

सामग्री का 40% ऑनलाइन एवं 60% प्रत्यक्ष शिक्षण द्वारा संचालित करने पर सहमति बनायी। विभिन्न कार्यक्रमों के संशोधित पाठ्यक्रम को शिक्षकों, विभागाध्यक्षों और पीठ के अधिष्ठाता के सामूहिक प्रयास से तैयार किया गया है। प्रत्येक विभाग द्वारा विभाग, पीठ एवं विश्वविद्यालय स्तर पर आयोजित शृंखलाबद्ध विचार-सत्रों में गहन विचार-विमर्श से पाठ्यक्रम-प्रारूप निर्मित किया गया है। संशोधित पाठ्यक्रम के लिए एक समान रूप और संरचना विकसित करने की पूरी कवायद के पीछे विश्वविद्यालय का नेतृत्व एक प्रेरक शक्ति रहा है।

विश्वविद्यालय के कुलपति ने पाठ्यक्रम के विविध आयामों एवं दृष्टिकोणों के अनुरूप एकीकृत ढाँचे हेतु पृष्ठभूमि, कार्यक्रम निष्कर्ष, कार्यक्रम विशेष के निष्कर्ष, स्नातकोत्तर की महत्ता, निष्णात पाठ्यक्रम की संरचना, अधिगम निष्कर्ष सूचकांक, सेमेस्टरवार पाठ्यक्रम और क्रेडिट वितरण, पाठ्यक्रम आधारित अधिगम निष्कर्ष, शिक्षण-अधिगम प्रक्रिया, मिश्रित अधिगम, आकलन एवं मूल्यांकन, प्रमुख बिंदु, संदर्भ एवं अनुलग्नक जैसे बिंदुओं पर विभागाध्यक्षों और अधिष्ठाताओं के साथ शृंखलाबद्ध बैठकें की। विभिन्न अध्ययन मंडल एवं पीठ मंडल के विशेषज्ञों ने प्रत्येक कार्यक्रम के पाठ्यक्रम को अंतिम रूप प्रदन करने में अपनी महती भूमिका अदा की।

नयी शिक्षा नीति-2020 में परिकल्पित पाठ्यचर्या सुधारों के क्रियान्वयन को सुनिश्चित करने के लिए, विश्वविद्यालय ने विभिन्न प्रावधानों को चरणबद्ध तरीके से लागू करने का निर्णय लिया है। अत: पाठ्यक्रम की वार्षिक समीक्षा की जा सकेगी।

कार्यक्रम के परिणाम

एम.ए. हिंदी कार्यक्रम की पूर्णता के उपरांत विद्यार्थी निम्नलिखित परिणामों से लाभान्वित होगा :

PO-1.	जीवन के नानाविध स्तरों की समझ का पूर्णता में निदर्शन।
PO-2.	जीवन की यथार्थ स्थितियों में विभिन्न सामाजिक, राजनीतिक एवं साहित्यिक धाराओं का अनुप्रयोग तथा विमर्श।
PO-3.	बहुविषयी दृष्टिकोण के द्वारा समसामयिक सामाजिक, राजनीतिक, सांस्कृतिक और साहित्यिक संदर्भों का विमर्श एवं समझ।
PO-4.	जीवन की वस्तुगत स्थितियों में प्रासंगिक, सैद्धांतिक अवधारणाओं के अनुप्रयोग का निदर्शन।
PO-5.	मानविकी एवं समाज विज्ञान में उच्चानुशीलित-अत्याधुनिक ज्ञान में परंपरागत ज्ञान के समावेशन की दक्षता।
PO-6.	ज्ञान के अंत:विषयी और अंतरविषयी समझ के आधार पर उपयुक्त प्रस्तावों का सूत्रीकरण।
PO-7.	स्थानीय, राष्ट्रीय और अंतरराष्ट्रीय परिदृश्य की समझ एवं विश्लेषण।
PO-8.	सामाजिक परिप्रेक्ष्य में जीवन की वस्तुस्थितियों का विश्लेषण एवं विवेचन की दक्षता का निदर्शन।
PO-9.	मनुष्य के समक्ष उपस्थित समस्याओं के बहुश्रुत एवं दक्ष व्यक्तित्व के रूप में समाधान प्रस्तुत करना।

कार्यक्रम के विशेष परिणाम

एम.ए. हिंदी कार्यक्रम की पूर्णता के उपरांत विद्यार्थी निम्नलिखित परिणामों से लाभान्वित होगा :

PSO-1.	हिंदी साहित्य के विभिन्न रूपों में आलोचनात्मक समझ का प्रदर्शन।
PSO-2.	विभिन्न साहित्यिक विधाओं, शब्दों और आंदोलनों की स्पष्टता के साथ चर्चा।
PSO-3.	रचनात्मक और आलोचनात्मक अंतर्दृष्टि, सौंदर्यबोध और विश्लेषणात्मक कौशल विकास।
PSO-4.	वाचन एवं लेखन में हिंदी भाषा में दक्षता एवं सुसंगतता का प्रदर्शन।
PSO-5.	विभिन्न संदर्भों और युगों में निर्मित साहित्य में साहित्यिक प्रवृत्तियों की तुलना।
PSO-6.	उपयुक्त सैद्धांतिक स्वरूप के साथ साहित्यिक ग्रंथों की जानकारी एवं उनके विश्लेषण का ज्ञान।
PSO-7.	विभिन्न साहित्यिक एवं सांस्कृतिक परंपराओं के आलोक में क्षेत्रीय और विश्व साहित्य का बोध।
PSO-8.	साहित्यिक दृष्टिकोण से जीवन की वास्तविकताओं की व्याख्या करने की क्षमता का निदर्शन।
PSO-9.	साहित्य में शोध हेतु दक्षता और कौशल का उन्नयन।

स्नातकोत्तर की महत्ता/विशेषता

- अंत:अनुशासनिक और अंतर-अनुशासनिक ज्ञान
- रचनात्मक एवं आलोचनात्मक कौशल का विकास
- बहुआयामी चिंतन
- समस्या निवारण
- तर्क पद्धति का विकास
- संप्रेषण कौशल
- अनुसंधान कौशल
- जीवन एवं नैतिक मूल्य
- भारतीय एवं वैश्विक ज्ञान एवं संस्कृतिबोध
- व्यावसायिक कौशल
- सतत अधिगम के उपक्रम

पाठ्यक्रम संरचना

Core Course (CC)

(Exclusive for Hindi students)

क्र. सं.	पाठ्यक्रम कोड	पाठ्यक्रम का शीर्षक	L	T	P	क्रेडिट
1.	SHSS HND 1 1 01 C 4105	आधुनिक हिंदी कविता-I	4	1	0	5
2.	SHSS HND 1 1 02 C 4105	हिंदी कथा साहित्य –I	4	1	0	5
3.	SHSS HND 1 1 03 C 4105	आदिकालीन एवं मध्यकालीन साहित्य का इतिहास	4	1	0	5
4.	SHSS HND 1 1 04 C 4105	भाषाविज्ञान एवं हिंदी भाषा	4	1	0	5
5.	SHSS HND 1 2 05 C 4105	आधुनिक हिंदी कविता-II	4	1	0	5
6.	SHSS HND 1 2 06 C 4105	हिंदी कथा साहित्य-II	4	1	0	5
7.	SHSS HND 1 2 07 C 4105	आधुनिक हिंदी साहित्य का इतिहास	4	1	0	5
8.	SHSS HND 1 2 08 C 4105	आदिकालीन एवं रीतिकालीन काव्य	4	1	0	5
9.	SHSS HND 1 3 09 C 4105	भक्तिकाव्य	4	1	0	5
10.	SHSS HND 1 3 10 C 4105	भारतीय काव्यशास्त्र	4	1	0	5
11.	SHSS HND 1 3 11 C 4105	हिंदी नाटक एवं रंगमंच	4	1	0	5
12.	SHSS HND 1 4 12 C 4105	हिंदी आलोचना	4	1	0	5
13.	SHSS HND 1 4 13 C 4105	पाश्चात्य काव्यशास्त्र	4	1	0	5

Discipline Centric Elective Courses (DCEC)

(offered to the students of Hindi department)

क्र. सं.	पाठ्यक्रम कोड	पाठ्यक्रम का शीर्षक	L	T	P	क्रेडिट
1.	SHSS HND 1 2 01 DCEC 0202	पुस्तक एवं फिल्म समीक्षा (अनिवार्य)	0	2	0	2
2.	SHSS HND 1 2 02 DCEC 3104	हिंदी पत्रकारिता एवं जनसंचार	3	1	0	4
3.	SHSS HND 1 2 03 DCEC 3104	आधुनिक भारतीय साहित्य	3	1	0	4
4.	SHSS HND 1 2 04 DCEC 3104	लोक साहित्य	3	1	0	4
5.	SHSS HND 1 2 05 DCEC 3104	समकालीन हिंदी कविता	3	1	0	4
6.	SHSS HND 1 2 06 DCEC 3104	हिंदी में अनूदित विश्व साहित्य	3	1	0	4
7.	SHSS HND 1 2 07 DCEC 3104	कथेतर गद्य विधाएँ	3	1	0	4
8.	SHSS HND 1 2 08 DCEC 3104	प्रवासी साहित्य	3	1	0	4
9.	SHSS HND 1 3 09 DCEC 3104	कबीरदास	3	1	0	4
10.	SHSS HND 1 3 10 DCEC 3104	मलिक मुहम्मद जायसी	3	1	0	4
11.	SHSS HND 1 3 11 DCEC 3104	तुलसीदास	3	1	0	4
12.	SHSS HND 1 3 12 DCEC 3104	सूरदास	3	1	0	4
13.	SHSS HND 1 3 13 DCEC 3104	मीरां	3	1	0	4
14.	SHSS HND 1 3 14 DCEC 3104	बिहारीदास	3	1	0	4
15.	SHSS HND 1 3 15 DCEC 3104	घनानंद	3	1	0	4
16.	SHSS HND 1 3 16 DCEC 3104	भारतेंदु हरिश्चंद्र	3	1	0	4
17.	SHSS HND 1 3 17 DCEC 3104	बालमुकुंद गुप्त	3	1	0	4
18.	SHSS HND 1 3 18 DCEC 3104	प्रेमचंद	3	1	0	4
19.	SHSS HND 1 3 19 DCEC 3104	रामचंद्र शुक्ल	3	1	0	4

20.	SHSS HND 1 3 20 DCEC 3104	सूर्यकांत त्रिपाठी 'निराला'	3	1	0	4
21.	SHSS HND 1 3 21 DCEC 3104	सच्चिदानंद हीरानंद वात्स्यायन 'अज्ञेय'	3	1	0	4
22.	SHSS HND 1 3 22 DCEC 2114	शोध प्रविधि एवं प्रक्रिया (अनिवार्य)	2	1	1	4

Generic Elective Course (GEC)
(Offered to other departments)

क्र. सं.	पाठ्यक्रम कोड	पाठ्यक्रम का शीर्षक	L	T	P	क्रेडिट
1.	SHSS HND 1 1 01 GE 3104	हिंदी भाषा एवं व्याकरण	3	1	0	4
2.	SHSS HND 1 1 02 GE 3104	हरियाणा का साहित्य	3	1	0	4
3.	SHSS HND 1 1 03 GE 3104	अनुवाद : सिद्धांत एवं प्रयोग	3	1	0	4
4.	SHSS HND 1 1 04 GE 3104	सृजनात्मक लेखन	3	1	0	4
5.	SHSS HND 1 3 05 GE 3104	सिनेमा अध्ययन	3	1	0	4
6.	SHSS HND 1 3 06 GE 3104	प्रयोजनमूलक हिंदी	3	1	0	4
7.	SHSS HND 1 3 07 GE 3104	साहित्य का अंतर-अनुशासनिक अध्ययन	3	1	0	4
8.	SHSS HND 1 3 08 GE 3104	अस्मितामूलक साहित्य	3	1	0	4
9.	SHSS HND 1 3 09 GE 3104	साहित्य का समाजशास्त्र	3	1	0	4

Skill Enhancement Elective Course (Compulsory and exclusively for Hindi students)

क्र. सं.	पाठ्यक्रम कोड	पाठ्यक्रम का शीर्षक	L	T	P	क्रेडिट
1.	SHSS HND 1 4 01 SEEC 014014	लघु शोध-प्रबंध	0	14	0	14

प्रथम सेमेस्टर

क्रम सं.	पाठ्यक्रम कोड	पाठ्यक्रम का शीर्षक	L	T	P	क्रेडिट
1.	SHSS HND 1 1 01 C 4105	आधुनिक हिंदी कविता-I	4	1	0	5
2.	SHSS HND 1 1 02 C 4105	हिंदी कथा साहित्य –I	4	1	0	5
3.	SHSS HND 1 1 03 C 4105	आदिकालीन एवं मध्यकालीन साहित्य का इतिहास	4	1	0	5
4.	SHSS HND 1 1 04 C 4105	भाषाविज्ञान एवं हिंदी भाषा	4	1	0	5
5.		***अन्य विभाग से चयन किया जायेगा***				4

द्वितीय सेमेस्टर

क्रम सं.	पाठ्यक्रम कोड	पाठ्यक्रम का शीर्षक	L	T	P	क्रेडिट
1.	SHSS HND 1 2 05 C 4105	आधुनिक हिंदी कविता-II	4	1	0	5
2.	SHSS HND 1 2 06 C 4105	हिंदी कथा साहित्य-II	4	1	0	5
3.	SHSS HND 1 2 07 C 4105	आधुनिक हिंदी साहित्य का इतिहास	4	1	0	5
4.	SHSS HND 1 2 08 C 4105	आदिकालीन एवं रीतिकालीन काव्य	4	1	0	5
5.	SHSS HND 1 2 01 DCEC 0202	पुस्तक एवं फिल्म समीक्षा (अनिवार्य)	0	2	0	2
6.	**विभाग के विद्यार्थियों के लिए** *अधोलिखित में से किसी एक का चयन करना होगा*		3	1	0	4
	SHSS HND 1 2 02 DCEC 3104	हिंदी पत्रकारिता एवं जनसंचार				
	SHSS HND 1 2 03 DCEC 3104	आधुनिक भारतीय साहित्य				
	SHSS HND 1 2 04 DCEC 3104	लोक साहित्य				
	SHSS HND 1 2 05 DCEC 3104	समकालीन हिंदी कविता				
	SHSS HND 1 2 06 DCEC 3104	हिंदी में अनूदित विश्व साहित्य				
	SHSS HND 1 2 07 DCEC 3104	कथेतर गद्य विधाएँ				
	SHSS HND 1 2 08 DCEC 3104	प्रवासी साहित्य				

तृतीय सेमेस्टर

क्रम सं.	पाठ्यक्रम कोड	पाठ्यक्रम का शीर्षक	L	T	P	क्रेडिट
1.	SHSS HND 1 3 09 C 4105	भक्तिकाव्य	4	1	0	5
2.	SHSS HND 1 3 10 C 4105	भारतीय काव्यशास्त्र	4	1	0	5
3.	SHSS HND 1 3 11 C 4105	हिंदी नाटक एवं रंगमंच	4	1	0	5
4.	SHSS HND 1 3 01 DCEC 2114	शोध प्रविधि एवं प्रक्रिया (अनिवार्य)	2	1	1	4
5.	***अन्य विभाग से चयन किया जायेगा***					4
6.	***विभाग के विद्यार्थियों के लिए*** *अधोलिखित में से किसी एक का चयन करना होगा*		3	1	0	4
	SHSS HND 1 3 02 DCEC 3104	कबीरदास				
	SHSS HND 1 3 03 DCEC 3104	मलिक मुहम्मद जायसी				
	SHSS HND 1 3 04 DCEC 3104	तुलसीदास				
	SHSS HND 1 3 05 DCEC 3104	सूरदास				
	SHSS HND 1 3 06 DCEC 3104	मीरां				
	SHSS HND 1 3 07 DCEC 3104	बिहारीदास				
	SHSS HND 1 2 08 DCEC 3104	घनानंद				
	SHSS HND 1 2 09 DCEC 3104	भारतेंदु हरिश्चंद्र				

	SHSS HND 1 2 10 DCEC 3104	बालमुकुंद गुप्त	
	SHSS HND 1 2 11 DCEC 3104	प्रेमचंद	
	SHSS HND 1 2 12 DCEC 3104	रामचंद्र शुक्ल	
	SHSS HND 1 2 13 DCEC 3104	सूर्यकांत त्रिपाठी 'निराला'	
	SHSS HND 1 2 14 DCEC 3104	अज्ञेय	

चतुर्थ सेमेस्टर

क्रम सं.	पाठ्यक्रम कोड	पाठ्यक्रम का शीर्षक	L	T	P	क्रेडिट
1.	SHSS HND 1 4 12 C 4105	हिंदी आलोचना	4	1	0	5
2.	SHSS HND 1 4 13 C 4105	पाश्चात्य काव्यशास्त्र	4	1	0	5
3.	SHSS HND 1 4 01 SEEC 014014	लघु शोध-प्रबंध	0	14	0	14

अन्य विभाग के विद्यार्थियों हेतु प्रस्तावित सामान्य वैकल्पिक पाठ्यक्रमों (GEC) की सूची

क्रम सं.	पाठ्यक्रम कोड	पाठ्यक्रम का शीर्षक	L	T	P	क्रेडिट
प्रथम सेमेस्टर में प्रस्तावित						
1.	SHSS HND 1 1 01 GE 3104	हिंदी भाषा एवं व्याकरण	3	1	0	4
2.	SHSS HND 1 1 02 GE 3104	हरियाणा का साहित्य	3	1	0	4
3.	SHSS HND 1 1 03 GE 3104	अनुवाद : सिद्धांत एवं प्रयोग	3	1	0	4
4.	SHSS HND 1 1 04 GE 3104	सृजनात्मक लेखन	3	1	0	4
तृतीय सेमेस्टर में प्रस्तावित						
5.	SHSS HND 1 3 05 GE 3104	सिनेमा अध्ययन	3	1	0	4
6.	SHSS HND 1 3 06 GE 3104	प्रयोजनमूलक हिंदी	3	1	0	4
7.	SHSS HND 1 3 07 GE 3104	साहित्य का अंतर-अनुशासनिक अध्ययन	3	1	0	4
8.	SHSS HND 1 3 08 GE 3104	अस्मितामूलक साहित्य	3	1	0	4
9.	SHSS HND 1 3 09 GE 3104	साहित्य का समाजशास्त्र	3	1	0	4

अधिगम परिणाम सूचकांक

I. कार्यक्रम के परिणाम तथा कार्यक्रम के विशेष परिणाम (Programme Outcomes and Programme Specific Outcomes)

PO	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6	PSO-7	PSO-8	PSO-9
PO-1	✓	✓	✓	✓	✓	✓	✓	✓	✓
PO-2	✓	✓	✓	✓	✓	✓	✓	✓	✓
PO-3	✓	✓	✓	✓	✓	✓	✓	✓	✓
PO-4	✓	✓	✓	✓	✓	✓	✓	✓	✓
PO-5	✓	✓	✓	✓	✓	✓	✓	✓	✓
PO-6	✓	✓	✓	✓	✓	✓	✓	✓	✓
PO-7	✓	✓	✓	✓	✓	✓	✓	✓	✓
PO-8	✓	✓	✓	✓	✓	✓	✓	✓	✓
PO-9	✓	✓	✓	✓	✓	✓	✓	✓	✓

पाठ्यक्रम स्तरीय अधिगम निष्कर्ष

I. मुख्य पाठ्यक्रम / Core Courses (CC):

PSO	CC-1	CC-2	CC-3	CC-4	CC-5	CC-6	CC-7	CC-8	CC-9	CC-10	CC-11	CC-12	CC-13
PSO-1	✓	✓	✓	X	✓	✓	✓	✓	✓	✓	✓	✓	✓
PSO-2	✓	✓	✓	X	✓	✓	✓	✓	✓	✓	✓	✓	✓
PSO-3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
PSO-4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
PSO-5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
PSO-6	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
PSO-7	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
PSO-8	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
PSO-9	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

III. वैकल्पिक पाठ्यक्रम (विभाग के विद्यार्थियों हेतु) / Elective Courses (DCEC):

PSO	DCEC-1	DCEC-2	DCEC-3	DCEC-4	DCEC-5	DCEC-6	DCEC-7	DCEC-8	DCEC-9	DCEC-10	DCEC-11
PSO-1	✓	✓	✓	✓	✓	✓	✓	✓	X	X	X
PSO-2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
PSO-3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
PSO-4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
PSO-5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
PSO-6	✓	X	✓	✓	✓	✓	✓	✓	✓	✓	✓
PSO-7	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
PSO-8	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
PSO-9	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

PSO	DCEC-12	DCEC-13	DCEC-14	DCEC-15	DCEC-16	DCEC-17	DCEC-18	DCEC-19	DCEC-20	DCEC-21	DCEC-22
PSO-1	X	X	X	✓	✓	✓	✓	✓	✓	✓	X
PSO-2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	X
PSO-3	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
PSO-4	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
PSO-5	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	X
PSO-6	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
PSO-7	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
PSO-8	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
PSO-9	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

IV. वैकल्पिक पाठ्यक्रम (अन्य विभागों हेतु) Elective Courses (GEC):

PSO	GEC-1	GEC-2	GEC-3	GEC-4	GEC-5	GEC-6	GEC-7	GEC-8	GEC-9
PSO-1	X	X	✓	✓	✓	X	✓	✓	✓
PSO-2	X	✓	X	✓	X	X	✓	✓	✓
PSO-3	✓	✓	✓	✓	✓	✓	✓	✓	✓
PSO-4	✓	✓	✓	✓	✓	✓	✓	✓	✓
PSO-5	X	✓	✓	✓	X	X	✓	✓	✓
PSO-6	✓	✓	✓	✓	✓	✓	✓	✓	✓
PSO-7	X	✓	✓	✓	✓	✓	✓	✓	✓
PSO-8	✓	✓	✓	✓	✓	✓	✓	✓	✓
PSO-9	✓	✓	✓	X	✓	✓	✓	✓	✓

V. कौशल आधारित वैकल्पिक पाठ्यक्रम / Skill Enhancement Elective Courses (SEEC) :

PSO	SEEC-1
PSO-1	✓
PSO-2	✓
PSO-3	✓
PSO-4	✓
PSO-5	✓
PSO-6	✓
PSO-7	✓
PSO-8	✓

प्रथम सेमेस्टर

पाठ्यक्रम : आधुनिक हिंदी कविता-I
पाठ्यक्रम कोड : SHSS HND 1 1 01 C 4105

पाठ्यक्रम का उद्देश्य :

- आधुनिक हिंदी कविता के विविध आयामों से परिचित कराना।

पाठ्यक्रम के अपेक्षित परिणाम :

- आधुनिक हिंदी कविता के सामाजिक-राजनीतिक परिवेश का ज्ञान।
- खड़ी बोली में कविता के आरंभिक स्वरूप का बोध।
- भारतेंदु, द्विवेदी और छायावादयुगीन कवियों की संवेदना, काव्यभाषा एवं प्रवृत्तियों का ज्ञान।
- पाठ-बोध से आधुनिक कविता को समझने का व्यावहारिक ज्ञान।

इकाई	पाठ्यक्रम
1.	भारतेंदुयुगीन कविता का स्वरूप; द्विवेदीयुगीन काव्य की विशेषताएँ; छायावाद : नामकरण, परिभाषा और समय-सीमा; छायावाद की विशेषताएँ; छायावाद की राजनीतिक-सामाजिक-सांस्कृतिक-दार्शनिक पृष्ठभूमि; छायावाद में प्रकृति और स्त्री; छायावाद की काव्य-भाषा और छंद-विधान
2.	**मैथिलीशरण गुप्त :** साकेत (नवम सर्ग) **जयशंकर प्रसाद :** कामायनी (श्रद्धा, इड़ा)
3.	**सूर्यकांत त्रिपाठी 'निराला' :** जुही की कली; राम की शक्तिपूजा
4.	**सुमित्रानंदन पंत :** परिवर्तन; प्रथम रश्मि **महादेवी वर्मा :** मैं नीर भरी दुःख की बदली; बीन भी हूँ मैं तुम्हारी रागिनी भी हूँ; यह मंदिर का दीप इसे नीरव जलने दो; फिर विकल हैं प्राण मेरे

अनुशंसित पुस्तकें :

- छायावाद; नामवर सिंह; राजकमल प्रकाशन, दिल्ली; 1955.
- निराला की साहित्य साधना-1,2,3; रामविलास शर्मा; राजकमल प्रकाशन, दिल्ली; 1969-1976.
- निराला : आत्महंता आस्था; दूधनाथ सिंह; लोकभारती प्रकाशन, दिल्ली; 2009.
- कामायनी : एक पुनर्विचार; मुक्तिबोध; राजकमल प्रकाशन, दिल्ली; 2007.
- महादेवी; दूधनाथ सिंह; राजकमल प्रकाशन, दिल्ली; 2009.
- पंत और पल्लव; सूर्यकांत त्रिपाठी 'निराला; गंगा-ग्रंथागार, लखनऊ; 1966.
- काव्य और कला तथा अन्य निबंध; जयशंकर प्रसाद; लोकभारती प्रकाशन, दिल्ली; 2016.
- जयशंकर प्रसाद; नन्ददुलारे वाजपेयी; भारती भंडार, इलाहाबाद; 2013.
- कल्पना और छायावाद; केदारनाथ सिंह; वाणी प्रकाशन; दिल्ली; 1957.
- आधुनिक हिंदी कविता; कमला प्रसाद; वाणी प्रकाशन, दिल्ली; 2017.

- छायावाद की प्रासंगिकता; रमेशचंद्र शाह; वाग्देवी पॉकेट बुक्स, बीकानेर (राज.); 2003.
- छायावाद का पतन; देवराज उपाध्याय; श्री विद्यावती, छपरा; 1948.

पाठ्यक्रम : हिंदी कथा साहित्य-I
पाठ्यक्रम कोड : SHSS HND 1 1 02 C 4105

पाठ्यक्रम का उद्देश्य :

- प्रेमचंद पूर्व एवं प्रेमचंदयुगीन हिंदी कथा साहित्य और उसके स्वरूप की जानकारी।

पाठ्यक्रम के अपेक्षित परिणाम :

- हिंदी कहानी और उपन्यास की पृष्ठभूमि एवं आरंभिक स्वरूप का ज्ञान।
- हिंदी कहानी एवं उपन्यास की विशिष्टता का बोध।
- हिंदी कहानी एवं उपन्यास की संरचना व शिल्प से परिचय।

इकाई	पाठ्यक्रम
1.	प्रेमचंद पूर्व हिंदी कहानी; प्रेमचंदयुगीन हिंदी कहानी; हिंदी की पहली कहानी; प्रेमचंद पूर्व हिंदी उपन्यास; प्रेमचंदयुगीन हिंदी उपन्यास
2.	**उपन्यास : श्रीनिवास दास :** परीक्षा गुरु; **देवकीनंदन खत्री :** चंद्रकांता
3.	**उपन्यास : प्रेमचंद :** गोदान; **जैनेंद्र कुमार :** त्यागपत्र
4.	**कहानी : किशोरी लाल गोस्वामी :** इंदुमती; **माधव प्रसाद मिश्र :** विश्वास का फल **चंद्रधर शर्मा 'गुलेरी' :** उसने कहा था; **विश्वंभरनाथ शर्मा 'कौशिक' :** ताई **सुदर्शन :** हार की जीत; **जयशंकर प्रसाद :** आकाशदीप; **प्रेमचंद :** ईदगाह

अनुशंसित पुस्तकें :

- हिंदी की आरंभिक कहानियां; (संपा.) गंगाप्रसाद विमल; नेशनल बुक ट्रस्ट, दिल्ली; 2014.
- हिंदी उपन्यास : एक अंतर्यात्रा; रामदरश मिश्र; राजकमल प्रकाशन, दिल्ली; 2016.
- हिंदी कहानी : अंतरंग पहचान; रामदरश मिश्र; वाणी प्रकाशन, दिल्ली; 2014.
- कहानी की रचना प्रक्रिया; परमानन्द श्रीवास्तव; लोकभारती प्रकाशन, इलाहाबाद; 2012.
- 23 हिंदी कहानियां; (संपा.) जैनेंद्र कुमार; लोकभारती प्रकाशन, इलाहाबाद; 1998.
- प्रेमचंद : एक विवेचन; इंद्रनाथ मदान; राधाकृष्ण प्रकाशन, दिल्ली; 2006.
- प्रेमचंद : एक साहित्यिक विवेचन; नंददुलारे वाजपेयी; राजकमल प्रकाशन, दिल्ली; 2013.
- चंद्रकांता; देवकीनंदन खत्री; राधाकृष्ण प्रकाशन, दिल्ली; 2012.
- हिंदी कहानी संग्रह; संपा. भीष्म साहनी; साहित्य अकादमी, दिल्ली; 2015.
- अठारह उपन्यास; राजेंद्र यादव; राधाकृष्ण प्रकाशन, दिल्ली; 1999.
- हिंदी साहित्य का इतिहास; आचार्य रामचंद्र शुक्ल; लोकभारती प्रकाशन, इलाहाबाद; 2013.
- हिंदी साहित्य का दूसरा इतिहास; बच्चन सिंह; राधाकृष्ण प्रकाशन, दिल्ली; 2014.
- हिंदी कहानी का इतिहास; गोपाल राय; राजकमल प्रकाशन, दिल्ली; 2018.
- हिंदी कहानी का इतिहास (भाग-2); गोपाल राय; राजकमल प्रकाशन, दिल्ली; 2019.
- हिंदी कहानी का इतिहास (भाग-3); गोपाल राय; राजकमल प्रकाशन, दिल्ली; 2020.

पाठ्यक्रम : आदिकालीन एवं मध्यकालीन साहित्य का इतिहास
पाठ्यक्रम कोड : SHSS HND 1 1 03 C 4105

पाठ्यक्रम का उद्देश्य :

- आदिकालीन एवं मध्यकालीन हिंदी-साहित्य के इतिहास से परिचित कराना।

पाठ्यक्रम के अपेक्षित परिणाम :

- आदिकालीन एवं मध्यकालीन हिंदी-साहित्य से संबंधित प्रमुख कवियों एवं उनके द्वारा रचित ग्रंथों की जानकारी।
- तात्कालिक युग के साहित्य की प्रकृति एवं मौलिक विशेषताओं का ज्ञान।
- तत्कालीन साहित्य और उसके स्वरूप का बोध।

इकाई	पाठ्यक्रम
1.	हिंदी साहित्य के प्रमुख इतिहास ग्रंथ एवं रचनाकार; इतिहास दर्शन और इतिहास लेखन की आवश्यकता; हिंदी साहित्य के इतिहास के पुनर्लेखन की समस्याएं; हिंदी साहित्य का कालविभाजन और नामकरण
2.	आदिकाल की सामान्य विशेषताएं एवं युगीन प्रवृत्तियां; रासो काव्य परंपरा; जैन, सिद्ध एवं नाथ साहित्य का परिचय
3.	भक्ति-आंदोलन के उदय के कारण एवं युगीन प्रवृत्तियां; निर्गुण एवं सगुण भक्ति का स्वरूप एवं प्रवृत्तियां; भक्तियुगीन काव्यधाराएं; वैष्णव भक्ति का उदय एवं आलवार संत
4.	रीतिकालीन साहित्य की प्रमुख प्रवृत्तियाँ; रीतिसिद्ध, रीतिबद्ध एवं रीतिमुक्त काव्यधाराएं रीति-कवियों का आचार्यत्व; रीतिकवियों का सौंदर्य बोध

अनुशंसित पुस्तकें :

- हिंदी साहित्य का इतिहास: रामचन्द्र शुक्ल, नागरी प्रचारिणी सभा, वाराणसी; 1988.
- हिंदी साहित्य की भूमिका: हजारी प्रसाद द्विवेदी, राजकमल प्रकाशन, दिल्ली; 2017.
- हिंदी साहित्य का आदिकाल: हजारी प्रसाद द्विवेदी, वाणी प्रकाशन, दिल्ली; 2008.
- हिंदी साहित्य का अतीत (दो खंड): विश्वनाथ प्रसाद मिश्र, वाणी प्रकाशन, दिल्ली; 2012.
- हिंदी साहित्य का इतिहास: डॉ. नगेन्द्र, मयूर पेपर बैक्स, दिल्ली; 2018.
- हिंदी रीति साहित्य: भगीरथ मिश्र, राजकमल प्रकाशन, दिल्ली; 1999.
- परंपरा का मूल्यांकन: रामविलास शर्मा, राजकमल प्रकाशन, दिल्ली; 2004.
- लोक जागरण और हिंदी साहित्य: रामचन्द्र शुक्ल, वाणी प्रकाशन, दिल्ली; 1990.
- हिंदी साहित्य का सरल इतिहास: विश्वनाथ त्रिपाठी, ओरिएंट ब्लैकस्वान, दिल्ली; 2007.
- वैष्णव भक्ति का उद्भव और विकास; सुवीरा जायसवाल; ग्रंथशिल्पी, दिल्ली; 1996.
- रीतिकाव्य की भूमिका; डॉ. नगेंद्र; नेशनल पब्लिशिंग हाउस, दिल्ली; 1953.

पाठ्यक्रम : भाषाविज्ञान एवं हिंदी भाषा
पाठ्यक्रम कोड : SHSS HND 1 1O4 C 4105

पाठ्यक्रम का उद्देश्य :

- भाषाविज्ञान की अवधारणा एवं हिंदी भाषा के इतिहास की समझ विकसित करना।

पाठ्यक्रम के अपेक्षित परिणाम :

- भाषाविज्ञान के विभिन्न अंगों के बारे में जानकारी।
- भाषा की रूपगत संरचना का बोध।
- हिंदी भाषा का आधारभूत ज्ञान।

इकाई	पाठ्यक्रम
1	भाषाविज्ञान की अवधारणा; भाषाविज्ञान का क्षेत्र; भाषाविज्ञान की उपयोगिता; भाषाविज्ञान और अन्य शास्त्र
2	स्वन/ध्वनि विज्ञान की अवधारणा; ध्वनि-वर्गीकरण के आधार; स्वन और उसकी सार्थकता; स्वनिम की विशेषताएं; स्वनिम और संस्वन
3	शब्द और रूप (पद); संबंध तत्त्व और अर्थ तत्त्व; रूपिमों का स्वरूप; रूपिमों का वर्गीकरण; अर्थ की अवधारणा; अर्थ बोध के साधन; अर्थ विकास की दिशाएँ; अर्थ परिवतन के कारण
4	हिंदी की ऐतिहासिक पृष्ठभूमि; आर्य भाषा परिवार की रूप-रेखा; हिंदी भाषा का का उद्भव और विकास; हिंदी भाषा का भौगोलिक विस्तार; हिंदी की प्रमुख बोलियाँ; हिंदी की संवैधानिक स्थिति : राजभाषा, संपर्क भाषा और राष्ट्रभाषा

अनुशंसित पुस्तकें :

- भाषाविज्ञान : डॉ भोलानाथ तिवारी, किताब महल, इलाहाबाद; 2018.
- भाषाविज्ञान की भूमिका : देवेंद्रनाथ शर्मा, राधाकृष्ण प्रकाशन, दरियागंज दिल्ली; 2016.
- हिंदी भाषा : डॉ भोलानाथ तिवारी, किताब महल, इलाहाबाद; 2016.
- हिंदी भाषा का इतिहास : डॉ धीरेन्द्र वर्मा, हिंदुस्तानी एकेडमी, प्रयाग; 1933
- भाषा –विज्ञान एवं भाषा- शास्त्र : डॉ कपिलदेव द्विवेदी, विश्वविद्यालय प्रकाशन, वाराणसी; 2012.
- आधुनिक भाषाविज्ञान : कृपाशंकर सिंह , नेशनल पब्लिशिंग हाउस, दिल्ली; 1977.
- भाषा, साहित्य और इतिहास का पुनर्पाठ; राजेंद्र प्रसाद सिंह; सम्यक प्रकाशन, दिल्ली; 2021.
- हिंदी भाषा और नागरी लिपि का विकास; बालगोविंद मिश्र; हिंदी साहित्य प्रेस, इलाहाबाद; 1957.
- हिंदी भाषा : इतिहास और स्वरूप; राजमणि शर्मा; वाणी प्रकाशन, दिल्ली; 2014.
- भारतीय आर्य भाषा और हिंदी; डॉ. सुनीति कुमार चटर्जी; राजकमल प्रकाशन, दिल्ली; 1954.
- हिंदी-उर्दू : साझा संस्कृति; संपा. मुरली मनोहर प्रसाद सिंह, चंचल चौहान एवं अन्य; नेशनल बुक ट्रस्ट, दिल्ली; 2011.

द्वितीय सेमेस्टर

पाठ्यक्रम : आधुनिक हिंदी कविता-II
पाठ्यक्रम कोड : SHSS HND 1 2 05 C 4105

पाठ्यक्रम का उद्देश्य :

- छायावादोत्तर काव्य के विविध आयामों से परिचय।

पाठ्यक्रम के अपेक्षित परिणाम :

- छायावादोत्तर काव्य के विविध काव्यांदोलनों की प्रवृत्तियों का ज्ञान।
- स्वाधीनता आंदोलन और उसके उपरांत भारतीय समाज, संस्कृति और राजनीति का बोध।
- पाठ-अध्ययन से काव्यालोचन-विवेक का निर्माण।
- विभिन्न धाराओं के कवियों की काव्यसंवेदना, काव्यभाषा और शिल्प का ज्ञान।

इकाई	पाठ्यक्रम
1.	छायावादोत्तर कविता की राजनीतिक-सामाजिक-सांस्कृतिक पृष्ठभूमि प्रगतिवाद, प्रयोगवाद, हालावाद, मांसलवाद, राष्ट्रवादी कविता, नयी कविता, अकविता, नवगीत एवं समकालीन कविता की प्रमुख प्रवृत्तियाँ
2.	**रामधारी सिंह 'दिनकर':** उर्वशी (तृतीय अंक) **नागार्जुन :** बादल को घिरते देखा है, कालिदास, शासन की बन्दूक
3.	**सच्चिदानंद हीरानंद वात्स्यायन 'अज्ञेय':** असाध्यवीणा, कलगी बाजरे की **भवानी प्रसाद मिश्र :** गीत फरोश
4.	**गजानन माधव 'मुक्तिबोध':** अँधेरे में **सुदामा पाण्डेय 'धूमिल' :** रोटी और संसद, मोचीराम, नक्सलबाड़ी

अनुशंसित पुस्तकें :

- नयी कविता और अस्तित्ववाद; रामविलास शर्मा; राजकमल प्रकाशन, दिल्ली; 1987.
- एक साहित्यिक की डायरी; गजानन माधव मुक्तिबोध; राजकमल प्रकाशन, दिल्ली; 1980.
- कल्पना का उर्वशी विवाद; सं. गोपेश्वर सिंह; वाणी प्रकाशन; दिल्ली; 2010.
- कविता के नये प्रतिमान; नामवर सिंह; राजकमल प्रकाशन, दिल्ली; 2009.
- प्रगतिवाद और समानांतर साहित्य; रेखा अवस्थी; राजकमल प्रकाशन, दिल्ली; 2012.
- मुक्तिबोध: ज्ञान और संवेदना; नंद किशोर नवल; राजकमल प्रकाशन, दिल्ली; 2019.
- नेहरू युग और अकविता; वेद प्रकाश; शिल्पायन, दिल्ली; 2015.
- सुदामा पाण्डेय 'धूमिल'; अवधेश प्रधान; साहित्य अकादमी; दिल्ली; 2012.
- प्रगतिवाद; शिवदान सिंह चौहान; प्रदीप कार्यालय; मुरादाबाद; 1946.
- आधुनिक साहित्य की प्रवृत्तियाँ; नामवर सिंह; राजकमल प्रकाशन, दिल्ली; 2008.
- अज्ञेय की काव्य तितीर्षा; नंदकिशोर आचार्य; सूर्य प्रकाशन मंदिर, बीकानेर; 1980.
- अकविता और कला-संदर्भ; श्याम परमार; जयकृष्ण अग्रवाल, अजमेर; 1968.

पाठ्यक्रम : हिंदी कथा साहित्य-II
पाठ्यक्रम कोड : SHSS HND 1 2 06 C 4105

पाठ्यक्रम का उद्देश्य :

- प्रेमचन्दोत्तर हिंदी कथा साहित्य और उसके स्वरूप से परिचित कराना।

पाठ्यक्रम के अपेक्षित परिणाम :

- हिंदी कहानी और उपन्यास के स्वरूप का ज्ञान।
- हिंदी कहानी के विविध आंदोलनों की जानकारी।
- पाठ बोध से भारतीय समाज एवं राजनीति की समझ का विकास ।

इकाई	पाठ्यक्रम
1.	भारत विभाजन और हिंदी कथा साहित्य; नयी कहानी और उसका स्वरूप; हिंदी कहानी के विविध आंदोलन; विचारधारा और उपन्यास; प्रेमचंदोत्तर हिंदी उपन्यास; प्रेमचंदोत्तर हिंदी कहानी
2.	**उपन्यास : अज्ञेय :** शेखर : एक जीवनी (भाग-एक)
3.	**उपन्यास : श्रीलाल शुक्ल :** राग दरबारी; **कृष्णा सोबती :** समय सरगम
4.	**कहानी : अमरकांत :** जिंदगी और जोंक; **निर्मल वर्मा :** परिंदे; **रांगेय राघव :** गदल **उषा प्रियंवदा :** वापसी; **ओमप्रकाश वाल्मीकि :** बैल की खाल

अनुशंसित पुस्तकें :

- कहानी : नयी कहानी; नामवर सिंह; लोकभारती प्रकाशन, इलाहाबाद; 2014.
- नयी कहानी की भूमिका; कमलेश्वर; राजकमल प्रकाशन, दिल्ली; 2020.
- हिंदी उपन्यास का इतिहास; गोपाल राय; राजकमल प्रकाशन, दिल्ली; 2016.
- कहानी : अनुभव और अभिव्यक्ति; राजेंद्र यादव; वाणी प्रकाशन, दिल्ली; 2009.
- कहानी : स्वरूप और संवेदना; राजेंद्र यादव; वाणी प्रकाशन, दिल्ली; 2013.
- हिंदी कहानी : यथार्थवादी नज़रिया; मार्कंडेय; लोकभारती प्रकाशन, इलाहाबाद; 2013.
- हिंदी कहानी : परंपरा और प्रगति; डॉ. हरदयाल; वाणी प्रकाशन, दिल्ली; 2012.
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- एक दुनिया : सामानांतर; राजेंद्र यादव; राजकमल प्रकाशन, दिल्ली; 2021.
- हिंदी कहानी संग्रह; संपा. भीष्म साहनी; साहित्य अकादमी, दिल्ली; 2015.
- नयी कहानी : संदर्भ और प्रवृत्ति; देवीशंकर अवस्थी; राजकमल प्रकाशन, दिल्ली; 1973.
- हिंदी कहानी : प्रक्रिया और पाठ; सुरेंद्र चौधरी; अंतिका प्रकाशन, गाज़ियाबाद; 2009.
- हिंदी कहानी : रचना और परिस्थिति; सुरेंद्र चौधरी; अंतिका प्रकाशन, गाज़ियाबाद; 2009.
- हिंदी कहानी : अस्मिता की तलाश; मधुरेश; आधार प्रकाशन ,पंचकूला; 1997.
- हिंदी उपन्यास : एक अंतर्यात्रा; रामदरश मिश्र; राजकमल प्रकाशन; 2016.
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- शांति निकेतन से शिवालिक तक; संपा. शिवप्रसाद सिंह; नेशनल पब्लिशिंग हाउस, दिल्ली; 1988.
- भारतीय उपन्यास और आधुनिकता; वैभव सिंह; आधार प्रकाशन ,पंचकूला; 2013.
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- उपन्यास और लोकतंत्र; मैनेजर पाण्डेय; वाणी प्रकाशन, दिल्ली; 2013.

पाठ्यक्रम : आधुनिक हिंदी साहित्य का इतिहास
पाठ्यक्रम कोड : SHSS HND 1 2 07 C 4105

पाठ्यक्रम का उद्देश्य :

- आधुनिक हिंदी साहित्य के इतिहास की आवश्यक जानकारी प्रदान करना।

पाठ्यक्रम के अपेक्षित परिणाम :

- आधुनिक हिंदी-साहित्य से संबंधित प्रमुख कवियों एवं उनकी कविता की जानकारी।
- आधुनिक युग के साहित्य की प्रकृति का ज्ञान
- आधुनिक युग के साहित्य की मौलिक विशेषताओं की समझ का विकास।

इकाई	पाठ्यक्रम
1.	आधुनिकता की अवधारणा; हिंदी गद्य का उद्भव और विकास; 1857 की क्रांति एवं सांस्कृतिक पुनर्जागरण; भारतेंदु हरिश्चंद्र एवं उनका मंडल; हिंदी नवजागरण और पत्र-पत्रिकाएँ
2.	छायावाद के प्रतिनिधि कवि एवं उनके काव्य-ग्रंथ; छायावादी काव्य की प्रमुख प्रवृत्तियां; प्रगतिवाद के उदय के कारण एवं युगीन परिस्थितियां; प्रगतिवाद एवं प्रयोगवाद के प्रमुख कवि; नयी कविता एवं उसकी प्रमुख प्रवृतियाँ
3.	हिंदी उपन्यास की विकास यात्रा; हिंदी कहानी का उद्भव और विकास; हिंदी नाटक एवं रंगमंच का इतिहास; हिंदी आलोचना एवं निबंध साहित्य का परिचय; प्रेमचंद एवं उनके युग का साहित्य
4.	हिंदी साहित्य में दलित विमर्श; हिंदी साहित्य में नारी विमर्श हिंदी साहित्य में अन्य हाशिए के विमर्श; हिंदी का प्रवासी साहित्य

अनुशंसित पुस्तकें :

- हिंदी साहित्य का इतिहास; रामचन्द्र शुक्ल, नागरी प्रचारिणी सभा, वाराणसी; 2008.
- आधुनिक हिंदी साहित्य का इतिहास; बच्चन सिंह; लोकभारती प्रकाशन, इलाहाबाद; 2007.
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- आधुनिक साहित्य की प्रवृत्तियां; नामवर सिंह; लोकभारती प्रकाशन, इलाहाबाद; 2008.
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- हिंदी नाटक का आत्म-संघर्ष; गिरीश रस्तोगी; वाणी प्रकाशन, दिल्ली; 2017.
- उपन्यास और लोकतंत्र; मैनेजर पाण्डेय; वाणी प्रकाशन, दिल्ली; 2013.
- हिंदी आलोचना; विश्वनाथ त्रिपाठी; राजकमल प्रकाशन, दिल्ली; 2019.
- हिंदी कविता का अतीत और वर्तमान; मैनेजर पाण्डेय; वाणी प्रकाशन, दिल्ली; 2013.
- हिंदी साहित्य का सरल इतिहास; विश्वनाथ त्रिपाठी; ओरिएंट ब्लैकस्वान, दिल्ली; 2007.

- हिंदी नाटक : उद्भव और विकास; दशरथ ओझा; राजपाल एंड संस, दिल्ली; 2013.
- प्रवासी लेखन : नयी जमीन, नया आसमान; अनिल जोशी; वाणी प्रकाशन, दिल्ली
- हिंदी का गद्य साहित्य; रामचंद्र तिवारी; विश्वविद्यालय प्रकाशन, वाराणसी; 2014.
- हिंदी साहित्य और संवेदना का विकास; रामस्वरूप चतुर्वेदी; लोकभारती प्रकाशन, इलाहाबाद; 2005.
- हिंदी साहित्य का आधा इतिहास; सुमन राजे; भारतीय ज्ञानपीठ, दिल्ली; 2003.

पाठ्यक्रम : आदिकालीन एवं रीतिकालीन काव्य
पाठ्यक्रम कोड : SHSS HND 1 2 08 C 4105

पाठ्यक्रम का उद्देश्य :

- आदिकालीन एवं रीतिकालीन काव्य की जानकारी प्रदान करना।

पाठ्यक्रम के अपेक्षित परिणाम :

- आदिकालीन एवं मध्यकालीन युग से संबंधित प्रतिनिधि कवियों एवं उनके द्वारा रचित काव्य की जानकारी।
- आदिकालीन एवं रीतिकालीन साहित्य के भाव, भाषा एवं शिल्प का ज्ञान.
- आदिकालीन एवं रीतिकालीन साहित्य की मौलिक विशेषताओं की समझ का विकास।

इकाई	पाठ्यक्रम
.1	भारतीय धर्म साधना में नाथों व सिद्धों का योगदान तथा उनका साहित्य; आदिकालीन हिंदी का जैन साहित्य; अमीर खुसरो की हिंदी कविता; लोक-काव्य के रूप में ढोला मारू रा दूहा
.2	रीतिकवियों का आचार्यत्व; रीतिकाल की प्रमुख प्रवृत्तियां; रीतिकाल के प्रमुख कवि और उनका काव्य; रीतिकाव्य में लोक जीवन; रीति काव्य की अंतर्वस्तु एवं युगबोध; केशव की संवाद योजना एवं काव्य दृष्टि; बिहारी की काव्य-कला एवं सौंदर्य भावना; घनानंद की प्रेम व्यंजना एवं छंद योजना
.3	ढोला मारू रा दूहा : संपा. नरोत्तम स्वामी एवं सूर्यकरण पारीक (आरंभिक छह पद) पृथ्वीराज रासो (चंद वरदायी) : रेवा तट विद्यापति की पदावली: संपा. डॉ. नरेन्द्र झा (आरंभिक दस पद)
. 4	केशवदास-रामचंद्रिका : संपा. विजयपाल सिंह (आरंभिक छह पद); बिहारी सतसई: संपा. जगन्नाथ दास ' रत्नाकर' (आरंभिक पच्चीस दोहे); घनानंद कवित्त: संपा. विश्वनाथ मिश्र (आरंभिक दस पद)

अनुशंसित पुस्तकें :

- हिंदी साहित्य का इतिहास; रामचन्द्र शुक्ल; लोकभारती प्रकाशन, इलाहाबाद; 2013.
- हिंदी साहित्य की भूमिका; हजारी प्रसाद द्विवेदी; राजकमल प्रकाशन, दिल्ली; 2017.
- हिंदी साहित्य का आदिकाल, हजारी प्रसाद द्विवेद; वाणी प्रकाशन, दिल्ली; 2019.
- हिंदी साहित्य का अतीत (दो खंड); विश्वनाथ प्रसाद मिश्र; वाणी प्रकाशन, दिल्ली; 2012.
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- विद्यापति पदावली; संपा. रामवृक्ष बेनीपुरी; साहित्य सरोवर, पटना; 2018.
- ढोला मारू रा दूहा; संपा. नरोत्तम स्वामी, सूर्यकरण पारीक एवं राम सिंह; राजस्थानी ग्रंथागार, उदयपुर; 2014.
- अमीर खुसरों का हिंदवी काव्य; गोपी चंद नारंग; वाणी प्रकाशन, दिल्ली; 2012.
- हिंदी रीति साहित्य; भगीरथ मिश्र; राजकमल प्रकाशन,दिल्ली; 1999.
- केशवदास; संपा. विजयपाल सिंह, लोकभारती प्रकाशन, इलाहाबाद; 2015.
- बिहारी का नया मूल्यांकन; बच्चन सिंह; लोकभारती प्रकाशन, इलाहाबाद; 2014.
- घनानंद का शृंगार काव्य; रामदेव शुक्ल; अनन्य प्रकाशन, दिल्ली; 2017.

पाठ्यक्रम : पुस्तक एवं फिल्म समीक्षा (अनिवार्य)
पाठ्यक्रम कोड : SHHSS HND 1 2 01 DCEC 0202

पाठ्यक्रम का उद्देश्य :

- पुस्तक एवं फिल्म समीक्षा के माध्यम से आलोचनात्मक दृष्टि का विकास।

पाठ्यक्रम के अपेक्षित परिणाम :

- पुस्तक एवं फिल्म की जानकारी की प्राप्ति।
- पुस्तक एवं फिल्म के भाव, भाषा और शिल्प का ज्ञान।

नोट : यह पाठ्यक्रम चयनित फिल्मों एवं पुस्तकों की समीक्षा पर आधारित होगा. फिल्मों एवं पुस्तकों का चयन संबंधित शिक्षक द्वारा किया जाएगा.

पाठ्यक्रम : हिंदी पत्रकारिता और जनसंचार
पाठ्यक्रम कोड : SHSS HND 12O2 DCEC 3104

पाठ्यक्रम का उद्देश्य :

- हिंदी पत्रकारिता की भाषा, स्वरूप का बोध प्राप्त करना।

पाठ्यक्रम के अपेक्षित परिणाम :

- जनसंचार माध्यमों की उपयोगिता का मूल्यांकन।
- मीडिया लेखन की विभिन्न तकनीकों के बोध की प्राप्ति।
- समाचार की संरचना और उसकी भाषा का ज्ञान।
- हिंदी पत्रकारिता के इतिहास क्रम की जानकारी।

इकाई	पाठ्यक्रम
1	पत्रकारिता की परिभाषा एवं स्वरूप; हिंदी पत्रकारिता का इतिहास; हिंदी की प्रमुख पत्र-पत्रिकाएँ; हिंदी पत्रकारिता एवं सामयिक मुद्दे; पत्रकरिता और विश्वसनीयता; पीत पत्रकारिता
2	जनसंचार का अर्थ एवं अवधारणा; जनसंचार माध्यमों की संरचना; संचार माध्यमों का स्वरूप एवं भाषा; संचार माध्यमों का सामाजिक प्रभाव; सोशल मीडिया और उसकी आवश्यकता
3	मीडिया लेखन : प्रिंट मीडिया; समाचार पत्र की संरचना; समाचार का अर्थ और प्रकृति; फीचर लेखन; संवाददाता के गुण; समाचार के स्रोत; संपादक और संपादन
4	इलेक्ट्रॉनिक मीडिया: रेडियो लेखन; रेडियो समाचार के गुण; रेडियो और विज्ञापन; टी.वी लेखन : समाचार लेखन; समाचारों की प्रस्तुति एवं भाषा

अनुशंसित पुस्तकें :

- हिंदी पत्रकारिता का वृहद् इतिहास; अर्जुन तिवारी; वाणी प्रकाशन, दिल्ली; 1997.
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- पत्रकारिता के उत्तर-आधुनिक चरण; कृपाशंकर चौबे; वाणी प्रकाशन, दिल्ली; 2003.
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- आधुनिक विज्ञापन; प्रेमचंद पातंजलि; वाणी प्रकाशन, दिल्ली; 2008.
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- मीडिया, जनतंत्र और आतंकवाद; सुधीश पचौरी; राधाकृष्ण प्रकाशन, दिल्ली; 2005.
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पाठ्यक्रम : आधुनिक भारतीय साहित्य
पाठ्यक्रम कोड : SHSS HND 1 2 03 DCEC 3104

पाठ्यक्रम का उद्देश्य :

- आधुनिक भारतीय साहित्य की अवधारणा एवं स्वरूप की जानकारी।

पाठ्यक्रम के अपेक्षित परिणाम :

- भारतीय साहित्य की अवधारणा की समझ का विकास।
- आधुनिक भारतीय साहित्य में अभिव्यक्त मूल्यों का ज्ञान ।
- आधुनिक भारतीय साहित्य के सरोकारों से परिचय।
- हिंदी एवं अन्य भारतीय भाषाओं के साहित्य की तुलनात्मक जानकारी

इकाई	पाठ्यक्रम
1	भारत और भारतीयता की अवधारणा; भारतीय चिंतन परंपरा; भारत में बहुभाषिकता और बहुसांस्कृतिकता; आधुनिक भारतीय साहित्य का स्वरूप
2	**उपन्यास :** तकषी शिवशंकर पिल्लै : मछुआरे (मलयालम) **नाटक :** गिरीश कर्नाड : तुगलक (कन्नड़)
3	**चिंतन :** ज्योतिबा फुले : गुलामगिरी (मराठी) **कहानी :** करतार सिंह दुग्गल : इंसानियत (पंजाबी) सच्चिदानंद राउतराय : जंगल (उड़िया)
4	**कविताएँ : रवींद्रनाथ टैगोर :** अभिसार, प्राण, मुक्ति त्राण, भारत तीर्थ, बंदी, अपमानित (अनुवाद एवं संपादन : हजारी प्रसाद द्विवेदी) (बांग्ला) **: ग़ालिब :** कोई उम्मीद बार नहीं आती, हजारों ख्वाहिशें ऐसी कि हर ख्वाहिश पे दम निकले, बाज़ीचा-ए-अत्फ़ाल है दुनिया मेरे आगे (उर्दू)

अनुशंसित पुस्तकें :

- भारतीय साहित्य की भूमिका; रामविलास शर्मा; राजकमल प्रकाशन, दिल्ली; 2017.
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- भारतीय चिंतन परंपरा; के. दामोदरन; पीपुल्स पब्लिशिंग हाउस, दिल्ली; 2011.
- भारतीय साहित्य; नगेंद्र; प्रभात प्रकाशन, दिल्ली; 2018.
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पाठ्यक्रम : लोक साहित्य
पाठ्यक्रम कोड : SHSS HND 1 2 04 DCEC 3104

पाठ्यक्रम का उद्देश्य :

- लोक साहित्य व विमर्श से परिचय।

पाठ्यक्रम के अपेक्षित परिणाम :

- लोक साहित्य की अवधारणा की समझ का विकास।
- लोक साहित्य की विभिन्न विधाओं की जानकारी की प्राप्ति।
- लोक संस्कृति और साहित्य के अंतर्संबंधों का ज्ञान।

इकाई	पाठ्यक्रम
1.	लोक साहित्य की अवधारणा एवं स्वरूप; लोक और शास्त्र का संबंध; लोक साहित्य की विभिन्न विधाएँ; लोक साहित्य : परंपरा और प्रयोग; साहित्य और लोक साहित्य; लोक साहित्य के अध्ययन का इतिहास
2.	रामलीला, जात्रा, कथकली, नौटंकी, तमाशा, यक्षगान, भवाई, माच, स्वांग का सामान्य परिचय; लोकगाथा का स्वरूप और विशेषताएँ; लोकगाथा की भारतीय परंपरा; लोकगीत का स्वरूप और विशेषताएँ; लोकगीतों के प्रकार
3.	लोककथा का स्वरूप और विशेषताएँ; लोककथाएँ और लोकजीवन; लोक की बोलियाँ, मुहावरे, लोकोक्तियाँ, पहेलियाँ आदि **लोककथा :** ज्ञान की महिमा (असमिया); शिल्पी की देन (उड़िया); कर्त्तव्य पालन (काश्मीरी); बुद्धि की परख (मलयालम); विधाता की हार (तेलंगी); त्याग की भावना (तमिल) (संकलित-भारतीय लोककथाएँ; पहाड़ी; हिमांचल प्रकाशन, इलाहाबाद)
4.	**लोकनाट्य :** राजा हरिश्चंद्र (पंडित लखमीचंद); बिदेसिया (भिखारी ठाकुर) **लोकगीत :** भर लावो पाणी... (पृ.82.), उड़े-उड़े रे म्हारा कागा...(पृ. 133.) (राजस्थानी) (राजस्थानी लोकगीत; पुरुषोत्तमलाल मेनारिया) जगमल लौंग दुपत... (पृ.262.), सांझ भेल न घर...(पृ. 336.) (मैथिली) (मैथिली लोकगीत; राम इकबाल सिंह 'राकेश') असीं रावी ते... (पृ.95.), पंज सत्त पिन्नियां...(पृ. 103.) (पंजाबी) (धीरे बहो गंगा; देवेंद्र सत्यार्थी) हे री आई सै रंगीली तीज... (पृ. 8) (हरियाणवी) (हरियाणा के लोकगीत; संपा. साधुराम शारदा)

अनुशंसित पुस्तकें :

- लोक साहित्य की भूमिका; कृष्णदेव उपाध्याय; राजकमल प्रकाशन, दिल्ली; 2019.
- भारतीय लोक साहित्य; श्याम परमार; राजकमल प्रकाशन, दिल्ली; 1954.
- लोक साहित्य विज्ञान; डॉ. सत्येंद्र; वाणी प्रकाशन, दिल्ली; 2017.
- भारतीय लोक साहित्य कोश; संपा. डॉ. सुरेश गौतम, संजय प्रकाशन, दिल्ली; 2007.
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- पं. लखमीचंद ग्रंथावली; संपा. पूर्णचंद शर्मा; हरियाणा ग्रंथ अकादमी, पंचकूला; 2013.
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- हरियाणा प्रदेश का लोक साहित्य; शंकरलाल यादव; हिंदुस्तानी एकेडेमी, इलाहबाद; 2000.
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- लोक साहित्य की भूमिका; डॉ. धीरेंद्र वर्मा; साहित्य भवन प्रा.लि., इलाहाबाद; 1957.
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- भोजपुरी ग्रामगीत; कृष्णदेव उपाध्याय; हिंदी साहित्य सम्मलेन, प्रयाग; 2000.
- लोकगीतों का बुगचा; निर्मल; वाणी प्रकाशन, दिल्ली; 2014.
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पाठ्यक्रम : समकालीन हिंदी कविता
पाठ्यक्रम कोड : SHSS HND 1 2 05 DCEC 3104

पाठ्यक्रम का उद्देश्य :

- समकालीन हिंदी कविता के परिदृश्य और परिवेश से परिचय।

पाठ्यक्रम के अपेक्षित परिणाम :

- समकालीन समाज, संस्कृति और राजनीति का बोध।
- समकालीन हिंदी कविता की प्रवृत्तियों का ज्ञान।
- समकालीन कविता के लोकतांत्रिक स्वरूप का बोध।
- समकालीन कवियों और उनके कविकर्म का ज्ञान।

इकाई	पाठ्यक्रम
1.	समकालीनता की अवधारणा; आपातकाल और हिंदी कविता; काव्यांदोलन और कविता की वापसी; समकालीन कविता : भूमंडलीकरण, साम्प्रदायिकता और पर्यावरण; समकालीन हिंदी कविता का लोकतांत्रिक स्वरूप; समकालीन हिंदी कविता में अस्मितामूलक स्वर; समकालीन हिंदी कविता और आलोचना
2.	**आलोक धन्वा :** सफेद रात; **ज्ञानेंद्रपति :** ट्राम में एक याद, बीज-व्यथा; **राजेश जोशी :** बच्चे काम पर जा रहे हैं; **चंद्रकांत देवताले:** औरत; **अरुण कमल :** अपनी केवल धार
3.	**वीरेन डंगवाल :** हमारा समाज; **अष्टभुजा शुक्ल :** हाथा मारना; **कुमार अंबुज :** क्रूरता; **ओमप्रकाश वाल्मीकि :** ठाकुर का कुआँ; **मलखान सिंह :** मैं आदमी नहीं हूँ
4.	**अनामिका :** खियाँ, बेजगह; **कात्यायनी :** सात भाइयों के बीच चम्पा; **निर्मला गर्ग :** जीने की शर्त; **सविता सिंह :** विमला की यात्रा; **नीलेश रघुवंशी:** हंडा; **इंदु जैन:** यह लड़की; **गगन गिल :** एक दिन लौटेगी लड़की; **सुशीला टाकभौरे :** सुनो विक्रम, ओ वाल्मीकि

अनुशंसित पुस्तकें :

- हिंदी की प्रगतिशील कविता; लल्लन राय; हरियाणा साहित्य अकादमी, पंचकूला; 1989.
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- समकालीन कविता का व्याकरण; परमानंद श्रीवास्तव; शुभदा प्रकाशन, दिल्ली; 1980.
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- स्त्री अस्मिता और समकालीन; प्रमिला के.पी.; लोकचेतना प्रकाशन; दिल्ली; 2011.
- समकालीन साहित्य की भूमिका; विश्वम्भरनाथ उपाध्याय; प्रकाशन, जयपुर; 2005.
- कविता और समय; अरुण कमल; वाणी प्रकाशन; दिल्ली; 2002.

पाठ्यक्रम : हिंदी में अनूदित विश्व साहित्य
पाठ्यक्रम कोड : SHSS HND 1 2 06 DCEC 3104

पाठ्यक्रम का उद्देश्य :

- हिंदी में अनूदित साहित्य से परिचय।

पाठ्यक्रम के अपेक्षित परिणाम :

- वैश्विक स्तर पर विभिन्न भाषाओं में रचित साहित्य की जानकारी।
- हिंदी में अनूदित विश्व साहित्य में अभिव्यक्त मूल्यों का ज्ञान ।
- विश्व साहित्य के सरोकारों से परिचय।

इकाई	पाठ्यक्रम
1.	हिंदी में अनूदित विश्व साहित्य की अवधारणा एवं स्वरूप; विश्व साहित्य की विभिन्न विधाओं से परिचय; भारतीय साहित्य एवं विश्व साहित्य का तुलनात्मक अध्ययन; विश्व साहित्य की समृद्धि में हिंदी का योगदान; विश्व साहित्य का हिंदी साहित्य पर प्रभाव
2.	उपन्यास : **मैक्सिम गोर्की :** माँ (रशियन) **अल्बेयर कामू :** प्लेग (फ्रेंच)
3.	कहानियां : **ओ' हेनरी :** बीस साल बाद (अंग्रेजी) (विश्व की पचास संवेदनशील कहानियां; अनु. ब्रह्मदेव) **अल्बर्तो मोरेविया :** गरमी का मजाक (इतालवी) (विश्व की पचास संवेदनशील कहानियां; अनु. ब्रह्मदेव)
4.	कविताएँ : **बेर्टोल्ट ब्रेष्ट :** जनरल तुम्हारा टैंक एक मजबूत वाहन है; जनता की रोटी, नया ज़माना (जर्मन) (बेर्टोल्ट ब्रेष्ट : इकहत्तर कविताएँ और तीस छोटी कहानिया; अनु. मोहन थपलियाल) **पाब्लो नेरुदा :** ओ धरा, मेरा इंतजार करो; अपार हिमपात और बर्फ़ (स्पैनिश) (देश-देश की कविताएँ; अनु. केदारनाथ अग्रवाल) **विस्वावा शिम्बोर्स्का :** बायोडाटा लिखना; अपनी बहन की तारीफ़ में (पोलिश) (रोशनी की खिड़कियाँ; अनु. सुरेश सलिल) **कामिमुरा हाजिमे :** पहाड़ की तलहटी, जुगनू (जापानी) (रोशनी की खिड़कियाँ; अनु. सुरेश सलिल)

अनुशंसित पुस्तकें :

- बेर्टोल्ट ब्रेष्ट : इकहत्तर कविताएँ और तीस छोटी कहानिया; अनु. मोहन थपलियाल; परिकल्पना प्रकाशन, लखनऊ; 2017.
- रोशनी की खिड़कियाँ; अनुवाद-सुरेश सलिल; अदिता प्रकाशन, दिल्ली; 2009.
- देश-देश की कविताएँ; अनु. केदारनाथ अग्रवाल; साहित्य भंडार, इलाहाबाद; 2010.
- विश्व की पचास संवेदनशील कहानियां; अनु. ब्रह्मदेव; मेधा बुक्स, दिल्ली; 2011.
- बीतती सदी में; नोबेल विजेता कवयित्री विस्साव शिम्बोर्स्का की कविताएँ; रूपांतर-विजय आहलूवालिया; संवाद प्रकाशन, मुंबई/मेरठ; 2004.

- दो नोबेल पुरस्कार विजेता कवि : चेस्साव मिविश, विस्वावा शिम्बोर्स्का; अनु. विष्णु खरे; वाणी प्रकाशन, दिल्ली; 2001.
- माँ; मैक्सिम गोर्की; विदेशी भाषा प्रकाशन, मास्को; 2008.
- जब मैं जड़ों के बीच रहता हूँ; पाब्लो नेरुदा; अनु. रामकृष्ण पाण्डेय; परिकल्पना प्रकाशन, लखनऊ; 2014.

पाठ्यक्रम : कथेतर गद्य साहित्य
पाठ्यक्रम कोड : SHSS HND 1 2 07 DCEC 3104

पाठ्यक्रम का उद्देश्य :

- हिंदी कथेतर गद्य साहित्य की जानकारी प्रदान करना।

पाठ्यक्रम के अपेक्षित परिणाम :

- भारतेंदु पूर्व हिंदी गद्य की निर्माण भूमि के बारे जानकारी मिलेगी।
- हिंदी निबंध, रेखाचित्र, संस्मरण, आत्मकथाओं आदि की लेखन परंपरा का ज्ञान होगा।
- महत्त्वपूर्ण हिंदी निबंधों एवं अन्य विधाओं की आलोचनात्मक समझ विकसित होगी।

इकाई	पाठ्यक्रम
1.	हिंदी गद्य की निर्माण भूमि : फोर्ट विलियम कॉलेज; भारतेंदु पूर्व हिंदी गद्य; गिलक्राइस्ट, सदल मिश्र, इंशाअल्ला खां, सदासुख लाल, शिव प्रसाद सितारेहिन्द, राजा लक्ष्मण सिंह का परिचयात्मक अध्ययन
2.	भारतेंदु युग : आधुनिकता और गद्य का अंतर्संबंध; हिंदी गद्य के विकास में द्विवेदी युग का महत्त्व; हिंदी निबंध, रेखाचित्र, संस्मरण, यात्रा-वृत्तांत, रिपोर्ताज, आत्मकथा, व्यंग्य, डायरी एवं लघुकथा लेखन की परंपरा
3.	**निबंध :** साहित्य जन समूह के हृदय का विकास है (बालकृष्ण भट्ट); बनाम लार्ड कर्जन (बालमुकुंद गुप्त); मजदूरी और प्रेम (अध्यापक पूर्ण सिंह); कविता क्या है (रामचंद्र शुक्ल); नाखून क्यों बढ़ते हैं (हजारी प्रसाद द्विवेदी); मेरे राम का मुकुट भीग रहा है (विद्यानिवास मिश्र); उत्तराफाल्गुनी के आस-पास (कुबेरनाथ राय)
4.	**यात्रा संस्मरण :** नेपाल की ओर (मेरी तिब्बत यात्रा-राहुल सांकृत्यायन) **रेखाचित्र :** ठकुरी बाबा (महादेवी वर्मा), माटी की मूरतें (रामवृक्ष बेनीपुरी) **आत्मकथा :** अपनी खबर (पाण्डेय बेचन शर्मा 'उग्र'); **रिपोर्ताज :** तूफानों के बीच (रांगेय राघव)

अनुशंसित पुस्तकें :

- मेरी तिब्बत यात्रा; राहुल सांकृत्यायन; छात्रहितकारी पुस्तकमाला, प्रयाग; 1937.
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- हिंदी कथेतर गद्य : परंपरा और प्रयोग; दयानिधि मिश्र; वाणी प्रकाशन, दिल्ली; 2020.
- बालमुकुंद गुप्त के श्रेष्ठ निबंध; सत्यप्रकाश मिश्र; लोकभारती प्रकाशन, इलाहाबाद; 2005.
- श्रेष्ठ निबंध; आचार्य रामचंद्र शुक्ल; संपा. रामचंद्र तिवारी; राजकमल प्रकाशन, दिल्ली; 2004.
- सरदार पूर्णसिंह अध्यापक के निबंध; संपा. प्रभात शास्त्री; कौशांबी प्रकाशन, इलाहाबाद; संवत 2015.
- हजारीप्रसाद द्विवेदी : संकलित निबंध; संपा. नामवर सिंह; नेशनल बुक ट्रस्ट, दिल्ली; 2020.
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- कुबेरनाथ राय : रचना संचयन; चयन एवं संपा. हनुमान प्रसाद शुक्ल; साहित्य अकादमी, दिल्ली; 2015.

- स्मृति की रेखाएं; महादेवी वर्मा; लोकभारती प्रकाशन, इलाहाबाद; 2008.
- माटी की मूरतें; रामवृक्ष बेनीपुरी; प्रभात प्रकाशन, दिल्ली; 2019.
- तूफ़ानों के बीच; रांगेय राघव; राधाकृष्ण प्रकाशन, दिल्ली; 2012.
- अपनी ख़बर; पांडेय बेचन शर्मा 'उग्र'; राजकमल प्रकाशन, दिल्ली; 2006.

पाठ्यक्रम : प्रवासी हिंदी साहित्य
पाठ्यक्रम कोड : SHSS HND 1 2 08 DCEC 3104

पाठ्यक्रम का उद्देश्य :

- प्रवासी हिंदी साहित्य से परिचय।

पाठ्यक्रम के अपेक्षित परिणाम :

- प्रवासी हिंदी साहित्य के हिंदी में अवदान की जानकारी।
- प्रवासी हिंदी साहित्य में अभिव्यक्त मूल्यों का ज्ञान ।
- प्रवासी हिंदी साहित्य का आलोचनात्मक मूल्यांकन ।

इकाई	पाठ्यक्रम
1.	प्रवासी जीवन : अवधारणा एवं स्वरूप; प्रवासी हिंदी साहित्य : परिभाषा और प्रवृत्तियां; प्रवासी हिंदी साहित्य का आलोचनात्मक मूल्यांकन; वैश्विक पटल पर प्रवासी साहित्य की भूमिका; साहित्य के संबंध में प्रवासी जीवन और समस्याएं
2.	अमेरिका का प्रवासी हिंदी साहित्य; मॉरीशस का प्रवासी हिंदी साहित्य; सूरीनाम का प्रवासी हिंदी साहित्य; अन्य देशों का प्रवासी हिंदी साहित्य
3.	उपन्यास : **अभिमन्यु अनत :** लाल पसीना **सुषम बेदी :** मैंने नाता तोड़ा
4.	कहानियां : **उषा प्रियंवदा :** कितना बड़ा झूठ **तेजेंद्र शर्मा :** देह की कीमत **उषा राजे सक्सेना :** वह रात

अनुशंसित पुस्तकें :

- कितना बड़ा झूठ; उषा प्रियंवदा; राजकमल प्रकाशन, दिल्ली; 2008.
- लाल पसीना; अभिमन्यु अनत; राजकमल प्रकाशन, दिल्ली; 2010.
- मैंने नाता तोड़ा; सुषम बेदी; भारतीय ज्ञानपीठ, दिल्ली; 2009.
- देह की कीमत; तेजेंद्र शर्मा; वाणी प्रकाशन, दिल्ली; 2014.
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- सूरीनाम का सृजनात्मक हिंदी साहित्य; संपा. विमलेश काँटी वर्मा, भावना सक्सेना; राधाकृष्ण प्रकाशन, दिल्ली; 2015.
- हिंदी प्रवासी साहित्य; संपा. डॉ. कमल किशोर गोयनका; यश पब्लिकेशन्स, दिल्ली; 2016.
- प्रवासी लेखन : नयी ज़मीन, नया आसमान; अनिल जोशी; वाणी प्रकाशन, दिल्ली; 2018.
- हम प्रवासी; अभिमन्यु अनत; प्रभात प्रकाशन, दिल्ली; 2004.

तृतीय सेमेस्टर

पाठ्यक्रम : भक्तिकाव्य
पाठ्यक्रम कोड : SHSS HND 1 3 09 C 4105

पाठ्यक्रम का उद्देश्य :

- भक्तिकाव्य से परिचय।

पाठ्यक्रम के अपेक्षित परिणाम :

- भक्तिकाव्य की आलोचनात्मक समझ का विकास।
- भक्तिकाव्य की विभिन्न धाराओं की विशिष्टताओं के बारे में ज्ञान।
- भक्तिकाव्य के काव्य-सरोकार व मूल्यों की जानकारी।
- भक्तिकाव्य के प्रतिनिधि कवियों के काव्य की जानकारी।

इकाई	पाठ्यक्रम
.1	भक्ति आंदोलन और उसके संप्रदाय; भक्ति काव्य की दार्शनिक पृष्ठभूमि; कबीर की भक्ति-भावना एवं रहस्य साधना; कबीर का समाज दर्शन; कबीर के काव्य में विद्रोह के स्वर; कबीर की काव्य-भाषा; कबीर: स. हजारी प्रसाद द्विवेदी (पद संख्या 161 से 175 तक)
.2	हिंदी के प्रमुख सूफी कवि एवं सूफी काव्य की विशेषताएँ; जायसी के काव्य में प्रेम भावना; पद्मावत में प्रकृति-चित्रण; पद्मावत में अभिव्यक्त रूपक एवं लोक तत्व; मालिक मुहम्मद जायसी के पद्मावत का 'नागमती वियोग खंड': सं. रामचंद्र शुक्ल
.3	मध्यकाल में स्त्री स्वर; मीरां का जीवन, युग एवं समाज; मीरां के काव्य में लोक तत्त्व; मीरां के काव्य में गीति तत्त्व; मीरां का काव्य: स. विश्वनाथ त्रिपाठी (आरंभिक दस पद) कृष्ण काव्य धारा एवं अष्टछाप के कवि; सूर काव्य में वाग्विदग्धता एवं लोक तत्त्व; सूरदास का श्रृंगार एवं वात्सल्य वर्णन; सूरदास : भ्रमरगीत सार-सं. रामचंद्र शुक्ल (पद संख्या : 21-30)
. 4	लोकमंगल की अवधारणा एवं तुलसीदास; तुलसी काव्य में निहित सामाजिक-सांस्कृतिक दृष्टि; तुलसी की काव्य कला एवं प्रबंध कल्पना; तुलसीदास द्वारा रचित रामचरितमानस का 'उत्तर काण्ड' (गीता प्रैस) (आरंभिक दस दोहे एवं चौपाइयां)

अनुशंसित पुस्तकें :

- भ्रमरगीत सार; रामचन्द्र शुक्ल; वाणी प्रकाशन, दिल्ली; 2009.
- गोस्वामी तुलसीदास; रामचन्द्र शुक्ल; नागरी प्रचारिणी सभा, वाराणसी; 1935.
- हिंदी साहित्य की भूमिका; हजारी प्रसाद द्विवेदी; राजकमल प्रकाशन, दिल्ली; 2005.
- कबीर; हजारी प्रसाद द्विवेदी; राजकमल प्रकाशन दिल्ली; 2019.

- सूर साहित्य; हजारी प्रसाद द्विवेदी; राजकमल प्रकाशन, दिल्ली; 2017.
- त्रिवेणी; रामचंद्र शुक्ल; वाणी प्रकाशन, दिल्ली; 2016.
- मध्यकालीन बोध और साहित्य; हजारीप्रसाद द्विवेदी; राजकमल प्रकाशन दिल्ली; 2015.
- सूफी मत : साधना और साहित्य; रामपूजन तिवारी; ज्ञानमंडल, वाराणसी; संवत 2013.
- कबीर मीमांसा; रामचंद्र तिवारी; लोकभारती प्रकाशन, इलाहाबाद; 2018.
- कबीरदास : विविध आयाम; संपा. प्रभाकर श्रोत्रिय; लोकभारती प्रकाशन, इलाहाबाद; 2002.
- अकथ कहानी प्रेम की; पुरुषोत्तम अग्रवाल; राजकमल प्रकाशन, दिल्ली; 2019.
- पांच भक्त कवि; मुरली मनोहर प्रसाद सिंह; भारतीय ज्ञानपीठ, दिल्ली; 2017.
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- मीरां का जीवन :अरविंद सिंह तेजावत, लोकभारती प्रकाशन ,इलाहाबाद; 2015.
- मीरां की भक्ति एवं राजनीति; अरविन्द सिंह तेजावत; वाणी प्रकाशन, दिल्ली; 2015.
- जायसी; विजयदेव नारायण साही; हिन्दुस्तानी अकादमी, इलाहाबाद; 1973.
- भक्ति आन्दोलन और सूरदास का काव्य; मैनेजर पाण्डें; वाणी प्रकाशन, नयी; 2001.
- लोकवादी तुलसीदास; विश्वनाथ त्रिपाठी; राजकमल प्रकाशन, दिल्ली; 1991.
- मलिक मुहम्मद जायसी; रामचंद्र शुक्ल; नागरी प्रचारिणी सभा, वाराणसी; 2012.
- भक्ति और भक्ति आंदोलन; डॉ. सेवा सिंह; आधार प्रकाशन, पंचकूला; 2017.
- मध्यकालीन साहित्य : पुनरवलोकन; नित्यानंद तिवारी; साहित्य भंडार, इलाहाबाद; 2015.

पाठ्यक्रम : भारतीय काव्यशास्त्र
पाठ्यक्रम कोड : SHSS HND 1 3 10 C 4105

पाठ्यक्रम का उद्देश्य :

- साहित्य के विषय में भारतीय चिंतन पद्धति की जानकारी।

पाठ्यक्रम के अपेक्षित परिणाम :

- भारतीय काव्यशास्त्र के स्वरूप एवं ज्ञान परंपराओं का बोध।
- भारतीय काव्य सिद्धांतों की महत्वपूर्ण अवधारणाओं की जानकारी।
- भारतीय काव्यशास्त्र की मूल स्थापनाओं का विश्लेणात्मक बोध|

इकाई	पाठ्यक्रम
1	काव्य : अर्थ एवं परिभाषा; काव्य लक्षण, काव्य हेतु एवं काव्य प्रयोजन काव्य भेद : महाकाव्य, खंडकाव्य, गीतिकाव्य एवं मुक्तक, चम्पू काव्य; काव्य गुण एवं काव्य दोष
2	रस सिद्धांत : रस की परिभाषा एवं रस सूत्र की व्याख्या; रस निष्पत्ति; साधारणीकरण अलंकार सिद्धांत : स्वरूप एवं स्थापनाएं; अलंकारों का सामान्य परिचय (अनुप्रास, उपमा, उत्पेक्षा, रूपक, यमक, श्लेष, अतिश्योक्ति)
3	रीति सिद्धांत : स्वरूप एवं स्थापनाएं वक्रोक्ति सिद्धांत : स्वरूप एवं प्रकार
4	ध्वनि सिद्धांत : स्वरूप एवं स्थापनाएं; शब्द शक्ति औचित्य सिद्धांत : स्वरूप एवं स्थापनाएं

अनुशंसित पुस्तकें :

- काव्यशास्त्र; भगीरथ मिश्र; विश्वविद्यालय प्रकाशन, वाराणसी; 2014.
- भारतीय काव्यशास्त्र की भूमिका; डॉ नगेन्द्र; नेशनल पब्लिशिंग हाउस, दिल्ली; 2007.
- रीतिकाव्य की भूमिका; डॉ नगेन्द्र; नेशनल पब्लिशिंग हाउस, दिल्ली; 2012.
- भारतीय काव्यशास्त्र; सत्यदेव चौधरी; अलंकार प्रकाशन, दिल्ली; 2018.
- काव्य के रूप; गुलाब राय; प्रतिभा प्रकाशन मंदिर, दिल्ली; 2009.
- साहित्यालोचन; श्यामसुंदर दास; इंडियन प्रेस, प्रयाग; 2017.
- रस सिद्धांत; डॉ नगेन्द्र; नेशनल पब्लिशिंग हाउस, दिल्ली; 2007.
- रस मीमांसा; आचार्य रामचंद्र शुक्ल; नागरी प्रचारिणी सभा, काशी; 2000.
- भारतीय एवं पाश्चात्य काव्य सिद्धांत; गणपति चंद्र गुप्त; लोकभारती प्रकाशन, इलाहाबाद; 2009.
- संस्कृत आलोचना; बलदेव उपाध्याय; उत्तर प्रदेश हिंदी संस्थान, लखनऊ; 2006.
- साहित्यालोचन : सिद्धांत और अध्याय; डॉ. सीताराम दीन; विनोद पुस्तक मंदिर, आगरा; संवत 2006.

पाठ्यक्रम : हिंदी नाटक एवं रंगमंच
पाठ्यक्रम कोड : SHSS HND 1 3 11 C 4105

पाठ्यक्रम का उद्देश्य :

- हिंदी नाटक एवं रंगमंच की अवधारणा एवं स्वरूप की जानकारी।

पाठ्यक्रम के अपेक्षित परिणाम :

- नाटक एवं रंगमंच की विभिन्न रंग दृष्टि एवं शैलियों का ज्ञान।
- हिंदी नाटक एवं रंगमंच की परंपराओं का बोध।
- प्रमुख नाटककारों के माध्यम से समकालीन चिन्तन की समझ।

इकाई	पाठ्यक्रम
1	नाटक के प्रमुख प्रकार एवं उनका रचना विधान; हिंदी नाटक एवं रंगमंच का उद्भव एवं विकास; भारतेंदु के नाटकों की रंगमंचीयता; आधुनिक नाटककारों की रंग दृष्टि; रंगमंच की प्रमुख शैलियाँ
2	भारतेंदु और प्रसाद के नाटकों की अभिनेयता; प्रसाद के नाटकों में राष्ट्रीय एवं सांस्कृतिक चेतना नाटक : **भारतेंदु हरिश्चंद्र :** अंधेर नगरी **जयशंकर प्रसाद :** ध्रुवस्वामिनी
3	मोहन राकेश के नाटकों में आधुनिकता बोध एवं प्रयोगधर्मिता नाटक : **मोहन राकेश :** आषाढ़ का एक दिन **धर्मवीर भारती :** अंधा युग
4	हिंदी एकांकी का उद्भव और विकास एकांकी : **भारत भूषण अग्रवाल :** महाभारत की एक साँझ **भुवनेश्वर :** तांबे के कीड़े

अनुशंसित पुस्तकें:

- भारतेंदु हरिश्चंद्र और हिंदी नवजागरण की समस्याएं; रामविलास शर्मा; राजकमल प्रकाशन, दिल्ली; 2019.
- भारतेंदु और हिंदी भाषा की विकास परंपरा; रामविलास शर्मा; राजकमल प्रकाशन, दिल्ली; 2017.
- प्रसाद के नाटकों का शास्त्रीय अध्ययन; जगन्नाथ शर्मा; वाणी प्रकाशन, दिल्ली; 2009.
- मोहन राकेश और उनके नाटक; गिरीश रस्तोगी; लोकभारती प्रकाशन, इलाहाबाद; 2008.
- हिंदी नाटक का आत्मसंघर्ष; गिरीश रस्तोगी; लोकभारती प्रकाशन, इलाहाबाद; 2017.
- हिंदी नाटक; बच्चन सिंह; राधाकृष्ण प्रकाशन, दिल्ली; 2008.
- रंगदर्शन; नेमी चंद्र जैन; राधाकृष्ण प्रकाशन, दिल्ली; 2008.
- संक्षिप्त नाट्यशास्त्रम; राधा वल्लभ त्रिपाठी; वाणी प्रकाशन, दिल्ली; 2008.
- रंगमंच और नाटक की भूमिका; डॉ लक्ष्मी नारायण लाल; नेशनल पब्लिशिंग हाउस, दिल्ली; 2011.
- हिंदी नाटक का उद्भव और विकास; दशरथ ओझा; राजपाल एंड संस, दिल्ली; 2008.

पाठ्यक्रम : शोध प्रविधि एवं प्रक्रिया (अनिवार्य)*
पाठ्यक्रम कोड : SHSS HND 1 3 22 DCEC 2114

पाठ्यक्रम का उद्देश्य :

- शोध प्रविधि एवं प्रक्रिया से परिचय।

पाठ्यक्रम के अपेक्षित परिणाम :

- शोध प्रविधि का सैद्धांतिक एवं व्यावहारिक ज्ञान।
- शोध-पत्र के लेखन एवं प्रस्तुतीकरण संबंधी कौशल विकास।

इकाई	पाठ्यक्रम
1.	शोध की अवधारणा एवं स्वरूप शोध की आवश्यकता एवं महत्त्व शोध और आलोचना शोध और समीक्षा शोध और मूल्य
2.	शोध के प्रकार एवं पद्धति साहित्य में शोध विषय चयन शोध प्रारूप एवं परिकल्पना शोध : संदर्भ एवं उद्धरण संदर्भ ग्रंथ सूची शोध और पुस्तकालय कंप्यूटर का व्यावहारिक ज्ञान

***इसमें दो क्रेडिट की सत्रांत परीक्षा होगी, जिसकी अवधि दो घंटे की होगी तथा शेष दो क्रेडिट हेतु विद्यार्थी द्वारा संगोष्ठी-पत्र का लेखन एवं प्रस्तुतीकरण होगा, जिसका मूल्यांकन विभाग के शिक्षक द्वारा किया जाएगा.**

अनुशंसित पुस्तकें :

- शोध प्रविधि; हरिश्चंद्र वर्मा; हरियाणा साहित्य अकादमी, पंचकूला; 2006.
- शोध का स्वरूप एवं मानक व्यावहारिक कार्यविधि; बैजनाथ सिंहल; वाणी प्रकाशन, दिल्ली; 2015.
- अनुसंधान प्रविधि; एस.एन. गणेशन; सिद्धांत और प्रक्रिया; लोकभारती प्रकाशन, इलाहाबाद; 2021.
- हिंदी अनुसंधान; विजयपाल सिंह; लोकभारती प्रकाशन, इलाहाबाद; 2007.
- शोध प्रविधि; विनय मोहन शर्मा; मयूर बुक्स, दिल्ली; 2018.

पाठ्यक्रम : कबीरदास
पाठ्यक्रम कोड : SHSS HND 1 3 09 DCEC 3104

पाठ्यक्रम का उद्देश्य :

- कबीरदास के जीवन, साहित्य और दर्शन से परिचय।

पाठ्यक्रम के अपेक्षित परिणाम :

- कबीरदास के साहित्यिक अवदान की जानकारी।
- कबीरदास के साहित्यिक सरोकारों व मूल्यों का बोध।
- हिंदी आलोचना में कबीरदास के चिंतन से आलोचनात्मक समझ का विकास।
- पाठ अध्ययन से कबीरदास की काव्य-संवेदना, भाषा और रचना-प्रक्रिया का बोध।

इकाई	पाठ्यक्रम
1.	कबीर के युग का समाज; कबीर का जीवन एवं स्रोत सामग्री; कबीर का राजनीतिक परिवेश एवं समस्याएं हिंदी आलोचना में कबीर का स्थान; परवर्ती काव्य पर कबीर का प्रभाव
2.	निर्गुण काव्य परंपरा और कबीर; कबीर के काव्य में सगुण-निर्गुण का साम्य-वैषम्य; कबीर के राम; कबीर के काव्य में रहस्यात्मकता
3.	कबीर के काव्य में विद्रोह के स्वर; कबीर की भाषायी व्यापकता; कबीर के काव्य में प्रगतिशीलता
4.	कबीर- संपा. हजारी प्रसाद द्विवेदी (चयनित पद संख्या - 176-209)

अनुशंसित पुस्तकें :

- कबीर; हजारी प्रसाद द्विवेदी; राजकमल प्रकाशन, दिल्ली; 2019.
- हिंदी साहित्य का इतिहास; रामचंद्र शुक्ल; नागरी प्रचारिणी सभा, वाराणसी; 2021.
- कबीर ग्रंथावली; श्यामसुंदर दास; लोकभारती प्रकाशन, दिल्ली; 2019.
- सांग्स ऑफ कबीर; इवेलिन अंडरहिल,न्यू यॉर्क, दा मैकमिलान कंपनी (अनुवाद- रवीन्द्रनाथ टैगोर); 2004.
- कबीर का रहस्यवाद; डॉ रामकुमार वर्मा; साहित्य भवन लिमिटेड, इलाहाबाद; 2005.
- कबीर के कुछ और आलोचक; डॉ धर्मवीर; वाणी प्रकाशन, दिल्ली; 2002.
- हिंदी साहित्य की भूमिका; हजारी प्रसाद द्विवेदी; राजकमल प्रकाशन, दिल्ली; 2017.
- श्री भक्तमाल (टीका कवित्त); प्रियादास; श्रीवयंकेटश्वर प्रेस, मुंबई; 2014.
- कबीर के आलोचक; डॉ. धर्मवीर; वाणी प्रकाशन, दिल्ली; 2004.
- अकथ कहानी प्रेम की; पुरुषोत्तम अग्रवाल; राजकमल प्रकाशन, दिल्ली; 2019.
- संत काव्य: परशुराम चतुर्वेदी; लोकभारती प्रकाशन, इलाहाबाद; 2019.
- हिंदी काव्य में निर्गुण संप्रदाय; पीतांबर दत्त बड़थ्वाल; अवध पब्लिशिंग हाउस, लखनऊ; संवत 2007.
- पांच भक्त कवि; मुरली मनोहर प्रसाद सिंह; भारतीय ज्ञानपीठ, दिल्ली; 2017.
- कबीर : व्यक्तित्व, कृतित्व एवं सिद्धांत; सरनाम सिंह शर्मा; कल्पना प्रकाशन, दिल्ली; 2011.
- कबीर का रहस्यवाद; डॉ. रामकुमार वर्मा; साहित्य भवन, इलाहाबाद; 2005.

- दूसरी परंपरा की खोज; नामवर सिंह; राजकमल प्रकाशन, दिल्ली; 2020.
- कबीर वचनावली; अयोध्या सिंह उपाध्याय 'हरिऔध'; वाणी प्रकाशन, दिल्ली; 2011.
- कबीर की परख; परशुराम चतुर्वेदी; लीडर प्रैस, इलाहाबाद; 2012.

पाठ्यक्रम : मलिक महुम्मद जायसी
पाठ्यक्रम कोड : SHSS HND 1310 DCEC 3104

पाठ्यक्रम का उद्देश्य :

- मलिक मुहम्मद जायसी के जीवन, साहित्य और दर्शन से परिचय।

पाठ्यक्रम के अपेक्षित परिणाम :

- मलिक मुहम्मद जायसी के साहित्यिक अवदान की जानकारी।
- मलिक मुहम्मद जायसी के साहित्यिक सरोकारों व मूल्यों का बोध।
- मलिक मुहम्मद जायसी की काव्य चेतना का बोध।
- पाठ अध्ययन से जायसी की काव्य-संवेदना, भाषा और रचना-प्रक्रिया का बोध

इकाई	पाठ्यक्रम
1	भक्ति के उदय की पृष्ठभूमि; भक्तिकाल और लोकजागरण; भक्तिकाल का वैचारिक आधार सूफी दर्शन एवं काव्य परम्परा
2	जायसी काव्य के स्रोत; जायसी काव्य का दार्शनिक आधार; जायसी की काव्यभाषा और प्रबंध योजना
3	पद्मावत की अंतर्वस्तु; पद्मावत में इतिहास और कल्पना; पद्मावत में प्रेमतत्त्व; पद्मावत का काव्य रूप
4	व्याख्या हेतु : पद्मावत (संपा. वासुदेवशरण अग्रवाल; साहित्य सदन ,चिरगाँव झाँसी) नागमती सुआ खंड (पद सं. 83-91), पद्मावती वियोग खंड (पद सं. 168-173), पद्मावती सुआ भेंट खंड (पद सं. 174-182), बसंत खंड (पद सं. 183-197)

अनुशंसित पुस्तकें :

- पद्मावत; संपा. वासुदेवशरण अग्रवाल; साहित्य सदन ,चिरगाँव, झाँसी; संवत 2018.
- सूफी मत; रामपूजन तिवारी; ज्ञानमंडल लिमिटेड, वाराणसी; 2011.
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- पद्मावत; माताप्रसाद गुप्त; लोकभारती प्रकाशन, इलाहाबाद; 2018.
- जायसी ग्रंथावली; रामचंद्र शुक्ल; नागरी प्रचारिणी सभा, काशी; 2015.
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- हिंदी साहित्य का उद्भव और विकास; हजारीप्रसाद द्विवेदी, राधाकृष्ण प्रकाशन, दिल्ली; 2015.
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- त्रिवेणी; आचार्य रामचंद्र शुक्ल; सं. योगेन्द्रप्रताप सिंह; लोकभारती प्रकाशन, इलाहाबाद; 2016.
- जायसी; विजयदेव नारायण साही; वाणी प्रकाशन, दिल्ली; 2020.
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- परम्परा का मूल्यांकन: रामविलास शर्मा, राजकमल प्रकाशन, दिल्ली; 2016.

पाठ्यक्रम : तुलसीदास
पाठ्यक्रम कोड : SHSS HND 1 3 11 DCEC 3104

पाठ्यक्रम का उद्देश्य :

- तुलसीदास के जीवन, सृजनकर्म और उसके प्रभाव का अध्ययन।

पाठ्यक्रम के अपेक्षित परिणाम :

- भक्तिकाल के परिवेश और पृष्ठभूमि का ज्ञान।
- रामकाव्य परंपरा और इसकी प्रासंगिकता संबंधी बोध का विकास।
- पाठ अध्ययन से तुलसीदास की काव्य-संवेदना, भाषा और रचना-प्रक्रिया का बोध।
- तुलसीदास की लोकव्याप्ति के विभिन्न आयामों और उपादानों का ज्ञान।

इकाई	पाठ्यक्रम
1.	भक्ति आंदोलन और तुलसीदास; वैष्णव भक्ति परंपरा और तुलसीदास; रामकाव्य की परंपरा; तुलसीदास का सौन्दर्यबोध; तुलसीदास की समन्वय भावना एवं मर्यादा भाव; तुलसीदास और लोकमंगल; तुलसीदास और आदर्श राज्य की अवधारणा; तुलसीदास के राम; तुलसीदास की काव्यभाषा और काव्य-योजना
2.	रामचरितमानस (गीता प्रेस, गोरखपुर): उत्तरकाण्ड (दोहा सं. 103-120) विनय पत्रिका (गीता प्रेस, गोरखपुर): 26, 45, 76, 90, 111, 115, 155, 174
3.	कवितावली (गीता प्रेस, गोरखपुर): बालकाण्ड : 1, 6, 17, 18; अयोध्याकाण्ड : 1, 11,14, 20, 23 ; सुन्दरकाण्ड: 1, 2, 6; लंकाकाण्ड: 9, 10, 56, 57; उत्तरकाण्ड: 61, 64, 70, 83, 88, 110
4.	गीतावली (गीता प्रेस, गोरखपुर): बालकाण्ड : 7, 8, 23, 33, 44, 95; अयोध्याकाण्ड : 23, 24, 28, 43; अरण्यकाण्ड: 9, 10, 12; सुन्दरकाण्ड: 10, 24, 45; लंकाकाण्ड: 13, 16; उत्तरकाण्ड: 24, 27, 31

अनुशंसित पुस्तकें :

- गोस्वामी तुलसीदास; रामचंद्र शुक्ल; नागरी प्रचारिणी सभा, काशी; 2012.
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- रामकाव्यधारा : अनुसंधान एवं चिंतन; भगवती प्रसाद सिंह; लोकभारती प्रकाशन, इलाहाबाद; 1976.
- लोकजागरण और हिंदी साहित्य; (सं.) रामविलास शर्मा; वाणी प्रकाशन, दिल्ली;2012.
- वैष्णव धर्म; परशुराम चतुर्वेदी; विवेक प्रकाशन, इलाहाबाद; 2017.
- भारतीय सौन्दर्यबोध और तुलसीदास; रामविलास शर्मा; साहित्य अकादमी, दिल्ली; 2007.
- रामभक्ति में रसिक संप्रदाय; भगवती प्रसाद सिंह; अवध साहित्य मंदिर, बलरामपुर; 2019.

- तुलसीदास और उनका काव्य; रामनरेश त्रिपाठी; राजपाल एंड संस, दिल्ली; 2009.
- तुलसीदास; रामजी तिवारी; साहित्य अकादमी, दिल्ली; 2008.

पाठ्यक्रम : सूरदास
पाठ्यक्रम कोड : SHSS HND 1 3 12 DCEC 3104

पाठ्यक्रम का उद्देश्य :

- सूरदास के जीवन, साहित्य और उनके दर्शन की जानकारी।

पाठ्यक्रम के अपेक्षित परिणाम :

- कृष्ण काव्य परम्परा में सूरदास के साहित्यिक अवदान का ज्ञान।
- सूरकाव्य के माध्यम से सूरदास की काव्य संवेदना, शिल्प एवं काव्यभाषा की जानकारी।
- पाठ अध्ययन से सूरदास के साहित्यिक सरोकारों एवं चिंतन का बोध।

इकाई	पाठ्यक्रम
1.	सूरदास का जीवन और सृजन; अष्टछाप और वल्लभ संप्रदाय; कृष्ण काव्य परंपरा में सूरदास; सूरदास की भक्ति भावना
2.	सूर काव्य में गीति तत्त्व; सूर काव्य में प्रेमतत्त्व; सूरदास का शृंगार वर्णन; सूरदास का वात्सल्य वर्णन; सूर काव्य में कृषि संस्कृति; सूरदास : परंपरा और आधुनिकता
3.	सूरदास की काव्य भाषा; भ्रमरगीत काव्य परम्परा और सूरदास; भ्रमरगीत सार में सगुण-निर्गुण; सूर काव्य में वाग्विदग्धता एवं लोक तत्त्व; सूर की कविता में स्त्री-विमर्श
4.	भ्रमरगीत सार: संपा. रामचंद्र शुक्ल (पद संख्या : 1, 8, 23, 24, 25, 28, 34, 42, 52, 59, 62, 64, 95, 101, 102, 103, 108, 111, 114, 136, 138, 172, 196, 210, 214, 241, 316, 400)

अनुशंसित पुस्तकें :

- सूरदास; मैनेजर पांडेय; साहित्य अकादमी, दिल्ली; 2001.
- सूर साहित्य; हजारी प्रसाद द्विवेदी; राजकमल प्रकाशन, दिल्ली; 2017.
- सूरदास; नंद दुलारे वाजपेयी; राजकमल प्रकाशन, दिल्ली; 2018.
- अष्टछाप और वल्लभ संप्रदाय; दीनदयालु गुप्त; हिंदी साहित्य सम्मेलन, प्रयाग; 2000.
- पाँच भक्तकवि; मुरली मनोहर प्रसाद सिंह; भारतीय ज्ञानपीठ; दिल्ली; 2017.
- भ्रमरगीत सार; सूरदास; संपा. रामचंद्र शुक्ल; श्री प्रकाशन, दिल्ली; 2013.
- सूरदास और भ्रमरगीत सार; डॉ. किशोरी लाल; अभिव्यक्ति प्रकाशन, इलाहाबाद; 2017.
- सूरदास; रामचंद्र शुक्ल; नगरी प्रचारिणी सभा, काशी; 2012.
- सूर सारावली; संपा. प्रभुदयाल मीतल; अग्रवाल प्रेस, मथुरा; 2009.
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- भक्ति आंदोलन और सूरदास का काव्य; मैनेजर पांडेय; वाणी प्रकाशन, दिल्ली; 2001.
- प्राचीन कवि; विश्वंभर मानव; लोकभारती प्रकाशन, इलाहाबाद; 2008.
- महाकवि सूरदास; नंददुलारे वाजपेयी; आत्माराम एंड संस, दिल्ली; 1952.
- सूरदास; ब्रजेश्वर वर्मा; लोकभ्रती प्रकाशन, इलाहाबाद; 2017.

पाठ्यक्रम : मीरां
पाठ्यक्रम कोड : SHSS HND 1313 DCEC 3104

पाठ्यक्रम का उद्देश्य :

- मीरां के जीवन, सृजनकर्म और उसके प्रभाव का अध्ययन।

पाठ्यक्रम के अपेक्षित परिणाम :

- भक्तिकाल के परिवेश और पृष्ठभूमि का ज्ञान।
- भक्ति काव्य परंपरा में मीरां के अवदान की जानकारी।
- पाठ अध्ययन से मीरां की काव्य-संवेदना एवं भाव-भाषा का बोध।
- मीरां की लोकव्याप्ति के विभिन्न आयामों और उपादानों का ज्ञान।

इकाई	पाठ्यक्रम
1.	मीरां एवं हिंदी आलोचना मीरां के जीवन से संबंधित स्रोत सामग्री ऐतिहासिक परिप्रेक्ष्य में मीरां का जीवन
2.	सती-प्रथा एवं मीरां के युग का समाज चित्तौड़गढ़ में मीरां का राजनीतिक परिवेश मेड़तिया-हाड़ा संघर्ष एवं मीरां
3.	मीरां की भक्ति एवं सगुण-निर्गुण का प्रश्न मीरां के काव्य में विद्रोह चेतना एवं अन्य काव्यगत विशेषताएँ मीरां के काव्य में लोक तत्त्व, गीति तत्त्व एवं प्रेम तत्त्व
4.	मीरां का काव्य: स. विश्वनाथ त्रिपाठी (आरंभिक 26 पद)

अनुशंसित पुस्तकें :

- मीरांबाई का जीवन चरित्र; मुंशी देवी प्रसाद; बंगीय हिंदी परिषद, कोलकाता; 1954.
- मीरां स्मृति ग्रन्थ; बंगीय हिंदी परिषद, कोलकाता; 1951.
- मीरां का जीवन और काव्य (दो भाग); डॉ. सी. एल. प्रभात; राजस्थानी ग्रंथागार, जोधपुर; 1999.
- वीर विनोद (भाग दो): श्यामलदास, मोतीलाल बनारसीदास; दिल्ली; 1985.
- उदयपुर राज्य का इतिहास; गौ. ही. ओझा; राजस्थानी ग्रंथागार, जोधपुर; 1985.
- मीरां का काव्य; विश्वनाथ त्रिपाठी; वाणी प्रकाशन, दिल्ली; 2010.
- पचरंग चोला पहर सखी री; माधव हाड़ा; वाणी प्रकाशन, दिल्ली; 2015.
- मीरां का जीवन :अरविंद सिंह तेजावत, लोकभारती प्रकाशन ,इलाहाबाद; 2015.
- मीरां की भक्ति एवं राजनीति: अरविन्द सिंह तेजावत, वाणी प्रकाशन, दिल्ली; 2015.
- मध्यकालीन बोध और साहित्य; हजारीप्रसाद द्विवेदी; राजकमल प्रकाशन, दिल्ली; 2015.
- पांच भक्त कवि; मुरली मनोहर प्रसाद सिंह; भारतीय ज्ञानपीठ, दिल्ली; 2017.
- फिर से मीरां; संपा. पल्लव; आधार प्रकाशन, पंचकूला; 2013.

पाठ्यक्रम : बिहारीदास
पाठ्यक्रम कोड : SHSS HND 1314 DCEC 3104

पाठ्यक्रम का उद्देश्य :

- बिहारी के जीवन, सृजनकर्म और उसके प्रभाव का अध्ययन।

पाठ्यक्रम के अपेक्षित परिणाम :

- रीतिकाल के परिवेश और पृष्ठभूमि का बोध।
- सतसई परंपरा में बिहारी के महत्त्व का ज्ञान।
- पाठ अध्ययन से बिहारी की काव्य-संवेदना, भाषा और रचना-प्रक्रिया का बोध।
- बिहारी की काव्य कला और काव्य रूपों की जानकारी।

इकाई	पाठ्यक्रम
1	रीतिकाल की पृष्ठभूमि; रीतिकाल का परिवेश : ऐतिहासिक, सामाजिक ,सांस्कृतिक; रीतिकाव्य का काव्य शास्त्रीय आधार
2	बिहारी का काव्य परिचय; रीतिबद्ध काव्यधारा और बिहारी; सतसई काव्य परम्परा में बिहारी का स्थान; बिहारी की बहुज्ञता
3	बिहारी की काव्य में शृंगारिक्ता; बिहारी की काव्य कला; बिहारी की काव्य भाषा; बिहारी का काव्य रूप
4	बिहारी सतसई; (सं जगन्नाथ दास रत्नाकर) दोहा संख्या 1-50

अनुशंसित पुस्तकें :

- हिंदी साहित्य का इतिहास; आचार्य रामचन्द्र शुक्ल; नागरी प्रचारणी सभा, काशी; 2008.
- रीतिकाव्य की भूमिका; डॉ नगेन्द्र; नेशनल पब्लिशिंग हाउस, दिल्ली; 2012.
- हिंदी साहित्य का उद्भव और विकास; हजारीप्रसाद द्विवेदी; राधाकृष्ण प्रकाशन, दिल्ली; 2015.
- बिहारी और उनका साहित्य; सं डॉ हरवंशलाल शर्मा एवं डॉ परमानंद शास्त्री; भारत प्रकाशन मंदिर, अलीगढ़; 1957.
- बिहारी का नया मूल्याकंन; डॉ बच्चन सिंह; राजकमल प्रकाशन, दिल्ली; 2014.
- हिंदी साहित्य का दूसरा इतिहास; डॉ बच्चन सिंह; राधाकृष्ण प्रकाशन, दिल्ली; 2009.
- बिहारी वैभव; विजयपाल सिंह; हिंदी साहित्य सम्मलेन, इलाहाबाद; 1997.
- बिहारी की वाग्विभूति; विश्वनाथ प्रसाद सिंह; हिंदी साहित्य कुटीर, बनारस; 2004.
- देव और बिहारी; कृष्ण बिहारी मिश्र; गंगा पुस्तकमाला, लंखनऊ; 1982.
- बिहारी का काव्य लालित्य; रमाशंकर तिवारी; ग्रंथम, रामबाग, कानपुर; 2000.
- हिंदी नवरत्न; मिश्र बंधु; हिंदी ग्रंथ प्रसारक मंडली, प्रयाग; 1967.
- हिंदी रीति परंपरा; भगीरथ मिश्र; राजकमल प्रकाशन, दिल्ली; 1989.

पाठ्यक्रम : घनानंद
पाठ्यक्रम कोड : SHSS HND 1315 DCEC 3104

पाठ्यक्रम का उद्देश्य :

- घनानंद के जीवन, सृजनकर्म और उसके प्रभाव का अध्ययन।

पाठ्यक्रम के अपेक्षित परिणाम :

- भक्तिकाल के परिवेश और पृष्ठभूमि का ज्ञान।
- रीति काव्य की परंपरा में घनानंद के महत्त्व का ज्ञान।
- पाठ अध्ययन से घनानंद की काव्य-संवेदना, भाषा और शिल्प का बोध।

इकाई	पाठ्यक्रम
1.	रीतिकाल की पृष्ठभूमि; रीतिकाव्य का काव्य शास्त्रीय आधार; घनानंद का जीवन और साहित्य; रीतिमुक्त काव्यधारा एवं घनानंद
2.	घनानंद के काव्य में प्रेम-व्यंजना; घनानंद के काव्य में छंद-विधान; घनानंद के काव्य में अलंकार योजना
3.	घनानंद के काव्य की भाषा एवं स्वच्छंद योजना; घनानंद के काव्य की अन्य शिल्पगत विशेषताएं
4.	घनानंद कवित्त: सं. विश्वनाथ मिश्र (आरंभिक तीस पद)

अनुशंसित पुस्तकें :

- घनानंद का शृंगार काव्य; रामदेव शुक्ल; अनन्य प्रकाशन, दिल्ली; 2017.
- सनेह को मारग; इमरै बंघा; वाणी प्रकाशन, दिल्ली; 2014.
- हिंदी साहित्य का इतिहास; रामचन्द्र शुक्ल; नागरी प्रचारिणी सभा, वाराणसी; 2008.
- हिंदी साहित्य की भूमिका; हजारी प्रसाद द्विवेदी; राजकमल प्रकाशन, दिल्ली; 2017.
- हिंदी साहित्य का अतीत (दूसरा खंड); विश्वनाथ प्रसाद मिश्र; वाणी प्रकाशन, दिल्ली; 2006.
- हिंदी रीति साहित्य; भगीरथ मिश्र; राजकमल प्रकाशन ,दिल्ली; 1989.
- घनानंद कवित्त; संपा. विश्वनाथ प्रसाद मिश्र; वाणी वितान प्रकाशन, वाराणसी; संवत 2029.
- घनानंद और स्वच्छंद काव्यधारा; मनोहर लाल गौड़; नागरी प्रचारिणी सभा, काशी; संवत 2015.

पाठ्यक्रम : भारतेंदु हरिश्चंद्र
पाठ्यक्रम कोड : SHSS HND 1 3 16 DCEC 3104

पाठ्यक्रम का उद्देश्य :

- भारतेंदु के जीवन और साहित्यिक अवदान का परिचय।

पाठ्यक्रम के अपेक्षित परिणाम :

- भारतेंदु पूर्व हिंदी गद्य की निर्माण भूमि के बारे जानकारी।
- भारतेंदु हरिश्चंद्र के साहित्यिक अवदान का ज्ञान।
- भारतेंदु के काव्य सरोकारों एवं मूल्यों का बोध।

इकाई	पाठ्यक्रम
1.	भारतेंदु युग की सामाजिक, राजनीतिक एवं आर्थिक परिस्थितियां; भारतेंदु हरिश्चंद्र का जीवन और साहित्य हिंदी नाटक परंपरा और भारतेंदु हरिश्चंद्र; भारतेंदु हरिश्चंद्र और उनका मंडल; भारतेंदु हरिश्चन्द्र की काव्य-भाषा और शिल्प; भारतेंदु युग में साम्राज्य-विरोधी चेतना तथा स्वदेश प्रेम का विकास; भारतेंदु हरिश्चंद्र के नाटकों की रंगमंचीयता; भारतेंदु हरिश्चंद्र और नवीन साहित्य चेतना
2.	**नाटक**: भारत दुर्दशा; नील देवी
3.	**निबंध** : दिल्ली दरबार दर्पण; हिंदी भाषा; भारतवर्षोन्नति कैसे हो सकती है?; स्वर्ग में विचार सभा
4.	**कविता** : प्रेम तरंग (सं. 1-5); होली (सं. 2, 7, 16, 41, 77); प्रबोधिनी, बंदर सभा (भारतेंदु ग्रंथावली, खंड-2; संपा. ब्रजरत्न दास)

अनुशंसित पुस्तकें :

- भारतेन्दु युग और हिन्दी भाषा की विकास परम्परा; रामविलास शर्मा; राजकमल प्रकाशन, दिल्ली; 2006.
- हिंदी साहित्य का इतिहास; रामचंद्र शुक्ल; नागरी प्रचारिणी सभा, वाराणसी; 1957.
- भारतेंदु का नाट्य साहित्य; डॉ वीरेंद्र कुमार; प्रकाशक-राम नारायन लाल, प्रयाग; 1955.
- भारतेंदु के नाटकों का शास्त्रीय अनुशीलन; गोपीनाथ तिवारी; राजकमल प्रकाशन, दिल्ली; 1971.
- भारतेंदु के निबंध; डॉ केसी नारायण शुक्ला; सरस्वती मंदिर, बनारस; 1955.
- भारतेंदु साहित्य; डॉ. रामगोपाल सिंह चौहान; सर्वोदय साहित्य मंदिर, हैदराबाद; 1957.
- भारतेंदु हरिश्चंद्र और हिंदी नवजागरण की समस्याएं; रामविलास शर्मा; राजकमल प्रकाशन,दिल्ली; 1999.
- भारतेंदु हरिश्चंद्र; लक्ष्मीसागर वार्ष्णेय; साहित्य भवन, इलाहाबाद; 1951.
- भारतेंदु बाबू हरिश्चंद्र का जीवन-चरित्र; राधाकृष्ण दास; उत्तर प्रदेश हिंदी संस्थान, लखनऊ; 1978.
- भारतेंदु ग्रंथावली, (सभी खंड); संपा. ब्रजरत्न दास; नागरी प्रचारिणी सभा, काशी; 1920.

पाठ्यक्रम : बालमुकुंद गुप्त
पाठ्यक्रम कोड : SHSS HND 1 3 17 DCEC 3104

पाठ्यक्रम का उद्देश्य :

- बालमुकुन्द गुप्त के जीवन, सृजन एवं दर्शन की जानकारी।

पाठ्यक्रम के अपेक्षित परिणाम :

- बालमुकुन्द गुप्त के जीवन, साहित्य और दर्शन का बोध।
- बालमुकुंद गुप्त के हिंदी भाषा के निर्माण एवं साहित्यिक अवदान का परिचय।
- बालमुकुन्द गुप्त की पत्रकारिता एवं काव्य-सरोकारों का ज्ञान।

इकाई	पाठ्यक्रम
1.	बालमुकुंद गुप्त : जीवन और सृजन; नवजागरण में बालमुकुंद गुप्त की भूमिका; बालमुकुंद गुप्त और उनके समकालीन; बालमुकुंद गुप्त की किसान चेतना; बालमुकुंद गुप्त और पत्रकारिता
2.	बालमुकुंद गुप्त की काव्यभाषा; निबंधकार बालमुकुंद गुप्त; बालसाहित्यकार बालमुकुंद गुप्त; बालमुकुंद गुप्त और भाषा के प्रश्न; बालमुकुंद गुप्त के साहित्य में व्यंग्य; अनस्थिरता विवाद
3.	**शिवशम्भु के चिट्ठे :** बनाम लार्ड कर्जन; श्रीमान का स्वागत; वैसराय का स्वागत; पीछे मत फेंकिये; आशा का अंत; एक दुराशा; विदाई संभाषण; बंग विच्छेद
4.	**कविताएँ :** सर सैय्यद का बुढ़ापा; वसंतोत्सव; भैंस का स्वर्ग; पंजाब में लायल्टी; पालिटिकल होली; बड़े लाट कर्ज़न; टेसू (आए-आए..., अबके टेसू...); सच्चाई

अनुशंसित पुस्तकें :

- बालमुकुंद गुप्त रचनावली (भाग-2,3,4); संपा. के.सी. यादव; हरियाणा इतिहास एवं संस्कृति अकादमी; गुडगाँव; 2013.
- बालमुकुंद गुप्त : स्मारक ग्रंथ; झाबरमल शर्मा व बनारसीदास चतुर्वेदी; गुप्त स्मारक ग्रंथ प्रकाशक समिति, कलकत्ता; 1950.
- बालमुकुंद गुप्त ग्रंथावली; संपा. नत्थन सिंह; हरियाणा साहित्य अकादमी, पंचकूला; 2008.
- बालमुकुंद गुप्त : संकलित निबंध; संपा. कृष्णदत्त पालीवाल; राष्ट्रीय पुस्तक न्यास, दिल्ली; 2014.
- बालमुकुंद गुप्त विशेषांक; संपा. सुभाष चंद्र; देस हरियाणा, कुरुक्षेत्र; अंक-26
- बाबू बालमुकुंद गुप्त : जीवन और साहित्य; नत्थन सिंह; विनोद पुस्तक भंडार, आगरा; 1959.
- शिवशम्भु के चिट्ठे; बालमुकुंद गुप्त; राजकमल प्रकाशन, दिल्ली; 2009.
- गुप्तजी, गुड़ियानी और गुमनामी की पीर; सत्यवीर नाहड़िया; समदर्शी प्रकाशन, मेरठ; 2020.
- बालमुकुंद गुप्त के श्रेष्ठ निबंध; सत्यप्रकाश मिश्र; लोकभारती प्रकाशन, इलाहाबाद; 2019.
- बालमुकुंद गुप्त : निबन्धों की दुनिया; संपा. रेखा सेठी; वाणी प्रकाशन, दिल्ली; 2009.
- हिंदी की अनस्थिरता : एक ऐतिहासिक बहस; महावीर प्रसाद द्विवेदी, बालमुकुंद गुप्त एवं अन्य; वाणी प्रकाशन, दिल्ली; 1993.

पाठ्यक्रम : प्रेमचंद
पाठ्यक्रम कोड : SHSS HND 1 3 18 DCEC 3104

पाठ्यक्रम का उद्देश्य :

- प्रेमचंद के जीवन, सृजन एवं दर्शन से परिचय।

पाठ्यक्रम के अपेक्षित परिणाम :

- प्रेमचंद के साहित्यिक अवदान के बारे जानकारी।
- प्रेमचंद की पत्रकारिता एवं साहित्यिक सरोकारों का ज्ञान।
- पाठ अध्ययन से प्रेमचंद की साहित्यिक संवेदना और भाव-भाषा का बोध।

इकाई	पाठ्यक्रम
1.	प्रेमचंद का जीवन और सृजन; प्रेमचंद और राष्ट्रवाद; प्रेमचंद और पत्रकारिता; प्रेमचंद का उर्दू लेखन; प्रेमचंद : स्त्री एवं दलित प्रश्न; प्रेमचंद और किसान; प्रेमचंद का आदर्श और यथार्थ
2.	**उपन्यास :** रंगभूमि
3.	**कहानियां :** दुनिया का सबसे अनमोल रतन; पंच परमेश्वर; ठाकुर का कुआं; पूस की रात; बड़े भाई साहब; ईदगाह; कफ़न
4.	**निबंध :** साहित्य का उद्देश्य; महाजनी सभ्यता; कहानी कला-1,2,3; राष्ट्रभाषा हिंदी और उसकी समस्याएँ

अनुशंसित पुस्तकें :

- प्रेमचंद : एक विवेचन; इंद्रनाथ मदान; राधाकृष्ण प्रकाशन, दिल्ली; 2006.
- प्रेमचंद : एक साहित्यिक विवेचन; नंद दुलारे वाजपेयी; राजकमल प्रकाशन, दिल्ली; 2003.
- प्रेमचंद : कहानी का रहनुमा; जाफ़र रज़ा; लोकभारती प्रकाशन, इलाहाबाद; 2005.
- प्रेमचंद और उनका युग; रामविलास शर्मा; राजकमल प्रकाशन, दिल्ली; 2008.
- प्रेमचंद और भारतीय किसान; रामबक्ष; वाणी प्रकाशन, दिल्ली; 2015.
- प्रेमचंद : घर में; शिवरानी देवी; नयी किताब, दिल्ली; 2020.
- कलम का सिपाही; अमृत राय; क्लासिकल पब्लिशिंग हाउस; 2009.
- कुछ विचार; प्रेमचंद; लोकभारती प्रकाशन, इलाहाबाद; 2003.
- मान सरोवर (भाग 1-8); प्रेमचंद; प्रकाशन संस्थान, दिल्ली; 2018.
- प्रेमचंद की किसानी कहानियां; संपा. अमित मनोज; अद्वैत प्रकाशन, दिल्ली; 2017.
- सामंत का मुंशी; डॉ. धर्मवीर; वाणी प्रकाशन, दिल्ली;2005.
- प्रेमचंद की नीली आँखें; डॉ. धर्मवीर; वाणी प्रकाशन, दिल्ली; 2010.
- प्रेमचंद : व्यक्ति और साहित्यकार; मन्मथनाथ गुप्त; सरस्वती प्रेस, इलाहाबाद; 1961.
- प्रेमचंद : जीवन, कला और कृतित्व; हंसराज रहबर; विजय गोयल पब्लिशर, दिल्ली; 2009.
- प्रेमचंद; कमल किशोर गोयनका; साहित्य अकादमी, दिल्ली; 2013.
- यह प्रेमचंद है; अपूर्वानंद; सेतु प्रकाशन, नोएडा; 2021.
- प्रेमचंद; रामविलास शर्मा; सरस्वती प्रैस, इलाहाबाद; 1952.

पाठ्यक्रम : रामचंद्र शुक्ल
पाठ्यक्रम कोड : SHSS HND 1 3 19 DCEC 3104

पाठ्यक्रम का उद्देश्य :

- आचार्य रामचंद्र शुक्ल एवं उनके आलोचना कर्म की विस्तृत जानकारी।

पाठ्यक्रम के अपेक्षित परिणाम :

- आचार्य रामचंद्र शुक्ल के जीवन और साहित्य से परिचय।
- आचार्य रामचंद्र शुक्ल की साहित्यिक मान्यताओं एवं उनके आलोचना कर्म का ज्ञान।
- आचार्य शुक्ल के इतिहासबोध की जानकारी।
- निबंधों के माध्यम से आलोचनात्मक समझ का विकास।

इकाई	पाठ्यक्रम
1.	आचार्य रामचंद्र शुक्ल का जीवन और साहित्य; रामचंद्र शुक्ल का कविता विषयक चिंतन; रामचंद्र शुक्ल की इतिहास दृष्टि; रामचंद्र शुक्ल का अनुवाद कर्म; हिंदी आलोचना और रामचंद्र शुक्ल; परवर्ती आलोचकों की दृष्टि में शुक्ल
2.	रामचंद्र शुक्ल की इतिहास दृष्टि एवं भक्तिकाल; रामचंद्र शुक्ल की इतिहास दृष्टि; काव्य में लोकमंगल की साधनावस्था एवं आनंद की सिद्धावस्था;
3.	रामचंद्र शुक्ल के आलोचनात्मक प्रतिमान; रामचंद्र शुक्ल के आलोचना कर्म में तुलसी, सूर एवं जायसी; रामचंद्र शुक्ल के आलोचना कर्म में बिहारीदास एवं घनानंद
4.	निबंध : उत्साह; श्रद्धा भक्ति; ईर्ष्या; लज्जा और ग्लानि; कविता क्या है ? (चिंतामणि; भाग : एक; रामचंद्र शुक्ल)

अनुशंसित पुस्तकें :

- रामचंद्र शुक्ल और हिंदी आलोचना; रामविलास शर्मा; राजकमल प्रकाशन, दिल्ली; 2009.
- हिंदी साहित्य का इतिहास; रामचंद्र शुक्ल; नागरी-प्रचारिणी सभा, काशी; 1929.
- त्रिवेणी; रामचंद्र शुक्ल; नागरी प्रचारिणी सभा, काशी; 2016.
- चिंतामणि (भाग 1,2,3); रामचंद्र शुक्ल; नागरी प्रचारिणी सभा, काशी; 1939.
- हिंदी समीक्षा और आचार्य शुक्ल; नामवर सिंह; राजकमल प्रकाशन, दिल्ली; 2013.
- हिंदी आलोचना; विश्वनाथ त्रिपाठी; राजकमल प्रकाशन, दिल्ली; 2019.
- हिंदी आलोचना का विकास; नंदकिशोर नवल; राजकमल प्रकाशन, दिल्ली; 2011.
- गोस्वामी तुलसीदास; आचार्य रामचंद्र शुक्ल; प्रकाशन संस्थान, दिल्ली; 2012.
- सूरदास: आचार्य रामचंद्र शुक्ल, वाणी प्रकाशन, दिल्ली; 2008.

- रामचंद्र शुक्ल; मलयज; राजकमल प्रकाशन, दिल्ली; 1987.
- हिंदी साहित्य; बीसवीं शताब्दी; नंद दुलारे वाजपेयी; इंडियन बुक डिपो; लखनऊ; 1945.
- हिंदी आलोचना : शिखरों का साक्षात्कार; रामचंद्र तिवारी; लोकभारती प्रकाशन, इलाहाबाद; 2005.

पाठ्यक्रम : सूर्यकांत त्रिपाठी 'निराला'
पाठ्यक्रम कोड : SHSS HND 1 3 20 DCEC 3104

पाठ्यक्रम का उद्देश्य :

- निराला के जीवन और सृजनकर्म के विविध आयामों से परिचय।

पाठ्यक्रम के अपेक्षित परिणाम :

- निराला के साहित्यिक सरोकारों का ज्ञान।
- निराला के काव्य-वैशिष्ट्य का बोध।
- निराला के काव्येतर सृजनकर्म की जानकारी।
- पाठ अध्ययन से निराला की साहित्य-संवेदना, भाषा, शिल्प और परवर्ती साहित्यकारों पर इसके प्रभावों का ज्ञान ।

इकाई	पाठ्यक्रम
1.	निराला का जीवन और सृजन; निराला के काव्य में जागरण का स्वर; मुक्त छंद और निराला; निराला के काव्य में प्रेम-तत्त्व; लंबी कविता की अवधारणा और निराला; निराला के काव्य में गीति-तत्त्व; निराला की काव्यभाषा; निराला की आलोचना-दृष्टि; निराला की कहानी कला; निराला की उपन्यास कला; निराला का अनुवादकर्म
2.	कविताएँ : सरोज-स्मृति, कुकुरमुत्ता, तुलसीदास, तोड़ती पत्थर, वनबेला
3.	उपन्यास : चोटी की पकड़
4.	निबंध : पंत और पल्लव, रवीन्द्र कविता कानन; परिमल की भूमिका

अनुशंसित पुस्तकें :

- छायावाद; नामवर सिंह; राजकमल प्रकाशन, दिल्ली; 2020.
- निराला की साहित्य-साधना (भाग:1-3); रामविलास शर्मा; राजकमल प्रकाशन, दिल्ली; 1990.
- क्रांतिकारी कवि निराला; बच्चन सिंह; नंदकिशोर एंड संस, वाराणसी; 1947.
- निराला : आत्महंता आस्था; दूधनाथ सिंह; लोकभारती प्रकाशन, इलाहाबाद; 2009.
- कवि निराला; नंददुलारे वाजपेयी; लोकभारती प्रकाशन, इलाहाबाद; 2015.
- निराला: कृति से साक्षात्कार; नंदकिशोर नवल; राजकमल प्रकाशन, दिल्ली; 2009.
- निराला-काव्य की छवियाँ; नंदकिशोर नवल; राजकमल प्रकाशन, दिल्ली; 2012.
- कथा शिल्पी निराला; बलदेव प्रसाद मेहरोत्रा; लोकभारती प्रकाशन, इलाहाबाद; 1984.
- निराला; परमानंद श्रीवास्तव; साहित्य अकादमी, दिल्ली; 2020.
- महाकवि निराला : काव्यकला और कृतियाँ, विश्वम्भरनाथ उपाध्याय, सरस्वती पुस्तक सदन, आगरा; 1961.
- निराला रचनावली (खंड 1-8); सूर्यकांत त्रिपाठी निराला; राजकमल प्रकाशन, दिल्ली; 2009.
- निराला संचयन; संपा. विवेक निराला; राजकमल प्रकाशन, दिल्ली; 2018.
- सम्पूर्ण कहानियां; सूर्यकांत त्रिपाठी 'निराला'; राजकमल प्रकाशन, दिल्ली; 2016.

पाठ्यक्रम : सच्चिदानंद हीरानंद वात्स्यायन 'अज्ञेय'
पाठ्यक्रम कोड : SHSS HND 1321 DCEC 3104

पाठ्यक्रम का उद्देश्य :

- सचिदानंद हीरानंद वात्सायन 'अज्ञेय' के जीवन, सृजन एवं साहित्यिक अवदान की जानकारी।

पाठ्यक्रम के अपेक्षित परिणाम :

- सचिदानंद हीरानंद वात्सायन 'अज्ञेय' के साहित्य और दर्शन से परिचय।
- सचिदानंद हीरानंद वात्सायन 'अज्ञेय' के साहित्यिक सरोकारों व मूल्यों का बोध।
- सचिदानंद हीरानंद वात्सायन 'अज्ञेय' की रचनाओं के भावबोध और उनके वैशिष्ट्य का ज्ञान।

इकाई	पाठ्यक्रम
1.	सचिदानंद हीरानंद वात्सायन 'अज्ञेय' का जीवन और सृजन; अज्ञेय का काव्य चिंतन; प्रयोगवाद और अज्ञेय; 'तारसप्तक' की भूमिका का साहित्यिक अवदान; अज्ञेय की कविता में वस्तु और प्रयोग; अज्ञेय का कथा साहित्य; अज्ञेय का कथेतर गद्य साहित्य
2.	**उपन्यास :** अपने-अपने अजनबी
3.	**कहानियां :** गैंग्रीन; शरणार्थी; खितीन बाबू
4.	**कविताएँ :** कितनी नावों में कितनी बार; कांच के पीछे की मछलियाँ; हरी घास पर क्षण भर; भीतर जागा दाता; बावरा अहेरी

अनुशंसित पुस्तकें :

- तारसप्तक; सचिदानंद हीरानंद वात्सायन 'अज्ञेय; भारतीय ज्ञानपीठ, दिल्ली; 1943.
- आत्मनेपद; सचिदानंद हीरानंद वात्सायन 'अज्ञेय'; भारतीय ज्ञानपीठ, दिल्ली; 2003.
- लेखक का दायित्व; अज्ञेय; भारतीय ज्ञानपीठ, दिल्ली; 1959.
- अज्ञेय; भोलाभाई पटेल; वाणी प्रकाशन, दिल्ली; 2014.
- अज्ञेय : प्रतिनिधि कविताएँ एवं जीवन परिचय; विद्यानिवास मिश्र; राजपाल एंड संस, दिल्ली; 2003.
- कवि अज्ञेय; नंदकिशोर नवल; राजकमल प्रकाशन, दिल्ली; 2016.
- आधुनिक साहित्य की प्रवृत्तियां; नामवर सिंह; लोकभारती प्रकाशन, इलाहाबाद; 2016.
- अज्ञेय और आधुनिक रचना की समस्या; रामस्वरूप चतुर्वेदी; भारतीय ज्ञानपीठ, दिल्ली; 2000.
- नयी कविता और अस्तितत्ववाद; रामविलास शर्मा; राजकमल प्रकाशन, दिल्ली; 2012.
- अज्ञेय और उनका कथा साहित्य; गोपाल राय; वाणी प्रकाशन, दिल्ली; 2010.
- आलोचक अज्ञेय की उपस्थिति; कृष्णदत्त पालीवाल; वाणी प्रकाशन, दिल्ली; 2011.
- अज्ञेय की काव्य-तितीर्षा; नंदकिशोर आचार्य; वाग्देवी प्रकाशन, बीकानेर; 2001.
- अज्ञेय का काव्य; प्रणय कृष्ण; लोकभारती प्रकाशन, इलाहाबाद; 2015.

- अज्ञेय : प्रतिनिधि निबंध; संपा. कृष्णदत्त पालीवाल; नेशनल बुक ट्रस्ट, दिल्ली; 2011.
- अरे यायावर रहेगा याद !; अज्ञेय; राजकमल प्रकाशन, इलाहाबाद; 2016.
- अज्ञेय होने का अर्थ; कृष्णदत्त पालीवाल; वाणी प्रकाशन, इलाहाबाद; 2012.
- अपने-अपने अज्ञेय; ओम थानवी; वाणी प्रकाशन, दिल्ली; 2011.
- आदम की डायरी; अज्ञेय; वाग्देवी प्रकाशन, बीकानेर; 2012.

चतुर्थ सेमेस्टर

पाठ्यक्रम : हिंदी आलोचना
पाठ्यक्रम कोड : SHSS HND 1 4 12 C 4105

पाठ्यक्रम का उद्देश्य :

- हिंदी आलोचना के विकास और सिद्धांत-निर्माण से परिचय।

पाठ्यक्रम के अपेक्षित परिणाम :

- हिंदी आलोचना के क्रमबद्ध विकास का ज्ञान।
- साहित्य में आलोचना की प्रक्रिया और महत्ता का बोध।
- आलोचनात्मक प्रतिमानों के निर्माण की जानकारी।
- प्रमुख आलोचकों के आलोचनाकर्म का ज्ञान।

इकाई	पाठ्यक्रम
1.	साहित्य और आलोचना; आधुनिकता और आलोचना; हिंदी आलोचना का उद्भव और विकास; आलोचना की विविध पद्धतियाँ; आलोचना की रचना-प्रक्रिया; हिंदी के प्रमुख आलोचक
2.	मिश्र-बंधु, लाला भगवानदीन, पद्म सिंह शर्मा और महावीर प्रसाद द्विवेदी के आलोचना-कर्म का सामान्य परिचय; रामचन्द्र शुक्ल : लोकमंगल, रस-दृष्टि, इतिहास-दृष्टि
3.	नंददुलारे वाजपेयी : आलोचना के मानदंड, छायावाद संबंधी प्रमुख स्थापनाएँ हजारी प्रसाद द्विवेदी : आलोचना की दूसरी परंपरा, प्रमुख आलोचनात्मक प्रतिमान; नगेंद्र की आलोचना दृष्टि; रामविलास शर्मा और नामवर सिंह की आलोचना-दृष्टि एवं आलोचना-कर्म
4.	प्रेमचंद, प्रसाद, निराला, पंत, मुक्तिबोध और विजयदेव नारायण साही का आलोचना-कर्म; मैनेजर पांडेय का समाजशास्त्रीय चिंतन; समकालीन आलोचना की विविध पद्धतियाँ (स्त्रीवादी, दलितवादी, आदिवासी-चिंतन)

अनुशंसित पुस्तकें :

- हिंदी आलोचना; विश्वनाथ त्रिपाठी; राजकमल प्रकाशन, दिल्ली; 2011.
- आचार्य रामचंद्र शुक्ल और हिंदी आलोचना; रामविलास शर्मा; राजकमल प्रकाशन, दिल्ली; 1987.
- हिंदी साहित्य : बीसवीं शताब्दी; नंददुलारे वाजपेयी; लोकभारती प्रकाशन, दिल्ली; 1970.
- कबीर; हजारी प्रसाद द्विवेदी; राजकमल प्रकाशन, दिल्ली; 2019.
- पंत और पल्लव; सूर्यकांत त्रिपाठी 'निराला'; गंगा-ग्रन्थागार, लखनऊ; 1966.
- काव्य और कला तथा अन्य निबंध; जयशंकर प्रसाद; लोकभारती प्रकाशन, दिल्ली; 2016.
- इतिहास और आलोचना; नामवर सिंह; राजकमल प्रकाशन, दिल्ली; 1978.
- एक साहित्यिक की डायरी; गजानन माधव मुक्तिबोध; राजकमल प्रकाशन, दिल्ली; 1980.
- दूसरी परंपरा की खोज; नामवर सिंह; राजकमल प्रकाशन, दिल्ली; 1980.
- समकालीन हिंदी आलोचना; परमानन्द श्रीवास्तव; साहित्य अकादमी, दिल्ली; संस्करण : अंकित नहीं
- ज्ञान का स्त्रीवादी पाठ; सुधा सिंह; ग्रंथ शिल्पी, दिल्ली; 2008.

- छठवां दशक; विजयदेव नारायण साही; हिन्दुस्तानी एकेडमी, इलाहाबाद; 1987.
- रस सिद्धांत; नगेंद्र; नेशनल पब्लिशिंग हाउस, दिल्ली; 2019.

पाठ्यक्रम : पाश्चत्य काव्यशास्त्र
पाठ्यक्रम कोड : SHSS HND 1413 C 4105

पाठ्यक्रम का उद्देश्य :

- साहित्य के विषय में पाश्चात्य चिंतन पद्धति की जानकारी।

पाठ्यक्रम के अपेक्षित परिणाम :

- पाश्चात्य ज्ञान की परंपराओं का बोध।
- साहित्य की आलोचना और मूल्यांकन की दृष्टि का विकास।
- पाश्चात्य काव्य सिद्धांतों की महत्वपूर्ण अवधारणाओं की जानकारी।

इकाई	पाठ्यक्रम
1	प्लेटो : काव्य सिद्धांत; अनुकरण सिद्धांत अरस्तु : अनुकरण सिद्धांत; विरेचन और त्रासदी की अवधारणा
2	लोंजाइनस : उदात्त की अवधारणा; कॉलरिज : कल्पना सिद्धांत; वर्डसवर्थ : काव्य की अवधारणा; काव्य भाषा का सिद्धांत
3	क्रोचे : अभिव्यंजनावाद; आई.ए.रिचर्डस : मूल्य एवं संप्रेषण सिद्धांत; टी.एस. इलियट : परम्परा और निर्वैक्तिकता का सिद्धांत; मैथ्यू अर्नाल्ड : आलोचना का स्वरूप और प्रकार्य
4	नयी समीक्षा; मार्क्सवाद; मनोविश्लेषणवाद; अभिव्यंजनावाद; बिम्ब, प्रतीक, फैंटेसी, कल्पना

अनुशंसित पुस्तकें :

- पाश्चात्य काव्यशास्त्र; डॉ देवेन्द्रनाथ शर्मा; नेशनल पब्लिशिंग हाउस, दिल्ली; 2018.
- साहित्य सिद्धांत; डॉ रामअवध द्विवेदी; बिहार राष्ट्रभाषा परिषद्, पटना; 1963.
- पाश्चात्य साहित्य चिंतन; प्रो निर्मला जैन तथा डॉ कुसुम बांठिया; राधाकृष्ण प्रकाशन, दिल्ली; 1990.
- पाश्चात्य काव्यशास्त्र की परम्परा; डॉ नगेन्द्र एवं सावित्री सिन्हा; दिल्ली विश्वविद्यालय, दिल्ली; 1972.
- नयी समीक्षा : नये संदर्भ; डॉ नगेन्द्र; नेशनल पब्लिशिंग हाउस, दिल्ली; 1974.
- नयी समीक्षा के प्रतिमान; प्रो निर्मला जैन (संपा); नेशनल पब्लिशिंग हाउस, दिल्ली; 1977.
- आलोचना से आगे; सुधीश पचौरी; राधाकृष्ण प्रकाशन, दिल्ली; 2019.
- पाश्चात्य काव्यशास्त्र; विजय बहादुर सिंह; प्रकाशन संसथान, दिल्ली; 2011.
- विश्व साहित्य शास्त्र; डॉ. नगेंद्र; किताबघर प्रकाशन, दिल्ली; 1996.
- हिंदी आलोचना की पारिभाषिक शब्दावली; अमरनाथ; राजकमल प्रकाशन, दिल्ली; 2009.
- पाश्चात्य समीक्षा दर्शन; जगदीश चंद्र जैन, हिंदी प्रचारक संस्थान, वाराणसी; 1969.
- नयी समीक्षा; अमृत राय; हिंदुस्तानी पब्लिशिंग हाउस, बनारस; 1950.
- हिंदी आलोचना के नए सरोकार; कृष्णदत्त पालीवाल; वाणी प्रकाशन, दिल्ली; 2002.

पाठ्यक्रम : लघु शोध-प्रबंध*
पाठ्यक्रम कोड : SHSS HND 1 4 01 SEEC 014014

*इसमें प्रत्येक विद्यार्थी को निर्धारित निर्देशक से विचार-विनिमय करके एक लघु शोध-प्रबंध लिखना होगा.

सामान्य वैकल्पिक पाठ्यक्रम (GEC)

प्रथम सेमेस्टर में प्रस्तावित

पाठ्यक्रम : हिंदी भाषा एवं व्याकरण

पाठ्यक्रम कोड : SHSS HND 1 1 01 GE 3104

पाठ्यक्रम का उद्देश्य :

- भाषा एवं व्याकरण की मूल प्रकृति की जानकारी।

पाठ्यक्रम के अपेक्षित परिणाम :

- भाषा और व्याकरण के विविध घटकों का परिचय।
- शब्द, पद और वाक्य की रचना का बोध।
- भाषा के विविध रूपों का ज्ञान।

इकाई	पाठ्यक्रम
1	भाषा की परिभाषा एवं विशेषताएं; भाषा के विविध रूप; भाषा की उत्पत्ति; भाषा की संरचना भाषा और व्याकरण; व्याकरण का महत्व; ध्वनि और वर्ण हिंदी की ध्वनियों का वर्गीकरण (स्वर, व्यंजन और मात्राएँ)
2	शब्द की परिभाषा और उसके भेद (रचना और स्रोत के आधार पर) शब्दों की व्याकरणिक कोटियाँ (संज्ञा, सर्वनाम, विशेषण, क्रिया आदि) शब्द निर्माण (उपसर्ग, प्रत्यय, संधि और समास)
3	शब्द और पद में अंतर विकारी शब्दों की रूप-रचना (संज्ञा, सर्वनाम, विशेषण, क्रिया आदि) अविकारी शब्द (अव्यय)
4	वाक्य की परिभाषा और उसके अंग वाक्य के भेद (रचना और अर्थ के आधार पर) वाक्य की संरचना

अनुशंसित पुस्तकें :

- हिंदी : उद्भव, विकास और रूप; डॉ हरदेव बाहरी; किताब महल इलाहाबाद; 1969.
- व्याकरणिक कोटियों का विश्लेणात्मक अध्ययन; डॉ दीप्ति शर्मा, बिहार ग्रन्थ अकादमी; 1975.
- भाषाविज्ञान की भूमिका; डॉ देवेन्द्रनाथ शर्मा; राधाकृष्ण प्रकाशन, दरियागंज दिल्ली; 2015.
- हिंदी भाषा; डॉ भोलानाथ तिवारी; किताब महल, इलाहाबाद; 2004.
- हिंदी भाषा का उद्भव और विकास; उदय नारायण तिवारी; लोकभारती प्रकाशन, इलाहाबाद; 2016.
- हिंदी व्याकरण; कामता प्रसाद गुप्त; नागरी प्रचारिणी सभा, काशी; 1927.
- प्रामाणिक व्याकरण एवं रचना; विजयपाल सिंह; विश्वविद्यालय प्रकाशन, वाराणसी; 2008.
- व्यावहारिक हिंदी व्याकरण तथा रचना; हरदेव बाहरी; लोकभारती प्रकाशन, इलाहाबाद; 1972.
- हिंदी-उर्दू : साझा संस्कृति; संपा. मुरली मनोहर प्रसाद सिंह, चंचल चौहान एवं अन्य; नेशनल बुक ट्रस्ट, दिल्ली; 2011.

पाठ्यक्रम : हरियाणा का साहित्य
पाठ्यक्रम कोड : SHSS HND 1 1 02 GE 3104

पाठ्यक्रम का उद्देश्य :

- हरियाणा में रचित हिंदी साहित्य की जानकारी मिलेगी।

पाठ्यक्रम के अपेक्षित परिणाम :

- हरियाणा के नामकरण, इतिहास एवं प्राचीनता का ज्ञान होगा।
- हरियाणा के साहित्यिक अवदान की जानकारी प्राप्त होगी।
- पाठ बोध के माध्यम से साहित्यिक मूल्यों एवं सरोकारों का बोध होगा।

इकाई	पाठ्यक्रम
1.	हरियाणा का नामकरण एवं इतिहास; हरियाणा की साहित्यिक परंपरा का उद्भव; हरियाणा के सूफी कवि; हरियाणा के संत कवि; हरियाणा का आरंभिक गद्य साहित्य, हरियाणा की पत्र-पत्रिकाएँ; हरियाणा के समकालीन साहित्यकार
2.	हरियाणा की भाषा और बोलियाँ; हरियाणा के लोककवि; हरियाणा के लोकनाट्यकार; हरियाणा के लोकगीत; हरियाणा की रागनी
3.	**सूरदास :** भ्रमरगीत सार: संपा. रामचंद्र शुक्ल (पद संख्या : 23, 42, 64, 95, 114, 138, 210, 316) **गरीबदास :** गरीबदास जी की बानी : चेतावनी का अंग (1, 34, 36, 55, 84) **नितानंद :** सत्य सिद्धांत प्रकाश : विरह का अंग (1, 6, 27, 29, 34, 36, 42, 46, 52, 80, 81, 94, 109, 112, 113, 114, 143, 145, 164, 187) **अल्ताफ़ हुसैन हाली :** चुप की दाद
4.	**स्वांग : पं. लखमीचंद :** शाही लकड़हारा **कहानियां : माधव प्रसाद मिश्र :** विश्वास का फल; **विश्वम्भरनाथ शर्मा 'कौशिक' :** ताई; **स्वदेश दीपक :** किसी अप्रिय घटना का समाचार नहीं **निबंध : बालमुकुंद गुप्त :** श्रीमान का स्वागत; **राजकिशन नैन :** लो आई देखो रितु बसंत

अनुशंसित पुस्तकें :

- निबन्धों की दुनिया : बालमुकुंद गुप्त; संपा. रेखा सेठी; वाणी प्रकाशन, दिल्ली; 2009.
- गरीबदास; संपा. लालचंद गुप्त 'मंगल'; साहित्य अकादमी, दिल्ली; 2014.
- हरियाणा के संतकवि नितानंद; संपा. डॉ. रामकुमार भरद्वाज एवं अनिता भारद्वाज; हरियाणा साहित्य अकादमी, चण्डीगढ़; 1987.
- पं. माधव प्रसाद मिश्र ग्रंथावली; संपा. जयनाथ नलिन; हरियाणा साहित्य अकादमी, पंचकूला; 2009.
- पं. लखमीचंद ग्रंथावली; संपा. पूर्णचंद शर्मा; हरियाणा साहित्य अकादमी, पंचकूला; 2013.
- पं. मांगेराम ग्रंथावली; संपा. पूर्णचंद शर्मा; हरियाणा ग्रन्थ अकादमी, पंचकूला; 2013.
- हरियाणा प्रदेश के लोकगीतों का सामाजिक पक्ष; जगदीश नारायण एवं भोलानाथ शर्मा; हरियाणा साहित्य अकादमी, चंडीगढ़; 1989.

- बालमुकुंद गुप्त रचनावली (भाग-2,3,4); संपा. के.सी. यादव; हरियाणा इतिहास एवं संस्कृति अकादमी, गुडगाँव; 2013.
- बालमुकुंद गुप्त ग्रंथावली; संपा. नत्थन सिंह; हरियाणा साहित्य अकादमी, पंचकूला; 1993.
- लोक में ऋतु; राजकिशन नैन; आधार प्रकाशन, पंचकूला; 2012.
- हरियाणा का संत साहित्य; डॉ. सूरजभान; हरियाणा साहित्य अकादमी, पंचकूला; 1986.
- हरियाणवी लोकधारा : प्रतिनिधि रागनियाँ; संपा. सुभाष चंद्र; आधार प्रकाशन, पंचकूला; 2012.
- हरियाना प्रदेश का लोकसाहित्य; डॉ. शंकर लाल यादव; हिन्दुस्तानी एकेडेमी, इलाहाबाद; 2000.
- हरियाणा के लोकगीत; संपा. साधुराम शारदा; हरियाणा साहित्य अकादमी, पंचकूला; 1970.
- हरियाणा : एक सांस्कृतिक अध्ययन; संपा. साधुराम शारदा; भाषा विभाग, हरियाणा, चंडीगढ़; 1978.
- छापकटैया; राजेंद्र बड़गूजर; हरियाणा ग्रंथ अकादमी, पंचकूला; 2019.
- सत्य सिद्धांत प्रकाश; नितानंद; जटेला धाम, माजरा-दूबलधन, झज्जर (हरि.); 2015.
- लोकगीतों का बुगचा; संपा. निर्मल; वाणी प्रकाशन, दिल्ली; 2014.
- गरीबदास जी की बानी; बेलविडियर प्रिंटिंग वर्क्स, इलाहाबाद; 1969.
- बाबा शेख फरीद रत्नावली; संपा. जसविन्द्र कौर बिंद्रा; ग्रंथ अकादमी, दिल्ली; 2013.
- हरियाणा का हिंदी साहित्य : उद्भव और विकास; शिवप्रसाद गोयल; नटराज पब्लिशिंग हाउस, करनाल (हरि.); 1984.
- हरियाणा की समकालीन हिंदी कहानी; ज्ञानप्रकाश विवेक; हरियाणा ग्रंथ अकादमी, पंचकूला; 2014.

पाठ्यक्रम : अनुवाद : सिद्धांत एवं प्रयोग
पाठ्यक्रम कोड : SHSS HND 1 1 03 GE 3104

पाठ्यक्रम का उद्देश्य :

- अनुवाद की अवधारणा एवं स्वरूप से परिचय।

पाठ्यक्रम के अपेक्षित परिणाम :

- अनुवाद और साहित्य के सिद्धांतों की जानकारी।
- विभिन्न क्षेत्रों में अनुवाद के महत्त्व ज्ञान।
- अनुवाद की प्रक्रिया और उसके प्रयोग का बोध।

इकाई	पाठ्यक्रम
1.	अनुवाद की अवधारणा एवं स्वरूप; अनुवाद की संकल्पना; अनुवाद के प्रकार और क्षेत्र; अनुवाद : प्रविधि और प्रक्रिया
2.	अनुवाद: सिद्धांत और इतिहास; साहित्य और अनुवाद का अंत: संबंध; जनसंचार माध्यम और अनुवाद; अनुवाद का अनुप्रयुक्त पक्ष
3.	तत्काल भाषांतरण और अनुवाद; हिंदी के विविध क्षेत्र और व्यवहारिक अनुवाद; संचार माध्यम और अनुवाद (प्रिंट तथा इलेक्ट्रॉनिक माध्यमों का संदर्भ)
4.	सामाजिक तथा सांस्कृतिक क्षेत्र में अनुवाद; साहित्यिक अनुवाद; वैज्ञानिक अनुवाद; तकनीकि अनुवाद; राजभाषा और अनुवाद

अनुशंसित पुस्तकें :

- हिंदी अनुवाद परंपरा- एक अनुशीलन; कलवार, किशोरीलाल, नवभारत प्रकाशन, दिल्ली; 2009.
- अनुवाद सिद्धांत की रूपरेखा: कुमार सुरेश; वाणी प्रकाशन, दिल्ली; 2011.
- अनुवाद के भाषिक पक्ष; विभा गुप्ता; वाणी प्रकाशन, दिल्ली; 2007.
- हिंदी व्याकरण; कामताप्रसाद गुरु; प्रकाशन संस्थान, दिल्ली; 2009.
- अनुवाद विज्ञान: सिद्धांत एवं प्रविधि; भोलानाथ तिवारी; किताबघर प्रकाशन, दिल्ली; 2011.
- व्यवहारिक अनुवाद कला; रमेश चंद्र; नीलकंठ प्रकाशन, दिल्ली; 1998.
- अनुवाद साधना; पूरनचंद टंडन; अभिव्यक्ति प्रकाशन, दिल्ली; 2007.
- अनुवाद सिद्धांत एवं व्यवहार; जयंती प्रसाद नौटियाल; राधाकृष्ण प्रकाशन, दिल्ली; 2006.
- अनुवाद शिल्प : समकालीन संदर्भ; कुसुम अग्रवाल; साहित्य सलाहकार, दिल्ली; 1999.

पाठ्यक्रम : सृजनात्मक लेखन
पाठ्यक्रम कोड : SHSS HND 1 1 04 GE 3104

पाठ्यक्रम का उद्देश्य :

- सृजनात्मक लेखन के सिद्धांत एवं व्यवहार से परिचय।

पाठ्यक्रम के अपेक्षित परिणाम :

- सृजनात्मक लेखन की बुनियादी अवधारणाओं का ज्ञान।
- सृजनात्मक लेखन के कौशल का विकास।
- सृजनात्मक लेखन के विविध क्षेत्रों का ज्ञान।
- सृजनात्मक भाषा का विकास।

इकाई	पाठ्यक्रम
1.	सृजनात्मक लेखन की अवधारणा और स्वरूप; भाव एवं विचार की रचना में रूपांतरण की प्रक्रिया; विविध अभिव्यक्ति क्षेत्र: साहित्य, सिनेमा, विज्ञापन, पत्रकारिता एवं अन्य गद्य अभिव्यक्तियाँ; जनभाषण और लोकप्रिय संस्कृति; लेखन के विविध रूप
2.	अर्थ निर्मिति के आधार : शब्दार्थ-मीमांसा, शब्द के प्राक्-प्रयोग, नव्य-प्रयोग, शब्द की व्याकरणिक कोटि; भाषा की भंगिमाएँ : औपचारिक-अनौपचारिक, मौखिक-लिखित, मानक; रचना-सौष्ठव : शब्द-शक्ति' प्रतीक, बिंब, अलंकरण, वक्रताएं, मुहावरे और लोकोक्तियाँ
3.	विविध विधाओं का व्यावहारिक अध्ययन; कविता: संवेदना, काव्यरूप, भाषा-सौष्ठव, छंद, लय, गति और तुक; कथा साहित्य: वस्तु, पात्र, परिवेश और विमर्श; नाट्य साहित्य : वस्तु, पात्र, परिवेश और रंग-कर्म; विविध गद्य विधाएँ : निबंध, संस्मरण, व्यंग्य; बाल साहित्य की आधारभूत संरचना
4.	सूचना-तंत्र के लिए लेखन; प्रिंट माध्यम : फीचर- लेखन, यात्रा-वृत्तान्त, साक्षात्कार, पुस्तक-समीक्षा; इलेक्ट्रानिक माध्यम : रेडियो, दूरदर्शन, फिल्म पटकथा लेखन और टेलीविजन पटकथा लेखन

अनुशंसित पुस्तकें :

- रचनात्मक लेखन; (सं.) रमेश गौतम; भारतीय ज्ञानपीठ, दिल्ली; 2008.
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- उपन्यास की संरचना; गोपाल राय; राजकमल प्रकाशन, दिल्ली; 2006.
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- पटकथा लेखन : एक परिचय; मनोहर श्याम जोशी; राजकमल प्रकाशन, दिल्ली; 2016.
- मीडिया लेखन के सिद्धांत; एन.सी. पंत; तक्षशिला प्रकाशन, दिल्ली; 2005.
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- समाचार, फीचर-लेखन एवं संपादन कला; हरिमोहन, तक्षशिला प्रकाशन, दिल्ली; 1999.
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- हिंदी साहित्य का छंदोविवेचन; गौरीशंकर मिश्र 'द्विजेन्द्र'; बिहार हिंदी ग्रंथ अकादमी, पटना; 2016.
- सृजन का रसायन; शिवमूर्ति; वाणी प्रकाशन, दिल्ली; 2014.

तृतीय सेमेस्टर में प्रस्तावित

पाठ्यक्रम : सिनेमा अध्ययन
पाठ्यक्रम कोड : SHSS HND 1 3 05 GE 3104

पाठ्यक्रम का उद्देश्य :

- सिनेमा के स्वरूप एवं उसके महत्त्व की जानकारी।

पाठ्यक्रम के अपेक्षित परिणाम :

- सिनेमा एवं कला के अंतर्संबंधों का ज्ञान।
- समाज निर्माण में सिनेमा की भूमिका से परिचय ।
- सिनेमा से संबंधित प्रमुख संस्थाओं एवं निर्माण के केंद्रों की जानकारी ।
- फिल्मों के अध्ययन से आलोचनात्मक समझ का विकास।

इकाई	पाठ्यक्रम
1.	सिनेमा का उद्भव एवं विकास; सिनेमा उद्योग एवं कला का संबंध; सिनेमा के प्रकार; सिनेमा से संबंधित प्रमुख संस्थाएं और निर्माण के केंद्र
2.	सिनेमा और समाज; सिनेमा और साहित्य का संबंध; सांस्कृतिक विमर्श एवं सिनेमा; राष्ट्रीयता और सिनेमा; वृतचित्र एवं सिनेमा का बदलता स्वरूप
3.	आरंभिक हिंदी सिनेमा का स्वरूप; हिंदी सिनेमा का रूमानी दौर; हिंदी सिनेमा का वर्तमान परिदृश्य; हिंदी सिनेमा में नायकत्व की अवधारणा; हिंदी सिनेमा में स्त्री एवं प्रेम;
4.	फिल्म : मुग़ल-ए-आज़म (1960); एक रुका हुआ फैसला (1986); शेरनी (2021)

अनुशंसित पुस्तकें :

- लोकप्रिय सिनेमा और सामाजिक यथार्थ; जवरीमल्ल पारख; अनामिका प्रकाशन, दिल्ली; 2019.
- सिनेमा: कल ,आज ,कल; विनोद भारद्वाज; वाणी प्रकाशन, दिल्ली; 2006.
- सिनेमा और साहित्य; हरीश कुमार; संजय प्रकाशन, दिल्ली; 1998.
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- वर्ल्ड सिनेमा(हिस्ट्री); सं. ज्योफ्री नोवेल स्मिथ; ऑक्सफ़ोर्ड यूनिवर्सिटी प्रेस; 1997.
- लेखक का सिनेमा; कुंवर नारायण; राजकमल प्रकाशन, दिल्ली; 2017.
- दास्तान-ए-मुग़ल-ए-आज़म; राजकुमार केसवानी; मंजुल पब्लिशिंग हाउस; 2020.
- सिनेमा और सितारों का मायाजाल; जय प्रकाश चौकसे; प्रभात प्रकाशन, दिल्ली; 2018.

- हिंदी सिनेमा की यात्रा; संपा. पंकज शर्मा; अनन्य प्रकाशन, दिल्ली; 2015.
- बाज़ार के बाजीगर; प्रह्लाद अग्रवाल; राजकमल प्रकाशन, दिल्ली; 2007.

पाठ्यक्रम : प्रयोजनमूलक हिंदी
पाठ्यक्रम कोड : HND 13O6 GE 3104

पाठ्यक्रम का उद्देश्य :

- प्रयोजनमूलक हिंदी की अवधारणा और स्वरूप से परिचय।

पाठ्यक्रम के अपेक्षित परिणाम :

- हिंदी के विविध रूपों का व्यवहारिक मूल्यांकन।
- हिंदी भाषा में प्रिंट और इलेक्ट्रॉनिक मीडिया की रचना प्रक्रिया की जानकारी।
- कंप्यूटर की संरचना और उसके घटकों का बोध।
- अनुवाद की प्रविधि और प्रक्रिया का व्यावहारिक ज्ञान।

इकाई	पाठ्यक्रम
1	प्रयोजनमूलक हिंदी : परिभाषा और उसका स्वरूप; हिंदी के विविध रूप : राजभाषा, सम्पर्क भाषा, साहित्यिक भाषा, माध्यम भाषा; राजभाषा हिंदी के प्रमुख रूप : प्रारूपण, पल्लवन, टिप्पण, पत्र लेखन
2	मीडिया का स्वरूप: प्रिंट और इलेक्ट्रॉनिक मीडिया; प्रिंट मीडिया में लेखन : फीचर, समाचार, विज्ञापन और मीडिया की भाषा; इलेक्ट्रॉनिक मीडिया : समाचार निर्माण एवं प्रस्तुतीकरण; विज्ञापन का स्वरूप और संरचना; विज्ञापन की भाषा
3	कंप्यूटर : परिचय और महत्व, कंप्यूटर के विभिन्न घटक; कंप्यूटर की संरचना : हार्डवेयर और सॉफ्टवेर की भूमिका; इन्टरनेट : कार्य प्रणाली एवं सुविधाएँ
4	अनुवाद: प्रविधि और प्रक्रिया; भाषिक अनुवाद; अनुवाद प्रक्रिया के चरण; कार्यालयी हिंदी और अनुवाद; साहित्यिक अनुवाद; वाणिज्य क्षेत्र में अनुवाद; शब्दावली और अनुवाद; विधि शब्दावली का अनुवाद

अनुशंसित पुस्तकें :

- राजभाषा हिंदी; कैलाशचंद्र भाटिया; वाणी प्रकाशन, दिल्ली; 1994.
- प्रयोजनमूलक हिंदी; दंगल झालटे; वाणी प्रकाशन, दिल्ली; 2010.
- आधुनिक विज्ञापन; प्रेमचंद पातंजलि; वाणी प्रकाशन, दिल्ली; 2018.
- विज्ञापन डॉट कॉम; रेखा सेठी; वाणी प्रकाशन, दिल्ली; 2017.
- कंप्यूटर और हिंदी; हरिमोहन; तक्षशिला प्रकाशन, दिल्ली; 2015.
- रेडियो और दूरदर्शन पत्रकारिता; हरिमोहन; तक्षशिला प्रकाशन, दिल्ली; 2017.

पाठ्यक्रम : साहित्य का अंतर-अनुशासनिक अध्ययन
पाठ्यक्रम कोड : SHSS HND 1 3 07 GE 3104

पाठ्यक्रम का उद्देश्य :

- साहित्य का अन्य अनुशासनों से अंतर्संबंध का अध्ययन।

पाठ्यक्रम के अपेक्षित परिणाम :

- साहित्य के बुनियादी सरोकारों का ज्ञान।
- साहित्य का अन्य अनुशासनों के साथ संबंधों की जानकारी।
- जीवन-मूल्य और चिंतन के अनेक उपादानों का ज्ञान।
- विभिन्न अनुशासनों की दार्शनिक पृष्ठभूमि का ज्ञान।

इकाई	पाठ्यक्रम
1.	साहित्य की अंतर-अनुशासनिकता की अवधारणा; साहित्य की परिभाषा; साहित्य का उद्देश्य; साहित्य और जीवन-मूल्य; साहित्य का कला-रूप
2.	साहित्य और कला; साहित्य और संस्कृति; साहित्य और संगीत; साहित्य और मूर्तिकला; साहित्य और चित्रकला; साहित्य और नृत्यकला; साहित्य और सिनेमा
3.	साहित्य और दर्शनशास्त्र; पाश्चात्य दर्शन का साहित्य से संबंध; साहित्य और समाज विज्ञान; साहित्य और समाजशास्त्र का संबंध; साहित्य और राजनीति का संबंध; साहित्य और विधि का संबंध; साहित्य और इतिहास का संबंध; साहित्य और अर्थशास्त्र का संबंध
4.	साहित्य और विज्ञान; मानव-विज्ञान और साहित्य का संबंध; साहित्य और पर्यावरण का संबंध; साहित्य और चिकित्साशास्त्र का संबंध; साहित्य और मनोविज्ञान का संबंध; साहित्य का अन्य विज्ञानपरक अनुशासनों से संबंध

अनुशंसित पुस्तकें :

- भारतीय विज्ञान की कहानी; गुणाकर मुले; राजकमल प्रकाशन, दिल्ली; 2003.
- भारतीय संगीत की कहानी; भगवतशरण उपाध्याय; राजपाल एंड संस, दिल्ली; 2016.
- भारत की मूर्तिकला की कहानी; भगवतशरण उपाध्याय; राजपाल एंड संस, दिल्ली; 2013.
- भारतीय चित्रकला का संक्षिप्त इतिहास, वाचस्पति गैरोला; लोकभारती प्रकाशन; इलाहाबाद; 2009.
- भारत के शास्त्रीय नृत्य; लीला वेंकटरमन (अनु.-प्रयाग शुक्ल); नियोगी बुक्स, दिल्ली; 2019.
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- साहित्य के समाजशास्त्र की भूमिका; मैनेजर पाण्डेय; हरियाणा ग्रंथ अकादमी, पंचकूला; 1989.
- साहित्य और इतिहास-दृष्टि; मैनेजर पाण्डेय; वाणी प्रकाशन, दिल्ली; 2016.
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- धुनों की यात्रा; पंकज राग; राजकमल प्रकाशन, दिल्ली; 2006.
- दर्शन, साहित्य और समाज; शिवकुमार मिश्र; वाणी प्रकाशन, दिल्ली; 2000.
- चित्रकला और समाज; भाऊ समर्थ; सेतु प्रकाशन, नोएडा; 2020.

पाठ्यक्रम : अस्मितामूलक साहित्य
पाठ्यक्रम कोड : SHSS HND 1 3 08 GE 3104

पाठ्यक्रम का उद्देश्य :

- अस्मितामूलक साहित्य की अवधारणा और उसके स्वरूप से परिचय।

पाठ्यक्रम के अपेक्षित परिणाम :

- अस्मितामूलक साहित्य के बुनियादी सरोकारों का ज्ञान।
- अस्मितामूलक साहित्य में मुक्ति के स्वरों की पहचान।
- अस्मितामूलक साहित्य की समझ का विकास।
- पाठ बोध के माध्यम से भाषा, भाव और रचना प्रक्रिया की जानकारी।

इकाई	पाठ्यक्रम
1.	अस्मिता की अवधारणा; स्मृति, इतिहास और अस्मिता; अस्मिता और सत्ता; धर्म और अस्मिता; अस्मिता और राष्ट्र; भूमंडलीकरण और अस्मिता
2.	अस्मितामूलक आंदोलन; मुक्ति की आकांक्षा और स्वर; सहानुभूति बनाम स्वानुभूति; आदिवासी अस्मिता और साहित्य; व्यक्ति अस्मिता और सामूहिक अस्मिता; स्त्री अस्मिता और हिंदी साहित्य
3.	**आत्मकथा : ओमप्रकाश वाल्मीकि** : जूठन **निबंध : महादेवी वर्मा** : युद्ध और नारी, नारीत्व का अभिशाप (शृंखला की कड़ियाँ)
4.	**कविताएँ : मलखान सिंह** : सफ़ेद हाथी; एक पूरी उम्र **: वंदना टेटे** : सबसे सुंदर स्त्री हो जाती है, पत्थलगड़ी की औरतें **: निर्मला पुतुल** : गजरा बेचने वाली स्त्री; आदिवासी स्त्रियाँ; बाहामुनी

अनुशंसित पुस्तकें :

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- शृंखला की कड़ियाँ; महादेवी वर्मा; लोकभारती प्रकाशन, इलाहाबाद; 2004.
- आदिवासी अस्मिता : प्रभुत्व और प्रतिरोध; संपा. अनुज लुगुन; अनन्य प्रकाशन, दिल्ली; 2015.

पाठ्यक्रम : साहित्य का समाजशास्त्र
पाठ्यक्रम कोड : SHSS HND 1 3 09 GE 3104

पाठ्यक्रम का उद्देश्य :

- साहित्य और समाज के अंतर्संबंधों और सरोकारों से परिचय।

पाठ्यक्रम के अपेक्षित परिणाम :

- साहित्य और समाज के संबंधों की मीमांसा।
- साहित्य के समाजशास्त्र की विभिन्न पद्धतियों की प्रविधि का बोध।
- साहित्यिक रचनाओं के समाजशास्त्रीय पाठ की प्रस्तुति का ज्ञान।
- साहित्य का समाजशास्त्रीय दृष्टि से विश्लेषण करने की समझ का विकास।

इकाई	पाठ्यक्रम
1	साहित्य और समाज का अंतर्संबंध; साहित्य के समाजशास्त्र का इतिहास; साहित्य के समाजशास्त्र की रूपरेखा
2	साहित्य के समाजशास्त्र की पद्धतियाँ : मार्क्सवादी पद्धति, समाजशास्त्रीय पद्धति, संरचनावादी पद्धति
3	साहित्यिक रूपों की अवधारणा; वस्तु और रूप का अंतर्संबंध; उपन्यास का समाजशास्त्र; कविता का समाजशास्त्र
4	'आत्महत्या के विरुद्ध' कविता का समाजशास्त्रीय अध्ययन; 'गोदान' उपन्यास का समाजशास्त्रीय अध्ययन 'जूठन' आत्मकथा का समाजशास्त्रीय अध्ययन

अनुशंसित पुस्तकें :

- साहित्य का समाजशास्त्र; डॉ नगेन्द्र; नेशनल पब्लिशिंग हाउस, दिल्ली; 1982.
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- साहित्य के सिद्धांत; रेने वेलेक, आस्टिन वारेन; बीएस. पालीवाल; लोकभारती प्रकाशन, इलाहाबाद; 2012.

शिक्षण अधिगम प्रक्रिया

- व्याख्यान
- प्रश्नोत्तर
- अभ्यास
- सहभागितामूलक अधिगम
- अनुप्रेरक सत्र
- विचार-सत्र
- संगोष्ठी
- अनुसंधान आधारित पाठचर्या एवं लघु शोध प्रबंध
- तकनीकी आधारित अधिगम

मिश्रित अधिगम

संकल्पना : मिश्रित अधिगम एक शैक्षणिक दृष्टिकोण है जो शिक्षण और अधिगम की प्रक्रिया में कंप्यूटर-आधारित गतिविधियों के साथ अभिमुख कक्षा की पद्धतियों को समेकित करता है। इसका आधार अधिगम-प्रक्रियाओं को अधिक रोचक और आकर्षक बनाने के लिए अभिमुख और ऑनलाइन गतिविधियों का सुन्दर समावेश है। यह परम्परागत शिक्षण पद्धति और आईसीटी केन्द्रित गतिविधियों का समायोजन करता है। यह छात्र-केंद्रित अधिगम के परिवेश पर बल देता है जहां शिक्षक उत्पादक और उल्लेखनीय अधिगम निष्कर्षों का सूत्रधार है। यह डिजिटल प्लेटफॉर्म के माध्यम से वीडियो लेक्चर, पॉडकास्ट, रिकॉर्डिंग और लेखों जैसे ओपन-एक्सेस स्रोतों की विस्तृत श्रृंखला तक पहुंचने और खोजने के लिए छात्रों और शिक्षकों को पर्याप्त स्वतंत्रता और लचीलापन देते हुए, अभिमुख-अधिगम का अनुकूलन और सहयोग करता है। यह शिक्षकों को अभिमुख-अधिगम के उपयुक्त डिजिटल प्लेटफॉर्म, संसाधनों और समयावधि के चयन में स्वतंत्रता और स्वायत्तता देता है। मिश्रित अधिगम शिक्षक की भूमिका को कम नहीं करता है, बल्कि यह उसे पाठ्यक्रम की आवश्यकताओं के अनुसार परम्परा से हटकर खोज करने का अवसर देती है।

मिश्रित अधिगम के मुख्य बिंदु

- छात्र-केंद्रित शैक्षणिक दृष्टिकोण समय, सामग्री की गुणवत्ता, छात्रों की जरूरतों और रुचियों में लचीलेपन और उनकी पसंद के माध्यम से अध्ययन करने की स्वतंत्रता पर ध्यान केंद्रित करता है
- विभिन्न माध्यमों और तकनीकों को चुनने की स्वतंत्रता
- अधिगम में छात्रों की व्यस्तता में वृद्धि
- शिक्षक और छात्र के मध्य संवाद में वृद्धि
- छात्र अधिगम-निष्कर्ष में सुधार
- शिक्षण-अधिगम परिवेश में अत्याधिक लचीलापन
- स्वयं और निरंतर सीखने के लिए अधिक क्रियाशील
- प्रयोगात्मक अधिगम हेतु बेहतर अवसर
- अधिगम कौशल में अभिवृद्धि
- सूचना तक अधिक पहुंच, बेहतर संतुष्टि और अधिगम-निष्कर्ष।

आकलन एवं मूल्यांकन

- प्रत्येक पाठ्यक्रम-स्तरीय अधिगम-निष्कर्ष की उपलब्धि के बाद नियमित रूप से निरंतर व्यापक मूल्यांकन
- एकमुश्त मूल्यांकन के बजाय पूरे कार्यक्रम में शिक्षार्थी की गतिविधियों के आधार पर रचनात्मक मूल्यांकन
- प्रस्तुति और संचार कौशल का परीक्षण करने के लिए मौखिक परीक्षा
- अर्जित ज्ञान की बेहतर समझ और अनुप्रयोग के लिए खुली किताब परीक्षा
- समस्या समाधान अभ्यास पर समूह परीक्षा
- संगोष्ठी प्रस्तुतियाँ
- उपलब्ध सामग्री की समीक्षा
- सहयोगात्मक कार्य

प्रमुख बिंदु

- मुख्य और वैकल्पिक पाठ्यक्रमों का वृहद् समवाय
- प्रत्येक पाठ्यक्रम से सुनिश्चित लक्ष्य की प्राप्ति
- विश्व साहित्य और आधुनिक भारतीय साहित्य का समावेश
- पत्रकारिता, जनसंचार और अनुवाद के कौशल संबंधी प्रश्न पत्र
- अंतर-अनुशासनिक विषय-वस्तु की उपलब्धता
- स्थानीय साहित्य के साथ-साथ हिंदी व्याकरण के अध्ययन की सुविधा
- अनुसंधान और विशेषज्ञता केन्द्रित

प्रमुख शब्द

- LOCF/एलओसीएफ
- NEP-2020/नयी शिक्षा नीति-2020
- Blended Learning/ मिश्रित अधिगम
- Face to face (F to F) Learning/ प्रत्यक्ष अधिगम
- Programme Outcomes/ कार्यक्रम के निष्कर्ष
- Programme Specific Outcomes/ कार्यक्रम के विशेषीकृत निष्कर्ष
- Course-level Learning Outcomes/ पाठ्यक्रम-स्तरीय अधिगम निष्कर्ष
- Postgraduate Attributes/स्नातकोत्तर की महत्ता/ विशेषता
- Learning Outcome Index/अधिगम निष्कर्ष सूचकांक
- Formative Assessment and Evaluation/ एकमुश्त आकलन एवं मूल्यांकन
- Comprehensive and Continuous Evaluation/ सतत आकलन एवं मूल्यांकन

संदर्भ

- नयी शिक्षा नीति-2020

  https://www.education.gov.in/sites/upload_files/mhrd/files/NEP_Final_English_0.pdf .

- यूजीसी की वेबसाईट पर उपलब्ध विषय आधारित एलओसीएफ प्रारूप का नमूना

  https://www.ugc.ac.in/ugc_notices.aspx?id=MjY5OQ==

- यूजीसी की वेबसाईट पर उपलब्ध शिक्षण एवं अधिगम का मिश्रित माध्यम विषयक संकल्पना प्रपत्र

  https://www.ugc.ac.in/pdfnews/6100340_Concept-Note-Blended-Mode-of-Teaching-and-Learning.pdf

अनुलग्नक

पाठ्यक्रम सुधार- राष्ट्रीय शिक्षा नीति -2020 के मुख्य बिंदु

I. **राष्टीय शिक्षा नीति : उच्च शिक्षा का दृष्टिकोण**

- ❖ एक प्रबुद्ध, सामाजचेता-, ज्ञानवान और कुशल राष्ट्र के विकास को संभव बनाना
- ❖ ज्ञान सृजन और नवाचार का आधार जिससे एक बढ़ती हुई राष्ट्रीय अर्थव्यवस्था में योगदान होता है।
- ❖ अधिक जीवंत, सामाज-सम्बद्ध, सहकारी समुदायों और एक खुशहाल, एकजुट, सुसंस्कृत, उत्पादक, अभिनव, प्रगतिशील और समृद्ध राष्ट्र की कुंजी।
- ❖ सतत आजीविका और राष्ट्र के आर्थिक विकास में योगदान करना
- ❖ 21वीं सदी के प्रमुख कौशलसे युक्त, परिपूर्ण, विचारशील, रचनात्मक और समुचित योग्य व्यक्तियों का निर्माण करना

II. **नयी शिक्षा नीति: एकीकृत दृष्टिकोण पर बल**

- ❖ पेशेवर और व्यावसायिक शिक्षा सहित एक एकीकृत उच्च शिक्षा प्रणाली;
- ❖ उच्च गुणवत्ता वाली बहु विषयक और-अंतर-अनुशासनिक शिक्षा को सक्षम और प्रोत्साहित करना;
- ❖ कला, मानविकी, भाषा, विज्ञान, सामाजिक विज्ञान, और पेशेवर, तकनीकी और व्यावसायिक क्षेत्रों के क्षेत्रों में 21वीं सदी की क्षमता;
- ❖ यहां तक कि इंजीनियरिंग संस्थान, जैसे कि आईआईटी, कला और मानविकी के साथ अत्याधिक समग्र और बहु विषयक शिक्षा की ओर-अग्रसर।
- ❖ कला और मानविकी के छात्र अधिक विज्ञान सीखने का लक्ष्य रखेंगे
- ❖ सामान्य शिक्षा में अधिक व्यावसायिक विषयों और सॉफ्ट स्किल्स को शामिल करने का प्रयास
- ❖ सकारात्मक अधिगम निष्कर्षों के लिए मानविकी और कला का एसटीईएम के साथ एकीकरण।

III. **राष्ट्रीय शिक्षा नीति : पाठ्यचर्या संबंधी संस्तुतियां**

- ❖ छात्रोपयोगिता के बेहतर अनुभव के लिए पाठ्यक्रम, शिक्षण-पद्धति, मूल्यांकन और छात्र सहयोग में सुधार;
- ❖ रटने की संस्कृति से दूर वास्तविक समझ विकसित करना और सीखना सीखना। -
- ❖ चरित्र, नैतिक और संवैधानिक मूल्य, बौद्धिक जिज्ञासा, वैज्ञानिक स्वभाव, रचनात्मकता, सेवा की भावना का विकास करना
- ❖ छात्रों को अधिक सार्थक और संतोषजनक जीवन और कार्ययोजना के लिए तैयार करना
- ❖ छात्रों को आर्थिक रूप से आत्मनिर्भर करते हुए, अपने अनुशासन और इसके बाहर कौशल और मूल्यों के क्षेत्र की विशिष्ट पहचान कराना।

IV. **राष्ट्रीय शिक्षा नीति : कौशल संबंधी संस्तुतियां**

- अनुशासनों की निर्बाधता में 21वीं सदी की योग्यताएं
- व्यक्तिगत उपलब्धि और ज्ञानोदय;
- रचनात्मक सार्वजनिक जुड़ाव
- समाज में उत्पादक योगदान;
- वैज्ञानिक स्वभाव और साक्ष्य आधारित चिंतन;
- रचनात्मकता और नवीनता
- आलोचनात्मक और उर्ध्व चिंतन क्षमता,
- संप्रेषण कौशल,
- समसामयिकी और स्थानीय समुदायों, राज्यों, देश और दुनिया के सामने आने वाले महत्वपूर्ण मुद्दों का ज्ञान।
- गहन शिक्षण और सभी क्षेत्रों में पाठ्यक्रम में महारत हासिल करना
- सामाजिक एवं नैतिक जागरूकता
- कला और सौंदर्य का बोध
- मौखिक और लिखित संप्रेषण
- स्वास्थ्य एवं पोषण
- शारीरिक शिक्षा, फिटनेस, स्वास्थ्य, और खेलकूद
- सहयोग और सामूहिकता
- समस्या समाधान और तर्कशक्ति परीक्षण
- पर्यावरण जागरूकता, जल/संसाधन संरक्षण, स्वच्छता और साफ़-सफाई

V. **राष्ट्रीय शिक्षा नीति : सुधार हेतु संस्तुतियां**

- छात्रों के बीच विभिन्न महत्वपूर्ण कौशल विकसित करने के लिए आर्टिफिशियल इंटेलिजेंस, डिजाइन थिंकिंग, समग्र स्वास्थ्य, जैविक जीवन, पर्यावरण शिक्षा, वैश्विक नागरिकता शिक्षा (जीसीईडी), आदि जैसे समकालीन विषयों का परिचय
- शिक्षण और अधिगम की आकर्षक प्रक्रियाओं के माध्यम से कौशल और मूल्यों को आत्मसात करना
- आलोचनात्मक चिंतन और परिपूर्ण, पूछताछआधारित-, खोजआधारित-, चर्चा-आधारित और विश्लेषण-आधारितअधिगम के लिए जगह बनाने के लिए पाठ्यचर्या सामग्री को कम किया जाना है।
- सामग्री मुख्य संकल्पनाओं, विचारों, अनुप्रयोगों और समस्या समाधान पर विषय-वस्तु केंद्रित रहेगी
- प्रायोगिक अधिगम जिसमें व्यावहारिक अधिगम, कलाएकीकृत-एकीकृत और खेल- अधिगम शामिल है
- प्रत्येक विषय में किस्सागोई आधारित शिक्षण-पद्धति
- सभी अनुशासनों की संकल्पनाओं के अधिगम के आधार के रूप में कला और संस्कृति के विभिन्न आयाम और रूप
- शिक्षण और अधिगम की प्रक्रिया में भारतीय कला और संस्कृति के एकीकरण के माध्यम से भारतीय लोकाचार को आत्मसात करना

- पाठ्यचर्या और शिक्षण-पद्धति को भारतीय और स्थानीय संदर्भ और संस्कृति, परंपरा, विरासत, रीति-रिवाज, भाषा, दर्शन, भूगोल, प्राचीन और समकालीन ज्ञान, सामाजिक और वैज्ञानिक जरूरतों, सीखने के स्वदेशी और पारंपरिक तरीकों आदि के संदर्भ में दृढ़ता से निहित किया जाना चाहिए
- पाठ्यक्रम विकल्प में लचीलापन लाकर छात्रों को सशक्त बनाना
- अध्ययनगत अनुशासनों के रचनात्मक संयोजन को सक्षम करने के लिए कल्पनाशील और लचीली पाठ्यक्रम संरचना
- वर्तमान में प्रचलित कठोर सीमाओं को हटाकर और सतत अधिगम के लिए नई संभावनाएं पैदा करके एकाधिक प्रवेश और निकास बिंदु प्रदान करना
- भारतीय मानकों को अंतरराष्ट्रीय श्रम संगठन द्वारा बनाए गए व्यवसायों के अंतरराष्ट्रीय मानक वर्गीकरण के साथ क्रमबद्ध किया जायेगा
- 'पाठ्यचर्या', 'पाठ्येतर', या 'सह-पाठ्यचर्या', 'कला', 'मानविकी', और 'विज्ञान' के बीच, या 'व्यावसायिक' या 'शैक्षणिक' धाराओं के बीच कोई जटिल अलगाव नहीं है
- भारतीय शास्त्रीय भाषाओं के लिए बहुभाषावाद और लगाव को बढ़ावा देकर भारतीय ज्ञान प्रणाली, सांस्कृतिक परंपराओं और शास्त्रीय साहित्य के लिए अभिवृद्धि
- विभिन्न प्रासंगिक विषयों और वास्तविक जीवन के अनुभवों के साथ भाषाओं के सांस्कृतिक आयामों का रचाव - जैसे कि फिल्में, थिएटर, कहानी, कविता और संगीत
- प्राचीन भारत के ज्ञान और आधुनिक भारत में इसके योगदान के बारे में छात्रों को शिक्षित करने के लिए "भारत का ज्ञान"
- सभी छात्रों में बुनियादी नैतिक तर्क, पारंपरिक भारतीय मूल्य और मानवीय और संवैधानिक मूल्य विकसित किए जाने चाहिए
- सामुदायिक जुड़ाव और सेवा, पर्यावरण शिक्षा और मूल्य-आधारित शिक्षा के क्षेत्रों में क्रेडिट-आधारित पाठ्यक्रम और परियोजनाएं
- स्थानीय उद्योग, व्यवसायों, कलाकारों, शिल्पकारों आदि के साथ इंटर्नशिप के अवसर ताकि छात्र अपनी रोजगार क्षमता में सुधार के लिए अपने अधिगम के व्यावहारिक पक्ष से जुड़ सकें
- कौशल अंतराल विश्लेषण और स्थानीय अवसरों की पहचान के आधार पर व्यावसायिक शिक्षा के लिए लक्षित क्षेत्रों का चयन किया जाएगा
- स्टार्ट-अप इन्क्यूबेशन केंद्र; प्रौद्योगिकी विकास केंद्र; और व्यापक उद्योग-अकादमिक संबंध के माध्यम से अनुसंधान और नवाचार पर ध्यान देना
- तकनीकी शिक्षा के लिए वांछित निष्कर्षों हेतु पाठ्यचर्या योजना में नवाचार को बढ़ावा देने के लिए उद्योग और उच्च शिक्षा संस्थानों के बीच घनिष्ठ सहयोग की आवश्यकता
- तकनीकी शिक्षा में युवाओं की रोजगार क्षमता बढ़ाने के लिए अन्य विषयों के साथ गहराई से जुड़ने के अवसरों पर नए सिरे से ध्यान केंद्रित किया जाना चाहिए।
- प्रत्येक कार्यक्रम के लक्ष्यों को आगे बढ़ाने के लिए सतत रचनात्मक मूल्यांकन
- उच्चस्तरीय परीक्षाओं से हटकर अधिक सतत और व्यापक मूल्यांकन की ओर बढ़ना
- प्रत्येक कार्यक्रम के लिए अधिगम लक्ष्यों के आधार पर छात्र की उपलब्धि का आकलन करना, प्रणाली को निष्पक्ष बनाना और निष्कर्षों को अधिक तुलनीय बनाना

- ❖ इन-क्लास, ऑनलाइन और ओडीएल मोड सहित गुणवत्ता के वैश्विक मानकों को प्राप्त करने के लिए सभी विषयों में सभी कार्यक्रम, पाठ्यक्रम, पाठ्यचर्या और शिक्षण-पद्धति।
- ❖ शिक्षक को पाठ्यपुस्तक और पठन सामग्री चयन, असाइनमेंट और मूल्यांकन सहित अनुमोदित ढांचे के भीतर अपने स्वयं के पाठ्यचर्या और शैक्षणिक दृष्टिकोण को निर्मित करने की स्वतंत्रता दी जानी चाहिए।
- ❖ नए शिक्षण, अनुसंधान और सेवा के संचालन के लिए संकाय को सशक्त बनाना, जिसे वे सर्वाधिक उपयुक्त देखते हैं
- ❖ कक्षा अंतरण को योग्यता-आधारित शिक्षा और अधिगम की ओर स्थानांतरित करना
- ❖ मूल्यांकन उपकरण प्रत्येक विषय के लिए निर्दिष्ट अधिगम निष्कर्षों, क्षमताओं और स्वभाव के साथ संरेखित किये जाने चाहिए

Annexure-XIII

पाठ्यक्रम

पीएच.डी. (हिंदी)_कोर्स वर्क

(2021-22 से प्रभावी)

हरियाणा केंद्रीय विश्वविद्यालय, महेंद्रगढ़

पाठ्यक्रम

पीएच.डी. (हिंदी)_कोर्स वर्क

हिंदी विभाग

मानविकी एवं समाज विज्ञान पीठ

हरियाणा केंद्रीय विश्वविद्यालय, महेंद्रगढ़

(2021-22 से प्रभावी)

पाठ्यक्रम : **शोध प्रविधि**
पाठ्यक्रम का कोड : **SHSS HND 01 C 101**

क्रेडिट-6

(इस पाठ्यक्रम में शोध की विभिन्न प्रणालियों, विषय चयन, शोध की उपयोगिता, बौद्धिक संपदा के साथ-साथ साहित्य में अनुसंधान में आने वाली समस्याओं का अध्ययन किया जाएगा)

इकाई	पाठ्यक्रम
1	शोध की अवधारणा एवं स्वरूप; शोध और आलोचना; शोध और समीक्षा; शोध के तत्व; शोध के प्रकार
2	शोध की पद्धतियाँ; एतिहासिक शोध; समाजशास्त्रीय शोध; अंतर्विद्यावर्ती शोध; पाठालोचनात्मक शोध; तुलनात्मक शोध; लोकसाहित्यिक शोध; भाषा-वैज्ञानिक शोध; शैली-वैज्ञानिक शोध
3	शोध परिकल्पना; विषय संकल्पना; रूप-रेखा निर्माण; विषय वर्गीकरण; शोध-सामग्री प्रलेखीकरण; उद्धरण और संदर्भ; ग्रंथ सूची के निर्माण की प्रविधि
4	संचार क्रांति एवं साहित्यिक शोध; मानव मूल्य और शोध; शोध की वस्तुनिष्ठता एवं शोधकर्ता की आत्मपरकता; बौद्धिक संपदा; हिंदी में शोध की समस्याएँ; प्रायोजित शोध; शोध में अनुदान एवं पुस्तकालय की भूमिका

अनुशंसित पुस्तकें :

- शोध प्रविधि; हरिश्चंद्र वर्मा; हरियाणा साहित्य अकादमी, पंचकूला; 2006.
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- शोध प्रविधि; विनय मोहन शर्मा; मयूर बुक्स, दिल्ली; 2018.
- शोध प्रविधि; मैथिली प्रसाद भारद्वाज; आधार प्रकाशन, पंचकूला; 2005.
- शोध और सिद्धांत; डॉ. नगेंद्र; नेशनल पब्लिशिंग हाउस, दिल्ली; 1961.

पाठ्यक्रम : तुलनात्मक साहित्य
पाठ्यक्रम कोड : SHSS HND 01 E 102

क्रेडिट-6

(इस पाठ्यक्रम में विभिन्न भारतीय भाषाओं एवं विदेशी भाषाओं के साहित्य के तुलनात्मक अध्ययन के साथ-साथ तुलनात्मक साहित्य की अवधारणा, समस्याओं एवं उसके विभिन्न परिप्रेक्ष्यों का अध्ययन अपेक्षित होगा.)

इकाई	पाठ्यक्रम
1	तुलनात्मक साहित्य की अवधारणा और स्वरूप; तुलनात्मक साहित्य के वैचारिक आधार; तुलनात्मक साहित्य के अध्ययन का इतिहास एवं वर्तमान परिदृश्य; तुलनात्मक साहित्य के मूल्य एवं मंतव्य
2	तुलनात्मक साहित्य के अध्ययन की प्रविधि एवं परिप्रेक्ष्य; तुलनात्मक साहित्य के राष्ट्रीय एवं अंतर्राष्ट्रीय संदर्भ; तुलनात्मक साहित्य का भारतीय संदर्भ
3	भारतीय साहित्य की अवधारणा और अध्ययन की समस्याएँ; मध्यकालीन धर्म, दर्शन और कविता; भारतीय साहित्य में आधुनिकता का उदय; अनुवाद अध्ययन और तुलनात्मक साहित्य
4	तुलनात्मक साहित्यं एवं पाठ : कालिदास और शेक्सपीयर; प्रेमचंद और गोर्की; निराला और रवींद्रनाथ टैगोर

अनुशंसित पुस्तकें :

- तुलनात्मक अध्ययन एवं स्वरूप; संपा. भ.ह. राजूरकर एवं राजकमल बोरा; वाणी प्रकाशन, दिल्ली; 1978.
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- तुलनात्मक अध्ययन : भारतीय परिप्रेक्ष्य; इंद्रनाथ चौधरी; वाणी प्रकाशन, दिल्ली; 2007.
- तुलनात्मक साहित्य की भूमिका; इंद्रनाथ चौधरी; नेशनल पब्लिशिंग हाउस, दिल्ली; 1999.
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पाठ्यक्रम : साहित्य का इतिहास दर्शन
पाठ्यक्रम कोड : SHSS HND 01 E 103

क्रेडिट-6

(इस पाठ्यक्रम में साहित्य के इतिहास की अवधारणा, दर्शन एवं उसके औचित्य, विभिन्न दृष्टियों, इतिहास लेखन की मूल समस्याएँ और उसके पुनर्विचार संबंधी अध्ययन अपेक्षित होगा.)

इकाई	पाठ्यक्रम
1.	साहित्य के इतिहास की अवधारणा एवं आवश्यकता साहित्य के इतिहास की विभिन्न दृष्टियाँ: विधेयवादी, मार्क्सवादी
2.	हिंदी साहित्य का इतिहास एवं काल विभाजन साहित्य के इतिहास लेखन की मूल समस्याएँ साहित्य के इतिहास लेखन पर पुनर्विचार की आवश्यकता
3.	आचार्य रामचंद्र शुक्ल एवं हिंदी साहित्य का इतिहास दूसरी परंपरा का इतिहास एवं आचार्य हजारी प्रसाद द्विवेदी
4.	डॉ. रामविलास शर्मा की इतिहास दृष्टि डॉ नगेन्द्र की इतिहास दृष्टि अन्य इतिहास दृष्टियाँ- नामवर सिंह, मैनेजर पाण्डेय

संदर्भ पुस्तकें :

- हिंदी साहित्य का इतिहास; रामचन्द्र शुक्ल; नागरी प्रचारिणी सभा, वाराणसी; 2008.
- हिंदी साहित्य की भूमिका; हजारी प्रसाद द्विवेदी; राजकमल प्रकाशन, दिल्ली; 2017.
- हिंदी साहित्य का आदिकाल; हजारी प्रसाद द्विवेदी; वाणी प्रकाशन, दिल्ली; 2008.
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- हिंदी कविता का अतीत और वर्तमान; मैनेजर पाण्डेय; वाणी प्रकाशन, दिल्ली;
- इतिहास दर्शन; रामविलास शर्मा; वाणी प्रकाशन, दिल्ली; 2007.
- इतिहास और आलोचना; नामवर सिंह; राजकमल प्रकाशन, दिल्ली;
- साहित्य और इतिहास दृष्टि; मैनेजर पाण्डेय; वाणी प्रकाशन, दिल्ली; 2016.
- हिंदी साहित्य का इतिहास : पुनर्लेखन की समस्याएँ; श्याम कश्यप (स.); हिंदी माध्यम कार्यान्वयन निदेशालय, दिल्ली;
- इतिहास और विचारधारा; इरफ़ान हबीब; ग्रन्थ शिल्पी प्रकाशन, दिल्ली; 2005.

पाठ्यक्रम : साहित्य और विचारधारा
पाठ्यक्रम कोड : SHSS HND 01 E 104

क्रेडिट-6

(इस पाठ्यक्रम में साहित्य और विचारधारा के संबंधों का सैद्धांतिक विवेचन करने के साथ हिंदी कृति एवं कृतिकारों की सृजन-प्रक्रिया पर उसके प्रभावों का अध्ययन किया जाएगा.)

इकाई	पाठ्यक्रम
1	विचारधारा की अवधारणा का विकास, विचारधारा : धर्म और दर्शन, विचारधारा और विज्ञान विचारधारा का स्वरूप, विचारधाराओं का सामाजिक आधार, विचारधारा के रूपों में साहित्य का स्थान, साहित्य की स्वायत्तता और विचारधारा, साहित्य की सैद्धांतिकी के निर्माण में विचारधारा की भूमिका, विचारधारा और साहित्य रूप, साहित्यिक कृति और विचारधारा का सम्बन्ध: द्वंद्व और सामंजस्य.
2	विचारधारा संबंधी प्रमुख चिन्तक : ग्यार्ज लुकाच, अंतोनियो ग्राम्शी, गाँधी, बी.आर.आंबेडकर, राम मनोहर लोहिया
3	प्रमुख विचारधाराएं : मार्क्सवाद, गाँधीवाद, आंबेडकरवाद, मनोविश्लेषणवाद, अस्तित्ववाद, उत्तर-आधुनिकता
4	व्यवहार पक्ष : रामचरितमानस, मैला आंचल और कामायनी का विचारधारात्मक अध्ययन

सहायक पुस्तकें:

- आलोचना और विचारधारा; नामवर सिंह; राजकमल प्रकाशन, दिल्ली; 2014.
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- गाँधी, आम्बेडकर, लोहिया और भारतीय इतिहास की समस्याएँ; राम विलास शर्मा; वाणी प्रकाशन; दिल्ली; 2008.
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पाठ्यक्रम : पाठालोचन
पाठ्यक्रम कोड : SHSS HND 01 E 105

क्रेडिट-6

(इस पाठ्यक्रम में हिंदी साहित्य में पाठालोचन की अवधारणा, वर्तमान स्थिति व उसकी आवश्यकता, पाठ-भेद और मूल-पाठ के निर्धारण संबंधी समस्याओं का अध्ययन अपेक्षित होगा.)

इकाई	पाठ्यक्रम
1.	हिंदी साहित्य में पाठालोचन की अवधारणा पाठालोचन की वर्तमान स्थिति एवं आवश्यकता साहित्य में पाठालोचन का इतिहास, भविष्य एवं संभावनाएं
2.	पाठालोचन एवं उसकी विभिन्न पद्धतियों का परिचय पाठालोचन के क्षेत्र में लकमैन एवं हेनरी क्विंटन का योगदान पाठभेद एवं मूल-पाठ के निर्धारण की समस्याएँ
3.	शिलालेखों तथा उत्कीर्ण-लेखों का पाठालोचन हस्तलिखित पांडुलिपियों का पाठालोचन छापाखाने का आविष्कार, मुद्रित पुस्तकें एवं पाठालोचन भक्त-कवियों की कृतियों के पाठालोचन का प्रायोगिक अध्ययन
4.	ऑनलाइन कार्पस का परिचय एवं निर्माण पद्धतियाँ प्रमुख ऑनलाइन कार्पसों का संक्षिप्त विवरण ऑनलाइन कार्पस एवं उनका पाठालोचन में योगदान

संदर्भ पुस्तकें :

- साहित्य के समाज शास्त्र की भूमिका: मैनेजर पाण्डेय; हरियाणा ग्रंथ अकादमी, पंचकूला;
- साहित्य और इतिहास दृष्टि: मैनेजर पाण्डेय; वाणी प्रकाशन, दिल्ली; 2016.
- हिंदी साहित्य का इतिहास :रामचन्द्र शुक्ल; नागरी प्रचारिणी सभा; वाराणसी; 2008.
- हिंदी साहित्य का अतीत (दो खंड); विश्वनाथ प्रसाद मिश्र; वाणी प्रकाशन, दिल्ली; 2012.
- राष्ट्रीय संग्रहालय, दिल्ली में उपलब्ध शिलालेख एवं अन्य उत्कीर्ण लेख
- प्राच्य विद्या प्रतिष्ठान, जोधपुर में उपलब्ध पांडुलिपियाँ एवं अनुक्रमणिका
- प्राच्य विद्या प्रतिष्ठान, उदयपुर में उपलब्ध पांडुलिपियाँ एवं अनुक्रमणिका
- नागरी प्रचारिणी सभा, काशी में उपलब्ध पांडुलिपियाँ एवं अनुक्रमणिका
- हिंदी साहित्य सम्मलेन, प्रयाग में उपलब्ध पांडुलिपियाँ एवं अनुक्रमणिका
- इंटरनेट में उपलब्ध विभिन्न ऑनलाइन पाठ्यक्रम

पाठ्यक्रम : अस्मितामूलक चिंतन
पाठ्यक्रम कोड : SHSS HND 01 E 106

क्रेडिट-6

(इसमें विभिन्न अस्मिताओं के विकास, आन्दोलन, सिद्धांत और प्रमुख सिद्धांतकारों का अध्ययन किया जाएगा.)

इकाई	पाठ्यक्रम
1	अस्मिता की अवधारणा, अस्मितावादी चिंतन का इतिहास, अस्मितावादी आन्दोलन: वैश्विक और भारतीय परिप्रेक्ष्य, अस्मितावाद का समसामयिक परिप्रेक्ष्य
2	स्त्रीवाद की अवधारणा, स्त्रीवादी आन्दोलन का इतिहास : भारतीय एवं पाश्चात्य संदर्भ, स्त्रीवादी चिंतन के सिद्धांत और प्रमुख भारतीय व पाश्चात्य स्त्रीवादी चिंतक
3	दलित अस्मिता की अवधारणा, दलित आन्दोलन का इतिहास, दलित चिंतन के सिद्धांत और प्रमुख चिंतक
4	आदिवासी अस्मिता की अवधारणा, भारत के प्रमुख आदिवासी आन्दोलन और उनके नायक, आदिवासी चिंतन के सिद्धांत और प्रमुख चिंतक

सहायक पुस्तकें:

- दलित दृष्टि; ओम वेटगेल; वाणी प्रकाशन, दिल्ली; 2011.
- आधुनिकता के आईने में दलित; (सं.) अभी कुमार दुबे; वाणी प्रकाशन, दिल्ली; 2002.
- दलित साहित्य का सौंदर्यशास्त्र; शरण कुमार लिम्बाले; वाणी प्रकाशन, दिल्ली; 2014.
- बहुजन साहित्य की प्रस्तावना; प्रमोद रंजन एवं आयवन कोसका (सं.); फारवर्ड प्रेस, दिल्ली; 2016.
- आदिवासी समाज और साहित्य; रमणिका गुप्ता (सं.); वाणी प्रकाशन, दिल्ली;
- आदिवासी अस्मिता का संकट; रमणिका गुप्ता; सामयिक प्रकाशन, दिल्ली; 2018.
- आदिवासी साहित्य विमर्श; (सं. गंगा सहाय मीणा); अनामिका प्रकाशन, दिल्ली;
- शृंखला की कड़ियाँ; महादेवी वर्मा; लोकभारती प्रकाशन, इलाहाबाद ; 2008.
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- स्त्री मुक्ति के प्रश्न; देवेन्द्र इस्सर; संवाद प्रकाशन, मेरठ;

नोट : उक्त के अतिरिक्त शोध कार्यक्रम के कोर्स वर्क का अध्ययन करने वाले शोधार्थियों को यूजीसी द्वारा अनिवार्य एवं हरियाणा केंद्रीय विश्वविद्यालय द्वारा लागू प्रश्न-पत्र 'शोध एवं प्रकाशन मूल्य' (Research & Publication Ethics) का अध्ययन करना अपेक्षित/अनिवार्य होगा, जिसका पाठ्यक्रम हरियाणा केंद्रीय विश्वविद्यालय के केंद्रीय पुस्तकालय द्वारा उपलब्ध करवाया जाएगा.

हरियाणा केंद्रीय विश्वविद्यालय
(संसद अधिनियम संख्या 25 (2009) के तहत स्थापित)
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DEPARTMENT OF HISTORY & ARCHAEOLOGY

CENTRAL UNIVERSITY OF HARYANA

Minutes of the Board of Studies Meeting

A meeting of the Board of Studies was held on 8th Sep 2021 at 4 PM in virtual mode.

Following members were present in the meeting:

1. Prof. S. K. Chahal, External Member, BOS, Dept. of History, Kurukshetra University
2. Dr. Abhiranjan Kumar, Member, BOS, Dept. of History & Archaeology, CUH

One faculty member from the department of History & Archaeology joined this meeting as guest member:

1. Dr. Iswar Parida, Guest Member, Dept. of History & Archaeology, CUH

Proposed Agenda:

Item no. 1. To consider and approve changes in the selected courses of the existing syllabus of PG and M.Phil.

Item no. 2: To consider and approve new courses for GEC and DCEC at PG level.

Item no. 3: To approve the online-offline distribution of course in a 40-60 ratio.

Item no. 4. Other, if any, with permission of the chair.

Resolutions:

Srl no.	Proposed Agenda	Resolutions
Item no. 1	To consider and approve changes in the selected courses of the existing syllabus of PG and M.Phil.	Approved as proposed.

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Item no. 2	To consider and approve new courses for GEC and DCEC at PG level.	Approved as proposed.
Item no. 3	To approve the online-offline distribution of course in a 40-60 ratio.	Approved as proposed.
Item no. 4	Other, if any, with permission of the chair. a) It was observed that paper four, a seminar paper (a research article writing paper), of semester third is restricted to one theme and to one concerned teacher only, making it inconvenient for a single teacher to do justice.	a) It was agreed that the seminar paper of semester third (Paper 4 both in Archaeology and Modern India) will be made open to any theme related to the specialization area (Archaeology or Modern India). Also that any teacher from these areas can supervise. Therefore, these courses in each specialization will now be shifted to the DCEC course with new course code. This new course code will be as follows: 1. SAHS HA 010311 MOD DCEC 4004: Constitutional History of India:1773 Regulating Act to 1947 Act 2. SAHS HA 010309 ARCH DCEC4004: Indian Epigraphy Up to 1200 AD

Suggestion:

1. Prof. S K Chahal, the external member, suggested the introduction of two new courses at the DCEC level, if the department thinks it deem suitable:

a) Business history of India
b) Depressed classes in Indian History

The suggestion was appreciated and it was hold that the department would take up this suggestion in its next departmental meeting.

The HOD (Dept. of History & Archaeology) endorsed the resolutions telephonically.

The meeting concluded at 4:45 PM with a vote of thanks by Dr. Abhiranjan Kumar.

(Prof. S K Chahal) 8-9-21

(Dr. Abhiranjan Kumar)

(Dr. Ishwar Parida)

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Annexure-1 A

Suggested changes for the revision in existing syllabus in the courses taken by Dr. Abhiranjan Kumar

	Course & Semester: Course (Core): Introduction to History & its Research Methods; Sem.-I	
Srl no	**Existing portion**	**Suggested changes**
1	**Unit 1: Understanding History**	
	i. B. Aspects: Social, political, economic, religious, cultural, ecological	a. In sub unit B: Merge the two (Sub para B and C) and remove the details b. Aspects of history; Types of history
	ii. C. Types of history: Universal, national, regional, local, oral, archival, textual-official and private, traditional, memory based	a. Emerging trends: New history, Sub history, Big history
	iii. D. Relation of history with other subjects: Social Sciences, Environmental Science, Literature, Mythology, Natural Sciences	a. Relation of History with other subjects
	Unit 3: Methods in History	
	i. A. Research methods: Qualitative and quantitative; Hypothesis	a. Research methods; Hypothesis
	ii. Historical criticism; Text criticism-Old and new-Deconstruction	a. Historical criticism
	iii. Sources of information: types	a. Historical sources
	Unit 4: Elements and Techniques of Historical Research	
	i. C. Presenting research work/argument	a. Presenting research work
	ii. D. Use of computer: MS word, PPT, Basic Excel, Formatting, Using internet, Reliability of internet information, Basic SPSS	a. Use of computer: MS word, PPT, Basic Excel, Using internet and reliability of internet information
	Course (Core): Historiography from ancient to contemporary world Sem.-II	
2	**UNIT 2: Historiography in the Medieval World**	
	i. A. Arab Historiography	a. Medieval Islamic historiography
	ii. D. Changing Contours of Historiography during Renaissance and Reformation	a. Historiography during Renaissance and Reformation

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	UNIT 3: Historiography in Modern Age	
	i. A. Historiography during Enlightenment ii. B. Romanticism and Idealism in History – Hegel, Herder and French Historians	a. Merge the two sub para A and B and change it to: *Historiography during Enlightenment and Romanticism*
	i. C. Nationalist and Literary Expression: British and German Historiography	a. This will be changed to: *19th century Europe and history writing* and be repositioned to sub para B
	i. D. Berlin Revolution: Niebuhr and Ranke; Materialists and Positivists' Assertions-Marx and Comte	a. This will be broken into two separate themes in two different sub paras. Sub para C: Berlin revolution: Niebuhr and Ranke
	i. D. Materialists and Positivists' Assertions-Marx and Comte	a. This will be situated in a new sub para D
	UNIT 4: Ideological Shift in 20th Century Historiography	
	i. D. Literary theory and historiography: Post-structuralism, Deconstruction and Post modernism	a. Critical literary theory and historiography
	ii. B. Annals School of History-Contribution and Impact	a. Annals school of history
3	**Course (DCEC): History of World Cinema Semester II**	
	UNIT 1: World Cinema	
	i. The beginning-History and Films in early days. ii. Film Theory and Criticism; Films in perspectives-Sociological, Political, Cultural, Economic. iii. Film as setting History- German Expressionism, Italian Neorealism, French New Wave, Bollywood Parallel Cinema. iv. History of Major Film Industries-Hollywood and Bollywood	a. History of the beginning: the 19th century b. Films in early years: 1895-1915 c. Film Theory and Criticism d. Representative cinematic movement: German Expressionism, Italian Neorealism, French New Wave, Bollywood Parallel Cinema, Third cinema
	UNIT 2: Broader Forms of Cinema	
	i. A. Evolution of Cinema as Language; Images and Signs in Cinema. ii. B. Cinema as History-Memory, Re-reading and Consciousness iii. C. Cinema and New Technology	a. Short films b. Documentary

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	iv. D. Cults Cinema and the Limits of Cinema	c. Animated films d. Cult films
	UNIT 3: Cinema and Subjects	
	i. A. Psychoanalysis, Aesthetic and Gender ii. B. Globalization, Documentary and Third Cinema iii. C. Social Responsibility iv. D. Objectification and Dehumanization- Deconstructing Cinema	a. Freedom of Expression and Cinema. b. Globalization and the world of cinema c. Social Responsibility and cinema d. Objectification and Dehumanization in Cinema
	UNIT 4: World of Cinema at a Glance	
	i. A. History of Cinema Awards-Oscar. ii. B. Freedom of Expression and Cinema.	a. History of Cinema Awards: Oscar b. History of film studios
4	**Course (Core): MODERN INDIA (1757 AD - 1947 AD)** **SEM: III**	
	Historiography in Modern India	
	UNIT 1: Beginning	
	i. A. Introduction to Indian Historiography; British and the beginning of modern history writing in India; Dutch, French and Portugese Works and Indian Historiography	a. Introduction to modern Indian Historiography
	ii. B. Administrator Historians and Orientalists- Charles Wilkins, William Jones, Cunningham, Elliphinston, James Princep; Construction of the Image of India.	a. Foreign traveller's account on India in medieval and early modern period
	iii. C. Government Policies and history Writing	a. European missionaries in India and their writings
	iv. D. New Ideas and the Growth in Technology and the Growth of Indian Historiography- Archaeology, Numismatics and Inscriptions	a. Indian history and British writings in 18th century
	UNIT 2: Imperialist Historiography:	**UNIT 2: 18TH-19TH century and history writing**
	i. Imperial Historians-Meaning, Features, Criticisms	a. Oriental studies in India; Major orientalists

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	ii. Utilitarianism-Meaning, Features, Criticisms; Evangelicals-Meaning, Features, Criticisms	b. Imperialist writings on India: Utilitarian and Evangelicals
	iii. Asiatic Mode of Production, Oriental Despotism, Static Society and Hydraulic State	c. Major Imperialist historians
	iv. Major Historians- James Mill, Elliot and Dawson, V A Smith	d. Marx's Asiatic mode of production
	UNIT 3: Nationalist Historians, Marxists, Subalterns and Others:	**UNIT 3: History writing in India from 20th century to Our Age**
	i. A. Nationalist History: Introduction, Causes, Features, Criticism.	a. Nationalist History writing and Historians
	ii. B. Symbolism, Search for Heroism and Political Climate and the Nationalist HistoriansHistorians-R C Dutta, R C Majumdar, Jadunath Sarkar, K P Jayaswal, Altekar.	b. Marxist Historiography and major historians
	iii. Marxist Historiography-Features, Critical Evaluation; Historians	c. Subaltern historiography
	iv. Subaltern Historiography-Beginning, features, Criticism; Historians	d. Rewriting Indian history: Politics or history
	v. F. Post Modernism and Deconstruction and Indian Historiography. G. Neo-Nationalists and rewriting Indian History-Agenda, Features, Right Wing Politics and Historians	e. Remove F and G
	Unit 4: Thematic Study of Modern Indian History	Selected Themes of Modern Indian History writing
5	**Course (DCEC): Communalism in Colonial India Sem.: III**	
	UNIT 1: Towards Understanding Communalism:	
	i. A. Historiography **ii.** B. Communalism-Meaning, Features	a. Understanding Communalism b. Historiography
	iii. C. Causes, Nature, Outcomes	c. Communalism: Legacy or Construction
	iv. D. Communalism: Legacy or Construction	d. Literary and Visual Expressions
	UNIT 2: Exploring Issues:	
	i. A. Social-Loss of Privileges and Honour under Colonial Rule, Crisis of Trust; Economic- Landlords, Peasants &	a. Political, Social and Economic

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	Agricultural Crisis, Government Jobs & Middle Class Aspirations	
	ii. B. Political-Electoral Politics and Imperial Strategies, Nationalist Politics & Communalism, Local Leadership and Communal Ideology	b. Religious-cultural
	iii. C. Religious-Socio-religious movement, Cow killing, Festivals and communal aggression.	c. Psychological
	iv. D. Other Issues: Fear Psychosis, Imagined Hegemony, Western Education, Politics of language, Role of Media	d. Others: Role of Press
6	**Course (SEEC): ECONOMIC HISTORY OF INDIA: 1757 AD-1947 AD Sem.: IV**	
	UNIT II: Agriculture:	
	i. A. Pre Colonial Agricultural System-land revenue, relations in land; Colonial Land Revenue System	a. Colonial Land Revenue System
	ii. B. Commercialization of Agriculture; Plantation-Tea and Coffee	b. Commercialization of Agriculture
	iii. C. Famines; Rural Indebtedness	c. Famines
	UNIT III: Trade, Commerce and Industries:	
	i. B. Large Scale Industries-Iron & Steel, Cotton textile; Mining- Coal and Iron ore.	a. Large Scale Industries; Mining
	ii. C. Foreign Trade and Balance of Payment; Price Movement and Economic Fluctuation	b. Foreign Trade and Balance of Payment
	iii. D. The Fiscal system: Money and Credit; Banking	c. Fiscal system: Money, Credit & Banking
	UNIT IV: Laws & Regulation, Population and Perception on Indian Economy	**UNIT IV: Other Aspects of Colonial Indian Economy**
	i. Legal Regulations, Debt and Commercial Laws.	a. Delete this existing topic and replace it by: Population, Migration and Labour
	ii. B. Population; Migration; Labour	b. Shift this to Sub Para A. and bring Sub Para C viz., Transportation and Communication-

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		Railways, Postal & Telegraph, Shipping
	iii. C. Transportation and Communication- Railways, Postal and Telegraph, Shipping; Impact	c. Growth of Indian Capitalist Class
	iv. D. Growth of Indian Economy and Indian Nationalism; Perception on Indian economy: Gandhi, Indian National Congress, Indian Communists, Ambedkar	d. Indian National Congress and Economic issues

Note: After the changes, the courses will appear as follows:

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SEMESTER: I

PAPER: 1: INTRODUCTION TO HISTORY AND ITS RESEARCH METHODS

Number of credits: **5**

Nature of course: **Core**

Aim of the course: The broad aim is to acquaint students with the basic understanding of the subject history, its philosophy, the research method and other basic ideas.

Objectives of the course:

i. To understand the idea of history;

ii. To develop a critical reading of the subject;

iii. To know the philosophy of the subject; and

iv. To know the methods employed in history.

UNIT 1: Understanding History:

A. Meaning, Rationality, Nature and Scope

B. Aspects of history; Types of history

C. Emerging trends: New history, Sub histories, Big history

D. Relation of history with other subjects

UNIT 2: Philosophy of History:

A. Historical facts; Objectivity and bias in history

B. Causation; Idea of progress in history

C. Generalization; Explanation and interpretation; Value judgment in history

D. Post- modernist skepticism and history

UNIT 3: Methods and Sources in History:

A. Research methods; Hypothesis

B. Data collection and selection

C. Historical criticism

D. Historical Sources



UNIT 4: Elements and Techniques of Historical Research:

A. Research Process in history

B. Formalization of research work: foot notes, charts, tables, arrangement of references, indexing, appendices, bibliography

C. Presenting research work: Report, Research paper, Project, Dissertation and Thesis.

D. Use of computer: MS word, PPT, Basic Excel, Using internet and reliability of internet information

Classroom strategy:

The major emphasis will be on theory aspect. Hence formal lectures will be given priority. Guest lecture, too, may be arranged depending upon the requirement of the course module. Projects, assignments, discussions and tutorial classes will form part of the class room teaching of the course.

Suggested readings:

- E. H. Carr, What is History?
- B. Sheikh Ali, History: Its Theory and Method
- P. Gardiner, Theories of History
- Steon, The Varities of History
- RanjitGuha, Subaltern Studies Volumes,
- Edward Said, Orientalism
- Alvesson Mats (2002) : Postmodernism and Social Research
- Bentley, Michael (1997) : Companion to Historiography
- Bloch, Marc (1954) : The Historian's Craft (Knopf, 1953),
- Translated from French by Peter Putnam (in Hindi), Bloch, Marc (2000) : Itihaskar Ka Shilp
- Boyd, Kelly (ed.) (1999) : Encyclopaedia of Historians and Historical Writing, Vol. 1 & 2
- Canon, John (ed.) (1980) : The Historians at Work (George Allen & Unwin, London, 1980)
- Chaube, Jharkhande (1999) : Itihaas - Darshan
- Collingwood, R.G. (2004) : The Idea of History (Oxford UniversityPress, 1946, 1972, 2004)



- Gardiner, Patrick (ed.) : Theories of History (New York 1969)
- Hobsbawm, Eric J. (2003) : Itihaskar ki Chinta
- Hughes-Warrington-Marine : Fifty Great Thinkers on History(2004 Indian Reprint)
- Lambert, Peter and Phillip : Making History : An Introduction to the Sccofield (2004) Practices of a Discipline
- Marwick, Arthur : The Nature of History (Macmillan, London, 1970, 1984) (in Hindi also)
- Marwick, Arthur (2008) : Itihas Ka Swarup
- Marwick, Arthur (2001) : New Nature of History : Knowledge, Evidence, Language
- Sheikh Ali, B. : History : Its Theory and Method (Macmillan, Madras, 1978)
- Sreedharan, E. (2004) : A Textbook of Historiography 500 BC to AD 2000 (Orient Longman, Delhi, 2000) (in Hindi also)
- Stone, Lawrence (1987) : The Past and the Present (Revised)
- Verma, Lal Bahadur (1984) : Itihas Ke Bare Mein
- Woolf, D.R. (ed.) (1988) : A Global Encyclopaedia of Historical Writing (1 & 2)
- Anderson et al., Thesis and assignment writing
- Elton G.R., The Practice of History
- Gottschalk L., Generalisation in the writing of History
- Joseph Gibaldy, MLA Handbook for the writers of Research papers, New York, Modern Language Association, America, 1999.
- Sharron Sorenson, How to write Research Paper, MacMillan, 1995.
- G.J. Renier, History: Its Purpose and Method, Allen and Unwin,1961
- R.J. Shafer, A Guide to Historical Method Dorsey Press,1983
- W.H. Walsh, Philosophy of History: An Introduction, Harper and Row,1968
- R.F. Atkinson, Knowledge and Explanation in History, Macmillan, 1978
- W.H. Dray, (Ed), Philosophical Analysis and History, Harper and Row,1966
- Patrick Gardiner, The Nature of Historical Explanation,OUP,1968
- Christopher Lloyd, The Structures of History, Blackwell Press, 1996.



SEMESTER: II

PAPER: 1: HISTORIOGRAPHY FROM ANCIENT TO CONTEMPORARY WORLD

Number of credits: **5**

Nature of course: **CORE**

Aim of the course: The broad aim is to make students aware about the development of history writing in different historical phases continuing till present days.

Objectives of the course:

i. To know the beginning of history writing.

ii. To know the progress of history writing in different ages.

iii. To understand the growth of numerous philosophical, intellectual and ideological constructs in all these phases.

iv. To understand the growth of historiography in the given historical milieu.

UNIT 1: Historiography in Ancient World:

A. Introduction and the beginning;

B. Greek-Roman Historiography;

C. Chinese Historiography;

D. Ancient Indian Historiography

UNIT 2: Historiography in the Medieval World:

A. Medieval Islamic Historiography;

B. Historiography in Medieval Europe;

C. Historiography in Medieval India;

D. Historiography during Renaissance and Reformation

UNIT 3: Historiography in Modern Age:

A. Historiography during Enlightenment and Romanticism

B. Nationalist and Literary Expression: British and German Historiography

C. Berlin Revolution: Niebuhr and Ranke

D. Materialists' and Positivists' Assertions-Marx and Comte

UNIT 4: Ideological Shift in 20th Century Historiography:

A. Modern Historiography: Continuation and Changes



B. Annals School of History

C. Post-Colonial Historiography—Subaltern historiography

D. Critical Literary theory and historiography

Classroom strategy:

It will be a blend of formal theoretical teaching and audio-visual teaching. Presentations, assignments, discussions, quiz and brainstorming sessions will equally be employed. Wherever possible, guest lectures will also be organized.



SEMESTER: II

PAPER: 7: HISTORY OF WORLD CINEMA

Number of credits: **4**

Nature of course: **DCEC**

Aim of the course: The broad aim is to make pupil understand the history of the inauguration of cinema on the world horizon with its growing intent, influence, glamour and potential as well as harbinger of change.

Objectives of the course:

i. To understand the gradual evolution of the technique of cinema with its far reaching consequences.
ii. To understand the growth, hold and glamour of the most popular visual medium of expression, called cinema.
iii. To understand the unpredictable journey of aesthetic, fantasy, magic, imagination treading along the path of reality.

UNIT 1: World Cinema:

A. History of the beginning: the 19th century

B. Films in early years: 1895-1915

C. Film Theory and Criticism

D. Representative cinematic movement: German Expressionism, Italian Neorealism, French New Wave, Bollywood Parallel Cinema, Third cinema

UNIT 2: Broader Forms of Cinema:

A. Short films

B. Documentary

C. Animated films

D. Cult films

UNIT 3: Cinema and Subjects:

A. Freedom of Expression and Cinema

B. Globalization and the world of cinema

C. Social Responsibility and cinema

D. Objectification and Dehumanization in Cinema.

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UNIT 4: World of Cinema at a Glance:

A. History of Cinema Awards: Oscar

B. History of film studios

C. Understanding Major Cinema makers- Any Two Film Makers

D. Understanding Cinema-Any Two Films

Classroom strategy:

It will be a blend of formal theoretical teaching and discussions. Movie watching, audio-visual display, presentations, assignments, discussions, quiz and brainstorming sessions will equally be employed. Wherever possible, guest lectures may also be organized.

Suggested readings:

- Bordwell, David and Thompson, Kristin, Film Art: an Introduction, 7th ed. New York: McGraw-Hill Co., 2004.
- -Kawin, Bruce, How Movies Work. Berkeley and Los Angeles: University of California
- Press, 1992.
- -Cook, David A., A History of Narrative Film, 4th ed. New York: W.W. Norton & Co., 2004.
- Andrew, Dudley The Major Film Theories: An Introduction. Oxford: Oxford University Press, 1976.
- Altman, Rick. Film/Genre. London: 1999.
- Bazin, Andre. What is Cinema? Foreword by Francois Truffaut. Berkeley: University of
- California Press, 2005.
- Boggs, Joseph M. & Petrie, Dennis W. The Art of Watching Films. 7th ed. NY: McGraw-Hill, 2008.
- Braudy, Leo & Cohen, Marshall (eds). Film Theory and Criticism.5th ed.NY & Oxford: Oxford University Press, 1999.
- Cook, David A. A History of Narrative Film. 4th ed. NY & London: WW Norton & Company, 2004.
- Cook, Pam. The Cinema Book. 3rd ed. London: BFI, 2007.
- Deleuze, Giles. Cinema 1 &2. Hugh Tomlinson & Barbara Habberjam (trans). London & NY: Continuum, 1986.
- Etherington-Wright, Christine & Doughty, Ruth. Understanding Film Theory. London:
- Palgrave, 2011.
- Andre Bazin, The Evolution of the Language of Cinema,
- Thompson Bordwell and Janet Stager, The Classical Hollywood Cinema-Fil style and mode of production to 1969, Routledge 1985.
- Claudia Gorbmen, Audio-Vision, sound on screen, Columbia press, 1994.
- Introduction to documentary, Bloomington, Indiana University Press, 2001.
- A L Rees, A history of experimental film and video, Palgrave mcmillan 2011.
- Douglas Kellner, Film, politics, and Ideology: reflection on Hollywood film in Regan era.

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- Lev Manovich, The language of new media, Cambridge, MIT Press, 2001.
- Christine Gledhil n Linda Wiliams, (ed) Reventing film studies.
- J lye, Ideology and film-A brief guide, (web), 1997.
- Dyr, Introdution to film studies.
- Ira Bhaskar and Ranjani Mazumdar, Film and History.
- ----------, Global Art Cinema.
- ----------, Advanced Research in Cinema Studies.
- ----------, Introduction to Film studies.
- Saumyabrata Chaudhary and Samik Bandopadhyaya, Cultural studies and performance, Aesthetic Thought and the Concept of Performance.
- Bernard Cohn, Colonialism and its forms of arts.
- Bordwell, David and Kristin Thompson, Film Art: An Introduction Film, 9th edition (New York, McGraw-Hill, 2009) Maria Pramaggiore and Tom Wallis, Film: A Critical Introduction, 3rd edition (New York and London: Pearson, 2011)
- Bordwell and Thompson, Film History: An Introduction, 3rd edition (New York: McGraw-Hill, 2009)
- R.L. Rutsky and Jeffrey Geiger (eds.), Film Analysis (New York: W. W. Norton & Company, 2005)
- Braudy, Leo and Marshall Cohen (eds.),Film Theory and Criticism: Introductory Readings, 7th edition (New York: Oxford University Press, 2009)
- Corrigan, Timothy and Patricia White, The Film Experience: An Introduction, 2nd edition (New York: Bedford/St. Martins, 2008). Corrigan, Timothy, Short Guide to Writing about Film,
- 8th edition (New York: Longman, 2011).
- Hayward, Susan, Cinema Studies: The Key Concepts, 3rd edition (New York and London: Routledge, 2006).
- Cook, Pam (ed.) The Cinema Book , 3rd edition (London: British Film Institute, 2008).
- Furstenau, Marc (ed.),Film Theory Reader: Debates & Arguments (New York and London: Routledge, 2010).
- Gibbs, John and Douglas Pye (eds.), Style and Meaning: Studies in the Detailed Analysis of
- Film (Manchester, UK: Manchester University Press, 2005).
- Gomery, Douglas and Clara Pafort-Overduin, Movie History: A Survey, 2nd edition (New York and London: Routledge, 2011).
- Monaco, James, How to Read a Film: Movies, Media, and Beyond, 4th edition (New York, Oxford University Press, 2009).
- Nichols, Bill, Engaging Cinema: An Introduction to Film Studies (New York: W. W. Norton & Company, 2010).
- Nowell-Smith, Geoffrey (ed.), Oxford History of World Cinema (New York: Oxford University Press, 1997).
- Simpson, P., Andrew U., & Shepherdson K.J. (eds.), Film Theory: Critical Concepts in Media and Cultural Studies (New York and London: Routledge, 2004).
- Stam, Robert, Film Theory: An Introduction (London: Blackwell, 2000).

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- Stam, Robert & Toby Miller, Ed-Film and Theory: An Anthology, London, Blackwell, 2000.
- ----------, A Companion to film Theory, London, Blackwell, 1999.
- Gledhill, Christine& Linda Williams, Ed, Reinventing Film Studies, London, Arnold, 2000.
- Robert Allen & Douglas Gomery, Film History: Theory and Practice, NewYork, McGrow Hill, 1987.
- Jane Gaienes, Ed., Classical Hollywood Narratives: The Paradigm Wars, Duke University Press, 1992.



SEMESTER: III MODERN INDIA: 1757 AD-1947 AD

PAPER: 11: COMMUNALISM IN COLONIAL INDIA

Number of credits: 4

Nature of course: DCEC

Aim of the course: The broad aim is to make students understand the forces of communal elements, their origin, spread and nefarious outcomes during the colonial regime.

Objective of the course: i. To know the history of communalism in colonial India.

ii. To know about its growth, features, nature and outcome.

UNIT 1: Towards Understanding Communalism:

A. Understanding Communalism

B. Historiography

C. Communalism: Legacy or Construction

D. Literary and Visual Expressions

UNIT 2: Exploring Issues:

A. Political, Social and Economic

B. Religious-cultural

C. Psychological

D. Others: Role of Press

UNIT 3: Crisis of Trust, Communalism and Violence:

A. 19th Century and the Hindu-Muslim Relations: Fissures and Patches

B. Communal violence in 19th century- 1809, 1893

C. Communal Violence in 20th Century- 1917 Bihar riot and 1931 Kanpur riot

D. Communalism, Partition and Unsettling Humanity- Punjab and Bengal in 1947

UNIT 4: Unabated March of Communalism & India's Partition:

A. Communalism Unabated: 1946-1947

B. Veiled Communalism-Leadership in Indian National Congress

C. Communalism and partition

D. Indelible Scar of Violence-Refugee, Alienation, Silence, Trauma



SEM III: PAPER: 1: HISTORIOGRAPHY IN MODERN INDIA

Number of credits: 5

Nature of course: CORE

Aim of the course: The broad aim is to acquaint students with the deep understanding of the historiography of modern India with all its dissensions, consensus and alternative concepts.

Objective of the course:

i. To understand the beginning of historiography in modern India.

ii. To know the various schools of historians and history writing within their historical milieu.

iii. To construct history in its wider form on the basis of the historiographical traditions.

UNIT 1: Beginning:

A. Introduction to modern Indian historiography;
B. Foreign traveller's account in medieval and early modern Indian period;
C. European missionaries in India and their writings;
D. Indian history and British writings in 18th century;

UNIT 2: 18TH-19TH century and history writing:

A. Oriental studies in India; Major orientalists
B. Imperialist writings on India: Utilitarian and Evangelicals
C. Major imperialist historians
D. Marx's Asiatic mode of production

UNIT 3: History writing in India from 20th century to Our Age:

A. Nationalist History and Historians
B. Marxist Historiography and major historians
C. Subaltern Historiography
D. Rewriting Indian History: Politics or history

UNIT 4: Selected Themes of Modern Indian Historiography:

A. Historiography of Indian Nationalism.
B. Historiography of 1857 Revolt.
C. Historiography of India's Partition.
D. Economic Nationalism and History Writing.

Classroom strategy:

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The major emphasis will be on theory aspect. Hence formal lectures will be given priority. Guest lecture, too, may be arranged depending upon the requirement of the course module. Projects, assignments, discussions and tutorial classes will form part of the class room teaching of the course.

Suggested reading:

H.M. Elliot and John Dowson, The History of India as Told by its Historians: The Muhammadan Period, 8 vols, London, 1867-77. [Reprint, Delhi, 2001]

S. W. Fallon, A New Hindustani English Dictionary (1879), Delhi: National Council for the Promotion of Urdu, 2004 (second edition).

Arberry A.J. British Orientalists, William Collins, London,1943

Chaudhuri, Nirad C.,Scholar Extraordinary: The life of Friedrich Max Muller, Orient Paperbacks, Delhi,1974

Currie, Kate, Beyond Orientalism K.P.Bagchi and Co, Calcutta,1996

Inden, Ronald, Imagining India, Blackwell,1990 Keay, John, India Discovered, Collins,London,1981

Kejarival O.P, The Asiatic Society of Ben al and the discovery of India's past 1784-1838 Delhi,1988

Kopf, David, British Orientalism and the Indian Renaissance: the Dynamics of Indian Modernisation 1773-1835, University of california Press, Berkeley and Los Angeles,1969

Mackenzie, John M., Orientalism: History, theory and the Arts, Manchester and New York, 1995, Manchester University Press.

Javed n overned Ima inin s: james ill's the History of British india and orientalism Oxford, The Clarendon Press,1992

Metrcalf, Thomas R., ideologies of the Raj, Cambridge university Press,1987

Mukherjee, S.N., Sir William Jones: A Study of Eighteeth century British attitudes to India, Bombay, orient Longman,1987

' eary Brendan The Asiatic mode of production: oriental despotism Historical Materialism and Indian history.

Said, Edward, Orientalism, pantheon Books, New York, 1987

Teltscher, Kate, India Inscibed, OUP, New Delhi, 1995

Trautmann, Thomas R., Aryands and British India, New Delhi, 1997, Sage



Vistar Viswanathan, Gauri, Masks of Conquest: Literary Study and British rule in India, Faber and faber, London,1990

Daud Ali,ed., Viewing the Past, OUP,2000

Ranajit Guha et . al.ed. Subaltern tudies .I-XII

David Ludden ,ed., Reading Subaltern Studies, Anthem Press, 2005

Partha Chatterjee ,ed., History and the Present, Permanent Black,2003143

Saurabh Dube ed., Post-Colonial Passages, OUP, 2004

Sanjay subrahmanyam, Velcheru narayana rao and David Shulman., Textures of Time, OUP, 2001

S.B. Chaudhuri, Civil Rebellion in the Indian Mutinies, World Press, Calcutta, 1957.

P.C. Joshi (ed.), Rebellion 1857: A Symposium New elhi eople's ublishin house 1957.

Rudrangshu Mukherjee, Awadh in Revolt: 1857-1858, Anthem Press, 2002.

S. N. Sen, Eighteen Fifty-Seven, Delhi: Publications Division, 1957.

Tapti Roy, The Politics of a Popular Uprising: Bundelkhand in 1857, Oxford University Press, 1994.

Shireen Moosvi (ed.), Facets of the Great Revolt: 1857, Tulika Books, 2008.

Abhiranjan Kumar

SEMESTER: IV

MODERN INDIA: 1757 AD-1947 AD

PAPER: 3: ECONOMIC HISTORY OF INDIA: 1757 AD-1947 AD

Number of credits: 5

Nature of course: SEEC

Aim of the course: The broad aim is to know the development of Indian economy under the British period.

Objective of the course:

i. To know the various circumstances in which Indian economy developed under the British rule.

ii. To deliberate upon the outcome of this development and also the role of economic nationalism in the struggle against the British.

UNIT I: Introduction:

A. Historiography

B. Indian economy in the 18^{th} century

C. De-industrialization

D. Contemporary Indians and Critique of Colonial Indian Economy

UNIT II: Agriculture:

A. Colonial Land Revenue System

B. Commercialization of Agriculture

C. Famines

D. Irrigation

UNIT III: Trade, Commerce and Industries:

A. Industrial policies and Reports

B. Large Scale Industries; Mining

C. Foreign Trade and Balance of Payment

D. Fiscal system: Money, Credit & Banking

UNIT IV: Other Aspects of Colonial Indian Economy

A. Population, Migration and Labour

B. Transportation and Communication-Railways, Postal and Telegraph, Shipping

C. Growth of Indian Capitalist Class



D. Indian National Congress and Economic issues

Classroom strategy:

The major emphasis will be on theory aspect. Hence formal lectures will be given priority. Guest lecture, too, may be arranged depending upon the requirement of the course module. Projects, assignments, discussions and tutorial classes will form part of the class room teaching of the course.

Suggested readings:

- R.P. Dutt: India Today
- R.C.Dutt. Economic History of India (2 vols.)
- Ranajit Guha: A Rule of Property for Bengal.
- Holden Furber: Rival Companies of the Orient
- Frykenburg (ed.) Land Control and Social Structure in Indian History.
- Stokes: English Utilitarians and India. Stokes: Peasants and the Raj
- Asok Sen et al (eds.) Three Studies on the Agrarian Structure of Bengal, (Oxford University Press, Delhi, 1982).
- K.N. Raj et al (eds.), Commercialisation of Indian Agriculture, Delhi, Oxford University Press, 1985.
- Gyan Prakash (ed.), The World of Rural Labourer, Delhi, Oxford University Press, 1992
- Brij Lal, Chalo Jahaji: On a journey through indenture in Fiji, ANU, Canberra & National Museum, Suva, Fiji, 2000.
- A.K. Bagchi, Private Investment in India, 1900-1939, Cambridge University Press, 1972.
- Dipesh Chakrabarty, Rethinking Working Class History. Bengal, 1890-1940, Princeton, 1989.
- Sabyasachi Bhattacharya, The Financial Foundations of the British Raj, Simla, Indian Institute of Advanced Study, 1971.
- Dharma Kumar ed., The Cambridge Economic History of India, ii (Orient Longmans, Delhi 1984), selected portions.
- Dharma Kumar, Land and Caste in South India, Cambridge University Press, Cambridge, 1965.
- Ranajit Guha, A Rule of Property in Bengal: An Essay on the Idea of Permanent Settlement, Duke University Press, New Delhi, 1982.
- Asiya Siddiqui (ed.), Trade and Finance in Colonial India 1750-1860, Oxford University Press, New Delhi, 1995.
- Prasannan Parthasarathy, The Transition to a Colonial Economy: Weavers, Merchants and Kings in South India, 1720-1800, Cambridge, 2001.
- B.B Chaudhury, Growth of Commercial Agriculture in Bengal 1757-1900, Calcutta, 1964.
- Jan Breman, Labour Bondage in West India from Past to Present, Oxford University Press, New Delhi, 2008.
- Roy, Tirthankar, The Economic History of India, 1857-1947, Oxford University Press, 2020



Annexure 1 B

Suggested changes for the revision in existing syllabus in the courses taken by Dr. Iswar Parida:

OPTION III: HISTORIOGRAPHY OF MODERN INDIA (Ph. D. Course Work)

Number of Credits: 06

Nature of Course: Elective

Aim of the Course: The broader aim is to introduce and impart the basic concepts concerning historiography of modern India which is vital for higher studies in the concerned subject.

Objectives:

- To carry out research, writing, and organizational skills in the field of Asian history through an independent study project and completion of a long written assignment based on primary sources
- To investigate in-depth knowledge and understanding of approaches, methods and theories in the Historical Sciences and the region and topic of specialization
- To undertake further postgraduate study
- To prepare the candidate for M.Phil. and PhD Research by providing one-to-one training related to research design and the use of sources in a specific region.

Unit – 1: Making of 'History' as a Discipline and Nature of Historical Sources

A. Genesis of the discipline "history"
B. Sources and History-Writing
C. Abode of Historical Sources
D. Expanding the Categories of Historical sources

Unit - 2: **Colonialism, Nationalism and Communalism**

A. Colonialism in India
B. Colonial Economy
C. Nationalism in India
D. Communalism in India

Unit – 3: Caste, Gender, and Family

A. Understanding Modern Caste
B. Invention of Colonial Categories
C. Gendered Identities
D. Colonizing Family

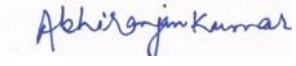
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Unit – 4: Law, Medicine, and Environment

A. Law in Colonial India

B. Medicine and Public Health
C. Medicine and Advertisement
D. Ecological Resources

Classroom strategy:
It will be a blend of formal theoretical teaching and discussions. Audio-visual display, presentations, assignments, discussions, quiz and brainstorming sessions will equally be employed. Wherever possible, guest lectures may also be organized. **The 30 percent of this paper will be taught online and rest of it will be offline.**



MEDIEVAL EUROPE

Number of credits: 5
Nature of course: CORE
Aim of the course: The broader aim is to make pupil understand the different historical phases during the medieval Europe.
Objective of the course:
i. To know the civilizational development in medieval Europe
ii. To critically examine the various facets of historical development

UNIT 1: The Carolingian Empire
A. Downfall of Roman Empire
B. Causes of Coronations of Charlemagne
C. Administration of Charles the Great
D. Carolingian Renaissance

UNIT 2: Imperial Age
A. Otto the Great
B. Frederic Barbossa
C. Frederic-II
D. Philip Augustus

UNIT 3: Feudalism
A. Rise
B. Features
C. Culture
D. Decline

UNIT 4: Rise of Papacy
A. Investiture Controversy
B. Pope Gregory VII
C. Pope Innocent III
D. Crusades: Causes and Effects

Classroom strategy:
The major emphasis will be on theory aspect. Hence formal lectures will be given priority. Guest lecture, too, may be arranged depending upon the requirement of the course module. Projects, assignments, discussions and tutorial classes will form part of the class room teaching of the course. **The 30 percent of this paper will be taught online and rest of it will be offline.**

Suggested readings:



- Gibbon, Edward. *The History of the Decline and Fall of the Roman Empire*. New York: Harper and Brothers, 1836 (4 Volumes).
- Lawrence, C.H. *Medieval Monasticism: Forms of Religious Life in Western Europe in the Middle Ages*. New York: Routledge, 2015.
- Gies, Frances and Joseph Gies. *Life in a Medieval Village*. London: HarperCollins, 2016.
- Wickham, Chris. *Framing the Early Middle Ages: Europe and the Early Mediterranean, 400-800*. New York: OUP, 2005.
- Mitchell, Linda E. *Family Life in the Middle Ages*. London: Greenwood Press, 2007.
- Smith, Julia M.H. *Europe after Rome: A New Cultural History, 500-1000*. New York: OUP. 2005.
- Pirenne, Henry. *Medieval Cities: Their Origins and the Revival of Trade*. Princeton: Princeton University Press, 1969.
- Whalen Brett Edward. *The Medieval Papacy*. London: Palgrave Macmillan, 2014.
- Burns, J.H(ed.). *The Cambridge History of Medieval Political Thought, 350-1450*. Cambridge: CUP, 2008.
- Poston, M.M (ed.). *The Cambridge Economic History of Europe (Vol. III)*. Cambridge: CUP, 1965.
- Anderson, Perry. *Passages from Antiquity to Feudalism*. London: NLB, 1974.
- Singman. Jeffrey L. *Daily Life in Medieval Europe*. London: Greenwood Press, 1999.
- Nelson, Janet L. *Politics and Ritual in Early Medieval Europe*. London: The Hambledon Press, 1986.
- Pirenne, Henry. *Economic and Social History of Medieval Europe*. New York: A Harvest Book, 1937.
- Figg, Kristen Mossler and John Block Friedman(ed.). *Arts and Humanities Through the Ages: Medieval Europe, 814-1450*. New York: Thomson Gale, 2005.
- Hummer, Hans J. *Politics and Power in Early Medieval Europe: Alsace and Frankish Realm, 600-1000*. Cambridge: CUP, 2005.



SEMESTER: II
MODERN WORLD, 1789-1945

Number of credits: 5
Nature of course: CORE
Aim of the course: The broad aim is to make students aware about the numerous changes and continuity at the global level with special reference to the happenings in Europe.
Objective of the course:
i. To understand the complex interrelationship that existed between the political, economic and socio-cultural elements.
ii. To understand the causes of the numerous wars and its repercussions.
iii. To understand its impact on the world.

UNIT 1: Europe during 1789-1815:
A. French Revolution
B. Jacobianism
C. Napoleonic Europe
D. Ideological and Cultural Advancements

UNIT 2: Europe during 1815-1871:
A. Concert of Europe
B. Revolution of 1830
C. Revolution of 1848
D. Unification of Germany and Italy

UNIT 3: Europe during 1871-1914:
A. Age of Bismark
B. Nationalism in Eastern Europe
C. The System of Alliances
D. Major International Crisis

UNIT 4: Europe during 1914-1945:
A. First World War- Causes, Nature and Consequences
B. League of Nations
C. Nazism and Fascism
D. Second World War- Causes, Nature and Consequences

Classroom strategy:
It will be a blend of formal theoretical teaching and discussions. Audio-visual display, presentations, assignments, discussions, quiz and brainstorming sessions will equally be employed. Wherever possible, guest lectures may also be organized. **The 40 percent of this paper will be taught online and rest of it will be offline.**

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Suggested readings:

- Israel, Jonathan Irvine. *Revolutionary Ideas: An Intellectual History of the French Revolution from the Rights of Man to Robespirre*. Princeton: Princeton University Press, 2014.
- Blanning, Timothy C. W. *The French Revolutionary Wars: 1787-1802*. Cambridge: Hodder Arnold, 1996.
- Hibbert, Christopher. *The French Revolution*. London: Penguin, 1982.
- Thomson, David. *Europe since Napoleon*. London: Penguin, 1990.
- Habsbawm, Eric. *The Age of Revolution: 1789-1848*. United Kingdom: Abacus, 1988.
- Habsbawm, Eric. *The Age of Empire: 1875-1914*. United Kingdom: Abacus, 1989.
- Bell, David A. *Napoleon: A Concise Biography*. Oxford: OUP, 2015.
- Grab, Alexander. *Napoleon and the Transformation of Europe*. London: Macmillan, 2003.
- Langer, William L. *The Rise of Modern Europe*. New York: Harper and Brothers, 1952.
- Birnie, A. An Economic History of Europe.
- Carr, E.H. *A History of Soviet Russia*. New York: Macmillan, 1952.
- Hayes, C.J.H. *The Historical Evolution of Modern Nationalism*. New York: Richard R. Smith, 1931.
- Palmer, R.R. *The Age of the Democratic Revolution: A Political History of Europe and America, 1760-1800*. Princeton: Princeton University Press, 2014.
- Ferreo, Guglielmo. *The Reconstruction of Europe; Talleyrand and the Congress of Vienna, 1814-1815*. London: Putnam, 1941.
- Evans, D.O. *Social Romanticism in France, 1830-1848*. London: Octagon Books, 1969.
- Burke, Peter. *The Historical Anthropology of Early Modern Italy: Essays on Perception and Communication*. Cambridge: CUP, 1987.
- Davis, Natalie Zemon. *Society and Culture in early Modern France*. Stanford: Stanford University Press, 1967.
- Ozment, Steven E. *When Fathers Ruled: Family Life in Reformation Europe*. Cambridge: Harvard University Press, 1983.
- Wiesner, Merry E. *Women and Gender in early Modern Europe*. Cambridge: CUP, 1993.
- Ginzburg, Carlo. *The Cheese and the Worms: The Cosmos of a Sixteenth-Century Miller*. USA: Johns Hopkins University Press, 1992.
- Muir, Edward. *Ritual in Early Modern Europe*. Cambridge: CUP, 1997.
- Parry, Markvin. *An Intellectual History of Modern Europe*. Boston: Houghton Mifflin, 1992.
- Hilton, Rodney. *Transition from Feudalism to Capitalism*. London: Verso, 1976.
- Hill, Christopher. *Reformation to Industrial Revolution: 1530-1780*. London: Verso, 2018.
- Polanyi, Karl. *The Great Transformation: The Political and Economic Origins of Our Times*. Boston, MA: Beacon Press, 2001
- Smith, Adam. *Wealth of Nations*. New York : Random House, 1985
- Ricardo, David. *On the Principles of Political Economy and Taxation*. London: John Murray, 1817
- Wood, Ellen Meiksins. *The Origin of Capitalism*. London: Verso, 2017.



- Butterfield, Herbert. *The Origins of Modern Science, 1300-1800*. New York: The Free Press, 1957.
- Hall, A. Rupert. *From Galileo to Newton*. New York: Dover Publications, 1981.
- Gupta, Parthasarathi. AdunikPachim Ka Uday
- Devesh Vijay, Prarambhik Europe main Sanskritrik Parivartan



SEMESTER-IV

SOCIAL CHANGE IN MODERN INDIA: 1769-1947

Number of credits: 5

Nature of course: CORE

Aim of the course: The broad aim is to make students aware about the numerous changes and continuity in colonial Indian society.

Objective of the course:

i. To understand the theories in social history.

ii. To examine the social-history writing

iii. To understand the complex interrelationship that existed between various institutions of Indian society.

UNIT – 1: Colonial Knowledge Production and English Officials in India

A. Colonial Official and Indian Languages (Persian, Sanskrit and Hindoostani)
B. Indigenous Law and Colonial Administration: William Jones, Nathaniel Halhed, Thomas Colebrooke
C. Gazetteers and Census: Social engineering of Indian Society; Cartography in India
D. Self and Other; Colonial Narrative of Indian Society

UNIT – 2: Caste and Colonial Modernity

A. Caste and *Jati*: Perception and Practice of Caste in pre-colonial Indian society
B. Textualization of Caste: Census and politics of social hierarchy
C. Modernization of Caste: Caste Associations and Effort for Social Mobility
D. Dalit Movement: Jotiba Phule, Periyar, Narayan Guru and Dr. B.R. Ambedkar

UNIT – 3: Colonial Education and Making of Educated middle Class

A. System of Education in Pre-Colonial Indian Society
B. Anglo-Oriental Debate on Education
C. Macaulay Minute, Woods Despatch, Hunter Commission on Indian education
D. Emergence of Educated Middle Class

UNIT – 4: Family and Childhood

A. Family in pre-colonial Indian Society
B. Women and Social Reform Movements



C. Modernization of Family: Changing Role of Women and Children
D. Making of Colonial Childhood: Family and School

Classroom strategy:
It will be a blend of formal theoretical teaching and discussions. Audio-visual display, presentations, assignments, discussions, quiz and brainstorming sessions will equally be employed. Wherever possible, guest lectures may also be organized. **The 30 percent of this paper will be taught online and rest of it will be offline.**

Suggested Readings

- Sarkar, Sumit. *Writing Social History*. New York: Oxford University Press, 1997.
- Cohn, Bernard S. *Colonialism and Its Forms of Knowledge: the British in India*. New Jersy: Princeton University Press, 1996.
- Edney, Mathew H. *Mapping an Empire: The Geographical Construction of British India, 1765-1843*. Chicago: The University of Chicago Press, 1997.
- Bayly. C.A. *Empire and Information: Intelligence Gathering and Social Communication in India, 1780-1870*. Cambridge: Cambridge University Press, 1996.
- Nandy, Ashis. *The Intimate Enemy: Loss and Recovery of Self under Colonialism*. Delhi: Oxford University Press, 1983.
- Nandy, Ashis. *Sati as Profit versus Sati as Spectacle: The Public Debate on Roop Kanwar's Death*. In Sati, the Blessing and the Curse, ed. J.S. Hawley, 131-49. New York, Oxford: Oxford University Press, 1994.
- Malhotra, Rajiv. *Weaving India's Mahakatha (Grand Narrative) for the 21st Century*. Shimla: Indian Institute of Advanced Studies, 2018.
- Malhotra, Rajiv. *Being Different: An Indian Challenge to Western Universalism*. Delhi: HarperCollins, 2013.
- Foucault, Michel. *The Government of Self and Other: Lectures at the College de France, 1982-83*. Paris: ST MARTINS Press, 2011.
- Sartre, Jean-Paul. *Being and Nothingness: An Essay on Phenomenological Ontology*
- Metcalf, Thomas R. *Ideologies of the Raj*. Cambridge: Cambridge University Press, 1997.
- Dirks, Nicholas B. *Castes of Mind: Colonialism and the Making of Modern India*. Princeton: Princeton University Press, 2001.
- Bayly, Christopher Alan. *Indian Society and the Making of the British Empire*. Cambridge: Cambridge University Press, 1990.
- Cohn, Bernard S. *An Anthropologist Among Historians*. New York: Oxford University Press, 1987.
- Bates, Crispin B. *Race, Caste and tribe in Central India: The Early Origin of Indian Anthropometry*. London: OUP, 1995.
- Pinch, William R. *Peasants and Monks in British India*. London: University of California Press, 1996.



- Mines, Diane P. *Caste in India*. California: Association for Asian Studies, 2009.
- O'Hanlon, Rosalind. *Caste, Conflict and Ideology*. Cambridge: CUP, 1985.
- Ambedkar, B.R. *Castes in India*. Jullunder: Bheem Patrika Publications.
- Bayly, Susan. *Caste, Society and Politics in India from the Eighteenth Century to the Modern Age*. Cambridge: Cambridge University Press, 2008.
- Dumont, Louis. *Homo Hierarchicus: The Caste System and Its Implications*. New Delhi: OUP, 1970.
- Dubois, Abbe J.A. *Description of the Character, Manners and Customs of the People of India and of their Institutions, Religious and Civil*. London: Longman, 1817.
- Buhler, G. The Laws of Manu
- Zelliot, E. *From Untouchable to Dalit: Essay on Ambedkar Movement*. New Delhi: Manohar Publishers and Distributors, 1992.
- Dirks, Nicholas B. *Autobiography of an Archive: A Scholar's Passage to India*. Columbia: Columbia University Press, 2015.
- Irschick, Eugene F. *Dialogue and History*. Berkeley: University of California Press, 1994.
- Trevelyan, Charles E. *On the Education of the People of India*. London: Longman, 1838.
- Bhattacharya, Tithi. *The Sentinel of Culture*. New York: OUP. 2005.
- Habsbawm, Eric. *The Invention of Tradition*. Cambridge: CUP, 1992.
- Sarkar, Tanika. *Hindu Wife and Hindu Nation*. New Delhi: OUP, 2006.
- Mani, Lata. *Contentious Tradition*. Berkeley: University of California Press, 1998.
- Forbes, Geraldine. *Women in Modern India*. Cambridge: Cambridge University Press, 1996.
- Banerjee, Swapna M. *Men, Women and Domestic Workers: Articulating Middle Class Identity in Colonial Bengal*. New Delhi: OUP, 2005.
- Sen, Satadru. *Colonial Childhoods*. New York: Anthem Press, 2005.
- Banerjee-Dube, Ishita. *A History of Modern India*. New Delhi: CUP, 2015
- Bandopadhyay, Shekhar. *From Plassey to Partition*. New Delhi: Orient Blackswan, 2004.

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SEMESTER: II
RISE OF MODERN WEST

Number of credits: 5

Nature of course: CORE

Aim of the course: The broad aim is to make students aware about the numerous changes and continuity in Europe prior to the rise of modernism.

Objective of the course:

i. To understand the growing complex interrelationship that existed between the political, economic and socio-cultural elements.

ii. To understand the causes of the numerous changes and its repercussions.

iii. To understand its impact on the world.

UNIT 1: Age of Renaissance and Reformation:

A. Renaissance: Humanism, Rationalism, Individualism.

B. Renaissance in Art, Architecture and Painting

C. Reformation: Religion, God, Holy Book

D. Reformation in various parts of Europe and Counter-reformation

UNIT 2: Age of Geographical Discovery and Commercial Revolution:

A. Cartography, Cosmology and Navigation

B. Discovering new land: Africa, America, Asia

C. Commercial Revolution

D. Mercantilism in Theory and Practice

UNIT 3: Industrial Revolution:

A. Invention of Machines

B. Structural change in industrial production

C. Emergence of Capitalism

D. Industrialization in England and other parts of Europe

UNIT 4: The Intellectual Revolutions of 17th and 18th Centuries:

E. The Philosophical Foundations of Scientific Revolution

F. Impact of Scientific Revolution

G. The Enlightenment

H. Modernism



Classroom strategy:
It will be a blend of formal theoretical teaching and discussions. Audio-visual display, presentations, assignments, discussions, quiz and brainstorming sessions will equally be employed. Wherever possible, guest lectures may also be organized. **The 30 percent of this paper will be taught online and rest of it will be offline.**

Suggested readings:

- Burke, Peter. *The Historical Anthropology of Early Modern Italy: Essays on Perception and Communication*. Cambridge: CUP, 1987.
- Findlen, Paula (ed.). *The Italian Renaissance: The Essential Readings*. Malden, USA: Blackwell, 2002.
- Davis, Natalie Zemon. *Society and Culture in early Modern France*. Stanford: Stanford University Press, 1967.
- Ozment, Steven E. *The Reformation in the Cities: the Appeal of Protestantism to Sixteenth century Germany and Switzerland*. New Haven, USA: Yale University Press, 1975.
- Ozment, Steven E. *When Fathers Ruled: Family Life in Reformation Europe*. Cambridge: Harvard University Press, 1983.
- Wiesner, Merry E. *Women and Gender in early Modern Europe*. Cambridge: CUP, 1993.
- Ginzburg, Carlo. *The Cheese and the Worms: The Cosmos of a Sixteenth-Century Miller*. USA: Johns Hopkins University Press, 1992.
- Muir, Edward. *Ritual in Early Modern Europe*. Cambridge: CUP, 1997.
- Parry, Markvin. *An Intellectual History of Modern Europe*. Boston: Houghton Mifflin, 1992.
- Hilton, Rodney. *Transition from Feudalism to Capitalism*. London: Verso, 1976.
- Hill, Christopher. *Reformation to Industrial Revolution: 1530-1780*. London: Verso, 2018.
- Polanyi, Karl. *The Great Transformation: The Political and Economic Origins of Our Times*. Boston, MA: Beacon Press, 2001
- Smith, Adam. *Wealth of Nations*. New York : Random House, 1985
- Ricardo, David. *On the Principles of Political Economy and Taxation*. London: John Murray, 1817
- Wood, Ellen Meiksins. *The Origin of Capitalism*. London: Verso, 2017.
- Butterfield, Herbert. *The Origins of Modern Science, 1300-1800*. New York: The Free Press, 1957.
- Hall, A. Rupert. *From Galileo to Newton*. New York: Dover Publications, 1981.
- Gupta, Parthasarathi. AdunikPachim Ka Uday
- Devesh Vijay, Prarambhik Europe main Sanskritrik Parivartan



SEMESTER: III
MODERN INDIA: 1757 AD-1947 AD
NATIONALIST MOVEMENT: 1858-1947

Number of credits: 5

Nature of course: CORE

Aim of the course: The broad aim is to provide students a historical understanding of the factors, events, acts, policies, maneuvers and real politic that led to the emergence of a powerful force of nationalism in India and also to study the deep fissures within such force and how finally India received a divided independence.

Objective of the course:

i. To understand the historical factors for Indian nationalism.

ii. To know the local, national, international and British factors which were at work in the making of a nationalist movement in India.

iii. To understand the larger perspectives behind partition.

UNIT 1: Emergence of Indian Nationalism:

A. Historiography; Sources.
B. Formation of Associations in India: 1837-1885- Factors, Regions
C. Factors Responsible for the Emergence of Nationalism in India.
D. Indian National Congress from 1885-1916.

UNIT 2: India from 1905-1918:

A. Swadeshi Movement-The First Real Mass Movement.
B. Rise of Revolutionary Activities.
C. Home Rule Movement and its Impact.
D. First World War and the spread of Nationalism

UNIT 3: Gandhian Phase:

A. 1914-1917-From Mute Observer to Activist.
B. 1919-1922-Khilafat and Non-Cooperation Movement
C. 1922-1947: Civil Disobedience Movement, Quit India Movement.
D. Role of Gandhi in Freedom movement

UNIT 4: Alternative Ideologies and Movements:

A. The Swarajists.

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B. The Revolutionary Nationalists

C. The Leftists

D. The INA Saga

Classroom strategy:
The major emphasis will be on theory aspect. Hence formal lectures will be given priority. Guest lecture, too, may be arranged depending upon the requirement of the course module. Projects, assignments, discussions and tutorial classes will form part of the class room teaching of the course. **The 30 percent of this paper will be taught online and rest of it will be offline.**

Suggested readings:

- Benedict Anderson. *Imagined Communities*: Reflections on the Origin and Spread of Nationalism. London: Verso, 1983.
- C.A. Bayly. *Origins of Nationality in South Asia: Patriotism and Ethical Government in the Making of Modern India.* London: Oxford University press, 2001.
- C.A. Bayly *The Local Roots of Indian Politics*, *1880-1920*, Oxford : Clarendon Press, 1975.
- Hayes, Carlton J.H. Nationalism: A Religion.
- Partha Chatterjee. *Nationalist Thought and the Colonial World: A Derivative Discourse.* Minneapolis: University of Minnesota Press, 1993.
- Gellner, Ernest. Nations and Nationalism.
- J. R. McLane. *Indian Nationalism and the Early Congress*, Princeton, N.J.: Princeton University Press, 1977.
- Anil Seal. *The Emergence of Indian Nationalism*. London: Cambridge University Press, 1971.
- Desai, A.R. *Social Background of Indian Nationalism*. Delhi: Sage Publications, 2016.
- Chakrabarty, Dipesh. *Provincializing Europe: Postcolonial Thought and Historical Difference*. Princeton: Princeton University Press, 2000.
- Guha, Ranajit. *Dominance without Hegemony: History and Power in Colonial India*. Cambridge: Harvard University Press, 1997.
- Ghosh, P.C. *The Development of the Indian National Congress. 1892-1909*. Calcutta: Firma, 1960.
- Gallagher, J., G. Johnson and A. Seal (eds.). Locality, Province and Nation: Essays on Indian Politics, 1870-1940. Cambridge: Cambridge University Press, 1973.
- Dalmia, Vasudha. *The Nationalizations of Hindu Traditions: Bharatendu Harischandra and Nineteenth-Century Banaras*. Delhi: OUP, 1997.
- Mehrotra, S.R. *The Emergence of Indian National Congress*. Delhi: Vikas, 1971.
- King, Christopher R. *One Language Two Scripts: The Hindi Movement in Nineteenth-Century North India*. Delhi: OUP, 1999.
- Gordon, Richard. Non-Cooperation and Council Entry 1919 to 1920. In *Locality, Province and Nation: Essays on Indian Politics, 1870 to 1940*, ed. J. Gallagher, G. Johnson, and A. Seal, 123-53. Cambridge: CUP, 1973.



- Sumit Sarkar. *The Swadeshi Movement in Bengal*. New Delhi: Permanent Black, 1973.
- Bankim Chandra Chattopadhyay. *Anandamath.* New Delhi: Orient Paperbacks, 2019.
- Sachindranath Sanyal. *Bandi Jeevan*. Delhi: S. Prakashan, 2017.
- Mukhopadhyay Haridas & Mukhopadhyay Uma. (1972) *Bharater svadhinata andolané 'jugantar' patrikar dan*
- Sanyal, Shukla. *Revolutionary Pamphlets, Propaganda and Political Culture in Colonial Bengal*. Cambridge: CUP, 2014.
- Puri. Harish K. *Ghadar Movement: Ideology, Organization and Strategy*. Amritsar: Guru Nank Dev University,1993.
- Ramnath, Maia. *Haj to Utopia: How the Ghadar Movement Charted Global Radicalism and Attempted to Overthrow the British Empire*. California: University of California Press, 2011.
- Haynes, Douglas E. *Rhetoric and Ritual in Colonial India: The Shaping of a Public Culture in Surat City, 1852-1928*. California: University of California Press, 1991.
- M.K.Gandhi. *Autobiography: The Story of My Experiments with Truth*. Ahmedabad: Navjiban Trust, 1983.
- Gandhi, M.K. *Satyagraha in South Africa*. Ahmedabad: Navajivan Publishing House, 1928.
- Parel, Anthony J(ed.). *Gandhi: "Hind Swaraj and Other Writings*. Cambridge: CUP, 2009.
- Henri David Thoureau. *On the Duty of Civil Disobedience.* Radford, USA: Wilder Publications, 2018.
- Bakshi, Shiri Ram. *Swaraj Party and Gandhi*. New Delhi: Atlantic Publishers and Distributors, 1995.
- Toye, Hugh. *The Springing Tiger: A Study of the Indian National Armyand of Netaji Subhas Chandra Bose*. Delhi: Allied Publishers, 1959.
- Singh, Harkirat. *The INA Trial and the Raj*. New Delhi: Atlantic Publishers and Distributors, 2003.
- Shekhar Bandopadhyay. *Plassey to Partition: A History of Modern India*. Hyderabad: Orient Longman, 2004.
- Sumit Sarkar. *Modern India: 1885-1947*. Delhi: Pearson, 2014.
- Bipan Chandra. *India's Struggle for Independence*, *1885-1947*. Delhi: Penguin Books, 1989.
- Peter Hardy. *The Muslims of British India*. London: Cambridge University Press, 1972.
- Movies: Basudev Balwant Phadke, Bhagat Singh, Kalapani, Gandhi, Anandmath



MODERN INDIA: 1757 AD-1947 AD
RISE OF THE BRISTISH EMPIRE IN INDIA: 1757-1857

Number of credits: 5

Nature of course: CORE

Aim of the course: The broad aim is to acquaint students with the in-depth knowledge of the process, mechanism, policies and events that made the British Empire possible in India.

Objective of the course:

i. To understand the process of empire building.

ii. To know the various wars, events and maneuvering that helped in the realization and continuation of the empire in India.

UNIT 1: Introduction:
A. Sources for Modern Indian History
B. Making of India in Foreign Traveler's Account
C. India in the 18th Century
D. Mughals and European Settlements in India

UNIT 2: Territorial Expansion, 1740-1818:
A. Anglo-French Rivalry and Carnatic wars
B. Struggle for supremacy over Bengal
C. Anglo- Mysore Relations
D. Anglo- Maratha Relations

UNIT 3: Paramountacy and Consolidation of British Imperial Interest, 1818-1857:
A. Anglo-Oudh relations; Anglo-Sikh relations
B. Anglo- Afghan Relation; Sind; Nepal and Burma
C. British Imperialism in India: 1798-1857
D. Revolt of 1857: Causes, Nature, Events and Consequences.

UNIT 4: Knowledge, Ideologies and Administrative Structure:
A. Production of Colonial Knowledge
B. Colonial Ideologies
C. Colonization of Indian Administration
D. Colonial Rule of Law



Classroom strategy:
The major emphasis will be on theory aspect. Hence formal lectures will be given priority. Guest lecture, too, may be arranged depending upon the requirement of the course module. Projects, assignments, discussions and tutorial classes will form part of the class room teaching of the course. **The 40 percent of this paper will be taught online and rest of it will be offline.**

Suggested readings:

- Bernard S. Cohn. *An Anthropologist among Historians*. Delhi: Oxford University Press, 1998.
- Bernard S. Cohn. *Colonialism and Its Forms of Knowledge*. Princeton: Princeton University Press, 1996.
- Disney, Anthony; Booth, Emily. *The Indian Ocean in World History*. New Delhi and New York: Oxford University Press, 2000.
- K.M. Panikkar. *Asia and Western Dominance: A Survey of the Vasco da Gama Epoch of Asian History, 1498-1945*. London: Allen & Unwin, 1959.
- Edward Atherton (Trans.). *The Adventures of Marcopolo: The Great Traveler*. London: D. Appleton and Company, 1912.
- H.A.R. Gibb. *Ibn Batuta: Travels in Asia and Africa, 1325-1354*. London: Routledge, 1929.
- V. Ball (Trans.). *Travels in India by Jean Baptiste Tavernier*. London: Macmillan and Co., 1889.
- Francois Bernier. *Travels in the Mogul Empire, 1656-1668*. London: Oxford University Press, 1916.
- M. Athar Ali. The Eighteenth Century: An Interpretation. *Indian Historical Review* 5 91-2): 175-86.
- Satish Chandra. *Parties and Politics at the Mughal Court, 1707-1740*. Delhi: Oxford University Press, 2004.
- M. Alam, *The Crisis of Empire in Mughal North India: Awadh and the Punjab*. Delhi: Oxford University Press, 1986
- Christopher Alan Bayly. *Indian Society and the Making of the British Empire*. Cambridge: Cambridge University Press, 1988.
- Christopher Alan Bayly. *Rulers, Townsmen and Bazaars: North Indian Society in the Age of British Expansion*. Cambridge: Cambridge University Press, 1983.
- P. Lawson. *The East India Company: A History*. London: Longmans, 1993.
- R. Barnett. *Rethinking Early Modern India*. New Delhi: Manohar, 2002.
- C.A. Bayly, *Imperial Meridian: The British Empire and the World 1780-1830*. London: Longman, 1989.
- P. Kennedy. *The Rise and Fall of the Great Powers: Economic Change and Military Conflict from 1500 to 2000*. New York: Vintage Books, 1987.
- J. M. Ward. *Colonial Self-Government: The British Experience 1759-1856.* Toronto: University of Toronto Press 1976.
- Douglas M. Peers. *India under Colonial Rule 1700-1885*. London: Routledge, 2013.



- J. Malcolm. *Political History of British India from 1784 to 1823.* New Delhi: Associated Pub. House 1970
- T.R. Metcalf. *Ideologies of the Raj.* Cambridge: Cambridge University Press, 1997.
- Eric Stokes. *The English Utilitarians and India*. Delhi: Oxford University Press, 1982.
- S. Alavi, *The Sepoys and the Company: Tradition and Transition in Northern India, 1770-1830*, Oxford University Press, 1995.
- Edward W. Said. *Orientalism: Western Conceptions of the Orient*. New Delhi: Penguin Books, 2001.
- O.P. Kejariwal. *The Asiatic Society of Bengal and the Discovery of India's Past*. New York: Oxford University Press, 1988.
- John Clark Marshal. *The Life and Times of Carey, Marshman and Ward: History of the Serampore Mission*. London: Spottiswoode and Co., 1859.
- Sisir Kumar Das. *Sahibs and Munshis: An Account of the College of Fort William*. New Delhi: Orion Publication, 1978.
- Singha, Radhika. *A Despotism of Law: Crime and Justice in Early Colonial India*. Delhi: OUP, 1998.
- Foucault, Michel. *Discipline and Punish: The Birth of the Prison*. New York: Vintage, 1995.
- Shekhar Bandopadhyay. *Plassey to Partition: A History of Modern India*. Hyderabad: Orient Longman, 2004.
- Ishita Banerjee-Dube. *A History of Modern India*. Cambridge: Cambridge University Press, 2015.



Annexure 1 C

Suggested changes for the revision in existing syllabus in the courses taken by Dr. Narendra Parmar:

PAPER: 2: INTRODUCTION TO ARCHAEOLOGY

Number of credits: 5

Nature of course: Core

Aim of the course:

The broad aim is to acquaint students with the basic understanding of the subject matter of archaeology as an autonomous and important part of history, its technical dimensions and uncovering it layer by layer.

Objectives of the course:

i. To explore the term archaeology and to know its scientific beginning;

ii. To develop a critical reading of the subject;

iii. To know the philosophy of the subject;

iv. To explore the technical aspects of it;

v. To understand the subject with the aid of other natural and social sciences.

UNIT 1: Introduction to Archaeology

1. Archaeology: definition, scope, relevance

2. Relation with history and science

3. Terms in archaeology: culture assemblages

UNIT 2: History of Archaeology

1. History of archaeology in colonial India: from 18th century to 1902

2. History of archaeology in colonial India: from 1902 to 1947

3. Archaeology in Independent India: contribution of institutions and individuals

UNIT 3: Methods of Data Retrieval

1. Field discoveries: aims and methods of Explorations

2. Unearthing the sites: planning excavations, layout, techniques of Excavations–Vertical; Horizontal, tools and equipments.

3. Methods of recording the contexts of excavated remains: preparation of sections and plans, three-dimensional recording, site formation processes, floatation technique,

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UNIT 4: Chronology and Dating Methods

1. Stratigraphy: Principles of stratification, Identification and recording of strata, Reconstruction of cultural sequence

2. Other methods of Relative chronology: Typology, Cross-dating, Palynology

3. Absolute methods of dating: Radiocarbon, Potassium-argon, Thermoluminescence, Pollen analysis, Dendrochronology

Method:

The major emphasis will be both on theory as well as practical aspects. Besides the formal lectures, the field survey and practical training will be duly focused upon. Guest lecture, too, may be arranged depending upon the requirement of the course module. Projects, assignments, discussions and tutorial classes will form part of the class room teaching of the course.

Suggested readings:

• Aitken, M. J. 1990. Science based Dating in Archaeology. London: Longmans.

• Atkinson, R. J. C. 1953. Field Archaeology. London: Methuen and Co.

• Barker, P. 1982. Techniques of Archaeological Excavation. London: Batsford.

• Binford, L. R. 1964. A Consideration of Hypothetical Research Design, American Antiquity.

• Bintliff, John. 2004. A companion to Archaeology. U.K.: Blackwell.

• Chakrabarti, D. K. 1988 A History of Indian Archaeology: From the Beginning to 1947. New Delhi: Munsiram Manoharlal.

• Crawford, O. G. S. 1953. Archaeology in the Field. London: Phoenix.

• Dancey, W. S. 1985. Archaeological Field Methods: An Introduction. New Delhi: Surjeet Publications.

• Harris, E. C. 1979. Principles of Archaeological Stratigraphy. London: Academic Press.

• Hester, T., Heizer, R. E. and J. A. Graham. 1975. Field Methods in Archaeology. Palo Alto (California): Mayfield Press.

• Johnson, Matthew 2007 Archaeological Theory: An Introduction. Blackwell Publishing

• Rajan, K. 2002. Archaeology. Tanjavur: Mannop Publishers.

• Renfrew, Colin and Paul Bahn 2006 Archaeological: Theories and Methods and Practice.

• Wheeler, R. E. M. 1954. Archaeology from the Earth. Harmondsworth: Penguin Books.



ANNEXURE 1 D (Ph. D. Course Work Syllabus)

OPTION III: HISTORIOGRAPHY OF MODERN INDIA

Number of Credits: 06

Nature of Course: Elective

Aim of the Course: The broader aim is to introduce and impart the basic concepts concerning historiography of modern India which is vital for higher studies in the concerned subject.

Objectives:

- To carry out research, writing, and organizational skills in the field of Asian history through an independent study project and completion of a long written assignment based on primary sources
- To investigate in-depth knowledge and understanding of approaches, methods and theories in the Historical Sciences and the region and topic of specialization
- To undertake further postgraduate study
- To prepare the candidate for M.Phil. and PhD Research by providing one-to-one training related to research design and the use of sources in a specific region.

Unit – 1: Making of 'History' as a Discipline and Nature of Historical Sources

E. Genesis of the discipline "history"
F. Sources and History-Writing
G. Abode of Historical Sources
H. Expanding the Categories of Historical sources

Unit - 2: **Colonialism, Nationalism and Communalism**

A. Colonialism in India
B. Colonial Economy
C. Nationalism in India
D. Communalism in India

Unit – 3: Caste, Gender, and Family

A. Understanding Modern Caste
B. Invention of Colonial Categories
C. Gendered Identities
D. Colonizing Family

Unit – 4: Law, Medicine, and Environment

A. Law in Colonial India
B. Medicine and Public Health



C. Medicine and Advertisement
D. Ecological Resources

Classroom strategy:
It will be a blend of formal theoretical teaching and discussions. Audio-visual display, presentations, assignments, discussions, quiz and brainstorming sessions will equally be employed. Wherever possible, guest lectures may also be organized. **The 30 percent of this paper will be taught online and rest of it will be offline.**

Recommended Readings:

- Chakrabarty, Dipesh. *The Calling of History: Sir Jadunath Sarkar and His Empire of Truth*. Chicago: The University of Chicago Press, 2015.
- Chakrabarty, Dipesh. *Provincializing Europe: Postcolonial Thought and Historical Difference*. Princeton: Princeton University Press, 2000.
- Chakrabarty, Dipesh. Postcoloniality and the Artifice of History: Who Speaks for "Indian" Pasts? Vol. No. 37, Special Issue: *Imperial Fantasies and Postcolonial Histories*. (Winter, 1992), pp. 1-26.
- Luden, David E. *Contesting the Nation: Religion, Community, and the Politics of Democracy in India*. Philadelphia: University of Pensylvannia Press, 1996.
- Luden, David E. *The New Cambridge History of India: An Agrarian History of South Asia*. Cambridge: Cambridge University Press, 2008.
- Nandy, Ashis Nandy, *The Intimate Enemy: Loss and Recovery of Self under Colonialism*. Oxford: Oxford University Press, 1983.
- Kaviraj, Sudipta. *The Imaginary Institution of India: Politics and Ideas*. New York: Columbia University Press, 2010.
- Pandey, Gyanendra. *The Construction of Communalism in Colonial North India*. New Delhi: OUP, 2012.
- Washbrook, D.A. 'Law, State and Agrarian Society in Colonial India', *Modern Asian Studies*, 1981
- Chatterjee, Partha. *The Nation and Its Fragments: Colonial and Postcolonial Histories*. Prineton: Princeton Univeristy Press, 1993.
- Dumont, Louis. *Homo Hierarchicus: The Caste system and Its Implications*. Delhi: OUP, 1998 (1970).
- Cohn, Bernard S. *An Anthropologist Among Historians*. New York: Oxford University Press, 1987.
- Dirks, Nicholas B. *Castes of Mind: Colonialism and the Making of Modern India*. Princeton: Princeton University Press, 2001.
- Bayly, Susan. Caste, Society and Politics in India from the Eighteenth Century to the Modern Age, Chapters 1, 3 and 4.
- Sangari, Kumkum, and Sudesh Vaid (eds.). *Recasting Women: Essays in Indian Colonial History*. USA: Rutgers University Press, 1989. (Chapters by Lata Mani and Partha Chatterjee)



- Sarkar, Tanika. 'Enfranchised Selves: Women, Culture and Rights in Nineteenth-Century Bengal.' *Gender and History* 13, no. 3 (2001): 546-65
- Sinha, Mrinalini. *Specters of Mother India: The Global Restructuring of an Empire*. USA: Duke University Press, 2006.
- Gadgil, Madhav and Guha, Ramachandra. *Ecology and Equity: the Use and Abuse of Nature in Contemporary India*. London, New York: Routledge, 1995 (Chs 1,2 &3).
- Shahabuddin, Ghazala and Rangarajan, Mahesh (eds.). 2007. Making Conservation Work: Securing biodiversity in this new century. Delhi: Permanent Black.
- White, Hayden. *Meta History: The Historical Imagination in Nineteenth Century Europe*. Baltimore: John Hopkins University Press, 1973.
- Mukhopadhyay, Anindita. *Behind the Mask: The Cultural Definition of the Legal Subject in Colonial Bengal (1715-1911)*. New Delhi: OUP, 2006.
- Pati, Biswamoy and Mark Harrison(ed.). *The Social History of Health and Medicine in Colonial India*. New York: Routledge, 2009.
- Movies and Documentaries: Kim (English); Bharat Ek Khoj: Topic related episodes (Hindi); Sudra: The Rising (Hindi); Water (Hindi); Pournami (Telugu dubbed in Hindi); Teesri Azadi (Hindi); Sangam (Hindi); Garam Hawa (Hindi); Tamash (Hindi); A Train to Pakistan (Hindi)



ANNEXURE 2

(New courses to be introduced at GEC and DCEC level)

SEMESTER: I

PAPER-9: THE BIG HISTORY

(SAHS HA 010105 GE 4004)

Number of credits: 4

Nature of course: GEC

Aim of the course: The broad aim is to develop a broad multidisciplinary historical approach about the journey of the universe and human civilization till our present era.

Objectives of the course:

i. To know the beginning and expansion of the universe.
ii. To know the creation of solar system, earth and the arrival of human.
iii. To understand the historical phases of human civilization.
iv. To understand modernity and sustainability of human civilization.

Learning outcome for students:

- Students will be able to appreciate the importance of inter-disciplinary approach in academics;
- Next, they will be able to know the integration of scientific and socio-cultural approaches;
- Third, they will also be able to develop a global approach in a global environment;
- Next, they will be able to inculcate rational ways to examine and analyse the physical, biological, technological and socio-cultural constructs;
- Next, the learning of using data, models, reasoning, quantification and graphics will help them garner some basic skills;
- They will be able to comprehend various present days human problems and working for their solutions through integrating regional-global collaborations.

Unit 1: The Beginning of Cosmos:

A. Scientific theories; Religious origin
B. The expansion: stars and galaxies
C. The solar system

Unit 2: The Earth:

A. The formative phase: Atmosphere and Geological changes
B. The coming of life: Plants and animals

Unit 3: The Human:

A. Evolution and early phase
B. The age of Anthropocene: Agriculture, Early Civilizations
C. Ancient and Medieval World

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Unit 4: Modernity Arrives:

A. Ideas and progresses
B. The crisis of modernity
C. Sustainability and future

Classroom strategy:

It will be a blend of formal offline and online teaching with the necessary aid of audio-visual devices. Presentations, assignments, discussions, quiz and brainstorming sessions will equally be employed. Wherever possible, guest lectures may also be organized

Suggested Reading:

- Christian, David, Cynthia Stokes Brown, and Craig Benjamin (2013) Big History: Between Nothing and Everything, New York: McGraw-Hill Education.
- Christian, David (2004) Maps of Time: An Introduction to Big History, London: University of California press
- Mcquarie University Big History Institute (2016) Big History: Examines Our Past, Explains Our Present, Imagines Our Future, London: DK.
- Alvarez, Walter (2016) A Most Improbable Journey: A Big History of Our Planet and Ourselves, W.W. Norton & Company.
- Spier, Fred (2015) Big History and the Future of Humanity, Wiley Blackwell, UK
- Benjamin, Craig, Esther Quaedackers and David Baker (2020): The Routledge Companion to Big History, UK: Routledge
- Sverre Raffnsøe (2016) Philosophy of the Anthropocene: The Human Turn, Palgrave Macmillan, UK
- Darwin, Charles (1981) The Descent of Man and Selection in Relation to Sex, Princeton University Press
- Hawkins, Stephen (1998) A Brief History of Time, Bantam Publisher
- Singh, Savinder (2020) Physical Geography, Pravalika Publication (Hindi and English)
- Huggett, Richard (1998) Fundamentals of Biogeography –Routledge
- Dukes, Paul (2011) Minutes to Midnight: History and the Anthropocene Era from 1763 Anthem Press
- Professor Brown (2001) History and Climate Change: A Eurocentric Perspective, Routledge
- Ehlers, Eckart and Thomas Krafft -Eds. (2006) Earth System Science in the Anthropocene: Emerging Issues and Problems, Springer
- The Journal of Big History, : Different volumes: https://jbh.journals.villanova.edu/
- The Big History Project - David Christian at Macquarie University, May 27, 2015: https://www.youtube.com/watch?v=rWzUSgPMRD4



SEMESTER: II

PAPER: 11-HISTORY & CINEMA

(SAHS HA 010206 DCEC 4004**)**

Number of credits: 4

Nature of course: DCEC

Aim of the course: The broad aim is to develop a broad understanding between history and cinema and to know if cinema can be medium to read history.

Objectives of the course:

v. To know the beginning of cinema.
vi. To know the relationship that exists between history and cinema.
vii. To use cinema as a source of history to the extent possible.

Learning outcome for students:

- They will be able to appreciate the positive importance of cinema
- They will know the history of cinema
- They will be to find the relationship between cinema and history
- They may be able to use cinema as a source of history

Unit 1: The Beginning of Cinema:

A. Introduction
B. 19^{th} century and the beginning
C. The early years and the spread of cinema

Unit 2: Cinema and History:

A. Cinema as a source: Possibility and limitation
B. Treatment of historical themes in cinema
C. Official history, Propaganda and cinema

Unit 3: Selected Historical Themes and Cinema:

A. Biographies
B. World War
C. Racism

Unit 4: Documentary, TV Shows and history:

A. Difference between documentary and cinema
B. Documentary as a source
C. Popular TV shows and historical representation



Classroom strategy:

It will be a blend of formal offline and online teaching with the necessary aid of audio-visual devices. Presentations, assignments, discussions, quiz and brainstorming sessions will equally be employed. Wherever possible, guest lectures may also be organized

Suggested Reading:

- Cousins, Mark, The Story of Film, Pavilion, Revised edition, 2020
- Villarejo: Film Studies: The Basics, Routledge, 2006
- Turner, The Film Cultures Reader, Routledge, 2001
- Hayward, Cinema Studies: The Key Concepts, Routledge, 1996
- Burgoyne, Robert, The Epic Film in World Culture, Routledge, 2010
- Cullen, Jim, Essaying the Past: How to Read, Write and Think about History, Wiley-Blackwell, 2012
- Calahan, Vicki et.al., Reclaiming the Archive: Feminism and Film History, Wayne State University Press, 2010
- Hoffman, Hilmar, The Triumph of Propaganda: Film and National Socialism, 1933-1945
- Barber, Sian. Using Film as a Source. Manchester: Manchester University Press, 2015
- Card, James. "Problems of Film History." Hollywood Quarterly 4, no. 3 (1950): 279–88. https://doi.org/10.2307/1209399.
- O'Connor, John E. "Image as Artifact: Historians and the Moving-Image Media." OAH Magazine of History 16, no. 4 (2002): 23–23.
- Stover, John a. "Framing Social Movements through Documentary Films." Contexts 12, no. 4 (2013): 56–58.
- Stevenson, Brenda E. "12 YEARS A SLAVE: NARRATIVE, HISTORY, AND FILM." The Journal of African American History 99, no. 1–2 (2014): 106–18. https://doi.org/10.5323/jafriamerhist.99.1-2.0106.
- Toplin, Robert Brent. "From the Editor: Invigorating History: Using Film in the Classroom." OAH Magazine of History 16, no. 4 (2002): 5–6.
- Films and Documentaries: The Birth of the Nation, Triumph of the Will, Gandhi, The Pianist, 12 Years a Slave, Padmavat, India's Daughter (BBC Documentary)



SEMESTER: II

PAPER: 10- NORTH EAST INDIA: ANCIENT TO PRESENT

(SAHS HA 010205 DCEC 4004**)**

Number of credits: **4**

Nature of course: **DCEC**

Aim of the course: The broad aim is to make students aware about the history of Northeast India and to bring this course within mainstream history.

Objectives of the course:

i. To know the history of Northeast India.

ii. To know the academic progresses made in this field.

iii. To know about the socio-political, economic, cultural and literary history of the region.

iv. To understand the interdisciplinary historical milieu for the study of this course.

Learning outcome for students:

i. The students will be able to know about the Northeast people, culture, history and their problems and struggles.
ii. The idea of India as a nation-state will become more integral and closer to students.
iii. This will allow students to understand the importance of North-East in the lives of India.
iv. It will also help them to undo their biasness, prejudices or any non-real perception, if any, about the land, the people and the culture of north-east.

UNIT 1: Northeast: A General Introduction

A. Introduction: the land and the people

B. Culture and religion

C. Society in Northeast

D. Literary forms, heritage and identity

UNIT 2: Ancient and Medieval Northeast History:

A. Sources: Archaeological and literary

B. Polity and Society

C. Economy

D. Culture and religion

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UNIT 3: Northeast during Colonial period:

A. British and the political domination

B. Northeast and freedom movement

C. Education and missionaries; Economy

D. Writings on Northeast: Colonial and Regional

UNIT 4: Northeast in the post-independent phase:

A. Constitutional integration and Central policies for inclusion

B. Voices and politics of dissent and resistance

C. External threats and security

D. Opportunities: political, commercial and cultural

Classroom strategy:

It will be a blend of formal theoretical teaching and audio-visual teaching. Presentations, assignments, discussions, quiz and brainstorming sessions will equally be employed. Wherever possible, guest lectures will also be organized.

Suggested Readings:

- Abbi BL (ed) (1984) North-East region: problems and prospects of development. CRRID, Chandigarh
- Banerjee A et al (eds) Economic planning and development of North-Eastern States. Kanishka Publishers, New Delhi
- Aggarwal KS (ed) (1999) Dynamics of identity and intergroup relations in North-East India. IIAS, Shimla
- Alemchiba M (1970) A brief historical account of Nagalan. The Naga Institute of Culture, Kohima
- K.R. Dikshit and J.K. Dikshit, North-East India: Land, People and Economy, Advances in Asian Human-Environmental Research, DOI 10.1007/978-94-007-7055-3, © Springer Science+Business Media Dordrecht 2014
- Baishya P et al (1997) Development issues of North-east India. LBS, Guwahati
- Bandopadhyay PK (2005) North-East saga. Publication Division, Govt. of India
- Banerjee AC (1943) Eastern frontier of British India, 1784–1826. Calcutta
- Barpujari HK (1977) Political history of Assam, vols 1 and 2. Govt. of Assam, Guwahati
- Barpujari HK (1986b) American missionaries and North-East India, 1836–1900. Spectrum Publications, Guwahati



- Barpujari HK (1998) North-East India: problems, policies and prospects. Spectrum Publications, Guwahati
- Barpujari HK (2003) The Nagas: the evolution of their history and administration (1832–1839). Spectrum Publications, Guwahati
- Barua H (1965) Assamese literature. NBT, Delhi
- Barua SN (1991) Tribes of Indo-Burma border. Mittal Publications, New Delhi
- Baruah AK, Dev R (2006) Ethnic identities and democracy and electoral politics in North-East India. Regency Publication, New Delhi
- Basu A, Das Gupta BK, Sarkar, J (2004) Anthropology for North-east India: a reader. Special Publication of the Indian National Confederation and Academy of Anthropologists, Indian Anthropological Society & Museum of Mankind, Kolkata
- Bhushan C (2004) The terrorism and separation in North-East India. Kalpaz Publications, Delhi
- Medhi DK (ed) Man and environment in North-East India. Omsons, Guwahati
- Biswas, Prasenjit and C. Joshua Thomas (eds.), Peace in India's North-East: Meaning, Metaphor, and Method : Essays of Concern and Commitment, Regency Publications, New Delhi, 2006
- Borthakur DN (1992) Agriculture of the North-Eastern region with special reference to hill agriculture. Beecee Prakashan, Guwahati
- Bose ML (1978) British policy in North-East frontier agency. Concept, New Delhi
- Bose ML (1979) Historical and constitutional documents of the North-east, 1824–1973 New Delhi
- Census of India (2001) Scheduled tribe atlas of India, New Delhi
- Census of India (1991) Languages, language atlas of India
- Chakraborty BC (1964) British relations with hill tribes of Assam since 1858. Firma K.L. Mukhopadhyay, Calcutta
- Chaudhuri JG (1980) Tripura: the land and its people. Leeladevi Publication, Delhi
- Chaudhury JN (1983) Arunachal Pradesh. Cosmo Publications, New Delhi
- Das G, Purkayastha RK (eds) (2000) Border trade; Northeast India and neighbouring centres. Akanksha Publishing House, New Delhi
- Dena Lal (ed) (1991) History of modern Manipur (1826–1949). Orbit Publishers, New Delhi
- Dev BJ, Lahiri DK (1987) Manipur: culture and politics. Mittal Publications, Delhi
- Elwin V (1958) Myths of North-East Frontier of India. NEFA Administration, Shillong
- Ghosh BB (1980) History of Nagaland. S. Chand & Co, New Delhi
- Gopalakrishnan R (1995) Meghalaya: land and its people. Omsons Publications, New Delhi
- Government of India (1965) NEFA. Publication Division, New Delhi
- Guha A (1977) Planter Raj to Swaraj: freedom struggle and electoral politics in Assam 1826–1947. ICHR, New Delhi
- Kabui G (1991) History of Manipur – pre colonial, vol 1. NBH, New Delhi



- Kyndiah PR (1994) Mizo freedom fighters. Sanchar Publishing House, Delhi
- Misra U (1988) Northeast India: quest for identity. (A collection of essays on socio-economic topics). Omsons Publications, Guwahati Misra U (ed) (1991) Nation building and development in North-East India. Guwahati, Purbanchal Prakash
- Nayak P (ed) (2010) Growth and human development in North-East India. OUP, New Delhi
- Sen S (1985) The tribes of Meghalaya. Mittal Publications, New Delhi
- Sen S (1987) The tribes of Nagaland. Mittal Publications, New Delhi
- Sen S (1992a) Tribes and castes of Manipur. Mittal Publications, New Delhi
- Sen S (1992b) Tribes of Mizoram: description, ethnology, bibliography. Gyan Publishing House, New Delhi
- Census reports for various decades



ANNEXURE 3

DISTRIBUTION OF ONLINE AND OFFLINE RATIO IN THE FOLLOWING COURSES:

	MODERN INDIA; INSTRUCTOR: DR ABHIRANJAN KUMAR		
SRL NO	**COURSE**	**SEMESTER**	**ONLINE**
1	SAHS HA 010101C5005 Introduction to History and Its Research Methods	1	Unit 1
2	SAHS HA 010205C5005 Historiography from Ancient to Contemporary World	2	Unit 4
3	SAHS HA 010202DCEC4004 History of World Cinema	2	Unit 4
4	SAHS HA 010309 MOD C 5005 Historiography in Modern India	3	Unit 1
5	SAHS HA 010308 MOD DCEC 4004 Communalism in Colonial India	3	Unit 2
6	SAHS HA 010414 MOD C5005 Economic History of India: 1757 AD – 1947 A	4	Unit 1

Note: Dr. Iswar Parida has mentioned this ratio in the changes which he has suggested in his papers itself.

Abhiranjan Kumar

DEPARTMENT OF HISTORY & ARCHAEOLOGY

CENTRAL UNIVERSITY OF HARYANA

SYLLABUS: M. A.

Jant-Pali Villages, Mahendragarh, Pin: 123031, Haryana, India
Website: cuh.ac.in
NAAC accredited 'A' grade University

(Established under the Central Universities Act, 2009 of the Parliament)

ABOUT

Department of History and Archaeology is one of the youngest departments of studies of the University opened in the academic year 2014-15. The Department of History and Archaeology is functioning under the School of Arts, Humanities and Social Sciences, the oldest & founding school of the University. The department offers PG programme (MA- History & Archaeology) of two years duration with four semesters, M. Phil. and Ph. D. The Department marks a departure from the traditional teaching and understanding of the concerned subject by bringing qualitative shift in its curricula, teaching methodology, perception development and in the realm of knowledge gain.

VISION

Expanding the horizon of the field of History where no one remains untouched in the march towards humanity, civilization and sustainability. It endorses the belief of this university that we "…must have the vision to see where higher education can take us in a future where human can live in peace and prosperity…"

MISSION

To inculcate human values among the people through propagating the sense of History with multidisciplinary approach for the better understanding of society and realizing mutual coexistence.

OBJECTIVES

- To inculcate sense of History among students and others;
- To discuss the subject in the changing environment;
- To highlight the utility of the subject in the present scenario;
- To focus on multidisciplinary approach;
- To make history a meaningful way to understand changes in society and the surroundings for a fuller development of the self as well as the society;
- To help minimize the abuses/misuses of history;
- To initiate the process of dialogue in historical contexts among the stakeholders in order to establish a more reasoned, liberal and flexible society based on the social virtues like mutual understanding and cooperation; and
- To relocate, re-contextualize and reposition the missing historical sections/issues/aspects.

SEMESTER: I

SRL NO.	COURSE CODE	COURSES	L	T	P	CREDITS	CORE/DCEC/GE
1	SAHS HA 010101C5005	Introduction to History and Its Research Methods	5	0	0	5	CORE
2	SAHS HA 010102C5005	Introduction to Archaeology	5	0	0	5	CORE
3	SAHS HA 010103C5005	Culture in Ancient India	5	0	0	5	CORE
4	SAHS HA 010104C5005	Medieval Europe	5	0	0	5	CORE
	To be Taken from Other Department					4	
						24	Total Credit
	To be Taken from the Dept. of History & Archaeology						
5	SAHS HA 010101GE4004	History of Haryana	4	0	0	4	GE
6	SAHS HA 010102GE4004	Art, Architecture and Culture in Ancient World	4	0	0	4	GE
7	SAHS HA 010103GE4004	Women in Ancient World	4	0	0	4	GE
8	SAHS HA 010104GE4004	Life in Medieval Europe	4	0	0	4	GE
9	SAHS HA 010105GE4004	The Big History	4	0	0	4	GE

NOTE:

1. *For the academic session 2015-16 onwards, elementary English/Communication skill classes will be arranged for the students who are weak in English. This will be a non-credit course.*
2. *It is compulsory for the students of semester One to go on a trip for archaeological excavation/exploration.*

SEMESTER: II

SRL NO.	COURSE CODE	COURSES	L	T	P	CREDITS	CORE/DCEC/GE
1	SAHS HA 010205C5005	Historiography from Ancient to Contemporary World	5	0	0	5	CORE
2	SAHS HA 010206C5005	Pre History of South Asia	5	0	0	5	CORE
3	SAHS HA 010207C5005	Rise of Modern West	5	0	0	5	CORE
4	SAHS HA 010208C5005	Modern World: 1789 to 1945	5	0	0	5	CORE
5	SAHS HA 010205GE2002	Medieval Islam (Compulsory)	2	0	0	2	GE
		Select any one of the following courses					
6	SAHS HA 010201DCEC4004	Contemporary World (1945 - 2001)	4	0	0	4	DCEC
7	SAHS HA 010202DCEC4004	History of World Cinema	4	0	0	4	DCEC
8	SAHS HA 010203DCEC4004	Women in Medieval World	4	0	0	4	DCEC
9	SAHS HA 010204DCEC4004	History of Human Ideas	4	0	0	4	DCEC
10	SAHS HA 010205 DCEC4004	North East India: Ancient to Present	4	0	0	4	DCEC
11	SAHS HA 010206 DCEC4004	History & Cinema	4	0	0	4	DCEC
						22	Total Credit

SEMESTER: III

NOTE:

1. The students are offered to opt one specialization in the final year of post-graduation.

2. It is compulsory on the part of the third semester students, who opt for Archaeology as their specialized paper, to go on a trip for archaeological excavation/exploration.

INDIAN ARCHAEOLOGY

SRL NO.	COURSE CODE	COURSES	L	T	P	CREDITS	CORE/DCEC/GE
1	SAHS HA 010309 ARCH C5005	Proto History of India	5	0	0	5	CORE
2	SAHS HA 010310 ARCH C5005	Historical Archaeology of India	5	0	0	5	CORE
3	SAHS HA 010311 ARCH C5005	Indian Numismatics Up to 1200 AD	5	0	0	5	CORE
4	SAHS HA 010304 ARCH DCEC2002	Seminar Paper (Compulsory)	2	0	0	2	DCEC
	To be Taken from Other Department					4	
		To be Taken from the Dept. of History & Archaeology					
5	SAHS HA 010305 ARCH GE4004	Proto History of India	4	0	0	4	GE
6	SAHS HA 010306 ARCH GE4004	Indian Architecture Up to 1200	4	0	0	4	GE

		AD					
7	SAHS HA 010307 ARCH GE4004	Introduction to Archaeology	4	0	0	4	GE
		Select any one of the following courses					
8	SAHS HA 010305 ARCH DCEC4004	Indian Architecture Up to 1200 AD	4	0	0	4	DCEC
9	SAHS HA 010306 ARCH DCEC4004	Art and Iconography	4	0	0	4	DCEC
10	SAHS HA 010307 ARCH DCEC4004	Conservation & Preservation	4	0	0	4	DCEC
11	SAHS HA 010308 ARCH DCEC4004	Antiquarian Laws	4	0	0	4	DCEC
12	SAHS HA 010309 ARCH DCEC4004	Indian Epigraphy Up to 1200 AD	4	0	0	4	DCEC
						25	Total Credit

OR

ANCIENT INDIA (1500 BC - 1200 AD)

SRL NO.	COURSE CODE	COURSES	L	T	P	CREDITS	CORE/DCEC/GE
1	SAHS HA 010309 ANC C5005	Trends and Themes in Ancient Indian Historiography	5	0	0	5	CORE
2	SAHS HA 010310 ANC C5005	History of Political Ideas and Institutions in Ancient India	5	0	0	5	CORE
3	SAHS HA 010311 ANC C5005	Economic History of Ancient India	5	0	0	5	CORE
4	SAHS HA	Seminar Paper	2	0	0	2	DCEC

	010304 ANC DCEC2002	(Compulsory) Social History of Ancient India					
	To be Taken from Other Department					4	
		To be Taken from the Dept. of History & Archaeology					
5	SAHS HA 010305 ANC GE4004	Political History of Ancient India	4	0	0	4	GE
6	SAHS HA 010306 ANC GE4004	Orientalism in India	4	0	0	4	GE
7	SAHS HA 010307 ANC GE4004	Social History of Ancient India	4	0	0	4	GE
		Select any one of the following courses					
8	SAHS HA 010305 ANC DCEC4004	Art and Architecture in Ancient India	4	0	0	4	DCEC
9	SAHS HA 010306 ANC DCEC4004	Education, Culture and Religious Changes in Ancient India	4	0	0	4	DCEC
10	SAHS HA 010307 ANC DCEC4004	Gender and Women in Ancient India	4	0	0	4	DCEC
11	SAHS HA 010308 ANC DCEC4004	Land and People: The Formation of Cultural and Regional Identities	4	0	0	4	DCEC
						25	Total Credit

OR

MEDIEVAL INDIA (1200 AD -1757 AD)

SRL NO.	COURSE CODE	COURSES	L	T	P	CREDITS	CORE/DCEC/GE
1	SAHS HA 010309 MED C5005	Medieval Indian Historiography	5	0	0	5	CORE
2	SAHS HA 010310 MED C5005	Delhi Sultanat	5	0	0	5	CORE
3	SAHS HA 010311 MED C5005	Mughal India	5	0	0	5	CORE
4	SAHS HA 010304 MED DCEC2002	Seminar Paper (Compulsory) Socio-Cultural Transformation in Medieval India	2	0	0	2	DCEC
	To be Taken from Other Department					4	
		To be Taken from the Dept. of History & Archaeology					
5	SAHS HA 010305 MED GE4004	Gender and Women in Medieval India	4	0	0	4	GE
6	SAHS HA 010306 MED GE4004	Medieval Indian Ideas and Institutions	4	0	0	4	GE
7	SAHS HA 010307 MED GE4004	History of the Marathas	4	0	0	4	GE
		Select any one of the following courses					
8	SAHS HA 010305 MED DCEC 4004	Gender and Women in	4	0	0	4	DCEC

		Medieval India					
9	SAHS HA 010306 MED DCEC 4004	Science and Technology in Medieval India	4	0	0	4	DCEC
10	SAHS HA 010307 MED DCEC 4004	History of the Marathas	4	0	0	4	DCEC
11	SAHS HA 010308 MED DCEC 4004	Vijaynagar and Bahmani Empire	4	0	0	4	DCEC
						25	Total Credit

OR

MODERN INDIA (1757 AD - 1947 AD)

SRL NO.	COURSE CODE	COURSES	L	T	P	CREDITS	CORE/DCEC/ GE
1	SAHS HA 010309 MOD C 5005	Historiography in Modern India	5	0	0	5	CORE
2	SAHS HA 010310 MOD C 5005	Rise of the British Empire in India: 1757 AD-1857 AD	5	0	0	5	CORE
3	SAHS HA 010311 MOD C 5005	Nationalist Movement: 1858 AD -1947 AD	5	0	0	5	CORE
4	SAHS HA 010304 MOD DCEC 2002	Seminar Paper (Compulsory)	2	0	0	2	DCEC
	To be Taken from Other Department					4	
		To be Taken from the Dept. of History & Archaeology					

5	SAHS HA 010305 MOD GE 4004	Nationalist Movement: 1858 AD -1947 AD	4	0	0	4	GE
6	SAHS HA 010306 MOD GE 4004	Introduction to Indian Marxism	4	0	0	4	GE
7	SAHS HA 010307 MOD GE 4004	History of Indian Cinema	4	0	0	4	GE
		Select any one of the following courses					
8	SAHS HA 010305 MOD DCEC 4004	Gender and Women in Colonial India	4	0	0	4	DCEC
9	SAHS HA 010306 MOD DCEC 4004	Science and Technology in Colonial India	4	0	0	4	DCEC
10	SAHS HA 010307 MOD DCEC 4004	Socio-Religious Movements and Cultural Transformation in Colonial India	4	0	0	4	DCEC
11	SAHS HA 010308 MOD DCEC 4004	Communalism in Colonial India	4	0	0	4	DCEC
12	SAHS HA 010309 MOD DCEC 4004	History of Childhood	4	0	0	4	DCEC
13	SAHS HA 010310 MOD DCEC 4004	Peasants, Workers and Tribes in Colonial India (Identities, Revolts and Contestations)	4	0	0	4	DCEC
14	SAHS HA 010311 MOD DCEC 4004	Constitutional History of India: 1773 Regulating Act to 1947 Act	4	0	0	4	DCEC
						25	Total Credit

SEMESTER IV

Skill Enhancement Elective Course (Compulsory and exclusively for History & Archaeology students).

INDIAN ARCHAEOLOGY

SRL NO.	COURSE CODE	COURSES	L	T	D	CREDITS	SEEC
1	SAHS HA 010412 ARCH C001616	Dissertation (including viva-voce)	0	0	16	16	SEEC
2	SAHS HA 010413 ARCH C 5005	Science in Archaeology	5	0	0	5	SEEC
3	SAHS HA 010414 ARCH C5005	Debate in Archaeology	5	0	0	5	SEEC
						26	Total Credit

OR ANCIENT

INDIA

SRL NO.	COURSE CODE	COURSES	L	T	D	CREDITS	SEEC
1	SAHS HA 010412 ANC C001616	Dissertation (including viva-voce)	0	0	16	16	SEEC
2	SAHS HA 010413 ANC C 5005	Problems and Debates in Ancient India	5	0	0	5	SEEC
3	SAHS HA 010414 ANC C5005	Ancient Indian Philosophy and Knowledge System	4	0	0	5	SEEC
						26	Total Credit

OR

MEDIEVAL INDIA

SRL NO.	COURSE CODE	COURSES	L	T	D	CREDITS	SEEC
1	SAHS HA 010412 MED C001616	Dissertation (including viva-voce)	0	0	16	16	SEEC
2	SAHS HA 010413 MED C 5005	Popular Resistance in Mughal India	5	0	0	5	SEEC
3	SAHS HA 010414 MED C5005	Themes, Problems and Perspectives of Medieval India	5	0	0	5	SEEC
						26	Total Credit

OR

MODERN INDIA

SRL NO.	COURSE CODE	COURSES	L	T	D	CREDITS	SEEC
1	SAHS HA 010412 MOD C001616	Dissertation (including viva-voce)	0	0	16	16	SEEC
2	SAHS HA 010413 MOD C 5005	Social Change in Modern India: 1769 AD – 1947 AD	5	0	0	5	SEEC
3	SAHS HA 010414 MOD C5005	Economic History of India: 1757 AD – 1947 AD	5	0	0	5	SEEC
						26	Total Credit

NOTE:

1. A trip, in general, may be organized annually for the students of History as part of educational trip of the historical cities/places/sites.
2. A trip for archaeological excavation/exploration is compulsory for the students of semester One. Next, the semester Third students who will be opting for the paper of Archaeology as their specialization should also compulsorily be part of such trip.

ABBREVIATIONS USED:

I. **CC: Core Course**
II. **DCEC: Discipline Centric Elective Course**
III. **GEC: Generic Elective Course**
IV. **SEEC: Skill Enhancement Elective Course**

SEMESTER-I

Semester: I

SRL NO.	COURSE CODE	COURSES	L	T	P	CREDITS	CORE/DCEC/GE
1	SAHS HA 010101C5005	Introduction to History and Its Research Methods	5	0	0	5	CORE
2	SAHS HA 010102C5005	Introduction to Archaeology	5	0	0	5	CORE
3	SAHS HA 010103C5005	Culture in Ancient India	5	0	0	5	CORE
4	SAHS HA 010104C5005	Medieval Europe	5	0	0	5	CORE
	To be Taken from Other Department					4	
						24	Total Credit
	To be Taken from the Dept. of History & Archaeology						
5	SAHS HA 010101GE4004	History of Haryana	4	0	0	4	GE
6	SAHS HA 010102GE4004	Art, Architecture and Culture in Ancient World	4	0	0	4	GE
7	SAHS HA 010103GE4004	Women in Ancient World	4	0	0	4	GE
8	SAHS HA 010104GE4004	Life in Medieval Europe	4	0	0	4	GE
9	SAHS HA 010105GE4004	The Big History	4	0	0	4	GE

SEMESTER: I

PAPER 1: INTRODUCTION TO HISTORY AND ITS RESEARCH METHODS

Number of credits: **5**

Nature of course: **Core**

Aim of the course: The broad aim is to acquaint students with the basic understanding of the subject history, its philosophy, the research method and other basic ideas.

Objectives of the course:

i. To understand the idea of history;
ii. To develop a critical reading of the subject;
iii. To know the philosophy of the subject; and
iv. To know the methods employed in history.

UNIT 1: Understanding History:

A. Meaning, Rationality, Nature and Scope
B. Aspects of history; Types of history
C. Emerging trends: New history, Sub histories, Big history
D. Relation of history with other subjects

UNIT 2: Philosophy of History:

A. Historical facts; Objectivity and bias in history
B. Causation; Idea of progress in history
C. Generalization; Explanation and interpretation; Value judgment in history
D. Post- modernist skepticism and history

UNIT 3: Methods and Sources in History:

A. Research methods; Hypothesis
B. Data collection and selection
C. Historical criticism
D. Historical Sources

UNIT 4: Elements and Techniques of Historical Research:

A. Research Process in history
B. Formalization of research work: foot notes, charts, tables, arrangement of references, indexing, appendices, bibliography
C. Presenting research work: Report, Research paper, Project, Dissertation and Thesis.
D. Use of computer: MS word, PPT, Basic Excel, Using internet and reliability of internet information

Classroom strategy:

The major emphasis will be on theory aspect. Hence formal lectures will be given priority. Guest lecture, too, may be arranged depending upon the requirement of the course module. Projects, assignments, discussions and tutorial classes will form part of the class room teaching of the course.

Suggested readings:

- E. H. Carr, What is History?, Penguin, UK, 1991
- B. Sheikh Ali, History: Its Theory and Method, Laxmi Publications, 2019
- P. Gardiner, Theories of History, Free Press, 1959
- Steon, The Varities of History, Vintage Publication, 1973
- RanjitGuha, Subaltern Studies, 10 Volumes, Oxford University Press, 1999
- Edward Said, Orientalism, Penguin, 2001
- Alvesson Mats (2002) : Postmodernism and Social Research, Open University Press
- Bloch, Marc (1954) : The Historian's Craft (Knopf, 1953),
- Translated from French by Peter Putnam (in Hindi), Bloch, Marc (2000) : Itihaskar Ka Shilp
- Boyd, Kelly (ed.) (1999) : Encyclopaedia of Historians and Historical Writing, Vol. 1 & 2
- Canon, John (ed.) (1980) : The Historians at Work, George Allen & Unwin, London, 1980
- Chaube, Jharkhande (1999) : Itihaas - Darshan
- Collingwood, R.G. (2004) : The Idea of History, Oxford UniversityPress, 2004
- Gardiner, Patrick (ed.) : Theories of History, New York 1969
- Hobsbawm, Eric J. (2003) : Itihaskar ki Chinta
- Hughes-Warrington-Marine : Fifty Great Thinkers on History(2004 Indian Reprint)
- Lambert, Peter and Phillip : Making History : An Introduction to the Sccofield (2004) Practices of a Discipline
- Marwick, Arthur : The Nature of History, Macmillan, London, 1970, 1984 (in Hindi also: (2008) : Itihas Ka Swarup)
- Marwick, Arthur : New Nature of History : Knowledge, Evidence, Language,
- Sreedharan, E. (2004) : A Textbook of Historiography 500 BC to AD 2000 (Orient Longman, Delhi, 2000) (in Hindi also)
- Stone, Lawrence (1987) : The Past and the Present (Revised)
- Verma, Lal Bahadur (1984) : Itihas Ke Bare Mein
- Woolf, D.R. (ed.) (1988) : A Global Encyclopaedia of Historical Writing (1 & 2)
- Anderson et al.,: Thesis and assignment writing
- Elton G.R.: The Practice of History
- Gottschalk L.: Generalisation in the writing of History
- Joseph Gibaldy: MLA Handbook for the writers of Research papers, New York, Modern Language Association, America, 1999.
- Sharron Sorenson: How to write Research Paper, MacMillan, 1995.
- G.J. Renier, History: Its Purpose and Method, Allen and Unwin,1961
- R.J. Shafer: A Guide to Historical Method Dorsey Press,1983
- W.H. Walsh: Philosophy of History: An Introduction, Harper and Row,1968
- R.F. Atkinson: Knowledge and Explanation in History, Macmillan, 1978
- W.H. Dray, (Ed): Philosophical Analysis and History, Harper and Row,1966
- Patrick Gardiner: The Nature of Historical Explanation, OUP,1968
- Christopher Lloyd: The Structures of History, Blackwell Press, 1996.

PAPER: 2: INTRODUCTION TO ARCHAEOLOGY

Number of credits: 5

Nature of course: Core

Aim of the course: The broad aim is to acquaint students with the basic understanding of the subject matter of archaeology as an autonomous and important part of history, its technical dimensions and uncovering it layer by layer.

Objectives of the course:

i. To explore the term archaeology and to know its scientific beginning;

ii. To develop a critical reading of the subject;

iii. To know the philosophy of the subject;

iv. To explore the technical aspects of it;

v. To understand the subject with the aid of other natural and social sciences.

UNIT 1: Introduction to Archaeology

1. Archaeology: definition, scope, relevance

2. Relation with history and science

3. Terms in archaeology: culture assemblages

UNIT 2: History of Archaeology

1. History of archaeology in colonial India: from 18th century to 1902

2. History of archaeology in colonial India: from 1902 to 1947

3. Archaeology in Independent India: contribution of institutions and individuals

UNIT 3: Methods of Data Retrieval

1. Field discoveries: aims and methods of Explorations

2. Unearthing the sites: planning excavations, layout, techniques of Excavations–Vertical; Horizontal, tools and equipments.

3. Methods of recording the contexts of excavated remains: preparation of sections and plans, three-dimensional recording, site formation processes, floatation technique,

UNIT 4: Chronology and Dating Methods

1. Stratigraphy: Principles of stratification, Identification and recording of strata, Reconstruction of cultural sequence

2. Other methods of Relative chronology: Typology, Cross-dating, Palynology

3. Absolute methods of dating: Radiocarbon, Potassium-argon, Thermoluminescence, Pollen analysis, Dendrochronology

Classroom strategy:

The major emphasis will be both on theory as well as practical aspects. Besides the formal lectures, the field survey and practical training will be duly focused upon. Guest lecture, too, may be arranged depending upon the requirement of the course module. Projects, assignments, discussions and tutorial classes will form part of the class room teachin g of the course.

Suggested readings:

• Aitken, M. J. 1990. Science based Dating in Archaeology. London: Longmans.

• Atkinson, R. J. C. 1953. Field Archaeology. London: Methuen and Co.

• Barker, P. 1982. Techniques of Archaeological Excavation. London: Batsford.

• Binford, L. R. 1964. A Consideration of Hypothetical Research Design, American Antiquity.

• Bintliff, John. 2004. A companion to Archaeology. U.K.: Blackwell.

• Chakrabarti, D. K. 1988 A History of Indian Archaeology: From the Beginning to 1947. New Delhi: Munsiram Manoharlal.

• Crawford, O. G. S. 1953. Archaeology in the Field. London: Phoenix.

• Dancey, W. S. 1985. Archaeological Field Methods: An Introduction. New Delhi: Surjeet Publications.

• Harris, E. C. 1979. Principles of Archaeological Stratigraphy. London: Academic Press.

• Hester, T., Heizer, R. E. and J. A. Graham. 1975. Field Methods in Archaeology. Palo Alto (California): Mayfield Press.

• Johnson, Matthew 2007 Archaeological Theory: An Introduction. Blackwell Publishing

• Rajan, K. 2002. Archaeology. Tanjavur: Mannop Publishers.

• Renfrew, Colin and Paul Bahn 2006 Archaeological: Theories and Methods and Practice.

• Wheeler, R. E. M. 1954. Archaeology from the Earth. Harmondsworth: Penguin Books.

PAPER: 3: CULTURE IN ANCIENT INDIA

Number of credits: 5

Nature of course: Core

Aim of the course: It is intended to provide the students higher level understanding of the history of the ancient societies. The different aspects belonging to the ancient world will be thoroughly examined in the light of the new researches in the mentioned field.

Objectives of the course:

i. To explore the ancient Indian culture;
ii. To develop a critical understanding of the subject;
iii. To understand the process of development into cultural fields of ancient Indian civilization;
iv. To enlighten the students with the cultural formation and the need for heritage building measures.

UNIT I INTRODUCTION TO INDIAN CULTURE

1. Origin of the study of Ancient Indian Culture
2. The main characteristics of Ancient Indian Culture.
3. Geographical and Ethnic Profile
4. Methods and approaches to the study of Indian Culture: - Imperialist, Nationalist, Marxist.

UNIT II SOCIAL INSTITUTIONS IN ANCIENT INDIA

1. Varna system- Meaning, origin and development; Difference between Varna and Jāti.
2. Āśrama system- Concept and Cultural significance of Āśrama system.
3. Sanskāra- Concept and cultural importance of Sanskāra; Marriage system in Ancient India.
4. Purusārtha: Concept of Rin and nature and aims of Education in Ancient India.

UNIT III DHARMAS IN ANCIENT INDIA

1. Vedic dharma- various devī and devatās, Yajñas and sacrifices.
2. Buddhism- Origin of Buddhism; Hīnayāna and Mahāyāna, Vajrayāna and Tantric Buddhism
3. Jainism- Origin and Development of Jainism; Other heterodox sects.
4. Hinduism- Vaisnavism; Saivism and Saktism.

UNIT IV LITERARY TRADITIONS IN ANCIENT INDIA

1. Vedic literature- Vedas, Upanishadas, Brāhmanas, Āranyakas; Sutra- Smritis and Dharmaśāstras.
2. Buddhist literature- Pitakas (with special reference to Vinayapitaka and Suttapitaka);

Dhammapada.

3. Jain Literature- Pariśiṭha Parvaṇa; Kalpasūtra; Āċārānga sūtra.
4. Sanskrit literature- Arthaśāstra, Buddhacharita; Kamasutra; Manusmriti; Epics

Classroom strategy:

The major emphasis will be on theory aspect. Hence formal lectures will be given priority. Guest lecture, too, may be arranged depending upon the requirement of the course module. Projects, assignments, discussions and tutorial classes will form part of the class room teaching of the course. Screening featurefilms related to the concerned topics and documentary movies may also form part of the teaching scheme.

Suggested readings:

- Basham, A.L. The History and Doctrines of the Ajivikas: a Vanished Indian Religion, London, 1951
- Basham, A.L. The Wonder that was India, London, 2004,
- Basham, A.L. A Cultural History of India (editor), Oxford, 1997.
- Dinkar, R S, Sanskriti ke char adhyaya, Allahabad, 2011
- Pande, G.C., Foundations of Indian Culture - Vol. 1&2: Spiritual Vision and Symbolic Forms, in
  Ancient India, Varanasi, 2007.
- Majumdar, R.C. Ancient India, Varanasi, 2016.Kosambi,
- D.D. The Culture and Civilisation of Ancient India in Historical Outline, New Delhi, 1997.
- Agnihotri, V.K. Indian History and Culture, New Delhi, 2013.
- Banerji, S.C. Society in Ancient India: Evolution since the Vedic Times Based on Sanskrit, Pali, Pakrit and Other Classical Sources (Reconstructing Indian History and Culture), New Delhi, 1997.
- Bapat, P.V. 2500 Years of Buddhism, New Delhi,

PAPER: 4 MEDIEVAL EUROPE

Number of credits: 5

Nature of course: CORE

Aim of the course: The broader aim is to make pupil understand the different historical phases during the medieval Europe.

Objective of the course:

i. To know the civilizational development in medieval Europe

ii. To critically examine the various facets of historical development

UNIT 1: The Carolingian Empire
A. Downfall of Roman Empire
B. Causes of Coronations of Charlemagne
C. Administration of Charles the Great
D. Carolingian Renaissance

UNIT 2: Imperial Age
A. Otto the Great
B. Frederic Barbossa
C. Frederic-II
D. Philip Augustus

UNIT 3: Feudalism
A. Rise
B. Features
C. Culture
D. Decline

UNIT 4: Rise of Papacy
A. Investiture Controversy
B. Pope Gregory VII
C. Pope Innocent III
D. Crusades: Causes and Effects

Classroom strategy:
The major emphasis will be on theory aspect. Hence formal lectures will be given priority. Guest lecture, too, may be arranged depending upon the requirement of the course module. Projects, assignments, discussions and tutorial classes will form part of the class room teaching of the course. **The 30 percent of this paper will be taught online and rest of it will be offline.**

Suggested readings:

- Gibbon, Edward. *The History of the Decline and Fall of the Roman Empire*. New York: Harper and Brothers, 1836 (4 Volumes).

- Lawrence, C.H. *Medieval Monasticism: Forms of Religious Life in Western Europe in the Middle Ages*. New York: Routledge, 2015.
- Gies, Frances and Joseph Gies. *Life in a Medieval Village*. London: HarperCollins, 2016.
- Wickham, Chris. *Framing the Early Middle Ages: Europe and the Early Mediterranean, 400-800*. New York: OUP, 2005.
- Mitchell, Linda E. *Family Life in the Middle Ages*. London: Greenwood Press, 2007.
- Smith, Julia M.H. *Europe after Rome: A New Cultural History, 500-1000*. New York: OUP. 2005.
- Pirenne, Henry. *Medieval Cities: Their Origins and the Revival of Trade*. Princeton: Princeton University Press, 1969.
- Whalen Brett Edward. *The Medieval Papacy*. London: Palgrave Macmillan, 2014.
- Burns, J.H(ed.). *The Cambridge History of Medieval Political Thought, 350-1450*. Cambridge: CUP, 2008.
- Poston, M.M (ed.). *The Cambridge Economic History of Europe (Vol. III)*. Cambridge: CUP, 1965.
- Anderson, Perry. *Passages from Antiquity to Feudalism*. London: NLB, 1974.
- Singman. Jeffrey L. *Daily Life in Medieval Europe*. London: Greenwood Press, 1999.
- Nelson, Janet L. *Politics and Ritual in Early Medieval Europe*. London: The Hambledon Press, 1986.
- Pirenne, Henry. *Economic and Social History of Medieval Europe*. New York: A Harvest Book, 1937.
- Figg, Kristen Mossler and John Block Friedman(ed.). *Arts and Humanities through the Ages: Medieval Europe, 814-1450*. New York: Thomson Gale, 2005.
- Hummer, Hans J. *Politics and Power in Early Medieval Europe: Alsace and Frankish Realm, 600-1000*. Cambridge: CUP, 2005.

PAPER: 5: HISTORY OF HARYANA

Number of credits: **4**

Nature of course: **GE**

Aim of the course: The broader aim is to make pupil understand the different historical phases in the history of Haryana. How Haryana marched towards its journey to civilization will form a major aim of the paper.

Objectives of the course:

i. To know the civilizational development in Haryana;
ii. To focus on the regional history;
iii. To provide a socio-cultural study of the area; and
iv. To critically examine the various facets of historical development.

UNIT 1: Ancient Haryana:

A. Sources of Ancient Period
B. Harappan Civilization: General Features
C. Growth of Vedic Civilization and Historicity of battle of Mahabharata.
D. From Republic to Empire: Yaudheyas, Agras and Kunindas; Pushpabhutis

UNIT 2: Medieval Haryana:

1. Rise of New Powers:

A. Sources of Medieval Period
B. Gurjara-Pratiharas;
C. Tomaras;
D. Chahamanas.

2. Sultanate Period:

A. Haryana on the Eve of Turkish Invasion;
B. Revolts of Meos and Rajputs;
C. Provincial Administration-Iqta system;
D. Economic, Social and Cultural Changes.

UNIT 3: Mughal Period:

A. First and Second Battle of Panipat and Hemu; Revolt of Satnamis
B. Pargana Administration
C. Economy-Land Revenue System: Cropping pattern and Irrigation System; Industries and Commerce.
D. Socio-Religious Movement-Bhakti and Sufi: Spread and Impact

UNIT 4: Modern Haryana:

A. Sources of Modern Period;
B. Political: Emergence of Marathas, Jats and Sikhs; George Thomas

Socio-Religious Movements in Haryana: a. Arya Samaj, b. Sanatan Dharam

C. Development of Education in Colonial Haryana;
D. Political Movements: i. Revolt of 1857; ii. Rise of Political Consciousness; iii. National Movement (1885-1919); iv. 1920- 1947: Mass Movements; Non Cooperation; Civil Disobedience; Praja Mandal, Quit India Movement; Regional Consciousness-Unionist Party.

Classroom strategy:

With the help of formal lectures and discussions the rather unfamiliar aspects of the age will be discussed. Guest lecture, too, may be arranged depending upon the requirement of the course module.

Projects, assignments, discussions and tutorial classes will form part of the class room teaching of the course.

Suggested Readings:

- Buddha Prakash, Haryana through the Ages, Kurukshetra University, Kurukshetra, 1962.
- Glimpses of Haryana, Kurukshetra University, Kurukshetra, 1969.
- Das Gupta, K.K., Tribal History of Ancient India,
- Devahuti, D., Harsha: A Political Study, Oxford Clarendom Press, 1970.
- Dwivedi, H.N., Dilli ke Tomar (736-1193), Vidya Mandir Prakashan, Gwalior, 1973.
- Goyal, J.B., (ed.) Haryana-Puratattna, Itihas, Sanskriti, Sahitya evom Lokwarta, Delhi, 1966.
- Gupta, S.P. & Rama & Chandran, K.S., Mahabharata: Myth and Reality, Agam Prakashan, New Delhi, 1976.
- Phadke, H.A. Haryana: Ancient and Medieval, Harman Publication House, New Delhi, 1990.
- Phogat, S.R., Inscriptions of Haryana, Kurukshetra University Kurukshetra, 1978.
- Puri, B.N., History of Gurjar-Prathiharas, Munshiram Manoharlal, New Delhi, 1968.
- Sen, S.P. (Ed.), Sources of the History of India, Vol. II, Munshiram Manoharlal, New Delhi, 1979.
- Sharda, Sadhu Ram, Haryana-Ek Sanskritik Adyayan, Bhasha Vibhag, Haryana, Chandigarh, 1978.
- Sharma, D., Early History of Chahamanas, Delhi, 1959.
- Singh, Fauja (ed.), History of the Punjab, Vol. I-III, Publication Bureau, Punjab University, Patiala, 1997-2000.
- Suraj Bhan, Excavations at Mithathal (1968) and other Explorations in Satluj Yamuna Divide, Kurukshetra University, Kurukshetra, 1975.
- Tripathi, R.S., History of Kanauj, Munshiram Manoharlal, New Delhi, 1964.
- Yadav, K.C., Haryana: Itihas evom Sanskriti, Part 1 & 2, Manohar Publisher, New Delhi, 1994 (2nd Ed.)

PAPER: 6: ART, ARCHITECTURE AND CULTURE IN ANCIENT WORLD

Number of credits: **4**

Nature of course: **GE**

Aim of the course: Through this paper, it is desired to make students understand how art, architecture and culture grew in the ancient world. It will be of particular interest to the students of the ancient history and those who are interested in the concerned field.

Objectives of the course:

i. To understand the basics of the art, architecture and culture of the ancient world;
ii. To study the growth of artistic skills among the ancient people in their own milieu
iii. To demystify various aspects related to this topic.

UNIT 1: Ancient Mesopotamia:

A. Sources-Categories and Types of Archaeological Sources; Sequence of the Culture;
B. Socio-Political Factors Leading to the Development of Art and Culture.
C. Architectural Structures and their Functional Features; Minor arts and Craftsmanship.
D. Religion, Mythology and Beliefs; Writings, Literature.

UNIT 2: Ancient Egypt:

A. Early and Old Kingdom- Beginning, Features, Pyramids-Function, Purpose, Technology.
B. Middle Kingdom.
C. New Kingdom.
D. Religion-Gods, Priests and Temples, Mythology, Ideas, Daily Life, Culture.

UNIT 3: Ancient Greeko- Roman World

A. Historiography; Sources.
B. The Bronze Age Greek Art-Minoa, Mycena, Thera, Crete.
C. Architecture, Temples, Painting, Pottery;
D. Religion, Myths, Philosophy, Literature, Daily Life.

UNIT 4: Ancient Rome:

A. Historiography; Sources.
B. Roman Art and Culture- Relationship with Socio, Political and Economic Factors; Design, Construction and methods in Roman Buildings.
C. Art and Architecture in Imperial Rome.
D. Religion, Myths, Literature, Philosophy, Daily Life.

Classroom strategy:

With the help of formal lectures, discussions and video films, the rather unfamiliar aspects of the age will be discussed. Guest lecture, too, may be arranged depending upon the requirement of the course module. Projects, assignments, discussions and tutorial classes will form part of the class room teaching of the course.

Suggested Readings:

- David, Rosalie (1993). Discovering Ancient Egypt. Facts on File. New York, New York
- David, Rosalie (1988). The Egyptian Kingdoms; The Making of the Past. Peter Bedrick Books. New York, New York.
- David, Rosalie (1998). Handbook to Life in Ancient Egypt. Facts on File. New York, New York.
- James, T.G.H. (1988). Ancient Egypt; The Land and It's Legacy. First University of Texas Press.

Austin, Texas.
- James, T.G.H. (1979). An Introduction to Ancient Egypt. Harper & Row Publishers. New York, New York.
- Harris, Geraldine (1990). Ancient Egypt; Cultural Atlas for Young People. Facts on File. New York, New York.
- Mckenzie, Michael; Prime, Richard; George, Lisa; Dunning, Ray (2001). Mythologies of the World; the Illustrated Guide to Mythological Beliefs and Customs. Checkmark Books. New York, New York.
- New York Graphic Society (1954). Egypt, Paintings from Tombs and Temples. Italy.
- Pace, Mildred Mastin (1981). Pyramids; Tombs for Eternity. Peter Bedrick Books. New York, New York.
- Redford, Donald B. (2002). The Ancient Gods Speak; A Guide to Egyptian Religion. Oxford University Press. New York, New York.
- Unstead, R. J. (1986). See Inside an Egyptian Town. Warwick Press. New York, New York.
- Verner, Miroslav (1997). The Pyramids; the Mystery, Culture, and Science of Egypt's Great Monuments. Grover Press. New York, New York.
- Wyly, Michael J. (2002). Death and the Underworld. Lucent Books. San Diego,
- Christenson, E.O.: The History of Western Art
- Ritcher, G.: A Handbook on Greek Art
- Seltman, C.: The Approach to Greek Art
- Demargne, P. Agean Art: The Origins of Greek Art. London: Thames & Hudson, 1964.
- Fullerton, M.D. 2000 Greek Art. Cambridge: Cambridge University Press, 1982.
- Hampe, R & E. Simon Birth of Greek Art from the Mycenean to the Archaic Period. London: Thames and Hudson, 1981.
- Havelock, C.M. Hellenistic Art. London: Phaidon Press, 1972.
- Holscher, Tonio. The language of images in Roman art. Cambridge: Cambridge University Press,
- 2004.
- Kleiner, Fred S. A History of Roman Art. Belmont: Thompson Wadsworth, 2007.
- Lawrence, A.W. Greek Architecture (revised by R. Tomlinson). New Haven: Yale University Press
- Pelican History of Art, 1996.
- Pedley, J.G. Greek Art and Archaeology. U.K: Lawrence King Publishing, 1993.
- Pollitt, J.J. Art in the Hellenistic Age. London: Cambridge University Press, 1987.
- Richter, G.M.A. A Handbook of Greek Art. London: Phaidon Press, 1959.
- Robertson, M. A History of Greek Art (Vols. 1-2). Cambridge: Cambridge University Press, 1975.
- Schroder, R.V. Masterpieces of Greek Art. London: Studio Books, 1975.
- Jacobson, T. (1997). The Harps the Once... Yale University Press.
- Jacobson, T. (1978). The Treasures of Darkness: A History of Mesopotamian Religion. Yale
- University Press.
- Frankfort, H. (1996). The Art and Architecture of the Ancient Orient. Yale University Press.
- Oppenheim, L. (1968): Ancient Mesopotamia: Portrait of a Dead Civilization. London and
- Chicago. The University Press of Chicago.

SEMESTER-I

PAPER: 7: GENDER AND WOMEN IN ANCIENT WORLD

Number of credits: **4**

Nature of course: **GE**

Aim of the course: The broad aim is to make students knowledgeable and also to sensitize them about women in a historical perspective.

Objectives of the course:

i. To develop a critical understanding of the subject;
ii. To know the conditions of women in main civilizations of the ancient world;
iii. To know the history of women in her material milieu.

UNIT 1: Introduction:

A. Understanding gender; Gender and historical analysis; its contribution towards understanding social relations in ancient world;
B. Gender and the prehistoric world: technological development, social settings, cultural, religious and ideological development and women;
C. Historiography on women in ancient world.

UNIT 2: Women in Ancient Mesopotamia:

A. Women in Sumerian and Babylonian worlds;
B. Temple, religion and politics: women in ancient Mesopotamia;
C. Education, health, culture and social and legal status.

UNIT 3: Women in Ancient Egypt:

A. Women through the kingdoms: The Early dynastic period, Old, Middle and Late kingdoms;
B. Social, economic and legal status of women in ancient Egypt;
C. Political connections, health, education, medicine and the issue of women in ancient Egypt world.

UNIT 4: Women in Greeko-Roman World:

A. Critical understanding of the historiography;
B. Women in ancient Greece: From archaic to Hellinistic period- A socio-political, economic and cultural perspective.
C. Women in ancient Roman world: From Pre-Roman to Republic to Empire- A socio-political, economic and cultural perspective.

Classroom strategy:

The major emphasis will be on theory aspect. Hence formal lectures will be given priority. Guest lecture, too, may be arranged depending upon the requirement of the course module. Projects, assignments, discussions and tutorial classes will form part of the class room teaching of the course. Graphics and videos may also form part of the teaching wherever it is required and possible.

Suggested readings:

- Burguiere et.al. (eds), A History of the Family: Distant Worlds, Ancient Worlds,Polity, 1996.
- Sarah Pomeroy, Goddesses, Whores, Wives and Slaves: Women in Classical Antiquity, Schocken, Books 1995.
- Archer, Fischler and Wyke (eds), Women in Ancient Societies, Routledge, 1994.
- Gerda Lerner, The Creation of Patriarchy, OUP, 1986.
- Zainab Bahrani, Women of Babylon: Gender and Representation in Mesopotamia,Routledge,
- 2001.
- Gay Robins, Women in Ancient Egypt, Stanford University Press 1993.
- Women in ancient Mesopotamia Civilization of Ancient Iraq by Foster and Foster
- Women in European History, Ed by Renate Bridenthal et al.
- Bryan, B. "The Evidence for Female Literacy from Theban Tombs of the New Kingdom,"
- Ward, "The Egyptian Economy and Non-royal Women: Their Status in Public Life" [Web essay];
- Wente, "A Husband to His Deceased Wife (letter)," Papyrus Leiden I.
- Manniche, "Some Aspects of Ancient Egyptian Sexual Life,"
- Cameron and A. Kuhrt, eds. Images of Women in Antiquity. Detroit: Wayne State U. Press, 1993
- Arjava, A. *Women and Law in Late Antiquity*. New York: Clarendon, 1996.
- Barrett, A.A. *Agrippina: Sex, Power, and Politics in the Early Empire*. New Haven: Yale U. Press,
- 1996.
- Blundell, S. and M. Williamson, eds. *The Sacred and the Feminine in Ancient Greece*. London: Routledge, 1998.
- Calame, C. Choruses of Young Women in Ancient Greece: Their Morphology, Religious Role, and Social Function.
- Cohen, D. *Law, Sexuality and Society*. Cambridge: Cambridge University Press, 1991.
- Foley, ed *Reflections of Women in Antiquity*. New York: Gordon and Breach Science, 1981
- Dixon, S. *The Roman Family*. Baltimore: Johns Hopkins University Press, 1992.
- _. *The Roman Mother*. Norman: U. of Oklahoma Press, 1988.
- Hawley, R. and B. Levick, eds. *Women in Antiquity*. London: Routledge, 1995.
- Wyke, M., ed. Gender and the Body in the Ancient Mediterranean. Oxford: Blackwell Publishers, 1998.
- Zoll, A. Gladiatrix: the True Story of History's Unknown Woman Warrior. New York: Berkley Blvd, 2002.
- Waite, M.E. *A History of Women Philosophers: Ancient Women Philosophers 600 B.C. to 500 A.D.*
- Kerenyi, K. *Athene: Virgin and Mother in Greek Religion*. Irving, TX: Spring Publications, 1979
  _. *Goddesses of Sun and Moon: Circe/Aphrodite/Medea/Niobe*. Irving, TX: Spring Publications, 1979b.
  _. *Zeus and Hera: Archetypical Image of Father, Husband and Wife*. London: Routledge & Kegan Paul, 1975.
  _. *Eleusis: Archetypical Image of Mother and Daughter*. Princeton: Princeton University Press, 1967.
- Kraemer, R.S. Women's Religions in the Greco-Roman World: a Sourcebook. London: Oxford,
- 2004.
- Lacey, W.K. *The Family in Classical Greece.* Ithaca: Cornell University Press, 1989.
- McClure, L. *Spoken Like a Woman: Speech and Gender in Athenian Drama*. Princeton: Princeton
- University Press, 1999.
- McGinn, T.A. Prostitutes, Sexuality, and the Law in Ancient Rome. New York: Oxford, 1998.

SEMESTER: I

PAPER: 8: LIFE IN MEDIEVAL EUROPE

Number of credits: **4**

Nature of course: **GE**

Aim of the course: The broad aim is to make students aware about the medieval lives. Besides, political aspects, knowing the society of medieval world is an interesting issue for the students of medieval history students.

Objectives of the course:

i. To develop a critical understanding of the subject;
ii. To know the conditions of people in general in medieval world;
iii. To know the progress of civilization through the medieval ages.

UNIT 1: Political:

A. Post Roman Polity and the Nature of state;
B. Kingship, Nobility and Clergy
C. Church and Political institution;
D. Rebellions Especially of Fourteenth Century and the Crisis; Its Outcome

UNIT 2: Economic:

A. Agriculture with particular reference to feudal dynamics;
B. Trade, Commerce and Industry;
C. Growth of Urban Centres and Urban Life;
D. Innovations and the Artisans and the Merchants.

UNIT 3: Social and Cultural:

A. Social and Cultural Life;
B. Life of Women;
C. Religious Practices and Institutions;
D. Socio-Cultural Institutions

UNIT 4: Ideas and Education:

A. Ideological and philosophical development;
B. Growth of Universities;
C. Science and Technology;
D. Continuation, Revivalism and Change.

Classroom strategy:

It will be a blend of formal theoretical teaching and audio-visual teaching. Presentations, assignments, discussions, quiz and brainstorming sessions will equally be employed.

Suggested readings:

- Henri Pirenne, Economic and Social History of Medieval Europe, Routledge, London, 1958.
- Marc Bloch, Feudal Society, Vol. II, Rotletdge & Kegan Paul Ltd. Chicago, 1964.

- Georges Duby, Early Growth of European Economy: Warrior and Peasants from the Seventh to the Twelfth Century, Cornell, 1974.
- L. Ganshof, Carolingians and the Frankish Monarch, Cornell University Press, London, 1971.
- R. H. Bautier, The Economic Development of Medieval Europe, London 1971.
- Lynn White, Medieval Technology and Social Change, Oxford University Press, London, 1966.
- Rodney Hilton, Bond Man Made Free, Maurice Temple Smith Ltd., London, 1973.
- Georges Duby, Three Orders,University of Chicago Press,Chicago,1980
- Jacques Le Goff (ed.), The Medieval World.
- Carlo Cipolla, Before the Industrial Revolution, Routledge, London,1993

SEMESTER: I
PAPER-9: THE BIG HISTORY

Number of credits: 4

Nature of course: GEC

Aim of the course: The broad aim is to develop a broad multidisciplinary historical approach about the journey of the universe and human civilization till our present era.

Objectives of the course:

i. To know the beginning and expansion of the universe.
ii. To know the creation of solar system, earth and the arrival of human.
iii. To understand the historical phases of human civilization.
iv. To understand modernity and sustainability of human civilization.

Learning outcome for students:

- Students will be able to appreciate the importance of inter-disciplinary approach in academics;
- Next, they will be able to know the integration of scientific and socio-cultural approaches;
- Third, they will also be able to develop a global approach in a global environment;
- Next, they will be able to inculcate rational ways to examine and analyse the physical, biological, technological and socio-cultural constructs;
- Next, the learning of using data, models, reasoning, quantification and graphics will help them garner some basic skills;
- Comprehend various present days human problems and working for their solutions through integrating regional-global collaborations.

Unit 1: The Beginning of Cosmos:

A. Scientific theories; Religious origin
B. The expansion: stars and galaxies
C. The solar system

Unit 2: The Earth:

A. The formative phase: Atmosphere and Geological changes
B. The coming of life: Plants and animals

Unit 3: The Human:

A. Evolution and early phase
B. The age of Anthropocene: Agriculture, Early Civilizations
C. Ancient and Medieval World

Unit 4: Modernity Arrives:

A. Ideas and progresses
B. The crisis of modernity
C. Sustainability and future

Classroom strategy:
It will be a blend of formal offline and online teaching with the necessary aid of audio-visual devices. Presentations, assignments, discussions, quiz and brainstorming sessions will equally be employed. Wherever possible, guest lectures may also be organized

Suggested Reading:

- Christian, David, Cynthia Stokes Brown, and Craig Benjamin (2013) Big History: Between Nothing and Everything, New York: McGraw-Hill Education.
- Christian, David (2004) Maps of Time: An Introduction to Big History, London: University of California press
- Mcquarie University Big History Institute (2016) Big History: Examines Our Past, Explains Our Present, Imagines Our Future, London: DK.
- Alvarez, Walter (2016) A Most Improbable Journey: A Big History of Our Planet and Ourselves, W.W. Norton & Company.
- Spier, Fred (2015) Big History and the Future of Humanity, Wiley Blackwell, UK
- Benjamin, Craig, Esther Quaedackers and David Baker (2020): The Routledge Companion to Big History, UK: Routledge
- Sverre Raffnsøe (2016) Philosophy of the Anthropocene: The Human Turn, Palgrave Macmillan, UK
- Darwin, Charles (1981) The Descent of Man and Selection in Relation to Sex, Princeton University Press
- Hawkins, Stephen (1998) A Brief History of Time, Bantam Publisher
- Singh, Savinder (2020) Physical Geography, Pravalika Publication (Hindi and English)
- Huggett, Richard (1998) Fundamentals of Biogeography –Routledge
- Dukes, Paul (2011) Minutes to Midnight: History and the Anthropocene Era from 1763 Anthem Press
- Professor Brown (2001) History and Climate Change: A Eurocentric Perspective, Routledge
- Ehlers, Eckart and Thomas Krafft -Eds. (2006) Earth System Science in the Anthropocene: Emerging Issues and Problems, Springer
- The Journal of Big History, : Different volumes: https://jbh.journals.villanova.edu/
- The Big History Project - David Christian at Macquarie University, May 27, 2015: https://www.youtube.com/watch?v=rWzUSgPMRD4

SEMESTER-II

SRL NO.	COURSE CODE	COURSES	L	T	P	CREDITS	CORE/DCEC/GE
1	SAHS HA 010205C5005	Historiography from Ancient to Contemporary World	5	0	0	5	CORE
2	SAHS HA 010206C5005	Pre History of South Asia	5	0	0	5	CORE
3	SAHS HA 010207C5005	Rise of Modern West	5	0	0	5	CORE
4	SAHS HA 010208C5005	Modern World: 1789 to 1945	5	0	0	5	CORE
5	SAHS HA 010205GE2002	Medieval Islam (Compulsory)	2	0	0	2	GE
		Select any one of the following courses					
6	SAHS HA 010201DCEC4004	Contemporary World (1945 - 2001)	4	0	0	4	DCEC
7	SAHS HA 010202DCEC4004	History of World Cinema	4	0	0	4	DCEC
8	SAHS HA 010203DCEC4004	Women in Medieval World	4	0	0	4	DCEC
9	SAHS HA 010204DCEC4004	History of Human Ideas	4	0	0	4	DCEC
10	SAHS HA 010205 DCEC4004	North East India: Ancient to Present	4	0	0	4	DCEC
11	SAHS HA 010206 DCEC4004	History & Cinema	4	0	0	4	DCEC
						22	Total Credit

SEMESTER: II

PAPER: 1: HISTORIOGRAPHY FROM ANCIENT TO CONTEMPORARY WORLD

Number of credits: **5**

Nature of course: **CORE**

Aim of the course: The broad aim is to make students aware about the development of history writing in different historical phases continuing till present days.

Objectives of the course:

i. To know the beginning of history writing.
ii. To know the progress of history writing in different ages.
iii. To understand the growth of numerous philosophical, intellectual and ideological constructs in all these phases.
iv. To understand the growth of historiography in the given historical milieu.

UNIT 1: Historiography in Ancient World:

A. Introduction and the beginning;
B. Greek-Roman Historiography;
C. Chinese Historiography;
D. Ancient Indian Historiography

UNIT 2: Historiography in the Medieval World:

A. Medieval Islamic Historiography;
B. Historiography in Medieval Europe;
C. Historiography in Medieval India;
D. Historiography during Renaissance and Reformation

UNIT 3: Historiography in Modern Age:

A. Historiography during Enlightenment and Romanticism
B. Nationalist and Literary Expression: British and German Historiography
C. Berlin Revolution: Niebuhr and Ranke
D. Materialists' and Positivists' Assertions-Marx and Comte

UNIT 4: Ideological Shift in 20th Century Historiography:

A. Modern Historiography: Continuation and Changes
B. Annals School of History
C. Post-Colonial Historiography—Subaltern historiography
D. Critical Literary theory and historiography

Classroom strategy:

It will be a blend of formal theoretical teaching and audio-visual teaching. Presentations, assignments, discussions, quiz and brainstorming sessions will equally be employed. Wherever possible, guest lectures will also be organized.

Suggested readings:

- R.G. Collingwood, The Idea of History, Hesperides Press, 2008
- M.I. Finley, The Greek Historians, Penguin, 1997

- J.W. Thompson, A History of Historical Writings 2 vols, The Macmillan Company, 1942
- Pieter Geyl, Debates with Historians, Collins, 1962
- Peter Burke, The French Historical Revolution, Stanford University Press, 1990
- Immanuel LeRoy Ladurie, The Territory of the Historian, The HarvesterPress, 1979
- Lawrence Stone, The Past and the Present, Routledge and Kegan Paul, 1981
- Keith Jenkins (Ed), The Post Modern History Reader, Routledge, 1997
- Gertrude Himmalfarb, The New History and the Old, Harvard University Press
- Arnoldo Momigliano: Ancient and Modern Historiography, Oxford, 1977.
- M.C.Lemon: The Philosophy of History, Routledge, 2003
- L. Marshack. The Nature of Historical Enquiry, Krieger Publishing, 2006
- Bentley: A Companion to Historiography, Routledge, 2002
- Plekhanov: Introduction to the Monist view of History, 1895, People's Publishing 1974
- G. A. Cohen: Karl Marx's Theory of History, London 1978.
- Perry Anderson: In the Tracks of Historical Materialism, Verso, 1983
- Hobsbawm: On History, Abacus, 1998
- E.P.Thomspon: Making of History, New Press, 1994
- Gramsci: Selections from the Prison Notebooks, International Publishers, 1971
- Max Horkheimer: Between Philosophy and Social Sciences: Selected early writings, MIT Press, 1993
- Peter Burke: The French Historical Revolution: The Annales School 1929-2014, Polity, 2014.
- Keith Jenkins: Rethinking History, London, 2002.
- Beverly Southgate, History: What and Why, Routledge, 1996
- Aram Wiser: New Historicism, Routledge
- Mark Poster: Foucault, Marxism and History: Mode of production versus Mode of information, Polity Press, 1984
- Edward Said: Orientalism, Penguin
- Robert Burns and H.R.Richard (ed): Philosophies of History: From enlightenment to post modernity, Black well, 2000.
- Aron V. Cicourel (ed). Advances in Social Theory and Methodology, Routledge, 1981.
- Joyce Appleby, Margaret Jacob and Lynn Hunt (eds.): Telling the Truth about History, London, 1995
- Lynn Hunt (ed): New Cultural History, University of California Press, 1989
- Allen Munslow, Deconstructing History, London, 2004.

SEMESTER: II

PAPER: 2: PRE- HISTORY OF SOUTH ASIA

Number of credits: **5**

Nature of course: **CORE**

Aim of the course: The broad aim is to make students aware about the south Asian pre-history through the field of archaeology.

Objectives of the course:

i. To know various concepts and themes related to the pre-history of South Asia.
ii. To know how men lived in this part of the world in various phases of Paleolithic and Mesolithic age.

Unite-1: Introduction

1. Prehistory: definition, scope, terminology and periodization
2. Quaternary Period: position of prehistory in geological chronology, climatic conditions
3. Prehistoric sites: type and nature of sites, landscape configuration, primary and secondary sites
4. Stone tool technology, typology, material and study of stone artefacts

Unite -2: Palaeolithic Culture

1. Lower Palaeolithic cultures: nature and significance of the technology, distribution and variation, important sites, chronology.
2. Middle Palaeolithic cultures: nature and significance of the technology, distribution and variation, important sites, chronology.
3. Upper Palaeolithic cultures: nature and significance of the technology, distribution and variation, important sites, chronology.

Unite-3: Mesolithic Culture

1. Mesolithic cultures: distribution, artefacts, technology, raw material, economy, pottery, animal domestication.
2. Important sites: Bagor, Tilwara, Langhnaj, Birbhanpur, Teri sites, Adamgarh, Bhimbetka, Sarai Nahar Rai, Mahadaha, Damdama
3. Ornaments and Rock Art

Unit-4: Current Trends in South Asian Prehistory

1. Debates related to pre-historic terminology of cultural phases.
2. The position of the Soanian in the South Asian Palaeolithic.
3. South Asian Paleolithic in the global context

Classroom strategy:

It will be a blend of formal theoretical teaching and audio-visual teaching. Presentations, assignments, discussions, quiz and brainstorming sessions will equally be employed. Wherever possible, guest lectures will also be organized.

Suggested readings:

- Allchin, F. R. and B. Allchin 1993. The Birth of Civilization in India.revised ed. New Delhi: Penguin Books.
- Chakravarty, K. K., and R. G. Bednarik. 1997. Indian Rock Art in Global Context. Delhi: Motilal Banarasidass & IGRMS.
- Dennell, R.W. 2009. Palaeolithic Settlement of Asia. Cambridge: Cambridge University Press.
- Mishra, S. 2007. The Indian Lower Palaeolithic. Bulletin of the Deccan College Postgraduate and Research Institute 66-67:47-94.
- Misra V. N., 1989. Stone Age India: an Ecological Perspective, Man and Environment 14:17–64.
- Neumayer, E. 2010. Rock Art of India. Oxford and New Delhi: Oxford University Press.
- Paddayya, K. 2008. Evolution within the Acheulian in India: A case study from the Hunsgi and Baichbal valleys, Karnataka. Bulletin of the Deccan College Postgraduate and Research Institute 66-67:95-111.
- Pal, J. N. 2002. The Middle Palaeolithic Culture of South Asia, in Indian Archaeology in Retrospect Prehistory Archaeology of South Asia Vol. I. Edited by S. Settar and R. Korisettar, Pandey, S. K. 1993. Indian Rock Art. Delhi: Aryan Books International.
- Pant, P. C.and V. Jayaswal.1991. Paisra: The Stone Age Settlement of Bihar. Delhi: Agam Kala Prakashan.
- Pappu, R. S. 2001. Acheulian Culture in Peninsular India: an Ecological Perspective. New Delhi: D.K. Printworld.
- Pappu, S., 2001. A Re-Examination of the Palaeolithic Archaeological Record of Northern Tamil Nadu, South India. Oxford: British Archaeological Reports (BAR) International Series 1003.
- Raju, D. R. 1988. Stone Age Hunter-Gatherers: An Ethnoarcheaology of Cuddapah Region, South-East India. Pune: Ravish Publishers.
- Sankalia, H. D. 1974. The Prehistory and Protohistory of India and Pakistan. Pune: Deccan College Postgraduate and Research Institute.
- Sankalia, H. D. 1977. Prehistory of India. New Delhi: Munshiram Manoharlal.

SEMESTER: II
RISE OF MODERN WEST

Number of credits: 5

Nature of course: CORE

Aim of the course: The broad aim is to make students aware about the numerous changes and continuity in Europe prior to the rise of modernism.

Objective of the course:

i. To understand the growing complex interrelationship that existed between the political, economic and socio-cultural elements.

ii. To understand the causes of the numerous changes and its repercussions.

iii. To understand its impact on the world.

UNIT 1: Age of Renaissance and Reformation:

A. Renaissance: Humanism, Rationalism, Individualism.

B. Renaissance in Art, Architecture and Painting

C. Reformation: Religion, God, Holy Book

D. Reformation in various parts of Europe and Counter-reformation

UNIT 2: Age of Geographical Discovery and Commercial Revolution:

A. Cartography, Cosmology and Navigation

B. Discovering new land: Africa, America, Asia

C. Commercial Revolution

D. Mercantilism in Theory and Practice

UNIT 3: Industrial Revolution:

A. Invention of Machines

B. Structural change in industrial production

C. Emergence of Capitalism

D. Industrialization in England and other parts of Europe

UNIT 4: The Intellectual Revolutions of 17th and 18th Centuries:

A. The Philosophical Foundations of Scientific Revolution

B. Impact of Scientific Revolution

C. The Enlightenment

D. Modernism

Classroom strategy:

It will be a blend of formal theoretical teaching and discussions. Audio-visual display, presentations, assignments, discussions, quiz and brainstorming sessions will equally be employed. Wherever possible, guest lectures may also be organized. **The 30 percent of this paper will be taught online and rest of it will be offline.**

Suggested readings:

- Burke, Peter. *The Historical Anthropology of Early Modern Italy: Essays on Perception and Communication*. Cambridge: CUP, 1987.
- Findlen, Paula (ed.). *The Italian Renaissance: The Essential Readings*. Malden, USA: Blackwell, 2002.
- Davis, Natalie Zemon. *Society and Culture in early Modern France*. Stanford: Stanford University Press, 1967.
- Ozment, Steven E. *The Reformation in the Cities: the Appeal of Protestantism to Sixteenth century Germany and Switzerland*. New Haven, USA: Yale University Press, 1975.
- Ozment, Steven E. *When Fathers Ruled: Family Life in Reformation Europe*. Cambridge: Harvard University Press, 1983.
- Wiesner, Merry E. *Women and Gender in early Modern Europe*. Cambridge: CUP, 1993.
- Ginzburg, Carlo. *The Cheese and the Worms: The Cosmos of a Sixteenth-Century Miller*. USA: Johns Hopkins University Press, 1992.
- Muir, Edward. *Ritual in Early Modern Europe*. Cambridge: CUP, 1997.
- Parry, Markvin. *An Intellectual History of Modern Europe*. Boston: Houghton Mifflin, 1992.
- Hilton, Rodney. *Transition from Feudalism to Capitalism*. London: Verso, 1976.
- Hill, Christopher. *Reformation to Industrial Revolution: 1530-1780*. London: Verso, 2018.
- Polanyi, Karl. *The Great Transformation: The Political and Economic Origins of Our Times*. Boston, MA: Beacon Press, 2001
- Smith, Adam. *Wealth of Nations*. New York : Random House, 1985
- Ricardo, David. *On the Principles of Political Economy and Taxation*. London: John Murray, 1817
- Wood, Ellen Meiksins. *The Origin of Capitalism*. London: Verso, 2017.
- Butterfield, Herbert. *The Origins of Modern Science, 1300-1800*. New York: The Free Press, 1957.
- Hall, A. Rupert. *From Galileo to Newton*. New York: Dover Publications, 1981.
- Gupta, Parthasarathi. AdunikPachim Ka Uday Devesh Vijay, Prarambhik Europe main Sanskritrik Parivartan

SEMESTER: II
MODERN WORLD, 1789-1945

Number of credits: 5

Nature of course: CORE

Aim of the course: The broad aim is to make students aware about the numerous changes and continuity at the global level with special reference to the happenings in Europe.

Objective of the course:

i. To understand the complex interrelationship that existed between the political, economic and socio-cultural elements.

ii. To understand the causes of the numerous wars and its repercussions.

iii. To understand its impact on the world.

UNIT 1: Europe during 1789-1815:

A. French Revolution

B. Jacobianism

C. Napoleonic Europe

D. Ideological and Cultural Advancements

UNIT 2: Europe during 1815-1871:

A. Concert of Europe

B. Revolution of 1830

C. Revolution of 1848

D. Unification of Germany and Italy

UNIT 3: Europe during 1871-1914:

A. Age of Bismark

B. Nationalism in Eastern Europe

C. The System of Alliances

D. Major International Crisis

UNIT 4: Europe during 1914-1945:

E. First World War- Causes, Nature and Consequences

F. League of Nations

G. Nazism and Fascism

H. Second World War- Causes, Nature and Consequences

Classroom strategy:

It will be a blend of formal theoretical teaching and discussions. Audio-visual display, presentations, assignments, discussions, quiz and brainstorming sessions will equally be employed. Wherever

possible, guest lectures may also be organized. **The 40 percent of this paper will be taught online and rest of it will be offline.**

Suggested readings:

- Israel, Jonathan Irvine. *Revolutionary Ideas: An Intellectual History of the French Revolution from the Rights of Man to Robespirre*. Princeton: Princeton University Press, 2014.
- Blanning, Timothy C. W. *The French Revolutionary Wars: 1787-1802*. Cambridge: Hodder Arnold, 1996.
- Hibbert, Christopher. *The French Revolution*. London: Penguin, 1982.
- Thomson, David. *Europe since Napoleon*. London: Penguin, 1990.
- Habsbawm, Eric. *The Age of Revolution: 1789-1848*. United Kingdom: Abacus, 1988.
- Habsbawm, Eric. *The Age of Empire: 1875-1914*. United Kingdom: Abacus, 1989.
- Bell, David A. *Napoleon: A Concise Biography*. Oxford: OUP, 2015.
- Grab, Alexander. *Napoleon and the Transformation of Europe*. London: Macmillan, 2003.
- Langer, William L. *The Rise of Modern Europe*. New York: Harper and Brothers, 1952.
- Birnie, A. An Economic History of Europe.
- Carr, E.H. *A History of Soviet Russia*. New York: Macmillan, 1952.
- Hayes, C.J.H. *The Historical Evolution of Modern Nationalism*. New York: Richard R. Smith, 1931.
- Palmer, R.R. *The Age of the Democratic Revolution: A Political History of Europe and America, 1760-1800*. Princeton: Princeton University Press, 2014.
- Ferreo, Guglielmo. *The Reconstruction of Europe; Talleyrand and the Congress of Vienna, 1814-1815*. London: Putnam, 1941.
- Evans, D.O. *Social Romanticism in France, 1830-1848*. London: Octagon Books, 1969.
- Burke, Peter. *The Historical Anthropology of Early Modern Italy: Essays on Perception and Communication*. Cambridge: CUP, 1987.
- Davis, Natalie Zemon. *Society and Culture in early Modern France*. Stanford: Stanford University Press, 1967.
- Ozment, Steven E. *When Fathers Ruled: Family Life in Reformation Europe*. Cambridge: Harvard University Press, 1983.
- Wiesner, Merry E. *Women and Gender in early Modern Europe*. Cambridge: CUP, 1993.
- Ginzburg, Carlo. *The Cheese and the Worms: The Cosmos of a Sixteenth-Century Miller*. USA: Johns Hopkins University Press, 1992.
- Muir, Edward. *Ritual in Early Modern Europe*. Cambridge: CUP, 1997.
- Parry, Markvin. *An Intellectual History of Modern Europe*. Boston: Houghton Mifflin, 1992.
- Hilton, Rodney. *Transition from Feudalism to Capitalism*. London: Verso, 1976.
- Hill, Christopher. *Reformation to Industrial Revolution: 1530-1780*. London: Verso, 2018.
- Polanyi, Karl. *The Great Transformation: The Political and Economic Origins of Our Times*. Boston, MA: Beacon Press, 2001
- Smith, Adam. *Wealth of Nations*. New York : Random House, 1985
- Ricardo, David. *On the Principles of Political Economy and Taxation*. London: John Murray, 1817
- Wood, Ellen Meiksins. *The Origin of Capitalism*. London: Verso, 2017.
- Butterfield, Herbert. *The Origins of Modern Science, 1300-1800*. New York: The Free Press, 1957.

- Hall, A. Rupert. *From Galileo to Newton*. New York: Dover Publications, 1981.
- Gupta, Parthasarathi. AdunikPachim Ka Uday
- Devesh Vijay, Prarambhik Europe main Sanskritrik Parivartan

SEMESTER: II

PAPER: 5: MEDIEVAL ISLAMIC WORLD

Number of credits: **2**

Nature of course: **GE (*compulsory*)**

Aim of the course: The broad aim is to make students aware about the genesis, growth and development of Islam in history.

Objectives of the course:

i. To know the beginning of Islam.
ii. To understand the factors responsible for their growth and development;
iii. Impact on the world.

UNIT 1: Background and emergence of Islam:

A. Geographical Condition of Arabian Peninsula
B. Social and Economic Conditions of Pre-Islamic Arabia
C. Religious and Political Conditions of Pre-Islamic Arabia
D. Life and Teachings of Prophet Muhammad.

UNIT 2: The Caliphate:

A. Causes of Expansion of Islam, Character and Achievements of Orthodox Caliphs
B. Abu Bakr
C. Umar
D. Usman& Ali

UNIT 3: Islamic State under Umayyad Dynasty:

A. Society
B. Administrative Institutions
C. Cultural Achievements
D. Decline

UNIT 4: Evolution of Islamic State under Abbasid Dynasty:

A. Society & Economy
B. Administrative Institutions
C. Cultural Achievements
D. Decline

Classroom strategy:
It will be a blend of formal theoretical teaching and audio-visual teaching. Presentations, assignments, discussions, quiz and brainstorming sessions will equally be employed. Wherever possible, guest lectures may also be organized.

Suggested readings:

- P. K. Hitti, A Short History of the Arabs

- Amir Ali, Short History of Saracenes.
- W. Muir, The Caliphate: Its Rise and Fall
- T. W. Arnold, The Caliphate
- Hussai, The Arab Administration
- Md. Sayeed, Arab kiSabhyata
- Bipin Bihari Sinha, Madhyakalin Islam
- K. P. Sahu, Islam- Udbhavaur Vikas

SEMESTER: II

PAPER: 6: CONTEMPORARY WORLD

Number of credits: **4**

Nature of course: **DCEC**

Aim of the course: The broad aim is to make students aware about the numerous changes with continuity at global levels affecting the larger landscape of the world.

Objectives of the course:

i. To understand the geo-political conditions of the world in the post second world war scenario;
ii. To understand the growth of cold war followed by American imperialism and a post modern, post-colonial world;
iii. To understand the development of various issues linked with the very survival of mankind like environmental issues.

UNIT 1: Post Second World War Scenario-Ideologies and Institutions:

A. Cold War-Historiography, Introduction, Features, Outcome; Major Political Imbroglio-US & its relation with USSR, Cuba and Vietnam; Korean Wars, Sino-Japanese, Indo-Pak War, Collapse of Berlin War.
B. NAM: Concept, Features, Results.
C. UN: Origin, Structure, Allied Bodies, Works, Evaluation.
D. WTO, NATO, LPG/Globalization.

UNIT 2: Technology and a New World:

A. Horrors of Technology-Weapons of Mass Destruction-Nuclear, Hydrogen and Bio- Weapons: Introduction, Threat, (Im) Balance, Spread; History of guns-AK 47.
B. Top 11 Innovations & their Impact: Satellites, Aeroplane, Internet & Computers, Radio & Television, Mobile Phones, Bullet Trains, Cloning and Genetic Engineering, Antibiotic, Renewal Energy, Cinematic Technology and e-Commerce,
C. Computer and Internet-Global Village, Terror/Security, Liberation/Bondage of humans.
D. History of the use of Technology in Education-Printing Press, Internet, Video Conferencing, Satellite and Television, Online Classes.

UNIT 3: Terrorism and the Modern World:

A. Meaning, Ideology, Causes, Acts, Organization and Effects.
B. Types of Terrorism-State Terrorism, Bioterrorism, Cyber terrorism, Eco terrorism, Narco terrorism, Nuclear Terrorism, Suicidal Terror; Categories of Groups-Separatists, Ethnocentric, Nationalist, Revolutionary, Political, Religious, Social, Domestic, International/Transnational.
C. History of Spread and Most Affected Areas-South Asia, Middle East, Africa and Parts of Europe; War against Terror-US-Taliban, US-Iraq.
D. Emergence of Religious Terrorism-Al Qaida, Taliban and ISIS.

UNIT 4: Idea of Development and the Question of Survival:

A. Development: Introduction, History of Development from 20^{th} to 21^{st} Century, Facets, Industries & Government vis-à-vis Common Men, Idea of sustainability.
B. Ecological and Environmental issues-Global Warming, Depletion of Natural resources, Conservation and Government Policies.

C. Political Philosophy of Modern Age & their Suitability-Democracy & Liberalism, Totalitarianism.
D. History of the Search for Alternative Ideology-Modernity, Post-Modernity.

Classroom strategy:

It will be a blend of formal theoretical teaching and discussions. Audio-visual display, presentations, assignments, discussions, quiz and brainstorming sessions will equally be employed. Wherever possible, guest lectures may also be organized.

Suggested readings:

- Gerard Chaliand and Arnaud Blin. 2007. The History of Terrorism from Antiquity to Al Qaeda.
- Mark Juergensmeyer. 2001. Terror in the Mind of God: The Global Rise of Religious Violence.
- Talal Asad. 2007. On Suicide Bombing.
- Susan Faludi. 2007. The Terror Dream: Fear and Fantasy in Post-9/11 America.
- Hoffman, Bruce (2006), *Inside Terrorism* (2nd ed). New York: Columbia University Press
- Walter Reich, Ed. Origins of Terrorism: Psychologies, Ideologies, Theologies, States of Mind (2nd Ed.)
- Natasha Miskovic and Harals Fischer, Ed. The Non Aligned Movement and the Cold War.
- Peter Dricker, Ed., IMF/ World Bank/ WTO: The Free Market Fiasco.

SEMESTER: II

PAPER: 7: HISTORY OF WORLD CINEMA

Number of credits: **4**

Nature of course: **DCEC**

Aim of the course: The broad aim is to make pupil understand the history of the inauguration of cinema on the world horizon with its growing intent, influence, glamour and potential as well as harbinger of change.

Objectives of the course:

i. To understand the gradual evolution of the technique of cinema with its far reaching consequences.
ii. To understand the growth, hold and glamour of the most popular visual medium of expression, called cinema.
iii. To understand the unpredictable journey of aesthetic, fantasy, magic, imagination treading along the path of reality.

UNIT 1: World Cinema:

A. History of the beginning: the 19th century
B. Films in early years: 1895-1915
C. Film Theory and Criticism
D. Representative cinematic movement: German Expressionism, Italian Neorealism, French New Wave, Bollywood Parallel Cinema, Third cinema

UNIT 2: Broader Forms of Cinema:

A. Short films
B. Documentary
C. Animated films
D. Cult films

UNIT 3: Cinema and Subjects:

A. Freedom of Expression and Cinema
B. Globalization and the world of cinema
C. Social Responsibility and cinema
D. Objectification and Dehumanization in Cinema.

UNIT 4: World of Cinema at a Glance:

A. History of Cinema Awards: Oscar
B. History of film studios
C. Understanding Major Cinema makers- Any Two Film Makers
D. Understanding Cinema-Any Two Films

Classroom strategy:

It will be a blend of formal theoretical teaching and discussions. Movie watching, audio-visual display, presentations, assignments, discussions, quiz and brainstorming sessions will equally be employed. Wherever possible, guest lectures may also be organized.

Suggested readings:

- Bordwell, David and Thompson, Kristin, Film Art: an Introduction, 7th ed New York: McGraw-Hill Co., 2004.
- -Cook, David A., A History of Narrative Film, 4th Ed. New York: W.W. Norton & Co., 2004.
- Andrew, Dudley The Major Film Theories: An Introduction. Oxford: Oxford University Press, 1976.
- Altman, Rick. Film/Genre. London: 1999.
- Bazin, Andre. What is Cinema? Foreword by Francois Truffaut. Berkeley: University of
- California Press, 2005.
- Boggs, Joseph M. & Petrie, Dennis W. The Art of Watching Films. 7th ed. NY: McGraw-Hill, 2008.
- Braudy, Leo & Cohen, Marshall (Eds). Film Theory and Criticism.5th ed.NY & Oxford: Oxford University Press, 1999.
- Cook, Pam. The Cinema Book. 3rd ed. London: BFI, 2007.
- Etherington-Wright, Christine & Doughty, Ruth. Understanding Film Theory. London: Palgrave, 2011.
- Andre Bazin, The Evolution of the Language of Cinema,
- Thompson Bordwell and Janet Stager, The Classical Hollywood Cinema-Film style and mode of production to 1969, Routledge 1985.
- Claudia Gorbmen, Audio-Vision, sound on screen, Columbia press, 1994.
- Introduction to documentary, Bloomington, Indiana University Press, 2001.
- A L Rees, A history of experimental film and video, Palgrave Macmillan 2011.
- Lev Manovich, The language of new media, Cambridge, MIT Press, 2001.
- Christine Gledhil n Linda Wiliams, (ed) Reventing film studies.
- J lye, Ideology and film-A brief guide, (web), 1997.
- Ira Bhaskar and Ranjani Mazumdar, Film and History.
- ----------, Introduction to Film studies.
- Saumyabrata Chaudhary and Samik Bandopadhyaya, Cultural studies and performance, Aesthetic Thought and the Concept of Performance.
- Bernard Cohn, Colonialism and its forms of arts.
- Bordwell, David and Kristin Thompson, Film Art: An Introduction Film, 9th edition (New York, M cGraw-Hill, 2009)
- Maria Pramaggiore and Tom Wallis, Film: A Critical Introduction, 3rd edition (New York and London: Pearson, 2011)
- Bordwell and Thompson, Film History: An Introduction, 3rd edition (New York: McGraw-Hill, 2009)
- R.L. Rutsky and Jeffrey Geiger (eds.), Film Analysis (New York: W. W. Norton & Company, 2005)
- Braudy, Leo and Marshall Cohen (eds.) Film Theory and Criticism: Introductory Readings, 7th edition (New York: Oxford University Press, 2009)
- Corrigan, Timothy and Patricia White, The Film Experience: An Introduction, 2nd edition (New York: Bedford/St. Martins, 2008). Corrigan, Timothy, Short Guide to Writing about Film, 8th edition (New York: Longman, 2011).
- Hayward, Susan, Cinema Studies: The Key Concepts, 3rd edition (New York and London: Routledge, 2006). Cook, Pam (ed.)
- Furstenau, Marc (ed.), Film Theory Reader: Debates & Arguments (New York and London: Routledge, 2010).

- Gibbs, John and Douglas Pye (eds.), Style and Meaning: Studies in the Detailed Analysis of
- Film (Manchester, UK: Manchester University Press, 2005).
- Gomery, Douglas and Clara Pafort-Overduin, Movie History: A Survey, 2nd edition (New York and London: Routledge, 2011).
- Monaco, James, How to Read a Film: Movies, Media, and Beyond, 4th edition (New York, Oxford University Press, 2009).
- Nichols, Bill, Engaging Cinema: An Introduction to Film Studies (New York: W. W. Norton & Company, 2010).
- Nowell-Smith, Geoffrey (ed.), Oxford History of World Cinema (New York: Oxford University Press, 1997).
- Simpson, P., Andrew U., & Shepherdson K.J. (eds.), Film Theory: Critical Concepts in Media and Cultural Studies (New York and London: Routledge, 2004).
- Stam, Robert, Film Theory: An Introduction (London: Blackwell, 2000).
- Stam, Robert & Toby Miller, Ed-Film and Theory: An Anthology, London, Blackwell, 2000.
- ----------, A Companion to film Theory, London, Blackwell, 1999.
- Gledhill, Christine& Linda Williams, Ed, Reinventing Film Studies, London, Arnold, 2000.
- Robert Allen & Douglas Gomery, Film History: Theory and Practice, NewYork, McGrow Hill, 1987.
- Jane Gaienes, Ed., Classical Hollywood Narratives: The Paradigm Wars, Duke University Press,
- 1992.

SEMESTER: II

PAPER: 8: WOMEN IN MEDIEVAL WORLD

Number of credits: **4**

Nature of course: **DCEC**

Aim of the course: The broad aim is to make pupil understand the history of the inauguration of cinema on the world horizon with its growing intent, influence, glamour and potential as well as harbinger of change.

Objectives of the course:

i. To understand the changes in the condition of women during the medieval period.
ii. To read the myths, traditions, orthodoxy and the actuality in the making of the history of women in this period.
iii. To read about their liberation/subjugation.

UNIT 1: Women in Medieval Europe-1:

A. Introduction-Historiography, Women Writers of Medieval and Modern Days.
B. Women in Renaissance and Reformation.
C. Women in 17^{th}-18^{th} Century.
D. Women and Politics-Medieval Queenship: Theory and Practice

UNIT 2: Women in Medieval Europe-2:

A. Women and Society-Family, Marriage, Sex, Body
B. Health, Medicine, Witchcraft, Religion.
C. Women and Art, Architecture, Literature.
D. Women and Work-Female Labour in Medieval Europe.

UNIT 3: Women in Medieval Islam:

A. Historiography.
B. Approaches to the Study of Women in Islam-The Holy Quran, the Hadith and the Sharia.
C. Women under the Caliphs, the Abbassid and the Ummaiyads.
D. Family, Marriage, Sex and Health.

UNIT 4: Women in Medieval Asia:

A. Historiography-Japan, China and South Asia
B. Women in Medieval Japan
C. Women in Medieval China
D. Women in Medieval South Asia

Classroom strategy:

It will be a blend of formal theoretical teaching and discussions. Audio-visual display, presentations, assignments, discussions, quiz and brainstorming sessions will equally be employed. Wherever possible, guest lectures may also be organized.

Suggested readings:

- Amt, Emilie, ed. Women's Lives in Medieval Europe: A Sourcebook. New York and London: Routledge, 1993. Baker, Derek, ed. Medieval Women. Studies in Church History: Subsidia, I. Oxford: Basil
- Blackwell, 1978.

- B. Hanawalt, Women and Work in Preindustrial Europe, Bloomington: Indiana University
- Press, 1986
- Bennett, Judith. Women in the Medieval English Countryside: Gender and Household in Brigstock before the Plague. New York and Oxford: Oxford Univ. Press, 1987.
- Clanchy, Michael T. Abelard: A Medieval Life. Oxford: Blackwell, 1997.
- Dronke, Peter. Women Writers of the Middle Ages. Cambridge: Cambridge University Press, 1984.
- Vern L. Bullough and James Brundage,Ed, In Sexual Practices and the Medieval Church, Buffalo: Prometheus Books, 1982.
- Green, Monica. The Trotula: A Medieval Compendium of Women's Medicine. Philadelphia: University of Pennsylvania Press, 2001.
- Hanawalt, Barbara. The Ties that Bound: Peasant Families in Medieval England. New York and Oxford: Oxford Univ. Press, 1986.
- Hanawalt, Barbara, ed. Women and Work in Preindustrial Europe, Bloomington: Indiana
- University Press, 1986.
- Rosmarie Morewedge, Ed, In The Role of Women in the Middle Ages,
- Herlihy, David. Opera Muliebria: Women and Work in Medieval Europe. New York: McGraw
- Hill, 1990.
- Hollister, C. Warren. Medieval Europe: A Short History. 8th ed. Boston: McGraw Hill, 1998.
- John Carmi Parsons, In Medieval Queenship, New York: St. Martin's Press, 1993.
- Johnson, Penelope. Equal in Monastic Profession: Religious Women in Medieval France.
- Chicago: University of Chicago Press, 1991.
- Leonardi, Susan J. Dangerous by Degrees: Women at Oxford and the Somerville College Novelists, New Brunswick and London: Rutgers Univ. Press, 1989.
- Constance M. Rousseau and Joel T. Rosenthal, In Women, Marriage, and Family in Medieval Christendom, Kalamazoo: Medieval Institute Publications, 1998.
- Nichols, John A., and Shank, Lillian Thomas, eds. Distant Echoes: Medieval Religious Women, Volume One. Kalamazoo: Cistercian Publications, Inc., 1984.
- Ozment, Steven. Ancestors: The Loving Family in Old Europe. Cambridge, Mass.: Harvard
- University Press, 2001.
- J. C. Parsons, Queen and Society in Thirteenth-Century England, New York: Macmillan,
- 1995.
- Parsons, John Carmi, ed. Medieval Queenship. New York: St. Martins, 1993.
- Petroff, Elizabeth. Body and Soul: Essays on Medieval Women and Mysticism. New York: Oxford University Press, 1994.C. G. Crump and E. F. Jacob, In The Legacy of the Middle Ages, Oxford: Clarendon Press,
  1926.
- Rosenthal, Joel T., ed. Medieval Women and the Sources of Medieval History. Athens and London: University of Georgia Press, 1990.
- John A. Nichols and Lillian T. Shank, In Medieval Religious Women, Volume One, Distant
- Echoes, Kalamazoo: Cistercian Publications Inc., 1984.
- Stuard, Susan Mosher, ed. Women in Medieval History and Historiography. Philadelphia: University of Pennsylvania Press, 1987.
- Wemple, Suzanne Fonay. Women in Frankish Society: Marriage and the Cloister 500-900.
- Philadelphia: University of Pennsylvania Press, 1981.
- Wilson, Katharina M., ed. Medieval Women Writers. Athens: University of Georgia Press, 1984.
- Wood, Charles T. "Queens, Queans, and Kingship: An Inquiry into Theories of Royal
  William C. Jordan et al, In Order and Innovation in the Middle Ages, Princeton: Princeton Univ. Press, 1976.
- Ahmed, Leila. 1992. Women and Gender in Islam: Historical Roots of a Modern Debate. Yale University Press.

SEMESTER: II

PAPER: 9: HISTORY OF HUMAN IDEAS

Number of credits: 4
Nature of course: DCEC
Aim of the course: It is intended to provide the students higher level understanding of the history of human ideas. The different aspects human ideas will be thoroughly examined in the light of the new researches in the mentioned field.

Objectives of the course:
i. To explore the idea of human ideas;
ii. To develop a critical understanding of the subject;
iii. To understand the process of development into different fields in the human ideas;
iv. To enlighten the students with the socio-cultural notion of human ideas.

Unit – 1: Human Ideas in Ancient Societies (Imagination to Matter)

a. Egypt and Mesopotamia
b. India (Vedic Ideas, Buddhism, Jainism, and Charvak)
c. Chinese
d. Ancient Greek and Roman (Thales to Cicero)

Unit – 2: Human Ideas in Middle Ages (Religion to Way of Life)

a. Europe
b. China
c. India
d. Japanese

Unit – 3: Human Ideas in Modern Period (Intuition-Language-Practice)

a. Francis Beacon and Rene Descartes
b. David Hume, Rousseau and Imannual Kant
c. Montesquieu, Voltaire, Thomas Paine, Hegel
d. Karl Marx, Antonio Gramsci, Henry David Thoreau, Mahatma Gandhi

Unit – 4: Post Modernism and Human Ideas (Questioning Structure)

a. Frederic Nietzsche
b. Ludwig Wittgenstein
c. Derrida
d. Michel Foucault

Classroom strategy:
The major emphasis will be on theory aspect. Hence formal lectures will be given priority. Guest lecture, too, may be arranged depending upon the requirement of the course module. Projects, assignments, discussions and tutorial classes will form part of the class room teaching of the course. Screening feature films related to the concerned topics and documentary movies may also form part of the teaching scheme.

Suggested Readings:

- Osborne, Catherine. *Presocratic Philosophy: A Very Short Introduction*. New York: Oxford
- University Press, 2004.
- Williams, Raymond. *Culture and Society, 1780-1950*. New York: Anchor Books, 1960.
- ——. *Keywords: A Vocabulary of Culture and Society*. New York: Oxford University Press,
- 1985 (1976).
- Foucault, Michel. *The Archaeology of Knowledge*. London: Routledge Classics, 2009.
- ——. *The Order of Things: An Archaeolog of the Human Sciences*. London: Routledge
- Classics, 2002.
- Wittgenstein, Ludwig. *Tractus Logico-Philosophicus*. London: Routledge, 2001.
- Wittgenstein, Ludwig. *Philosophical Investigations*. Oxford: Basil Blackwell, 1958.
- Gandhi, Mahatma. *Hind Swaraj or Indian Home Rule*. Ahmedabad: Navjivan Publishing
- House, 1970.
- Sivanand, Swami. Vedanta for Beginners. Kolkata: A Divine Life Society Publication, 1941.
- Tolstoy, Leo. *The Kingdom of God is Within You*. New York: Casell Publishing Company, 2006.
- Immanuel Kant. *An Answer to the Question "What is Enlightenment?*" 30th September,
- 1784.
- Chakrabarty, Dipesh. *Provincializing Europe: Postcolonial Thought and Historical Difference*.
- Oxford: Princeton University Press, 2000.
- Kuhn. Thomas S. *The Structure of Scientific Revolutions*. Chicago: The University of Chicago
- Press, 1962.
- Stephen, Leslie. *English Thought in the Eighteenth Century*. New York, 1881, Vol. I.
- Thoreau, Henri David. *The Duty of Civil Disobedience*. Pennsylvania: The Pennsylvania State
- University Press, 1998.
- Nietzsche, Friedrich. *Beyond Good and Evil*. Germany: 1886.
- Nietzsche, Friedrich. *On the Genealogy of Morality*. Germany: 1886.
- Paine, Thomas. *The Age of Reason*. Peterborough: Broadview Press, 2011
- Avineri, Shlomo. *The Social and Political Thought of Karl Marx*. Cambridge: CUP, 1968.
- Descartes, Rene. *Discourse on the Method*
- Rousseau, Jean Jacques. *The Social Contract*
- Rousseau, Jean Jacques. *Discourse on Inequality*. Holland: Marc – Michel Ray, 1755.

PAPER: 10- NORTHEAST INDIA: ANCIENT TO PRESENT

Number of credits: **4**

Nature of course: **DCEC**

Aim of the course: The broad aim is to make students aware about the history of Northeast India and to bring this course within mainstream history.

Objectives of the course:

i. To know the history of Northeast India.
ii. To know the academic progresses made in this field.
iii. To know about the socio-political, economic, cultural and literary history of the region.
iv. To understand the interdisciplinary historical milieu for the study of this course.

Learning outcome for students:

i. The students will be able to know about the Northeast people, culture, history and their problems and struggles.
ii. The idea of India as a nation-state will become more integral and closer to students.
iii. This will allow students to understand the importance of North-East in the lives of India.
iv. It will also help them to undo their biasness, prejudices or any non-real perception, if any, about the land, the people and the culture of north-east.

UNIT 1: Northeast: A General Introduction

A. Introduction: the land and the people
B. Culture and religion
C. Society in Northeast
D. Literary forms, heritage and identity

UNIT 2: Ancient and Medieval Northeast History:

A. Sources: Archaeological and literary
B. Polity and Society
C. Economy
D. Culture and religion

UNIT 3: Northeast during Colonial period:

A. British and the political domination
B. Northeast and freedom movement
C. Education and missionaries; Economy
D. Writings on Northeast: Colonial and Regional

UNIT 4: Northeast in the post-independent phase:

A. Constitutional integration and Central policies for inclusion
B. Voices and politics of dissent and resistance
C. External threats and security
D. Opportunities: political, commercial and cultural

Classroom strategy:

It will be a blend of formal theoretical teaching and audio-visual teaching. Presentations, assignments, discussions, quiz and brainstorming sessions will equally be employed. Wherever possible, guest lectures will also be organized.

Suggested Readings:

- Abbi BL (ed) (1984) North-East region: problems and prospects of development. CRRID, Chandigarh
- Banerjee A et al (eds) Economic planning and development of North-Eastern States. Kanishka Publishers, New Delhi
- Aggarwal KS (ed) (1999) Dynamics of identity and intergroup relations in North-East India. IIAS, Shimla
- Alemchiba M (1970) A brief historical account of Nagalan. The Naga Institute of Culture, Kohima
- K.R. Dikshit and J.K. Dikshit, North-East India: Land, People and Economy, Advances in Asian Human-Environmental Research, DOI 10.1007/978-94-007-7055-3, © Springer Science+Business Media Dordrecht 2014
- Baishya P et al (1997) Development issues of North-east India. LBS, Guwahati
- Bandopadhyay PK (2005) North-East saga. Publication Division, Govt. of India
- Banerjee AC (1943) Eastern frontier of British India, 1784–1826. Calcutta
- Barpujari HK (1977) Political history of Assam, vols 1 and 2. Govt. of Assam, Guwahati
- Barpujari HK (1986b) American missionaries and North-East India, 1836–1900. Spectrum Publications, Guwahati
- Barpujari HK (1998) North-East India: problems, policies and prospects. Spectrum Publications, Guwahati
- Barpujari HK (2003) The Nagas: the evolution of their history and administration (1832–1839). Spectrum Publications, Guwahati
- Barua H (1965) Assamese literature. NBT, Delhi
- Barua SN (1991) Tribes of Indo-Burma border. Mittal Publications, New Delhi
- Baruah AK, Dev R (2006) Ethnic identities and democracy and electoral politics in North-East India. Regency Publication, New Delhi
- Basu A, Das Gupta BK, Sarkar, J (2004) Anthropology for North-east India: a reader. Special Publication of the Indian National Confederation and Academy of Anthropologists, Indian Anthropological Society & Museum of Mankind, Kolkata
- Bhushan C (2004) The terrorism and separation in North-East India. Kalpaz Publications, Delhi
- Medhi DK (ed) Man and environment in North-East India. Omsons, Guwahati
- Biswas, Prasenjit and C. Joshua Thomas (eds.), Peace in India's North-East: Meaning, Metaphor, and Method : Essays of Concern and Commitment, Regency Publications, New Delhi, 2006
- Borthakur DN (1992) Agriculture of the North-Eastern region with special reference to hill agriculture. Beecee Prakashan, Guwahati
- Bose ML (1978) British policy in North-East frontier agency. Concept, New Delhi

- Bose ML (1979) Historical and constitutional documents of the North-east, 1824–1973 New Delhi
- Census of India (2001) Scheduled tribe atlas of India, New Delhi
- Census of India (1991) Languages, language atlas of India
- Chakraborty BC (1964) British relations with hill tribes of Assam since 1858. Firma K.L. Mukhopadhyay, Calcutta
- Chaudhuri JG (1980) Tripura: the land and its people. Leeladevi Publication, Delhi
- Chaudhury JN (1983) Arunachal Pradesh. Cosmo Publications, New Delhi
- Das G, Purkayastha RK (eds) (2000) Border trade; Northeast India and neighbouring centres. Akanksha Publishing House, New Delhi
- Dena Lal (ed) (1991) History of modern Manipur (1826–1949). Orbit Publishers, New Delhi
- Dev BJ, Lahiri DK (1987) Manipur: culture and politics. Mittal Publications, Delhi
- Elwin V (1958) Myths of North-East Frontier of India. NEFA Administration, Shillong
- Ghosh BB (1980) History of Nagaland. S. Chand & Co, New Delhi
- Gopalakrishnan R (1995) Meghalaya: land and its people. Omsons Publications, New Delhi
- Government of India (1965) NEFA. Publication Division, New Delhi
- Guha A (1977) Planter Raj to Swaraj: freedom struggle and electoral politics in Assam 1826–1947. ICHR, New Delhi
- Kabui G (1991) History of Manipur – pre colonial, vol 1. NBH, New Delhi
- Kyndiah PR (1994) Mizo freedom fighters. Sanchar Publishing House, Delhi
- Misra U (1988) Northeast India: quest for identity. (A collection of essays on socio-economic topics). Omsons Publications, Guwahati Misra U (ed) (1991) Nation building and development in North-East India. Guwahati, Purbanchal Prakash
- Nayak P (ed) (2010) Growth and human development in North-East India. OUP, New Delhi
- Sen S (1985) The tribes of Meghalaya. Mittal Publications, New Delhi
- Sen S (1987) The tribes of Nagaland. Mittal Publications, New Delhi
- Sen S (1992a) Tribes and castes of Manipur. Mittal Publications, New Delhi
- Sen S (1992b) Tribes of Mizoram: description, ethnology, bibliography. Gyan Publishing House, New Delhi
- Census reports for various decades

SEMESTER: II
PAPER: 11-HISTORY & CINEMA

Number of credits: 4

Nature of course: DCEC

Aim of the course: The broad aim is to develop a broad understanding between history and cinema and to know if cinema can be medium to read history.

Objectives of the course:

i. To know the beginning of cinema.
ii. To know the relationship that exists between history and cinema.
iii. To use cinema as a source of history to the extent possible.

Learning outcome for students:

- They will be able to appreciate the positive importance of cinema
- They will know the history of cinema
- They will be to find the relationship between cinema and history
- They may be able to use cinema as a source of history

Unit 1: The Beginning of Cinema:

A. Introduction
B. 19th century and the beginning
C. The early years and the spread of cinema

Unit 2: Cinema and History:

A. Cinema as a source: Possibility and limitation
B. Treatment of historical themes in cinema
C. Official history, Propaganda and cinema

Unit 3: Selected Historical Themes and Cinema:

A. Biographies
B. World War
C. Racism

Unit 4: Documentary, TV Shows and history:

A. Difference between documentary and cinema
B. Documentary as a source
C. Popular TV shows and historical representation

Classroom strategy:
It will be a blend of formal offline and online teaching with the necessary aid of audio-visual devices. Presentations, assignments, discussions, quiz and brainstorming sessions will equally be employed. Wherever possible, guest lectures may also be organized.

Suggested Reading:

- Cousins, Mark, The Story of Film, Pavilion, Revised edition, 2020
- Villarejo: Film Studies: The Basics, Routledge, 2006
- Turner, The Film Cultures Reader, Routledge, 2001
- Hayward, Cinema Studies: The Key Concepts, Routledge, 1996
- Burgoyne, Robert, The Epic Film in World Culture, Routledge, 2010
- Cullen, Jim, Essaying the Past: How to Read, Write and Think about History, Wiley-Blackwell, 2012
- Calahan, Vicki et.al. Reclaiming the Archive: Feminism and Film History, Wayne State University Press, 2010
- Hoffman, Hilmar, The Triumph of Propaganda: Film and National Socialism, 1933-45
- Barber, Sian, Using Film as a Source, Manchester: Manchester University Press, 2015
- Card, James, "Problems of Film History". Hollywood Quarterly 4, no. 3 (1950): 279-88.
- https://doi.org/10.2307/1209399.
- O'Connor, John E, "Image as Artifact: Historians and the Moving-Image Media." OAH Magazine of History 16, no. 4 (2002): 23-24
- Stover, John, "Framing Social Movements through Documentary Films." Contexts 12, no. 4 (2013): 56-58
- Stevenson, Brenda E, "12 Years a Slave: Narrative, History and Film." The Journal of African American History 99, no. 1-2. (2014): 106-18.
- http://doi.org/10.5323/jafriamerhist.99.1-2.0106.
- Toplin, Robert Brent, "From the Editor: Invigorating History: Using Film in the Classroom." OAH Magazine of History 16, no. 4 (2002): 5-6
- Films and Documentaries: The Birth of the nation, Triumph of the Will, Gandhi, The Pianist, 12 Years a Slave, Padmavat, India's Daughter (BBC Documentary)

SEMESTER

III

INDIAN ARCHAEOLOGY

NOTE:

1. The students are offered to opt one specialization in the final year of post-graduation.

2. It is compulsory on the part of the third semester students, who opt for Archaeology as their specialized paper, to go on a trip for archaeological excavation/exploration.

SRL NO.	COURSE CODE	COURSES	L	T	P	CREDITS	CORE/DCEC/GE
1	SAHS HA 010309 ARCH C5005	Proto History of India	5	0	0	5	CORE
2	SAHS HA 010310 ARCH C5005	Historical Archaeology of India	5	0	0	5	CORE
3	SAHS HA 010311 ARCH C5005	Indian Numismatics Up to 1200 AD	5	0	0	5	CORE
4	SAHS HA 010304 ARCH DCEC2002	Seminar Paper (Compulsory) Indian Epigraphy Up to 1200 AD	2	0	0	2	DCEC
	To be Taken from Other Department					4	
		To be Taken from the Dept. of History & Archaeology					
5	SAHS HA 010305 ARCH GE4004	Proto History of India	4	0	0	4	GE
6	SAHS HA 010306 ARCH GE4004	Indian Architecture Up to 1200 AD	4	0	0	4	GE
7	SAHS HA 010307 ARCH GE4004	Introduction to Archaeology	4	0	0	4	GE
		Select any one of the following					

		courses					
8	SAHS HA 010305 ARCH DCEC4004	Indian Architecture Up to 1200 AD	4	0	0	4	DCEC
9	SAHS HA 010306 ARCH DCEC4004	Art and Iconography	4	0	0	4	DCEC
10	SAHS HA 010307 ARCH DCEC4004	Conservation & Preservation	4	0	0	4	DCEC
11	SAHS HA 010308 ARCH DCEC4004	Antiquarian Laws	4	0	0	4	DCEC
12	SAHS HA 010309 ARCH DCEC4004	Indian Epigraphy Up to 1200 AD	4	0	0	4	DCEC
						25	Total Credit

NOTE: *One paper is to be taken from other department which will carry 4 credits.*

SEMESTER: III

PAPER: 1: PROTO -HISTORY OF INDIA

Number of credits: **5**

Nature of course: **Core**

Aim of the course: The broad aim is to acquaint students with the basic understanding of the proto history of India with all its variations and features.

Objectives of the course:

i. To explore the proto- history and to know its evolution.
ii. To develop a critical reading of the subjects.

Unit-1: Introduction

A. Proto-history: definition, scope, terminology and periodization
B. Development from Mesolithic to Neolithic culture
C. Proto-historic sites: type and nature of sites, landscape configuration

Unit-2: Neolithic Cultural Traditions

A. Neolithic cultures of Afghanistan and Baluchistan
B. Neolithic culture of Mid Ganga Basin- Lahuradewa, Jhusi etc.
C. Neolithic culture of Kashmir valley
D. Neolithic cultures of the Vindhyas
E. South Indian Neolithic
F. Eastern and North eastern Indian Neolithic

Unit-3: Harappan Civilization

A. Early Harappan Culture: origin and development, geographical distribution, extent, settlement patterns, regional variation (Kulli, Nal, Amri, Kot Diji, Hakra, Ravi, Sothi-Siswal, Padri, Pre-Prabhas, Anarta)
B. Matura Harappan Culture: extent, town planning, architecture, trade, economy, technology, script, art, socio political and religious organization.
C. Late Harappan Culture: geographical distribution, salient features and various theories of decline.

Units-4: Iron Age and Chalcolithic Cultures

A. Ochre Coloured Pottery culture: distribution pattern, characteristic features, chronology, relation to copper hoardes.
B. Painted Grey Ware culture: distribution pattern, characteristic features, chronology, relation to late Harappan culture.
C. Megalithic cultures of India: distribution pattern, different types of megaliths, characteristic features.
D. Chalcolithic cultural tradition: Kaytha, Ahar, Malwa, Jorwe.

Classroom strategy:

The major emphasis will be on theory aspect. Hence formal lectures will be given priority. However, Field surveys and practical information too will form part of wider understanding. Guest lecture, too, may be arranged depending upon the requirement of the course module. Projects, assignments, discussions and tutorial classes will form part of the class room teaching of the course.

Suggested Readings:

- Agrawal, D. P. 2000. Ancient Metal Technology and Archaeology of South Asia (A Pan Asian Perspective), Aryan Books International, New Delhi
- Agrawal D. P. 2007. Indus Civilization: An Interdisciplinary Perspective, New Delhi, Aryan Books International, New Delhi.
- Agrawal, D. P. and D. K. Chakrabarti (eds.). 1979. Essays in Indian Protohistory. New Delhi: D.K Publishers.
- Allchin, F. R. and B. Allchin 1993. The Birth of Civilization in India. Revised ed. New Delhi: Penguin Books.
- Deo, S.B. 1979. Problem of South Indian Megaliths. Dharwad: Karnataka University.
- Haimendorf, C. von. F. 1945. The Problem of Megalithic Cultures in Middle India. Man in India XXV: 73 86.
- Lal, B. B. 2000. The Saraswati Flows on. New Delhi: Aryan Books.
- Lal, Makhan. 1984. Settlement History and the Rise of Civilization in the Ganga Yamuna Doab. New Delhi: B.R Publishing House.
- Moorti, U. S. 1994. Megalithic Cultures of South India: Socio Economic Perspectives. Varanasi: Ganga Kaveri.
- Parmar Narender 2014. Origin, Development and Decline of the First Urbanization in the Upper Saraswati Basin. Heritage: Journal of Multidisplinary Studies in Archaeology 2: 862-882
- Possehl, G. L. 1979 (ed.). 1979. Ancient Cities of the Indus. New Delhi: Vikas Publishing House.
- Possehl, G. L. (ed.). 1993. Harappan Civilization A Recent Perspective. New Delhi: Oxford and IBH Publishing Co.
- Possehl, G. 1999. The Indus Age. New Delhi: Oxford.
- Sankalia, H. D. 1974. Pre and Protohistory of India and Pakistan. Pune: Deccan College.
- Shinde, Vasant. 1989. New Light on the Origin, Settlement System and Decline of the Jorwe Culture of the Deccan, India South Asian Studies 5:60 72
- Shinde, Vasant. 1998. Early Farming Community in the Central Tapi Basin (Study of Settlement and Subsistence Patterns), Munshiram Manoharlal Publishers, New Delhi
- Singh, Purushottam. 1991. Neolithic Origins. New Delhi: Agam Kala Prakashan.
- Tripathi, Vibha. 1976. The Painted Grey Ware: An Iron Age Culture of Northern India. Delhi: Concept.
- Tripathy, V i b h a . 2001. Age of Iron in South Asia: Legacy and Tradition, Aryan Books International, New Delhi.
- Wheeler, R. E. M. 1968. Indus Civilization. (Third Edition). Cambridge: Cambridge University Press.

SEMESTER: III

PAPER: 2: HISTORICAL ARCHAEOLOGY

Number of credits: **5**

Nature of course: **Core**

Aim of the course: The broad aim is to acquaint students with the basic understanding of the historical archaeology-as a concept and as a full -fledged subject matter.

Objectives of the course:

i. To explore the word historical archaeology.
ii. To find - out its importance and its reading in Indian context.

Unit-1: Introduction

A. Historical Archaeology: Definition and scope.
B. Literary tradition and archaeology
C. Ceramic assemblage: northern black polished ware, black and red ware, red polished ware, rang mahal ware, rouletted ware, russet coated ware,

Unit-2: Pre Mauryan Period and Mauryan Period

A. Brief review of archaeology of pre-Mauryan period from 6th century B.C. to 4th century B.C. and contemporary cultural assemblage including potteries of the sub-continent.
B. Technology and elements of economy – historical urbanization.
C. Archaeology of Mauryan period: NBP and other contemporary wares, use of scripts and other salient elements: late 4th century B.C. to 2nd century B.C.

Unit-3: Post Mauryan Period:

A. Archaeology of the Kushan period and other contemporary dynasties (2nd century B.C. to end of 3rd century A.D.).
B. Archaeology of the Guptas period and other contemporary dynasties (4th century A.D. to 6th century A.D.).
C. Archaeology of 7th century A.D. to 8th century A.D. in different regions.

Unit-4: Cultural Sequence of Important Sites:

A. Hastinapur, Taxila, Ahichchhatra, Purana Qila, Thanesar (Harsha-ka-Tila), Rajghat, Rajgir, Sisupalgarh, Adam, Nagarjunakonda, Arikamedu and Chandraketugarh

Classroom strategy:

The major emphasis will be on theory aspect. Hence formal lectures will be given priority. Guest lecture, too, may be arranged depending upon the requirement of the course module. Projects, assignments, discussions and tutorial classes will form part of the class room teaching of the course.

Suggested readings:

- Allchin, R. 1995. The Archaeology of Early Historic South Asia The Emergence of Cities and States. Cambridge University Press.

- Dhavalikar, M. K. 1999. Historical Archaeology of India. New Delhi: Books and Books.
- Dymond, D. P. 1974. Archaeology and History: A Plea for Reconciliation. London: Thames and Hudson.
- Ghosh, A. 1973. City in Early Historical India. Simla: Indian Institute for Advanced Studies.
- Lahiri, Nayanjot and others. 2002. Historical archaeology of India: an outline of the work of the Archaeological Survey of India, in S. Settar and R. Korisettar (ed.) Indian Archaeology in Retrospect: Archaeology and Historiography, pp.71 115. New Delhi: ICHR and Manohar.
- Lal, Makkan 1984. Settlement History and the Rise of Civilization in the Ganga Yamuna Doab.
- New Delhi: B.R. Publishing House. 91
- Ray, Amita and S. Mukherjee (ed.) 1990. Historical Archaeology of India. New Delhi: Books and Books.
- Roy, T. N. 1983. The Ganges Civilization: a Critical Study of the PGW and NBPW Periods of the Ganga Plains of India. New Delhi: Ramanand Vidya Bhavan.
- Schuyler, R. L. 1978 Historical Archaeology: A Guide to Substantive and Theoretical Contributions. New York: Baywood Publishing Company.
- Sharma, R. S. 1987 Urban Decay in India 300 to 1000 A.D). New Delhi: Munshiram Manoharlal.
- Sharma, Y. D.1953 Exploration of Historical Sites. Ancient India 9:116 169.
- South, S. 1977 Method and Theory in Historical Archaeology. New York: Academic Press.

SEMESTER: III

PAPER: 3: INDIAN NUMISMATICS

Number of credits: **5**

Nature of course: **Core**

Aim of the course: The broad aim is to acquaint students with the basic understanding of numismatics in Indian context and also its growth, features and variations in different ages.

Objectives of the course:

i. To understand numismatics as a major theme and source for the study of history.
ii. To know the origin, features, techniques etc. in Indian context.

Unit-1: Introduction

A. Numismatics: Definition and historical importance
B. Origin and antiquity of coinage in India
C. Metal content of coins, weight and shape
D. Technique of minting coins: Punch-marked, cast, die-struck and mints

Unit-2: Early Indian Coins:

A. Punch-marked coins: distribution, symbols, chronology, metrology
B. Tribal coins: Yaudheyas, Agras and Kunidas.
C. Indo-Greek coins: distribution, salient features, coins type of Strato-I and Menander

Unit-3: Post Mauyran Coins

A. Kushanas coins: distribution, general features, symbols, coins type of Kujula Kadphises, Wima Kadphises and Kanikasya
B. Satavahana coins: distribution, symbols, general features coins type of Sri Satakarni, Gautamiputra Satakarni and Vasisthiputra Pulumavi.
C. Gupta coins: general features of gold coins, metrology, foreign influence, distribution and symbols,

Unit-4: Post Gupta Coins:

A. Huna coins: distribution, symbols, salient features
B. Indo-Sassanian (Gadhaiya) coins: distribution, symbols, salient features
C. Rajput coins: Tomara, Pratihara, Parmar and Chahmana

Classroom strategy:

The major emphasis will be on theory aspect. Hence formal lectures will be given priority. Guest lecture, too, may be arranged depending upon the requirement of the course module. Projects, assignments, discussions and tutorial classes will form part of the class room teaching of the course.

Suggested readings:

- Allan, J. 1935. Catalogue of Coins of Ancient India. London: British Museum

- Altekar, A. S., 1937. Catalogue of Coins of the Gupta Empire. Varanasi: Numismatic Society of India.
- Chattopadhyaya, Bhaskar 1967. The Age of the Kushanas – A Numismatic Study. Calcutta: Punthi Pustak.
- Dasgupta, K. K. 1974. A Tribal History of Ancient India – A Numismatic Approach. Calcutta: Nababharat Pablications.
- Datta, Mala 1990. A Study of the Satavahana coinage. Delhi: Harman Publishing House.
- Handa, Devendra 2007. Tribles Coins of Ancient India. New Delhi: Aryan Books International.
- Gardener, P. 1886. The Coinage of the Greek and Scythic Kings of Bactria and India in British Museum. London: British Museum.
- Gokhale, Shobhana 1981. New Discoveries in the Satavahana Coinage, JNSI vol. XLIII: 54-59.
- Goyal, S. R. 1995. Dynastic Coins of Ancient India. Jodhpur: Kusumanjali Book World.
- Gupta, P. L. 1979. (2nd Revised Edition) Coins. New Delhi: National Book Trust.
- Gupta, P. L. and Sarojini Kulashreshtha 1993. Kushana Coins and History. New Delhi: D.K.
- Publishers.
- Gupta, P. L. and T.R. Hardaker 1985. Ancient Indian Silver Punch-Marked Coins of the Magadha–Maurya Karshapana Series. Nasik: Indian Institute of Research in Numismatic Studies.
- Jha, Amiteshwar and Dilip Rajgor 1994. Studies in the Coinage of Western Kshatrapas. Anjaneri: Indian Institute of Research in Numismatic Studies. Journal of the Numismatic Society of India, Varanasi.
- Lahiri, A. N. 1965. Corpus of Indo-Greek Coins. Calcutta:
- Rajgor, Dilip 2001. Punch-Marked Coins of Early Historic India. California: Reesha Books
- International.
- Sahni, Birbal 1973. The Technique of Casting Coins in Ancient India. Varanasi: Bharatiya
- Publishing House.
- Sarma, I.K. 1980. Coinage of the Satavahana Empire. Delhi: Agam Kala Prakashan.
- Shastri, A. M. (Ed.) 1972. Coinage of Satavahanas and Coins from Excavations, Nagpur: Nagpur University.
- Srivastava, A. K. 1969. Catalogue of Indo-Greek Coins in the State Museum, Lucknow. Lucknow: State Museum.

SEMESTER: III

PAPER: 4: INDIAN EPIGRAPHY UP TO 1200 AD

(*SEMINAR PAPER-Compulsory*)

Number of credits: **2**

Nature of course: **DCEC**

Aim of the course: The broad aim is to acquaint students with the basic understanding of epigraphy in Indian context and also its growth, features and variations in different ages.

Objectives of the course:

i. To understand epigraphy as a major theme and source for the study of history.
ii. To know the origin, features, techniques etc. in Indian context.

Unit-1: Introduction

A. Epigraphy and historical reconstruction
B. Origin and antiquity of writing in India
C. Origin and development of Brahmi and Kharoshthi scripts
D. Eras and Dates in Indian inscriptions: kali, vikrama, saka, gupta

Unit-2: Mauyran Inscription

A. Asokan Rock Edict II (Girnar)
B. Asokan Rock Edict XII (Girnar)
C. Asokan Rock Edict XIII (Shahbazgarhi)
D. Rummindei Piller Inscription of Asoka

Units-3: Post-Mauyran Inscription

A. Hathigumpha Inscription of Kharavela
B. Sarnath Buddhist Image Inscription of Kanishka I
C. Nasik Inscription of Vasishthputra Pulumavi
D. Girnar Rock Inscription of Rudradaman I

Unit-4: Gupta and Post Gupta Inscription

A. Allahabad Pillar Inscription of Samudragupta
B. Bhitari Pillar Inscription of Skandagupta
C. Aihole Inscription of Pulakesin II
D. Gwalior Inscription of Mihirabhoja

Classroom strategy:

The major emphasis will be on theory aspect. Hence formal lectures will be given priority. Guest lecture, too, may be arranged depending upon the requirement of the course module. Projects, assignments, discussions and tutorial classes will form part of the class room teaching of the course.

Suggested readings:

- Allchin, F. R. and K. R. Norman 1985. Guide to the Ashokan Inscriptions, South Asian Studies, I: 49-50.
- Bhandarkar, D. R. 1981. Inscriptions of the Early Gupta Kings (Bahadurchand Chhabra and Govind Swamirao Gai eds.). Corpus Inscriptionum Indicarum vol. III. New Delhi: Archaeological Survey of India.
- Bühler, George 1898. On the Origin of Indian Brahma Alphabet. Strassburg: Karl J. Trubner.
- Bühler, George 1959. Indian Palaeography. Calcutta: Indian Studies.
- Dani, Ahmad Hasan 1963. Indian Palaeography, Oxford: Clarendon Press. Epigraphia Indica
- 1892-1940.Vol. 1- XXV, Archaeological Survey of India.
- Goyal, S. R. 2005. Ancient Indian Inscriptions. Jodhpur: Kusumanjali Book World.
- Mangalam, S. J. 1990. Kharoshti Script. Delhi: Eastern Book Linkers.
- Mehendale, M. A. 1948. Asokan Inscriptions in India (Linguistic Study together with Exhaustive Bibliography). Bombay: University of Bombay.
- Mirashi, V. V. 1981. The History and Inscriptions of the Satavahanas and the Western
- Kshatrapas. Bombay: Maharashtra State Board of Literature and Culture.
- Pandey, R. 1957. Indian Palaeography. Delhi: Motilal Banarasidas.
- Ramesh, K. V. 1984. Indian Epigraphy. Delhi: Sundeep Prakashan.
- Salomon, Richard 1998. Indian Epigraphy. New Delhi: Munshiram Manoharlal Publishers Pvt. Ltd.
- Shastri, A. M. 1996-97. Some Observations on the Origin and Early History of the Vikrama Era, Prachya Pratibha, vol. XVIII: 1-51.
- Shastri, A. M. 1966. The Saka Era, Panchal, vol. 9: 109-132.
- Sircar, D. C. 1965. Indian Epigraphy. Delhi: Motilal Banarasidas.

SEMESTER: III

PAPER: 5: PROTO -HISTORY OF INDIA

Number of credits: **4**

Nature of course: **GE**

Aim of the course: The broad aim is to acquaint students with the basic understanding of the proto history of India with all its variations and features.

Objectives of the course:

i. To explore the proto- history and to know its evolution.
ii. To develop a critical reading of the subjects.

Unit-1: Introduction

A. Proto-history: definition, scope, terminology and periodization
B. Development from Mesolithic to Neolithic culture
C. Proto-historic sites: type and nature of sites, landscape configuration

Unit-2: Neolithic Cultural Traditions

A. Neolithic cultures of Afghanistan and Baluchistan
B. Neolithic culture of Mid Ganga Basin- Lahuradewa, Jhusi etc.
C Neolithic culture of Kashmir valley
D Neolithic cultures of the Vindhyas
E. South Indian Neolithic
F. Eastern and North eastern Indian Neolithic

Unit-3: Harappan Civilization

A. Early Harappan Culture: origin and development, geographical distribution, extent, settlement patterns, regional variation (Kulli, Nal, Amri, Kot Diji, Hakra, Ravi, Sothi-Siswal, Padri, Pre-Prabhas, Anarta)
B. Matura Harappan Culture: extent, town planning, architecture, trade, economy, technology, script, art, socio political and religious organization.
C. Late Harappan Culture: geographical distribution, salient features and various theories of decline.

Units-4: Iron Age and Chalcolithic Cultures

A. Ochre Coloured Pottery culture: distribution pattern, characteristic features, chronology, relation to copper hoardes.
B. Painted Grey Ware culture: distribution pattern, characteristic features, chronology, relation to late Harappan culture.
C. Megalithic cultures of India: distribution pattern, different types of megaliths, characteristic features.
D. Chalcolithic cultural tradition: Kaytha, Ahar, Malwa, Jorwe.

Classroom strategy:

The major emphasis will be on theory aspect. Hence formal lectures will be given priority. However, Field surveys and practical information too will form part of wider understanding. Guest lecture, too, may be arranged depending upon the requirement of the course module. Projects, assignments, discussions and tutorial classes will form part of the class room teaching of the course.

Suggested Readings:

- Agrawal, D. P. 2000. Ancient Metal Technology and Archaeology of South Asia (A Pan Asian Perspective), Aryan Books International, New Delhi
- Agrawal D. P. 2007. Indus Civilization: An Interdisciplinary Perspective, New Delhi, Aryan Books International, New Delhi.
- Agrawal, D. P. and D. K. Chakrabarti (ed) 1979. Essays in Indian Protohistory. New Delhi: D.K Publishers.
- Allchin, F. R. and B. Allchin 1993. The Birth of Civilization in India. Revised ed. New Delhi: Penguin Books.
- Deo, S.B. 1979. Problem of South Indian Megaliths. Dharwad: Karnataka University.
- Haimendorf, C. von. F. 1945. The Problem of Megalithic Cultures in Middle India. Man in India XXV: 73 86.
- Lal, B. B. 2000. The Saraswati Flows on. New Delhi: Aryan Books.
- Lal, Makhan. 1984. Settlement History and the Rise of Civilization in the Ganga Yamuna Doab. New Delhi: B.R Publishing House.
- Moorti, U. S. 1994. Megalithic Cultures of South India: Socio Economic Perspectives. Varanasi: Ganga Kaveri.
- Parmar Narender 2014. Origin, Development and Decline of the First Urbanization in the Upper Saraswati Basin. Heritage: Journal of Multidisplinary Studies in Archaeology 2: 862-882
- Possehl, G. L. 1979 (ed.). 1979. Ancient Cities of the Indus. New Delhi: Vikas Publishing House.
- Possehl, G. L. (ed.). 1993. Harappan Civilization A Recent Perspective. New Delhi: Oxford and IBH Publishing Co.
- Possehl, G. 1999. The Indus Age. New Delhi: Oxford.
- Sankalia, H. D. 1974. Pre and Protohistory of India and Pakistan. Pune: Deccan College.
- Shinde, Vasant. 1989. New Light on the Origin, Settlement System and Decline of the Jorwe Culture of the Deccan, India South Asian Studies 5:60 72
- Shinde, Vasant. 1998. Early Farming Community in the Central Tapi Basin (Study of Settlement and Subsistence Patterns), Munshiram Manoharlal Publishers, New Delhi
- Singh, Purushottam. 1991. Neolithic Origins. New Delhi: Agam Kala Prakashan.
- Tripathi, Vibha. 1976. The Painted Grey Ware: An Iron Age Culture of Northern India. Delhi: Concept.
- Tripathy, Vibha. 2001. Age of Iron in South Asia: Legacy and Tradition, Aryan Books International, New Delhi.
- Wheeler, R. E. M. 1968. Indus Civilization. (Third Edition). Cambridge: Cambridge University Press.

SEMESTER: III

PAPER: 6: INDIAN ARCHITECTURE UP TO 1200 AD

Number of credits: **4**

Nature of course: **GE**

Aim of the course: The broad aim is to acquaint students with the growth, features, styles and regional variations in the field of Indian architecture.

Objectives of the course:

i. To understand the process of the evolution of Indian architecture.
ii. To know the origin, features, styles, buildings, art etc. in Indian context.

Unit-1: Traditions of Architecture in India

A. Introduction to components of Architecture
B. Protohistoric architecture with emphasis on Harappan town planning
C. Building the rule of the early Mauryan dynasty: wooden origins
D. Sources of Inspiration of Mauryan Architecture: Foreign and Indigenous.

Unit 2 Emergence and Development of Structural Stupa Architecture

A. Origin of Stupa Architecture -Theoretical aspects.
B. Stupa Architecture - Pre-Mauryan and Mauryan period.
C. Study of important stupa: Sanchi, Bharut Amravati, Nagarjunkonda and Taxila
D. Structural monasteries and Chaityas.

Unit 3 Emergence and Development of Rock-cut Architecture

A. Origin of Rock-cut Architecture-Theoretical aspects.
B. Study of important rock cut cave: Barabar Hills, Udaygiri, Khandagiri, Karle, Bhaje, Kanheri and Ajanta
C. Hindu rock-cut caves at Elephanta and Udaygiri.
D. Study of Rock-cut Architecture-Practical Training of Plan drawing.

Unit 4 Emergence and Development of Temple Architecture

A. Origin of Temple Architecture- Theoretical aspects.
B. Archaeological remains of structural temples.
C. Style of Temple Architecture: Nagara, Dravida and Vesara
D. Evolution of the Temple Architecture.

Classroom strategy:

The major emphasis will be on theory aspect. Hence formal lectures will be given priority. Guest lecture, too, may be arranged depending upon the requirement of the course module. Projects, assignments, discussions and tutorial classes will form part of the class room teaching of the course.

Suggested readings:

- Barua, B. 1934-37. Barhut Vol.I-III. Calcutta: Indian Research Institute.

- Behrend, Kurt A.2004. The Buddhist Architecture of Gandhara. Leiden: Brill.
- Brown, Percy 1940. Indian Architecture (Buddhist and Hindu Periods). Bombay: D.B. Taraporevala Sons and Co.
- Chandra, Pramod (ed) 1975. Studies in Indian Temple Architecture. New Delhi: American
- Institute of Indian Studies.
- Cunningham, Alexander 1965. The Stupa of Bharhut. Varanasi: Indological Book Corporation.
- Dallapiccola, L., S. Z. Lallemant. 1980. The Stupa: Its Religious, Historical, and Architectural
- Significance.Wiesbaden: Franz Steiner Verlag.
- Dehejia, Vidya 1972. Early Buddhist Rock Temples A chronological Study. London: Thames and Hudson.
- Deva, Krishna 1995. Temples of India (2 vols.) New Delhi: Aryan Books International.
- Dhaky, M. A. 2005. The Indian Temple Traceries. New Delhi: D.K. Printworld (P) Ltd.
- Fergusson, James and James Burgess 2000 (reprint). The Cave Temples of India. New Delhi: Munshiram Manoharlal.
- Ghosh, A. 1974. Jaina Art and Architecture (Vol 1-3), New Delhi: Bharatiya Jnanapith
- Gupta, S. P. (ed.). 2003. Kushana Sculptures from Sanghol. New Delhi: National Museum.
- Hawkes, J. and Akira Shimada (eds.) 2009. Buddhist Stupas in South Asia. New Delhi: Oxford University Press.
- Huntington, Susana. L. with John Huntington 1985. The Art and Architecture of India. New York: Weatherhill.
- Kala, S. C. 1951. Bharhut Vedika. Allahabad: Municipal Museum.
- Mitra, Debla 1971. Buddhist Monuments. Calcutta: Sahitya Samsad.
- Nagaraju, S. 1981. Buddhist Architecture of Western India. New Delhi: Agam Kala Prakashan.
- Roy, Anamika 1994. Amravati (2 vols.). New Delhi: Agam Kala Prakashan.
- Sarkar, H. 1966. Studies in Early Buddhist Architecture of India. New Delhi: Munshiram
- Manoharlal.
- Tadgell, Christopher 1995. The History of Architecture in India. London: Phaidon Press Ltd.
- Tripathi, Aruna 2003. Buddhist Art of Kosambi. New Delhi: D.K. Printworld.
- Williams, Joanna 1982. The Art of Gupta Indian-Empire and Province. New Jersey: Princeton University Press.

SEMESTER: III

PAPER: 7: INTRODUCTION TO ARCHAEOLOGY

Number of credits: **4**

Nature of course: **GE**

Aim of the course: The broad aim is to acquaint general students with the basic understanding of the subject matter of archaeology as an autonomous and important part of history, its technical dimensions and uncovering it layer by layer.

Objectives of the course:

i. To explore the term archaeology and to know its scientific beginning;
ii. To develop a critical reading of the subject;
iii. To know the philosophy of the subject; and
iv. To explore the technical aspects of it;
v. To understand the subject with the aid of other natural and social sciences.

UNIT 1: Introduction to Archaeology

1. Archaeology: definition, scope, relevance
2. Relation with history and science
3. Terms in archaeology: culture assemblage

UNIT 2: History of Archaeology

1. The background: from antiquarianism to modern archaeology
2. History of archaeology in colonial India: from 18th century to 1947
3. Archaeology in Independent India: contribution of institutions and individuals

UNIT 3: Methods of Data Retrieval

1. Field discoveries: aims and methods of Explorations; Chance discoveries; Map and satellite image studies; village to village survey, salvage archaeology, geophysical methods, sampling methods, photogrammetry, geographical Information System .
2. Unearthing the sites: planning excavations; layout; techniques of Excavations –Vertical; Horizontal, tools and equipments.
3. Excavation of sites: habitation, rock-shelter, prehistoric sites, burial and stupa etc.
4. Methods of recording the contexts of excavated remains; preparation of sections and plans, role of stratigraphy, three dimensional recording, site formation processes, retrieval of botanical and other non-artefactual remains: floatation technique, soil analysis, sample collection of various materials.

UNIT 4: Chronology and Dating Methods

1. Stratigraphy: Principles of stratification, factors and process of formation of layers, Identification and recording of strata, Reconstruction of cultural sequence
2. Determining the chronology and periods of the excavated remains

3. Other methods of Relative chronology: Typology, Statistical studies

4. Absolute methods of dating: Radiocarbon, Potassium-argon, Thermoluminiscence, Pollen analysis, Fluorine test, Obsidian hydration, Dendrochronology

Classroom strategy:

The major emphasis will be both on theory as well as practical aspects. Besides the formal lectures, the field survey and practical training will be duly focused upon. Guest lecture, too, may be arranged depending upon the requirement of the course module. Projects, assignments, discussions and tutorial classes will form part of the class room teaching of the course.

Suggested readings:

- Aitken, M. J. 1990. Science based Dating in Archaeology. London: Longmans.
- Atkinson, R. J. C. 1953. Field Archaeology. London: Methuen and Co.
- Barker, P. 1982. Techniques of Archaeological Excavation. London: Batsford.
- Binford, L. R. 1964. A Consideration of Hypothetical Research Design, American Antiquity.
- Bintliff, John. 2004. A companion to Archaeology. U.K.: Blackwell.
- Chakrabarti, D. K. 1988 A History of Indian Archaeology: From the Beginning to 1947, New Delhi: Munsiram Manoharlal.
- Crawford, O. G. S. 1953. Archaeology in the Field. London: Phoenix.
- Dancey, W. S. 1985. Archaeological Field Methods: An Introduction. New Delhi: Surjeet Publications.
- Harris, E. C. 1979. Principles of Archaeological Stratigraphy. London: Academic Press.
- Hester, T., Heizer, R. E. and J. A. Graham. 1975. Field Methods in Archaeology. Palo Alto (California): Mayfield Press.
- Johnson, Matthew 2007 Archaeological Theory: An Introduction. Blackwell Publishing
- Rajan, K. 2002. Archaeology. Tanjavur: Mannop Publishers.
- Renfrew, Colin and Paul Bahn 2006 Archaeological: Theories and Methods and Practice.
- Wheeler, R. E. M. 1954. Archaeology from the Earth. Harmondsworth: Penguin Books.

SEMESTER: III

PAPER: 8: INDIAN ARCHITECTURE UP TO 1200 AD

Number of credits: 4

Nature of course: DCEC

Aim of the course: The broad aim is to acquaint students with the growth, features, styles and regional variations in the field of Indian architecture.

Objectives of the course:

i. To understand the process of the evolution of Indian architecture.
ii. To know the origin, features, styles, buildings, art etc. in Indian context.

Unit-1: Traditions of Architecture in India

A. Introduction to components of Architecture
B. Protohistoric architecture with emphasis on Harappan town planning
C. Building the rule of the early Mauryan dynasty: wooden origins
D. Sources of Inspiration of Mauryan Architecture: Foreign and Indigenous.

Unit 2 Emergence and Development of Structural Stupa Architecture

A. Origin of Stupa Architecture -Theoretical aspects.
B. Stupa Architecture - Pre-Mauryan and Mauryan period.
C. Study of important stupa: Sanchi, Bharut Amravati, Nagarjunkonda and Taxila
D. Structural monasteries and Chaityas.

Unit 3 Emergence and Development of Rock-cut Architecture

A. Origin of Rock-cut Architecture-Theoretical aspects.
B. Study of important rock cut cave: Barabar Hills, Udaygiri, Khandagiri, Karle, Bhaje, Kanheri and Ajanta
C. Hindu rock-cut caves at Elephanta and Udaygiri.
D. Study of Rock-cut Architecture-Practical Training of Plan drawing.

Unit 4 Emergence and Development of Temple Architecture

A. Origin of Temple Architecture- Theoretical aspects. B.
Archaeological remains of structural temples.
C. Style of Temple Architecture: Nagara, Dravida and Vesara
D. Evolution of the Temple Architecture.

Classroom strategy:

The major emphasis will be on theory aspect. Hence formal lectures will be given priority. Guest lecture, too, may be arranged depending upon the requirement of the course module. Projects, assignments, discussions and tutorial classes will form part of the class room teaching of the course.

Suggested readings:

- Barua, B. 1934-37. Barhut Vol.I-III. Calcutta: Indian Research Institute. Behrend, Kurt A.2004. The Buddhist Architecture of Gandhara. Leiden: Brill.

- Brown, Percy 1940. Indian Architecture (Buddhist and Hindu Periods). Bombay: D.B. Taraporevala Sons and Co.
- Chandra, Pramod (ed) 1975. Studies in Indian Temple Architecture. New Delhi: American
- Institute of Indian Studies.
- Cunningham, Alexander 1965. The Stupa of Bharhut. Varanasi: Indological Book Corporation. 34
- Dallapiccola, L., S. Z. Lallemant. 1980. The Stupa: Its Religious, Historical, and Architectural Significance.Wiesbaden: Franz Steiner Verlag.
- Dehejia, Vidya 1972. Early Buddhist Rock Temples A chronological Study. London: Thames and Hudson.
- Deva, Krishna 1995. Temples of India (2 vols.) New Delhi: Aryan Books International.
- Dhaky, M. A. 2005. The Indian Temple Traceries. New Delhi: D.K. Printworld (P) Ltd.
- Fergusson, James and James Burgess 2000 (reprint). The Cave Temples of India. New Delhi: Munshiram Manoharlal.
- Ghosh, A. 1974. Jaina Art and Architecture (Vol 1-3), New Delhi: Bharatiya Jnanapith
- Gupta, S. P. (ed.). 2003. Kushana Sculptures from Sanghol. New Delhi: National Museum.
- Hawkes, J. and Akira Shimada (eds.) 2009. Buddhist Stupas in South Asia. New Delhi: Oxford University Press.
- Huntington, Susana. L. with John Huntington 1985. The Art and Architecture of India. New York: Weatherhill.
- Kala, S. C. 1951. Bharhut Vedika. Allahabad: Municipal Museum.
- Mitra, Debla 1971. Buddhist Monuments. Calcutta: Sahitya Samsad.
- Nagaraju, S. 1981. Buddhist Architecture of Western India. New Delhi: Agam Kala Prakashan.
- Roy, Anamika 1994. Amravati (2 vols.). New Delhi: Agam Kala Prakashan.
- Sarkar, H. 1966. Studies in Early Buddhist Architecture of India. New Delhi: Munshiram Manoharlal.
- Tadgell, Christopher 1995. The History of Architecture in India. London: Phaidon Press Ltd.
- Tripathi, Aruna 2003. Buddhist Art of Kosambi. New Delhi: D.K. Printworld.
- Williams, Joanna 1982. The Art of Gupta Indian-Empire and Province. New Jersey: Princeton University Press.

PAPER: 9 : ART AND ICONOGRAPHY

Number of credits: **4**

Nature of course: **DCEC**

Aim of the course: The broad aim is to acquaint students with the growth of art and iconography in India.

Objectives of the course:

i. To understand the process of the evolution of Indian art and iconography.
ii. To know the features, styles and also the socio-economic and religious influences behind it.

Unit-1: Early Indian Art Tradition

A. Art in prehistoric India
B. Art in protohistoric India – sculpture in diverse mediums, paintings and other works of art.
C. Art tradition in pre Mauryan and Mauryan period: stone, terracotta, stucco, bone, ivory, metal etc.

Unit-2: Post Mauryan Art Tradition

A. Sunga and Satavahana art tradition:
B. Kushana art: schools of art Mathura and Gandhara.
C. Gupta art: schools of art Mathura and Sarnath.
D. Art traditions of Vakataka, Pallava, Chalukya, and Rashtrakuta

Unit-3: Hindu Iconography

A. Emergence and development of Iconography of Vishnu: Sadharan murtis, incarnations, other important representations of Vishnu, Regional traits of Vaishnava iconography
B. Emergence and development of Iconography of Shiva: Anugraha murtis, Samhara murtis, Vishesha murtis, Regional traits of Shaiva iconography
C. Brahma, Ganesha, Surya, Karttikeya
D. Development of Iconography of Goddesses: Saptamatrikas, Durga, Lakshmi, Saraswati, Mahishsuramardini, Chamunda, Bhairavi, Regional traits of Shakta iconography.

Unit-4: Buddhist and Jaina Iconography

A. Origin of Buddha images: different iconographic forms, Manushi and Dhyani Buddhas
B. Bodhisattva: Avalokiteswara Maitreya, Manjusri and other Female Buddhist deities: Tara, Maha Mayuri and Prajnaparamita
C. Evolution of Jaina images, Adinatha, Neminatha, Parsvanatha, Mahavira, Bahubali,
D. Jaina Yaksha and Yakshi: Ambika, Chakreshvari, Padmavati, Saraswati, Kubera

Classroom strategy:

The major emphasis will be on theory aspect. Hence formal lectures will be given priority. Guest lecture, too, may be arranged depending upon the requirement of the course module. Projects, assignments, discussions and tutorial classes will form part of the class room teaching of the course.

Suggested readings:

- Agrawal, P. K.1994. Studies in Indian Iconography. Jaipur: Publication Scheme.
- Agrawal, V. S. 1972. Indian Art. Varanasi: Prithvi Prakashan.
- Banerjee, J. N.1974. Development of Hindu Iconography. New Delhi: Munshiram Manoharlal.
- Bhattacharya, A.K.2010. Historical Development of Jaina Iconography (A comprehensive study), Delhi: Bharatiya Kala Prakashan.
- Bhattacharya, B. 1958. Indian Buddhist Iconography. Calcutta: K.L.Mukhopadhyaya.
- Bruhn, Klaus 1963. Jina Images of Deogarh vol.I. Leiden: Brill.
- Czuma, Stanislaw.J.1985. Kushana sculpture: Images from early India. Ohio: The Cleveland Museum.
- Dhavalikar, M. K. 2004. Satavahana Art. Delhi: Sharada Publishing House.
- Gopinath Rao, T. A. 1985. (2nd ed.) Elements of Hindu Iconography. Varanasi: Motilal Banarasidas.
- Gupta, S. P. 1980. Roots of Indian Art. New Delhi: B.R. Publishing Corporation.
- Gupte, R. S. 1971. Iconography of Hindus, Buddhists and Jainas. Bombay: D.B. Taraporewala Sons and Co.
- Joshi N. P. 1966. Mathura Sculptures. Mathura: Archaeological Museum.
- Khandalwala, Karl (ed.) 1991. Golden Age: Gupta Art Empire, Province and Influence. Bombay: Marg Publications.
- Krishnan, Y. 1996. The Buddha image: Its origin and Development. New Delhi: Munshiram Manoharlal Pvt. Ltd.
- Marshall, John 1960. The Buddhist Art of Gandhara. Cambridge: Cambridge University Press.
- Lokesh, Chandra 1987. Buddhist Iconography 2 vols. New Delhi: Aditya Prakashan. 40
- Reechard, J.Cohen 2003. Essays on Jaina Art. New Delhi: Manohar Publications.
- Sahai, Bhagwant 1975. Iconography of Minor Hindu and Buddhist Deities. New Delhi
- Sahai, Bhagwant 2006. Recent Researches in Indian Art and Iconography. Missouri: Kaveri Prakashan.
- Sivrammurti, C.1961. Indian Sculpture. New Delhi: Allied Publishers Pvt. Ltd.
- Pandey, C. B. 1988 (reprint). Mauryan Art. New Delhi: Bhartiya Vidya Prakashan.
- Ray, Niharranjan1965. Maurya and Sunga Art. Calcutta: Indian Studies Past and Present.

SEMESTER: III

PAPER: 10: CONSERVATION & PRESERVATION

Number of credits: **4**

Nature of course: **DCEC**

Aim of the course: The broad aim is to acquaint students with the skill of archaeological conservation and preservation.

Objectives of the course:

i. To understand the process of the conservation and preservation.
ii. To know the techniques and relevance.

Unit-1: History and Principles of Conservation & Preservation

A. History of archaeological conservation and preservation in India
B. General principles and guidelines for conservation and preservation of monuments / sites and excavated remains in India
C. Distribution of monuments in different geographical zones and their conservation problem

Unit-2: Conservation: Materials and Techniques

A. Stone: classification, quarries, selection, specifications, defects, types of masonry, techniques of jointing and pointing
B. Brick: types, kilns, material composition, techniques of manufacturing, characteristics, specifications, bonding and laying,
C. Wood: structure of timber, seasoning, defects and treatment, use in buildings, causes of decay and remedies

Unit-3: Foundation, Scaffolding and Constructional Members

A. Foundation: types of foundation, typical failures of foundation, Consolidating and strengthening of foundations.
B. Scaffolding: types of scaffolding, temporary supports, propping and strutting, centering, shoring, timbering of deep trenches, providing of chutes, safety measures
C. Constructional Members: pointing, underpinning, inlay work, stucco work and tile work

Unit-4: Preservation of Antiquities

A. Metallic Antiquities: Gold, Silver, Copper, Bronze and Iron
B. Organic Antiquities: Ivory, Bone, Wood and Textile
C. Siliceous and Argillaceous Antiquities: Stone, Semi-precious stone, Terracotta and Pottery

Classroom strategy:

The major emphasis will be on theory aspect. Hence formal lectures will be given priority. Guest lecture, too, may be arranged depending upon the requirement of the course module. Projects, assignments, discussions and tutorial classes will form part of the class room teaching of the course.

Suggested readings:

- Agrawal O. P. 1977. Care and Preservation of Museum Objects, New Delhi: National ResearchLaboratory for Conservation of Cultural Property.
- Allchin B., F. R. Allchin and B. K. Thapar 1989. Conservation of the Indian Heritage. New Delhi: Cosmo Publications
- Batra N. L. 1994. A Plea for New Technology in Conservation. Proceedings of World
- Archaeological Congress 3. New Delhi
- Batra N. L. 1996. Heritage Conservation Preservation and Restoration of Monuments. New
- Delhi: Aryan Books International
- Bhowmik, S. K. 2004 Heritage Management: Care, Understanding and Appreciation of Cultural Heritage. Jaipur: Publication Scheme.
- Biswas, Sachindra Sekhara. 1999. Protecting the Cultural Heritage (National Legislation and
- International Conservation). New Delhi: Aryan Books International.
- Deshpande, M. N. 1994. Care of Cultural Heritage. New Delhi: National Museum Institute.
- Dhawan, Shashi. 1996. Recent Trends in Conservation of Art Heritage. Delhi: Agam Kala
- Prakashan.
- Marshall, J. 1923. Conservation Manual. Calcutta: Superintendent Government Printing.
- Plenderlith, H. J. 1965. The Conservations of Antiquities and Works of Art, London: Oxford University press.
- Plenderleith H. J. 1971. Conservation of Antiquities and Works of Arts in India, Delhi: Sandeep Prakashan.
- Thapar, B. K. 1989 Conservation of the Indian Heritage. New Delhi: Cosmo Publication.

SEMESTER: III

PAPER: 11: ANTIQUARIAN LAWS

Number of credits: **4**

Nature of course: **DCEC**

Aim of the course: The broad aim is to acquaint students with the antiquarian laws in India in order to understand the legal aspects of the world of Indian archaeology.

Objectives of the course:

i. To know the antiquarian laws in India.
ii. To know its significance and need.

Unit-1: Introduction

A. History of antiquarian laws in India
B. Importance and significance of antiquarian laws
C. General Problems and implementation

Unit-2: Important Legislations

A. The Indian Treasure Trove Act, 1878
B. The Ancient Monuments Preservation Act, 1904
C. The Ancient Monuments and Archaeological Sites and Remains Act, 1958
D. The Antiquities and Art Treasures Act, 1972

Unit-3: Related act and Rules

A. Land Acquisition Act, 1894
B. Public Premises (Eviction of unauthorized occupants) Act, 1971
C. Public Premises (Eviction of unauthorized occupants) Rules

Unit-4: International Conventions

A. The Athens Charter for the Restoration of Historic Monuments, 1931
B. Convention concerning the protection of the World Cultural and Natural Heritage, 1972
C. UNESCO Recommendation for the protection of movable cultural property, 1978
D. Charter for the Protection and Management of the Archaeological Heritage, 1990

Classroom strategy:

The major emphasis will be on theory aspect. Hence formal lectures will be given priority. Guest lecture, too, may be arranged depending upon the requirement of the course module. Projects, assignments, discussions and tutorial classes will form part of the class room teaching of the course.

Suggested readings:

- Acts of Indian and International law.
- Sites of Archaeological survey of India.

SEMESTER-III

ANCIENT INDIA

(1500 BC-1200 AD)

SRL NO.	COURSE CODE	COURSES	L	T	P	CREDITS	CORE/DC EC/GE
1	SAHS HA 010309 ANC C5005	Trends and Themes in Ancient Indian Historiography	5	0	0	5	CORE
2	SAHS HA 010310 ANC C5005	History of Political Ideas and Institutions in Ancient India	5	0	0	5	CORE
3	SAHS HA 010311 ANC C5005	Economic History of Ancient India	5	0	0	5	CORE
4	SAHS HA 010304 ANC DCEC2002	Seminar Paper (Compulsory) Social History of Ancient India	2	0	0	2	DCEC
	To be Taken from Other Department					4	
		To be Taken from the Dept. of History & Archaeology					
5	SAHS HA 010305 ANC GE4004	Political History of Ancient India	4	0	0	4	GE
6	SAHS HA 010306 ANC GE4004	Orientalism in India	4	0	0	4	GE
7	SAHS HA 010307 ANC GE4004	Social History of Ancient India	4	0	0	4	GE
		Select any one of the following courses					
8	SAHS HA 010305 ANC DCEC4004	Art and Architecture in Ancient India	4	0	0	4	DCEC
9	SAHS HA 010306 ANC DCEC4004	Education, Culture and Religious Changes in Ancient India	4	0	0	4	DCEC

10	SAHS HA 010307 ANC DCEC4004	Gender and Women in Ancient India	4	0	0	4	DCEC
11	SAHS HA 010308 ANC DCEC4004	Land and People: The Formation of Cultural and Regional Identities	4	0	0	4	DCEC
						25	Total Credit

NOTE: *One paper is to be taken from other department which will carry 4 credits.*

SEMESTER: III

ANCIENT INDIA

PAPER: 1: TRENDS AND THEMES IN ANCIENT INDIAN HISTORIOGRAPHY

Number of credits: **5**

Nature of course: **CORE**

Aim of the course: The broad aim is to make students knowledgeable about the tradition of history writing in ancient India.

Objectives of the course:

i. To develop a critical understanding of the subject;
ii. To know how it began and developed in India.
iii. To know the various forms in which it was produced.

UNIT 1: Introduction:

A. The Beginning; Historiography.
B. Forms of Early Historical Expressions-Itihas in Veda; Gatha, Narsamsi, Akhyan, Danstuti.
C. Itihas Purana Tradition.
D. Sutamagadha Traditions; Vamsanucharita; Prasastis and Dynastic Chronicle

UNIT 2: Establishing the Tradition:

A. History in the Epics-The Mahabharata, The Ramayana.
B. History as Literature-Kalidas, Vishakhadatta.
C. History as Biography-Harshacharita, Ramacharita.
D. Inscriptions as Official History and the Bards.

UNIT 3: Alternative Historiography:

A. The Buddhist Writings.
B. The Jaina Writings,
C. Foreign Accounts and Ancient Indian History.
D. Historical Traditions in Ancient South India.

UNIT 4: Themes in Ancient Indian Historiography:

A. The Concept of Time in Ancient India: Cyclical or Linear.
B. Debate on the Historical Consciousness.
C. Asiatic Modes of Production, Oriental Despotism and Hydraulic State.
D. Historians of Ancient India-Banabhatta, Kalhan.

Classroom strategy:

The major emphasis will be on theory aspect. Hence formal lectures will be given priority. Guest lecture, too, may be arranged depending upon the requirement of the course module. Projects, assignments, discussions and tutorial classes will form part of the class room teaching of the course. Graphics and videos may also form part of the teaching wherever it is required and possible.

Suggested readings:

- Brockington, C.F., The Righteous Rama, Oxford University Press
- Bulcke, Kamil, Ramakatha
- Pargiter, F.E., Ancient Indian Historical Tradition, London,1974
- The Puranic Accounts of the Dynasties of the Kali Age, Delhi,1927
- Pathak V.S., The Ancient Historians of India, Delhi,1966
- Warder A.K., An Introduction to Indian Historiography
- Philips C.H.,ed, Historians of India, Pakistan and Ceylon, London,1961
- Sankalia H.D., Ramayana: Myth or Reality
- Thapar, Romila., Exile and the Kingdom, Bangalore,1978
- ---Ancient Indian Social History: some Interpretations, Delhi 1975
- ---., Cultural Pasts, New Delhi,2001
- --- 'Of Biographies and in Kings' The Book Review' Vol.xxi No.8 August 1997
- ---, Past and Prejudice, NBT, New Delhi, 1975
- ---, Interpreeting early India,OUP, New delhi,1999
- ---, The Past before Us, Permanent Black, 2013.
- A.Sreedhara menon – A survey of Kerala History
- P.J.Cherian (Ed), Perspectives in Kerala History
- Rajan Gurukkal and Raghava Varier : A Cultural History of Kerala Vol.1
- Partha Chatterjee & Anjan Ghosh, ED, History and the Present, Permanent Black, 2015,
- Bhupendra Yadav, Framing History: Context and Perspectives, Publication Division, 2012.

SEMESTER: III

PAPER: 2: HISTORY OF POLITICAL IDEAS AND INSTITUTIONS IN ANCIENT INDIA

Number of credits: **5**

Nature of course: **CORE**

Aim of the course: The broad aim is to make students understand the political development in its fullest measure in ancient India.

Objective of the course:

i. To develop a critical understanding of the subject;
ii. To know the beginning of state formation in ancient India;
iii. To critically analyse the evolution of different political ideas and institutions in ancient India.

UNIT 1: Introduction:

A. Understanding the Beginning-The Vedas & the Process of Evolution.
B. Historiography-Colonial, Nationalist and Marxist.
C. Sources
D. The Concept of Oriental Despotism.

UNIT 2: Towards the Formation of State:

A. Rigvedic Political Institutions
B. Later Vedic Polity
C. State Formation in Pre-Mauryan Times
D. Saptanga Theory of State

UNIT 3: Towards the Empire:

A. Socio-Economic Basis of Mauryan State.
B. Nature.
C. Central Administration.
D. Revenue System.

UNIT 4: Post Mauryan Polity:

A. Post Maurya to Pre Gupta Polity-Sungas, Kushana & Satvahans and the Republicans.
B. Gupta Polity.
C. Polity during Harshavardhan.
D. Post Harsha Polity and the Rise of the Regional Kingdoms-Pala, Pratihara and Rashtrakuta.

Classroom strategy:

The major emphasis will be on theory aspect. Hence formal lectures will be given priority. Guest lecture, too, may be arranged depending upon the requirement of the course module. Projects, assignments, discussions and tutorial classes will form part of the class room teaching of the course. Graphics and videos may also form part of the teaching wherever it is required and possible.

Suggested readings:

- R. S. Sharma, Political Ideas and Institution in Ancient India
- Romila Thaper, From Lineage to State.
- M. Fried, The Evolution of Political Society
- J. M. Classes and P. Skalnik (ed.), The Early State
- J. P. Sharma, Republics in Ancient India
- N. Jha, The Licchavis
- Romila Thaper, Ashoka and Decline of Mauryas
- S. Sharma, Kushan Studies.
- Bhattacharya, Sibesh "Brahamana-Kshatriya Relationship in Northern India – Aspect of Power-elite configuration" IHR, vol. 10, 1984.
- Bongard-Levin, J.M., Ancient India: a Complex Study, Delhi, 1986.
- Chattopadhyaya, Brajadulal, The Making of Early Medieval India, OUP, Delhi, 1994.
- Claessen, H.J.M. and P. Skalnik, The Early State, The Hague, 1978.
- Claessen, Henri J.M. and Pieter van de Velde, ed., Early State Dynamics, Brill, Leiden, 1987.
- Drekmeier, Charles, Kingship and Community in Early India, OUP/Stanford University Press,
- 1962.
- Gonda, Jan, Ancient Indian Kingship from the Religious Point of View, Brill, Leiden, 1966.
- Gurukkal, Rajan, Social Formations of Early South India, OUP, 2010.
- Inden, R., Imagining India, (London, 1990).
- Karashima, Noboru, ed., Kingship in Indian History: Japanese Studies in South Asia No.2, Manohar, New Delhi, 1999.
- Kosambi, D.D., An Introduction to the Study of Indian History (Bombay, 1956).
- Krader, L. The Formation of the State, London, 1968
- Mabbet, I.W., Truth, Myth and Politics in Ancient India, Oxford University Press, New Delhi, 1980.
- 'Flaherty W. The Cccconcept of Duty in South Asia, Delhi, 1978.
- Olivelle, Patrick, ed., Dharma: Studies in its Semantics, Cultural and Religious History, First enlarged Indian edition, Motilal Banarsidass, Delhi, 2009.
- Roy, Kumkum, Emergence of Monarchy in North India, Oxford University Press, New Delhi, 1994.
- Sharma, R.S., Material Culture and Social Formations in Ancient India, Mac Millan, New Delhi, rpt. 1990
- Sharma, R.S., The State and Varna Formation in the Mid-Ganga Plains, Manohar Publications, New Delhi, 1996
- Smith, Bardwell, Essays in Gupta Culture, Delhi, 1986.
- Thapar, Romila Asoka and the Decline of the Mauryas, Oxford University Press.
- Thapar, Romila, From Lineage to State, Oxfor University Press, 1984
- Thapar, Romila, The Mauryas Re-visited, K.P. Bagchi & Company, New Delhi, 1984
- Veluthat, Kesavan, The Early Medieval in South India, New Delhi, 2009
- Veluthat, Kesavan, The Political Structure of Early Medieval South India, Delhi, 1993.
- Yoffee, Norman, Myths of the Archaic State: Evolution of the Earliest Cities, States, and Civilizations, CUP, 2005.

SEMESTER: III

PAPER: 3: ECONOMIC HISTORY OF ANCIENT INDIA

Number of credits: **5**

Nature of course: **CORE**

Aim of the course: The broad aim is to make students understand the development of economic policies, rules, processes, trading activities etc.in its fullest measure in ancient India.

Objectives of the course:

i. To develop a critical understanding of the subject;
ii. To know the beginning and spread of economic institutions in ancient India;
iii. To critically analyse the evolution of various economic activities and the role of state in it.

UNIT 1: Introduction:

A. Historiography.
B. Sources.
C. Rg Vedic Economy.
D. Transition to Later Vedic Economy.

UNIT 2: Second Urbanization:

A. Forces of production.
B. Rural Economy.
C. Causes and Nature of Second Urbanization.
D. Pre-Mauryan Economy.

UNIT 3: The Mauryan and Post Mauryan Economy:

A. Land System and Agrarian Economy with Special reference to the state participation in agriculture.
B. Trade and commerce.
C. Taxation System.
D. Economy in Post Mauryan age with special reference to Indi-Roman Trade.

UNIT 4: Gupta and post Gupta Economy:

A. Gupta Land System; Agriclture.
B. Trade and Commerce during the Guptas.
C. Economy in the Post-Gupta Age.
D. Feudalism and ancient Indian Economy- State and the Agricultural Processes.

Classroom strategy:

The major emphasis will be on theory aspect. Hence formal lectures will be given priority. Guest lecture, too, may be arranged depending upon the requirement of the course module. Projects, assignments, discussions and tutorial classes will form part of the class room teaching of the course. Graphics and videos may also form part of the teaching wherever it is required and possible.

Suggested readings:

- N. Bose, Social and Rural Economy of Northern India.
- L. Gopal, Economic Life of Northern India.
- R.S. Sharma, Some Economic Aspects of Caste System in Ancient India.
- N. Jha, Revenue System of Post Maurya and Gupta Times.
- N. C. Banerjee, Economic Life and Progress in Ancient India
- Ram Saran Sharma, Purvekalin Bharitya Samaj tatha arthawayavastha par Prakash
- Das, Puri,Chopra, Bharat ka Samajik Aarthik aur Sanskritik Ethas, Part-I
- R. K. Choudhry, Prachin Bharat ka Aarthik Etihas.

SEMESTER: III

PAPER: 4: SOCIAL HISTORY OF ANCIENT INDIA (1500 BC-1200 AD)

Number of credits: **2**

Nature of course: **DCEC**

Aim of the course: The broad aim is to make students understand the development of system and set up in its fullest measures in ancient India.

Objectives of the course:

i. To develop a critical understanding of the subject;
ii. To know the beginning and spread of social institutions in ancient India;
iii. To critically analyse the evolution of various social activities.

UNIT 1: Introduction:

A. Historiography.
B. Sources
C. Rg Vedic Society.
D. Transition to Later Vedic Society.

UNIT 2: Traditions and Institutions:

A. Varnashram System and origin of Jati-Process, Theory and Debate.
B. Marriage
C. Samskara
D. Ashrama.

UNIT 3: Marginalised Groups:

A. Shudra.
B. Varnashankar.
C. Slavery-Debate.
D. Tribals.

UNIT 4: Changes in Ancient India:

A. Social Changes.
B. Proliferation of Caste.
C. Spread of Aryan Culture and their Movement across India.
D. Status of Peasantry and their Protests.

Classroom strategy:

The major emphasis will be on theory aspect. Hence formal lectures will be given priority. Guest lecture, too, may be arranged depending upon the requirement of the course module. Projects, assignments, discussions and tutorial classes will form part of the class room teaching of the course. Graphics and videos may also form part of the teaching wherever it is required and possible.

Suggested readings:

- Romila Thaper, Ancient Indian History
- R. S. Sharma, Social Changes in Early Medieval India
- R. S. Sharma, Sudras in Ancient India
- C. Sircar, Some Aspects of Earliest Social History of India
- Jai Shankar Mishra, Prachin Bharat ka Samajik Itihas
- Om Prakash, Prachin Bharat ka Samajik aur Aarthik Itihas

SEMESTER: III

PAPER: 5: POLITICAL HISTORY OF ANCIENT INDIA (1500 BC-1200 BC)

Number of credits: **4**

Nature of course: **GE**

Aim of the course: The broad aim is to make students understand the basic political conditions prevailing in the then ancient India, about the different kingdoms and the ultimate evolution of the political system.

Objectives of the course:

i. To develop a critical understanding of the subject;
ii. To know the beginning and evolution of different forms of political systems and kingdoms in ancient India;

UNIT 1: Early Phase:

A. Historiography.
B. Sources
C. Rg Vedic Polity.
D. Transition to Later Vedic Polity.

UNIT 2: 6th BC to the Mauryas:

A. Political India in the 6th BC
B. Pre Mauryan Polity.
C. The Maryans
D. Mauryan theory of kingship.

UNIT 3: 2nd BC-6th AD:

A. Rise of Regional Kingdoms-Sungas, Kanvas, Satvahana, the Republicans.
B. Foreign Political Rulers-the Indo-Greeks, Shaka, Parthians, Kushans, Huns.
C. The Coming of the Guptas.
D. The Later Guptas.

UNIT 4: Rule of the Regional Kingdoms:

A. Northern & East India-Vardhan, Chauhans, Parmars, Gahadavals, Palas, Gurjara Pratihara Chahmans.
B. South India-Chola, Chalukya, Pallava, Rashtrakuta.
C. Muslim Invasions-712 AD-1200 AD.

Classroom strategy:
The major emphasis will be on theory aspect. Hence formal lectures will be given priority. Guest lecture, too, may be arranged depending upon the requirement of the course module. Projects, assignments, discussions and tutorial classes will form part of the class room teaching of the course. Graphics and videos may also form part of the teaching wherever it is required and possible.

Suggested readings:

- The Wonder That was India A.L. Basham
- Ancient India - An Introductory Outline D.N. Jha
- History of India, Vol. I Romila Thapar
- Aspects of Political Ideas and Institutions in Ancient India R.S. Sharma
- Material culture & Social Formation in Ancient India R.S. Sharma
- Ashoka & Decline of the Maurya Romila Thapar
- A History of South India K.A. Nilkantha Sastri
- An Advanced History of India - R.C. Majumdar, H.C. Raychaudhurai, - Kalikinkar Datta.
- Mauryan: Ashoka and the decline of Mauryan Empire - Romila Thapar.
- The Age of Imperial Unity-R C Majumdar (Bhartiya Vidya Mandir)
- Age of the Nandas and Mauryas-K A N Shastri.
- Chandragupta-Mauryas and his Times- R K Mookerjee
- Ashoka-R K Mookerjee.
- Ahoka- R G Bhandarkar.
- India under the Kushans- B N Puri.
- India in the time of Patanjali- B N Puri
- Political History of India-H C Raychaudhary.
- The Vaktaka Gupta-R C Majumdar & Altekar.
- The Gupta Empire-R K Mookerji
- The Harsha-R K Mookerji
- Life in Gupta Age-R N Salatore.
- History of the Maukharis- B N Srivastava.
- Dynastic History of Northern India, Vol-I, II- H C Ray.
- The Age of Imperial Kanauj-R C Majumdar.
- The Struggle for Empire-R C Majumdar.
- The History of Bengal- R C Majumdar.
- The Gurjara Pratihars- B N Puri.
- History of Kanauj-R S Tripathi.
- Early History of the Chauhans- D Sharma
- History of the Parmars-D G Ganguli.
- The Chandellas of the Jijubhukti-Dr R K Dixhit
- The Parmars-Pratipal Bhatia
- The Gahdavals- Rama Neogi.
- Rajputana ka Itihas- G S Ojha.

SEMESTER: III

PAPER: 6 : ORIENTALISM

Number of credits: **4**

Nature of course: **GE**

Aim of the course: The broad aim is to make students understand the basic understanding of the concept of orientalism and its uses in Indian context.

Objectives of the course:

i. To develop a critical understanding of the subject;
ii. To know the application of the term Orientalism in Indian contexts;
iii. To know its benefits and shortcomings.

UNIT 1: Early Phase:

A. Historiography; The Beginnings: The knowledge about the Orient before colonial conquest – The need for knowledge about the colony.
B. The Portuguese and Dutch attempts.
C. Production of knowledge and strategies of control under the English East India Company -the greater extent of British control and their bigger needs.
D. The work before Jones – Warren Hastings.

UNIT 2: Early Orientalism:

A. Early Orientalism: William Jones and the Asiatic Society – Jones' life and work – the Asiatic Society and Asiatic Researches – Wilkins, Colebrooke, Wilson and textual studies.
B. Princep and epigraphy – Cunningham and Archaeology – Havell, Fergusson and art.
C. Orientalism in imperial ideology – the role of "native" scholars.
D. Orientalism without empire: German and French "Indology"- Max Müller and the high noon of Orientalism.

UNIT 3: Orientalism: Theory and Practice

A. The Orientalist Constructions: The "discovery" of India – Historiography, ethnology and study of languages – construction of images and stereotypes: (a) the theory of the Aryan race (b) the Indian village community (c) unchanging East (d) Indian spirituality vs. Western materialism (e) Oriental Despotism and Asiatic Mode of Production.

B. Orientalism in Action: The use in colonial control and domination – boosting middle class morale.
C. Orientalism and Indian "renaissance" – Orientalism and revivalism
D. Orientalism and Indian nationalism – communal ideology – the expansion of database about India's past.

UNIT 4: Criticism of Orientalism:

A. Early reactions – the implicit acceptance in early nationalist writings.
B. The modern historians" perspective – Edward Said and the Foucauldian understanding – Critique of Said – recent Japanese work.
C. An assessment of Orientalism – Orientalism today.

Classroom strategy:

The major emphasis will be on theory aspect. Hence formal lectures will be given priority. Guest lecture, too, may be arranged depending upon the requirement of the course module. Projects, assignments, discussions and tutorial classes will form part of the class room teaching of the course. Graphics and videos may also form part of the teaching wherever it is required and possible.

Suggested readings:

- Ahmed, Aijaz, In Theory, Delhi, 1992. Oxford University Press.
- Arberry, A.J., British Orientalists, London, 1943. William Collins.
- Bongard-Levin, G.M. and .A.Vigasin, The Image of India: The Study of Ancient Indian Civilisation in the USSR, 1984.
- Breckenridge, Carol A. and Peter van der Veer, eds., Orientalism and the Postcolonial Predicament, Delhi, 1994. Oxford University Press.
- Chakrabarti, Dilip K., Colonial Indology: Socio-politics of the ancient Indian past. Delhi, 1997 Munshiram Manoharlal.
- Chaudhuri, Nirad C., Scholar Extraordinary: the Life of Friedrich Max Muller, New Delhi, 1974. Orient Paperbacks.
- Currie, Kate, Beyond Orientalism, Calcutta, 1996. K.P.Bagchi and Company.
- Dodson, Michael S., Orientalism, empire and National Culture: India, 1770-1880 Delhi, 2010 Foundation Books.
- Inden, Ronald, Imagining India, Oxford, 1990. Blackwell Publishers.
- Keay, John, India Discovered, London, 1981. Collins
- Kejariwal, O.P., The Asiatic Society of Bengal and the Discovery of India‟s Past 1784-1838, Delhi, 1988 Oxford University Press.
- King, Richard: Orientalism and Religion: Postcolonial Theory, India and 'The Mystic East', OUP, 1999.
- Kopf, David, British Orientalism and Indian Renaissance: the Dynamics of Indian Modernisation 1773- 1835, Berkeley and Los Angeles, 1969. University of California Press.
- MacKenzie, John M., Orientalism: History, Theory and the Arts, Manchester and New York, 1995 Manchester University Press.
- Majeed, Javed, Ungoverned Imaginings: James Mill‟s The History of British India and Orientalism, Oxford, 1992. Clarendon Press.
- Metcalf, Thomas R., Ideologies of the Raj, Cambridge, 1987. Cambridge University Press.
- Mukherjee, S.N., Sir William Jones: A Study in Eighteenth-Century British Attitudes to India, Bombay, 1987. Orient Longman.
- O‟Leary, Brendan, The Asiatic Mode of Production: Oriental Despotism, Historical Materialism and Indian History, Oxford, 1989. Basil Blackwell.
- Philips, C.H., ed., Historians of India, Pakistan and Ceylon, London, 1961. Oxford University Press.
- Said, Edward, Orientalism, New York, 1987. Pantheon Books.
- Singh, Upinder, The Discovery of Ancient India: early archaeologists and the beginnings of archaeology Delhi, 2004. Permanent Black.
- Teltscher, Kate, India Inscribed, Delhi, 1995. Oxford University Press.
- Thapar, Romila, Interpreting Early India, Delhi, 1999. Oxford University Press.
- Thapar, Romila, Past and Prejudice, New Delhi, 1975. National Book Trust.
- Trautmann, Thomas R., Aryans and British India, New Delhi, 1997. Sage-Vistar.
- Viswanathan, Gauri, Masks of Conquest: Literary Study and British Rule in India, London, 1990. Faber

SEMESTER: III

PAPER: 7 : SOCIAL HISTORY OF ANCIENT INDIA (1500 BC-1200 AD)

Number of credits: **4**

Nature of course: **GE**

Aim of the course: The broad aim is to make students understand the development of system and set up in its fullest measures in ancient India.

Objectives of the course:

i. To develop a critical understanding of the subject;
ii. To know the beginning and spread of social institutions in ancient India;
iii. To critically analyse the evolution of various social activities.

UNIT 1: Introduction:

A. Historiography.
B. Sources
C. Rg Vedic Society.
D. Transition to Later Vedic Society.

UNIT 2: Traditions and Institutions:

A. Varnashram System and origin of Jati-Process, Theory and Debate.
B. Marriage
C. Samskara
D. Ashrama.

UNIT 3: Marginalised Groups:

A. Shudra.
B. Varnashankar.
C. Slavery-Debate.
D. Tribals.

UNIT 4: Changes in Ancient India:

A. Social Changes.
B. Proliferation of Caste.
C. Spread of Aryan Culture and their Movement across India.
D. Status of Peasantry and their Protests.

Classroom strategy:

The major emphasis will be on theory aspect. Hence formal lectures will be given priority. Guest lecture, too, may be arranged depending upon the requirement of the course module. Projects, assignments, discussions and tutorial classes will form part of the class room teaching of the course. Graphics and videos may also form part of the teaching wherever it is required and possible.

Suggested readings:

- Romila Thaper, Ancient Indian History
- R. S. Sharma, Social Changes in Early Medieval India
- R. S. Sharma, Sudras in Ancient India
- C. Sircar, Some Aspects of Earliest Social History of India
- Jai Shankar Mishra, Prachin Bharat ka Samajik Itihas
- Om Prakash, Prachin Bharat ka Samajik aur Aarthik Itihas

SEMESTER: III

PAPER: 8 : ART & ARCHITECTURE IN ANCIENT INDIA

Number of credits: **4**

Nature of course: **DCEC**

Aim of the course: The broad aim is to make students understand the basic understanding of the development of numerous artistic and architectural forms in India.

Objectives of the course:

i. To develop a critical understanding of the subject;
ii. To know the application of the term Orientalism in Indian contexts;
iii. To know its benefits and shortcomings.

UNIT 1: Early to Mauryan Period:

A. Historiography.
B. Early Rock Art: Purpose, Motifs, Techniques and Development.
C. Harrapan Art & Architecture: Forms, Uses, Urban Planning and Techniques; Late Harrappans.
D. Mauryans and the Imperial art; Art and the Common Masses.

UNIT 2: Early forms of architecture (up to 400 CE):

A. Architectural types as evidenced in art and archaeological remains, texts and inscriptions: vernacular architecture, city gates and fortifications, free standing pillars, palace remains, bodhigharas, shrines, etc.
B. Stupas, chaityas and viharas: architectural features, relief sculptures and modes of narration (select case studies from Bharhut, Sanchi, Amaravati, Nagarjunakonda, Sannati, Barabar and Nagarjuni hills, Udaygiri Khadagiri, Bhaja, Bedsa, Karle, Pitalkhora, Nasik, etc.);
C. Patterns of patronage;
D. Materials and methods: relationship of wood and other perishable materials to stone architecture; tools and techniques of artists; signatures of artists.

UNIT 3: Early temples in stone: Form, Iconography and Ritual, c.400-600 AD:

A. Structural temples in stone: select case studies.
B. Cave temples: eg. Ajanta, Elephanta, Badami: architecture and iconographic programme.
C. Temple rituals and politics.

UNIT 4: Modes of representation in early Indian sculpture, c. 320 BC-600 AD:

A. Images of gods and humans: yaksha-yakshi, shalabhanjika, and mithuna images, Bodhisattvas and Buddhas; Jaina images, mukhalingas, anthropomorphic Brahmanical deities; personification of nature and attributes of gods; early attempts at royal portraiture;
B. Flora and fauna and hybrid or 'grotesque' forms
C. Motifs, symbols and their meanings;
D. Early Indian terracottas.
E. Paintings: Ajanta and Bagh: context, content, technique, and form; development of the aesthetic canon: relationship of text to practice.

Classroom strategy:

The major emphasis will be on theory aspect. Hence formal lectures will be given priority. Guest lecture, too, may be arranged depending upon the requirement of the course module. Projects, assignments, discussions and tutorial classes will form part of the class room teaching of the course. Graphics and videos may also form part of the teaching wherever it is required and possible.

Suggested Readings:

- Barlingay, S.S. 2007. A Modern Introduction to Indian Aesthetic Theory: The development from Bharata to Jagannatha, New Delhi: D.K. Printworld.
- Berkson, Carmel, Wendy Doniger O‟Flaherty, George Michell, 1983. Elephanta, the Cave of Shiva, Princeton University Press.
- Coomaraswamy, A.K. 1956. The Transformation of Nature in Art, New York: Dover Publications (also 2004 reprint of 1934 edn, Munshiram Manoharlal).
- Dehejia, Vidya, Unseen Presence: The Buddha at Sanchi, Marg Publications.
- Ghosh A. ed. 1996 (reprint of 1967), Ajanta Murals, New Delhi: Archaeological Survey of India.
- Gupte, R.S. 1972. Iconography of the Hindus, Buddhists and Jains, Bombay: D.B. Traporevala Sons and Co.
- Huntington, Susan L. 1985. The Art of Ancient India, New York and Tokyo: Weatherhill.
- Knox, Robert, 1993. Amaravati: Buddhist Sculpture from the Great Stupa, Dover Publications.
- Meister, M W ed. 1992. Ananda Coomaraswamy: Essays in Early Indian Architecture, New Delhi.
- Neumayer, Erwin, 2010. Rock Art of India, Oxford University Press.
- Ray, Niharranjan, 1974. An Approach to Indian Art, Chandigarh: Panjab University Publication Bureau.
- Schlingloff, Dieter, 1999. Guide to the Ajanta Paintings: Narrative wall paintings, Vol. 1, Delhi:
- Munshiram Manoharlal Pub.
- Settar, S. 2003, “Footprints of Artisans in Indian History: Some Reflections on Early Artisans of India,” Proceedings of the Indian History Congress, General President‟s Address, 64th session, Mysore, pp. 1-43.
- Shah, Priyabala, ed., 1958. Citrasutra of the Visnudharmottara Purana, third khanda, Baroda.
- Singh, Upinder, 2009. A History of Ancient and Early Medieval India: from the Stone Age to the 12th century, Delhi: Pearson Longman.
- Spink, Walter, 2005-2007. Ajanta: History and Development, Vols. I to V, Leiden and Boston: Brill.
- Williams, Joanna G. 1982. The Art of Gupta India: Empire and Province, Princeton University Press.
- Willis, Michael, 2009. The Archaeology of Hindu Ritual: Temples and the establishment of the gods, Cambridge University Press.
- Zimmer, Heinrich. 1984. Artistic Form and Yoga in the Sacred Images of India, Princeton: Princeton University Press.

SEMESTER: III

PAPER: 9 : EDUCATION, CULTURE AND RELIGIOUS CHANGES IN ANCIENT INDIA

Number of credits: **4**

Nature of course: **DCEC**

Aim of the course: The broad aim is to make students understand the development education, culture and religion in ancient India.

Objective of the course:

i. To develop a critical understanding of the subject;
ii. To know the beginning and spread of education, culture and religion in ancient India;
iii. To critically analyse the evolution of various traditions, institutions and the role of state in it.

UNIT 1: Educational Changes:

A. Historiography; Sources.
B. Educational System.
C. Major educational Institutions.
D. Impact of Education in Society.

UNIT 2: Religious Changes:

A. Evolution of Brahamanical Religion.
B. Spread and Schism- Vaisanavism, Shaivism.
C. Hetrodox Sects-Buddhism, Jainism-Emergence, Causes, Teachings, Spread.
D. Tantricism.

UNIT 3: Cultural Changes:

A. Historiography; Sources.
B. Cultural Interaction between India and Asia with special Reference to South East and East Asia.
C. Spread of Sastric-epic-Puranic Ideas.
D. India in the accounts of the people from outside the subcontinent: *The Periplus;* tolemy's *Geography;* Hsuan-tsan 's *Si-yu-ki* and Alberuni's *Kitabul Hind.*

UNIT 4: Major Themes:

A. Religious Beliefs and Social Stratification: A Study of Vedism.
B. Love and sexuality/pleasure- Human and divine love; Kama. Bhakti. Represention of love and sexuality in Literature.
C. Violence and non-violence- Killing, sacrifice and war. Violence in the public and private domains. Injuring animals and plants: Buddhist and Jaina environmental ethics.
D. Understanding Dynamics of Religion.

Classroom Strategy:

The major emphasis will be on theory aspect. Hence formal lectures will be given priority. Guest lecture, too, may be arranged depending upon the requirement of the course module. Projects, assignments,

discussions and tutorial classes will form part of the class room teaching of the course. Graphics and videos may also form part of the teaching wherever it is required and possible.

Suggested readings:

- Davie, Grace: The Sociology of Religion, 2007.
- Dunham, Barrows: Man against Myth (1947), National Book Trust Reprint, 2007.
- Idinopulos, Thomas A. and Wilson, Brian C.: What is Religion? Origins, Definitions, & Explanations (1998).
- Idinopulos, Thomas A. and Yonan, Edward A. (eds.): Religion and Reductionism 1994.
- Kumar, Penumala Pratap: Methods and Theories in the Study of Religions: Perspectives from the Study of Hinduism and other Indian Religions (2005).
- Saxton, Alexander: Religion and the Human Prospect, 2006.
- Thapar, Romila : „Durkheim and Weber on Theories of Society and Race Relating to Pre-Colonial India" in author"s Interpreting Early India, 1992..
- Whaling, Frank (ed.): Contemporary Approaches to the Study of Religion, 1985.
- Bhattacharyya, N. N.: Ancient Indian Rituals and Their Social Contents, 2nd Ed., 1996.
- Chitgopekar, Nilima (ed): Invoking Goddesses, 2002 (chapters 1-3 only)
- Erdosy, George (Ed.): The Indo-Aryans of Ancient and South Asia: Language, Material Culture and Ethnicity, 1995 (Indian Reprint, 1997).
- Keith, A.B.: The Religion and Philosophy of the Veda and Upanishads, Indian Reprint, 1970.
- Lincoln, Bruce: Priests, Warriors and Cattle, 1981.
- Macdonell, A.A.: The Vedic Mythology, Indian Reprint, 1963.
- Mallory, J.P.: In Search of the Indo-Europeans, 1989.
- Polome, Edgar C.ed., Indo-European Religion after Dumezil, Journal of Indo-European Studies Monograph No.16, 1996.
- Sharma, R.S.: Material Culture and Social Formations in Ancient India, 1983.
- Shrimali, K.M.: „The Rigveda and the Avesta: A Study of their Religious Trajectories" in Irfan Habib, ed. A Shared Heritage: The Growth of Civilizations in India & Iran, 2002, pp. 23-57.
- Smith, Brian K.: „ Ritual Perfection and Ritual Sabotage in the Veda „, History of Religions**,** Vol. 35, No.4, May 1996, pp.285 - 306.
- Ali, Daud. 2004. Courtly Culture and Political Life in Early Medieval India. Cambridge: Cambridge University Press.
- Kane, P. V. 1930-62. History of Dharmasastra. Poona: Bhandarkar Oriental Research Institute.
- Ramaswamy, Vijaya, 1997. Walking Naked: Women, Society, and Spirituality. Simla: Institute of Advanced Studies.
- Settar, S. 1992. Pursuing Death: Philosophy and Practice of Voluntary Termination of Life. Dharwad: Institute of India Art History, Karnatak University.
- G Kuppuram and K Kumudamani, History of Science and Technology in India (12 Vols), Sundeep Prakashan (Delhi, 1996).
- A.K. Bag, History of Technology in India, 4 vols. Indian National Science Academy, New Delhi, 1997.
- A.K. Bag, India and Central Asia: Science and Technology, 2 vols. Indian National Science Academy, New Delhi
- D.M. Bose, Sen & Subbarappa, A Concise History of Sciences in India, National Commission for the Compilation of History of Sciences in India by] Indian National Science Academy (New Delhi, 1971)
- Rahman, A. History of Indian Science Technology and Culture Delhi, 1998: Oxford University Press.
- A.K.Bag, Science and Civilisation in India, vol. I. Navarang Publishers, New Delhi, 1985.
- A.K. Bag, History of Mathematics in Ancient and Medieval India, Chaukhamba Varanasi, 1979.
- Watters, Thomas: On Yuan Chwang"s Travels in India (first published in 1904-05), Munshiram Manoharlal, Delhi, reprint 1961.

- Shastri, Ajay Mitra: India as Seen in the Brihat Samhita of Varahamihira, Motilal Banarsidass, Delhi, 1969.
- Sachau, Edward C., tr. and notes: Alberuni‟s India... (First published 1910) reprint, Delhi, 1989.
- Pollock, Sheldon, ed., Literary Cultures in History: Reconstruction from South Asia, New Delhi,
- 2003.
- Pollock, Sheldon: The Language of the Gods in the World of Men, Delhi, 2007.
- Ali, S. Muzafer : The Geography of the Puranas, People‟s Publishing House, New Delhi, Second edition, 1973.
- Bhattacharya, P.K.: Historical Geography of Madhya Pradesh from Early Records, Delhi, 1977.
- Casson, L.: The Periplus Maris Erythraei, Princeton University Press, 1989.
- Chatterji, Suniti Kumar: Kirata-Jana-Kriti: The Indo-Mongoloids: Their Contribution to the
- History and Culture of India, Asiatic Society, Calcutta, 1951.

SEMESTER:
III

PAPER: 10 : GENDER AND WOMEN IN ANCIENT INDIA

Number of credits: **4**

Nature of course: **DCEC**

Aim of the course: The broad aim is to make students understand the changing position of women throughout the ancient Indian period and its impact on the then society.

Objective of the course:

i. To develop a critical understanding of the subject;
ii. To critically analyse the evolution of various traditions, institutions and the role of state in the changing position of women.

UNIT 1: Introduction:

A. Historiography-Colonial, Nationalist, Marxist and Others; Original Sources.
B. Women in various religious Traditions-Brahanical, Buddhist, Jaina, Bhakti, Tantrik. C. Anicent Indian Women-An Overview.

UNIT 2: Women in Ancient Indian Literary Tradition:

A. Women in Early Indian Inscriptions.
B. Understanding Women through Ancient Indian Literature.
C. Position of Women as depicted in Smritis and Law books

UNIT 3: Women and Family:

A. The Patriarchy and the Accommodation of Female; The concept and working of matriliny –Anthropological and Sociological perspectives in historical reconstructions.
B. The Socio-Sexual Construction of Womanhood-Education, Marriage, Family and Household.
C. Women and Property-The issue of Stridhana.
D. Legal Position of Women in Family.

UNIT 4: Reflections on Various Facets:

A. Women for Pleasure- The Institutions of Devdasi and Prostituion; Women in Public Sphere- Wage Earners, Rulers and Patrons.
B. Body, Sex, Eroticism and Love as depicted in Classical Literature.
C. Socio-Religious Movements and Women-Virsaivas and Srivaisanava Community; Ascetic Women.

Classroom Strategy:

The major emphasis will be on theory aspect. Hence formal lectures will be given priority. Guest lecture, too, may be arranged depending upon the requirement of the course module. Projects, assignments, discussions and tutorial classes will form part of the class room teaching of the course. Graphics and videos may also form part of the teaching wherever it is required and possible.

Suggested readings:

- Altekar, A.S., The Position of Women in Hindu Civilisation, second revised edition, chs. 8, 9.
- Aparna Basu and A .Taneja [eds] Breaking out of Invisibility; Women in Indian History, 2002
- Atre, Shubhangana, The Archetypal Mother, 1987.
- Barai, Kumudini, Role of women in the History of Orissa; From the earliest times to 1568A.D. 1994
- Bhattacharji, Sukumari, Women and Society in Ancient India, 1994
- Bhattacharyya, N.N. The Indian Mother Goddess. 3Revised edition.1999
- Blackstone, Katharine R., Women in the Footsteps of the Buddha: Struggle for Liberation in the
- Their Gathas, 1998.
- Carroll, B.A. (ed), Liberating Women's History: Theoretical and Critical ssays, 1976.
- Centuries, Manohar, 2009.
- Chakravarty Uma and Kum kum Roy " In search of our past: review of the limitations and possibilities of the historiography of women in early India" EPW, 23(18), April 30, 1988.
- Chakravarty Uma "Beyond the Altekarian paradigm: Towards the new understanding of gender relations in early Indian history" Social Scientist, 16(8), August 1988.
- Chakravarty, Uma, Everyday Lives, Everyday Histories; Beyond the Kings and Brahmanas of
- Ancient India, 2006
- Chakravarty, Uma, 'Whatever happened to the vedic Dasi?: Orientalism, Nationalism and Script from the past' in Sangari and Vaid [eds] Recasting Women,1989
- Chitgopekar Nilima (ed), Invoking Goddesses: Gender Politics in Indian Religion, 2002
- Dehejia, Vidya [ed], Representing The Body: Gender Issues in Indian Art
- Ehrenfels, O.R, The Mother Right in India.1941
- Godelier Maurice, "The Origin of Male Domination" New Left Review, 127, May-June 1981.
- Godesses, OUP, 2002.
- Hiltebeitel, A. and K. Erndl (eds), Is the Goddess a Feminist: The Politics of South Asian
- Hirschon, Renee, Women and Property: Women as Property, 1984.
- Jaini, Padmanabh, Gender and Salvation, 1992.
- Jaiswal, Suvira "Women in early India: roblems and erspectives" Proceedings of the Indian History Congress, 1981, pp. 54-60.
- Joan Wallach Scott, Gender and Politics of History, 1986.
- Kapadia, K.M., Marriage and Family in India, third revised edition, 1967.
- Karve, Irawati, Kinship Organization in India, second revised edition, 1965.
- Kosambi, D.D., Myth and Reality, 1962.
- Moore, Henrietta, Feminism and Anthropology, 1988.
- Nath, Vijay, The Puranic World: Environment, Gender, Ritual and Myth, 2008.
- Orr, Leslie, Donors Devotees and Daughters of the God, 2000
- Pintchman, Tracy, The Rise of the Goddess in the Hindu Tradition, Delhi, 1997.
- Ramaswamy, Vijaya, Divinity and Deviance: Women in Virashaivism, OUP, Delhi, 1996.
- Ramaswamy, Vijaya, Walking Naked: Women, Society, and Spirituality in South India, 1997.
- Rangachari, Devika, Invisible Women, Visible Histories. Society, Gender and Polity in North
- India. 2009
- Rosaldo and Lamphere (eds), Women, Culture and Society, 1974.
- Roy, Kumkum (ed), Women in Early Indian Societies, Manohar, 1999.
- Roy, Kumkum, 'The King's household: tructures and paces in the hastric Tradition' EPW 17[43]1992
- Sanday, Female Power and Male Dominance: On the Origins Of Sexual Inequality, Cup, 1981
- Shah, Kirit K., Problem of Identity: Women in Early Indian Inscriptions, OUP, 2001
- Shah, Shalini, Love, Eroticism and Female Sexuality in the Classical Sanskrit Literature 7-13th

Century.
- Shah, Shalini, Poetesses in the Classical Sanskrit Literature: 7th-13th Centuries
- Shah, Shalini, The Making of Womanhood: Gender Relations in the Mahabharata, 1995
- Tharu, Susie and K. Lalita (eds), Women Writing in India: 600 B.C. to the present, Delhi, 1993.
- Tyagi, A.K., Women Workers in Ancient India, New Delhi, 1994.
- Tyagi, Jaya, Engendering the Early Household, Orient Longman, Delhi, 2008.
- Wright Rita(ed), Gender and Archaeology, 1996.
- Averil Cameyon, Images of Women in Antiquity
- Prativa Jain, Women Images
- Suvira Jaiswal, Women in early India
- Triati Sharma, Women in Ancient India
- A.K. Tyagi, Women Workers in ancient India

PAPER: 11: LAND AND PEOPLE: THE FORMATION OF CULTURAL AND REGIONAL IDENTITIES

Number of credits: **4**

Nature of course: **DCEC**

Aim of the course: The broad aim is to develop a discourse in the formation of identities through the pages of ancient India.

Objective of the course:

i. To know the cultural-regional identities as expressed in the ancient texts.
ii. To know about the historical contexts in which it grew.

UNIT 1: Beginning:

A. Sapta Sindhavah to Aryavarta and Madhyadesha: Cosmographic conceptions, topographical features, tribes, settlements in Vedic literature.
B. Majjhimadesha and its people; Formation of Janapadas: Pali, Prakrit/ Apabhramsha texts.
C. Jambudvipa and Bharatavarsha – Kurma-nivesha: Mahabharata, Ramayana and the Puranas.
D. The Concept of Tamilakam (tinais): Perspectives from Sangam texts.

UNIT 2: Early Medieval Phase:

A. Cultural and regional identities in the subcontinent: Narratives from some early medieval texts Such as arahamihira's Brihatsamhita;
B. Rajashe hara's Kavyamimamsa,
C. alhana's Rajatarangini and
D. Shaktisangama Tantra.

UNIT 3: Identity through Foreign Texts:

A. India in the accounts of the people from outside the subcontinent
B. The Periplus; Ptolemy's Geography;
C. Hsuan-tsang's Si-yu-ki
D. Iberuni's Kitabul Hind.

UNIT 4: Regional Perspectives through Inscriptions:

A. Regional divisions in early Indian inscriptions
B. Thirteenth Rock Edict of Ashoka
C. Prayag Prasasti of Harisena
D. HathiGumpha Incription of Kharvela

Classroom strategy:

The major emphasis will be on theory aspect. Hence formal lectures will be given priority. Guest lecture, too, may be arranged depending upon the requirement of the course module. Projects, assignments, discussions and tutorial classes will form part of the class room teaching of the course.

Suggested readings:

- Ali, S. Muzafer: The Geography of the Puranas, People's publishing House, New Delhi, Second Edition, 1973.
- Bhattacharya, P.K.: Historical Geography of Madhya Pradesh from Early Records, Delhi, 1977.
- Casson, L.: The Periplus Maris Erythraei, Princeton University Press, 1989.

- Chattopadhyaya, B.D.: A Survey of Historical Geography of Ancient India, Manisha, Calcutta, 1974.
- Chattopadhyaya, Sudhakar : Racial Affinities of Early North Indian Tribes, Munshiram Manoharlal, Nedw Delhi, 1971.
- Chaudhuri, Sashi Bhushan: Ethnic Settlements in Ancient India, General Printers & Publishers, Calcutta, 1955.
- Cunningham, Alexander: The Ancient Geography of India (1871), Low Price Publications, Delhi, 1990 reprint.
- Entrikin, J.Nicholas, ed.: Regions: Critical Essays in Human Geography, Ashgate, Hampshire, England, 2008.
- Gupta, P.: Geography in Ancient Indian Inscriptions, Delhi, 1973.
- Habib, Irfan, ed., India: Studies in the History of an Idea, Munshiram Manoharlal, Delhi, 2004.
- Gurukkal, Rajan: Social Formations of Early South India, OUP, Delhi, 2010.
- Heesterman, J.C. ed., Sanskrit Place Names from Inscriptions, The Hague, 1968.
- Law, Bimala Churn: Historical Geography of Ancient India, Second and Revised Edition, Societe
- Asiatique de Paris, Paris, 1968.
- Majumdar, M.R.: A Study in the Cultural Geography of the Narmada, Baroda, 1968.
- Majumdar, R.C.: The Classical Accounts of India, Firma K.L.Mukhopadhyay, Calcutta, 1960.
- Morrison, B.M.: Political Centres and Cultural Regions in Early Bengal, Arizona, 1970.
- Mulay, Sumati: Studies in the Historical and Cultural Geography and Ethnography of the Deccan, Deccan College, Poona, 1972.
- Niyogi, P.: Brahmanical Settlements in Different Subdivisions of Ancient Bengal, Calcutta, 1967.
- Pandey, M.S.: The Historical Geography and Topography of Bihar, New Delhi, 1963.
- Pollock, Sheldon, ed., Literary Cultures in History: Reconstruction from South Asia, New Delhi, 2003.
- Pollock, Sheldon: The Language of the Gods in the World of Men, Delhi, 2007.
- Raschke, Manfred G.: New Studies in Roman Commerce with the East, Berlin-New York, 1978.
- Raychaudhuri, Hemchandra: Studies in Indian Antiquities, Second edition, University of Calcutta, 1958, Pt. II (Chapters V – X).
- Sachau, Edward C., tr. and notes: lberuni's India... (First published 1910) reprint, Delhi, 1989.
- Sankalia, H.D.: Studies in the Historical and Cultural Geography and Ethnography of the Gujarat (Places and Peoples in Inscriptions of Gujarat: 300 BC – 1300 AD), Deccan College, Poona, 1949.
- Sharma, R.S. and Shrimali, K.M. eds., A Comprehensive History of India, Vol.IV, Pt.2, Manohar, New Delhi, 2008.
- Shastri, Ajay Mitra: India as Seen in the Brihat Samhita of Varahamihira, Motilal Banarsidass, Delhi, 1969.
- Sircar, D.C. : Cosmography and Geography in Early Indian Literature (Sir William Meyer Endowment Lectures in History, 1965-66, University of Madras), Indian Studies – Past and Present, Calcutta, 1967.
- Sircar, D.C.: Studies in the Geography of Ancient and Medieval India, 2nd edition, Motilal
- Banarsidass, Delhi, 1971.
- Subbarayalu, Y. Political Geography of the Chola Country, Department of Archaeology, Tamilnadu, 1973.
- Upadhyaya, Bharatsingh: Buddhakalin Bharatiya Bhoogol (in Hindi), Hindi Sahitya Sammelan, and Prayag.
- Watters, Thomas: On Yuan Chwan's Travels in India (first published in 1904-05), Munshiram
- Manoharlal, Delhi, reprint 1961.

SEMESTER-III
MEDIEVAL INDIA
(1200 AD-1757 AD)

MEDIEVAL INDIA (1200 AD -1757 AD)

SRL NO.	COURSE CODE	COURSES	L	T	P	CREDITS	CORE/DCEC/GE
1	SAHS HA 010309 MED C5005	Medieval Indian Historiography	5	0	0	5	CORE
2	SAHS HA 010310 MED C5005	Delhi Sultanat	5	0	0	5	CORE
3	SAHS HA 010311 MED C5005	Mughal India	5	0	0	5	CORE
4	SAHS HA 010304 MED DCEC2002	Seminar Paper (Compulsory) Socio-Cultural Transformation in Medieval India	2	0	0	2	DCEC
	To be Taken from Other Department					4	
		To be Taken from the Dept. of History & Archaeology					
5	SAHS HA 010305 MED GE4004	Gender and Women in Medieval India	4	0	0	4	GE
6	SAHS HA 010306 MED GE4004	Medieval Indian Ideas and Institutions	4	0	0	4	GE
7	SAHS HA 010307 MED GE4004	History of the Marathas	4	0	0	4	GE
		Select any one of the following courses					
8	SAHS HA 010305 MED DCEC 4004	Gender and Women in Medieval India	4	0	0	4	DCEC
9	SAHS HA 010306 MED DCEC 4004	Science and Technology in Medieval India	4	0	0	4	DCEC
10	SAHS HA 010307	History of the	4	0	0	4	DCEC

	MED DCEC 4004	Marathas					
11	SAHS HA 010308 MED DCEC 4004	Vijaynagar and Bahmani Empire	4	0	0	4	DCEC
						25	Total Credit

NOTE: *One paper is to be taken from other department which will carry 4 credits.*

SEMESTER: III MEDIEVAL INDIA:

1200 AD-1757 AD

PAPER: 1: MEDIEVAL INDIAN HISTORIOGRAPHY

Number of credits: **5**

Nature of course: **CORE**

Aim of the course: The broad aim is to make students understand the development of historiography and its various dimensions during the entire medieval India.

Objective of the course:

i. To develop a critical understanding of the subject;
ii. To the deep understanding of how historiography developed during the Sultanate age in India.
iii. To critically analyse features of the medieval historiography.

UNIT 1: Beginning of Islamic Tradition of Historiography:

A. Historiography; Sources.
B. Major Historians-Al Beruni, Amir Khusrau, Ziauddin Barani
C. Historians at Work-Dynasties and History writing.
D. Features.

UNIT 2: Mughal Historiography:

A. Historiography; Sources-Court Historians, Biographers, Autobiographies, Court Chronicles, Letters, Gazetteers and Others.
B. Features.
C. Major Historians-Abul Fazal, Abdul Hamid Lahori, Abd-ul-Qadir Bada'uni Gulbadan Be um Inayat Khan, Dara Shikoh.
D. History Writing Under Different Rulers.

UNIT 3: Prominent Works and History:

A. Kitab ul-Hind; Deval Rani Khizr Khani, Nuh Siphir, Tughlaq Nama; Tarikh-i-Firoz Shahi,
B. Babur Nama, Humayun Nama, Akbar Nama; Muntakhwab ul-Twarikh
C. Padshah Nama, Shahjahan Nama, Sirr-e-Akbar and Majma ul-Bahrain.
D. Tarikh-i-Firishta and Gulshan-i-Abrahim.

UNIT 4: Beyond Imperial Historiography:

A. Foreign Accounts and History.
B. History Writings at Regional kingdoms-Vijaynagar Empire, Bahmani Empire and Marathas; Local Traditions.
C. Medieval literature and the Construction of History-Bhakti, Sufi, Secular and Popular Literature.
D. Understanding the Dynamics of Medieval Historiography.

Classroom Strategy:

The major emphasis will be on theory aspect. Hence formal lectures will be given priority. Guest lecture, too, may be arranged depending upon the requirement of the course module. Projects, assignments,

Discussions and tutorial classes will form part of the class room teaching of the course. Graphics and videos may also form part of the teaching wherever it is required and possible.

Suggested Readings:

- Henri Elliot and Charles Dowson, History of India as told by its own Historians, 8 vols.
- J.S.Grewal, Medieval India: History and Historians
- Harbans Mukhia, Historians and Historiography in the reign of Akbar
- K.A.Nizami, On History and Historians of medieval India
- Mohibul Hasan (ed), Historians of medieval India
- Peter Hardy: Historians of medieval India
- Aijaz Ahmad, In Theory, Oxford University Press, Delhi, 1992
- Eaton, Richard, ed., India's Islamic Traditions 711-1750, (Delhi: Oxford University Press, 2003).
- Lawrence, Bruce and David Gilmartin, eds., Beyond Turk and Hindu: Rethinking Islamicate Identities in Islamicate South Asia, (Gainesville: University of Florida Press, 2000)
- Prachi Deshpande, Creative Pasts: Historical Memory and Identity in Western India, 1700-1960 Columbia University Press, 2007
- Narayana Rao, Velcheru, David Shulaman and Sanjay Subrahmanyam, Textures of Time: Writing History in South India 1600-1800, Delhi, 2001.
- Karashima, Noboru, South Indian History and Society: Studies from Inscriptions AD 850-
- 1800, New Delhi, 1984.
- Al-Azmeh, Aziz. 2007. The Times of History: Universal Topics in Islamic Historiography. Budapest: CEU Press.
- Aquil, Raziuddin and Partha Chatterjee eds. 2008. History in the Vernacular. New Delhi: Permanent Black.
- Chatterjee, Kumkum. 2009. The Cultures of History in Early Modern India: Persianization and Mughal Culture in Bengal. New Delhi: Oxford University Press.
- Meisami, Julie Scott. 1999. Persian Historiography. Edinburgh: Edinburgh University Press.
- Mukhia, Harbans. 1976. Historians and Historiography during the Reign of Akbar. New Delhi: Vikas.
- Nizami, K.A. 1982. On Historians and Historiography in Medieval India. Delhi: Munshiram Manoharlal.
- Rao, Velcheru Narayana, David Shulman and Sanjay Subrahmanyam. 2001. Textures of Time: Writing History in South India, 1600-1800. New Delhi: Permanent Black.
- Robinson, Chase F. 2003. Islamic Historiography. Cambridge: Cambridge University Press.
- K.A. Nizami: Religion and Politics in India during the thirteen century (Aligarh, 1961)
- S.A.A. Rizvi: Muslim Revivalist Movements in Northern India in the Sixteenth and Seventeenth Centuries (reprint. New Delhi: 1993)
- C. Vaudeville: A Weaver named Kabir (New Delhi, 1991)

SEMESTER: III MEDIEVAL INDIA:

1200 AD-1757 AD

PAPER: 2: DELHI SULTANAT

Number of credits: **5**

Nature of course: **CORE**

Aim of the course: The broad aim is to make students understand the various facets of Delhi Sultanate.

Objective of the course:

i. To develop a critical understanding of the subject;
ii. To the deep understanding of how Sultanate period grew and developed.
iii. To critically analyse the numerous aspects of the Sultanate period.

UNIT 1: The Beginning and Beyond:

A. Historiography; Political Consolidation-The Slave Dynasty.
B. The Khaljis, the Tughlaqs and the Lodhis.
C. State-Theory of Kingship, Administration, Role of Ulemas.
D. Regional States-Gujarat, Malwa and Jaunpur.

UNIT 2: Trading and Commercial Activities:

A. Local Exchange: Exchange centres-Bazar, Mandi, Qasba; Goods Exchanged-Local Products, Grain, Daily Articles, Precious Items; Forms of Exchange-Goods to Goods, Money and Coins.
B. Internal Trade-Trading Routes-Water and Land, Trading Articles, Monetary Transactions, Weights and Measures, Itinerant Trade-Carvaan, Tolls & forms of Collections.
C. External Trade- Trading Routes-Water and Land, Main Ports, Trading Articles, Trading Network, Coastal Trade, Tolls & forms of Collections, Cargo and Shipping,
D. Structure of Trade-Trading Communities-State Agencies, Mercantile Community, Coastal Trading Groups, Middlemen, Traders/Baniya; Monetary Mechanism-Hundi, Letter of Exchange, Trading Contracts ad Agreements, State.

UNIT 3: Agriculture:

A. Power structure and Hierarchy in Agricultural System-Village Headmen, Chaudhary, Zamindari, Brahman and Ulema in Village Community, Ayagar of South India, Balutedari in West India, Jajmani System.
B. Agrarian Relations-Crown and Private Lands, Land Grants and its Types, Land lord-Tenant Relationship; South and West India- The Zamindari, Urar and Nattar – Temples as landlords – land management sabhai and variyam – service tenures – Jagir – Virutti in South India – military tenures – amaram.
C. Agriculture Technology and Production-manures, Tools, Irrigation, Field System, Crop Pattern, Weights and Measures; Soil, Seeds, Conditions, Crops.
D. Land Revenue and Forms of Redistribution-Batai, Nasq, Kankut and Zabti System.

UNIT 4: Society and Culture:

A. Social Set up.
B. Women-Marriage, Legal Rights, Divorce, Education.

C. Bhakti and Sufi Movement.
D. Indo-Islamic Art, Architecture, Paintings.

Classroom Strategy:

The major emphasis will be on theory aspect. Hence formal lectures will be given priority. Guest lecture, too, may be arranged depending upon the requirement of the course module. Projects, assignments, discussions and tutorial classes will form part of the class room teaching of the course. Graphics and videos may also form part of the teaching wherever it is required and possible.

Suggested readings:

- Tapan Roy Chaudhuri and Irfan Habib: Cambridge Economic History of India, Vol. I.
- Sanjay Subramaniam: Political Economy of Commerce.
- K.N.Chaudhuri: Trade and Civilization in the Indian Ocean.
- K.N.Chaudhuri: Asia before Europe.
- Surendra Gopal: Commerce and Crafts in Gujarat.
- R. Chempakalakshmi: Trade, Ideology and Urbanisation.
- V.K. Jain: Trade and Traders in Western India 1000-13000, Delhi, 1990.
- Meera Abraham. Two Merchant Guilds, Manohar, 1982.
- Kenneth Pearson: The Indian Ocean, London, 2001.
- Irfan Habib: Atlas of the Mughal Empire, OUP, 1982.
- Irfan Habib: Essays in Indian History, Tulika, 1993.
- Satish Chandra: Essays in Medieval Indian History, OUP, 2003.
- Kanakalatha Mukund: The World of the Tamil Merchant, Orient Longman, 2002.
- H. Qureshi, The administration of the Delhi Sultanate
- U. N. Dey, The Govt. of the Sultanate Encyclopedia of Islam (relevant articles from the new edition).
- E.G. Brown: A literary History of Persia (Cambridge, 1951), vols. III & IV
- K.A. Nizami (ed.): Politics and Society during the Early Medieval period being the Collected Works of Prof. Mohammad Habib (reprint; New Delhi: 1992), 2 volumes.
- Tirmizi, S. A. I. Some Aspects of Medieval Gujarat, Delhi, 1964.
- Misra, S.C. The Rise of Muslim Power in Gujarat: A History of Gujarat from 1298- 1442. Munshiram Manoharlal, 1982
- Sheikh, Samira, Forging a Region: Sultans, Traders, and Pilgrims in Gujarat, 1200-1500, New Delhi: OUP, 2010.

SEMESTER: III MEDIEVAL INDIA:

1200 AD-1757 AD

PAPER: 3: MUGHAL INDIA

Number of credits: **5**

Nature of course: **CORE**

Aim of the course: The broad aim is to make students understand the various facets Mughal India.

Objective of the course:

i. To develop a critical understanding of the subject;
ii. To the deep understanding of how Mughal period grew and developed.
iii. To critically analyse the numerous aspects of the Mughal period.

UNIT 1: The Beginning and Beyond:

A. Historiography.
B. The Beginning and Consolidation-Babar, Humayun and Akbar.
C. Continuation of Political Heydays-Jehangir, Shahjahan and Aurangzeb.
D. Decline and the rise of Regional States-The Marathas.

UNIT 2: Trading and Commercial Activities:

A. Local Exchange: Exchange centres; Goods Exchanged-Local Products, Grain, Daily Articles, Precious Items; Forms of Exchange-Goods to Goods, Money, Coins; Usury, Dadni System.
B. Trades-Internal Trade-Trading Routes-Water and Land, Trading Articles, Centres, Monetary Transactions, Weights and Measures, Tolls & forms of Collections; External Trade- Sea Trade, Ports, Land Routes, Trading Articles, Trading Network, Coastal Trade, Tolls & forms of Collections, Cargo and Shipping; Advent of European Companies their Impact.
C. Structure of Trade-Trading Communities-State Agencies, Mercantile Community, Coastal Trading Groups, Role of Middlemen, Traders/Baniya; Monetary Mechanism-Hundi, Trading Contracts ad Agreements, State.
D. Nature of Mughal Economy; Urban Growth-Causes, Centres, Life.

UNIT 3: Agriculture:

A. Power structure in Agricultural System-Categories of Peasants, Village Headmen, Zamindari, Jagirdari.
B. Agrarian Relations-Crown and Private Lands, Land Grants-Ijara and Madad-i-Maash, Land lord-Tenant Relationship, Jagirdari Crisis.
C. Agriculture Technology and Production-manures, Tools, Irrigation, Field System, Crop Pattern; Soil, Seeds, Conditions, Crops.
D. Land Revenue System-Mechanism, Mode of Payment, Various Taxes and Tolls, Assesment.

UNIT 4: Administration and External relations:

A. Central and Provincial Administration; Village administration.
B. Mansabdari System.
C. Theory of Kingship, Nature of State.
D. External relations.

Classroom Strategy:

The major emphasis will be on theory aspect. Hence formal lectures will be given priority. Guest lecture, too, may be arranged depending upon the requirement of the course module. Projects, assignments, discussions and tutorial classes will form part of the class room teaching of the course. Graphics and videos may also form part of the teaching wherever it is required and possible.

Suggested readings:

- Irfan Habib, Agrarian System of Mughal India (1556-1707), IInd revised addition, New Delhi: OUP, 1999.
- Ashin Das Gupta, Indian Merchants and the Decline of Surat C 1700-1750, New Delhi: Manohar, 1994 (First published in 1978).
- Ashin Das Gupta, The World of the Indian Ocean Merchants (Collected Essays), New Delhi: OUP
- Shireen Moosvi, The Economy of the Mughal Empire, New Delhi: OUP, 1987.
- Holden Furber, Rival Emopires of Trade in the Orient, 1600-1800, Minneapolis, 1976.
- Muzaffar Alam, The Crisis of Empire in Mughal North India: Awadh and the Punjab, 1707-1748, New Delhi, OUP, 1986
- P.J. Marshall, The Eighteenth Century in Indian History: Evolution or Revolution? New Delhi: OUP, 2003.
- S. Arasaratnam: Maritime Trade in the 17th Century, OUP, 1981.
- Irfan Habib: Atlas of the Mughal Empire, OUP, 1982.
- Satish Chandra: Essays in Medieval Indian History, OUP, 2003.
- Seema Alavi (ed.). Eighteenth Century in India, OUP, 2001.
- Kanakalatha Mukund: The World of the Tamil Merchant, Orient Longman, 2002.
- I.A.Khan, Serais in the Mughal Empire.
- H.K.Naqvi: Urbanisation and Urban centers under the Great Mughals.
- John, F.Rirhcards (ed.). Monetary system in Mughal India.
- Sanjay Subramaniam: Political Economy of Commerce.
- Sanjay Subramaniam: (ed.). Merchants, markets and capital in pre-modern India.
- S.C.Malik: Dissent and Protest in Indian Tradition.
- Kotani (ed.): Caste, Untouchability and the Depressed, Manohar, 1997.
- David Mandelbaum: Society in India, Delhi, 1970.
- H. Qureshi, The Administration of the Mughal Empire
- N. Sarkar, Mughal Administration
- S. R. Sharma, Mughal Administration
- U. N. Dey, The Mughal Govt.
- R. P. Tripathi, Some Aspects of Muslim Administration
- R. P. Khosla, Mughal Kingship and Nobility.
- Ibn Hasan, Central Structure of Mughal Empire

SEMESTER: III MEDIEVAL INDIA:

1200 AD-1757 AD

PAPER: 4: SOCIO-CULTURAL TRANSFORMATION IN MEDIEVAL INDIA

Number of credits: **2**

Nature of course: **DCEC**

Aim of the course: The broad aim is to make students understand the various facets of Delhi Sultanate.

Objective of the course:

i. To develop a critical understanding of the subject;
ii. To the deep understanding of various socio-cultural transformation during the Mughal India;
iii. To understand the development of various art forms.

UNIT 1: The Bhakti and the Sufi Movement:

A. Bhakti Movement: Historiography; Origin, Causes, Spread and Impact.
B. Types-Traditional, Radical, Female saints.
C. Sufism-Historiography, Development, Impact.
D. Major Sufi Sects/Silsilahs.

UNIT 2: Architecture:

A. Historiography.
B. Under Akbar, Jehangir and Shahjahan.
C. Under Aurangzeb and Later Mughals.
D. Features.

UNIT 3: Painting:

A. Historiography, Evolution and its Importance as a Source of History.
B. Development of Painting-Miniature, Portrait, Book Illustration, European, Asiatic and Indian Influences.
C. Pahari Paintings-Kangra, Basoli and Garhwal.
D. Regional Paintings-Rajput Paintings and Deccani Tradition.

UNIT 4: Broader Canvas of the Society:

A. Evolution of Composite Indo-Islamic Culture.
B. Religious Policies of Mughal Emperors and the Policy of Co-existence.
C. Secular Aspects of Society-Food, Dress, Festivals, Sports and Fairs.
D. Position of Women, Harem and Transgender.

Classroom Strategy:

The major emphasis will be on theory aspect. Hence formal lectures will be given priority. Guest lecture, too, may be arranged depending upon the requirement of the course module. Projects, assignments, discussions and tutorial classes will form part of the class room teaching of the course. Graphics and videos may also form part of the teaching wherever it is required and possible.

Suggested Reading:

- S.A.A. Rizvi: Muslim Revivalist Movements in Northern India in the Sixteenth and Seventeenth
- Centuries (reprint. New Delhi: 1993)
- Y.Friedman: Shaikh Ahmad Sirhindi: An outline of his thoughts and a study of his image in the eyes of Posterity (Mc. Gill, Canada: 1971)
- Carl Earnst: The Eternal Garden (New York, 1993)
- J.S. Tirmingham: Sufi Orders of Islam (London, 1971)
- Amin Maalouf: The Crusades Through Arab Eyes (London, 1986)
- Francis Robinson, Ulema of Firangi Mahal, Oxford University Press, Delhi, 2000.
- Afri, Saiyid Zaheer Husain (2006). The Islamic Path: Sufism, Politics, and society in India. New
- Delhi: Konrad Adenauer Foundation.
- Nile Green, Indian Sufism since the Seventeenth Century: Saints, Books and Empires in the
- Muslim Deccan (Routledge Sufi Series) 2009
- Saiyid Athar Abbas Rizvi, A History of Sufism In India, 2 Vols 2009
- Iwao Shima, Historical Development of the Bhakti Movement in India: Theory & Practice, by Schomer, Karine.
- McLeod, W. H., eds. (1987), The Sants: Studies in a Devotional Tradition of India, Motilal
- Banarsidass,
- Jayant Lele, Ed, Tradition and Modernity in Bhakti Movements,
- Hamid Hussain, Sufism and Bhakti Movement: Eternal Relevance, Manak, 2007
- B.N. Puri, M.N. Das, A Comprehensive History of India: Comprehensive history of medieval India
- K.M. Ashraf, Life and Conditions of the people of Hindustan
- P.N. Ojha, Some Aspects of North Indian Social life. (1556-1701 AD)
- P.N. Chopra, Some Aspects of Social Life during Mughal age.
- K.A. Nizami, Studies in Medieval Indian Society and Culture
- N.N.Law, Promotion of learning in India.
- Rashid Ali, Society and Culture in Medieval India.
- K.P.Sahu, Some Aspects of Social life in Northern India.
- A.L.Srivastav, Madhyakalin Bhartiya Sanskriti.
- Steven Kossak, Indian Court Painting: 16^{th}-19^{th} Century.
- P C Jain & Dr Daljeet, Fiction In Mughal Miniature Painting
- Stuart Cary Welch, India: Art and Culture, 1300-1900.
- George Michell & Amit Pasricha, Mughal Architecture and Gardens.
- Catherine B. Asher, Architecture of Mughal India.
- R Nath, History of Mughal Architecture, All 4 volumes.

SEMESTER: III

MEDIEVAL INDIA

PAPER: 5: GENDER AND WOMEN IN MEDIEVAL INDIA

Number of credits: **4**

Nature of course: **GE**

Aim of the course: The broad aim is to acquaint students with the basic understanding of the history of women in Mughal India.

Objective of the course:

i. To understand position of women in different aspects.
ii. To develop a critical reading of the subject;

UNIT 1:

A. Historiography.
B. Imperial Women-Petticoat Government, Matrimonial Relations with the Rajputs, Nurjehan Junta Jahanara's trading activities.
C. Sovereignty and the 'domestic' domain: women's agency in Turk-o-Mongol tradition; imperial women and the establishment of Mughal rule; Harem and sovereignty.
D. Courtly Love, Body and Emotion.

UNIT 2:

A. Common Women-Everyday Life, Household Life, Space within House.
B. Legal Rights, Rights over property, Divorce, Education.
C. Economic Activities, Labourer.
D. Prostitutes, Entertainer.

UNIT 3:

A. Literature and Women.
B. Socio-Religious Reform Movement and Women.
C. Health, Medicines and Women.
D. Urbanization and Growing Trading Activities and its Impact on women.

Classroom strategy:

The major emphasis will be on theory aspect. Hence formal lectures will be given priority. Guest lecture, too, may be arranged depending upon the requirement of the course module. Projects, assignments, discussions and tutorial classes will form part of the class room teaching of the course.

Suggested readings:

- Ruby Lal, Domesticity and Power in the Early Mughal World (Cambridge, 2005)
- Harbans Mukhia, The Mughals (Delhi: 2009)
- Farhat Hasan, State and Locality in Mughal India: Power Relations in Western India, c. 1572-1730 (Cambridge, 2005), chapter V.
- Leila Ahmed, Women and Gender in Islam: Historical Roots of a Modern Debate (Yale

University Press, 1992)
- Ruby Lal 'Historicizing the harem: The Challenge of a Princess's Memoir' Feminist Studies, 30, 3 (Fall/winter 2004)
- Leslie P. Pierce, The Imperial Harem: Women and Sovereignty in the Ottoman Empire (New York: 1993)
- Gavin Hambly (ed.), Women, Patronage and Self-representation in Islamic Societies (Albany: 2000)
- Afsaneh Najmabadi, Women with Moustaches and Men without Beards: Gender and Sexual Anxieties of Iranian Modernity (Berkeley, 2005)
- Rosalind 'Hanlon 'Manliness and Imperial Service in Mughal North India' JESHO, 42 (February 1999), 47-93
- Rosalind O 'Hanlon 'Kingdom, Household and Body: History Gender and Imperial service under bar' MAS, 41, 5 (2007), 887-922
- Farhat Hasan 'Norms and motions in the Ardhakathanaka' in Vijaya Ramaswamy ed. Biography as History (Delhi, 2009).

SEMESTER: III MEDIEVAL INDIA:

1200 AD-1757 AD

PAPER: 6: MEDIEVAL INDIAN IDEAS AND INSTITUTIONS

Number of credits: 4

Nature of course: GE

Aim of the course: The broad aim is to make students understand the various ideas and instutions which were integral part of Delhi Sultanate.

Objective of the course:

i. To develop a critical understanding of the subject;
ii. To develop a deep understanding of various political ideas and institutions;

UNIT 1: Sources:

A. Persian.
B. Other Indian Literary Sources.
C. Epigraphical Sources.
D. Foreign Accounts-English, French, Portugese, Others.

UNIT 2: Administrative Aspects:

A. Delhi Sultanat- Nature of State; Kingship-Nature and Features.
B. Mughal India-Nature of State; Kingship-Nature and Features; Mansabdari System.
C. Vijayanagar Empire- Nature of State; Kingship-Nature and Features.
D. Bahmani Empire- Nature of State; Kingship-Nature and Features.

UNIT 3: Law and Legal Institutions:

A. Major Resources.
B. Under Delhi Sultanat.
C. Under Mughal India.
D. Law and Legal Institutions at Regional Kingdoms-Bahmani and Vijaynagar Empire.

UNIT 4: Social-Religious Aspects:

A. Social Stratification in Medieval India-Caste, Race and Religion.
B. Social Stratificaton at Regional Kingdoms-Vijaynagar and Bahmani Kingdoms.
C. Religious Foundation-Sufism, Islam, Jainism, Sikhism, Hinduism-Vaisanavism, Shaivism, Bhakti.

Classroom Strategy:

The major emphasis will be on theory aspect. Hence formal lectures will be given priority. Guest lecture, too, may be arranged depending upon the requirement of the course module. Projects, assignments, discussions and tutorial classes will form part of the class room teaching of the course. Graphics and videos may also form part of the teaching wherever it is required and possible.

Suggested Reading:

- J.S. Tirmingham : Sufi Orders of Islam (London, 1971)
- Nile Green , Indian Sufism since the Seventeenth Century: Saints, Books and Empires in the Muslim Deccan (Routledge Sufi Series) 2009
- K.A. Nizami, Studies in Medieval Indian Society and Culture

- N.N.Law, Promotion of learning in India.
- Sharma; Mughal Government and Administration; Bombay, 1951.
- Shastri Nikanta K. A.: History of South India (2nd Ed.); Madras, 1958 (3rd ed.), 1966.
- Mahalingam, T.V.: Economic Life in the Vijayanagar Empire; Madras, 1951.
- Qureshi, I. A. : The Administration of Mughal Empire; Pa, 1975
- Qureshi; I. A.: The Administration of Sultanat of Delhi; Lahore (2nd ed.), 1944.
- Tapan Rayachaudhari and Ifran Habib (eds.): The Cambridge Economic History of India; Vol. I. c. 1200-c. 1750, Hydrabad, 1984.
- Wright H. Nelson: Coinage and Metrology of the Sultans of Delhi; Delhi, 1936, rpt. 1974.
- Chitnis, K. N.: Glimpses of Medieval Indian Ideas and Institutions; 2nd ed., Pune, 1981.
- Chitnis, K. N.: Socio-Economic Aspects of Medieval India; Pune, 1979.
- Hasan, Ibn: The Central Structure of the Mughal Empire; London, 1936.
- Husaini, S. A. O.: Administration under the Mughals; Dacca, 1952.
- Mahalingam, T. V.: Administration and Social Life under Vijaynagar; Madras.
- Moreland, W. H.: The Agrarian system of Muslim India: A Historical Essay with Appendices; Cambridge, 1929.
- Moreland, W. H.: Akbar to Aurangzeb - A Study of Indian Econiomic History; London, 1923.
- Saletore, B. A.: Social and Political Life in the Vijaynagar Empire; 2 Vols. Madras, 1934.
- Sarkar, Sir Jadunath: Mughal Administration; Calcutta, 1963.
- Yusuf, Husain: Glimpses of Medieval Indian Culture.
- U. N. Day: The Government of the Sultanat.
- U. N. Day: The Mughal Government; New Delhi, 1970.
- Mahalingam, T. V.: South Indian Policy; Madras, 1970.
- Tara Chand: Influence of Islam on Indian Culture; Allahabad, 1946.
- Ansari, M. A.: European Travellers under the Mughals India; New Delhi, 1968.
- Blochmann, H.: Ain-i-Akbari of Abul Fazl; Vol.I, tr., New Delhi, 1965.
- Jarrett. H. S.: Ain-i-Akbari of Abul Fazl; Vol.II, tr. Calcutta, 1891.
- Ahmad, Aziz: Studies in Islamic Culture in the Indian Environment; Oxford, 1964.
- Ather Ali- The Mughal Nobility under Aurangazeb; New York, 1966.
- Aziz Abdul: The Mansabdari System and the Mughal Army; Lahore, 1945.
- Aziz Ahmed: An Intellectual History of Islam in India; Edinburgh.
- Nurul Hasan: Thoughts on Agrarian Relations in Mughal India; New Delhi, 1975.
- Rashid A.: Society and Culture in Medieval India; Calcutta, 1969.
- Roy Choudhary, M. L.: The State and Religion in Mughal India; Calcutta, 1969.
- Siddiqui, N. A.: Land Revenue Administration under the Mughals (1700-1750); Bombay, 1962.
- Shrivastava, A. L.: Medieval Indian Culture; Agra, 1964.
- Tripathi, R. P.: Some Aspects of Muslim Administration; Allahabad, 1936.
- Yasin, Mohammad: A Social History of Islamic India; 1605-1748, Lucknow, 1958.
- Mishra, Rekha: Women in Mughal India (1526-1748 A.D.); Delhi, 1967.
- Rizvi, S. A. A. : Religious and Intellectual History of the Muslims in Akbar‟s Reign; New Delhi, 1975.
- Sahay, B. K.: Education and Learning under the Great Mughals 1526-1707 A.D; Bombay, 1968.
- Bhattacharya, N. N. (ed.): Medieval Bhakti Movement in India.
- Sherwani, H. K.: Studies in the History of Early Muslim Political Thought and Administration; Lahore, 1942.

SEMESTER: III MEDIEVAL INDIA:

1200 AD-1757 AD

PAPER: 7 : HISTORY OF THE MARATHAS

Number of credits: **4**

Nature of course: **GE**

Aim of the course: The broad aim is to acquaint students with the deep understanding of the rise and development of the Marathas as an important political power of India.

Objective of the course:

i. To understand the rise of the Marathas.
ii. To know the development of administration, military and a complete empire.
iii. To know the factors for their decline and their impact on Indian polity.

UNIT 1: Political HIstory:

A. Historiography & Sources-Lieterary, Persian, Sanskrit, Maratha, Foreign, Archival, Role of Administrators like Sardesai, Sane, Khare, Rajwade in Publishing Various Sources.
B. Political Situation in Maharashtra on the eve of the Rise of Maratha Power.
C. Shivaji-His Early Days and the Swarjya; His Coronation-Its Significance; Wars, Career and Evaluation; Foreign Relations of Shivaji-French, Portugese, British, Siddis; Relation with-Deccan Powers and Mughals.
D. Sambhaaji-Career and Achievments; Later Marathas and the Rule of Peshwas.

UNIT 2: Administration:

A. Kingship-Under Shivaji and Peshwas.
B. Administration-Central: Council of Ministers and Secretariat; Provincial-Under Royal Authority and Under Peshwas; Peshwas and the Maratha Confederacy.
C. Judicial Administration-Sources of Law, Judiciary at the Centre; Gotsabha, Brahmasabha, Village Panchayat; Police, Civil Offences, Crimes & Punishments, Judicial Procedure.
D. Military Administration-Division of Army, Their Organization, Naval Organization, Fort and Fort Organization.

UNIT 3: Socio-Economic & Cultural History:

A. Social Condition-Social Structure, Caste, Communities, Women, Village society, Entertainment, Fairs, Festivals, Education.
B.
    a. Economic Condition-Agriculture-Climate, Soil, Types of Crops Grown, Technology & Tools, Cropping Pattern; Land Revenue-Assessment, Method; Famines & Relief Measures.
    b. Trades & Commerce-Industries and Handicrafts, Trading Centres, Trading Routes, Technology; Banking and Currency-Types of Coins, Mints, Banking Houses; Instrument of Credit-Hundi, Varat.

c. Income & Expenditure of State-Income-Land Revenue as a Source, Chauth, Sardeshmukhi, Other Taxes; Expenditure-Royalty and the Central Administration, Provincial Administration, Military & Wars, Agriculture, Charity and Others.

C. Growth and Features of Marathi Culture; Impact of Islamic Culture on Maharashtra; Literature-Poets; Chronicles/Bakhars; Sahiri; Art and Architecture.

D. Religious Cults-Major: Mahanubhav Cult, Wakari Cult-Problem of Vithoba, Ramdasi Cult; Minor Cult-Nath, Datta, Shakti; Maharshtra Dharma-Meaning, origin, Development, Impact; Social Relations, Mobility, Customs, Manners.

UNIT 4: Decline:

A. Causes.
B. Responsibility.
C. Anglo-Maratha wars and Treaties.

Classroom strategy:

The major emphasis will be on theory aspect. Hence formal lectures will be given priority. Guest lecture, too, may be arranged depending upon the requirement of the course module. Projects, assignments, discussions and tutorial classes will form part of the class room teaching of the course.

Suggested readings:

- Sarkar, J. N.: Shivaji and his times; New Delhi, 1973.
- Sardesai, G. S.: New History of Marathas; Vol. I, Bombay, 1971.
- Setu Madhavrao Pagadi: Chhatrapati Shivaji, 1974.
- Sarkar, J. N.: House of Shivaji; New Delhi, 1978.
- Ranade, M. G.: Rise of Maratha Power; Bombay, 1900.
- Rawlinson and Patwardhan: A Source Book of Maratha History; Calcutta, 1978.
- Yazdani, G.: Bidar–Its History and Movements; Oxford, 1947.
- Radhey Shyam: A Kingdom of Ahmednagar.
- Kulkarni, G. T.: The Moghul - Maratha relations Twenty-five fateful years (1682-1707); Pune, 1983
- Kulkarni, A. R.: Maharashtra in the Age of Shivaji; Pune, 1969.
- Sen, S. N.: Administrative System of the Marathas; Calcutta, 1976.
- Sen, S. N.: Military System of the Marathas; New Delhi, 1970.
- Chitnis, K. N.: Glimpses of Medieval Indian Ideas and Institutions; Pune, 2nd edition, 1981.
- Chitnis, K. N.: Socio-Economic aspects of Medieval India; Pune, 1979.
- Divekar, V. D.: Survey of Material in Marathi on the Economic and Social History of India.
- Joshi, S. N. and Bhingare, L. M. (eds.) Ajnapatra Ani Rajnoti; Pune, 1960.
- Gune, V. T.: Judicial System of the Maratha; Pune, 1954.
- Kamble, B. R. (ed.): Studies in Shivaji and his times; Shivaji University, 1982.
- Desai, Sudha: Social life in Maharashtra under the Peshwas Period; Bombay, 1980.
- Mahajan, T. T.: Industry, Trade and Commerce during the Peshwas Period; Jaipur, 1980.
- Fukuzewa, H. : Land and peasant in the eighteenth century Maratha Kingdom Histotahubashi
- Journal of Economics; VI (I), P, Pune, 1976.
- Sardesai, G. S.: New History of Marathas; Vol. II and III.
- Saxena: Maratha Relations with the major states of Rajputana.
- Muddachari, B.: Resistance of Mysore to the Maratha expansion—1726-1761.
- Gupta, H. R. (ed.): Marathas and Panipat.
- Srinivasan, C.K. : Marathas rule in carnatic
- Sen, S. N.: Anglo-Maratha Relation (1785-8196), Calcutta, 1974.

- Hatalkar, V.G.: Relations between the French and theMarathas (1668-1815).
- Sinha, H. N.: Rise of the Peshwas.
- Mujumdar, R. C. (ed.): Bhartiya Vidya Bhavan Series- Maratha Supremacy.
- Acharya, K. A.: Maratha-Rajput Relations, From 1720- 1795. A.D.; Akda. 1978.
- Kakodkar, P.R.: The Portuguese and the Marathas; Bombay, 1975.
- Grant Duff: History of the Marathas; Vol. II and III.
- Vaidya, S. G.: Peshwa Bajirao II and downfall of the Maratha Power.
- Sardesai, G. S.: Selections from the Peshwas Daftar; Vol. I to 45.
- Shejwalkar, T. S.: Panipat; 1761.
- Ballahatchet, K. A.: Social Policy and Social change in Western India.
- Desai, Sudha: Social Life under the Peshwas.
- Rao, M. Rama: Social Conditions in Medieval Deccan; Q.R. of HS, Vol. V. No. 4 (1955-56).Sardesai, G. S.: New History of Marathas; Vol. II and III.
- Saxena: Maratha Relations with the major states of Rajputana.

SEMESTER: III

MEDIEVAL INDIA

PAPER: 8 : GENDER AND WOMEN IN MEDIEVAL INDIA

Number of credits: **4**

Nature of course: **DCEC**

Aim of the course: The broad aim is to acquaint students with the basic understanding of the history of women in Mughal India.

Objective of the course:

i. To understand position of women in different aspects.
ii. To develop a critical reading of the subject;

UNIT 1:

A. Historiography.
B. Imperial Women-Petticoat Government, Matrimonial Relations with the Rajputs, Nurjehan Junta, Jahanara's trading a ctivities.
C. Sovereignty and the 'domestic' domain: women's ascendency in Turk-o-Mongol tradition; imperial women and the establishment of Mughal rule; Harem and sovereignty.
D. Courtly Love, Body and Emotion.

UNIT 2:

A. Common Women-Everyday Life, Household Life, Space within House.
B. Legal Rights, Rights over property, Divorce, Education.
C. Economic Activities, Labourer.
D. Prostitutes, Entertainer.

UNIT 3:

A. Literature and Women.
B. Socio-Religious Reform Movement and Women.
C. Health, Medicines and Women.
D. Urbanization and Growing Trading Activities and its Impact on women.

UNIT 4:

A. Women in Early Medieval and Sultanat Period.
B. Women in Vijayanagar and Behmani Kingdom
C. Women in Mughal Period.
D. Women in Maratha Period.

Classroom strategy:

The major emphasis will be on theory aspect. Hence formal lectures will be given priority. Guest lecture, too, may be arranged depending upon the requirement of the course module. Projects, assignments, discussions and tutorial classes will form part of the class room teaching of the course.

Suggested readings:

- Ruby Lal, Domesticity and Power in the Early Mughal World (Cambridge, 2005)
- Harbans Mukhia, The Mughals (Delhi: 2009)
- Farhat Hasan, State and Locality in Mughal India: Power Relations in Western India, c. 1572-
- 1730 (Cambridge, 2005), chapter V.
- Leila Ahmed, Women and Gender in Islam: Historical Roots of a Modern Debate (Yale
- University Press, 1992)
- Leslie P. Pierce, The Imperial Harem: Women and Sovereignty in the Ottoman Empire (New York: 1993)
- Gavin Hambly (ed.), Women, Patronage and Self-representation in Islamic Societies (Albany:2000)
- Afsaneh Najmabadi, Women with Moustaches and Men without Beards: Gender and Sexual Anxieties of Iranian Modernity (Berkeley, 2005)
- Rosalind 'Hanlon ' anliness and Imperial ervice in u hal North India' JESHO, 42 (February 1999), 47-93
- Rosalind 'Hanlon ' in dom Household and Body: History Gender and Imperial ervice under bar' MAS, 41, 5 (2007), 887-922
- Farhat Hasan 'Norms and motions in the Ardhakathanaka' in ijaya Ramaswamy ed. Biography as History (Delhi, 2009).

SEMESTER: III

MEDIEVAL INDIA

PAPER: 9 : SCIENCE AND TECHNOLOGY IN MEDIEVAL INDIA

Number of credits: **4**

Nature of course: **DCEC**

Aim of the course: The broad aim is to acquaint students with the deep understanding of the health of science and technology in Mughal India.

Objective of the course:

i. To understand the technical development during this period.
ii. To know how it helped in the progress of the Mughal era.

UNIT 1: Introduction:

A. Historiography.
B. Introduction to the History of Science and Technology.
C. Traditions, Changes and Continuity.
D. Mughal Emperors and Science and Technology.

UNIT 2: Development in Various Fields:

A. Technology in Agriculture.
B. Technology in Industry.
C. Military Technology.
D. Technology and the Every Day Life.

UNIT 3: Spread and Development:

A. Health and Medicine; Beliefs and Practices; Concept of Pure, Impure, Sanitation and hygiene.
B. Inventions and Innovations; Centres; Impact of Technological Development.
C. Dissemination of Knowledge; Agencies of Dissemination; Centres of Exchange; Indian Science and Interaction with the Arab World and with Other South Asian Countries.

UNIT 4: Medieval Science and Tehcnology and Literature:

A. Sanskrit
B. Arabic and Persian
C. Vernacular Literature

Classroom strategy:

The major emphasis will be on theory aspect. Hence formal lectures will be given priority. Guest lecture, too, may be arranged depending upon the requirement of the course module. Projects, assignments, discussions and tutorial classes will form part of the class room teaching of the course.

Suggested readings:

- Debiprasad Chattopadhyaya, History of Science and Technology in Ancient India, Vol.III, Calcutta, 1996
- A.Rahman, (ed) History of Indian Science, Technology and Culture, A.D.1000-1800, OUP, New Delhi, 1999
- David Gosling, Science and Religion in India, Madras, 1976
- Bruce T Moran,(ed) Patronage and Institutions; Science Technology andMedicine at The European Court, 1500-1750,.Rochester, New York, 1991
- I A Khan, Gunpowder and Firearms: Warfare in Medieval India, Oxford University Press, New Delhi, 2004
- S. Subramaniam (ed).Merchants, Markets and State in Early Modern India, New Delhi, 1990
- Mattison Mines, The Warrior Merchants, Textiles, Trade, and Territory in South India, CUP, 1984
- Ashoke K Bagchi, Medicine in Medieval India: 11th to 18th Centuries, Konark Publishers, Delhi, 1997
- Michel Foucault, The Birth of The Clinic, An Archaeology of Medial Perception, Vintage Books, New York, 1973,
- Beni Gupta, Medical Beliefs and Superstitions, Sundeep Prakashan, Delhi, 1979
- Seema Alavi, Islam and Healing: Loss and Recovery of an Indo-Muslim Medical Tradition 1600- 1900, Palgrave Macmillan, 2008.

SEMESTER: III MEDIEVAL INDIA:

1200 AD-1757 AD

PAPER: 10: HISTORY OF THE MARATHAS

Number of credits: **4**

Nature of course: **GE**

Aim of the course: The broad aim is to acquaint students with the deep understanding of the rise and development of the Marathas as an important political power of India.

Objective of the course:

i. To understand the rise of the Marathas.
ii. To know the development of administration, military and a complete empire.
iii. To know the factors for their decline and their impact on Indian polity.

UNIT 1: Political HIstory:

A. Historiography & Sources-Lieterary, Persian, Sanskrit, Maratha, Foreign, Archival, Role of Administrators like Sardesai, Sane, Khare, Rajwade in Publishing Various Sources.
B. Political Situation in Maharashtra on the eve of the Rise of Maratha Power.
C. Shivaji-His Early Days and the Swarjya; His Coronation-Its Significance; Wars, Career and Evaluation; Foreign Relations of Shivaji-French, Portugese, British, Siddis; Relation with-Deccan Powers and Mughals.
D. Sambhaaji-Career and Achievments; Later Marathas and the Rule of Peshwas.

UNIT 2: Administration:

A. Kingship-Under Shivaji and Peshwas.
B. Administration-Central: Council of Ministers and Secretariat; Provincial-Under Royal Authority and Under Peshwas; Peshwas and the Maratha Confederacy.
C. Judicial Administration-Sources of Law, Judiciary at the Centre; Gotsabha, Brahmasabha, Village Panchayat; Police, Civil Offences, Crimes & Punishments, Judicial Procedure.
D. Military Administration-Division of Army, Their Organization, Naval Organization, Fort and Fort Organization.

UNIT 3: Socio-Economic & Cultural History:

A. Social Condition-Social Structure, Caste, Communities, Women, Village society, Entertainment, Fairs, Festivals, Education.
B.
    a. Economic Condition-Agriculture-Climate, Soil, Types of Crops Grown, Technology & Tools, Cropping Pattern; Land Revenue-Assessment, Method; Famines & Relief Measures.
    b. Trades & Commerce-Industries and Handicrafts, Trading Centres, Trading Routes, Technology; Banking and Currency-Types of Coins, Mints, Banking Houses; Instrument of Credit-Hundi, Varat.

c. Income & Expenditure of State-Income-Land Revenue as a Source, Chauth, Sardeshmukhi, Other Taxes; Expenditure-Royalty and the Central Administration, Provincial Administration, Military & Wars, Agriculture, Charity and Others.

C. Growth and Features of Marathi Culture; Impact of Islamic Culture on Maharashtra; Literature-Poets; Chronicles/Bakhars; Sahiri; Art and Architecture.

D. Religious Cults-Major: Mahanubhav Cult, Wakari Cult-Problem of Vithoba, Ramdasi Cult; Minor Cult-Nath, Datta, Shakti; Maharshtra Dharma-Meaning, origin, Development, Impact; Social Relations, Mobility, Customs, Manners.

UNIT 4: Decline:

A. Causes.
B. Responsibility.
C. Anglo-Maratha wars and Treaties.

Classroom strategy:

The major emphasis will be on theory aspect. Hence formal lectures will be given priority. Guest lecture, too, may be arranged depending upon the requirement of the course module. Projects, assignments, discussions and tutorial classes will form part of the class room teaching of the course.

Suggested readings:

- Sarkar, J. N.: Shivaji and his times; New Delhi, 1973.
- Sardesai, G. S.: New History of Marathas; Vol. I, Bombay, 1971.
- Setu Madhavrao Pagadi: Chhatrapati Shivaji, 1974.
- Sarkar, J. N.: House of Shivaji; New Delhi, 1978.
- Ranade, M. G.: Rise of Maratha Power; Bombay, 1900.
- Rawlinson and Patwardhan: A Source Book of Maratha History; Calcutta, 1978.
- Yazdani, G.: Bidar–Its History and Movements; Oxford, 1947.
- Radhey Shyam: A Kingdom of Ahmednagar.
- Kulkarni, G. T. : The Moghul - Maratha relations Twenty-five fateful years (1682-1707); Pune, 1983
- Kulkarni, A. R.: Maharashtra in the Age of Shivaji; Pune, 1969.
- Sen, S. N.: Administrative System of the Marathas; Calcutta, 1976.
- Sen, S. N.: Military System of the Marathas; New Delhi, 1970.
- Chitnis, K. N.: Glimpses of Medieval Indian Ideas and Institutions; Pune, 2nd edition, 1981.
- Chitnis, K. N.: Socio-Economic aspects of Medieval India; Pune, 1979.
- Divekar, V. D.: Survey of Material in Marathi on the Economic and Social History of India.
- Joshi, S. N. and Bhingare, L. M. (eds.) Ajnapatra Ani Rajnoti; Pune, 1960.
- Gune, V. T.: Judicial System of the Maratha; Pune, 1954.
- Kamble, B. R. (ed.): Studies in Shivaji and his times; Shivaji University, 1982.
- Desai, Sudha: Social life in Maharashtra under the Peshwas Period; Bombay, 1980.
- Mahajan, T. T.: Industry, Trade and Commerce during the Peshwas Period; Jaipur, 1980.
- Fukuzewa, H.: Land and peasant in the eighteenth century Maratha Kingdom Histotahubashi Journal of Economics; VI (I), P, Pune, 1976.
- Sardesai, G. S.: New History of Marathas; Vol. II and III.
- Saxena: Maratha Relations with the major states of Rajputana.
- Muddachari, B.: Resistance of Mysore to the Maratha expansion—1726-1761.
- Gupta, H. R. (ed.): Marathas and Panipat.
- Srinivasan, C.K. : Marathas rule in carnatic
- Sen, S. N.: Anglo-Maratha Relation (1785-8196), Calcutta, 1974.

- Hatalkar, V.G.: Relations between the French and theMarathas (1668-1815).
- Sinha, H. N.: Rise of the Peshwas.
- Mujumdar, R. C. (ed.): Bhartiya Vidya Bhavan Series- Maratha Supremacy.
- Acharya, K. A.: Maratha-Rajput Relations, From 1720- 1795. A.D.; Akda. 1978.
- Kakodkar, P.R.: The Portuguese and the Marathas; Bombay, 1975.
- Grant Duff: History of the Marathas; Vol. II and III.
- Vaidya, S. G.: Peshwa Bajirao II and downfall of the Maratha Power.
- Sardesai, G. S.: Selections from the Peshwas Daftar; Vol. I to 45.
- Shejwalkar, T. S.: Panipat; 1761.
- Ballahatchet, K. A.: Social Policy and Social change in Western India.
- Desai, Sudha: Social Life under the Peshwas.
- Rao, M. Rama: Social Conditions in Medieval Deccan; Q.R. of HS, Vol. V. No. 4 (1955-56).Sardesai, G. S.: New History of Marathas; Vol. II and III.
- Saxena: Maratha Relations with the major states of Rajputana.

SEMESTER: III

MEDIEVAL INDIA

PAPER: 11: VIJAYNAGAR AND BAHAMANI EMPIRE

Number of credits: **4**

Nature of course: **DCEC**

Aim of the course: The broad aim is to acquaint students with the deep understanding of the rise and development of strong regional powers juxtaposing the imperial Sultante rule.

Objective of the course:

i. To understand the rise of the Vijayanagar and the Bahamani powers.
ii. To know the development of administration, society, economy, military and a complete empire.
iii. To know the factors for their decline and their impact on Indian polity.

PART 1-VIJAYANAGAR EMPIRE

UNIT 1: Political Aspect:

A. Historiography; Sources-Literary, Architectural, Inscriptional, Numismatics.
B. Beginning-Origin-Various Theories; Imperial Line- Sangam Dynasty-Devaraya I & II, Suluva Dynasty, Tuluva Dynasty-Krishna Deva Raya.
C. Decline-Battle of Rakshasa Tangdi; Aravindu Dynasty; The End.
D. Off shoot-Keladi, Mysore, Tanjaur, Madurai.

UNIT 2: Socio-Ecoomic-Cultural-External Aspects:

A. Society-Social Set up, Caste, Village Set up, Position of Women.
B. Economy-Industries, Agriculture, Land and Other Sources of Revenue.
C. External Relations-With Bahamani Kingdom; With European Powers.
D. Culture-Art, Architecture, Literature, Customs & Manners, Festivals.

PART-2-BAHAMANI EMPIRE

UNIT 3: Political Aspect:

A. Historiography; Sources-Literary, Archaeological, Inscriptions, Numismatics, Foreign Accounts.
B. The Foundation, Expansion, Decline, off shoots.
C. Extent-Bijapur, Golkonda, Ahmednagar.
D. Role of Chand Biwi in Defence of the Empire.

UNIT 4: Socio-Economic-Cultural Aspects:

A. Administration-Central and Provincial; relation with the Vijaynagar Empire.
B. Socio-Economic Conditions; Sources of income.
C. Cultural-Art, Architecture, Literature.
D. Religious Policy.

Classroom strategy:

The major emphasis will be on theory aspect. Hence formal lectures will be given priority. Guest lecture, too, may be arranged depending upon the requirement of the course module. Projects, assignments, discussions and tutorial classes will form part of the class room teaching of the course.

Suggested readings:

- R. Sewell: Forgotten Empire; New Delhi, 1980
- Heras, H.: The Aravindu Dynasty of Vijaynagar; Madras, 1927.
- Ramsharma M. H.: The History of the Vijaynagar Empire; Vol. I and II Bombay, 1978.
- Nilkanta Sastry, K. A.: A History of South India; 4th Edition Delhi, 1976.
- Venkataramanayyas: Early Muslim Expansion in South India; Madras, 1942.
- Major (ed.) India in the Fifteenth Century.
- Aiyangar, S. K.: South India and her Muhammeden Invader; Madras, 1921.
- Heras, H.: Beginnings of Vijaynagar; Bombay, 1934.
- Aijangar, S. K.: Sources of Vijaynagar; Madras, 1927.
- Krishnaswami Aiyangar, S.: Sources of Vijaynagar History; Delhi, re-print, 1986.
- Nilkantha Sastri, K. A. and Ramanayya, Venkata: Further Sources of Vijaynagar History; Madras, 1946.
- Satyanata Ayyar, R.: History of the Nayakas of Madura; 1924.
- Vriddhigirisan: Nayakas of Tanjore; Annamalainagar, 1942.
- Shrinivasan: Nayakas of Gingee.
- Appadorai, A., Economic Conditions of Southern India, 1000-1500 A.D., Madras, 1936 (2 vols).
- Dallapiccola, A.L., Vijayanagara: City and Empire (Stuttgart, 1992).
- Filliozat, Vasundhara, ed., Vijayanagar, New Delhi, 1977.
- Karashima, Noboru, South Indian History and Society: Studies from Inscriptions AD 850- 1800, New Delhi, 1984.
- Karashima, Noboru, South Indian Society in Transition: Ancient to Medieval, New Delhi, 2009.
- Karashima, Noboru, Towards a New Formation: South Indian Society under Vijayanagar Rule, New Delhi, 1992.
- Mahalingam, T.V., Administration and Social Life under Vijayanagar, Madras, 1940.
- Mahalingam, T.V., South Indian Polity, Madras, 1955.
- Narayana Rao, Velcheru, David Shulaman and Sanjay Subrahmanyam, Symbols of Substance: Court and State in Nayaka Period Tamilnadu, New Delhi, 1992.
- Narayana Rao, Velcheru, David Shulaman and Sanjay Subrahmanyam, Textures of Time: Writing History in South India 1600-1800, Delhi, 2001.
- Rubies, Joan-Pau, Travel and Ethnography in the Age of the Renaissance, Cambridge, 1995.
- Stein, Burton, Peasant State and Society in medieval South India New Delhi, 1980.
- Stein, Burton, Vijayanagara, Cambridge, 1990.
- Sherwani, H. K.: The Bahamanis of the Deccan; Hyderabad, 1953.
- Sinha, S. K.: Medieval History of the Deccan; Vol. I, Bahamins, Hyderabad, 1964.
- Shervani, H. K. and Joshi P. M. (ed.): History of Medieval Deccan (1295-1724); Vol.I (mainly Political and Military Aspects), Hyderabad, 1973.
- W. Haig: Historical Landmarks of the Deccan; Allahabad, 1907.
- Husain Agha M.: Khandesh in New Light; 1963.
- J. N. Chaudhary-Malik Amber.
- Qadir, A. S.: Memories of Chand Bibi-the Princes of Ahmednagar; Hyderabad, 1937.
- Sherwani, H. K.: Muhammad Qutb Qutti Shah— Founder of Hyderabad; London, 1968.
- Yazdani, G. Bidar: Its History and Movements; Oxford, 1947.
- Radhey Shyam: A Kingdom of Ahmednagar.
- Varma: History of Bijapur.

SEMESTER-III

MODERN INDIA

(1757 AD-1947 AD)

MODERN INDIA (1757 AD - 1947 AD)

SRL NO.	COURSE CODE	COURSES	L	T	P	CREDITS	CORE/DCEC/ GE
1	SAHS HA 010309 MOD C 5005	Historiography in Modern India	5	0	0	5	CORE
2	SAHS HA 010310 MOD C 5005	Rise of the British Empire in India: 1757-1857	5	0	0	5	CORE
3	SAHS HA 010311 MOD C 5005	Nationalist Movement: 1858-1947	5	0	0	5	CORE
4	SAHS HA 010304 MOD DCEC 2002	Seminar Paper (Compulsory) Constitutional History of India: 1773 Regulating Act to 1947 Act	2	0	0	2	DCEC
	To be Taken from Other Department					4	
		To be Taken from the Dept. of History & Archaeology					
5	SAHS HA 010305 MOD GE 4004	Nationalist Movement: 1858-1947	4	0	0	4	GE
6	SAHS HA 010306 MOD GE 4004	Introduction to Indian Marxism	4	0	0	4	GE
7	SAHS HA 010307 MOD GE 4004	History of Indian Cinema	4	0	0	4	GE
		Select any one of the following courses					
8	SAHS HA 010305 MOD DCEC 4004	Gender and Women in Colonial India	4	0	0	4	DCEC
9	SAHS HA 010306 MOD DCEC 4004	Science and Technology in Colonial India	4	0	0	4	DCEC

10	SAHS HA 010307 MOD DCEC 4004	Socio-Religious Movements and Cultural transformation in Colonial India	4	0	0	4	DCEC
11	SAHS HA 010308 MOD DCEC 4004	Communalism in Colonial India	4	0	0	4	DCEC
12	SAHS HA 010309 MOD DCEC 4004	History of Childhood	4	0	0	4	DCEC
13	SAHS HA 010310 MOD DCEC 4004	Peasants, Workers and Tribes in Colonial India (Identities, Revolts and Contestations)	4	0	0	4	DCEC
14	SAHS HA 010311 MOD DCEC 4004	Constitutional History of India: 1773 Regulating Act to 1947 Act	4	0	0	4	DCEC
						25	Total credit

NOTE: *One paper is to be taken from other department which will carry 4 credits.*

SEMESTER: III MODERN INDIA

PAPER: 1: HISTORIOGRAPHY IN MODERN INDIA

Number of credits: **5**

Nature of course: **CORE**

Aim of the course: The broad aim is to acquaint students with the deep understanding of the historiography of modern India with all its dissensions, consensus and alternative concepts.

Objective of the course:

i. To understand the beginning of historiography in modern India.

ii. To know the various schools of historians and history writing within their historical milieu.

iii. To construct history in its wider form on the basis of the historiographical traditions.

UNIT 1: Beginning:

A. Introduction to modern Indian historiography;
B. Foreign traveller's account in medieval and early modern Indian period;
C. European missionaries in India and their writings;
D. Indian history and British writings in 18th century;

UNIT 2: 18TH-19TH century and history writing:

A. Oriental studies in India; Major orientalists
B. Imperialist writings on India: Utilitarian and Evangelicals
C. Major imperialist historians
D. Marx's Asiatic mode of production

UNIT 3: History writing in India from 20th century to Our Age:

A. Nationalist History and Historians
B. Marxist Historiography and major historians
C. Subaltern Historiography
D. Rewriting Indian History: Politics or history

UNIT 4: Selected Themes of Modern Indian Historiography:

A. Historiography of Indian Nationalism.
B. Historiography of 1857 Revolt.
C. Historiography of India's Partition.
D. Economic Nationalism and History Writing.

Classroom strategy:

The major emphasis will be on theory aspect. Hence formal lectures will be given priority. Guest lecture, too, may be arranged depending upon the requirement of the course module. Projects, assignments, discussions and tutorial classes will form part of the class room teaching of the course.

Suggested reading:

- H.M. Elliot and John Dowson, The History of India as Told by its Historians: The Muhammadan Period, 8 vols, London, 1867-77. [Reprint, Delhi, 2001]
- S. W. Fallon, A New Hindustani English Dictionary (1879), Delhi: National Council for the Promotion of Urdu, 2004 (second edition).
- Arberry A.J. British Orientalists, William Collins, London, 1943
- Chaudhuri, Nirad C., Scholar Extraordinary: The life of Friedrich Max Muller, Orient Paperbacks, Delhi, 1974
- Currie, Kate, Beyond Orientalism K.P.Bagchi and Co, Calcutta, 1996
- Inden, Ronald, Imagining India, Blackwell, 1990 Keay, John, India Discovered, Collins, London, 1981
- Kejarival O.P, The Asiatic Society of Ben al and the discovery of India's past 1784-1838 Delhi, 1988
- Kopf, David, British Orientalism and the Indian Renaissance: the Dynamics of Indian Modernisation 1773-1835, University of california Press, Berkeley and Los Angeles,1969
- Mackenzie, John M., Orientalism: History, theory and the Arts, Manchester and New York, 1995, Manchester University Press.
- Javed n overned Ima inin s: James Mill's the History of British India and orientalism Oxford, The Clarendon Press, 1992
- Metrcalf, Thomas R., ideologies of the Raj, Cambridge University Press, 1987
- Mukherjee, S.N. Sir William Jones: A Study of Eighteeth century British attitudes to India, Bombay, orient Longman, 1987
- O' Leary Brendan, The Asiatic mode of production: oriental despotism Historical Materialism and Indian history.
- Said, Edward, Orientalism, pantheon Books, New York, 1987
- Teltscher, Kate, India Inscibed, OUP, New Delhi, 1995
- Trautmann, Thomas R., Aryands and British India, New Delhi, 1997, Sage
- Vistar Viswanathan, Gauri, Masks of Conquest: Literary Study and British rule in India, Faber and faber, London, 1990
- Daud Ali, ed., Viewing the Past, OUP, 2000
- Ranajit Guha et al. ed. Subaltern tudies .I-XII
- David Ludden, ed., Reading Subaltern Studies, Anthem Press, 2005
- Partha Chatterjee, ed., History and the Present, Permanent Black, 2003143
- Saurabh Dube ed., Post-Colonial Passages, OUP, 2004
- Sanjay subrahmanyam, Velcheru narayana rao and David Shulman., Textures of Time, OUP, 2001
- S.B. Chaudhuri, Civil Rebellion in the Indian Mutinies, World Press, Calcutta, 1957.
- P.C. Joshi (ed.), Rebellion 1857: A Symposium New elhi eople's ublishin house 1957.
- Rudrangshu Mukherjee, Awadh in Revolt: 1857-1858, Anthem Press, 2002.
- S. N. Sen, Eighteen Fifty-Seven, Delhi: Publications Division, 1957.

- Tapti Roy, The Politics of a Popular Uprising: Bundelkhand in 1857, Oxford University Press, 1994.
- Shireen Moosvi (ed.), Facets of the Great Revolt: 1857, Tulika Books, 2008.

SEMESTER: III MODERN INDIA: 1757 AD-1947 AD

RISE OF THE BRISTISH EMPIRE IN INDIA: 1757-1857

Number of credits: **5**

Nature of course: **CORE**

Aim of the course: The broad aim is to acquaint students with the in-depth knowledge of the process, mechanism, policies and events that made the British Empire possible in India.

Objective of the course:

i. To understand the process of empire building.

ii. To know the various wars, events and maneuvering that helped in the realization and continuation of the empire in India.

UNIT 1: Introduction:

A. Sources for Modern Indian History
B. Making of India in Foreign Traveler's Account
C. India in the 18th Century
D. Mughals and European Settlements in India

UNIT 2: Territorial Expansion, 1740-1818:

A. Anglo-French Rivalry and Carnatic wars

B. Struggle for supremacy over Bengal

C. Anglo- Mysore Relations

D. Anglo- Maratha Relations

UNIT 3: Paramountacy and Consolidation of British Imperial Interest, 1818-1857:

A. Anglo-Oudh relations; Anglo-Sikh relations

B. Anglo- Afghan Relation; Sind; Nepal and Burma

C. British Imperialism in India: 1798-1857

D. Revolt of 1857: Causes, Nature, Events and Consequences.

UNIT 4: Knowledge, Ideologies and Administrative Structure:

A. Production of Colonial Knowledge

B. Colonial Ideologies
C. Colonization of Indian Administration

D. Colonial Rule of Law

Classroom strategy:

The major emphasis will be on theory aspect. Hence formal lectures will be given priority. Guest lecture, too, may be arranged depending upon the requirement of the course module. Projects, assignments, discussions and tutorial classes will form part of the class room teaching of the course. **The 40 percent of this paper will be taught online and rest of it will be offline.**

Suggested readings:

- Bernard S. Cohn. *An Anthropologist among Historians*. Delhi: Oxford University Press, 1998.
- Bernard S. Cohn. *Colonialism and Its Forms of Knowledge*. Princeton: Princeton University Press, 1996.
- Disney, Anthony; Booth, Emily. *The Indian Ocean in World History*. New Delhi and New York: Oxford University Press, 2000.
- K.M. Panikkar. *Asia and Western Dominance: A Survey of the Vasco da Gama Epoch of Asian History, 1498-1945*. London: Allen & Unwin, 1959.
- Edward Atherton (Trans.). *The Adventures of Marcopolo: The Great Traveler*. London: D. Appleton and Company, 1912.
- H.A.R. Gibb. *Ibn Batuta: Travels in Asia and Africa, 1325-1354*. London: Routledge, 1929.
- V. Ball (Trans.). *Travels in India by Jean Baptiste Tavernier*. London: Macmillan and Co., 1889.
- Francois Bernier. *Travels in the Mogul Empire, 1656-1668*. London: Oxford University Press, 1916.
- M. Athar Ali. The Eighteenth Century: An Interpretation. *Indian Historical Review* 5 91-2): 175-86.
- Satish Chandra. *Parties and Politics at the Mughal Court, 1707-1740*. Delhi: Oxford University Press, 2004.
- M. Alam, *The Crisis of Empire in Mughal North India: Awadh and the Punjab*. Delhi: Oxford University Press, 1986
- Christopher Alan Bayly. *Indian Society and the Making of the British Empire*. Cambridge: Cambridge University Press, 1988.
- Christopher Alan Bayly. *Rulers, Townsmen and Bazaars: North Indian Society in the Age of British Expansion*. Cambridge: Cambridge University Press, 1983.
- P. Lawson. *The East India Company: A History*. London: Longmans, 1993.
- R. Barnett. *Rethinking Early Modern India*. New Delhi: Manohar, 2002.
- C.A. Bayly, *Imperial Meridian: The British Empire and the World 1780-1830*. London: Longman, 1989.
- P. Kennedy. *The Rise and Fall of the Great Powers: Economic Change and Military Conflict from 1500 to 2000*. New York: Vintage Books, 1987.
- J. M. Ward. *Colonial Self-Government: The British Experience 1759-1856.* Toronto: University of Toronto Press 1976.
- Douglas M. Peers. *India under Colonial Rule 1700-1885*. London: Routledge, 2013.
- J. Malcolm. *Political History of British India from 1784 to 1823.* New Delhi: Associated Pub. House 1970
- T.R. Metcalf. *Ideologies of the Raj.* Cambridge: Cambridge University Press, 1997.
- Eric Stokes. *The English Utilitarians and India*. Delhi: Oxford University Press, 1982.

- S. Alavi, *The Sepoys and the Company: Tradition and Transition in Northern India, 1770-1830*, Oxford University Press, 1995.
- Edward W. Said. *Orientalism: Western Conceptions of the Orient*. New Delhi: Penguin Books, 2001.
- O.P. Kejariwal. *The Asiatic Society of Bengal and the Discovery of India's Past*. New York: Oxford University Press, 1988.
- John Clark Marshal. *The Life and Times of Carey, Marshman and Ward: History of the Serampore Mission*. London: Spottiswoode and Co., 1859.
- Sisir Kumar Das. *Sahibs and Munshis: An Account of the College of Fort William*. New Delhi: Orion Publication, 1978.
- Singha, Radhika. *A Despotism of Law: Crime and Justice in Early Colonial India*. Delhi: OUP, 1998.
- Foucault, Michel. *Discipline and Punish: The Birth of the Prison*. New York: Vintage, 1995.
- Shekhar Bandopadhyay. *Plassey to Partition: A History of Modern India*. Hyderabad: Orient Longman, 2004.
- Ishita Banerjee-Dube. *A History of Modern India*. Cambridge: Cambridge University Press, 2015.

SEMESTER: III
MODERN INDIA: 1757 AD-1947 AD
NATIONALIST MOVEMENT: 1858-1947

Number of credits: 5

Nature of course: CORE

Aim of the course: The broad aim is to provide students a historical understanding of the factors, events, acts, policies, maneuvers and real politic that led to the emergence of a powerful force of nationalism in India and also to study the deep fissures within such force and how finally India received a divided independence.

Objective of the course:

i. To understand the historical factors for Indian nationalism.

ii. To know the local, national, international and British factors which were at work in the making of a nationalist movement in India.

iii. To understand the larger perspectives behind partition.

UNIT 1: Emergence of Indian Nationalism:

A. Historiography; Sources.

B. Formation of Associations in India: 1837-1885- Factors, Regions

C. Factors Responsible for the Emergence of Nationalism in India.

D. Indian National Congress from 1885-1916.

UNIT 2: India from 1905-1918:

A. Swadeshi Movement-The First Real Mass Movement.

B. Rise of Revolutionary Activities.

C. Home Rule Movement and its Impact.

D. First World War and the spread of Nationalism

UNIT 3: Gandhian Phase:

A. 1914-1917-From Mute Observer to Activist.

B. 1919-1922-Khilafat and Non-Cooperation Movement

C. 1922-1947: Civil Disobedience Movement, Quit India Movement.

D. Role of Gandhi in Freedom movement

UNIT 4: Alternative Ideologies and Movements:

A. The Swarajists.

B. The Revolutionary Nationalists

C. The Leftists

D. The INA Saga

Classroom strategy:

The major emphasis will be on theory aspect. Hence formal lectures will be given priority. Guest lecture, too, may be arranged depending upon the requirement of the course module. Projects, assignments, discussions and tutorial classes will form part of the class room teaching of the course. **The 30 percent of this paper will be taught online and rest of it will be offline.**

Suggested readings:

- Benedict Anderson. *Imagined Communities*: Reflections on the Origin and Spread of Nationalism. London: Verso, 1983.
- C.A. Bayly. *Origins of Nationality in South Asia: Patriotism and Ethical Government in the Making of Modern India.* London: Oxford University press, 2001.
- C.A. Bayly *The Local Roots of Indian Politics*, *1880-1920*, Oxford: Clarendon Press, 1975.
- Hayes, Carlton J.H. Nationalism: A Religion.
- Partha Chatterjee. *Nationalist Thought and the Colonial World: A Derivative Discourse.* Minneapolis: University of Minnesota Press, 1993.
- Gellner, Ernest. Nations and Nationalism.
- J. R. McLane. *Indian Nationalism and the Early Congress*, Princeton, N.J.: Princeton University Press, 1977.
- Anil Seal. *The Emergence of Indian Nationalism*. London: Cambridge University Press, 1971.
- Desai, A.R. *Social Background of Indian Nationalism*. Delhi: Sage Publications, 2016.
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- Ghosh, P.C. *The Development of the Indian National Congress. 1892-1909*. Calcutta: Firma, 1960.
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- Mehrotra, S.R. *The Emergence of Indian National Congress*. Delhi: Vikas, 1971.
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- Gordon, Richard. Non-Cooperation and Council Entry 1919 to 1920. In *Locality, Province and Nation: Essays on Indian Politics, 1870 to 1940*, ed. J. Gallagher, G. Johnson, and A. Seal, 123-53. Cambridge: CUP, 1973.
- Sumit Sarkar. *The Swadeshi Movement in Bengal*. New Delhi: Permanent Black, 1973.
- Bankim Chandra Chattopadhyay. *Anandamath.* New Delhi: Orient Paperbacks, 2019.
- Sachindranath Sanyal. *Bandi Jeevan*. Delhi: S. Prakashan, 2017.
- Mukhopadhyay Haridas & Mukhopadhyay Uma. (1972) *Bharater svadhinata andolané 'jugantar' patrikar dan*
- Sanyal, Shukla. *Revolutionary Pamphlets, Propaganda and Political Culture in Colonial Bengal*. Cambridge: CUP, 2014.

- Puri. Harish K. *Ghadar Movement: Ideology, Organization and Strategy*. Amritsar: Guru Nank Dev University, 1993.
- Ramnath, Maia. *Haj to Utopia: How the Ghadar Movement Charted Global Radicalism and Attempted to Overthrow the British Empire*. California: University of California Press, 2011.
- Haynes, Douglas E. *Rhetoric and Ritual in Colonial India: The Shaping of a Public Culture in Surat City, 1852-1928*. California: University of California Press, 1991.
- M.K.Gandhi. *Autobiography: The Story of My Experiments with Truth*. Ahmedabad: Navjiban Trust, 1983.
- Gandhi, M.K. *Satyagraha in South Africa*. Ahmedabad: Navajivan Publishing House, 1928.
- Parel, Anthony J(ed.). *Gandhi: "Hind Swaraj and Other Writings*. Cambridge: CUP, 2009.
- Henri David Thoureau. *On the Duty of Civil Disobedience.* Radford, USA: Wilder Publications, 2018.
- Bakshi, Shiri Ram. *Swaraj Party and Gandhi*. New Delhi: Atlantic Publishers and Distributors, 1995.
- Toye, Hugh. *The Springing Tiger: A Study of the Indian National Armyand of Netaji Subhas Chandra Bose*. Delhi: Allied Publishers, 1959.
- Singh, Harkirat. *The INA Trial and the Raj*. New Delhi: Atlantic Publishers and Distributors, 2003.
- Shekhar Bandopadhyay. *Plassey to Partition: A History of Modern India*. Hyderabad: Orient Longman, 2004.
- Sumit Sarkar. *Modern India: 1885-1947*. Delhi: Pearson, 2014.
- Bipan Chandra. *India's Struggle for Independence*, *1885-1947*. Delhi: Penguin Books, 1989.
- Peter Hardy. *The Muslims of British India*. London: Cambridge University Press, 1972.

Movies: Basudev Balwant Phadke,

Bhagat Singh, Kalapani, Gandhi,

Anandmath

SEMESTER: III MODERN INDIA: 1757 AD-1947 AD

PAPER: 4 CONSTITUTIONAL HISTORY OF INDIA: FROM 1773 REGULATING ACT TO 1947 ACT

Number of credits: **2**

Nature of course: **DCEC**

Aim of the course: The broad aim is to acquaint students with the in-depth understanding of the process, events and policies that brought the gradual evolution of constitution in India.

Objective of the course:

i. To understand the historical process of constitution making.

ii. To know the local, national, international and British factors which were at work in the making of a constitutional act.

iii. To understand the larger implications of these acts in the changing milieu of a resurgent India.

UNIT 1: Introduction and the Gradual Consolidation of Power:

A. Historiography; Sources.
B. Background-1600 to 1773.
C. The beginning-The Regulating Act of 1773; The Pitt's India Act of 1784; The Reforming act Of 1786.
D. The 1793 Act.

UNIT 2: Further Consolidation of Power and Restricted Reforms:

A. Charter Act of 1813.
B. Charter Act of 1833.
C. The 1853 Act.
D. Assessment of Changing Indian Conditions and British Policies in post 1857 Phase.

UNIT 3: From Representative to Responsible Government:

A. 1858 Act; 1861 Act; 1893 Act.
B. 1909 Act-The Introduction of the Separate Electorate and the changing electoral scenario, Evaluation.
C. Dyarchy and 1919 Act.
D. Provincial Autonomy and 1935 Act.

UNIT 4: Colonial Responses to Indian Constitutional Demands, Contestations and Adjustments:

A. Simon Commission; Nehru Report.
B. Cripps Mission, Shimla Agreement and Cabinet Plan.
C. Rajagopalachari Formula; Sapru Report.

D. 1947 Independence Act.

E. Understanding Separatism and Independence from Constitutional Perspective:

Congress, Muslim League, Right Wing Hindus and Sikhs-A Constitutional Perspective: 1935-1947.

Classroom strategy:

The major emphasis will be on theory aspect. Hence formal lectures will be given priority. Guest lecture, too, may be arranged depending upon the requirement of the course module. Projects, assignments, discussions and tutorial classes will form part of the class room teaching of the course.

Suggested readings:

- Mishra, B. B.: Administration of East India Company, New York, 1960.
- Banerjee, Anil Chnadra: The Constitutional History of India, Vol-1-3, Mukherjee & Co Pvt Ltd, Kolkatta, Reprint, 1987.
- Keith, A. B.: A Constitutional History of India 1600-1935, Methuen & Co Ltd, London, 1936.
- Grover, B. L. (ed.) : A documentary study of British Policy towards Indian nationalism; Delhi, 1967
- B.B.Mishra, Administrative History of India
- Dodwell, Rise and Progress of British Power in India, Vol-II
- P.Mukherjee, Indian Constitutional Documents
- Pandey, The Growth of Indian Administration
- R. Coupland, Indian Constitutional Problems
- Stokes, Eric: English Utilitarians in India; Oxford, 1959.
- Philips, C.H.: The East India Company—1784-1834; 2nd ed., Manchester, 1961.
- Mukherjee, S. N.: Sir William Jones: Eighteen Century Attitude to India; Cambridge, 1968.
- Thompson Edwards and G. T. Garratt: Rise and Fulfilment of British Rule in India; Alahabad, 1958.
- Mujumdar, R.C. (ed.): History and Culture of the Indian People British Paramountacy and Indian Renaissanace; Bombay, 1963.
- Kaye, Sir John W.: The Administration of East India Company; London, 1853.
- Marshall, P.: Problems of an Empire.
- Nightingle, Pamela: Trade and Empire in Western India—1784-1806; Cambridge, 1970.
- Keith, A. B.: Speeches and Documents on Indian Policy—1750-1921; 2 Vols. London, 1922.
- Embree, Anisile T.: Charles Grant and British Rule in India; New York, 1962, Calcutta, 1962.
- Das Gupta, Anil C. (ed.): The Days of John Company—1824-1932; Culcutta, 1959.
- Bipin Chandra: The Rise and Growth of Economic Nationalism, New Delhi, 1966.
- B. Shiva Rao: The Framing of India's Consntitution (All Vol.), Universal Law Pub. 2015.

SEMESTER: III MODERN INDIA: 1757 AD-1947 AD

PAPER: 5 NATIONALIST MOVEMENT: 1858 AD - 1947 AD

Number of credits: **4**

Nature of course: **GE**

Aim of the course: The broad aim is to provide students a historical understanding of the factors, events, acts, policies, maneuvers and real politic that led to the emergence of a powerful force of nationalism in India and also to study the deep fissures within such force and how finally India received a divided independence.

Objective of the course:

i. To understand the historical factors for Indian nationalism.
ii. To know the local, national, international and British factors which were at work in the making of a nationalist movement in India.
iii. To understand the larger perspectives behind partition.

UNIT 1: Emergence of Indian Nationalism and the Early Phase of Indian National Congress:

A. Historiography; Sources; Factors Responsible for the Emergence of Nationalism in India
B. Formation of Associations in India: 1837-1885- Factors
C. Swadeshi Movement-The First Real Mass Movement; Home Rule Movement and its Impact.
D. Rise of Revolutionary Activities.
E. First World War and the spread of Nationalism

UNIT 2: Gandhian Phase:

A. 1914-1917-From Mute Observer to Activist.
B. 1919-1922-Khilafat and Non-Cooperation Movement: Artificial Hindu-Muslim Unity, Fight for Vague Swarajya and the Emergence of a True Mass Leader.
C. 1922-1947: From Political Leadership to Political Sainthood- Constructive Programmes, Civil Disobedience Movement, Quit India Movement.
D. Evaluation- Role of Gandhi in Freedom movement; Role in Partition.

UNIT 3: Alternative Ideologies and Movements:

A. The Swarajists.
B. The Revolutionaries.
C. The Leftists; the Trade Unions; IPTA; Progressive Writers Associations.
D. The INA Saga.

UNIT 4: British Policies, Native Aspirations and the Construction of Communal Politics:

A. Riots-Meaning, History, Factors and Manifestations-1806, 1892, 1917, 1946, 1947 Riots.

B. Construction of Communal Politics-British Policies, Formation of Sectarian Associations-Muslim League, RSS, Hindu Mahasabha, Electoral Politics, Middle Class Aspirations, Local Issues, Religious Sentiments, Media, Economic Realities and Politics of Vendetta.

C. 1945-1947: Blood for Blood-Communal Politics and the Partition of India.

D. The Other Side of Communal Manifestations- Loss, Silence, Pause, Invisibility and a Living Death.

Classroom strategy:

The major emphasis will be on theory aspect. Hence formal lectures will be given priority. Guest lecture, too, may be arranged depending upon the requirement of the course module. Projects, assignments, discussions and tutorial classes will form part of the class room teaching of the course.

Suggested readings:

- Bipin Chandra, Adunik Bharat
- Rajnipam Dutt, AaJ KA Bharat
- Sumit Srakar, Adunik Bharat
- R.S. Shukl, Adunik Bharat ka ItihaaS
- Ayodhya Prasad, Bharat ka Mukti Sangram
- Tarachandra, Bhartiye Swatantra Andolan ka itihaas Bandopadhyay, Plasy se Vibhajan tak.
- Anil Seal The Emergence of Indian Nationalism, London: Cambridge University Press, 1971.
- J. R. McLane Indian Nationalism and the Early Congress, Princeton, N.J.: Princeton University Press, 1977.
- Rajat Ray Social Conflict and Political Unrest in Bengal, 1875-1927, Delhi; New York: Oxford University Press, 1984.
- C.A. Bayly The Local roots of Indian Politics: Allahabad, 1880-1920, Oxford: Clarendon Press, 1975.
- Sumit Sarkar, The Swadeshi Movement in Bengal, Permanent Black, New Delhi, 1973.
- Peter Hardy The Muslims of British India, London, Cambridge University Press, 1972.
- David Lelyveld, Aligarh's First Generation: Muslim Solidarity in British India, Princeton, N.J.: Princeton University Press, 1978.
- Tapan Raychaudhuri, Europe Reconsidered: Perceptions of the West in Nineteenthcentury
- Bengal. Delhi; New York: Oxford University Press, 1988.
- Partha Chatterjee, Nationalist Thought and the Colonial World: A Derivative Discourse, Minneapolis: University of Minnesota Press, 1993.
- M. K. Gandhi, The Hind Swaraj, Various editions: Parel ed., and T. Surhud, S. Sharma ed., etc.
- R.N. Tagore, Nationalism, With an Introduction by E.P. Thompson, Calcutta, Rupa, 1992.
- Judith Brown, Gandhi's Rise to ower, Cambridge, 1971.
- Ravinder Kumar, Essays in the Social History of Modern India, Oxford University Press, 1983.

- Sumit Sarkar, Popular Movements and Middle Class Leadership, (K.P. Bagchi Calcutta, 1983.
- A. Low (ed.), Congress and the Raj (Reprinted by Oxford University Press, Delhi, 2004.
- Subaltern Studies, 1-12, Ed. Ranajit Guha and et al, Oxford University Press, Delhi,/Permanent
  Press 1982-.
- Gyanendra Pandey, The Ascendancy of the Congress in Uttar Pradesh, Oxford University Press, 1978.
- Shahid Amin, Event, Metaphor Memory: Chauri Chaura, 1922-1992, Penguin India, 2006.
- Richard Sisson & Stanley Wolpert (eds.), Congress and Indian Nationalism: The Pre- independence Phase, Berkeley, 1988.
- Gyanendra Pandey (ed.), The Indian Nation in 1942, (CSSS: K. P. Bagchi and Company, Calcutta, 1988.
- Vazira Zamindar, The Long Partition and the Making of Modern South Asia, Viking, New Delhi, 2007.
- Bernard Cohn, Colonialism and Its Forms of Knowledge: The British in India, Princeton University Press, 1996.
- Gyanendra Pandey, The Construction of Communalism in Colonial North India, Oxford University Press, 1990.Sandria Freitag, Collective Action and Community: Public Arenas and the Emergence of Communalism in North India, University of California Press, 1989.
- Vasudha Dalmia, The Nationalization of Hindu Tradition: Bhartendu
- Harishchandra and Nineteenth Century Banares, Oxford University Press, 1999.
- Barbara D. Metcalf, Islamic Revival in British India: Deoband, 1860-1900, Oxford University Press, 2002.
- Harjot Oberoi, The Construction of Religious Boundaries: Culture, Diversity and Identity in the Sikh Tradition, Oxford University Press, 1994.
- P. J. Marshall (ed.), British Discovery of Hinduism, Cambridge University Press, 1970.
- David Kopf, British Orientalism and Bengal Renaissance, Berkeley and Los Angeles, 1969.
- Gyanendra Pandey, Remembering Partition, Cambridge University Press, 2002.
- J. Zavos, The Emergence of Hindu Nationalism in India. Oxford University Press, 2000
- Raifuddin Ahmed, The Bengal Muslims, 1871-1906: A Quest for Identity (Oxfod Univ. Press, Delhi, 1981)
- Alok Rai, Hindi nationalism, Orient Longman, New Delhi, 2001.
- Benedict Anderson, Imagined Communities: Reflections on the Origin and Spread of Nationalism, Verso, New York/ London, 1991.
- Subaltern Studies V, Oxford University Press, 1987.
- Christopher King, One Language, Two Scripts: The Hindi Movement in Nineteenth Century North India, Oxford University Press, New Delhi, 1994.
- Kenneth Jones (ed.), Religious controversy in British India: dialogues in South Asian Languages, Albany, 1992.
- Lisa Mitchell, Language, Emotion, and Politics in South India: The Making of a Mother Tongue, Indiana University Press, 2009.
- Paul Brass, Language, Religion and Politics in South Asia, Cambridge University Press, 1974.

- Sheldon Pollock, Language of the Gods in the World of Men: Sanskrit, Culture and Power in Pre- modern India, Philip E. Lilienthal Books, 2006.
- Stuart Blackburn, Print, Folklore and Nationalism in Colonial South India, Permanent Black, Delhi, 2001.

SEMESTER: III MODERN

INDIA: 1757 AD-1947 AD

PAPER: 6: INTRODUCTION TO INDIAN MARXISM

Number of credits: **4**

Nature of course: **GE**

Aim of the course: The broad aim is to provide students a historical understanding of the factors and events that led to the development of Marxism in India.

Objective of the course:

i. To understand the historical factors for Indian Marxism.
ii. To know the major Indian Marxists leaders.
iii. To understand the contributions made by the Indian Marxism in India.

UNIT 1: Emergence of Marxism in India:

A. Historiography; Sources.
B. Marxism: A brief survey-Features, criticisms.
C. Development of Indian Marxism in India-Factors and Features
D. Limitations

UNIT 2: Indian National Movement and Marxism:

A. Communist Party of India: Growth, Division and role in Indian Nationalsim.
B. Indian National Congress and the Influence of Marxism.
C. Indian Marxism Communalism and India's partition.
D. Regional Development of Indian Marxism-Bengal, Maharashtra, Kerala, Andhra Pradesh.

UNIT 3: Wings of Indian Marxism:

A. Working Class Movement.
B. Peasant Struggles and Indian Marxism.
C. Revolutionaries and the impact of Marxism.
D. Women and Indian Marxism

UNIT 4: Major Indian Marxists:

A. M N Roy.
B. E V S Namboodripad.
C. Rajni Palme Dutta
D. Muzaffar Ahmed.

Classroom strategy:
The major emphasis will be on theory aspect. Hence formal lectures will be given priority. Guest lecture, too, may be arranged depending upon the requirement of the course module.

Projects, assignments, discussions and tutorial classes will form part of the class room teaching of the course.

Suggested readings:

- Satyabrata Rai Chaoudhary: Leftism in India: 1917-1947, McMillan Publication, Delhi, 2007.
- Shankar Sharan, Marxism and the Writing of Indian History, Indian First Foundation, Delhi.
- Sunil Kr Sen, Working class movements in India, 1885-1975, Oxford University Press, 1994
- M R Masani, The Communist Party of India: a Short History.
- Labour movements in India: Dcouments, All Volumes, Popular Prakshan, Bombay.
- Roy Samaren, M N Roy: A Political Biography, Pub by Orient Blackswan.
- Ramendra N Roy's New Humanism and Materialism, Pub by CreateSpace Independent Publishing Platform, 2014.
- Callaghan John, Rajni Palme Dutta: A Study in British Stalinism, Pub by Lawrence & Wishart, London.
- Chatapadhyaya suchetna, An Early Communist: Muzaffar Ahmed in Calcutta: 1913-1929.
- Ahmed Muzaffar, My Life and Communisgt Party of India, translated from Bengali by P K Sinha, Pub by National Book Agency, Kolkatta, 1970.
- Biswas S K, nine Decades of Marxism in the Land of Brahamanism, Pub by Other books, Kolkata, 2008.

SEMESTER: III MODERN

INDIA: 1757 AD-1947 AD

PAPER: 7: HISTORY OF INDIAN CINEMA

Number of credits: **4**

Nature of course: **GE**

Aim of the course: The broad aim is to provide students a historical understanding of the factors and events that led to the development of Marxism in India.

Objective of the course:

i. To understand the historical factors for Indian Marxism.
ii. To know the major Indian Marxists leaders.
iii. To understand the contributions made by the Indian Marxism in India.

UNIT 1: Beginning of Cinema in India:

A. Historiography; Sources.
B. Theorizing Films.
C. Beginning-Tool, Technique and Idea in the Ist decade of Indian Cinema.
D. Maker of Indian Cinema-Dada Saheb Phalke.

UNIT 2: Indian Cinema during Imperial Rule:

A. Thematic Development-Mythology, Patriotism, Romance and Violence.
B. British Policy on Indian Cinema-Laws, Censorship and Freedom of Expression.
C. Talking Film, Changing Technique and Growing Impact.
D. Raja Harsichandra and the Beginning of New Era

UNIT 3: Post Independent Development:

A. History of Parallel Cinema-Theme, Directors, Budget, Response and Impact.
B. Women in Indian Cinema; Stardom, Glamour, Industries and the Popular Psyche.
C. The Troika of Bollywood-Dilip Kumar, Raj Kapur and Devanand.
D. Mughal-e-Azam, Mother India, Sholay, Lagaan and Satya.

UNIT 4: Development of Regional Film Industries:

A. South Indian Film Industry-Malyalam, Tamil, Telgu and Kannada.
B. Bengal Film Industry.
C. Marathi Film Industry.
D. Other Regional Film Industries-Oriya, Assamese and Bhojpuri.

Classroom strategy:

The major emphasis will be on theory aspect. Hence formal lectures will be given priority. Guest lecture, too, may be arranged depending upon the requirement of the course module. Projects, assignments, discussions and tutorial classes will form part of the class room teaching of the

course. Screening of movies and documentaries followed by discussions and assignments will also form part of the class.

Suggested readings:

- Mukhopadhyaya, Urvi, The Medieval in Film: Representing a Contested Time on the Indian
- Screen (1920s 1960s), Pub by Orient Blackswan
- History of Indian Cinema pub by Diamond Pocket books.
- Aswin Punathambekar, From Bombay to Bollywood: The Making of a Global Media Industry, New York University Press, 2013
- Patrick Colm Hogan, Understanding Indian Movies: Culture, Cognition, and Cinematic
- Imagination, University of Texas Press, 2008
- Tejaswini Ganti, Bollywood: A Guidebook to Popular Hindi Cinema, Routledge, 2004
- Anustup Basu, Bollywood in the Age of New Media: The Geo-Televisual Aesthetic, Edinburgh University Press, 2010
- Jigna Desai, Beyond Bollywood: The Cultural Politics of South Asian Diasporic Film, Routledge, 2004
- Jyotika Virdi, The Cinematic Imagination: Indian Popular Films as Social History, Rutgers
- University Press, 2003
- Bapu Vatve, the father of Indian Cinema: Dada Saheb Phalke, Trnltd by S A Warkar, Pub by
- National Book Trust.
- D P Mishra, Great Masters of Indian Cinema: Winners of Dada Saheb Phalke Award, Pub by
- Publication Division.
- Ed by Ramindar Kaur and Ajay Sinha, Bollyworld: Popular Indian Cinema through a Transnational Lens, Pub by Sage Publication, 2005.
- Chowksey, Jaiprakash: Mahatma Gandhi and Cinema, Pub by Morya Arts, 2012.
- Garga, B D, From Raj to Swaraj: the Non Fiction Film in India, Pub by Penguin, 2007.
- Aruna Vasudeva, Series Editor: The Legends of Indian Cinema Series Books-All books, Pub by Wisdom Tree, Darya Ganj, New Delhi.
- Bhavna Somayya, Jigna Kothari, Supriya Madangarli: Mother, Maiden, Mistress: Women in
- Indian Cinema-1950-2010, Pub by Harper Collins.
- Ed. Souwmya Decchamma CC, E S Prakash: Cinemas of South India, pub by Oxford India, 2010.
- Edi Suresh Chabria, Light of Asia: Indian Silent Cinema-1912-1934, Pub by Niyogi Books, 2013.
- S Manjula, Indian Cinema through the Cnetury, Pub by Publication Division
- Bibekanand Roy, Conscience of Cinema: India's Offbeat Cinema, Pub by Publication Division, 2005.
- Firoze Rangoonwala, 75 Years of Indian Cinema, Indian Book Company, Delhi, 1975
- Yves Thoraval, Cinemas of India 1896-2000, Macmillan, Delhi, 2000.
- Gautam Kaul, Cinema and the Indian Freedom Struggle, Sterling Publishers Pvt. Ltd., New Delhi, 1998.
- K.A. Abbas, Mad, Mad, Mad World of Indian Films, Hind Pocket Books, Delhi, 1977
- Aruna Vasudev & Philippe Lenglet, ed., Indian Cinema Superbazaar, Vikas, Delhi, 1983
- T.M. Ramachandran ed. 50 years of Indian Talkies (1931 -81) A Commemorative Volume, Indian Academy of Motion Picture Act & Sciences, Bombay, 1981.

- Tamil Cinema, Jesudoss, Perianayagam Communication Research Trends, Vol. 28, No. 4, December 2009
- Wazir, Burhan, Misogyny in Bollywood, The World Today, Vol. 69, No. 1, February/March 2013
- Anthony R. Guneratne; , Rethinking Third Cinema, Wimal DissanayakeRoutledge, 2003
- Karim H. Karim, The Media of DiasporaRoutledge, 2003
- Film Fragments, Documentary History, and Colonial Indian CinemaBy Majumdar, NeepaCanadian Journal of Film Studies, Vol. 16, No. 1, Spring 2007
- Abdul Jamil Khan, Urdu/Hindi: An Artificial Divide: African Heritage, Mesopotamian Roots, Indian Culture & Britiah Colonialism Pub: Algora, 2006
- Jyotika Virdi, The Cinematic Imagination: Indian Popular Films as Social History
- Pub: Rutgers University Press, 2003
- Patrick Colm Hogan, Understanding Indian Movies: Culture, Cognition, and Cinematic
- Imagination Pub:University of Texas Press, 2008
- Steve DernéDan A. Chekki, Movies, Masculinity, and Modernity: An Ethnography of Men's
- Filmgoing in India, Pub: Greenwood Press, 2000
- Geoffrey Nowell-Smith, The Oxford History of World Cinema, Pub: Oxford University Press, 1997
- Susan Hayward, Cinema Studies: The Key Concepts, Pub: Routledge, 2000 (2nd edition)
- Manmohan Chadhha, Hindi Cinema Ka Itihaas, Sachin Prakashan, 1990
- Sanjit Narwekar, Marathi Cinema: In Retrospect, Govind Swarup, 1995
- B. D. Garga, From Raj to Swaraj: The Non-fiction Film In India, Penguin Books, 2007
- Vijaya Mulay, From Rajahs and Yogis to Gandhi and Beyond: Images of India in International Films of the Twentieth Century, Seagull Books, 2010
- B D Garga , Silent Cinema in India - A Pictorial Journey, Harper Collins India, 2012

SEMESTER: III MODERN INDIA: 1757 AD-1947 AD

PAPER: 8: GENDER AND WOMEN IN COLONIAL INDIA

Number of credits: 4

Nature of course: DCEC

Aim of the course: The broad aim is to explore the issue of women history during the colonial era and also to sensitize students about their struggle as well as progress and their multidimensional activities like education, reforms, political role, sexuality, relations etc.

Objective of the course:

i. To explore the history of women in colonial India.
ii. To know about the changes, their various roles and relations with various segments of society.

UNIT 1: Women, Politics and Colonial Regime:

A. Introduction-Understanding Gender in Particular Reference to Colonial India;
B. Historiography; Sources.
C. Women in Politics-1757-1857; Women in 1857 Revolt.
D. Women in Politics-1858-1947-Nationalism and Participation in Indian National Movement.

UNIT 2: Society, Family and Women:

A. Socio- Religious Reform Movements and Women.
B. Family, Sexuality and Domesticity.
C. Women and Education-Efforts, Policies, Nature, Impact on Family and Society; Public Services.
D. Social Status of Women of Different Castes and Classes-Struggles, Woes, Commonness and Differentiations; Continuity and Change .

UNIT 3: Economy, Judiciary and Women:

A. Economic Status; In Industries and Agriculture.
B. Legal Space and Women- Legal Rights, Property & Inheritance Rights, Franchise Rights, Violence, Crimes.
C. Communalism, Partition and Women.
D. Wars, Riots and Women

UNIT 4: Culture and Women:

A. Painting
B. Dance and Music
C. Film and Theatre
D. Media

Classroom strategy:

The major emphasis will be on theory aspect. Hence formal lectures will be given priority. Guest lecture, too, may be arranged depending upon the requirement of the course module. Projects, assignments, discussions and tutorial classes will form part of the class room teaching of the course.

Suggested readings:

- Neera Desai, Women in Modern India
- Jana M. Everett, Women and Social Change in India
- Geraldine Forbes, Women in Modern India
- Janaki Nair, Women and Law in Colonial India: A Social History
- R. Nanda (ed.), India Women: From Purdah to Modernity
- Chowdhry, Prem, The Veiled Women: Shifting Gender Equations in Rural Haryana (Oxford University Press, Delhi, 1994)
- Forbes, Geraldine, Women in Modern India (Cambridge University Press, Cambridge, 1996)
- Gupta, Charu, Sexuality, Obscenity, Community: Women, Muslims and the Hindu Public in Colonial India (Permanent Black, Delhi, 2001)
- Kumar, Radha, The History of oin : n Illustrated ccount of ovements for Women's rights and Feminism in India 1800-1990 (Delhi, 1993)
- Malhotra, Anshu, Gender, Caste and Religious Identities: Restructuring Class in Colonial Punjab (Oxford University Press, Delhi, 2002)
- Minault, Gail, Secluded scholars: Women's education and Muslim social Reform in Colonial India (OUP, Delhi, 1998)
- Rao, Anupama (ed.), Gender and Caste (Kali for Women, Delhi, 2003)
- Sangari, Kumkum and Sudesh Vaid (eds), Recasting Women: Essays in Colonial History (Kali for Women, Delhi, 1989)
- Sarkar, Tanika & Urvashi Butalia (eds), Women and the Hindu Right: A Collection of Essays (Kali for Women, Delhi, 1995)
- Sarkar, Tanika, Hindu Wife Hindu Nation (Permanent Black, Delhi, 2001).

SEMESTER: III MODERN INDIA: 1757 AD-1947 AD

PAPER: 9: SCIENCE AND TECHNOLOGY IN COLONIAL INDIA

Number of credits: 4

Nature of course: DCEC

Aim of the course: The broad aim is to know the factors, government policies, role of modern education and the impact on Indian society by the development of the science and technology in India.

Objective of the course:

i. To know the history of science and technology in India as legacy.
ii. To know about its development under colonial rule.
iii. To know the impact of this on India.

UNIT 1: Introduction

A. Historiography; Sources.
B. Legacy of Science and Technology in India.
C. Broader Factors for its Promotion by the British.
D. Science and Technology in the Middle of the 18^{th} Century.

UNIT 2: Science & Technology and Economy:

A. Industries-Manufacturing, Mining, Shipping, Small Scale. B. Agriculture and Plantation.
C. Military and Warfare Technology.
D. World Wars, Depression, Policies and Industrial Growth-Impact-Social, Economic.

UNIT 3: Proliferation of Scientific Ideas and Technology:

A. Science & Technology and Indian Education-School and College Education, Engineering and Medical Colleges, Agricultural Institutes, Nodal Agencies-Geological Survey of India, Policies, Curricula, Response.
B. Print Media, Film Technology, and Photography.
C. Creation of new Ideas, Consciousness, Class, Pride.
D. Industrial Development and Ecological and Environmental Concerns.

UNIT 4: Government and Nationalist Responses:

A. Government Policies and Plans-Industrial, Agricultural, Environmental 1757-1857; 1857-1947
B. Commissions and their Reports-Royal Commission, National Planning Committee, Bombay Plan. C. Mahatma Gandhi & Indian Nationalists-Response, Resistence and Adjustments;
D. Emergence of National Science and Relation vis-a-vis Colonial Science; Eminent Indian Scientists-P C Ray, Jagdish Chandra Bose, M N Saha, M L Sarkar.

Classroom strategy:
The major emphasis will be on theory aspect. Hence formal lectures will be given priority. Guest lecture, too, may be arranged depending upon the requirement of the course module. Projects, assignments, discussions and tutorial classes will form part of the class room teaching of the course.

Suggested readings:

- The Social Function of Science, J.D. Bansal, London 1939.
- Selections from educational records of Govt. of India, Scientific and Technical Education in India, (ed), K.D. Bhargava NAI, Delhi, 1968
- Science in India, A.K. Bisvas & K.L. Mukhopadhyaya, Kolkata, 1969.
- Indian Science and Technology in the Eighteenth Century, Dharmpal, Delhi, 1971.
- Islam and Science, Hoodbhoy Pervez, London, 1991.
- Science & Technology in History, Ian Inkstem, London, 1991.
- Science, Technology and Development, V.V. Krishna & S.S. Bhatnagar, Delhi, 1993.
- Science & Empire, Anamika Prakashan, Deepak Kumar, Delhi, 1991.
- Bharat Mein Angrejee Rajya Aur Vigyan Granth Shilpy, Deepak Kumar, Delhi (Hindi).
- Prodyogiki Ewam Bharat Mein Angrejee Rajya, Deepak Kumar, Delhi (Hindi).
- Science and the Raj, Deepak Kumar, OUP, Delhi, 2000.
- Technology and the Raj Deepak Kumar, Sage, New Delhi, 1995.
- Disease and Medicine in India, Deepak Kumar, New Delhi, 2001.
- Image and Context, Historiography of Science in India, Dhruv Raina, OUP, Delhi, 2003.
- Singh, V. B.: Economic History of India; 1965, Bombay, Allied Publishers.
- Gadgil, D.R: Industrial Evolution of India in Recent Times; 5th ed., 1971, New Delhi.
- Bagchi, A. K.: Private Investment in India—1900- 1939; 1972, Cambridge, University Press.
- Rungta, R. S.: The Rise of Business Corporations in India—1851-1900; Cambridge University Press.
- Tripathi, D.: Business House in India; 1980.
- Morris, M. D: Emergence of an Industrial Labour force in India—1965, Berley, University of California, Press.

SEMESTER: III MODERN INDIA: 1757 AD-1947 AD

PAPER: 10: SOCIO-RELIGIOUS MOVEMENTS AND CULTURAL TRANSFORMATION IN COLONIAL INDIA

Number of credits: **4**

Nature of course: **DCEC**

Aim of the course: The broad aim is to know the various factors responsible for the socio-religious movements and its wider impact on Indian people and Society.

Objective of the course:

i. To know the history of Socio-Religious Movements in Colonial India.
ii. To know about its growth, features, nature and outcome.

UNIT 1: Introduction

A. Historiography; Sources.
B. Legacy and History of socio-religious Movements in India. C. Broader Factors, Nature, Features, Areas Covered.
D. Colonial Policies, Missionaries, Western Education, and the Growth of Socio-Religious Movements.

UNIT 2: Major Movements:

A. Arya Samaj, Brahma Samaj, Ramakrishna Movement, Prarthana Samaj, Young Bengal Movement, Theosophical Society, Sri Narayan Dharma Paripalan Sabha; Bengal Renaissance.
B. Wahabi Movement, Ahmadiya Movement, Aligarh Movement,
C. Akali Movement, Rahnumani Majdayasan Sabha.
D. Secular Movements-Scout, Red Cross.

UNIT 3: Caste Movements, Dalit Movements, Tribal Awakening, Women Reforms:

A. Rise and Growth of Caste Movements- Factors, Nature, Demands, Impact; Self Respect Movement, Justice Party, Regional Caste Parties across Caste Lines
B. Dalit Movements- Factors, Nature, Impact; Ad Dharma of Punjab 1926, Mahar Movement 1924, Nam-Shudra of Bengal, Adi Movements of Tamil Nadu, Andhra, Karnataka, Organization of Pulayas & Cherumans of Kerala.
C. Tribal Awakening- Factors, Nature, Demands, Outcome; Voice of Dissent: **1757-1857:** Anglo-Kondha War of 1768, Jalwara Battle of 1768, Paharia Revolt of 1772, Koi Risings of 1832, Bhum Revolts of 1832-34, Santhal Revolts of 1855; **1857-1947:** Birsa Munda Revolt of 1899, Tana Bhagat Movement of 1914, Korapar Tribal Revolt of 1943.
D. Socio-Religiious Movements and Women's Reforms Sati, Widow Remarriage, Infanticide, Age of Consent Bill Agitation, History of WIA (1917), NCIW (1925), AIWC (1927).

UNIT 4: Major Reformers and Reforms:

A. Raja Ram Mohan Roy, Dayanand Saraswati, Vivekanand, Vidyasagar, Annie Besant.
B. Sir Saiyad Ahmed Khan, Saiyad Ameer Ali, Iqbal, Vakkom Maulvi.

C. Jotiba Phule, Pandit Ramabai, B R Ambedkar, E V Ramaswami Periyar.
D. Socio-Religious Movements, Nationalism, Separatism and Communalism; Dalit Upliftment: A Study in Contrast-Gandhi, Ambedkar and Periyar.

Classroom strategy:

The major emphasis will be on theory aspect. Hence formal lectures will be given priority. Guest lecture, too, may be arranged depending upon the requirement of the course module. Projects, assignments, discussions and tutorial classes will form part of the class room teaching of the course.

Suggested readings:

- Bayly, Susan, Caste, Society and Politics in India from the Eighteenth Century to the Modern Age, Cambridge: Cambridge University Press, 1999.
- Chandra, Sudhir, The Oppressive Present: Literature and Social Consciousness in Colonial India. Delhi: Oxford University Press, 1992.
- Datta, P. K., Carving Blocs: Communal Ideology in Early Twentieth Century Bengal. Delhi: Oxford University Press, 1999.
- Dube, Ishita-Banerjee (ed.), Caste in History, Delhi: Oxford University Press, 2008.
- Forbes, Geraldine, Women in Modern India. Cambridge: Cambridge University Press, 1996.
- King, Christopher R., One Language, Two Scripts: The Hindi Movement in Nineteenth Century North India, Bombay: Oxford University Press, 1994.
- Orsini, Francesca, The Hindi Public Sphere 1920-1940: Language and Literature in the Age of Nationalism, Delhi: Oxford University Press, 2002.
- Sarkar, Sumit, Writing Social History. Delhi: Oxford University Press, 1997.
- William Crooke, The Popular Religion and Folklore of Northern India (2nd ed., 1896) 2 vols. Reprint: Delhi, 1968, Kessinger Publishing, 2004.
- Lawrence Babb, The Divine Hierarchy: Popular Religion in Central India, Columbia University Press, New York, 1975.
- Bayly, Susan, Caste, Society and Politics in India from the Eighteenth Century to the Modern Age, Cambridge University Press, Cambridge, 1999.
- Kshirsagar, R. K., Dalit Movement in India and its Leaders, MD Publications Pvt. Ltd., New Delhi, 1994.
- Mahar, J. Michael (ed.), The Untouchables in Contemporary India, The University of Arizona Press, Tuscan, Arizona, 1972.
- Webster, John C. B., The Dalit Christians: A History, New Delhi, ISPCK, 1994, (2nd Edition).
- Andre Betellie, Cates: Old and New
- M.N.Shrinivas, Social changes in modern India
- N.K.Bose, Culture and Society in India
- J.P.Naik and S.Nurullah, History of Education in India during British period
- B.B.Mishra, The Indian Middle Class
- J.N.Farquhar, Modern Religious movements in India
- S.A. Natarajan, A History of Social Reform
- A.R.Desai, Peasants Struggles in India
- Gauri Viswanathan: Outside the Fold: Conversion, Modernity and Belief, OUP, 2001.
- Gail Omvedt: Cultural Revolt in a Colonial Society, Bombay, 1976.
- Jose Abraham, Islamic reform and colonial discourse on modernity in India, 2014, Palgrave Macmillan.
- Ballhachet, K.A. : Social Policy and Social Change in India

- Ahmed A.F.S. : Social Ideas and Social change in Bengal
- Ravinder Kumar : Western India in 19th Century
- Kopf. D. : British Orientalism and the Bengal Renaissance (Berkelay, 1969)
- Forbes, Geraldine : Women in Modern India, (London, 1998)
- Kumar, Ravinder : Essay's in Social History of Modern India (Modern, 1968)
- Mani, Lata : Contentious Traditions : The Debate on Sati in Colonial India (New Jersey, 1990)
- Sangari, Kumkum & Sudesh Vaid (eds.): Recasting Women: Essay in Colonial History

SEMESTER: III MODERN INDIA: 1757 AD-1947 AD

PAPER: 11: COMMUNALISM IN COLONIAL INDIA

Number of credits: 4

Nature of course: DCEC

Aim of the course: The broad aim is to make students understand the forces of communal elements, their origin, spread and nefarious outcomes during the colonial regime.

Objective of the course:

i. To know the history of communalism in colonial India.

ii. To know about its growth, features, nature and outcome.

UNIT 1: Towards Understanding Communalism:

A. Understanding Communalism

B. Historiography

C. Communalism: Legacy or Construction

D. Literary and Visual Expressions

UNIT 2: Exploring Issues:

A. Political, Social and Economic

B. Religious-cultural

C. Psychological

D. Others: Role of Press

UNIT 3: Crisis of Trust, Communalism and Violence:

A. 19th Century and the Hindu-Muslim Relations: Fissures and Patches

B. Communal violence in 19th century- 1809, 1893

C. Communal Violence in 20th Century- 1917 Bihar riot and 1931 Kanpur riot

D. Communalism, Partition and Unsettling Humanity- Punjab and Bengal in 1947

UNIT 4: Unabated March of Communalism & India's Partition:

A. Communalism Unabated: 1946-1947

B. Veiled Communalism-Leadership in Indian National Congress

C. Communalism and partition

D. Indelible Scar of Violence-Refugee, Alienation, Silence, Trauma

Classroom strategy:

The major emphasis will be on theory aspect. Hence formal lectures will be given priority. Guest lecture, too, may be arranged depending upon the requirement of the course module. Projects, assignments, discussions and tutorial classes will form part of the class room teaching of the course.

Suggested readings:

- Gyanendra Pandey, The Construction of Communalism in Colonial North India, Oxford University Press, 1990.
- Sandria Freitag, Collective Action and Community: Public Arenas and the Emergence of Communalism in North India, University of California Press, 1989.
- Vasudha Dalmia, The Nationalization of Hindu Tradition: Bhartendu Harishchandra a n d Nineteenth Century Banares, Oxford University Press, 1999.
- Barbara D. Metcalf, Islamic Revival in British India: Deoband, 1860-1900, Oxford University Press, 2002.
- Harjot Oberoi, The Construction of Religious Boundaries: Culture, Diversity and Identity in the Sikh Tradition, Oxford University Press, 1994.
- P. J. Marshall (ed.), British Discovery of Hinduism, Cambridge University Press, 1970.
- David Kopf, British Orientalism and Bengal Renaissance, Berkeley and Los Angeles, 1969.
- Raifuddin Ahmed, The Bengal Muslims, 1871-1906: A Quest for Identity (Oxfod Univ. Press, Delhi, 1981)
- Barlas Asma, Democracy, Nationalism and Communalism, Tlte Colonial Legacy in Soutlt India, Oxford, West View Press, 1994.
- Barnet, Marguerile Ross, The Politics of Cultural Nationalism In South India, U.S.A., Princeton University Press, 1976.
- Barrier N. Gerald, Roots of Communal Politics, Arnold-Heinemann Publishers, New Delhi, 1976.
- Chand S., M, National Leaders on Communalism, Jaipur, Printwell Publishers, 1985.
- Chatterjee Partha, Tlre Nation and its Fragments Colonial and Post Colonial Histories, Delhi, Oxford University Press, 1994.
- Dixit Prabha, Communalism; A Struggle for Power, New Delhi, Orient Longman. 1974.
- Dube S.C. and Basilov V.N., Secularisation in Multi Religious Societies; Indo Soviet Perspectives, Delhi, Concept Publishers, 1983.
- Dubey, Communal Revivalism in India, New Delhi, Har Anand Publications, 1994.
- Dumont Louis, Religion, Politics and History in India, Paris, Mouton Publishes, 1970.
- Engineer Asghar Ali**,** Shakir Moin, Communalism in India, Delhi, Ajantha
- Graham Bruce, Hindu Nationalism and Indian Politics: The Origins and Development of the Bharatiya Jana Sangh, Cambridge, Cambridge University Press, 1990.
- Panikkar K.Y**.,** Commur˜alismir t India; History, Politics and Culture, New Deihi ,Manohar Publications, 199 1.
- Sinha, Anugraha Narayan, A Guide to the Communal Problem in India (Patna, 1945)
- Sen, Dhirendranath, The Problem of Minorities (Calcutta, 1940)
- Prasad, Beni, The Hindu-Muslim Question {Allahabad, 1941)
- Mookerji, Radha Kumud, A New Approach to the Communal Problem (Bombay, 1943)
- Mirza, Bakar Ali, Hindu-Muslim Problem (2nd edn.) (Bombay, 1944)
- Manshardt, Clifford, The Hindu-Muslim Problem in India (London, 1936)
- Mehta, A. and Patwardhan, A. The Communal Triangle in India (Allahabad, 1942).
- Khan, Abdul Majid, The Communalism in India: Its Origin and Growth (Foreword by Rajendra Prasad and Introduction by Kalinath Ray) (Lahore, 1944)
- Hunter, W.W., The Indian Musalmans: Are They Bound in Conscience to Rebel against the Queen? (Lahore, 1968)
- Coupland, Reginald, The Indian Problem, 1883-1935 (London/ New York, 1942)
- Abdul Latif, Muslim Problem in India together with an Alternative Constitution for India (Bombay, 1939)

- Agarwala, R.M., Hindu-Muslim Riots: Their Cause and Cure (Lucknow, 1943)
- Ahmad, Sir A., The Indian Minorities Problem (London, 1932)
- All India Muslim League, Report of the Inquiry Committee appointed by the All India Muslim League to Inquire into Muslim Grievances in Congress Provinces (Lucknow, 1938)
- Ambedkar, B. R., Pakistan or the Partition of India (Bombay, 1940)
- Anadharujina, Rustomji B., Our Hindu-Muslim Problem (Bombay, 1946)
- Ansari, Shaukatullah, Pakistan: The Problem of India (Lahore, 1944)
- Penderel Moon, Divide and Quit, London, 1961.
- C.H. Philips and M.D. Wainwright (eds.), Partition of India: Policies and Perspectives: 1935-1947, London, 1970
- Nicholas Mansergh and Penderel Moon (ed.), Constitutional Relations between Britain and India: The Transfer of Power 1942-47, London, 1973.
- Peter Hardy, The Muslims of British India, Cambridge, 1972.
- David Page, Prelude to Partition: The Indian Muslims and the Imperial System of Control 1920-1932, Oxford, 1982.
- Farzana Shaikh, Community and Consensus in Islam: Muslim Representation in Colonial India, Cambridge, 1989.
- R.J. Moore, The Crisis of Indian Unity, Oxford, 1974.
- Paul Brass, Language, Religion and Politics in North India, Cambridge, 1974.
- Stanley Wolpert, Jinnah of Pakistan, Oxford, 1985.
- David Gilmartin, Empire and Islam: Punjab and the Making of Pakistan, Berkely, 1988.
- Ayesha Jalal, The Sole Spokesman: Jinnah, the Muslim League and the Demand for Pakistan, Cambridge, 19853
- Ajeet Jawed, Jinnah: Secular and Nationalist, New Delhi, 2005.
- Ian B. Wells, Jinnah's early politics: mbassador of Hindu – Muslim Unity, Cambridge, 2005.
- Amita Inder Singh, The Origins of the Partition of India: 1936-1947, Oxford, 1987.
- Yashmin Khan, The Great Partition: The Making of India and Pakistan, Cambridge, 2007.
- Narender Singh Serila, Shadow of the Great Game: The Untold Story of the Partition of India, Berkeley, 2007.
- Indian Annual Register, Selected volumes

SEMESTER: III MODERN INDIA: 1757 AD-1947 AD

PAPER: 12: HISTORY OF CHILDHOOD

Number of credits: 4

Nature of course: DCEC

Aim of the course: It is intended to provide the students higher level understanding of the history of Childhood. The different aspects Childhood will be thoroughly examined in the light of the new researches in the mentioned field.

Objectives of the course:

i. To explore the idea of Childhood;

ii. To develop a critical understanding of the subject;

iii. To understand the process of development into different fields in the idea of Childhood;

iv. To enlighten the students with the socio-cultural notion of Childhood.

UNIT – 1: History of Childhood: Its Genealogy, Historiography, and Growth of Modern Idea of Childhood in West

A. Defining Childhood: Childhood and History,
B. Genealogy of the modern idea of childhood: from 15^{th} Century to present time
C. Studying Childhood as a Discipline, Making of the discipline of history of childhood in 20^{th} and 21^{st} Centuries
D. Historiography and history of Childhood

UNIT – 2: Theoretical Approaches to History of Childhood

A. Theorizing childhood: childhood and human age, space, time, and childhood
B. Idea of ideal childhood in history
C. Theoretical dimensions for childhood study in other disciplines.
D. Scholars in Childhood history: Philippe Aries, Linda A. Pollock, Colin Heywood, Adriana Wilson

UNIT – 3: Understanding Classical Childhood

A. Sources for childhood study in classical period (Greek, Rome, China, India).
B. Childhood as an idea in classical periods (Greeko-Roman)
C. Classical childhood among various social group
D. Multiple aspects of classical childhood

UNIT – 4: Making of Medieval and Modern Childhood

A. Children or half-adult: An inquiry into the notion of childhood in medieval western societies.
B. Discourse on medieval conception of childhood
C. Idea childhood from pre-modern notion of childhood.
D. Childhood in colonial society: Fusion of Western and Indigenous Conception of Childhood.

Classroom strategy:

The major emphasis will be on theory aspect. Hence formal lectures will be given priority. Guest lecture, too, may be arranged depending upon the requirement of the course module. Projects, assignments, discussions and tutorial classes will form part of the class room teaching of the course. Screening feature films related to the concerned topics and documentary movies may also form part of the teaching scheme.

Suggested Readings:

- Sen, Satadru. Colonial Childhoods: The Juvenile Periphery of India, 1850-1945. London: Anthem Press, 2005.
- Stoler, Ann Laura. Carnal Knowledge and Imperial Power: Race and the Intimate in Colonial Rule. California: California University Press, 2002.
- Buettner, Elizabeth. Empire Families: Britons and Late Imperial India. Oxford; New York: Oxford University Press, 2004.
- Brendon, Vyvyen. Children of the Raj. London: Weidenfeld and Nicholson, 2005.
- Walsh, Judith E. Growing Up in British India: Indian Autobiographers on Childhood and Education under the Raj. New York: Holmes and Meier Publishers, 1983.
- Bandopadhyay, Sibaji. Gopal-Rakhal Dwanda Samash: Upanibeshbad O Bangla Shishu Sahitya. Kolkata: Pyapiras, 1991.
- Parida, Iswar. Construction of Childhood in Colonial Orissa (1822-1947). University of Hyderabad: Unpublished Thesis, 2015.
- Erasmus, Desiderius. A Handbook on Good Manners for Children (De Civilitate Morum Puerilium Libellus). Trans. by Eleanor Merchant. London: Preface Publishing, 2008.
- Locke, John. Some Thoughts Concerning Education. Cambridge: Cambridge University Press, 1892.
- Rousseau, Jean-Jacques. Emile or On Education. London: J. Nourse and P. Vaillant, 1763.
- Aries, Philippe. Centuries of Childhood: A Social History of Family Life. Trans. R. Baldick. New York: Random House, 1962.
- Hugh Cunningham. Histories of Childhood. The American Historical Review, Vol. 103, No. 4 (Oct., 1998), pp. 1195-1208.
- Pollock, Linda A. Forgotten Children: Parent-Child Relations from 1500 to 1900. Cambridge: Cambridge University Press, 1983.
- Aries, Philippe. Centuries of Childhood: A Social History of Family Life. Trans. R. Baldick. New York: Random House, 1962.
- Heywood, Colin. A History of Childhood: Children and Childhood in the West from Medieval to Modern Times. Cambridge: Polity Press, 2010 (2001).
- Adrian Wilson. The Infancy of the History of Childhood: An Appraisal of Philippe Aries. History and Theory, Vol. 19, No. 2 (Feb., 1980), pp.132-153.
- Stearns, Peter N. Childhood in World History. London: Routledge Falmer, 2006.
- Golden, Mark. Children and Childhood in Classical Athens. Baltimore: John Hopkins University Press, 1990.
- Dixon, Suzanne (ed.). Childhood, Class and Kin in the Roman World. London: Routledge, 2001.
- Kinney, Anne Behnke. Chinese Views of Childhood. Hawaii, USA: University of Hawaii Press, 1995.
- Rawson, Beryl. Children and Childhood in Roman Italy. Oxford: Oxford University Press, 2005 (2003).

- Kakar, Sudhir. The Inner World: A Psycho- Analytical Study of Childhood and Society in India, Delhi: Oxford University Press, 1981 (1978).
- Schultz, James A. The Knowledge of Childhood in the German Middle Ages, 1100-1350 Pennsylvania: Pennsylvania University Press, 1995.
- Shahar, Shulamith. Childhood in the Middle Ages. London: Routledge, 1990.
- Orme, Nicholas. Medieval Children. London: Yale University Press, 2001.
- Nicholas Orme. Children and the Church in Medieval England. Journal of Ecclesiastical History, 45 (1994), pp. 563-87.
- Hanawalt, Barbara. Growing Up in Medieval London: The Experience of Childhood in History, Oxford: Oxford University Press, 1993.
- Kinney, Anne Behnke. Chinese Views of Childhood. Hawaii, USA: University of Hawaii Press, 1995.
- Hsiung, Ping-Chen. A Tender Voyage: Children and Childhood in Late Imperial China. Stanford, California: Stanford University Press, 2007.
- Wicks, Ann Barrott. Children in Chinese Art. Honolulu: University of Hawaii Press, 2002.
- Bai, Limin. Children as the Youthful Hope of an Old Empire: Race, Nationalism, and Elementary Education in China, 1895-1915. Journal of the History of Childhood and Youth, March 2008, Vol.1, Issue 2, pp. 210-231.
- Raddock, David M. Growing Up in New China: A Twist in the Circle of Filial Piety. History of Childhood Quarterly, 1974, Vol. 2, Issue 2, pp. 201-220.
- Saari, Jon L. Legacies of Childhood: Growing Up Chinese in a Time of Crisis, 1890-1920. Harvard: Harvard University Asia Centre, 1990.
- Hecht, Tobias (ed.) Minor Omissions: Children in Latin American History and Society. Wisconsin: The University of Wisconsin Press, 2002.
- Gonzalez, Ondina E. and Bianca Premo. Raising an Empire: Children in Early Modern Iberia and ColonialLation America. USA: The University of New Mexico Press, 2007.
- Milanich, Nara B. Children of Fate: Childhood, Class, and the State in Chile, 1850-1930. Durham, USA: Duke University Press, 2009.

SEMESTER: III

MODERN INDIA: 1757 AD-1947 AD

PAPER: 13: PEASANTS, WORKERS AND TRIBES IN COLONIAL INDIA (IDENTITIES, REVOLTS AND CONTESTATIONS)

Number of credits: **4**

Nature of course: **DCEC**

Aim of the course: The broad aim is to know the people at margins and their existence in the colonial rule, the problems encountered by them and how they meted out the reactions.

Objective of the course:

I To know the various circumstances in which these classes suffered, struggled and made ways for themselves.

ii. To deliberate upon the various other issues afflicting these classes.

UNIT 1: Introduction:

A. Introduction; Historiography; Sources.
B. Peasants-Approaches, Methods, Issues, Characteristics of Peasant Societies.
C. Workers-Formation, Unions, Conditions.
D. Tribals-Introduction, Quest for Survival in New Age, Government Policies.

UNIT 2: Resistance:

A. Government Policies and Peasantry; Resistance-Modes, Reaction and
B. Pre 1857 Peasant Revolts; Peasantry and 1857 Revolt;
C. Peasant Resistance in 20th Century.
D. Tribal Movements- Causes, Role of Middlemen and Moneylenders, Tribal and Environment.

UNIT 3: Workers:

A. Last quarter of 19th Century and Workers.
B. Workers, Trade Unions, Associations-INC and Left.
C. Government Policies and Responses; Industrialists and Workers.
D. Workers and Indian National Movement.

UNIT 4: Peasants, Tribals and Indian National Movement:

A. Peasants in Indian National Movement
B. Regional Variations: UP, Bihar, Maharshtra, Andhra and Central Province
C. Tribals and the Indian Naitonal Movement
D. Tribals: Self and Others

Classroom strategy:

The major emphasis will be on theory aspect. Hence formal lectures will be given priority. Guest lecture, too, may be arranged depending upon the requirement of the course module. Projects, assignments, discussions and tutorial classes will form part of the class room teaching of the course.

Suggested readings:

- Eric Wolf, Peasants, Prentice Hall, Princeton, 1966.
- Alessandro Portelli, The Death of Luigi Trastulli and Other Stories: Form and Meaning in Oral History, State University of New York Press, 1991, Paperback.
- Ranajit Guha, Elementary Aspects of Peasant Insurgency in Colonial India, Oxford University Press, Delhi 1982, and PB editions.
- Andre Beteille, Six Essays in Comparative Sociology, Oxford University Press, Delhi, 1974, PB.
- Stephen Dale, Islamic Society on the South Asian Frontier: The Mapillas of Malabar, 1498-1922, Oxford University Press, 1980.
- 'The Rebellion Number' Man in India, Vol. xxv, No. 4, December, 1945.
- James Scott, Weapons of the Weak: Everyday Forms of Peasant Resistance, Yale University Press, 1987, Paperback (selected chapters).
- William Crooke, The Popular Religion and Folklore of Northern India (2^{nd} Edn. 1896) 2 vols. Reprint: Delhi, 1968, Kessinger Publishing, 2004.
- Lawrence Babb, The Divine Hierarchy: Popular Religion in Central India, Columbia University Press, New York, 1975.
- M.N. Srinivas, The Remembered Village, Oxford University Press, 1988 (Paperback and reprints), Ch. IX 'The Quality of s o c i a l Relations'.
- Dharma Kumar, Land and Caste in South India, Cambridge University Press, Cambridge, 1965.
- Ranajit Guha, A Rule of Property in Bengal: An Essay on the Idea of Permanent Settlement, Duke University Press, New Delhi, 1982.
- Asiya Siddiqui (ed.), Trade and Finance in Colonial India 1750-1860, Oxford University Press, New Delhi, 1995.
- Prasannan Parthasarathy, The Transition to a Colonial Economy: Weavers, Merchants and Kings in South India, 1720-1800, Cambridge, 2001.
- B.B Chaudhury, Growth of Commercial Agriculture in Bengal 1757-1900, Calcutta, 1964.
- Jan Breman, Labour Bondage in West India from Past to Present, Oxford University Press, New Delhi, 2008.
- Lauren Benton, Law and Colonial Cultures: Legal Regimes in World History, 1400-1900, Cambridge, 2002.

SEMESTER-IV

Skill Enhancement Elective Course (SEEC- Compulsory and exclusively for the students of the Dept. of History & Archaeology)

SEMESTER IV

INDIAN ARCHAEOLOGY

SRL NO.	COURSE CODE	COURSES	L	T	D	CREDITS	SEEC
1	SAHS HA 010412 ARCH C001616	Dissertation (including viva-voce)	0	0	16	16	SEEC
2	SAHS HA 010413 ARCH C 5005	Science in Archaeology	5	0	0	5	SEEC
3	SAHS HA 010414 ARCH C5005	Debate in Archaeology	5	0	0	5	SEEC
						26	Total Credit

NOTE: ***Paper first will be writing dissertation which will carry 16 credits.***

SEMESTER: IV

PAPER: 2: SCIENCE IN ARCHAEOLOGY

Number of credits: **5**

Nature of course: **SEEC**

Aim of the course: The broad aim is to acquaint students with the uses of science of archaeology while studying the subject.

Objective of the course:

i. To know the use of science in the field of archaeology.
ii. To know its significance, need and also how it helps in enhancing the scope and research of archaeology.

Unit-1: Introduction:

A. Role of various sciences in archaeological research
B. Geological time-scale – the position of the Quaternary Period within the standard geological column.
C. Description and interpretation of natural and archaeological section in the field

Unit-2: Geoarchaeology and Environmental Archaeology:

A. Rocks and Minerals – definition and types, their characteristic features.
B. Fluvial environments in archaeology: river terraces and other formations
C. Palaeo-environmental survey of India during Pleistocene and Holocene with example
D. Human–land relationships: understanding the impact of environmental change on early societies

Unit-3: Archaeozoology and Archaeobotany:

A. Application of archaeozoology in reconstruction of past
B. Survey of animal fossil remains and archaeozoological remains from archaeological sites in India
C. Application of archaeobotany in reconstruction of the past
D. Survey of plant remains and related evidences from archaeological sites in India

Unit-4: Anthropology and Chemistry:

A. Meaning and scope of Anthropology and its relevance in archaeological studies
B. Physical anthropology and its application to archaeology
C. Preliminary study of soils and sediments, pH, colour, texture, organic carbon, calcium carbonate and phosphate contents.
D. Chemical conservation and preservation of archaeological finds: metals, stones, terracotta, bone etc.

Classroom strategy:

The major emphasis will be on theory aspect. Hence formal lectures will be given priority. Guest lecture, too, may be arranged depending upon the requirement of the course module. Projects, assignments, discussions and tutorial classes will form part of the class room teaching of the course.

Suggested readings:

- Badam, G. L. 1979. Pleistocene Fauna of India, Pune: Deccan College.
- Baker, J. and D. Brothwell. 1980. Animal Diseases and Archaeology, Academic Press: London
- Biswas, A. K. 2005. Science in Archaeology and Archaeological materials. New Delhi: D.K. Print World (P) Ltd.
- Brothwell, D. and E. Higgs (Eds.). 1969. Science in Archaeology, London: Thames and Hudson.
- Brothwell, D. and A. M. Pollard. 2001. Handbook of Archaeological Sciences, New York: John Wiley and Sons.
- Cornwall, I. W. 1974. Bones for Archaeologists, (revised edition), London: L.M. Dent and Sons.
- Joshi, R. V. and B. C. Deotare. 1983. Chemical Analysis of Archaeological Deposits from India. Pune: Deccan College.
- Kajale, M. D. 1991. Current status of Indian Palaeoethnobotany: Introduced and indigenous food plants with a discussion of the historical development of Indian Agriculture and agricultural system in general, in New Light on Early Farming, Jane Renfrew (Ed.), Edinburgh: Edinburge University press, pp.155 190.
- Moore, P. D., Webb, J. A. and M. E. Collinson. 1992. Pollen Analysis, Oxford: Blackwell.
- Plenderlith, H. J. 1965. The Conservations of Antiquities and Works of Art, London: Oxford University press.
- Schmid, E. 1972. Atlas of Animal Bones. London: Elsevier publishing Co.

SEMESTER: IV

PAPER: 3: DEBATES IN ARCHAEOLOGY

Number of credits: **5**

Nature of course: **SEEC**

Aim of the course: The broad aim is to explore some of the vexatious areas in the field of archaeology and how the debates takes shape.

Objective of the course:

i. To know the problematic areas and the debates surrounding it.

Unit-1 Debate in Pre-history and Related Issues:

A. Terminology of cultural phases in Indian archaeology.
B. Recent theories and debates on human origins, dispersals and behavior
C. Problem of South Indian ashmounds
D. Debating of origins of rice

Unit-2: Debate in Harappan Civilization and Related Issues:

A. Origin of Harappans: foreign & indigenous theories
B. Rig-vedic text and Harappan civilizaion: problems of corroboration
C. Identity of the Sarasvati River
D. Horse in the Harappan civilization- a matter of debates

Unit-3: Debate in Vedic Period and Related Issues:

A. Aryana invasion: myths and reality
B. The problem of dating the great epics: Mahabharata and Ramayan
C. The antiquity of iron technology and second urbanization

Unit-4: Debate in Post Vedic Ancient India:

A. Gupta Age as Golden Age: Archaeological Perspective
B. Problem area of archaeology: Dwaraka and Rama Setu
C. Mahabharata and Ramayana: Reality or Myth-Archaeological Study

Classroom strategy:

The major emphasis will be on theory aspect. Hence formal lectures will be given priority. Guest lecture, too, may be arranged depending upon the requirement of the course module. Projects, assignments, discussions and tutorial classes will form part of the class room teaching of the course.

Suggested readings:

- Allchin, F. R. 1963. Neolithic Cattle-Keepers of South India. Cambridge: Cambridge University Press
- Allchin, F. R. and B. Allchin 1993. The Birth of Civilization in India, revised ed. New Delhi: Penguin Books.

- Dorian Q Fuller, Emma Harvey and Ling Qin 2007. Presumed domestication? Evidence for wild rice cultivation and domestication in the fifth millennium BC of the Lower Yangtze region antiquity 81: 316–331
- Gauri Lad 1983. Mahabharata & Archaeological evidence. Pune: Deccan Collage Post Graduate and Research Institute.
- Lal, B. B. 2002. The Saraswati Flows on the Continuity of Indian culture. New Delhi: Aryan Books International, Lal B. B. 2008. Rāma: His Historicity Mandir and S etu: vidence of L i t e r a t u r e , archaeology and Other Sciences. Delhi: Aryan Books International
- Mukherjee, Ashoke 2001. Rigvedic Saraswati: Myth and Reality Breakthrough, Vol.9, No.1:1-10
- Murthy, S. S. N. (2003). The Questionable Historicity of the Mahabharata. Electronic Journal of
- Vedic Studies (EJVS) 10, Issue 5 (Nov.14):1-15.
- Paddayya, K., 1998. "Evidence of Neolithic cattle- enning at Budihal, Gulbarga District, Karnataka', South Asian Studies 14: 141-153;
- Paddayya, K. 2000-01. "The problem of ashmounds of Southern Deccan in light of Budihal excavations, Karnataka', Bulletin of the Deccan College Post-Graduate and Research Institute
- 60/61: 189-225
- Possehl, G. 1999. The Indus Age. New Delhi: Oxford.
- Prasanna, T. R. S. 2012. There is no scientific basis for the Aryan Invasion Theory. Current
- Science vol. 103 (2): 216-221
- Rao, S. R. 1999. The Lost City of Dvaraka, New Delhl. Aditya Prakashan,
- Tripathy, Vibha. 2001. Age of Iron in South Asia: Legacy and Tradition, Aryan Books International, New Delhi.
- Valdiya K. S. 2013. The River Saraswati was a Himalayan-born river. Current Science vol. 104 (1): 42 -54.

Or

SEMESTER-IV

ANCIENT INDIA

SRL NO.	COURSE CODE	COURSES	L	T	D	CREDITS	SEEC
1	SAHS HA 010412 ANC C001616	Dissertation (including viva-voce)	0	0	16	16	SEEC
2	SAHS HA 010413 ANC C 5005	Problems and Debates in Ancient India	5	0	0	5	SEEC
3	SAHS HA 010414 ANC C5005	Ancient Indian Philosophy and Knowledge System	4	0	0	5	SEEC
						26	Total Credit

NOTE*: Paper first will be writing dissertation which will carry 16 credits.*

SEMESTER: IV

PAPER: 2: PROBLEMS AND DEBATES IN ANCIENT INDIA

Number of credits: **5**

Nature of course: **SEEC**

Aim of the course: The broad aim is to make students understand the importance of key unresolved areas of ancient past.

Objective of the course:

i. To develop a critical understanding of the subject.

NOTE: In this paper, the emphasis is not only on mere narration but also on critically brainstorming the unresolved issues of ancient India.

UNIT I:
The Aryan problem – Debates – Invasion hypothesis – Migration Hypothesis –
R.S.Sharma, Romila Thankar.

UNIT II:
From Tribe to State – Janapada Polity – Mauryan political apparatus –Debates on Arthasastra.

UNIT III:
Did India have a Golden age during the Guptas?

Unit IV:
Concept of crisis – Kali Age – Transition from ancient to Medieval- the Feudalism debate.

Classroom Strategy:
The major emphasis will be on theory aspect. Hence formal lectures will be given priority. Guest lecture, too, may be arranged depending upon the requirement of the course module. Projects, assignments, discussions and tutorial classes will form part of the class room teaching of the course. Graphics and videos may also form part of the teaching wherever it is required and possible.

Suggested Reading:

- Adams.R.H, The Evolution of urban Society, Chicago 1960
- Adhya. G. L., Early Indian Economics Bombay, 1966.
- Altekar.A.S, State and Government in Ancient India (Reprint, Delhi 1972)
- Anderson Perry, Lineages of the Absolutist State, Verso, London 1974.
- Balambal.V, Feudatories of South India (Allahabad, 1978)
- Bandopadyaya.N.C, Development of Hindu Polity and Political theories
- (Ed.By N.N.Bhattacharya), New Delhi 1980
- Basham.A.L, Studies in Indian History and culture (Calcutta, 1964)
- Braudel Fernand, The structure of Every day life (London, 1981)
- Chatto Padhyaya.B.D, The making of early Medieval India, (OUP, New Delhi, 2906)
- Fox, Richard, Realms and Region in Traditional India, (Delhi 1977)
- Fox, Richard, Kin, Clan, Raja and Rule State – Hinterland Relations in Pre-Industrial India
- Karashima.N, South Indian History and Society/Studies from inscriptions OVP, 1984.

- Stein, Burton, Peasant State and Society in Medieval South India.
- D.D.Kosambi An introduction to the study of Indian History (Bombay 1956)
- Roy Chandhari Political History of Ancient India, 6th Education, University of Calcutta, 1953
- Sharma.R.S, Indian Feudalism, 1965
- Sharma.R.S, Aspect of Political ideas and institutions in Ancient India
- Sharma.R.S ,Sudra in Ancient India
- Sharma.R.S , Material Culture and Social Formations in Ancient India
- Sircar.D.C Land system and Feudalism in Ancient India (University of Calcutta, 1966)
- Sircar.D.C Landurdism and Tenancy in Ancient and Medieval India as Reveled by Epigraphical Records (Lucknow, 1969)
- Vijayakumar Thakur, Historiography of Indian Feudalism
- Romila Thaper, Cultural Pasts
- Romila Thaper, From Lineage to state
- Romila Thaper, Interpreting Earley India
- Yadava, B.N.S Society and Culture in Northern India in the Twelfth Century (Allahabad, 1973)

SEMESTER: IV

PAPER: 2: ANCIENT INDIAN PHILOSOPHY AND KNOWLEDGE SYSTEM

Number of credits: **5**

Nature of course: **SEEC**

Aim of the course: The broad aim is to understand the ancient treasure of Indian wisdom through their religion and philosophy.

Objective of the course:

i. To know the history of ancient Indian knowledge system.
ii. To know about the growth of ancient Indian philosophy.
iii. To understand the relation between the two and the beginning of a thinking tradition in ancient India.

UNIT 1: Beginning of Ancient Indian Philosophy and Knowledge:

A. Vedic Corpus-Rg Veda, Sama Veda, Yajur Veda and Atharva Veda; Brahamanas; Aranyaks.
B. Cosmology of the Vedas- Origin of Calendar, Linguistics and Astronomy.
C. Vedangas and Specialized Knowledge; Sulba Sutra and Vedic Geometry; Upaveda.
D. Upanishads-Basis of Indian Philosophy: Atman and Brahma.

UNIT 2: Creation of Knowledge and Philosophy in a Transitional Society:

A. Buddhist and Jainist Philosophy- Epistemology, Cosmology, logic.
B. Evolution of Social Philosophy-The Dharmasastras; the Smritis; Puranas.
C. Philosophy of Other Heterodox Sects- Ajivkas, Lokayat.
D. The Six Schools-Sankhya, Yoga, Nyaya, Vasheshika, Purva Mimansa, Vedanta/Uttar Mimansa; the Six Sub Schools of Vedanta.
E. Tolkappiyam and manual; contributions of Tiruvalluvar; linguistic and grammar; Temple culture and worship – the Agamas.

UNIT 3: Classical knowledge System:

A. Astronomy and Mathematics – Bhaskara, Aryabhata, Varahamihira;
B. Treatises on Statecraft: The Arthasastra;
C. Healthcare Systems: Ayurveda-Vrksha, Hasti and Asva; Samhitas- Charaka, Susruta, and Bhela; Patanjali-Yoga System.
D. Lexicography: Amara and Hemachandra; Histrionics: Bharata and Natyasastra; Vatsayana- Kamasutra; Architecture: Samarangana Sutradhara.

UNIT 4: Theoretical Discourse:

A. Growth of Logic/Nyaya-Sixteen Categories; Anvikshki.
B. Language and Grammar - Dhvani and Rasa: Anandvardhan and Abhinav Gupta and Sphota-Sphotavada of Bhartihari.
C. Cosmology – Jiva-atma and loka – panchabhutas, padarthas.
D. Concepts of truth- Laukika, Vyavaharika and Paramarthika.

Classroom strategy:

The major emphasis will be on theory aspect. Hence formal lectures will be given priority. Guest lecture, too, may be arranged depending upon the requirement of the course module. Projects, assignments, discussions and tutorial classes will form part of the class room teaching of the course.

Suggested readings:

- H.C.Bharadwaj: Aspects of Ancient Indian Technology.
- D.P.Chattopadhyaya: Science and Society in Ancient India.
- A.K.Bag: Science and Civilization in Ancient India, Vol.I.
- A.K.Bag: India and Central Asia; Science and Technology (2 vols.).
- A.K.Warder: Indian Buddhism
- A.K.Chatterjee: A Comprehensive History of Jainism
- M.Hiriyanna: Outline History of Indian Philosophy.
- K.Damodaran: Indian Thought a Critical Outline
- S.N.Dasgupta: Outline of Indian Philosophy.
- H.Zimmer: Philosophies of India.
- E.Solomon: Indian Dialectics
- B.Matilal: The Word and the World
- B.Matilal: The Character of Logic in India
- B.Matilal: Perception.
- R.P.Kangle: Arthasastra of Kautilya.
- C.Sivaramamurti: Indian Architecture
- S.S.Barlingay: A Modern Introduction of Indian Logic
- P.V.Kane: Sanskrit Poetics.
- Krishna Chaitanya: An Introduction to Sanskrit Poetics
- Patrick Oliville: The Dharma Sutras
- T.Scherbatsky: Introduction to Buddhist Logic
- George Gheevarghese Joseph: Crest of the Peacock.
- S Radhakrishnan: Indian Philosophy, OUP.

Or

SEMESTER-IV

MEDIEVAL INDIA

SRL NO.	COURSE CODE	COURSES	L	T	D	CREDITS	SEEC
1	SAHS HA 010412 MED C001616	Dissertation (including viva-voce)	0	0	16	16	SEEC
2	SAHS HA 010413 MED C 5005	Popular Resistance in Mughal India	5	0	0	5	SEEC
3	SAHS HA 010414 MED C5005	Themes, Problems and Perspectives of Medieval India	5	0	0	5	SEEC
						26	Total Credit

NOTE: ***Paper first will be writing dissertation which will carry 16 credits.***

SEMESTER: IV

MEDIEVAL INDIA

PAPER: 2: POPULAR RESISTENCE IN MUGHAL INDIA

Number of credits: **5**

Nature of course: **CORE**

Aim of the course: The broad aim is to study the factors and contexts which gave rise to discontentment and eventually leading to vocal and violent manifestations during the Medieval India.

Objective of the course:

i. To know the reasons leading to anti –establishment outbursts.
ii. To make use of official as well as traditional and non- official sources for the study.

UNIT 1: Introduction:

A. Introduction; Historiography; Sources.

UNIT 2: Political and Economic Revolts:

A. Revolts of Nobility: 1560-1740-Causes, Nature, Outcome.
B. Zamindar's Revolts: Zamindars and the Mughal administration; Nature and Power of the New Zamindars, Local Uprisings and its impact on Mughal Polity; Jat Revolt.
C. Peasant's Revolt: Causes, Nature, Modes and Response of the state.

UNIT 3: Other Resistences:

A. Religious Revolts: Raushaniya Movement (1585, 1611-16, 1628 AD); Satnami Revolt (1628 AD); Sikh Revolt.
B. Merchants Resistence.
C. Everyday Resistence.

UNIT 4: Regional Resistences:

A. Maratha
B. Jat.
C. Bundela
D. Rohilla

Classroom strategy:

The major emphasis will be on theory aspect. Hence formal lectures will be given priority. Guest lecture, too, may be arranged depending upon the requirement of the course module. Projects, assignments, discussions and tutorial classes will form part of the class room teaching of the course.

Suggested readings:

- Alam, Muzaffar, The Crisis of Empire in Mughal North India; Awadh and the Punjab, 1707-1748, Delhi, 2001.
- Alam, M. & Subramaniyam, (eds.) The Mughal State, 1526-1750, New Delhi: OUP, 1998.
- Champaklakshmi, R. and Gopal, S. eds., Tradition, Dissent and Ideology, OUP, 2001
- Chandra, Satish, Parties and Politics at the Mughal Court, 1707-1740, New Delhi, OUP, 2003
- Medieval India: Society Jagirdari Crisis and the Village. Delhi: Macmillan,1992
- Bhadra, Gautam, 1999 'Two frontier uprisings in Mughal India', Subaltern Studies II.

- Hobsbawm, E.J. Bandits, Middlesex, 1985.
- Hasan, Farhat, State and Locality in Mughal India Power Relations in Western India, c. 1572-1730 (Cambridge: CUP, 2004).
- Irfan Habib, The Agrarian system of Mughal India (1556-1707), OUP, 1999.
- Hasan, S.Nurul, Thought on Agrarian relation in Mughal India, 1973.
- Mayaram, Shail, Against History, Against State: Counter perspectives from the margins, New Delhi, 2004.
- Scott, James C., Weapons of the Weak: Everyday Forms of Peasant Resistance, Yale University Press, 1985
- R.P.Rana, Rebels to Rulers: The Rise of Jat Power in Medieval India, c. 1665- 1735, New Delhi: Manohar, 2006.
- Khan, A.R., Chieftains in the Mughal Empire during the Reign of Akbar, Shimla, 1977.

SEMESTER: IV

MEDIEVAL INDIA

PAPER: 3: THEMES, PROBLEMS AND PERSPECTIVES OF MEDIEVAL INDIAN HISTORY

Number of credits: **5**

Nature of course: **SEEC**

Aim of the course: The broad aim is to highlight and discuss the problematic zones in the reading of medieval Indian history.

Objective of the course:

i. To know the vexatious issues afflicting the different sectors of governance and society.
ii. To deliberate upon the historical contexts in which such issues developed.

UNIT 1: The Political Structure:

A. Delhi Sultanate – Sultan, Nobility and Ulema: Conflict, Consensus and Continuity.
B. The Mughul State: Nature-Patrimonial Bureaucratic State; Revenue System –Mansabdari; Provincial Government- Suba, Sarkar, Pargana.
C. South Indian Kingship – Segmentary or Military Feudal? – Ritual and politics in Kingship.
D. Regional States – Rajput Polity; Maratha-Concept of Swarajya among Marathas.

UNIT 2: Socio-Economic:

A. The Village community – Landlords, tenants and labourers – Service and rent - organisation of occupations and social positions (Zamindar, Raiyat, Mirasi Ayakar and Balutedari) – Role of the Village headman.
B. Caste and Social stratification – Caste as occupational division and ideology – Theories of Louis Dumont and Criticisms.
C. Artisan groups and their organization of production – Local trade, Local market, trading groups.
D. Urbanism-Causes, Features, Types-Administrative, Coastal and Industrial.

UNIT 3: Religion and Culture:

A. Islam and Sufism; Din-i- Ilahi; Coming of Christianity.
B. Indigenous sects – Saivism and Vaishnavism.
C. Medieval Bhakti Movement – Syncretic tradition- Ramanand, Kabir and Nanak; Sectarian traditions- Chaitanya, Meera and Tulsidas; Maharashtra and South Indian Bhakti; Temple centers and pilgrimages.
D. Literature in Persian, Sanskrit and regional languages; Performance traditions – Music art, sculpture and architecture (Indo-Persian and indigenous forms); Festival and ceremonies; science and technology.

UNIT 4: Early Modern or Late Medieval:

A. Conceptualising Late Medieval/Early Modern.
B. Eighteenth century India – Decline of the Mughal state: Mughals and the 'successor' states.
C. Growth of regional cultural identities.
D. Social and cultural roots of Indian 'backwardness': The uropean rientalist perceptions and their critique.

Classroom strategy:

The major emphasis will be on theory aspect. Hence formal lectures will be given priority. Guest lecture, too, may be arranged depending upon the requirement of the course module. Projects, assignments, discussions and tutorial classes will form part of the class room teaching of the course.

Suggested readings:

- K.A. Nizami and Muhammad Habib (ed.): Comprehensive History of India, Vol. V,
- arts I and II. People's Publishing House, New Delhi.
- Satish Chandra: Medieval India, Vol. 1 and II. Har-Anand Publishers, New Delhi 2004.
- Sunil Kumar: Formation of the Delhi Sultanate. Permanent Black, New Delhi, 2007.
- K.A. Nisami: Region and Politics in India during 13th century. OUP, Delhi, New ed. 2009.
- J.F.Richards: The Mughal Empire, Foundation Books, 1993.
- J.F.Richards (ed.) Kingship and authority in Medieval India, Delhi.
- R.P.Tripathi: The Rise and Fall of the Mughal Empire, Allahabad, 1936.
- Musaffar Alam and Sanjay Subrahmanyam (eds.): The Mughal State, OUP, 1998.
- Herman Kulke (ed.): The State in India (1000-1700), Oxford
- Richard G Fox (ed.): Realism and Region in Medieval India, Delhi, 1976.
- Louis Dumont: Homo Hierarchicus
- Stewart Gordon: The Marathas, Cambridge,, 1998
- Irfan Habib: Agrarian System in Mughal India, OUP, 1999.
- Irfan Habib: (ed.): Akbar and His India, Oxford, 1997.
- Irfan Habib: Essays in Indian History, Tulika, Delhi.
- Stephen P. Blake: Shajahanbad, Cambridge
- H.K.Naqvi: Urbanism and Urban Centres in Medieval North India, OUP.
- A.Rahman (ed): Science and Technology in Medieval India OUP, 1994.
- N. Karashima: South Indian History and Society, OUP, 1984.
- N. Karashima: Kingship in Indian History, Manohar, Delhi.
- Aziz: Mansabdari Systems and the Mughal Army, Delhi, 1954.
- Satish Chandra: Essays on Medieval Indian History, OUP, 2003.
- T. Raychaudhuri and Irfan Habib (ed). Cambridge Economic History of India, Vol. I, Cambridge,
- Catherine B. Asher: Mughal Architecture, CUP, 1992.
- Milo C Beach: The Mughal Painting, CUP, 1992.
- Percy Brown: India Architecture (Islamic Period), Bombay, Taraporevala, 1958.
- H.K.Sherwani and P M Joshi (ed). History of Medieval Deccan (1295-1724) Hyderabad, 1973-74.
- H.K. Sherwani: Bahmanis of Deccan, New Delhi, 1985.
- Burton Stein: Peasant State and Society in Medieval South India, OUP, 1980.
- Burton Stein: Vijayanagara, CUP, 1989.
- Ronald Inden: Imaged India, Blackwell
- Kate Teltscher: India Inscribed, OUP.
- Seema Alavi (ed.): India in the Eighteenth century
- P.J.Marshal (ed): India in the Eighteenth Century.

Or

SEMESTER-IV

MODERN INDIA

SRL NO.	COURSE CODE	COURSES	L	T	D	CREDITS	SEEC
1	SAHS HA 010412 MOD C 001616	Dissertation (including viva-voce)	0	0	16	16	SEEC
2	SAHS HA 010413 MOD C 5005	Social Change In Modern India: 1769 AD – 1947 AD	5	0	0	5	SEEC
3	SAHS HA 010414 MOD C 5005	Economic History of India: 1757 AD - 1947 AD	5	0	0	5	SEEC
						26	Total Credit

NOTE: ***Paper first (according to serial number) will be writing dissertation which will carry 16 credits.***

SEMESTER-IV
SOCIAL CHANGE IN MODERN INDIA: 1769-1947

Number of credits: 5

Nature of course: CORE

Aim of the course: The broad aim is to make students aware about the numerous changes and continuity in colonial Indian society.

Objective of the course:

i. To understand the theories in social history.

ii. To examine the social-history writing

iii. To understand the complex interrelationship that existed between various institutions of Indian society.

UNIT – 1: Colonial Knowledge Production and English Officials in India

A. Colonial Official and Indian Languages (Persian, Sanskrit and Hindoostani)
B. Indigenous Law and Colonial Administration: William Jones, Nathaniel Halhed, Thomas Colebrooke
C. Gazetteers and Census: Social engineering of Indian Society; Cartography in India
D. Self and Other; Colonial Narrative of Indian Society

UNIT – 2: Caste and Colonial Modernity

A. Caste and *Jati*: Perception and Practice of Caste in pre-colonial Indian society
B. Textualization of Caste: Census and politics of social hierarchy
C. Modernization of Caste: Caste Associations and Effort for Social Mobility
D. Dalit Movement: Jotiba Phule, Periyar, Narayan Guru and Dr. B.R. Ambedkar

UNIT – 3: Colonial Education and Making of Educated middle Class

A. System of Education in Pre-Colonial Indian Society
B. Anglo-Oriental Debate on Education
C. Macaulay Minute, Woods Despatch, Hunter Commission on Indian education
D. Emergence of Educated Middle Class

UNIT – 4: Family and Childhood

A. Family in pre-colonial Indian Society
B. Women and Social Reform Movements
C. Modernization of Family: Changing Role of Women and Children
D. Making of Colonial Childhood: Family and School

Classroom strategy:
It will be a blend of formal theoretical teaching and discussions. Audio-visual display, presentations, assignments, discussions, quiz and brainstorming sessions will equally be employed. Wherever possible, guest lectures may also be organized. **The 30 percent of this paper will be taught online and rest of it will be offline.**

Suggested Readings

- Sarkar, Sumit. *Writing Social History*. New York: Oxford University Press, 1997.
- Cohn, Bernard S. *Colonialism and Its Forms of Knowledge: the British in India*. New Jersy: Princeton University Press, 1996.
- Edney, Mathew H. *Mapping an Empire: The Geographical Construction of British India, 1765-1843*. Chicago: The University of Chicago Press, 1997.
- Bayly. C.A. *Empire and Information: Intelligence Gathering and Social Communication in India, 1780-1870*. Cambridge: Cambridge University Press, 1996.
- Nandy, Ashis. *The Intimate Enemy: Loss and Recovery of Self under Colonialism*. Delhi: Oxford University Press, 1983.
- Nandy, Ashis. *Sati as Profit versus Sati as Spectacle: The Public Debate on Roop Kanwar's Death*. In Sati, the Blessing and the Curse, ed. J.S. Hawley, 131-49. New York, Oxford: Oxford University Press, 1994.
- Malhotra, Rajiv. *Weaving India's Mahakatha (Grand Narrative) for the 21st Century*. Shimla: Indian Institute of Advanced Studies, 2018.
- Malhotra, Rajiv. *Being Different: An Indian Challenge to Western Universalism*. Delhi: HarperCollins, 2013.
- Foucault, Michel. *The Government of Self and Other: Lectures at the College de France, 1982-83*. Paris: ST MARTINS Press, 2011.
- Sartre, Jean-Paul. *Being and Nothingness: An Essay on Phenomenological Ontology*
- Metcalf, Thomas R. *Ideologies of the Raj*. Cambridge: Cambridge University Press, 1997.
- Dirks, Nicholas B. *Castes of Mind: Colonialism and the Making of Modern India*. Princeton: Princeton University Press, 2001.
- Bayly, Christopher Alan. *Indian Society and the Making of the British Empire*. Cambridge: Cambridge University Press, 1990.
- Cohn, Bernard S. *An Anthropologist among Historians*. New York: Oxford University Press, 1987.
- Bates, Crispin B. *Race, Caste and tribe in Central India: The Early Origin of Indian Anthropometry*. London: OUP, 1995.
- Pinch, William R. *Peasants and Monks in British India*. London: University of California Press, 1996.
- Mines, Diane P. *Caste in India*. California: Association for Asian Studies, 2009.
- O'Hanlon, Rosalind. *Caste, Conflict and Ideology*. Cambridge: CUP, 1985.
- Ambedkar, B.R. *Castes in India*. Jullunder: Bheem Patrika Publications.
- Bayly, Susan. *Caste, Society and Politics in India from the Eighteenth Century to the Modern Age*. Cambridge: Cambridge University Press, 2008.
- Dumont, Louis. *Homo Hierarchicus: The Caste System and Its Implications*. New Delhi: OUP, 1970.
- Dubois, Abbe J.A. *Description of the Character, Manners and Customs of the People of India and of their Institutions, Religious and Civil*. London: Longman, 1817.
- Buhler, G. The Laws of Manu

- Zelliot, E. *From Untouchable to Dalit: Essay on Ambedkar Movement*. New Delhi: Manohar Publishers and Distributors, 1992.
- Dirks, Nicholas B. *Autobiography of an Archive: A Scholar's Passage to India*. Columbia: Columbia University Press, 2015.
- Irschick, Eugene F. *Dialogue and History*. Berkeley: University of California Press, 1994.
- Trevelyan, Charles E. *On the Education of the People of India*. London: Longman, 1838.
- Bhattacharya, Tithi. *The Sentinel of Culture*. New York: OUP. 2005.
- Habsbawm, Eric. *The Invention of Tradition*. Cambridge: CUP, 1992.
- Sarkar, Tanika. *Hindu Wife and Hindu Nation*. New Delhi: OUP, 2006.
- Mani, Lata. *Contentious Tradition*. Berkeley: University of California Press, 1998.
- Forbes, Geraldine. *Women in Modern India*. Cambridge: Cambridge University Press, 1996.
- Banerjee, Swapna M. *Men, Women and Domestic Workers: Articulating Middle Class Identity in Colonial Bengal*. New Delhi: OUP, 2005.
- Sen, Satadru. *Colonial Childhoods*. New York: Anthem Press, 2005.
- Banerjee-Dube, Ishita. *A History of Modern India*. New Delhi: CUP, 2015
- Bandopadhyay, Shekhar. *From Plassey to Partition*. New Delhi: Orient Blackswan, 2004.

SEMESTER: IV

MODERN INDIA: 1757 AD-1947 AD

PAPER: 3: ECONOMIC HISTORY OF INDIA: 1757 AD-1947 AD

Number of credits: 5

Nature of course: SEEC

Aim of the course: The broad aim is to know the development of Indian economy under the British period.

Objective of the course:

i. To know the various circumstances in which Indian economy developed under the British rule.

ii. To deliberate upon the outcome of this development and also the role of economic nationalism in the struggle against the British.

UNIT I: Introduction:

A. Historiography
B. Indian economy in the 18^{th} century
C. De-industrialization
D. Contemporary Indians and Critique of Colonial Indian Economy

UNIT II: Agriculture:

A. Colonial Land Revenue System
B. Commercialization of Agriculture
C. Famines
D. Irrigation

UNIT III: Trade, Commerce and Industries:

A. Industrial policies and Reports
B. Large Scale Industries; Mining
C. Foreign Trade and Balance of Payment
D. Fiscal system: Money, Credit & Banking

UNIT IV: Other Aspects of Colonial Indian Economy

A. Population, Migration and Labour
B. Transportation and Communication-Railways, Postal and Telegraph, Shipping
C. Growth of Indian Capitalist Class
D. Indian National Congress and Economic issues

Classroom strategy:

The major emphasis will be on theory aspect. Hence formal lectures will be given priority. Guest lecture, too, may be arranged depending upon the requirement of the course module. Projects, assignments, discussions and tutorial classes will form part of the class room teaching of the course.

Suggested readings:

- R.P. Dutt: India Today
- R.C.Dutt. Economic History of India (2 vols.)
- Ranajit Guha: A Rule of Property for Bengal.
- Holden Furber: Rival Companies of the Orient
- Frykenburg (ed.) Land Control and Social Structure in Indian History.
- Stokes: English Utilitarians and India. Stokes: Peasants and the Raj
- Asok Sen et al (eds.) Three Studies on the Agrarian Structure of Bengal, (Oxford University Press, Delhi, 1982).
- K.N. Raj et al (eds.), Commercialisation of Indian Agriculture, Delhi, Oxford University Press, 1985.
- Gyan Prakash (ed.), The World of Rural Labourer, Delhi, Oxford University Press, 1992
- Brij Lal, Chalo Jahaji: On a journey through indenture in Fiji, ANU, Canberra & National Museum, Suva, Fiji, 2000.
- A.K. Bagchi, Private Investment in India, 1900-1939, Cambridge University Press, 1972.
- Dipesh Chakrabarty, Rethinking Working Class History. Bengal, 1890-1940, Princeton, 1989.
- Sabyasachi Bhattacharya, The Financial Foundations of the British Raj, Simla, Indian Institute of Advanced Study, 1971.
- Dharma Kumar ed., The Cambridge Economic History of India, ii (Orient Longmans, Delhi 1984), selected portions.
- Dharma Kumar, Land and Caste in South India, Cambridge University Press, Cambridge, 1965.
- Ranajit Guha, A Rule of Property in Bengal: An Essay on the Idea of Permanent Settlement, Duke University Press, New Delhi, 1982.
- Asiya Siddiqui (ed.), Trade and Finance in Colonial India 1750-1860, Oxford University Press, New Delhi, 1995.
- Prasannan Parthasarathy, The Transition to a Colonial Economy: Weavers, Merchants and Kings in South India, 1720-1800, Cambridge, 2001.
- B.B Chaudhury, Growth of Commercial Agriculture in Bengal 1757-1900, Calcutta, 1964.
- Jan Breman, Labour Bondage in West India from Past to Present, Oxford University Press, New Delhi, 2008.
- Roy, Tirthankar, The Economic History of India, 1857-1947, Oxford University Press, 2020

Annexure-XV

Department of History & Archaeology

Central University of Haryana

Mahendragarh, Haryana

Syllabus of Ph.D. Course Work

Total Credits: 12 (6+6)

S. N.	Course Title	Courses Code	L	T	P	Credits	Course Type
1	Research Methodology in History	SAHS HA 030101 C6006	6	0	0	6	Core

Select any one of the following courses

2	Archaeology	SAHS HA 030102 ARCH E6006	6	0	0	6	Elective
3	Sources of Ancient Indian History	SAHS HA 030103 ANC E6006	6	0	0	6	Elective
4	Historiography of Modern India	SAHS HA 030105 MOD E6006	6	0	0	6	Elective

COURSE I: RESEARCH METHODOLOGY IN HISTORY

Course Code: SAHS HA 03 0101 C 6006 (Ph.D.)

Credit: 06

Nature: Core

Aim: The broader aim is to make a researcher acquaint with the basic understanding of research methodology in history.

Objectives:

i. To inculcate the idea of discipline centric research;
ii. To make researcher understand the process of research in history;
iii. To develop a sense of critical reading of texts;
iv. To make aware of how to use sources and computer for enhancing research output.

UNIT – 1: Understanding Research

A. Definition and Meaning
B. Types of research; Ethics in Social Science research
C. Theory building and research in social sciences
D. Research in history: looking into why, how and what

UNIT – 2: Methods in History

A. Qualitative and Quantitative; Descriptive and Analytical; Inductive and Deductive; Subjectivity and Objectivity
B. Historical criticism: External and Internal criticism
C. Reading and re-reading: Post Structuralism, deconstruction, postmodernism and history
D. Comprehending sources: Archaeological, literary and web-based

UNIT – 3: Techniques of Historical Research

A. Understanding research process in history
B. Preparing synopsis; Historigraphical Review
C. Collection and classification of data
D. Post data collection phase: analysis, generalization, synthesis and discussion

UNIT – 4: Arrangement, Presentation and Use of computer

A. Formalizing research work: footnotes, charts, tables, arrangement of references, indexing appendices, bibliography

B. Presentation: Research paper, Dissertation, Thesis, Project, Report
C. Basic computer: MS word, PPT, Photoshop basic
D. Using internet, reliability of internet information

Recommended Reading:

- Neuman, L.W. *Social Research Methods: Qualitative and Quantitative Approaches*, 7th edition, Pearson Publication, 2014.
- Kothari, C.R. *Research Methodology: Methods and Techniques*, New Age Publication, 2004
- Bryman, Alan. *Social Research Methods*, 5th edition, OUP, 2015
- Jr. E. Brent and Ronald E. Anderson. *Computer Application in the Social Sciences*, Temple University Press, 1990
- Ali, B. Sheikh. *History: Its Theory and Method*, Macmillan Publication, 1978.
- Gardiner, P. *Theories of History*, Free Press Publication, 1959
- Mats, Alvesson. *Postmodernism and Social Research*, Open University Press Publication, Buckingham, 2002
- Canon, John (ed.). *The Historians at Work*, George Allen and Unwin Publication, London, 1980
- Gardiner Patrick (ed.). *Theories of History*, New York, 1969
- Marwick, Arthur. *New Nature of History: Knowledge, Evidence, Language*, Palgrave Publication, 2001
- Anderson et al., *Thesis and Assignment Writing*, John Willey & Sons, 2nd Edition, 1994
- Elton G.R. *The Practice of History*, Fontana Books Publication, UK. 1970
- Gibaldy, Joseph. *MLA Handbook for the Writers of Research Papers*, 7th Edition, Modern Language Association, New York, 2009
- Sorenson, Sharron. *How to Write Research Paper*, MacMillan Publication, 1995
- Renier, G.J. *History: Its Purpose and Method*, Allen and Unwin Publication, 1961
- Shafer, R.J. *A Guide to Historical Method*, Dorsey Press Publication, 1983
- Lloyd, Christopher. *The Structures of History*, Blackwell Press Publication, 1996
- Foucault, Michel (Trans.). *Archaeology of Knowledge and the Discourse on Language*, Pantheon Book, New York, 1972
- Thompson, W. *Rethinking History*, Routledge Publication, London, 1991
- White, Hayden. *Metahistory: The Historical Imagination in the Nineteenth-Century Europe*, John Hopkins Press Publication, 1973

OPTION II: ARCHAEOLOGY

Number of Credit: 06

Nature of Course: Elective

Aim of the Course: The broad aim is to make the research-oriented students develop a critical understanding of the various archaeological, epigraphic, numismatics and art related sources for the reconstruction of ancient Indian history.

Objectives of the Course:

i. To make students critically understand the various nuances of archaeology in the reconstruction of Indian history;
ii. To provide in-depth critical understanding of art and architecture as an important aspect of the socio-cultural milieu of the past;
iii. To enamour students into the intricacies involved into pursuing and writing ancient history at higher level.

UNIT – 1: Archaeology and Archaeological Remains

A. Archaeology: Definition and scope; Limitations of the source
B. Field methods: exploration and excavation
C. Chronology: Relative and Absolute
D. Importance of excavated remains for historical reconstruction

UNIT – 2: Epigraphy

A. Significance of Paleography
B. Epigraphy: meaning, scope and limitations
C. Dating the historical events
D. Historical Reconstruction

UNIT – 3: Numismatics

A. Numismatics: meaning and scope; limitation of the source
B. Occurrences and nature of collection
C. Classification and types of coins
D. Historical reconstruction

UNIT – 4: Art and Architecture

A. Medium based classification: Clay sculpture, stone, metal, painting
B. Historical relevance; Limitations of the source
C. Historical reconstruction: religious, social, political, economic, technological

D. Types of monuments and architectural remains; Methods of study: plan, section, elevation and decoration

Recommended Reading

- Agrawala, V. S. 1965. *Bharatiya Kala* (Hindi), Varanasi.
- Atkinson, R. J. C. 1953. *Field Archaeology*. London: Methuen and Co.
- Barker, P. 1982. *Techniques of Archaeological Excavation*. London: Batsford.
- Bühler, George 1959. *Indian Palaeography*. Calcutta: Indian Studies.
- Brown, Percy 1940. *Indian Architecture (Buddhist and Hindu Periods*). Bombay: D.B. Taraporevala Sons and Co.
- Gupta, P. L. 1979. (2nd Revised Edition) *Coins*. New Delhi: National Book Trust.
- Gupta, P. L. and Sarojini Kulashreshtha 1993. *Kushana Coins and History*. New delhi: D.K. Publishers.
- Gupta, P. L. and T.R. Hardaker 1985. *Ancient Indian Silver Punch-Marked Coins of the Magadha– Maurya Karshapana Series*. Nasik: Indian Institute of Research in Numismatic Studies.
- Pandey, R. 1957. *Indian Palaeography*. Delhi: Motilal Banarasidas.
- Rajan, K. 2002. *Archaeology*. Tanjavur: Mannop Publishers.
- Rajgor, Dilip 2001. *Punch-Marked Coins of Early Historic India*. California: Reesha Books International.
- Ramesh, K. V. 1984. *Indian Epigraphy*. Delhi: Sundeep Prakashan
- Salomon, Richard 1998. *Indian Epigraphy*. New delhi: Munshiram Manoharlal Publishers Pvt. Ltd.
- Sircar, D. C. 1965. *Indian Epigraphy*. Delhi: Motilal Banarasidas.

COURSE II (To be opted any one)

OPTION I: SOURCES OF ANCIENT INDIAN HISTORY

Number of Credit: 06

Nature of Course: Elective

Aim of the Course: The broader aim is to inculcate a critical understanding of the various sources of ancient Indian history.

Objectives of the Course:

i. To develop critical understanding of the students for the various sources of literary, archaeological, epigraphic and numismatics importance, ethnographic and their application in the scientific reconstruction of ancient Indian history;
ii. To make students critically understand the different forms of writing traditions of historical importance like biographies, foreign accounts etc.
iii. To inspire students into the intricacies involved into pursuing and writing ancient history at higher level.

UNIT – 1: Literature:

A. Vedic Literature
B. Brahmanical Literature
C. Buddhist Literature
D. Jain Literature

UNIT – 2: Histories and Biographies:

A. Itihasa-Purana Tradition and Charitas with special reference to the Buddhacharita, Rajatarangini and Harshacharita
B. Account of foreign travelers with special reference to Meghasthenes, Hiuen-tsang, and Al-beruni
C. Romantic and folk literature with special reference to the Malavikagnimitram of Kalidasa and the Kathasaritsagara of Somadeva

UNIT – 3: Archaeological Sources:

A. Stone Age tools – Tool techniques and uses
B. Ceramic Assemblage;
C. Monuments as a source of ancient Indian history

UNIT – 4: Epigraphy and Numismatics:

A. Seals as a source of ancient Indian history
B. Inscriptions as a source of ancient Indian history
C. Coins as a source of ancient Indian history

Recommended Reading:

- Ghosal, U. N. *Studies in Indian History and Culture*. Bombay. 1965.
- Majumdar, R.C. & A.D. PusalkarShafer (Ed.). *The History and Culture of the Indian People* (Bharatiya Vidya Bhawan series). Vols. I (Portions of Language and Litearture). Mumbai. 1988.
- Pargiter, F.E. *Ancient Indian Historical Traditions*. Delhi. 1972.
- Pargiter, F.E. *The Purana Text of the Dynasties of the Kali Age*. Oxford. 1913.
- Rapson, E.J. *The Cambridge History of India*. Vol. I, Cambridge. 1922.
- Winternitz, M. *History of Indian literature*. Vols. I & II. Delhi. 1987. (Also in Hindi)

OPTION III: HISTORIOGRAPHY OF MODERN INDIA

Number of Credits: 06

Nature of Course: Elective

Aim of the Course: The broader aim is to introduce and impart the basic concepts concerning historiography of modern India which is vital for higher studies in the concerned subject.

Objectives:

- To carry out research, writing, and organizational skills in the field of Asian history through an independent study project and completion of a long written assignment based on primary sources
- To investigate in-depth knowledge and understanding of approaches, methods and theories in the Historical Sciences and the region and topic of specialization
- To undertake further postgraduate study
- To prepare the candidate for PhD Research by providing one-to-one training related to research design and the use of sources in a specific region.

Unit – 1: Making of 'History' as a Discipline and Nature of Historical Sources

A. Genesis of the discipline "history"
B. Sources and History-Writing
C. Abode of Historical Sources
D. Expanding the Categories of Historical sources

Unit - 2: **Colonialism, Nationalism and Communalism**

A. Colonialism in India
B. Colonial Economy
C. Nationalism in India
D. Communalism in India

Unit – 3: Caste, Gender, and Family

A. Understanding Modern Caste
B. Invention of Colonial Categories
C. Gendered Identities
D. Colonizing Family

Unit – 4: Law, Medicine, and Environment

A. Law in Colonial India
B. Medicine and Public Health
C. Medicine and Advertisement

D. Ecological Resources

Classroom strategy:
It will be a blend of formal theoretical teaching and discussions. Audio-visual display, presentations, assignments, discussions, quiz and brainstorming sessions will equally be employed. Wherever possible, guest lectures may also be organized. **The 30 percent of this paper will be taught online and rest of it will be offline.**

Recommended Readings:

- Chakrabarty, Dipesh. *The Calling of History: Sir Jadunath Sarkar and His Empire of Truth*. Chicago: The University of Chicago Press, 2015.
- Chakrabarty, Dipesh. *Provincializing Europe: Postcolonial Thought and Historical Difference*. Princeton: Princeton University Press, 2000.
- Chakrabarty, Dipesh. Postcoloniality and the Artifice of History: Who Speaks for "Indian" Pasts? Vol. No. 37, Special Issue: *Imperial Fantasies and Postcolonial Histories*. (Winter, 1992), pp. 1-26.
- Luden, David E. *Contesting the Nation: Religion, Community, and the Politics of Democracy in India*. Philadelphia: University of Pensylvannia Press, 1996.
- Luden, David E. *The New Cambridge History of India: An Agrarian History of South Asia*. Cambridge: Cambridge University Press, 2008.
- Nandy, Ashis Nandy, *The Intimate Enemy: Loss and Recovery of Self under Colonialism*. Oxford: Oxford University Press, 1983.
- Kaviraj, Sudipta. *The Imaginary Institution of India: Politics and Ideas*. New York: Columbia University Press, 2010.
- Pandey, Gyanendra. *The Construction of Communalism in Colonial North India*. New Delhi: OUP, 2012.
- Washbrook, D.A. 'Law, State and Agrarian Society in Colonial India', *Modern Asian Studies,* 1981
- Chatterjee, Partha. *The Nation and Its Fragments: Colonial and Postcolonial Histories*. Prineton: Princeton Univeristy Press, 1993.
- Dumont, Louis. *Homo Hierarchicus: The Caste system and Its Implications*. Delhi: OUP, 1998 (1970).
- Cohn, Bernard S. *An Anthropologist among Historians*. New York: Oxford University Press, 1987.
- Dirks, Nicholas B. *Castes of Mind: Colonialism and the Making of Modern India*. Princeton: Princeton University Press, 2001.
- Bayly, Susan. Caste, Society and Politics in India from the Eighteenth Century to the Modern Age, Chapters 1, 3 and 4.
- Sangari, Kumkum, and Sudesh Vaid (eds.). *Recasting Women: Essays in Indian Colonial History*. USA: Rutgers University Press, 1989. (Chapters by Lata Mani and Partha Chatterjee)

- Sarkar, Tanika. 'Enfranchised Selves: Women, Culture and Rights in Nineteenth-Century Bengal.' *Gender and History* 13, no. 3 (2001): 546-65
- Sinha, Mrinalini. *Specters of Mother India: The Global Restructuring of an Empire*. USA: Duke University Press, 2006.
- Gadgil, Madhav and Guha, Ramachandra. *Ecology and Equity: the Use and Abuse of Nature in Contemporary India*. London, New York: Routledge, 1995 (Chs 1,2 &3).
- Shahabuddin, Ghazala and Rangarajan, Mahesh (eds.). 2007. Making Conservation Work: Securing biodiversity in this new century. Delhi: Permanent Black.
- White, Hayden. *Meta History: The Historical Imagination in Nineteenth Century Europe*. Baltimore: John Hopkins University Press, 1973.
- Mukhopadhyay, Anindita. *Behind the Mask: The Cultural Definition of the Legal Subject in Colonial Bengal (1715-1911)*. New Delhi: OUP, 2006.
- Pati, Biswamoy and Mark Harrison(ed.). *The Social History of Health and Medicine in Colonial India*. New York: Routledge, 2009.
- Movies and Documentaries: Kim (English); Bharat Ek Khoj: Topic related episodes (Hindi); Sudra: The Rising (Hindi); Water (Hindi); Pournami (Telugu dubbed in Hindi); Teesri Azadi (Hindi); Sangam (Hindi); Garam Hawa (Hindi); Tamash (Hindi); A Train to Pakistan (Hindi)

Annexure-XVI

DEPARTMENT OF JOURNALISM & MASS COMMUNICATION

Master of Arts in Journalism & Mass Communication (M.A JMC)

Learning Outcomes-based Curriculum Framework (LOCF)

M.A JMC (Two-Year) Programme

Syllabus (2021-22)

Progressive from Semester-1

(As per National Education Policy 2020)

SCHOOL OF HUMANITIES AND SOCIAL SCIENCES, CENTRAL UNIVERSITY OF HARYANA MAHENDERGARH

विद्याधनं सर्व धनं प्रधानम्

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1. Background

Considering the curricular reforms as instrumental for desired learning outcomes, all the academic departments of the Central University of Haryana made a rigorous attempt to revise the curriculum of undergraduate and postgraduate programmes in alignment with National Education Policy-2020 and UGC Quality Mandate for Higher Education Institutions-2021. The process of revising the curriculum could be prompted with the adoption of ―Comprehensive Roadmap for Implementation of NEP-2020‖ in the 32nd meeting of the Academic Council of the University held on April 23, 2021. The Roadmap identified the key features of the Policy and elucidated the Action Plan with well-defined responsibilities and an indicative timeline for major academic reforms.

The process of revamping the curriculum started with a series of webinars and discussions conducted by the University to orient the teachers about the key features of the Policy, enabling them to revise the curriculum in sync with the Policy. Proper orientation of the faculty about the vision and provisions of NEP-2020 made it easier for them to appreciate and incorporate the vital aspects of the Policy in the revised curriculum focused on ‗creating holistic, thoughtful, creative and well-rounded individuals equipped with the key 21st-century skills for the development of an enlightened, socially conscious, knowledgeable, and skilled nation'.

With NEP-2020 in background, the revised curricula articulate the spirit of the policy by emphasising upon— integrated approach to learning; innovative pedagogies and assessment strategies; multidisciplinary and cross-disciplinary education; creative and critical thinking; ethical and Constitutional values through value-based courses; 21st century capabilities across the range of disciplines through life skills, entrepreneurial and professional skills; community and constructive public engagement; social, moral and environmental awareness; Organic Living and Global Citizenship Education (GCED); holistic, inquiry-based, discovery-based, discussion based, and analysis-based learning; exposure to Indian knowledge system, cultural traditions and classical literature through relevant courses offering ‗Knowledge of India'; fine blend of modern pedagogies with indigenous and traditional ways of learning; flexibility in course choices; student-centric participatory learning; imaginative and flexible curricular structures to enable creative combination of disciplines for study; offering multiple entry and exit points initially in undergraduate programmes; alignment of Vocational courses with the International Standard Classification of Occupations maintained by the International Labour Organization; breaking the silos of disciplines; integration of extra-curricular and curricular aspects; exploring internships with local industry, businesses, artists and crafts persons; closer collaborations between industry and higher education institutions for technical , vocational and science programmes; and formative assessment tools to be aligned with the learning outcomes, capabilities, and dispositions as specified for each course. In the case of UG programmes in Engineering and Vocational Studies, it was decided that the departments shall incorporate pertinent NEP recommendations while complying with AICTE, NBA, NSQF, International Standard Classification of Occupations, Sector Skill Council and other relevant agencies/sources. The University has also developed consensus on the adoption of Blended Learning with 40% component of online teaching and 60% face to face classes for each programme.

The revised curricula of various programmes could be devised with concerted efforts of the faculty, Heads of the Departments and the Deans of Schools of Study. The draft prepared by each department was discussed in a series of discussion sessions conducted at the

Department, School and University level. The leadership of the University has been a driving force behind the entire exercise of developing the uniform template and structure for the revised curriculum. The Vice-Chancellor of the University conducted series of meetings with Heads and Deans to deliberate upon the vital parameters of the revised curriculum to formulate a uniform template featuring Background, Programme Outcomes, Programme Specific Outcomes, Postgraduate Attributes, Structure of Masters Course, Learning Outcome Index, Semester-wise Courses and Credit Distribution, Course-level Learning Outcomes, Teaching-Learning Process, Blended Learning, Assessment and Evaluation, Keywords, References and Appendices. The experts of various Boards of Studies and School Boards contributed to a large extent in giving the final shape to the revised curriculum of each programme.

To ensure the implementation of curricular reforms envisioned in NEP-2020, the University has decided to implement various provisions in a phased manner. Therefore, the curriculum may be reviewed annually to gradually include all relevant provisions of NEP-2020.

The Guiding Principles adopted/adapted from the NEP 2020 to develop the Curriculum Framework for Master of journalism and mass communication program are:

G-1: Education must build character, enable learners to be ethical, rational, compassionate, and caring, while at the same time prepare them for gainful, fulfilling employment

G-2: Indian culture and values…Rich legacies to world heritage must not only be nurtured and preserved for posterity but also researched, enhanced, and put to new uses through our education system

G-3: With the rise of big data, machine learning, and artificial intelligence, many unskilled jobs worldwide may be taken over by machines, while the need for a skilled workforce, particularly involving mathematics, computer science, and data science, in conjunction with multidisciplinary abilities across the sciences, social sciences, and humanities, will be increasingly in greater demand

G-4: With the quickly changing employment landscape and global ecosystem, it is becoming increasingly critical that children not only learn but more importantly learn how to learn.

G-5: There must also be seamless integration and coordination across institutions and all stages of education

G-6: Facing and addressing these challenges will require high-quality interdisciplinary research across fields that must be done in India and cannot simply be imported; the ability to conduct one's research also enables a country to much more easily import and adapt relevant research from abroad much of the very best research in the world has occurred in multidisciplinary university settings.

2. Preamble

Learning Outcome-based Curriculum Framework is the need of the hour. This framework provides a paradigmatic shift from the traditional pattern of education to a choice-based credit system and includes enlightenment about the course aspects. The courses were introduced as per the course curriculum and the scheme and syllabi, but the LOCF format gives a detailed knowledge of what a student could learn from a course and how it will help him/her for better employment. Besides the main objectives of explicit description of the course, the LOCF format allows the students and teachers. Another hand extends based on asure the outputs in both qualitative and quantitative measures.

As per UGC, The fundamental premise of LOCF is to specify what graduates completing a particular programme of study are expected to know, understand and be able to do at the end of their programme of study. The LOCF approach makes the student an active learner, the teacher a good facilitator, and together they lay the foundation for lifelong learning.

The idea behind LOCF is to decide the desired outcome within the framework of the current Choice Based Credit System (CBCS) for undergraduate and postgraduate programmes and then design the curriculum to obtain these outcomes. The outcomes will be determined in terms of skills, knowledge, understanding, employability, graduate attributes, attitudes, values, etc., gained by students upon completing the course.

UGC wants to replace the marks or percentage-based evaluation system with CBCS, which "not only offers opportunities and avenues to learn core subjects but also exploring additional avenues of learning beyond the core subjects for holistic development of an individual. The Generic Elective (GE) course has to be compulsorily taken from an unrelated discipline/subject.

Hence, the new LOCF for Journalism and Mass Communication aims to impart more skill-based and practical training to the learners as per the nature of the field. This will enable the students to have a more holistic understanding of the subject and the ability to secure productive employment after completing their post-graduation.

In the current framework of M.A (MAJMC) in Journalism and Mass Communication, an effort has been made to offer more skill training and specialisation of the course fields. The course syllabus includes a varied mix of theoretical, practical, Skill-based, General elective, and Departmental elective courses. The students will choose and make a combination of subjects of their choice in each semester as per their desired interest areas. Each paper provides a complete description of what the learners will learn and the outcome after completing the particular course. It will help the students better understand and make the right choice with or without the help of others.

3. Introduction to Journalism and Mass Communication

Journalism and mass communication as an interdisciplinary subject touches almost all the branches of studies of human interest. Different departments of studies contribute equally to the development of humans and their world. Every branch shares a story with a large number of people and comes under journalism and mass communication.

The discipline Journalism and mass communication teach to create, manage and monitor the content that goes out to the masses. Mass Communication and Journalism both are the two sides of the same coin yet different. If the content is news, that mass communication function is called journalism. Other hands, there are many various forms of mass communication- Public Relations and marketing communication, Filmmaking, Photography, Radio and Television, Content Writing, Copywriting, digital media, information society and many more. From Information to entertainment, there are various platforms to practice Journalism and mass communication. It also accommodates new forms and technology to grow to all extents. Print to Digitization of mass media can be a great example. By practising this discipline, one can fulfil their passion for living things and contribute to humanity. As an academic discipline, it trains the fundamental practices and ethics of the domain.

In-depth research of different areas of journalism and mass communication is another facet of the discipline. It leads to contributing to the discipline itself and growing according to time and needs. There are ample opportunities to pursue independent research in the field of journalism and mass communication. At the same time, the discipline journalism and mass communication provides academic research at its full focus and strength and develops new academia in journalism and mass communication.

4. Programme Outcomes

On completing M. A. Programme, the students shall be able to realise the following programme outcome:

PO-1: Demonstrate holistic understanding of life in varied manifestations.

PO-2: Discuss and apply various social, political and literary trends in real-life situations.

PO-3: Understand and discuss contemporary socio-political, cultural and literary context through a multidisciplinary approach.

PO-4: Demonstrate an ability to use relevant theoretical concepts in real-life situations.

PO-5: Ability to integrate the traditional knowledge with the latest advances in social sciences and humanities.

PO-6: Formulate valid propositions on the basis of multidisciplinary and cross-disciplinary understanding of disciplines.

PO-7: Appreciate and analyse regional, national and international scenarios.

PO-8: Demonstrate the ability to interpret and analyse the realities of life from a social perspective.

PO-9: Propose solutions to the existing human problems as a well-informed and competent individual.

5. Programme Specific Outcomes

On completing M. A. in Journalism & Mass Communication, the students shall be able to realise the following outcomes:

PSO-1: Develop a critical understanding of communication and its varied forms.

PSO-2: Compare the trends in media produced in different contexts.

PSO-3: Exhibit Technical skill and competency for researching mass communication.

PSO 4: Enhancement soft skills and personality development

PSO 5: Enhance the ability to use language proficiently and correctly, both in speech and writing.

PSO 6: Develop understanding and competency on digital media

PSO 7: Command over various media Tools and techniques

PSO 8: Identify and apply an appropriate theoretical framework for media text.

PSO 9: Develop theoretical and practical capability on media Research

PSO 10: Hands-on training and field exposure

6. Semester wise structure

The programme is contenting of four semesters and required to achieve 104 credits are to be achieved through the various core, departmental electives, school level electives and open generic courses, demonstrated as below:

Master of Journalism and Mass Communication: 104 Credits					
Course/Sem	**Sem-1 (Credits)**	**Sem-2 (Credits)**	**Sem-3 (Credits)**	**Sem-4 (Credits)**	**Total**
Discipline Specific Courses Core (including practical training/dissertation)	20	25	15	20	80
Discipline Specific Elective Courses	4	4	8	0	16
Open Choice Courses/ GEC	4		4		8
Common Course(s) for Community Service/ Remembrance of University Kulgeet, National Anthem, National Song/ National Integration/Games and Sports/Campus Development					To be shown in the award list separately as per the University Guidelines
Total	**28**	**29**	**27**	**20**	**104**

7. Postgraduate Attributes

- Disciplinary Knowledge
- Creative and Critical Thinking
- Reflective Thinking
- Problem Solving
- Analytical Reasoning
- Communication Skills
- Research Skills
- Life Skills
- Multicultural Competence
- Moral and Ethical Values
- Life-long Learning
- Global Competency

8. Learning Outcome Index

Programme Outcomes and Programme Specific Outcomes

PO	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6	PSO-7	PSO-8	PSO-9	PSO-10
PO-1	X		X	X	X	X		X	X	X
PO-2		X	X		X	X	X	X		
PO-3	X		X	X		X	X	X	X	X
PO-4	X	X	X	X	X	X	X		X	X
PO-5	X	X	X	X	X		X	X	X	X
PO-6	X	X	X		X	X	X		X	X
PO-7	X	X	X		X	X	X	X	X	X
PO-8		X	X	X	X	X	X	X	X	X
PO-9				X	X	X	X		X	

Core Courses (CC):

PSO	CC 1	CC 2	CC 3	CC 4	CC 5	CC 6	CC 7	CC 8	CC 9	CC 10	CC 11	CC 12	CC 13	CC 14	CC 15	CC 16	CC 17
PSO-1	X			X	X	X	X	X		X	X	X	X	X			
PSO-2	X	X	X	X	X	X	X	X		X	X	X	X	X			
PSO-3	X				X			X	X	X	X	X	X	X	X	X	
PSO-4	X	X			X	X	X	X	X	X	X	X			X		
PSO-5	X	X	X		X	X	X	X	X	X	X				X		
PSO-6	X	X		X	X		X	X		X	X	X	X	X			
PSO-7				X				X	X	X	X	X	X	X		X	
PSO-8	X	X	X	X	X	X	X	X			X	X	X	X			
PSO-9	X	X			X	X		X							X		
PSO-10		X		X		X			X	X		X	X		X	X	

Elective Courses (EC):

PSO	EC-1	EC-2	EC -3	EC -4	EC-5	EC-6	EC-7	EC-8	EC-9	EC-10	EC-11	EC-12	EC-13	EC-14	EC-15	EC-16	EC-17
PSO-1	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x
PSO-2	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	x
PSO-3				x	x		x		x	x	x		x	x	x		
PSO-4			x	x	x		x		x		x	x	x	x	x	x	x
PSO-5				x	x		x		x				x			x	x
PSO-6			x	x	x		x		x	x	x		x	x	x		
PSO-7					x	x	x		x	x	x		x	x	x		
PSO-8	x	x	x	x		x	x	x	x	x		x	x	x	x	x	x
PSO-9				x			x							x			
PSO-10							x		x		x				x		

9. Semester-wise Courses

Abbreviation/ Acronyms	Description
C	Core course
DCEC	Discipline Centric Elective Course
GEC	Generic Elective Course
SEC	Skill Enhancement Course
SEEC	Skill Enhancement Elective Course
SGEC	School-Based Generic Elective Course
L	Lecture
T	Tutorial/Presentation
P	Practical

Course Structure of Master of Journalism and Mass Communication (MAJMC) under Choice Based Credit System for the year 2021-22 and beyond

Total No. of Credits in Four Semesters = 104 (96 + 8) (MAJMC Course + Course offered by other Department)

Semester-I Total Credits: 24

The first semester shall consist of 24 credits with 4 core courses. There shall be a 4-credit GEC/MOOC course which students are required to choose from courses offered by any other department of the university or UGC approved MOOC courses. There shall be a 0 credit Soft skill course which will be evaluated in Grades (As per ordinance) and grades will not be included in aggregate.

S. No.	Course Code	Course Title	Type	L	T	P	Total Credit	Class Hours per week	Theory (Mark)	Practical (Mark)	Internal Mark	Total Mark
1	SHSS DJMC 010101 C 3205	Introduction to Communication-I	C	3	2	0	5	5	70	0	30	100
2	SHSS DJMC 010102 C 3115	Writing Skills	C	3	1	1	5	6	50	20	30	100
3	SHSS DJMC 010103 C 3205	Media Laws and Ethics	C	3	2	0	5	5	70	0	30	100
4	SHSS DJMC 010104 C 3205	Introduction to Media	C	3	2	0	5	5	70	0	30	100
5	SHSS DJMC 010105SEEC 2200	Soft Skills*	SEEC	2	2	0	0	4	70	0	30	0
6	**To be taken from other Department/MOOC ***		**GEC**	-	-	-	4	4	-	-	-	100
	Total						24	29				500

1 Credit Theory = 16 hours in a semester
*A student has to take 4 credits General Elective Course(GEC) from other departments / MOOC approved by C.U.H/ U.G.C
*Soft skill course evaluation will be in Grading (As per ordinance) and will not be included in aggregate.
Course Code offered to other Department students in Semester I is presented in the list of GEC Courses offered by DJMC (Table: 1)
Skill Enhancement Elective Course (SEEC),Core courses (C) , Generic Elective Courses(GEC)
L: Lectures T: Tutorial P: Practical Cr: Credits

(Table:1)List of GEC Courses offered by the DJMC to other Departments in Semester-I (Anyone to be chosen)

S. No.	Course Code	Course Title	Type	L	T	P	Total Credit	Class Hours per week	Theory (Mark)	Practical (Mark)	Internal Mark	Total Mark
1	SHSS DJMC 010106 GEC 3104	Media Literacy	GEC	3	1	0	4	4	70	0	30	100
2	SHSS DJMC 010107 GEC 3104	Marketing and Promotion	GEC	3	1	0	4	4	70	0	30	100
3	SIAS LIS 01 03 GEC 3104	Media and Information Literacy*	GEC	3	1	0	4	4	50	20	30	100

- **With the department of library and information science , the course would be available only with the approval of the BOS of LIB.I.Sc Department and readiness of joint offering of the course.**

Semester-II Total Credits: 29

The Second semester shall consist of 29 credits with 5 core papers including a 4-week internship and a 4-credit Discipline Centric Elective Course to be chosen out of the list.

S. No.	Course Code	Course Title	Category Code	L	T	P	Total Credit	Class Teaching/ Field-Based Activity Hours per week	Theory (Mark)	Practical (Mark)	Internal Mark	Total Mark
1	SHSS DJMC 010208 C 3205	Introduction to Communication-II	C	3	2	0	5	5	70	0	30	100
2	SHSS DJMC 010209 C 3205	Communication Research	C	3	2	0	5	5	70	0	30	100
3	SHSS DJMC 010210 C 3205	Communication for Development	C	3	2	0	5	5	70	0	30	100
1	SHSS DJMC 010211 C 3115	Digital Media	C	3	1	1	5	6	50	20	30	100
5	SHSS DJMC 010212 C 0005	Internship (4- Weeks)	C	0	0	0	5	30	50	20	30	100
6		**Discipline Centric Elective Course (DCEC)***	DCEC				4	4	70	0	30	100
	Total						29	54				500

1 Credit Theory = 16 hours in a semester
*Anyone Discipline Centric Elective Course(DCEC) may be chosen from the list of DCEC Courses offered by DJMC(Table: 2)
*GEC Course offered to other Department in Semester II is presented in list of GEC offered by DJMC (Table: 3)
* With the end of the Second Semester End Exam, all students are required to go for a 4- weeks internship with a Media house/organization of their choice and/or in consultation with concerned teachers. They are also required to submit a Performance Assessment Report (PRA) in prescribed Proforma (Performa will be provided by the Department) and a performance Assessment Report to be submitted by the organization in which a student has completed the internship.

(Table: 2) List of Discipline Centric Elective Courses (DCEC) * offered by the DJMC in Ist Year (Semester II)

S. No.	Course Code	Course Title	Category Code	L	T	P	Total Credit	Class Teaching/ Field-Based Activity Hours per week	Theory (Mark)	Practical (Mark)	Internal Mark	Total Mark
4	SHSS DJMC 010213 C 3104	Contemporary Issues and Mass Media	DCEC	3	1	0	4	4	70	0	30	100
2	SHSS DJMC 010214 C 2204	Cross-Cultural Communication	DCEC	2	2	0	4	4	70	0	30	100

(Table: 3) List of GEC Courses offered by the DJMC to other Departments in Semester-II

S. No.	Course Code	Course Title	Category Code	L	T	P	Total Credit	Class Teaching/ Field-Based Activity Hours per week	Theory (Mark)	Practical (Mark)	Internal Mark	Total Mark
1	SHSS DJMC 010215 C 3104	Media and Society	GEC	3	1	0	4	4	70	0	30	100

Semester-III Total Credits: 27

The third semester shall consist of 27 credits with 3 core papers and two 4-credit Discipline Centric Elective Course (DCEC I & II) to be chosen out of the list. There shall be a 4-credit GEC/MOOC course which students are required to choose from courses offered by any other department of the university or UGC approved MOOC courses.

S. No.	Course Code	Course Title	Category Code	L	T	P	Total Credit	Class Teaching/ Field-Based Activity Hours per week	Theory (Mark)	Practical (Mark)	Internal Mark	Total Mark
1	SHSS DJMC 010316 C 3115	Reporting and Editing	C	3	1	1	5	6	50	20	30	100
1	SHSS DJMC 010317 C 3115	Advertising	C	3	1	1	5	6	50	20	30	100
	SHSS DJMC 010318 C 3115	Audio Visual Production	C	3	1	1	5	6	50	20	30	100
4	**Discipline Centric Elective Course(DCEC) - I***		DCEC	-	-	-	4	4	-	-	-	100
5	**Discipline Centric Elective Course(DCEC) - II***		DCEC	-	-	-	4	4	-	-	-	100
6	**To be taken from other Department/MOOC ***		GEC	-	-	-	4	4	-	-	-	100
	Total						27	30				600

1 Credit Theory = 16 hours in a semester
Discipline Centric Elective Course (DCEC) I and II* shall be chosen from the List of DCEC offered by DJMC. (Table: 4)
*GEC Course offered to other Department in Semester III is presented in List of GEC offered by DJMC (Table: 5)

Table-4: List of Discipline Centric Elective Courses (DCEC) * offered by the DJMC in 2nd Year (Semester III)

S. No.	Course Code	Course Title	Category Code	L	T	P	Total Credit	Class Teaching/ Field-Based Activity Hours per week	Theory (Mark)	Practical (Mark)	Internal Mark	Total Mark
1	SHSS DJMC 010319 DCEC 2204	Media Marketing Management	DCEC	2	2	0	4	4	70	0	30	100
2	SHSS DJMC 010320 DCEC 2204	Public Relation writing	DCEC	2	2	0	4	4	70	0	30	100
3	SHSS DJMC 010321 DCEC 2204	Portfolio	DCEC	2	2	0	4	4	70	0	30	100
4	SHSS DJMC 010322 DCEC 2204	Cinema Studies	DCEC	2	2	0	4	4	70	0	30	100
5	SHSS DJMC 010323 DCEC 2204	Sports Journalism	DCEC	2	2	0	4	4	70	0	30	100

(Table: 5) List of GEC Courses offered by the DJMC to other Departments in Semester-III

S. No.	Course Code	Course Title	Category Code	L	T	P	Total Credit	Class Teaching/ Field-Based Activity Hours per week	Theory (Mark)	Practical (Mark)	Internal Mark	Total Mark
1	SHSS DJMC 010324 GEC 3104	Film Appreciation	GEC	3	1	0	4	4	70	0	30	100
2	SHSS DJMC 010325 GEC 3104	Event Management	GEC	3	1	0	4	4	70	0	30	100

Semester-IV Total Credits: 24

The fourth semester shall consist of 25 credits with 4 core papers. There shall be a 4-credit compulsory Discipline Centric Elective Course (DCEC) to be chosen out of 2 papers. There shall be a Non-Credit but compulsory Skill enhancement Elective paper of Communication Skills.

S. No.	Course Code	Course Title	Category Code	L	T	P	Total Credit	ClassTeaching/ Field-Based Activity Hours per week	Theory (Mark)	Practical (Mark)	Internal Mark	Total Mark
1	SHSS DJMC 010426 C 3105	Photography	C	3	1	1	5	6	50	20	30	100
3	SHSS DJMC 010427 C 3105	Advertising and Public Relations Writing	C	3	1	1	5	6	50	20	30	100
4	SHSS DJMC 010428 C 3105	Dissertation	C	3	1	1	5	6	50	20	30	100
5	SHSS DJMC 010429 C 3105	Internship (4- Weeks)	C	0	0	0	5	30	50	20	30	100
6	SHSS DJMC 010430C 3105	Communication Skills*	SEEC	3	2	0	0	5	70	0	30	100
7	**Discipline Centric Elective Course(DCEC) - II***		DCEC	-	-	-	4	4	-	-	-	100
							24					

1 Credit Theory = 16 hours in a semester
Discipline Centric Elective Course(DCEC) I* and II* choose from the List of DCEC offered by DJMC. (Table: 6)
GEC Course offered to other Department in Semester IV presented in List of GEC offered by DJMC (Table: 7)
* Before the end of the fourth Semester End Exam all students are required to go for a 4- week internship with a media house/organization of their choice and/or in consultation with concerned teachers. They are also required to submit a Performance Assessment Report (PRA) in prescribed Proforma (Performa will be provided by the Department). Performance Assessment Report to be submitted by the organization in which a student has completed the internship.

(Table: 6) List of Discipline Centric Elective Courses (DCEC) * offered by the DJMC in 2nd Year (Semester IV)

S. No.	Course Code	Course Title	Category Code	L	T	P	Total Credit	Class Teaching/ Field-Based Activity Hours per week	Theory (Mark)	Practical (Mark)	Internal Mark	Total Mark
1	SHSS DJMC 010431 DCEC 2204	Gender and Media Sensitivity	DCEC	2	2	0	4	4	70	0	30	100
2	SHSS DJMC 010432 DCEC 2204	Art, Culture and Entertainment Reporting	DCEC	2	2	0	4	4	70	0	30	100
2	SHSS DJMC 010433 DCEC 2114	Graphic and Design	DCEC	2	1	1	4	4	50	20	30	100

(Table: 7) List of GEC Courses offered by the DJMC to other Departments in Semester-IV

S. No.	Course Code	Course Title	Category Code	L	T	P	Total Credit	Class Teaching/ Field-Based Activity Hours per week	Theory (Mark)	Practical (Mark)	Internal Mark	Total Mark
1	SHSS DJMC 010434 GEC 3104	Social media Marketing	GEC	3	1	0	4	4	70	0	30	100

“Dissertation ” deals with minor research work. Students have to submit a dissertation, completed with the guidance of assigned supervisors who shall guide students in completing their dissertation.

· Soft skill course evaluation will be in Grading (As per ordinance) and will not be included in aggregate.

Skill Enhancement Elective Course (SEEC),Core courses (C) , Generic Elective Courses(GEC)

Core Papers

First Year (Semester I)

1	SHSS DJMC 010101 C 3205	Introduction to Communication-I
2	SHSS DJMC 010102 C 3115	Writing Skills
3	SHSS DJMC 010103 C 3205	Media Laws and Ethics
4	SHSS DJMC 010104 C 3205	Introduction to Media

Semester II

5	SHSS DJMC 010208 C 3205	Introduction to Communication-II
6	SHSS DJMC 010209 C 3205	Communication Research
7	SHSS DJMC 010210 C 3205	Communication for Development
8	SHSS DJMC 010211 C 3205	Digital Media
9	SHSS DJMC 010212 C 0005	Internship (4- Weeks)

Second Year (Semester III)

10	SHSS DJMC 010316 C 3115	Reporting and Editing
11	SHSS DJMC 010317 C 3115	Advertising
12	SHSS DJMC 010318 C 3115	Audio Visual Production

Semester IV

13	SHSS DJMC 010426 C 3105	Photography
14	SHSS DJMC 010427 C 3105	Advertising and Public Relations Writing
15	SHSS DJMC 010428 C 3105	Dissertation
16	SHSS DJMC 010429 C 3105	Internship (4- Weeks)

Elective Courses (EC)

Discipline Specific Elective Papers

Semester II

1	SHSS DJMC 010213 C 3104	Contemporary Issues and Mass Media
2	SHSS DJMC 010214 C 2204	Cross Cultural Communication

Semester III

3	SHSS DJMC 010319 DCEC 2204	Media Marketing Management

2	SHSS DJMC 010320 DCEC 2204	Public Relation writing
4	SHSS DJMC 010321 DCEC 2204	Portfolio
5	SHSS DJMC 010322 DCEC 2204	Cinema Studies
6	SHSS DJMC 010323 DCEC 2204	Sports Journalism

Semester IV

7	SHSS DJMC 010431 DCEC 2204	Gender and Media Sensitivity
8	SHSS DJMC 010432 DCEC 2204	Art, Culture and Entertainment Reporting
9	SHSS DJMC 010433 DCEC 2114	Graphic and Design

III. Generic/Interdisciplinary Course

Semester I

01	SHSS DJMC 010106 GEC 3104	Media Literacy
02	SHSS DJMC 010107 GEC 3104	Marketing and Promotion
03	SIAS LIS 01 03 GEC 3104	Media and Information Literacy*

Semester II

04	SHSS DJMC 010215 C 3104	Media and Society

Semester III

05	SHSS DJMC 010324 GEC 3104	Film Appreciation
06	SHSS DJMC 010325 GEC 3104	Event Management

Semester IV

07	SHSS DJMC 010434 GEC 3104	Social Marketing

IV. Skill Enhancement Course

Semester I

01	SHSS DJMC 010105SEEC 2200	Soft Skills*

Semester IV

02	SHSS DJMC 010430C 3105	Communication Skills*

10. Teaching-Learning Process

The MAJMC Programme is designed to encourage the acquisition of disciplinary knowledge, understanding, skills, attitudes and ethical values required for media and information-based professions and jobs. Keeping this in mind the teaching-learning experiences should be designed and implemented to enable active/participative learning of the students. Librarianship being a practice-oriented service profession, the development of practical skills constitutes an important aspect of the Programme's teaching-learning process. To provide knowledge, develop understanding and impart required skills in the students, a variety of teaching-learning approaches would be adopted. These include

- Expert Lectures from eminent Media Professionals
- Seminars, Discussions and debates
- Brainstorming sessions
- Case studies
- Demonstrations
- Practical
- Tutorials
- Group/ Peer teaching and learning
- Project-based learning
- Field-based learning
- Open-ended project work
- Quiz and games
- Technology-enabled learning, etc.

A teaching-learning process suitable to impart problem-solving, reasoning and analytical skills may also be adopted. Internship and/or industrial training in Media and other information organizations will be a value-adding teaching-learning opportunity. Modes of study are flexible, being offered on both, the student's traditional face-to-face experience is enriched with the support of an e-learning portal, i.e. CUH LMS.

11. Blended Learning

Blended learning is a combination of face-to-face and online learning in a way that one compliments the other. It provides individuals with the opportunity to enjoy the best of both worlds. For example, a student might attend classes in a real-world classroom setting and then supplement the lesson plan, activities, and resource-based learning that can take place online. The students can use the course of the CUH LMS portal using login and password.

The department employs a blended approach in teaching all the courses some way or the other but, the broad metrics of blended learning is presented in the following table:

The programme is contenting of four semesters and required to achieve 104 credits are to be achieved through the various core, departmental electives, school level electives and open generic courses, demonstrated as below:

Master of Journalism and Mass Communication: 104 Credits				
Course/Sem	**Mode**	**Face to face**	**Online**	**Total**
Core Courses /Practical/Dissertation	Blended	60	20	80
Discipline-Specific Elective Courses	Blended	10	6	16
Open Choice Courses/ GEC	Blended	3	1	8
Total		**73**	**27**	**104**

While actual delivery of knowledge the use of ICT enabled teaching-learning may slightly vary according to the knowledge and exposure of the individual faculty.

Integration of MOOCs with the Courses: The students are encouraged to take up the MOOCs. It would further help the students to understand the newer trends both in the area of the MOOC/ Study and also teaching-learning pedagogies. These courses may be described as self-study courses to attain some skills but will not be required to be passed/ qualified. It's solely up to the student how much of the content they would use, complete the course or not, and attain the certificate or not from the SWAYAM course after the examination.

10. Assessment and Evaluation

Assessment is within each unit, including the dissertation. Assessment methods vary according to the nature of the content and material. Individual written assignments and exercises are the norms, but some units may use other methods, including individual practical exercises, group work projects and unseen examination papers or compiling resources and bibliographies. Most assessments have an element of choice, allowing you to focus on aspects of interest. Assessment Criteria are descriptions, based on the intended learning outcomes, of the skills, knowledge or attitudes that you need to demonstrate to complete an assessment successfully, providing a mechanism by which the quality of an assessment can be measured. Grade- Related Criteria are descriptions of the level of skills, knowledge or attributes that you need to demonstrate to achieve a certain grade or mark in an assessment, providing a mechanism by which the quality of an assessment can be measured and placed within the overall set of marks. Assessment Criteria and Grade-Related Criteria will be made available to you to support you in completing assessments. These may be provided in programme Statutes and Ordinances, unit specifications, on the virtual learning environment or attached to a specific assessment task.

The assessment activities may broadly be categorised as below:

• Continuous Comprehensive Evaluation (online or otherwise) at regular after the achievement of each Course-level Learning Outcomes
• Formative Assessment based on activities of a learner throughout the programme instead of one-time assessment
• Oral Examinations to test presentation and communication skills
• Open Book Examination for better understanding and application of the knowledge acquired
• Group Examinations on Problem solving exercises
• Seminar Presentations
• Review of Literature
• Collaborative Assignments
• Practical examination
• Evaluation of dissertation and project report

Students are encouraged to exchange thoughts, develop ideas and learn from one another. Assessment is by individual or group assignments aimed at developing self-reliance and autonomy and foster the capacity for lifelong continuing self-development and learning. The dissertation is a substantial component of the degree offering an opportunity to demonstrate a comprehensive understanding of a particular specialism and a systematic and professional approach to research. It is a substantive task that requires an investigation of a relevant chosen area under the supervision of a faculty.

11. Key Features

- ❖ NEP-2020 based Syllabus
- ❖ Wide range of core and elective courses
- ❖ Multi-disciplinary academic subject knowledge
- ❖ Properly spelt out measurable outcomes for each course
- ❖ Latest ICT tools and techniques incorporation in courses
- ❖ Opportunities for sustained Professional Growth
- ❖ Incorporation of professional values and Indian ethos
- ❖ Research-based practices through information, data and research literacies
- ❖ Technology-enabled teaching-learning practices
- ❖ Focus on Indian Knowledge System

12. References:

- Blended Mode of Teaching and Learning: Concept Note available on UGC website (Draft), available at: https://www.ugc.ac.in/pdfnews/6100340_Concept-Note-Blended-Mode-ofTeaching-and-Learning.pdf
- National Education Policy-2020. https://www.education.gov.in/sites/upload_files/mhrd/files/NEP_Final_English_0.pdf

Semester – I

Course Code	Course Title	Category	L	T	P	Total Credit	Hours	Theory	Practical	Internal	Total Mark
SHSS DJMC 010101 C 3205	Introduction to Communication-I	C	3	2	0	5	5	70	0	30	100

Learning Outcomes

The learning outcomes of this paper are:

- The students will learn about different facets of communication.
- They will learn about the designing part of communication.
- They will also learn about communication techniques.
- The students will learn about the functioning of mass communication.

UNIT I Communication

- Communication: Meaning, Nature and Process
- Features of Human Communication
- Functions, Types and Forms of Communication
- Barriers to Communication
- Role of Communication in Society

UNIT II Communication Models

- Aristotle's model, Shannon & Weaver's mathematical model, Berlo's SMCR model, Lasswell's model, Osgood and Schramm's Circular model, Gerbner's Model, Schramm's Field of experience model

UNIT III Communication Situation

- Group dynamics, Dyad and Triad
- Peer pressures; Reference Group
- Groupthink; Communicative Action
- The cultural context of communication

UNIT IV Mass Communication

- Mass Communication: Concept, Features and Functions
- Concept and Characteristics of Mass Broadcasting and Narrowcasting
- Global Village and Retribalization
- Manufacturing consent: Propaganda, and Hegemony

Suggested Readings

- Baran and Davis. Introduction to Mass Communication Theory 5th Edition (Wadsworth, 2005) Berlo, David. The Process of Communication (1960)
- DeVito Joseph A. Interpersonal Communication Book (Pearson Education US, 2006) Fiske, John. Introduction to Communication Studies (Routledge, 1990)
- Kumar, J. Keval. Mass Communication in India, (Jaico, 2010) McLuhan, M. Understanding Media 2nd ed. (Taylor and Francis,2005) McQuail, Denis. Mass Communication Theory, 6th ed., (Sage, 2010)

- Narula, Uma. Handbook of Communication Models, Perspectives, Strategies(Atlantic, 2006) Narula, Uma. Mass Communication Theory and Practice (HarAnand, 2008)
- Rogers M. Everett. A History of Communication Study (Free Press, 1997)
- Sontag, Susan. et al. The Medium is the Massage: An Inventory of Effects (Penguin, 2008) Williams, Raymond. Communication (Penguin, 1976)

Course Code	Course Title	Category	L	T	P	Total Credit	Hours	Theory	Practical	Internal	Total Mark
SHSS DJMC 010102 C 3115	Writing Skills	C	3	1	1	5	6	50	20	30	100

Learning Outcomes

- The learning outcomes of this paper are:
- The students will learn about the historical importance of writing.
- They will learn about the various kinds of writing.
- They will also learn about bilingual writing skills.
- The students will learn about the writing for media

UNIT I Basics of Writing

- Evolution of writing
- Importance of Writing
- Essentials of Good writing
- Language Skills and Media

UNIT II Writing for Communication

- Formal writing
- Writing for Self
- Writing for an individual and short group
- Writing for mass

UNIT III Translation in Writing

- Translation- Definition, significance and types
- Vocabulary- the importance of right words.
- Words & Phrases, synonyms & antonyms
- Writing for bilingual

UNIT IV Writing and Media

- Basic features of media writing
- Media Terminology
- Various forms of writing
- Style and structure of writing

Practical

- Multilingual translation (Minimum 5)
- Article writing (Minimum 5)
- News, editorial and feature writing (Minimum 5)
- Media writing (Minimum 5)

Suggested Readings

- Usha Raman, Writing for the Media, Oxford University Press, 2009
- Bruce Bartlet, Et. AL, Writing for Visual Media, Focal Press, 2013
- Basic Media Writing by Melvin Mencher
- Writing for the Mass Media (8th Edition) by James Glen Stovall

- Nortran, William Van, Media Writers Guide
- Dixit Surya Prasad, Media Writing Process

Course Code	Course Title	Category	L	T	P	Total Credit	Hours	Theory	Practical	Internal	Total Mark
SHSS DJMC 010103 C 3205	Media Laws and Ethics	C	3	2	0	5	5	70	0	30	100

Learning Outcomes

- The students will learn about the history of media laws.
- They will learn about the different media laws.
- They will also learn about the different rules for safeguarding journalists.
- The students will learn about journalistic ethics.

Unit I

- History of Media Regulations in India; Need for media regulation; Press and Registration of Books Act; Press Council Act, 1978; Copyright Act-1957; Obscenity law; media regulators: IBF, NBA

Unit II

- Indian Cinematograph Act, 1952; Cable Television Regulation Act; 1995 Drugs and Magical Remedies (Objectionable Advertising) Act,1954, Parliamentary regulation, Prasar Bharati Act.

Unit III

- Right to Freedom of Speech and Expression, Article 19(a); Official Secrets Act, 1923; RTI Act, 2006; Defamation law; The Contempt of Court Act (as amended); Intellectual Property Rights; Privacy laws; The Information Technology Act, 2000 (as amended)

Unit IV

- Press Council of India's norms of Journalistic Conduct; NBA's Code of Ethics and Broadcasting Standards; Difference between Ethical vs legal; Press and accountability in Democracy; Ethical issues in Journalism, Regulation of social media

Suggested Readings

- C.S. Rayudu& S.B. NageswarRao Mass Media Laws and Regulations (Himalaya Publishing House, 2013)
- DD Basu. Law of the Press, (Prentice Hall, New Delhi, 2006) Rao, M. C. The Press, National Book Trust (1974)
- Menon, P. K. Journalistic Ethics (Pointer Publishers, Jaipur, 2005) Thakurta, P.G. Media Ethics (Oxford University Press, 2009)

Course Code	Course Title	Category	L	T	P	Total Credit	Hours	Theory	Practical	Internal	Total Mark
SHSS DJMC 010104 C 3205	Introduction to Media	C	3	2	0	5	5	70	0	30	100

Learning Outcomes

- The students will learn about the overall understanding of the emergence of print media.
- They will learn about the different facets of Radio.
- They will also learn about the evolution of Television as a medium of mass communication.
- The students will learn about the emergence of Cinema, the Internet and digital convergence.

UNIT I Media evolution

- Evolution of print media: The World Context
- Folk media
- Pre and Post Indian Independence Journalism; Press during Emergency
- Major News Agencies: Indian and Foreign
- Press Commissions in India; Committees: Chanda, Verghese, Joshi
- MacBride Commission and NWICO

UNIT II Radio

- Beginning of Radio: India and World
- The emergence of All India Radio
- Radio Ceylon and BBC in Indian Radio scenario
- Commercial broadcast: FM Radios
- Non-commercial broadcast: Community Radio

UNIT III Television

- History of broadcasting
- Genesis and evolution of Television: India and World
- Doordarshan and Private Channel eras
- Educational Television in India- SITE, Edusat

UNIT IV Internet and Cinema

- Evolution of the Internet in India; Digital revolution; Digital convergence
- Cinema in India: Genesis, Evolution and Response
- Bollywood: Commercial, Parallel and Multiplex Cinema

Suggested Readings

- Adorno.T. The Culture Industry (Psychology Press, 2001)
- Asa Briggs, Peter Burke, Social History of the Media (Wiley, 2010) H.R.LuthraIndian Broadcasting (Publication Division, 1986)
- KC Sharma, & JN Sharma, Journalism in India: History Growth Development (Oscar, 2008) Kumar, Keval, J. Mass Communication in India, 4th Edition (Jaico, 1994)

- Mazumdar, Aurobindo, Indian Press and Freedom Struggle, (Orient-Longman, 1993), Natarajan, J, History of Indian Journalism, (Publications Division, 1955) R.ParthaSarathi. Journalism in India, (Sterling, 2001)
- S C Bhatt. Indian Press since 1955 (Publication Division, 1997)
- Vilanilam, J. Mass Communication in India: A Sociological Perspective (Sage, 2005)

Course Code	Course Title	Category	L	T	P	Total Credit	Hours	Theory	Practical	Internal	Total Mark
SHSS DJMC 010105SEEC 2200	Soft Skills*	SEEC	2	2	0	0	4	70	0	30	0

Learning Outcomes

- Students would be familiar with the language and grammar for communication.
- Students would be trained in attractive presenting skills.
- Students will learn official communication skills.
- familiarize the different modern platforms of official communication.

Unit I

- Language Proficiency
- Difference between Written and Oral Communication
- Pronunciation: Clarity and Standardization, Intonation and Accent

Unit II

- Personality traits; Dressing: Formal and Casual
- Principles of good Listening; Body language

Unit III

- Writing letters: Official and Demi Official
- Writing official e-mails and SMS
- Social media and Netiquette

Unit IV

- Time management; Developing Leadership traits;
- Public speaking Cultural assimilation, Personal Virtues: Honesty,
- Keeping promises, Dedication Developing a sharp memory,
- Motivation for self-growth

Suggested Readings

Fredrick H. Wentz ,Soft Skills Training – A workbook to develop skills for employment

Barun K. Mitra, Personality Development and Soft skills , Oxford University Press

Semester II

Course Code	Course Title	Category	L	T	P	Total Credit	Hours	Theory	Practical	Internal	Total Mark
SHSS DJMC 010208 C 3205	Documentary film theory	C	3	2	0	5	5	70	0	30	100

Learning Outcomes

- The students will learn about the rules and regulations of the media.
- The students will learn different laws and rules governing various reporting aspects.
- The students would be acquainted with the technical and legal aspects of the media field.

UNIT-1

- Introduction to documentary
- Documentary film movement in the world
- Documentary film development in India
- Important personality in documentary film making in India

UNIT -2

- Film theory
- Concept of non-fiction
- Realism in film
- Film semiotic
- Small screen and documentary

UNIT-3

- Copyright and intellectual rights issues
- Understanding of documentation
- Documentary for socio-culture development
- Propaganda and Campaign

UNIT-4

- Diegetic and Non diegetic
- Importance of sound in documentary
- Pre-production, Production and post-production
- 5-minute documentary filmmaking on any topic

Suggested Readings

- Reardon Nancy and Flynn Tom, On Camera: How to Report, Anchor and Interview, Focal Press
- Holman Tomlinson, Sound for Digital Video, Elsevier Publication
- Proffers Nicholas T, Film Directing Fundamentals, Focal Press
- Aufderheide Patricia, Documentary Film- A Very Short Introduction, Oxford Publication.
- Directing Documentary, Focal Press
- Mollison Martha, Production Video, Viva Books Private Ltd.

Course Code	Course Title	Category	L	T	P	Total Credit	Hours	Theory	Practical	Internal	Total Mark
SHSS DJMC 010209 C 3205	Communication Research	C	3	2	0	5	5	70	0	30	100

Learning Outcomes

- Enhance your understanding and appreciation of the study of communication and how knowledge is derived in the Communication discipline as a whole,
- Increase your knowledge of the principles, objectives, and limitations of different approaches to research and scholarship,
- Translate your research methods knowledge and skills into varying practical career fields.

Unit I

- Research and Research Perspective:
- Research and Research types;
- Social Research and Communication Research;
- Functional, Positivist, and Interpretive perspectives;
- Deductive and Inductive approaches;
- Theory and Method.

Unit II

- Research Design and Methodological approaches:
- Research Design;
- Meaning and types – Experimental, Descriptive and Exploratory;
- Quantitative and Qualitative Research and others, Mixed Method approach;
- Variables and Hypothesis – Types and Role of Communication Research.

Unit III

- Sampling and Data Collection: Sampling types and methods;
- Data collection tools – Observation, Interview, Schedule and Questionnaires, Focus Group; Presentation of data;
- Averages, Dispersion, Correlation and Association of attributes with exercises;
- Case study and Content Analysis; Test of Hypothesis;
- Validity and Reliability.

Unit IV

- Specified Methods for Communication Research:
- Semiology and Linguistics,
- Ethnography,
- Deconstruction, Discourse analysis,
- Textual and Intertextual reading.

Reading list:

- Reinard, J.; Introduction to Communication Research, (McGraw Hill, 2001)
- Sarantakos, S.; Social Research, (Palgrave, New York, 1988)
- Gillian Rose; Visual Methodologies, (New Delhi, Sage Publications, 2007)

- Young, P.V; Scientific Social Surveys and Research, (Prentice Hall of India Pvt. Ltd., 1984) Kothari, CR; Research Methodology, Methods and Techniques Calcutta, (Wiley Eastern Ltd.,
- 1985).
- Hansen, Anders & et al. ; Mass Communication Research Methods London, (Mc Millan, 1988)
- Paneerselvam; Research Methodology, (New Delhi, Prentice Hall of India, 2007).
- Watt, James H; Research Methods for Communication Science, (Sydney, Alliyn& Bacon, 1995).
- Churton, Mel; Theory and Method, (Hampshire, Mc Millan, 2000).

Course Code	Course Title	Category	L	T	P	Total Credit	Hours	Theory	Practical	Internal	Total Mark
SHSS DJMC 010210 C 3205	Communication for Development	C	3	2	0	5	5	70	0	30	100

Learning Outcomes

- Upgrade human resources with specialized knowledge and skills on communication for social change.
- Expand the knowledge base of theories around development, and its interrelation to
- Culture, behaviour change, social transformation and; human rights principles.
- Understand the newer approaches to C4D concepts, methods and techniques.
- Impart skills on carrying out research, design, development, implementation, monitoring & evaluation of C4D interventions
- facilitate on the field exposure to techniques of designing and developing effective C4D strategies, interventions for social transformation.

Unit I Development and Development Communication :

- Definition, Dimensions and indicators of Development;
- India's Development Scenario; Under development Syndrome, Development Communication: Definition, Features and Theoretical Perspective – Modernization, Critical and Liberation Perspective;
- Approaches to Development Communication, Idea of Happiness
- Five-year Planning, Cleanliness and Development, Skill education and Development

Unit II Modes and Strategy of Development Communication :

- Development Communication as Social Action for Directed Change;
- Modes of DC – Diffusion of Innovation, Advocacy and National campaigns, Social Marketing; Specific Varieties – Health Communication, Educational Communication for lifelong learning, Development Support Communication (UNDP);
- Extension Services in India, Social Marketing, Empathy

Unit III Mass Media and Development :

- Mass Media and Development Communication; Media and Nation Building;
- Communicative Action (Habermas); Participatory democracy through Community Radio and Leadership communication role;
- RTI provisions in India; Minimal effect hypothesis, Development journalism, Development and Change, Development Reporting, Media Advocacy

Unit IV ICT and Social Media for Development :

- Digital divide, Access and use of ICT in India;
- Network Society and Expansion of Contacts;
- Social Media and Self Development;
- E-governance; Globalisation of Culture.

Reading list:

- Kapoor, I. The Postcolonial Politics of Development. (London and New York: Routledge,2008)
- Melkote, S. R. and Steeves, H. L. Communication for Development in the Third World: Theory and Practice for Empowerment, 2nd Edition. (London: Sage,2001)

- Mody, B. (ed.) International and Development Communication: A 21st Century Perspective, 2nd Edition, (Thousand Oaks, CA: Sage Publications, 2003)
- Roy, S. Globalisation, ICT and Developing Nations: Challenges in the Information Age, (New Delhi: Sage,2005)
- Manyozo, L. Media, Communication and Development: Three Approaches. (London: Sage,2012)

Course Code	Course Title	Category	L	T	P	Total Credit	Hours	Theory	Practical	Internal	Total Mark
SHSS DJMC 010211 C 3205	Digital Media	C	3	1	1	5	6	50	20	30	100

Learning Outcome:

- demonstrate substantial in-depth knowledge about the meaning of digital media, information technologies and their uses in contemporary mediatized societies and cultures.
- Be aware of the current research in the area of digital media, culture and society.
- Adopt an independent and critical approach to information and research in the field of digital media and society.
- Demonstrate the writing skills required in the field of digital communication.
- Gain employment opportunities in the field of digital media and communication landscape.

Unit I Digital Media

- Digital Media: Definitions and Concept;
- Features of New Media;
- History of New Media; New vs Old media;
- World Wide Web: Concept and evolution

Unit II New Media Technologies

- Wearable technologies;
- Technological determinism;
- New Media Marketing;
- New Media Economy; Hyper-textuality;
- Digital Divide;
- Clouds technology

Unit III Society and New Media

- The Rise of Information Society;
- New Media Movements and Campaigns, Democratisation of Media/information;
- The phenomenon of YouTube Celebrities;
- New Media Literacy, Social Networking Sites & platforms, Netizens and Cyborgs,
- Internet addiction, Virtual World vs the Real-world

Unit IV Cyber Journalism

- Blogs,
- Microblogging sites like Twitter,
- Narrowcasting and Broadcasting Ethics of Cyber-journalism,
- Merits and Demerits of Cyber journalism,
- Effects of cyber journalism on society,
- Cybercrime and society

Practical

- Write content for different social media platforms

- Blogs, Web page, Digital poster
- Manage social media profile (like facebook, linkedin)
- Microblogging

Reading list:

- Lister, Martin, Jon Dovey, Seth Giddings, Iain Grant and Kieran Kelly. New Media: A Critical Introduction. 2nd ed. (Routledge, 2008)
- Manovich, Lev. The Language of New Media. Cambridge, (MIT press,

  2001) Papacharissi, Zizi, ed. A Networked Self: Identity, Community,

  and Culture on Social Network Sites. (New York: Routledge, 2011)

- Rettberg, Jill Walker. Blogging. Cambridge, (UK: Polity P, 2008)
- Bell, David and Barbara Kennedy, eds. The CyberCultures Reader. 2nd ed. (New York: Routledge, 2007)

Practical:

- Making a Blog.
- Use of social networking sites
- Selection of Content for New Media.
- Use of E-Mail

Course Code	Course Title	Category	L	T	P	Total Credit	Hours	Theory	Practical	Internal	Total Mark
SHSS DJMC 010212 C 0005	Internship (4- Weeks)	C	0	0	0	5	30	50	20	30	100

At the end of the second semester and after Term-end Exams, all students are required to undergo a 4-week internship with a media house/organization of their choice and/or in consultation with concerned teachers. They are also required to submit a Performance Assessment Report (PRA) in prescribed Proforma (Performa will be provided by the Department). Performance Assessment Report to be submitted by the organization in which a student has completed the internship.

The PRA shall contain details of the internship (work/duties/tasks performed, copies of work done, assignment details etc.) is to be submitted within a month of commencement of the third semester or as per the deadline decided by the department/school.

Based upon this report Internal Examiner evaluate and power-point presentation, External Examiner shall conduct the viva-voce.

Learning Outcome:

The expected learning outcomes of this paper are as follows:

- Discuss the application of classroom theory in the context of the student's work experience
- Apply appropriate skills in the techniques of getting a job
- Recognize knowledge and skills that relate to the technical aspects of their discipline
- Demonstrate in a written work report a broad understanding of the organization for which the student worked
- Practice good work habits
- Establish interpersonal relationships through personal contacts on the job and employer evaluations

All of these goals and objectives are parts of the Internship program. For some students, some of the objectives may

be more important than others. However, the Internship is designed to be an individual course of study flexible

enough to meet the special individual needs of students and employers.

Course Code	Course Title	Category	L	T	P	Total Credit	Hours	Theory	Practical	Internal	Total Mark
SHSS DJMC 010213 C 3104	Contemporary Issues and Mass Media	DCEC	3	1	0	4	4	70	00	30	100

Learning Outcome:

- Understand and analyse some of the present-day environmental, political, economic and social concerns and issues.
- Highlight the importance of human rights and their implementation in India.
- Understand the present-day problems and challenges and their implications on development.

Unit–I

Ecology and its related concerns:

- Climate change and Global warming- causes, consequences and remedial measures • Deforestation- causes, consequences and remedial measures
- Coastal regulatory Zone- need and importance, CRZ Act
- Sustainable development- concept, need and significance
- Movements related to environmental protection

Unit- II

Human Rights

- UDHR and its significance
- CRC and CEDAW
- DRD

Legislative measures concerning India.

- **Women:** Constitutional Rights and legal safeguards, Domestic and Family Violence Act of 2012, Sexual Harassment Act at the Work Place 2013, The Criminal Law (Amendment) Act of 2013
- **Child**: Protection of Children from sexual offence Act -2012 (POCSO), ChildLabour Act with new amendments, Juvenile Justice (Care and Protection of Children Act) 2000.
- **Education**: Right to Education Act 2009
- **Health**: National Health Policy of 2015, Transplantation of Human organs Act of 2002, Prenatal Diagnostic Technique Regulation and prevention of Misuse amendment rules of 2003, Prohibition of sale of cigarettes and other tobacco products around educational institutions 2004.

Unit-III

Political concerns and challenges

- Crime and Politics
- Corruption: Causes and remedial measures. RTI Act, Lokpal Bill.

- Whistle-Blowers- WhistleBlowers protection act 2011.
- Anti- State violence- Naxalism and its Impact.
- Insurgency concerning North-East – Issues involved, ULFA, Nagas, Manipur issue, AFSPA and its impact.
- Terrorism- causes, consequences and remedial measures

Unit- IV

Economic development and challenges:

- The Role of MIDC in the economic development of Maharashtra
- Special Economic Zone: Its role and significance in Maharashtra
- Food Security Act 2013
- Agrarian issues: rural indebtedness, farmers' suicides and its implications.

Social development and challenges:

- Tribal Issues: Marginalisation of the Tribals, Forest Rights Act, Land Acquisition Act. • Police reforms: Problems faced by Police and the Need for Reforms
- Illegal immigration from Bangladesh: Challenges and impact
- Developmental Issues: Displacement and rehabilitation

Suggested Readings

- Rush Ramona, Oukrop Carole, CreedonPamola (2013), 'Seeking equity for women in Journalism and Mass Communication Education: A 30-year Update', Taylor and FrancisRanganathan Maya; Rodrigues Usha: (2010) Indian media in a Globalised World, Sag Publications
- Bareh Hamlet, (2001), Encyclopedia of North-East India: Assam, Mitthal Publications. Uma Kapila(ed) (2013)Indian Economy: performance and policies,14th edition Academic Foundation.
- V. K Puri and S.K Misra (ed) (2013)Indian Economy,31stedition.Himalaya Pub House.
- Asha Bajpai, (2011) Child Rights in India: Law, policy, and practice.
- Dr B Ramaswamy and Nitin Shrirang Mane, (2013) Human Rights: Principles and practices, Alfa Publication.
- R P Kataria and Salah Uddin (2013) Commentary on Human Rights Orient Publishing Company.
- J.Shivanand, Human Rights: Concepts and Issues,
- Ram Ahuja, (2012), Indian social Problems, Rawat Publications.
- Ghanashyam Shah, (2011) Social Movements in India, Sage Publications. • A. R Desai, Rural Sociology.

Magazines and journals

- Down to Earth: Science and Environment Fortnightly
- Economic and Political Weekly
- Yojana

Course Code	Course Title	Category	L	T	P	Total Credit	Hours	Theory	Practical	Internal	Total Mark
SHSS DJMC 010214 C 2204	Cross-Cultural Communication	DCEC	2	2	0	4	4	70	0	30	100

Learning Outcomes :

- Differentiate nuances of communication practices in different cultural contexts to recognize differences between different styles of communication across cultures.
- Analyze the challenges and opportunities of cross-cultural communication to make decisions informed by cultural cues.
- Apply theories of differences in communication styles across cultures to case studies of cross-cultural communication experiences.
- Reflect critically on individual communication strengths and growth areas to set professional goals for working in international, intercultural settings.

UNIT I Theoretical backdrop of Intercultural Communication

Culture; concept and definition, Indus Culture, Western Culture, Mixed Culture, Clothing, food and culture; Inter-region Migration; World Capitalistic System; Clash of Civilizations; Culture shock; Melting pot; Composite culture; East-West parallelism; Indian diversity

UNIT II Concepts and Definitions

Culture and Civilization, Intercultural Communication; Human Communication, Identities; Socio-linguistic exchange, Ethos and Values; Subcultures; Religious and Spiritual discourses; Global culture

UNIT III Process of Intercultural Communication

Cultural negotiations; understanding similarities and differences in cultures Experiencing with empathy, Cultural Acquisition and Blending, Skills of adaptation

UNIT IV Facilitating Factors and Barriers of Intercultural Communication

Facilitating Factors: Globalization, Internationalizing Media, UNESCO activities, Colonialism, Great Literature, Business pressures and interests

Restricting Forces: Civilizational and Ethnic Clashes, Social Prejudices and Stereotypes, Identity preservation, Fundamentalism, Food culture

Suggested Readings

- Edwin R. et al. Specifications of Intercultural Communication: A Reader (Cengage Learning, 2014) Hutington, S.The Clash of Civilizations and the Remaking of World

Order (Penguin, 1997) James W. CareyCommunication as Culture: Essays on Media and Society (Psychology Press, 1989)
- Martin, J.N. & Nakayama, T.K. Intercultural Communication in Contexts 5th Edition(McGraw- Hill, 2009)
- Martin, J.N. & Nakayama, T.K. (2002). Readings in Intercultural Communication. Experiences and contexts (McGraw- Hill, 2001)
- Samovar, Porter, Understanding Intercultural Communication: The Working Principles (2009).
- Thombre, A, Ramesh N. Rao Specifications of Intercultural Communication: The Indian Context (SAGE Publications India Pvt Ltd, 2015)

Celluloid Reference

- La Haine by Mathieu Kassovitz

Semester III

Course Code	Course Title	Category	L	T	P	Total Credit	Hours	Theory	Practical	Internal	Total Mark
SHSS DJMC 010316 C 3115	Reporting and Editing	C	3	1	1	5	6	50	20	30	100

Learning Outcomes:

- Students would understand the significance of reporting.
- Students will be able to inculcate the news values and basics of news writing.
- Students would know the different styles of reporting for different mass media.
- Students will have an understanding of different types of reporting and reporting beats.
- Students would be familiarized with the basics of reporting, editing and recent trends in the field.

Unit - I

- News: Concept and definition, types of news, sources of news, the structure of news report
- Reporting: Concept, methods and techniques of news gathering, recent trends in reporting
- Techniques of news writing: Straight, Quoting, Interpretation, Comment, Analysis etc.
- Types of Reporting: Political, Economic, Crime, Science, Sports, Culture, Legislature, Judicial, Disaster, Accident, Travelogue, Conference, Environmental, Health, Developing follow-up, News Agency Reporting

Unit – II

- Newsgathering process and flow
- Reporting staff and their personalities and responsibilities; Reporters, Correspondents, Stringers, Freelancers, Citizen Journalists
- Approaches to Reporting: Objective, Interpretive, Investigative.
- Reporting Beats, Scoops, Ground Reporting, Web Reporting

Unit – III

- Reporting and Editing for Radio
- Structuring Radio Copy, Editing Agency Copy, and Illustrating copy with sound effects.
- Interview techniques and skills for Radio
- Field reporting, reporting specialised areas, investigative reporting, voice dispatches, and writing headlines.

Unit – IV

- Reporting and Editing for Television
- Reporting and editing a news package and news bulletin
- Interview techniques and skills for television
- Do’s and Don’ts of Television reporting
- Writing for Broadcast News, Digital Media

Practical

- Collect news and write news for Print, Television, Radio, and Digital Media.
- Prepare a News Bulletin for Radio
- Prepare a news bulletin for Television
- Prepare 10 news reports of different beats.
- Record and Edit Interviews for Radio and Television.

Suggested Readings

- Parthasarthy, Rangaswami: Journalism in India, Sterling Publishers Pvt. Ltd., 1997.
- N N Sarkar: Art and Production, Sagar Publishers, New Delhi, 2001
- J K Sharma: Print Media and Electronic Media, Authors Press, 2003
- Paul De Maeseneer: Here is the News: A Radio News Manual, UNESCO
- Harrower, T.: The Newspaper Designer's Handbook. McGraw-Hill, 2005.
- Herbert Strentz, News Reporters and News Sources, Prentice Hall of India, 1992.
- Jan R. Hakemulder, Fay A.C. de Jonge and P.P. Singh, News Reporting and Editing, Anmol Publications, New Delhi, 1998.
- M L Stein and Susan F. Peterno. The News Writers' Handbook, Blackwell, 2006.
- Natarajan J: History of Indian Journalism, Publications Division, Ministry of Information & Broadcasting, Govt. of India, 1997
- Trikha, N.K.: Reporting, Makhanlal Chaturvedi Rashtriya Patrkarita Avam Sanchar Vishawvidyalya.

Course Code	Course Title	Category	L	T	P	Total Credit	Hours	Theory	Practical	Internal	Total Mark
SHSS DJMC 010317 C 3115	Advertising	C	3	1	1	5	6	50	20	30	100

Learning Outcomes:

1. Students would understand the meaning and significance of advertising.
2. Students would be familiarised with the structure and recent trends in the advertising industry.
3. Students would be able to identify, analyze, and understand the advertising environment.
4. Students would inculcate the creative process of preparing advertising messages for various mass media.
5. Students would be familiarized with identifying, understanding, and applying for integrated brand promotion.

Unit – I

- Advertising: Concept, Meaning and Definition, Features and functions
- Types of Advertising
- Growth of Advertising- World and India
- Advertising models: AIDA, DAGMAR

Unit – II

- Principles and Appeals in Advertising
- Components of Advertisement- Ad copy, Slogans, Body, Logo, Layout and Illustrations
- Planning and Designing advertisement for different media
- Marketing Mix, Advertising Campaigns, Consumer Segmentation, Target Audiences
- Leaflets, Brochures, Pamphlets, Coffee Table Book

Unit – III

- Advertising Agency: Meaning, Structure, and functions
- Advertising Budget- Planning and Coordinating
- Media Planning- Choosing appropriate media for advertising
- Advertising as a Branding strategy
- Growth and recent trends in the advertising sector

Unit – IV

- Advertising Regulatory Mechanism
- Code and Ethics of Advertising
- Advertising regulatory bodies: ASA, ASCI
- Research and Advertising
- Major Laws related to Advertising

Practical

- Prepare five advertisements for print media
- Prepare five advertisements for Radio
- Prepare Leaflet, Brochure, Pamphlets, and Coffee Table Book
- Prepare five advertisements for Television
- Prepare two advertisements for Web Media

Suggested Readings

1. Tellis, Gerard J. Effective Advertising; New Delhi, Response books, 2006.
2. Blythe, Jins; *Marketing Communications*, (New York; PHI; 2000)
3. Kotler, Philip and Gary Armstrong; *Principles of Marketing*, (New Delhi, Pearson Education, 2004).
4. Jib Fowles, *Advertising and popular culture*, (Sage Publications, 1996)
5. Mary Cross; *Advertising and Culture,* (Prentice Hall, 2001).
6. Chunawalla SA & Sethia KC, *Foundations of Advertising Theory and Practice*, Himalaya Publishing House, Delhi.
7. Batra Rajeev et.al. *Advertising Management (Fifth Edition)*; Prentice Hall of India, New Delhi, 2000.

Course Code	Course Title	Category	L	T	P	Total Credit	Hours	Theory	Practical	Internal	Total Mark
SHSS DJMC 010318 C 3115	Audio Visual Production	C	3	1	1	5	6	50	20	30	100

Learning Outcomes

1. Students would understand the basics of electronic media productions.
2. Students would be trained for audio-visual productions.
3. Students will learn different audio-video production equipment and software for editing.
4. Students would inculcate the skills required for AV (Audio-visual productions) industry.
5. Students would be familiarized with audio-visual productions for different formats and media.

Unit – I

- TV studio and production: structure and working
- Video Camera: Parts, working, features and effects: optical zoom, digital zoom, focal length, focus, depth of field, aperture, neutral density filter, shutter speed, white balance, image distortion, shooting frame rate, aspect ratio.
- Advanced video cameras
- Basics of audio: properties of sound, types of program sounds, the concept of sound, functions of sound, types of microphones
- Terms used in the audio recording: Fade-in, Fade-out, fade under, sweetening, phase cancellation; Audio Faders and Mixers, Audio Formats
- Editing: Introduction, Elements: Motivation, Information, Composition, Sound, Camera angle, Continuity; Transitions: Cut, Dissolve, Fade, Wipe, Editing Modes, Linear Editing, Non-Linear Editing.

Unit – II

- Role and responsibilities of personnel for video production
- Role and responsibilities of personnel for News
- Production process: Pre-Production, Production, and Post-Production

Unit – III

- Various genres of TV programmes, TV news copy
- Audio-visual documentary: Scripting, Elements of a documentary, writing a documentary proposal
- Scripting Fiction: Basic Concept, Developing plot, character development and dialogue.
- Lighting and Audio-Video Productions: Properties of Light- intensity, colour, quality, dispersion, direction factors that influence light, lighting surface, lighting objects, lighting different situations, lighting ratio

Unit – IV

- Production for Print, Advertising, and Digital Media
- Producing advertisements, Photo production and editing for print, Digital Media Production
- Do's and Don'ts of Audio-video production
- Basics of audio-video production for the web especially social media

Practical

- Write for different types of programs.
- Anchoring with using Teleprompter
- Recording and editing voice-over for different programs.
- Moderating studio news program.
- Record and Edit Documentary.
- Prepare audio-visual assignments as per recent times and trends.

Suggested Readings

1. Television Production Handbook, Herbert Zettl, Wadsworth, Belmont, 2003
2. Shooting TV News: Views from Behind the Lens, Rich Underwood, Focal Press, Oxford, 2007
3. Nonlinear Editing: Storytelling, Aesthetics and Craft, Bryce Button, CMP Books, Berkley, 2002
4. Video Editing: A Post Production Primer, Steven E. Browne, Focal Press, Amsterdam, 2002.
5. How Video Works: From Analog to High Definition, Focal Press, Oxford, 2007
6. The Economic Regulation of Broadcasting Markets: Evolving Technology and Challenges for Policy, Ed. Paul Seabright and Jurgen Von Hagen, Cambridge, 2007
7. Broadcast Management in India: Major Guidelines and Policy Frameworks, Angela Wadia, Kanishka Publishers, New Delhi, 2007.
8. Indian Television and Video Programmes: Trends and Policies, Mridula Menon, Kanishka Publishers, New Delhi, 2007

Course Code	Course Title	Category	L	T	P	Total Credit	Hours	Theory	Practical	Internal	Total Mark
SHSS DJMC 010319 DCEC 2204	Media Marketing Management	DCEC	2	2	0	4	4	70	0	30	100

Learning Outcomes:

- Students would understand the basics of Media management.
- Students would know different marketing aspects and models of marketing management.
- Students would learn crisis management and conflict management in Marketing Management.
- Students would inculcate the skills required for Management and Marketing field.
- Students would be familiarized with Media organisations, ownership patterns, structures and working.

Unit – I

- Media Management- Definition, Concept and Scope
- Principles of Management - Taylor, Fayol, Mayo
- Functions of Media Management
- Role of Media in Marketing
- Regional, National, and International Marketing

Unit – II

- Media ownership
- Structure of a Media Organization
- Crisis Response in Media Organization
- Staff selection in Media Organizations

Unit – III

- Media Marketing: Definition, Concept and Scope
- Media Products and Media Markets
- Different Marketing Models: Mckinsey model, Ansoff matrix
- The BCG matrix, Diffusion of Innovation, DRIP, 7 P of Marketing Mix, Push and Pull Marketing, HTP model, SWOT analysis
- Digital Media Marketing
- Instruments of Media Marketing Measurement- TRP, TAM, RAM, ABC, IRS Revenue-Expenditure in Media

Unit – IV

- Organizational Behaviour: Definition, Importance and Scope
- Types of Conflict- Intrapersonal, Interpersonal and Organizational Conflict Management
- Stress Management- Definition and Causes of Stress, Porter 5 forces

Suggested Readings

- Koontz, H. (2010). Essential of Management. New Delhi: Tata McGraw-Hill Education.
- Saxena, S.C. (2000). Principles and practices of management. Africa Beyond: Pratiyogita Sahitya.
- Kotler, P. and Armstrong G. (2008). Principles of Marketing (12th Edition). India: Prentice-Hall.
- Ramaswamy, V.S. and Namakumari, S. (2002). Marketing Management. Macmillan India Limited.
- Rucker, F.W. and Williams, H.L. (1969). Newspaper Organization and Management. Iowa State University Press.
- Singhal, M. (2014). Media Management. New Delhi: Random Publication.
- Marketing Management - A South Asian Perspective:: Philip Kotler, Keller, Koshy and Jha, Published by Pearson Education
- The Practice of Management: Peter Drucker, published by Elsevier Ltd.
- Media Management: A Casebook Approach (Routledge Communication Series) by George Sylvie, Jan Wicks LeBlanc, C. Ann Hollifield, Stephen Lacy
- Handbook of Media Management and Economics by Alan B. Albarran, Sylvia M. Chan-Olmsted, Michael O. Wirth 6. Strategic Management in the Media: Theory to Practice by Lucy Keung, SAGE

Course Code	Course Title	Category	L	T	P	Total Credit	Hours	Theory	Practical	Internal	Total Mark
SHSS DJMC 010320 DCEC 2204	Public Relation writing	DCEC	2	2	0	4	4	70	0	30	100

Learning Outcomes:

- Students would understand the basics of Public Relations.
- Students would know about publicity, propaganda, advertising, Digital PR, Corporate communications etc.
- Students will learn different tools and methods of Public Relations.
- Students will inculcate the writing skills for PR writing.
- Students would be familiarized with the laws and ethics of Public Relations.

Unit – I

- Definition and Concept of Public Relations, Publicity, Propaganda, Advertising
- Fundamentals of Writing
- Functions of Public Relations
- PR Writing- Features and functions
- Writing aspects: Lucidity and Directness, Authenticity and credibility, Authorial voice

Unit – II

- Writing for Print Media
- Basics of Reporting and Editing
- Writing Features, Articles, Blogs, Backgrounders, News Analysis
- Writing for PR- Basics

Unit – III

- Different PR writing styles
- Writing for Crisis Management
- Writing Press Release, Difference between news, story and press release
- Writing Minutes, Memos, Report, Letter

Unit – IV

- Three models of PR: Propaganda, Publicity, and two-way public relations
- Latest trends in PR and PR writing
- Writing for different PR tools

Suggested Readings

- Public Relations in India by J. M. Kaul, Kolkata: Naya Prokash.
- Public Relations: The Profession and the Practice by Baskin W.Otis, AronoffE. Croig and Lattimore Dan. Dunique: Brown & Benchmark.
- Vigyapan aur Jansampark by Jaishri Jethwaney, Ravi Shanker and Narender Nath Sarkar. New Delhi: Sagar Publications.
- Basic Media Writing by Melvin Mencher.
- Writing for the Mass Media (8th Edition) by James Glen Stovall.
- Writing for Digital Media by Brian Carroll: Taylor & Francis.
- Journalism: Principles and Practice by Tony Harcup.
- Scholastic Journalism, 12th Edition by C. Dow Tate, Sherri A. Taylor.
- Writing for Visual Media by Anthony Friedmann: Taylor & Francis.

Course Code	Course Title	Category	L	T	P	Total Credit	Hours	Theory	Practical	Internal	Total Mark
SHSS DJMC 010321 DCEC 2204	Portfolio	DCEC	2	2	0	4	4	70	0	30	100

Learning Outcomes :

- Students would be trained for journalistic works.
- Students would be able to write and produce for different mass media.
- Students will have practical training along with academics.
- Students will inculcate the skills for writing and working in the media field.
- Students would be familiarized with the media environment through these practical works.

In this course, each student shall prepare a portfolio containing the productions carried out during the course. A minimum number of productions mentioned against each item must be part of the portfolio. Here, Portfolio refers to the class note in which the concerned teacher assigns work, corrects, and needs to be asked to rewrite and puts his signature on every work assigned with a date. The portfolio is for 40 marks. An external examiner will take a test giving three practical questions and students need to answer any two. That will be 30 marks. A student who does not have a portfolio will not be allowed to appear for the examination.

Practical:

- News Report of the events around-07
- Article -05
- Feature -05
- News analysis -05
- Press Release —05
- Development story-03
- Development article -02
- Backgrounder -02
- Caption writing for photographs ---05
- Newspaper Page make up-1
- Magazine Page design-1
- Newsletter -1
- Leaflets/Brochures/Posters/Coffee Table Book- 3

In addition to the above, as assigned by the concerned teacher.

Suggested Readings

- Feature Writing for Journalists, Sharon Wheeler, Routledge, New York.
- George, A.H. (1990). News Writing, Kanishka Publications.

- Stein, P. & Burnett (2000). News Writer's Handbook: An Introduction to Journalism, Blackwell Publishing.
- Intule & Anderson (2002). News Writing and Reporting for today's media, MCGraw Hill Publication.
- Julian, Harris, Kely Leiter, Stanley, Johnson, 'The Complete Reporter, Macmillan Publishing Co, New York.

Course Code	Course Title	Category	L	T	P	Total Credit	Hours	Theory	Practical	Internal	Total Mark
SHSS DJMC 010322 DCEC 2204	Cinema Studies	DCEC	2	2	0	4	4	70	0	30	100

Learning Outcomes:

- Students would be familiar with the glorious journey of cinema.
- Students would be trained in motion picture productions.
- Students will learn operating production equipment and software for editing.
- Students would inculcate the skills required for the Cinema industry.
- Students would be aware of producing motion pictures for different formats and media.

Unit – I

- Introduction to Indian Motion Picture Industry
- Research in motion picture production
- History of Cinema, Screen Grammar
- Film Theory
- The golden period of Cinema
- Regional Cinema vs. Bollywood
- FTII, Cinema as Industry

Unit – II

- The Art of Storytelling
- Motion picture: Production and Management
- Motion Picture Censor Certification, Distribution and Exhibition
- Production of Short Film: Writing, Shooting, Editing and directing narrative
- Single screen vs. multiplex cinema
- Liberalisation and Cinema

Unit – III

- Dynamics of picture and sound
- Types of sound in film production
- Creative, technical, and business aspects of motion picture production
- Current status, challenges and opportunities in the entertainment industry, OTT platforms

Unit – IV

- Basics of Composition of static shots
- Basics of Composition of moving shots
- Recording and editing shots and soundtracks for moving picture
- Film as an Art: Perspective and Descriptive theories
- Films and Culture, Films and Society, Film and the observer

Suggested Readings

- B. D. Garga, So Many Cinemas- The Motion Picture in India, Bombay, Eminence Design Pvt. Ltd 1996.
- Erik Barnouw and S. Krishnaswamy: Indian Films, New Delhi, Oxford, 1986.
- Rajadhyaksha, A., & Willemen, P. (Eds.). (2014). *Encyclopedia of Indian cinema*. Routledge.
- Saran, R. (2014). *History of Indian cinema*. Diamond Pocket Books Pvt Ltd.
- Ray, S. (2017). *Deep Focus: Reflection On Indian Cinema*. HarperCollins.
- Chaki, S. (2015). *A Journey Through 100 Years of Indian Cinema: A Quizbook on Indian Cinema*.

Course Code	Course Title	Category	L	T	P	Total Credit	Hours	Theory	Practical	Internal	Total Mark
SHSS DJMC 010323 DCEC 2204	Sports Journalism	DCEC	2	2	0	4	4	70	0	30	100

Learning Outcomes:

- Students would be acquainted with the general understanding of Sports Journalism.
- Students would be trained for covering sports news, events and various games.
- Students would learn different aspects of Sports reporting, Writing, rules, laws and others.
- Students would inculcate the skills required for Sports Journalism.
- Students would be familiarized with Sports personalities, Sports Journalists, Experts etc.

Unit – I

- Concept and Definition of Sports Journalism
- Basics of Sports Journalism
- Types of Sports Reporting
- Reporting vs. Commentary

Unit – II

- Basics of Sports Reporting for Print Media
- Basics of Sports Reporting for Radio
- Basics of Sports Reporting for Television
- Basics of Sports Reporting for Web Media

Unit – III

- Rules and Regulations of Olympic games reporting, CommonWealth games
- Reporting various games: Cricket, Football, Hockey, Athletics, Tennis and Other Sports Events
- Do's and Don'ts of Sports Journalism
- Technical terminology in the field of Sports Journalism
- Selecting Photos and Photo caption writing for Sports Journalism

Unit – IV

- Rules governing Sports Journalism
- Studio vs. Field Interview
- Ethics of Sports Journalism
- Recent trends in Sports Journalism

Suggested Readings

- Lambert, C. M. (2018). *Digital sports journalism*. Routledge.
- Washburn, P. S., & Lamb, C. (2020). *Sports Journalism: A History of Glory, Fame, and Technology*. University of Nebraska Press.
- Kian, E., Schultz, B., Clavio, G., & Sheffer, M. L. (2019). *Multimedia Sports Journalism: A Practitioner's Guide for the Digital Age*. Oxford University Press.
- MacNeill, M. (1995). Women, Media and Sport: Challenging Gender Values. *Canadian Woman Studies*, *15*(4).
- Fleming, C. (Ed.). (2006). *Introduction to Journalism*. Sage.

Semester IV

Course Code	Course Title	Category	L	T	P	Total Credit	Hours	Theory	Practical	Internal	Total Mark
SHSS DJMC 010426 C 3105	Photography	C	3	1	1	5	6	50	20	30	100

Learning Outcomes:

- The students will learn Professional photography skills.
- They will learn different techniques of photography.
- They will also learn about societal and cultural expressions through photography.
- From the practical component, they will learn how to use cameras, equipment, and software efficiently for photography.

Unit I

- Evolution of Photography
- Types of Camera: Film-based and digital
- Parts and Functioning of a camera
- Types of Camera Lenses; Micro and Macro photography

Unit II

- Exposure Triangle: Aperture, ISO and Shutter Speed.
- Basic Composition of shots
- Types of Camera angles and Shots
- Concept of Focus and Depth of Field

Unit III:

- Types of Camera Lenses
- Equipment of photography: Flash, tripods, battery, flash memory, lighting meter, filters Light: Characteristic and Types
- Lighting sources and types and modifiers

Unit IV:

- Types of Photography: Portrait, Landscape, Sports, Wild-life Photography, Nature Photography, Candid Photography, Street Photography
- Studio and Outdoor Photography
- Basic working in Photoshop
- Layers, Brushes, filters and tools of Photoshop

Practical:-

- Creating 5 photos each in the following categories
- Portrait
- Street
- Landscape
- Rural
- Concept shoot

References

- Kelby, S. (2006).The Digital Photography.San Francisco: Peachpit Press.
- Barnbaum, B. (1994).The Art of Photography. Korea: Rocky Nook.
- Long, Ben. (2012). Complete Digital Photography. Delmar Cengage Learning.
- Peterson, B. (2010). Understanding Exposure. Amphoto Books.
- Gustavson, T. (2009). Camera: A History of Photography from Daguerreotype to Digital. New York: Sterling Innovation.

Course Code	Course Title	Category	L	T	P	Total Credit	Hours	Theory	Practical	Internal	Total Mark
SHSS DJMC 010427 C 3105	Advertising and Public Relations Writing	C	3	1	1	5	6	50	20	30	100

Learning Outcomes:

- The students will learn about creating a better relationship between the organisation and society.
- They will learn to express the creative aspects of the product.
- They will also learn about how to convince the target audience through the media.
- From the practical component, they will learn about different tools for creating and disseminating advertising messages effectively.

Unit I

- Public Relations Writing
- Fundamentals of PR writing
- Creativity in PR writing
- Press Release, News, feature, PR writing, House Journal Writing
- Photo caption Writing
- Crisis management writing

Unit II

- Writing for Internal and External Public
- Writing for Digital media, Blog, Email, SMS
- Ethics in Public Relations; PRSI code
- PR Campaign Writing

Unit III

- Writing for Advertising
- Classified, Display Ads, Special target Audience writing
- Advertising campaign writing
- Creativity in Advertising
- The different advertising writing style

Unit IV

- Advertising appeals
- Corporate identity for image building
- PR and corporate advertising
- Case Studies: Corporate Communication

- Case Study Writing
- Media writing in crisis (Covid 19 pandemic)

Practical:

- Writing Press Release-5
- Preparing PR Case Study-2
- Writing PR feature-5
- Developing PR Campaign-2
- Preparing Press Kit (Organization's brief, press release)-1

References

- Paul, B. (1966). *Corporate Public Relations*. New York: Reinhold.
- Philips, L. (). *Lesley's Handbook of PR and Communication*. New York: American Management Association.
- Jetwani, Varma, and Sarkar (1994). *PR concept and strategies tools*.New Delhi: Sterling.
- Frazier, M. and Carfield (1977). *Public Relations Principles, Cases and problems*. Richard Irwin (Seventh Edition).
- Burton, P. (1966). *Corporate Public Relations*. New York: Reinhold.
- Reddi, N.(2015). *C.V. Public Relations Society of India - An introduction*.Hyderabad: PRSI.

Course Code	Course Title	Category	L	T	P	Total Credit	Hours	Theory	Practical	Internal	Total Mark
SHSS DJMC 010428 C 3105	Dissertation	C	3	1	1	5	6	50	20	30	100

Learning Outcomes:

- The students will learn the basics of research.
- They will learn about the different methods and techniques of research.
- They will also learn about how to identify research problems.
- From the practical component, they will learn how to generalise research results in society.

A dissertation shall be written by students under guidance from department faculty or guide after mutually discussing and agreeing upon. The dissertation may also cover topics of interdisciplinary nature.

References:

- Baran and Davis. *Introduction to Mass Communication Theory* 5th Edition (Wadsworth, 2005)
- Berlo, David. The Process of Communication (1960)

Course Code	Course Title	Category	L	T	P	Total Credit	Hours	Theory	Practical	Internal	Total Mark
SHSS DJMC 010429 C 3105	Internship (4-Weeks)	C	0	0	0	5	30	50	20	30	100

Learning Outcomes :

- The students will have practical exposure.
- They will learn about the different methods and techniques of working in the mass media.
- They will also learn about how to identify news and how to cover it.
- From the practical component, they will learn how to produce for different program genres and mass media.

At the end of the 3rd semester and after Term-end Exams, all students are required to undergo a 4-week internship with a media house/organization of their choice and/or in consultation with concerned teachers. They are also required to submit a Performance Assessment Report (PRA) in prescribed Proforma (Performa will be provided by the Department). Performance Assessment Report to be submitted by the organization in which a student has completed the internship.

The PRA shall contain details of the internship (work/duties/tasks performed, copies of work done, assignment details etc.) to be submitted within a month of commencement of the third semester or as per the deadline decided by the department/school.

Based upon this report Internal Examiner evaluate and power-point presentation, External Examiner shall conduct the viva-voce.

Course Code	Course Title	Category	L	T	P	Total Credit	Hours	Theory	Practical	Internal	Total Mark
SHSS DJMC 010430C 3105	Communication Skills*	SEEC	3	2	0	0	5	70	0	30	100

Learning Outcomes:

- To develop the skills for professional communication.
- To train the students for developing communication skills for different contexts in the profession.
- To learn different writing techniques for professional communication.
- To inculcate the skills required for expressing through Resume and Curriculum Vitae.
- To familiarize me with creativity and different communication activities.

Note: As it is non -credit course, there will be two lectures and two practicals every week. There will be four units in this course. The students shall be required to submit practical assignments before the term-end examination based on paper. The examination of the course shall be conducted as a theory and practical exam both.

Unit-1

- Communication as Process
- Motives for Communication
- Effective Communication And its benefits
- Barriers to effective communication

Unit-2

- Formal writing and literary writing
- Writing Styles
- Writing CV
- Formal Letters
- JAM (Just a minute talk)
- Minute Memo
- Letter Writing

Unit-3

- Spoken language: Accent and Vocabulary
- Greetings and Introduction
- Public Speaking, Group Discussion, Extempore
- Presentation skills

Unit 4

- Personality traits
- Dressing Code
- Communicating through body language: Gestures, Postures, kinesis,
- Mannerisms and Etiquettes
- Listening with empathy

Suggested Readings

- Sethi, J & etal. A Practice Course in English Pronunciation. New Delhi: Prentice-Hall of India.
- Pal, R. and Suri, P.L. (2011). English Grammar and Composition.New Delhi: Sultan Chand Publication& Sons.
- Leena, S. (2009).Communication Skills, New Delhi: Prentice-Hall of India.

Course Code	Course Title	Category	L	T	P	Total Credit	Hours	Theory	Practical	Internal	Total Mark
SHSS DJMC 010431 DCEC 2204	Gender and Media Sensitivity	DCEC	2	2	0	4	4	70	0	30	100

Learning Outcomes:

- To acquaint students with the basics of Women rights.
- To train the students for covering women related issues in the media.
- To learn different aspects of reporting for women empowerment.
- To inculcate the skills required for Women Journalism.
- To familiarize with famous personalities and reporting in the field.

Unit 1

- Status of Women and Mass Media
- Urban and Rural attitudes towards women prevailing in the society 1.3 Commodification of women
- Projection of women's image by the media
- Women Rights
- Women Reporting
- Prominent Women Media Journalist of India and abroad
- Prominent women personalities in the current times

Unit 2

- Gender and Media Sensitivity
- Transgender
- Theoretical perspectives on Women studies
- Classical
- Marxist
- Feminism, Emerging trends

Unit 3

- Role of Media in Women development & welfare.
- Women professionals in Media
- Women & Media : Opportunities & Challenges
- National Commission for Women-structure, role, Important Women organizations

Unit 4

- Media & Gender consciousness, Gender Sensitization.
- Media projection on Domestic Violence & Sexual Harassment 4.3 Image of Women in Advertisements
- Communalism riots, conflict situation & Women.

Suggested Reading

- Carter, C., Steiner, L., & Allan, S. (Eds.). (2019). *Journalism, gender and power*.

Routledge.
- De Bruin, M., & Ross, K. (Eds.). (2004). Gender and newsroom cultures: Identities at work. Hampton Press (NJ).
- Segal, M. T., & Demos, V. (Eds.). (2018). *Gender and the Media: Women's Places*. Emerald Group Publishing.
- O'Brien, A. (2019). *Women, Inequality and Media Work*. Routledge.
- Andrews, M., & McNamara, S. (Eds.). (2014). *Women and the Media: Feminism and Femininity in Britain, 1900 to the Present*. Routledge.

Course Code	Course Title	Category	L	T	P	Total Credit	Hours	Theory	Practical	Internal	Total Mark
SHSS DJMC 010432 DCEC 2204	Art, Culture and Entertainment Reporting	DCEC	2	2	0	4	4	70	0	30	100

Learning Outcomes:

- To acquaint students with the basics of Art, Culture and Entertainment Reporting
- To train the students for covering different aspects of life in different cultures.
- To learn different aspects of Society.
- To inculcate the skills required Cultural Reporting.
- To familiarize with the main aspects of different cultures of the society.

Unit-I

- Reporting on Art, Culture and Literature
- Indian Literature, Foreign Literature, Drama, Music, Mushaira, Indian and International Culture, Movies reporting Review, Criticism

Unit-II

- Reporting on Fashion & Lifestyle
- Fashion shows of different brands

Unit-III

- Film and Entertainment Reporting
- Review, Criticism, Brand promotion

Unit-IV

- Reporting on Community, Celebrations, Local Festivals and Religious Celebrations
- Regional, National, and International Festivals Covering special audience festivals and functions, reporting for Press and broadcast media, Digital Media, Festivals and markets, Festivals and branding, Current Festival scenario

Suggested Readings

- Kristensen, N. N. (2019). Arts, Culture, and Entertainment Coverage. *The International Encyclopedia of Journalism Studies*, 1-9.
- Reporting, C. All media guide to fair and cross cultural reporting
- Bolívar, M. P. R., Pérez, C. C., & Hernández, A. M. L. (2006). Cultural contexts and governmental digital reporting. *International Review of Administrative Sciences*, *72*(2), 269-290.

Course Code	Course Title	Category	L	T	P	Total Credit	Hours	Theory	Practical	Internal	Total Mark
SHSS DJMC 010433 DCEC 2114	Graphic and Design	DCEC	2	1	1	4	4	50	20	30	100

Learning Outcome:

- To acquaint students with the different tools and techniques of Graphics Designing
- To train the students as per the industry requirements.
- To learn different professional techniques for the graphic design field
- To inculcate the skills required for expressing products or ideas through Graphics Designing.
- To familiarize with the creativity and different aspects of Design for different media and purposes.

Unit-1

- Introduction to Graphics
- Meaning and Definition
- Concept of graphics design, importance and its applications
- Principles of design

Unit-2

- Visual illusions
- Balance in design
- Elements of Art: Line, Shape, Space, Color, Tone, Texture,

  Pattern Introduction to Layout and its types

Unit-3

- Types and tools of Graphics
- Designing Logo
- Importance and purpose of a logo
- Poster design

Unit-4

- Basic graphics creation InDesign
- Editing in InDesign
- Basic graphics creation in Photoshop
- Editing in Photoshop

Practical

- Designing logo-5
- Creating Newspaper layouts-5
- Designing Poster-5
- Creating Advertising layouts-5
- Basic photo edits-5

References

- Sarkar, N.N. (2008). Art and Production. USA: Oxford University Press.
- Lidwell, W. (2003). *Universal Principal of Designing*. Singapore: Rockport Publishers.
- Bringhurst, R. (1996). *The Elements of typographic style*. Canada:Hartley& Marks Inc., U.S.; 2nd edition.

Generic Elective Courses offered to other Departments

Semester- I

Course Code	Course Title	Category	L	T	P	Total Credit	Hours	Theory	Practical	Internal	Total Mark
SHSS DJMC 010106 GEC 3104	Media Literacy	GEC	3	1	0	4	4	70	0	30	100

Learning Outcomes

- Students would be familiar with every facet of media literacy.
- Students would be trained in reading the media messages.
- Students will learn to create the message. Understand the media messages and their creators, and recognise bias, spin, misinformation, false information.
- Know the various kinds of literacies relevant in the present age and the need for information and media literacy in particular.
- To know various channels of information and media and know various types of information sources and evaluate information and media sources.

UNIT I Introduction to Media Literacy

- Definition of Media Literacy
- Media Literacy: Nature, Scope and Importance
- Definition of key concepts (media, information, technology literacy, digital literacy and media information literacy)
- Meaning and development of traditional and new media, types and characteristics of tradition and new media, Fusion between traditional and new media

UNIT II Media Messages & Critical thinking

- Skills in Media Literacy, Interpreting media messages: Semiotics, Ideology
- Media as Text, Commercial messages
- Basic principles such as freedom of expression and information; reflections on learning, metacognition;
- Critical thinking pluralism of ideas/respect of others' opinions, tolerance, respect of authorship, social responsibility, Wise use of information

UNIT III Media Messages Reception & Sources of information

- Process of Message Generation and Communication
- Media Vehicles for messages and their types, Media stereotypes
- Nature of media messages; Media Exposure and Filters
- Sources of information; mass media, libraries, archives, internet, etc.
- Select appropriate sources; evaluating sources; sharing and publishing avenues

UNIT IV Media Ecosystem in Globalization and Legal, Ethical, and Societal Issues

- Media Ecosystem, Media Empires and Ownership patterns;
- Media markets, Propaganda and Hegemony
- Copyright, plagiarism, computer addiction and cyberbullying
- Fake news, information overload, an obsession with information, media and social issues

Readings:

Dill, K. How Fantasy Becomes Reality: Seeing Through Media Influence, 1st ed. (OUP, 2009)

Hodkinson, P. Media, Culture and Society: An Introduction (Sage, 2010)

John.V. The Media of Mass Communication (PHI, 2012)

Mackey, M. Literacies Across Media: Playing the Text (Taylor and Francis, 2004)

Pike, D.M. Media Literacy: Seeking Honesty, Independence, and Productivity in Today's Mass Messages (IDEA, 2013)

Potter, W.J. Theory of Media Literacy: A cognitive approach (Sage, 2004)

W.J. Potter, Media Literacy, 7th ed. (Sage,2013)

Course Code	Course Title	Category	L	T	P	Total Credit	Hours	Theory	Practical	Internal	Total Mark
SHSS DJMC 010107 GEC 3104	Marketing and Promotion	GEC	3	1	0	4	4	70	0	30	100

Learning Outcomes

- Students would be familiar with marketing and promotion skills.
- Students would be trained in branding and ethics.
- Students will learn marketing strategies.
- Students would be trained for designing part of marketing and weakness.

UNIT-1

- The Concept & Philosophy of Marketing
- Consumer Behavior models
- Marketing mix- Product, Price, Place & Promotion, Media mix
- Indian Marketing Scenario

UNIT-2

- Branding - introduction
- Situation analysis, market research
- C SR, Social marketing and Cause-related marketing
- Ethics and social responsibility of campaigns

UNIT-3

- Corporate marketing strategies: ambush, viral, buzz and guerrilla marketing
- Marketing Strategy - SWOT analysis, Strategic planning process and
- Consumer Behavior
- Personal selling, advertising, public relations, sales promotion
- Database marketing, Online and mobile marketing

UNIT-4

- Mass Communication and personal communication in marketing
- Media and Marketing strategy
- Designing marketing communication
- Major marketing weaknesses

References

- Kotler, Philip, and Armstrong, Gary, Principles of Marketing, Prentice-Hall of India, New Delhi.
- Etzel, Michael, Walker, Bruce J., and Stanton, W. J., Marketing, McGraw Hill, New York.
- Sharma, K., & Swati Aggarwal. (2018). Principles of Marketing. Taxmann's.
- Saxena, Rajan, Marketing Management, Tata McGraw Hill, Publishing Co., New Delhi.

Course Code	Course Title	Category	L	T	P	Total Credit	Hours	Theory	Practical	Internal	Total Mark
IAS LIS 01 03 GEC 3104	Media and Information Literacy*	GEC	3	1	0	4	4	70	0	30	100

Learning Outcomes

On studying this course, students shall be able to:

1. Know the various kinds of literacies relevant in the present age and the need for information and media literacy in particular.

2. Understand the media messages and their creators, and recognise bias, spin, misinformation, false information.

3. To know various channels of information and media and know various types of information sources and evaluate information and media sources.

4. Understand the legal rights to information and media structures of media ownership, legal, ethical, and societal issues in Media and Information

Unit-1: Introduction

- Definition of Media, Information, Technology,
- Digital Literacy; Media and Information literacy:
- Meaning and Development of Traditional and New Media;
- Types and Characteristics of Tradition and New Media, Fusion between Traditional and New media

Unit-2: Information Sources/ Resources

- Sources of Information;
- Mass Media, Libraries, Archives, Internet, etc.;
- Role of various Information Source/Providers;
- Locating the Sources; Retrieve sources from a Variety of Information Systems;
- Evaluate / Analyse / Relate/Interpret Sources, Messages and Information; select Appropriate Sources; Evaluating Sources; Sharing and Publishing Avenues

Unit-3:Media and Information Literacy

- Knowledge of available Communication and Information Resources, Media Communication, Information Chain;
- Basic Principles such as Freedom of Expression and Information;
- Reflections on Learning, Metacognition;
- Enquiring and Engaging in Research Skills and Processes, Critical Thinking, Pluralism of Ideas/Respect of others' Opinions, Tolerance, Respect of Authorship, Social Responsibility, Wise use of Information

Unit-4: Legal, Ethical, and Societal Issues in Media and Information

- Copyright, plagiarism, computer addiction,

- cyberbullying, dangers of internet use, 'Fake news,
- information overload,
- obsession of information, media and social issues

Recommended Readings:

1. Agosto, D. E. (Ed.). (2018). Information literacy and libraries in the age of fake news. ABC-CLIO.

2. Christian, S. E. (2019). Everyday media literacy: an analogue guide for your digital life. Routledge.

3. Frau-Meigs, D., Velez, I., & Michel, J. F. (Eds.). (2017). Public policies in media and information literacy in Europe: Cross-country comparisons. Taylor & Francis.

4. Hobbs, R. (2021). Media literacy in action: Questioning the media. Rowman & Littlefield Publishers.

5. Kellner, D., & Share, J. (2019). The critical media literacy guide: Engaging media and transforming education. Brill.

6. Leaning, M. (2017). Media and information literacy: An integrated approach for the 21st century. Chandos Publishing.

7. Lloyd, A. (2021). The Qualitative Landscape of Information Literacy Research: Perspectives, Methods and Techniques, Facet Publishing

8. Oberg, D., &Ingvaldsen, S. (Eds.). (2016). Media and information literacy in higher education: Educating the educators. Chandos Publishing.

9. American Association of School Librarians and Associations for Educational Communications and Technology. (1998).Information Standards for Student Learning. Chicago: American Library Association.

10. Armstrong, S. (2008). Information Literacy: Navigating & evaluating today's Media. California: Shell Education.

11. Blanchett, H., Powis, C. & Webb, J. (2012). A Guide to Teaching Information Literacy: 101 Practical Tips. London: Facet Publishing.

12. Ercegovac, Z. (2008). Information literacy: Search strategies, tools & resources for high school students and college freshmen (2nd ed.). Ohio: Linworth.

13. Herring, J. (2011). Improving Students' web use and information literacy: A guide for teachers and teacher librarians. London: Facet Publishing.

14. Koltay, T., Špiranec, S. &Karvalics, L. Z. (2016). Research 2.0 and the Future of Information Literacy. London: Chandos Publishing.

15. Neely, T. Y. (2006). Information Literacy Assessment: Standards-Based Tools and Assignments. Chicago: American Library Association.

16. Radcliff, C. J., et. al. (2007). A Practical Guide to Information Literacy Assessment for Academic Librarians. Westport: Libraries Unlimited.

17. Sales, D. & Pinto, M. (Eds.) (2017) Pathways into Information Literacy and Communities of Practice: Teaching Approaches and Case Studies. London: Chandos Publishing.

Semester-II

Course Code	Course Title	Category	L	T	P	Total Credit	Hours	Theory	Practical	Internal	Total Mark
SHSS DJMC 010215 C 3104	Media and Society	GEC	3	1	0	4	4	70	0	30	100

Learning Outcomes

The expected learning outcomes of this paper are as follows:

- To make students aware of contemporary media development and challenges in India.
- To help students develop the capability to assess, criticize and appreciate the role of media in fulfilling the aspirations of people.

UNIT I Perspectives on Media & Society

Merton (Functions –Dysfunctions); Gramsci (Hegemony); Adorno (Culture Industry); Baudrillard (Hyperreality); Fiske (Understanding Pop Culture); Dube (Cultural Development)

UNIT influence of Media on Society

Media structure, Media and Culture, production of Mass Society, Media and Morality, Media and Religious order, Women's representation in media; Media and lifestyle

UNIT III Indian Social Changes & Media

Modernization, Westernization, Sanskritisation; Globalising Culture and Resistance, Indian Social Structure and Digital Divide

UNIT IV Media Effects on Groups & Sub Cultures

Social Deviance & Crimes, Generation of SubCultures,

TV effects on Children and Youth, Social Media Uses,

Cognitive Dissonance, Media and Nationalism

Readings

Adorno, T, Culture Industry (Routledge, 2001

Baudrillard, J. Simulations (Semiotext(e), Inc., 1983)

Dube, S.C. Indian Society (National Book Trust, 2005)

Fiske, J. Television Culture (Methuen, London, 1987) --Understanding Popular Culture (Routledge,1989)

Gramsci, A. Selections from Prison Notebooks (International Publishers, 1971) Krik, J. Television and Social Change in Rural India (Sage, 2000)

McQuail, D. Sociology of Mass Communication, ed. (Penguin,1972)

Merton, R.K. Social Theory and Social Structure (McMillan Co. New York,1968) Natalie, F. Mass Media in Sociology: Issues and Debates (ed.) (Palgrave Macmillan, 2000) Ritger, G. Sociological Theory (Rawat, 2011)

Sriniwas, M.N. Caste in Modern India & other Essays(Media promoters and Publishers Ltd. 1962) Tester, K. Media, Culture and Morality (Routledge, 1994)

Semester III

Course Code	Course Title	Category	L	T	P	Total Credit	Hours	Theory	Practical	Internal	Total Mark
SHSS DJMC 010324 GEC 3104	Film Appreciation	GEC	3	1	0	4	4	70	0	30	100

Learning Outcomes

- Students would develop a basic understanding of films, their genres and their interpretation.
- Students would be trained in the basics of shooting and editing films.
- Students would learn different aspects of Film: Shooting, editing, writing, censorship, broadcasting etc.
- Students would inculcate the skills required for understanding and producing films.
- Students would be familiarised with the history of films, current trends, different approaches to understanding films etc.

Unit – I

- Film as a medium of expression; Film Genres
- Approaching Films: Semiotics, Psychoanalysis, Linguistics
- Film forms: Narrative and Non-Narrative

Unit – II

- Film Aesthetics
- Regional and National Cinema in India, Bollywood, World Cinema
- Film movements; The rise of Multiplex Cinema

Unit – III

- Basic Camera Shots and movements
- Film editing Principles: Mise-en-scene and montage
- Diegetic and Non-diegetic elements in a film

Unit – IV

- Major Film festivals and awards: Indian and Global
- Writing film reviews
- Film certification categories

Suggested Readings

- Khwaja Ahemad Abbas, *How films are made* (National Book Trust, 1977).
- MaricSetton; *Film as an art and appreciation*, (NCERT, New Delhi).
- *Cinematography Censorship rules*, (Govt. of India Press, Nasik, 1969).

- Eric Baranenn &Krishnaswamy; *Indian Film (*OVP, 2nd Edition, 1980).
- Monaco, J. (1981). *How to read a film: The art, technology, language, history, and theory of film and media*. New York: Oxford University Press.

Course Code	Course Title	Category	L	T	P	Total Credit	Hours	Theory	Practical	Internal	Total Mark
SHSS DJMC 010325 GEC 3104	Event Management	GEC	3	1	0	4	4	70	0	30	100

Learning Outcomes

- Students would be acquainted with the basics of Events- organising, technicalities, and execution.
- Students would be trained for organising various level events.
- Students would learn different aspects of the event and its management.
- Students would inculcate the skills required for Crisis management.
- Students would be familiarized with Media management for any event.

Unit – I

- Concept of Event; Types of Events
- Need for Professional Event Management
- Scope of Event Management
- The event industry in India

Unit – II

- Event Management: Planning and Steps
- Preparing Event Proposal, pitching for the event
- Permissions and licenses for various events
- Event Operations; Event technology and Logistics

Unit – III

- Marketing Mix, Preparing event proposal, pitching for event sponsorships,
- Branding through events
- Media Relations, Briefing Journalists

Unit – IV

- Various risk and risk assessments in events
- Crowd Management
- Preparing Contingency Plan
- Communication in Event Crisis

Suggested Readings

1. Goldblatt, J. &Supovitz, F.; Dollars & Cents. How to Succeed in the Special Events Business. (John Wiley & Sons: New York, 1999).

2. Goldblatt, J. & Nelson, K.; The International Dictionary of Event Management. (Second Edition. John Wiley & Sons, Inc.: New York, 2001).
3. Hoyle, L. Event Marketing, (John Wiley & Sons, Inc.: New York, 2002).
4. Malouf, L. Behind the Scenes at Special Events. (John Wiley & Sons: New York, 1999).
5. Amsborg, G. and et al.; Professional Convention Management Association. Professional Meeting Management – Comprehensive Strategies for Meetings, Conventions and Events. (5th Edition. Dubuque Iowa, 2008)
6. Rutherford-Silvers, J. (2012). Professional Event Coordination. John Wiley & Sons Inc.: New York, NY

Semester-IV

Course Code	Course Title	Category	L	T	P	Total Credit	Hours	Theory	Practical	Internal	Total Mark
SHSS DJMC 010434 GEC 3104	Social Marketing	GEC	3	1	0	4	4	70	0	30	100

Learning Outcomes

The learning outcomes of this paper are:

- The students will learn about "Social marketing" and Design social products.
- They will learn about the techniques of Social marketing.
- They will also learn about the scope of Social marketing in different areas.
- They would also learn to develop social marketing campaigns and programs.

Unit I

- Principles of Social Marketing
- Introduction to Social marketing
- Designing social products
- Distributing social packages
- Pricing consideration in Social marketing and managing the cost of adoption
- CSR, Social Marketing model

Unit II

- Major social issues in India:

Family Welfare, Immunization, Health and Sanitation, Prohibition and De-addiction, AIDS, Literacy, environment and pollution, Human Rights, Children's issues, communal harmony, gender bias, Social Harmony

Unit III

- Strategies of Social marketing
- Role of Social marketing in changing public behaviour
- Social marketing environment
- Identifying the target market
- Types of social marketing
- Need and Importance of Social Marketing

Unit IV

- Organizing and implementing a social programme
- Monitoring and evaluating social marketing programmes
- Popular social marketing examples in India

Suggested Readings

- Zarrella, D. (2009). *The social media marketing book*. " O'Reilly Media, Inc.".

- Tuten, T. L. (2020). *Social media marketing*. Sage.
- Evans, D. (2010). *Social media marketing: the next generation of business engagement*. John Wiley & Sons.
- Saravanakumar, M., & SuganthaLakshmi, T. (2012). Social media marketing. *Life science journal*, *9*(4), 4444-4451.
- Evans, D., Bratton, S., & McKee, J. (2021). *Social media marketing*. AG Printing & Publishing.
- Constantinides, E. (2014). Foundations of social media marketing. *Procedia-Social and behavioural sciences*, *148*, 40-57.
- Barker, M., Barker, D. I., Bormann, N. F., & Neher, K. E. (2012). *Social media marketing: A strategic approach*. CENGAGE Learning.

Central University of Haryana

Department of Political Science

Board of Studies Meeting

Date 20.08.2021

Minutes

A meeting of the Board of Studies of the Department of Political Science was held on 20.08.2021 at 11.00 am through Google meet. Following members are present at the meeting:

1. Prof R.S.Dalal, Head of the Department, Chairman
2. Prof Ashutosh Kumar, External Expert
3. Prof Ashok Acharya, External Expert
4. Dr. Rajeev Kumar Singh, Member

Agenda 1

Consideration of the revised syllabus of the post-Graduate programme of Department of Political Science, the Central University of Haryana (Attached as Annex-1)

Resolution: Approved (annex-1)

Agenda-2

Consideration and approval of the Departmental Research Committee meetings for the following dates:

Date	Attachment
29.07.2021	Annex-2
04.08.2021	Annex-3

Resolution: Approved

Head 20/8/21

Department of Political Science

Head
Department of Political Science
Central University of Haryana
Jant-Pali (Mahendergarh) Hr.

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Fwd: BOS Agenda for it online meeting to be held on 20-8-3021 at 11-00 a.m. onward.

Inbox

Political Science 11:17 AM (56 minutes ago)

to me

---------- Forwarded message ---------
From: **Political Science** <hodpolscience@cuh.ac.in>
Date: Tue, 17 Aug, 2021, 12:54 pm
Subject: Fwd: BOS Agenda for it online meeting to be held on 20-8-3021 at 11-00 a.m. onward.
To: [redacted], Ashok Acharya <aacharya.du@gmail.com>, Chanchal Kumar Sharma <chanchalsharma1@gmail.com>, Dr. Rajeev Kumar Singh <rajeevsingh@cuh.ac.in>, Registrar CUH <registrar@cuh.ac.in>, Finance Section <financesection@cuh.ac.in>, <rands@cuh.ac.in>
Cc: Dean Academic <deanacademic@cuh.ac.in>

Sir, Please find attached the agenda for aforementioned meeting of BOS for your kind consideration and approval. The link for the online meeting will be circulated soon.
With regards.
Dr Rajbir Singh Dalal

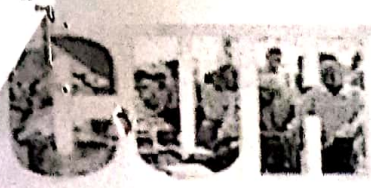
---------- Forwarded message ---------
From: **Dr. Rajeev Kumar Singh** <rajeevsingh@cuh.ac.in>
Date: Tue, 17 Aug, 2021, 11:02
Subject: BOS Agenda
To: Political Science <hodpolscience@cuh.ac.in>

Please find attached agenda items for the proposed BoS.
Agenda 1
Revised syllabus
Agenda 2
DRC minutes dated 29.07.2021 and 04.08.2021.

regards

Dr Rajeev Kumar Singh
Assistant Professor
Department of Political Science
Central University Of Haryana

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Dr. Rajeev Kumar Singh <rajeevsingh@cuh.ac.in>

BOS minutes and annexures of 20-8-2021 for approval.

5 messages

Political Science <hodpolscience@cuh.ac.in> Fri, Sep 3, 2021 at 12:41 PM
To: Ashok Acharya <aacharya.du@gmail.com>, Ashutosh Kumar <ashutoshchd@gmail.com>, "Dr. Rajeev Kumar Singh" <rajeevsingh@cuh.ac.in>

Respected members, Please find attached the BOS minutes alongwith annexures for your perusal and approval.
With regards.
Dr Rajbir Singh Dalal, Head Dept of Pol Science Central University of Haryana, Mahendergarh.

---------- Forwarded message ---------
From: **Dr. Rajeev Kumar Singh** <rajeevsingh@cuh.ac.in>
Date: Fri, 3 Sep, 2021, 12:35
Subject: BOS minutes and annexture
To: Political Science <hodpolscience@cuh.ac.in>

Central University of Haryana

Department of Political Science

Board of Studies Meeting

Date 20.08.2021

Minutes

A meeting of the Board of Studies of the Department of Political Science was held on 20.08.2021 at 11.00 am through Google meet. Following members are present at the meeting:

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1. Prof R.S.Dalal, Head of the Department, Chairman
2. Prof Ashutosh Kumar, External Expert
3. Prof Ashok Acharya, External Expert
4. Dr. Rajeev Kumar Singh, Member

Agenda 1

Consideration of the revised syllabus of the Post-Graduate programme of Department of Political Science, the Central University of Haryana (Attached as Annex-1)

Resolution: Approved (annex-1)

Agenda-2

Consideration and approval of the Departmental Research Committee meetings for the following dates:

Date	Attachment
29.07.2021	Annex-2
04.08.2021	Annex-3

Resolution: Approved (Annex 2 & 3)

Head

Department of Political Science
Dr Rajeev Kumar Singh
Assistant Professor
Department of Political Science
Central University Of Haryana
Mahendergarh, Haryana

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4 attachments

- **annex1.pdf** 1743K
- **annex 2 (1).pdf** 268K
- **annex 3.pdf** 1693K
- **bos minutes.docx** 17K

Ashutosh Kumar <ashutoshchd@gmail.com> Sun, Sep 5, 2021 at 11:07 AM
To: Political Science <hodpolscience@cuh.ac.in>
Cc: Ashok Acharya <aacharya.du@gmail.com>, "Dr. Rajeev Kumar Singh" <rajeevsingh@cuh.ac.in>

sending my inputs shortly
[Quoted text hidden]

--
Ashutosh Kumar
Lala Lajpat Rai Chair Professor
Chairperson
Department of Political Science
Arts Block-4, Panjab University
Chandigarh, India 160014
9815084030 (Mobile)

Residence-T-1/12 , Panjab University New Campus
Sector 25, Chandigarh 160014
Phones: 91-172-2548016[R],
91-172-2534765[O]
9815084030(M)

Political Science <hodpolscience@cuh.ac.in> Sun, Sep 5, 2021 at 6:52 PM
To: "Dr. Rajeev Kumar Singh" <rajeevsingh@cuh.ac.in>

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---------- Forwarded message ---------
From: **Ashutosh Kumar** <ashutoshchd@gmail.com>
Date: Sun, 5 Sep, 2021, 12:04
Subject: Re: BOS minutes and annexures of 20-8-2021 for approval.
To: Political Science <hodpolscience@cuh.ac.in>, Ashok Acharya <aacharya.du@gmail.com>, Ashutosh Kumar <ashutoshchd@gmail.com>

Dear Professor Dalal, Dr Rajeev Singh and Colleagues

Greetings from Chandigarh

Please add these readings mentioned below and you may delete some not so good/old publications .

I hereby give my conditional consent and approval to the proposed items thoroughly discussed in the two online meetings we held on the matter. This approval is subject to addition of these readings as far as the syllabus is concerned.

On rest of the items you have my unqualified approval.

This may be kindly considered be a formal letter.

regards,

ashutosh kumar

The following readings are to be included. would enrich the list and would be helpful. a few corrections also

- Paper III. Comparative Politics; no uniformity in mentioning the year of publication in the reading list
- Paper IV: Chanchal ji publication: Journal name to be italicized not the article title

Paper IV: consider adding (and please delete few also)

1. 1. *Politics in India: Structure, Process and Policy* , 2017 by Subrata K. Mitra , Routledge, London and New Delhi

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2. *State & Politics in India (Themes in Politics)*, 1998, Partha Chatterjee , New Delhi, Oxford University Press
3. *The Oxford Companion to Politics in India*, edited by Niraja Gopal Jayal and Pratap Bhanu Mehta, 2011, New Delhi, Oxford University Press
4. Niraja Gopal Jayal, ed, *Democracy in India*, New Delhi, Oxford University Press, 2007

- Paper VII pl add

Andrew Heywood, ***Politics***, Macmillan press, london, 2019

Paper VIII Political theory paper
[pl add

Political Theory : An Introduction , 2015, edited by

by Ashok Acharya Rajeev Bhargava , New Delhi, Pearson.

Paper XI contemporary issues in indian politics

pl add

Rethinking State Politics in India: Regions within Regions, Ashutosh kumar, ed, Routledge, London, India, 2017.

paper XIV constitution of india

1. Udit Bhatia, ed, *The Indian Constituent Assembly: Deliberations on Democracy*, Routledge, London, 2018

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2. • Rajeev Bhargava (ed.) *Politics and Ethics of the Indian Constitution*, New Delhi: Oxford University Press, 2008

3. Zoya Hasan, E. Sridharan, & R. Sudarshan

(Eds.), *India's living constitution ideas, practices, controversies* . New Delhi, Permanent Black, 2002

4. Madhav Khosla, *Indian Constitution*, New Dlhi, Oxford University Press, 2012

5. Khosla, Madhav (2020). *India's founding moment: The constitution of a most surprising democracy*. Harvard, Harvard University Press.

6. Krishnaswamy, S. (2010). *Democracy and constitutionalism in India: A study of the basic structure doctrine*.

Oxford University Press.

• Chowdhary, Sujit, Madhav Khosla, Pratap Bhanu Mehta (2017) (eds) *The Oxford Handbook of the Indian Constitution*, New Delhi: Oxford University Press
Paper XIII
Harihar Bhattacharyya and Lion Koing, Globalisation and Governance in India, Routledge, London , 2016

On Fri, 3 Sept 2021 at 12:42, Political Science <hodpolscience@cuh.ac.in> wrote:
[Quoted text hidden]

[Quoted text hidden]

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Ashutosh Kumar <ashutoshchd@gmail.com> Sun, Sep 5, 2021 at 7:00 PM
To: "Dr. Rajeev Kumar Singh" <rajeevsingh@cuh.ac.in>

[Quoted text hidden]
[Quoted text hidden]
[Quoted text hidden]

[Quoted text hidden]
[Quoted text hidden]

Dr. Rajeev Kumar Singh <rajeevsingh@cuh.ac.in> Mon, Sep 6, 2021 at 3:37 PM
Draft

Dr Rajeev Kumar Singh
Assistant Professor
Department of Political Science
Central University Of Haryana
Mahendergarh, Haryana

[Quoted text hidden]

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CENTRAL UNIVERSIY OF HARYANA

School of Humanities and Social Sciences

Minutes of the Online/Offline Meeting of the School Board

(Sept. 9, 2021)

An online/offline meeting of the School Board of the School of Humanities and Social Sciences was held at 11:00 AM on Sept. 9, 2021. Following members/special invitees joined the meeting online/offline:

1. Prof. C.R. Darolia	: External Member
2. Prof. Vikram Kaushik	: External Member
3. Prof. Rajbir Dalal	: Member
4. Dr. Vishwanand Yadav	: Member
5. Dr. Payal Kanwar Chandel	: Member
6. Dr. Rinu	: Member
7. Dr. Arvind Singh Tejawat	: Member
8. Dr. Narender Singh	: Member
9. Dr. Rajeev Kumar Singh	: Member
10. Dr. Pradeep Kumar	: Member
11. Dr. Surender	: Member
12. Prof. Ranvir Singh	: Special Invitee
13. Dr. Amit Kumar	: Special Invitee
14. Dr. Tanvi Bhati	: Special Invitee
15. Mr Alekha Sachidananda Nayak	: Special Invitee
16. Dr. Abhiranjan Kumar	: Member
17. Dr. Sanjiv Kumar	: Chairperson

At the outset, the Chairperson welcomed all the members and special invitees, and briefed about the agenda points. After thorough deliberations, the School Board of the School of Humanities and Social Sciences considered and approved as under:

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- Minutes of the Board of Studies of various departments and revised curriculum of the academic programmes of the following departments **(as attached):**

i. Department of English and Foreign Languages
ii. Department of Hindi
iii. Department of History and Archaeology
iv. Department of Journalism and Mass Communication
v. Department of Political Science
vi. Department of Psychology
vii. Department of Sanskrit
viii. Department of Sociology

The copy of the approved minutes and the revised curriculum is attached herewith.

- The School Board also recommended that the respective department may make grammatical/structural corrections, wherever required, before submission to the Academic Council.

The meeting ended with the vote of thanks by the Chairperson.

10/9/2021

(SANJIV KUMAR)
Dean, School of Humanities and Social Sciences

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Department of Political Science

Central University of Haryana

Consolidated Syllabus

Two-year M.A. (Political Science)

[2021-22]

Course Structure

Outlines (As per University Ordinance):

- The two-years programme will be divided in to four semesters of six months of each.
- The whole program is of **minimum 97 credits**
- There will be three types of course:
    1. Core Course (C) (Exclusive for students of Political Science)
    2. Generic Elective Course (GEC) (offered to other departments)
    3. Discipline Centric Elective Courses (DEC) (offered to the Political Science students)
- Skill Enhancement Elective Course (SEEC) will be offered in Semester 'four' as a compulsory, qualifying non-credit course (Exclusively for Political Science students)
- For the two-years program minimum of 18 credits from the elective courses (of which at least 6 credits shall be from elective courses offered by other departments).
- A student shall register for a minimum of 20 credits and can register for a maximum of 30 credits in a semester.
- The sessional evaluation shall be done on a continuous basis, taking into account the student's class performance, fulfilment of home assignments at the compulsory Sessional tests.
- Sessional Test 1 shall be held during the sixth week of the semester for the syllabi covered till then.
- Sessional Test 2 shall be held during the twelfth week for the syllabi covered between the seventh and twelfth week.
- 1 credit = 1 hour of instruction per week

Course Structure

Semester- I

Sl. No.	Paper code	Paper Name	Credit	Core/Elective
1	SSH POS01(101) C5005	Political Theory-I	5	Core
2	SSH POS01(102) C5005	Western Political Thought-I	5	Core
3	SSH POS01(103) C5005	Comparative Political Analysis	5	Core
4	SSH POS01(104) C5005	Indian Political System	5	Core
		To be taken from another Department		Generic Elective

(GEC) Offered to other Departments:

5	SSH POS01(105) GEC4004	Indian National Movement	4	Generic Elective
6	SSH POS01 (106) **GEC**4004	Principles of Political Science	4	Generic Elective

Total credit: 24

Semester -II

Sl. No.	Paper code	Paper Name	Credit	Core/Elective
7	SSH POS01(107) C5005	Political Theory-II	5	Core
8	SSH POS01(108) C5005	Western Political Thought-II	5	Core
9	SSH POS01(109) C5005	Comparative Political Institutions	5	Core
10	SSH POS01(110) C5005	International Relations	5	Core
11	SSH POS01(111) DEC4004	(Choose any one) (i) Contemporary Issues in Indian Politics, (ii) International Organizations (iii) Governance: Issues and Challenges	4	Departmental Elective Courses

Offered to other Departments:

12	SSH POS01(112) GEC4004	Introduction to Indian Constitution	04	Generic Elective
13	SSH POS01(113) GEC4004	Basics of International Politics	04	Generic Elective

Total Credit: 24

Semester –III

Sl. No.	Paper code	Paper Name	Credit	Core/Elective
14	SSH POS01(114) C5005	Research Methodology	5	Core
15	SSH POS01(115) C5005	Foreign Policy of India	5	Core
16	SSH POS01(116) C5005	Indian Political Thinkers	5	Core
17	SSH POS01(117) C5005	Contemporary Socio-Economic Issues in India	5	Core
18	SSH POS01(118) DEC4004	(Choose any one) (i) Federalism in India (ii) Local Self-Government in India (iii) Introduction to Public Administration	4	Departmental Elective Courses
		To be taken from another Department		Elective

Offered to other Departments:

19	SSH POS01(119) GEC4004	Politics in India	4	Generic Elective

20	SSH POS01(120) GEC4004	Introduction to National Security	4	Generic Elective
21	SSH POS 01 (121) GEC 4004	Exclusion and Inclusive Policy in India	4	Generic Elective

Total Credit: 28

Semester- IV

Sl. No.	Paper code	Paper Name	Credit	Core/ Elective
22	SSH POS01(122) C8008	Dissertation	08	Core
23	SSH POS01(123) C4004	Field Study	4	Core
23	SSH POS01 (124) C5005	Contemporary Indian Political Thinkers	5	Core
25	SSH POS01 (125) DEC4004	(Choose any one) (I) Contemporary Issues in World Politics (ii) Comparative Federalism (iii) Political Ideologies	4	Departmental Elective Courses
Offered to other Departments:				
26	SSH POS01 (126) GEC4004	Modern Indian Political Philosophy	4	Generic Elective
27	SSH P0S01(127) GEC4004	Introduction to Peace and Conflict Resolution	4	Generic Elective

Total Credit: 21

Credit scheme

1.	**Total credit for Core Courses**	**77**
2.	**Credit for General Elective**	**8 and above**
3.	**Credit for departmental elective**	**12**
4.	**Minimum credit required for the programme**	**97**

PAPER CODE: SCHOOL (SSH)-SUBJECT (POS)-COURSE CODE (01 for post-graduation)-NATURE OF PAPER (C-CORE, DEC-DEPARTMENTAL ELECTIVE, GEC-GENERIC ELECTIVE), -LECTURE-TUTORIAL-PRATICAL-CREDIT

Programme Specific Outcomes

On completing M. A. in Political Science Programme, the students shall be able to:

PSO 1: Demonstrate a critical understanding of political events and phenomena both national and international in their varied forms.

PSO 2: Discuss various political genres, concepts, and movements with clarity.

PSO 3: Develop analytical skills regarding politics, power, and other political phenomena.

PSO 4: Develop proficiency in political concepts, coherent thought, and presentation skills.

PSO 5: Compare political and administrative systems developed and working in different contexts.

PSO 6: Locate and analyse the political phenomena thoughts and events with the appropriate theoretical framework.

PSO 7: Appreciate regional and world politics in the light of different political cultures and traditions.

PSO 8: Demonstrate the ability to interpret and analyse the realities of political life from theoretical and empirical literary perspectives.

Semester I

Paper -I -Code: SSH POS01 (101) C5005

Political Theory -I

Course Objective:

This course is designed to disseminate knowledge about political theory, state, sovereignty, and other basic concepts and models of political science. By the end of this course, students would be able to understand and analyze the theoretical framework of political theory and have the practical knowledge regarding the different concepts and models of political science.

Course learning outcomes:

CLO1: To have an insight regarding political theory and its different approaches.

CLO2: To be able to know about the state and different theories regarding its origin and nature.

CLO3: To be able to understand the sovereignty, government and their constituents and forms.

CLO4: To have an insight regarding the power its different forms and attributes as well as its relations with authority and legitimacy.

CLO5: To have the knowledge of rights, their attributes and different forms with special reference to UDHR.

CLO6: To have the knowledge of liberty, equality, justice and their different theories regarding these as well as their relations with one another.

CLO7: To be able to understand political science in more specific, objectives and precise manner.

Unit I

Political Theory: Approaches

Unit II

State, Sovereignty, Civil Society

Unit III

Power, Authority, Legitimacy, Rights

Unit IV

Liberty, Equality, Justice

Suggested Readings:

- Robert E. Goodin and Philip Pettit (ed.), A Companion to Contemporary Political Philosophy, Blackwell, Oxford.
- Baker, John, (1987) Arguing for Equality, Verso, London.
- Bhargava, R and Acharya, A. (eds.)(2015) Political Theory: An Introduction. New Delhi: Pearson Longman.
- Bauman, Zygmunt, Freedom (1988), Open University Press, Milton Keynes.
- Cohen, Marshall, Thomas, Nagel and Thomas Scanlon (ed.) (1980), Marx, Justice and History, Princeton University Press, Princeton, (Part I on Marx's Views on Justice and Other Fundamental Ethical Ideas).
- Gauba O.P. (2016), An Introduction to Political Theory, Macmillan, New Delhi
- Held, D. (1990) Political Theory and the Modern State, Polity Press, Cambridge, .
- Heywood, Andrew (2003), Political Theory: An Introduction, St. Martin's Press, New York.
- Kukathas, Chandran and Philip Petit, Rawls (1990), A Theory of Justice and Its Critics, Cambridge.
- Kumar, Sanjeev, (2019), Understanding Political Theory, Hyderabad; Orient Blackswan.
- Kumar, Sanjeev, (2021), Rajniti Siddhant: Avardharney aur Vimarsha, Sage, New Delhi
- Anne Philips (ed.), Feminism and Equality, New York University Press, New York.
- Tawney, R.H., Equality, Allen & Unwin(1952), London and Harcourt Brace, New York,
- Walby, Sylvia, (1990) Theorizing Patriarchy, Blackwell, Oxford.

Semester I

Paper –II-Code: SSH POS01 (102) C5005

Western Political Thought-I

Course objective:

This course aims for developing an understanding of the trajectory of the evolution of ideas regarding state and changing relationships with individuals and society, especially in ancient and medieval phases.

Course learning outcomes:

CLO 1: It helps students discover the political philosophy that forms the basis of politics in the Western world, to interpret the political philosophies of the Greek, Roman, French, and English philosophers in a historical context as well as relate them to contemporary politics.

CLO 2: Concretizing their base in political thought.

CLO 3: Differences of thought in the different phases of the History of political thought:

CLO 4: Getting enlightened with fundamental features of political thought.

Unit-I

Plato.

Aristotle.

Unit- II

St. Augustine.

Thomas Aquinas.

Unit-III

Machiavelli

Hobbes

Unit-IV

Locke

Rousseau

Suggested Readings:

- A. Skoble and T. Machan, (2007) Political Philosophy: Essential Selections. New Delhi: Pearson Education
- Berlin, Isaiah, (1981) The Originality of Machiavelli in I. Berlin, Against the Current, OUP, Oxford, 1981.
- Brian R. Nelson, (2004) Western Political Thought, Pearson, New Delhi
- C. Macpherson, (1962) The Political Theory of Possessive Individualism: Hobbes to Locke. Oxford University Press, Ontario,
- Colletti, Lucio, (1978) "Rousseau as Critic of Civil Society" in Lucio Colletti ed. From Rousseau to Lenin, OUP, Delhi.
- Dunn, John,(1969) The Political Thought of John Locke, Cambridge University Press, Cambridge
- Grimsley, Ronald,(1973) The Philosophy of Rousseau, OUP, London.
- Hall, J.C., Rousseau (1971), Introduction to His Political Philosophy, Macmillan.
- I. Hampsher-Monk, (2001) A History of Modern Political Thought: Major Political Thinkers from Hobbes to Marx, Oxford: Blackwell Publishers, pp.
- Macpherson, C.B. (1962), Political Theory of Possessive Individualism, Hobbes to Locke, OUP, London.
- Pocock, J.,(1975) The Machiavellian Moment, Princeton, 1975.
- Raphael, D.D., (1977) Hobbes: Morals and Politics, George Allen & Unwin, London, 1977.
- Skinners, Q.,(1978). Foundations of Modern Political Thought, Vol. 1 : The Rennaissance, Cambridge University Press, Cambridge (Chs. 4, 5, 6).
- T. Burns, (2009) 'Aristotle', in D. Boucher, and P. Kelly, (eds) Political Thinkers: From Socrates to the Present. Oxford: Oxford University Press.

Semester-I

Paper-III - SSH POS01 (103) C5005

Comparative Political Analysis-I

Course Objective:

The course aims at acquainting the students with the nuances of Comparative Politics by imparting to them the central ideas, concepts, and theories that make up this field. This course is different from the ones taught in other universities, which are built around a set of country studies. The focus of this course is to undertake a thorough discussion of the basic grammar of comparative politics. This understanding will go a long way in helping students make sense of politics across time and space. The instructor will discuss case studies to help students understand broader issues of comparative politics.

Course learning outcomes:

After the completion of this course, the students will be able to:

CLO 1: Understand comparative politics and apply their knowledge to make sense of the political dynamics of the wider world.

CLO 2: Understand important political developments around the globe using the tools of comparative politics.

CLO3: Explore questions and concepts related to political culture, socialization, development, and modernization.

CLO 4: Apply the concepts of comparative politics to various political systems using approaches such as system analysis and structural functionalism.

Unit I

Comparative Politics: Meaning, Significance, Nature, and Evolution

Comparative Method: Challenges of comparison and Comparative Political Analysis.

Unit II

Comparative Politics: Different Perspectives

Structural

Institutional

Cultural

Political Economy

Unit III

Colonialism: Forms and Impact

Nationalism and Anti-colonial Movements

Decolonization

Unit IV

Nature of State: Capitalist, Socialist, Post-Colonial, Welfare State

The Nation States and Globalization

Political Regimes: Democratic and Non-Democratic

Suggested Readings:

- Almond, G. & Powell, B. (1966). *Comparative Politics: A Developmental Approach*. Boston: Little Brown.
- Bara, J. & Pennington, M. (Ed.). (2012). *Comparative Politics: Explaining Democratic Systems*. London: SAGE Publication Ltd. http://dx.doi.org/10.4135/9781446215685
- Caramani, D. (2017). *Comparative Politics* (4th ed.). Oxford University Press.
- Eckstein, M. & Apter, D. (1963). *Comparative Politics: A Reader*, New York: Free Press, 1963.
- Ghai, U. R. (2017). *Comparative Politics and Government*. Jalandhar: New Academic Publishing co.
- Hague, R. & Harrop, M. (2004). The state in a global context, in Comparative Government 14 and Politics: An Introduction, pp. 17-34. London: Palgrave McMillan.
- Heywood, A. (2015*). Global Politics*. (2nd ed.). London; New York: Palgrave Macmillan.

- Hague, R. & Harrop, M. (2015). *Comparative Government and Politics: An Introduction.* (9th ed.). London: Palgrave McMillan.
- Hague, R., Harrop, M., & McCormick, J. (2019). *Comparative Government and Politics: An Introduction.* (11th ed.). Red Globe Press McMillan.
- Mohanty, M. (1975) '*Comparative Political Theory and Third World Sensitivity*', in Teaching Politics. Nos. 1 & 2, pp. 22-38.
- Mukherjee, S. & Ramaswamy, S. (2017*). Theoretical Foundations of Comparative Politics*. The Orient Blackswan.
- Newton, K. & Deth, Jan W. V. (2016). *Foundations of Comparative Politics: Democracies of the Modern World*. (3rd ed.). Cambridge: Cambridge University Press.
- O'Neil, P. (2017) *Essentials of Comparative Politics*. (6th ed.). New York: WW. Norton & Company, Inc
- Yamahata, Y. (2019, December 15). Decolonising World Politics: Anti-Colonial Movements Beyond the Nation-State. *E-International Relations*. https://www.e-ir.info/2019/12/15/decolonising-world-politics-anti-colonial-movements-beyond-the-nation-state/
- Synder, R. (2001). 'Scaling Down: The Subnational Comparative Method'. *Studies in Comparative International Developmen*t. 36(1): 93-110.
- Takis S. Pappas. (2018), 'How to Tell Nativists from Populists', *Journal of Democracy*, 29(1): 148-152
- Taylor, Charles, 'Modes of Civil Society', *Public Culture, Vol. 3,* No. 1, Fall 1990.
- *The Oxford Handbooks of Political Institutions*. Oxford: Oxford University Press. (Part I & 2)
- Vernon Bogdanor (ed.). (1987). *The Blackwell Encyclopaedia of Political Institutions*, Blackwell, Oxford,

Semester-I

Paper - IV - Code- SSH POS01 (104) C5005

Indian Political System

Course Objective:

This course is intended to prepare the student to gain an in-depth understanding of the government and politics of the Indian Government. The course is specially designed to supplement and enhance the understanding of students about the philosophical, theoretical, Institutional, and functional aspects of Indian Polity.

Course learning outcomes:

After the completion of this course, the students will be able to:

CLO 01: Students will be able to understand the composition of the constituent assembly and the introduction of constitutional debate will be able to develop a better understanding of the Indian constitution.

CLO 02: Students will know about the component of the preamble, fundamental rights, and how these rights are different from the directive principles of the state policy.

CLO 03: Students will be able to understand the electoral process of India and what role ECI plays in the conduct of the election.

CLO 04: They will be able to explain statutory institutions and develop a deeper understanding of constitutional and statutory institutions.

Unit-I

Constitution Assembly: Composition and Constitutional Debates, Sources and features of Indian Constitution

Unit-II

Philosophy of the constitution: Preamble, Fundamental Rights and Duties, Directive Principles of State Policy

Unit-III

Organs of the Government at Union and State levels: Legislative, Executive and Judiciary

Unit- IV

Elections and Electoral Reforms, Party system in India, Comptroller and Auditor General.

Suggested Readings:

- Basu D. D, (2019). *Introduction to the Indian Constitution*. (24th ed.). Lexis-Nexis Butterworth, Wadhwa Publishing House.
- Blair, H. (1986). *Caste, Faction, and Party in Indian Politics*. Vol. 1: Faction and Party. Vol. 2: Election Studies. By Paul R. Brass. Delhi: Chanakya Publications, 1984 and 1985. ix, 339 pp.: Xi, 325 pp. Maps. Rs. 150 and 180. *The Journal of Asian Studies, 45*(4), 874-876. doi:10.2307/2056129
- Chakrabarty, B. (2008). *Indian Politics and Society since Independence: Events, Processes, and Ideology.* London; New York: Routledge
- Dalal, Rajbir Singh (2012). *Recent trends in Indian Politics: An introspection.* The Indian Journal of Political Science,73(2), 375-384. Source: http://www.jstor.org/stable/41856599
- Dalal, Rajbir Singh (2016). Electoral Reforms attempts Towards Good Governance in India: An appraisal*, International Journal of Research in Social Sciences*, 6(1).
- Fadia, B. L. & Fadia, K. (2020). *Indian Government and politics.* (17th ed.). Delhi: Sahitya Bhawan.
- Granville, A. (1999). *The Indian Constitution: Cornerstone of A Nation.* Oxford University Press.
- Granville, A. (2000*). Working of a Democratic Constitution.* Oxford University Press.
- Jones, W. H. M. (1987). *The Government and Politics in India*. The Eothen Press
- Jha, R. K. (2012). *Fundamentals of Indian Political System*. Delhi: Pearson.
- Kothari, R. (2012). *Politics In India.* (2nd ed.). Orient Black Swan.
- Laxmikanth, M. (2019). *Indian Polity*. (6th ed.). McGraw-Hill
- Laxmikanth, M. (2021). Governance in India. (3rd ed.). McGraw-Hill.
- Palmer, N. D. (1975). *Elections and Political Development: South Asian Experience*. C Hurst & Co Publishers Ltd.
- Roy, H. & Singh, M.P. (2018). *Indian Political System*. (4th ed.). Pearson Education.
- Sharma, Chanchal Kumar. (2015). Reimagining Federalism in India: Exploring the Frontiers of Collaborative Federal Architecture*. Asia-Pacific Social Science Review 15(1): 1–25*

- Sharma, Chanchal Kumar. (2015). Intergovernmental coordination mechanisms in India. *South Asian Journal of Socio-Political Studies* 15(2): 40–48.
- Sharma, Chanchal Kumar. (2014). Rise and Demise of Nehruvian Consensus: A Historical Review. *South Asian Journal of Socio-Political Studies (SAJOSP*S) 15(1): 16–23
- Dalal, Rajbir Singh. (2015). Indian Democracy: An Evaluation from Electoral Aspect*, Indian Journal of Political Science*, 76 (4).
- Kumar, Ramesh. (2017). Electoral Reforms in India: Challenges and Suggestions. *Think India*, vol 20(2).
- Mitra, Subrata K. (2017). *Politics in India: Structure, Process and Policy* by, Routledge, London and New Delhi
- Chatterjee. Partha. *(1998). State & Politics in India* (*Themes in Politics)*. New Delhi, Oxford University Press.
- Jayal Niraja Gopal and Mehta Pratap Bhanu. (ed), (2011). *The Oxford Companion to Politics in India*. New Delhi, Oxford University Press.
- Jayal Niraja Gopal. (ed), (2007). *Democracy in India*. New Delhi, Oxford University Press.

Semester-I

Offered to other Departments: (General Elective Course)

Paper-V-Code:(SSHPOS01(105) GEC4004

Indian National Movement

Course Objective:

It is aimed to provide opportunity for students to be familiar with the diverse vision that guided the makers of the Indian Constitution. Course is also aimed to make students learn about the different historical trajectories, movements and processes due to which we formed our constitution as it is today.

Course Outcome:

CLO 01: Students will be able to analyse the process of rise of modern India and its foundation made by social reformer and freedom fighters.

CLO 02: Students will be able to analyse social background of Indian Nationalism.

CLO 03: It will help students to illustrate the rise and growth of Economic Nationalism in India.

CLO 04: Students will acquire knowledge about the freedom struggle and partition of India and making of Indian Constitution in aftermath.

Unit-I

Colonialism in India
National Movement

Unit-II

Peasant Movements
Labour Movements

Unit-III

Revolutionary Movement

The rise and growth of Communalism

Unit-IV

An Economic Critique of Colonialism

Freedom and Partition

Constitutional Development

Suggested Readings:

- Akbar, M. J. (2020). *Gandhi's Hinduism the struggle against Jinnah's Islam*. Bloomsbury Publishing.
- Azad, A. (2017). *India wins freedom: An autobiographical narrative*. Create space Independent Publishing Platform.
- Butalia, U. (2017). *The other side of silence: Voices from the partition of India*. Penguin UK. Dalrymple, W. (2017). *The last Mughal (Hindi)*. Bloomsbury Publishing.
- Datta, D. (2020). *Gandhi Porbandar to partition*. BEE Books.
- Guha, R. (2019). *India after Gandhi revised and updated edition: The history of the world's largest democracy*. HarperCollins.
- Habib, I. (2020). *A people's history of India 31: The national movement, Part 2: the struggle for freedom, 1919-1947*. Tulika Books.
- Hasan, M. (2016). *Roads to freedom: Prisoners in colonial India*. Oxford University Press.
- Khan, Y. (2017). *The great partition: The making of India and Pakistan*. Yale University Press.
- Naoroji, D. (2018). *Poverty and Un-British rule in India*. Franklin Classics Trade Press.
- Patel, D. (2020). *Naoroji: Pioneer of Indian nationalism*. Harvard University Press.
- Rogobete, D., & Marino, E. (2019). *The partition of India: Beyond improbable lines*. Cambridge Scholars Publishing.
- Tharoor, S. (2016). *An era of darkness: The British Empire in India*. Rupa Publications.

- Tharoor, S. (2018). *Inglorious empire: What the British did to India*. Penguin Classics.
- Arun Chandra Guha (2018) *First spark of revolution*. Orient Black swan, New Delhi
- Bipan Chandra (2016). *India's Struggle for Independence*. Penguin Books, New Delhi
- Mushirul Hasan (1981). *Communal and Pan Islamic Trends in Colonial India*. Delhi.

Semester-I

Paper-VII Code: SSHPOS01 (106) GEC4004

Principles of Political Science

Course Objective:

This course is designed to disseminate knowledge about state, sovereignty, and other basic concepts of political science. By the end of this course, students would be able to understand and analyze the theoretical framework of political science and have practical knowledge regarding the different concepts of political science.

Course learning outcomes:

CLO 01: To have an insight regarding political science and its different concepts.
CLO 02: To be able to know about the state and its theories regarding its origin and nature.
CLO 03: To be able to understand sovereignty, its constituents, and forms.
CLO 04: To have an insight regarding the power, authority, different forms and attributes as well as its relations with legitimacy.
CLO 05: To have the knowledge of rights, their attributes, and different forms with special reference to UDHR.
CLO 06: To have the knowledge of liberty, equality, and laws as well as their relations with one another.
CLO 07: To be able to understand political science in a more specific and objectives manner.

Unit I

Political Science: Concept, Nature, Scope and Significance

Unit II

State, Sovereignty, Government

Unit III

Power, Authority, Legitimacy,

Unit IV

Rights, Liberty, Equality, Laws

Suggested Readings:

- Chinkin, C. M., & Baetens, F. (2015). *Sovereignty, statehood and state responsibility: Essays in honour of James Crawford*.
- Dimova-Cookson, M. (2019). *Rethinking positive and negative liberty*. Routledge.
- Dobratz, B., Waldner, L., & Buzzell, T. (2015). *Power, politics, and society: An introduction to political sociology*. Routledge.
- Dyzenhaus, D., & Poole, T. (2015). *Law, liberty and state: Oakeshott, Hayek and Schmitt on the rule of law*. Cambridge University Press.
- Grimm, D. (2015). *Sovereignty: The origin and future of a political and legal concept*. Columbia University Press.
- Harrison, L., Little, A., & Lock, E. (2015). *Politics: The key concepts*. Routledge.
- Heywood, Andrew (2003), Political Theory: An Introduction, St. Martin's Press, New York.
- Hoffman, J., & Graham, P. (2015). *Introduction to political theory*. Routledge.
- Keman, H., & Woldendorp, J. J. (2016). *Handbook of research methods and applications in political science*. Edward Elgar Publishing.
- Lees-Marshment, J. (2020). *Political management: The dance of government and politics*. Routledge.
- Leibfried, S., Huber, E., Lange, M., Levy, J. D., Nullmeier, F., & Stephens, J. D. (2015). *The Oxford handbook of transformations of the state*. OUP Oxford.
- Leoni, B. (2017). *Law, liberty, and the competitive market*. Routledge.
- Mandle, J., & Roberts-Cady, S. (2020). *John Rawls: Debating the major questions*. Oxford University Press, USA.

- Riemer, N., Simon, D. W., & Romance, J. (2015). *The challenge of politics: An introduction to political science*. CQ Press.
- Rothbard, M. N. (2015). *The ethics of liberty*. NYU Press.
- Silier, Y. (2017). *Freedom: Political, metaphysical, negative and positive*. Routledge.
- Stoker, G., Peters, B. G., & Pierre, J. (2015). *The relevance of political science*. Macmillan International Higher Education.
- Wilson, H. T. (2017). *Political management: Redefining the public sphere*. Walter de Gruyter GmbH & Co KG.
- Ziyanak, S. (2020). *Political sociology: Readings on power, politics, state, and society*
- Bhargava, R and Acharya, A. (eds 2011.) Political Theory: An Introduction. New Delhi: Pearson Longman,
- Kumar, Sanjeev ,(2019), Understanding Political Theory, Hyderabad; Orient Blackswan.
- Kumar , Sanjeev,(2020), Rajniti Siddhant Ki Samajh, Hyderabad: Orient Blackswan.
- Heywood, A. (2015). *Political Theory: An Introduction*. Macmillan Press, London.
- Heywood, A. (2019). *Politics*. Macmillan Press, London,

Semester –II

Paper-VIII Code: SSH POS01 (107) C5005

Political Theory-II

Course objective:

This course aims to develop an understanding of the traditional and contemporary concepts in the discourse of political science, their western and non-western perspectives, and the key debates about them. Also, the course aims to make students acquainted with the values and issues of modern governance.

Course learning outcomes:

CLO 1: It helps students to get familiarized with different dimensions and the contemporary relevance of different concepts and theories.

CLO 2: Students will be able to understand and learn the different theories and contemporary debates in democracy.

CLO 3: It helps to make students a strong base in new political theories which emerged after 1990's like globalization and multiculturalism.

CLO 4: Understand the reasons for the emergence of new theories like post-modernism.

Unit –I

Critical Approaches: Postmodernism, Feminism, Multiculturalism

De-parochializing Political Theory

Unit-II

Citizenship: Classical and Modern

Unit-III

Democracy: Evolution, Theories, Trends

Unit –IV

Recent Debates in Political Theory

Suggested Readings:

- Alan Heslop, D. (n.d.). *Political system - Development and change in political systems*. Encyclopedia Britannica.
- Adichie, C. N. (2021). *We Should All Be Feminists* (Reprint ed.). Anchor Books.
- Busbridge, R. (2019). *Multicultural Politics of Recognition and Postcolonial Citizenship: Rethinking the Nation (Postcolonial Politics)* (1st ed.). Routledge.
- Fairfax, A. E. (2005). *The Democratic Trend Phenomena: The Predictability of the Democratic Vote for President*. Media Channel, LLC.
- Middleton, R. J., & Walsh, B. J. (1995). *Truth Is Stranger Than It Used to Be: Biblical Faith in a Postmodern Age*. IVP Academic.
- Newbigin, L. (1995). *Proper Confidence: Faith, Doubt, and Certainty in Christian Discipleship* (35384th ed.). Eerdmans.
- Ratha, K. C. (2021). *Political theory: Concepts and Debates*. Rawat.
- Seubert, S. (2014). *Dynamics of Modern Citizenship Democracy and Peopleness in a Global Era*. Constellations, *21*(4), 547–559. https://doi.org/10.1111/1467-8675.12119
- Singh, J. A. S. V. N. (2012). *Nariwad (Feminism)*. Rawat Books.
- Smith, B. (2019). *Citizenship without states: rehabilitating citizenship discourse among the anarchist left*. Citizenship Studies, *23*(5), 424–441. https://doi.org/10.1080/13621025.2019.1620688.
- Thapar, R., Ram, N., Bhatia, G., & Patel, A. G. (2021). *On citizenship*. Aleph Book Company.
- Tinder, G. (2021). *Political Thinking: The Perennial Questions (Longman Classics Series)*. Pearson Jul-12-2003.
- West, T. G. (2017). *The Political Theory of the American Founding: Natural Rights, Public Policy, and the Moral Conditions of Freedom*. Cambridge University Press.

- Bhargava, R and Acharya, A. (eds 2015). *Political Theory: An Introduction*. New Delhi: Pearson Longman.
- Kumar, Sanjeev. (2019). *Understanding Political Theory*. Hyderabad; Orient Blackswan.
- Kumar, Sanjeev. (2020). *Rajniti Siddhant Ki Samajh*. Hyderabad: Orient Blackswan.

Semester-II

Paper: IX Code: (SSH POS01 (108) C5005)

Western Political Thought-II

Course Objective:

The course is aimed to provide students with the historical, social and cultural context to relate to contemporary political society. It is hoped that familiarity with the ideas or concepts of some major western political thinkers will help the students to understand different perspective and approaches to concepts like State, politics, government, sovereignty, citizenship and so on.

Course learning outcomes:

CLO 1: The course will help students to theoretically locate the diverse intellectual traditions in the west.

CLO 2: It helps students to engage and critically examine the significant issues of the western political philosophy.

CLO 3: Students by the end of term will have a comparative perspective of political philosophies in the West and India.

Unit- I

Immanuel Kant

G.W.F Hegel

T.H. Green

Unit- II

Jeremy Bentham

J.S. Mill

Unit-III

Karl Marx

Lenin

Unit-IV

Mao

Gramsci

Suggested Readings:

- Bayefsky, R. (2013). *Dignity, Honour, and Human Rights: Kant's Perspective*. Political Theory,41(6), 809-837. Retrieved August 24, 2021, from http://www.jstor.org/stable/24571373
- Beresford, P., & Alibhai-Brown, Y. (2021). *Imposing ideology. In Participatory Ideology: From Exclusion to Involvement* (pp. 37-52). Bristol, UK: Bristol University Press. Doi: 10.2307/j.ctv1gbrrrw.10
- Dierksmeier, C. (2013). *Kant on Virtue. Journal of Business Ethics, 113*(4), 597-609. Retrieved August 24, 2021, from http://www.jstor.org/stable/23433685
- Church, J. (2013). *The Political Cultivation of Moral Character: Kant on Public Moral Feeling as a Precondition for Right*. Polity, *45*(1), 56-81. Retrieved August 24, 2021, from http://www.jstor.org/stable/24540255
- Cohen, G. (2014). *Hegel: Minds, Masters, And Slaves. in Wolff J. (ed.),* Lectures on the History of Moral and Political Philosophy (pp. 183-200). Princeton; Oxford: Princeton University Press. Retrieved August 24, 2021, from http://www.jstor.org/stable/j.ctt3fgzfh.10
- Gauba, O. P. (2017). *Western Political Thought* (Third ed.). National Publishing House.
- Hall, S. (2021). *Rethinking the "Base and Superstructure*" Metaphor [1977]. In McLennan G. (Ed.), *Selected Writings on Marxism* (pp. 62-90). Durham; London: Duke University Press. Doi: 10.2307/j.ctv1j9mjwm.7
- Jha, S. (2018). *Western Political Thought: From the Ancient Greeks to Modern Times* (2nd ed.). New Delhi: Pearson.
- Kelly, D. (2006). *Idealism and Revolution: T.H. Green's "Four Lectures on The English Commmonwealth*. *History of Political Thought, 27*(3), 505-542. Retrieved August 24, 2021, from http://www.jstor.org/stable/26222186
- Mukherjee, S., & Ramaswamy, S. (2011). *History Of Political Thought* (2nd ed.). PHI Publisher.
- Negri, A. (2011). *Reading Hegel: The Philosopher of Right. In Thomas P*. (Author) & Žizek S., Crockett C., & Davis C. (Eds.), *Hegel and the Infinite: Religion, Politics, and Dialectic* (pp. 31-46). New York: Columbia University Press. Retrieved August 24, 2021, from http://www.jstor.org/stable/10.7312/zize14334.7

- Nelson, B. R. (2015). *Western Political Thought: From Socrates to the Age of Ideology, Second Edition* (2nd ed.). Waveland Press, Inc.
- Sharma, U., & Sharma, S. K. (2020). *Western Political Thought from Plato to Burke* (Vol. 1). Atlantic.
- Sharma, U., & Sharma, S. K. (2020). *Western Political Thought from Bentham to Present Day* (Vol. 2). Atlantic.

Semester-II

Paper: X Code- SSH POS01 (109) C5005

Comparative Political Analysis-II

Course Objective:

This course aims to clarify and reinforce the most important concept studied in the course (Comparative Political Analysis) offered in the previous semester. The course will demonstrate how political institutions fundamentally guide the actions of political agents. Thus, the instructor will emphasize the significance of political institutions by familiarizing students with the political institutions 'in action'.

Course learning outcomes:

After the completion of this course, the students will be able to:

CLO 1: Learn about States, Nations, and the basics of democratic and non-democratic regimes.
CLO 2: Compare state power using the yardsticks of power, authority, legitimacy and capacity.
CLO 3: Compare and assess political institutions in different political systems.
CLO 4: Develop a thorough understanding of the interrelationships between organs of government in different political systems.
CLO 5: Understand the role of political participation, electoral politics, political parties and party systems in democratic regimes.

Unit I

Constitution and Constitutionalism: Forms of constitutions, Rule of Law, Judicial Independence, Constitutional Morality, Crisis of Constitutionalism.

Unit II

Democratisation: Democratic Transition and Consolidation

Theories of Development: Modernization, Underdevelopment, Dependency, World Systems theory.

Unit III

Structures of Power: Ruling class, power elites, democratic elitism

Unit IV

Actor and Processes: Electoral Systems, Political Parties and Party System, Interest groups, Social Movements, New Social Movements, Non-Governmental Organisations (NGOs).

Suggested Readings:

- Amin Samir. *Accumulation on a World Scale: A Critique of the Theory of Underdevelopment*, vol.II, Monthly Review Press, New York, 1974.
- Amin, Samir. *Social Movements at the Periphery* in P. Wignaraja (ed.), *New Social Movements in the South*, Zed, London, 1993.
- Andre Gunder Frank, 'The Development of Underdevelopment', *Monthly Review*, Vol. 41, June 1989 (reprinted from September 1966 issue), pp. 37-51.
- Ayers, A. J. (2019). *A Global Political Economy of Democratization: Beyond the Internal-External Divide (Ripe Series in Global Political Economy)* (1st ed.). Routledge.
- Bingham, T. (2011). *The Rule of Law* (Reprint ed.). Penguin UK.
- *Crisis and Constitutionalism by Alberico Gentili Fellow Benjamin Straumann (2016–04-04)*. (2021). Oxford University Press.
- Diwakar, R. (2018). *Party System in India (Oxford India Short Introductions Series)* (1st ed.). Oxford University Press.
- Drochon, H. (2020, June 1). *Robert Michels, the iron law of oligarchy and dynamic democracy*. Wiley Online Library. https://onlinelibrary.wiley.com/doi/full/10.1111/1467-8675.12494
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- Popelier, P., Aroney, N., & Delledonne, G. (2021). *Routledge Handbook of Subnational Constitutions and Constitutionalism* (1st ed.). Routledge.
- Rossatto, C. A. (2019). *Manifesto for New Social Movements: Equity, Access, & Empowerment (NA)* (Illustrated ed.). Information Age Publishing.
- Sengupta, A. (2019). *Independence and Accountability of the Higher Indian Judiciary*. Cambridge University Press.
- Shastri, S., Kumar, A., & Sisodia, S. Y. (2021). *Electoral Dynamics in the States of India* (1st ed.). Routledge India.
- Shepard, W. J. (1936). The Mind and Society. By Vilfredo Pareto. Edited by Arthur Livingston. (New York: Harcourt, Brace and Company. 1935. Four volumes. Pp. 2,033.). *American Political Science Review*, *30*(1), 166–168. https://doi.org/10.2307/1948018
- Valencia, S. A. (2018). *Sub-Imperialism Revisited: Dependency Theory in the Thought of Ruy Mauro Marini (Studies in Critical Social Sciences, 105)* (Reprint ed.). Haymarket Books.
- Welzel, C., Inglehart, R. F., Haerpfer, C., & Bernhagen, P. (2019). *Democratization* (2nd ed.). Oxford University Press.
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Semester-II

Paper-X Code: SSH POS01 (110) C5005

International Relations

Course Objective:

The paper aims to acquaint the students with major concepts and theories that are central to the understanding of contemporary International Relations. It explores the Nature, Scope and Development of International Relations along with theories that are at the core of explanation to relations between states.

Course learning outcomes:

After the completion of this course, the students will be able to:

CLO 01: Familiarization with the concept of International Relations as an academic discipline and its scope.

CLO 02: Have a broad understanding of various key concepts such as Power and National Power.

CLO 03: Acquire a comprehensive knowledge of mainstream theories: Realism, Structural Realism, Neo-Marxism, and Neo-Liberalism that have shaped and influenced international politics and assess the relevance of these theories in the present context.

CLO 04: Students will be able to know the evolution and genesis of the institutional framework of UN.

Unit- I

International Relations as an Academic Discipline and Scope;

National Power;

Conflict Resolution and Deterrence.

Unit-II

Approaches of International Relation: Realism, Structural Realism,

Neo-Marxism, Neo-Liberalism

Unit -III

United Nations: Aims, Objective, Structure, and evaluation of the working of UN.

Unit- IV

United Nations: Organs, Peace and Development Perspectives, Humanitarian Interventions.

Suggested Readings:

- Carvalho, B. D., Lopez, J. C., & Leira, H. (2021). *Routledge Handbook of Historical International Relations*. Routledge.
- Dunne, T., Kurki, M., & Smith, S. (2021). *International Relations Theories: Discipline and diversity*. Oxford University Press, USA.
- Garner, R., Ferdinand, P., & Lawson, S. (2020). *Introduction to politics*. Oxford University Press, USA.
- Hanhimäki, J. M. (2015). *The United Nations: A very short introduction*. Oxford University Press, USA.
- Jindal, N., & Kumar, K. (2020). *International relations: Theory and practice*. Sage Publications Pvt.
- Kille, K. J., & Lyon, A. J. (2020). *The United Nations: 75 years of promoting peace, human rights, and development*. ABC-CLIO.
- Kuusisto, R. (2019). International Relations Narratives: Plotting World Politics (1st ed.). Routledge
- Lamy, S. L., Masker, J. S., Baylis, J., Smith, S., & Owens, P. (2020). *Introduction to Global Politics* (6th ed.). Oxford University Press.

- Lawson, S. (2015). *Theories of International Relations: Contending Approaches to World Politics* (1st Ed.). Polity.

- Mingst, K., McKibben, H., & Arreguin-Toft, I. (2018). *Essentials of international relations* (8th ed.). W.W. Norton & Company.

Semester-II

Paper-XI Code: SSH POS01 (111) DEC4004 (i)

Contemporary Issues in Indian Politics

Course Objective:

The objective of the course is to give information and developed knowledge and analytical understanding among students regarding contemporary issues in Indian politics and enable students to have a better insight of Indian polity.

Course learning outcomes:

CLO1: To enable them to understand the role of caste and religion in Indian politics.

CLO2: To develop the understanding of regional identity and other movements in Indian polity.

CLO3: To be able to understand the social movement, its constituents and forms.

CLO4: To appreciate the concepts and models of equity and development as well as new institutional arrangements.

CLO5: To understand the significance of constitutional and institutional reforms.

Unit-I

Caste and Indian Politics

Religion and Indian Politics

Unit-II

Regional Identity and Movement

Social Movements in India

Unit-III

Equity and Development

New Institutional Arrangements

Unit-IV

Constitutional Reforms and Institutional Reforms

Suggested Readings:

- Ananth, V. K. (2010). *India Since Independence: Making Sense Of Indian Politics*. Pearson Education.
- Bajpai, K. P., & Pant, H., V. (2013). *India's National Security: A Reader (Critical Issues in Indian Politics)* (1st ed.). Oxford University Press.
- Dalal, Rajbir Singh (2016). *Electoral Reforms attempts Towards Good Governance in India: An appraisal,* International Journal of Research in Social Sciences, 6(1).
- Dalal, Rajbir Singh (2015). *Indian Democracy: Some Internal Challenges*, International Journal of Physical and Social Sciences, 5(6).
- Dalal, Rajbir Singh, (2017), Democratization and Increasing demand for Inclusive Development, Public Administration Review, 18(1).
- Jayal, N. G., & Mehta, P. B. (2011). *The Oxford Companion to Politics in India*. Oxford University Press.
- Hasan, Z. (2000). *Politics and the State in India (Readings in Indian Government and Politics series)* (1st ed.). SAGE Publications Pvt. Ltd.
- Kothari, R. (2020). *Politics In India (2nd edition)* (2nd ed.). Orient BlackSwan.
- Sharma, C. K., & Swenden, W. (2017). *Understanding Contemporary Indian Federalism*. Routledge.
- Singh, M. P., & Saxena, R. (2013). *Federalising Indian Politics in the Age of Globalization: Problems and Prospects* (1st ed.). Primus Books.
- Singh, M. P., & Saxena, R. (2021). *Indian Politics: Constitutional Foundations And Institutional Functioning* (3rd ed.). PHI Learning.
- Tiwari, L. (2015). *Issues in Indian politics* (1st ed.). Mittal Publications.
- Saez, Lawrence (2002). *Federalism without a Centre: The Impact of Political and Economic Reforms on India's Federal System*. Sage, New Delhi.
- Singh M.P, Roy Himanshu. (1988). *Indian Political System: Structure, policies, development*. Gyanada Prakashan, New Delhi.

- Dua B.D., M.P. Singh and Rekha Saxena (edt) *Indian Judiciary and Politics: The Changing landscape*. Manohar, New Delhi.
- Sharma, Chanchal Kumar, and Wilfried Swenden. (2018). *Modi-fying Indian Federalism? Center-state Relations Under Modi's Tenure as Prime Minister*. Indian Politics and Policy (PSA, Westphalia Press USA) 1(1): 51–82.
- Kumar, Ashutosh. (2017). 'Rethinking State Politics in India: Regions within region, Routledge, London India.
- Udit Bhatia, (ed), (2018). *The Indian Constituent Assembly: Deliberations on Democracy*, Routledge, London.
- Bhargava, Rajeev. (ed.), (2008). Politics *and Ethics of the Indian Constitution*, New Delhi: Oxford University Press.
- Zoya Hasan, E. Sridharan, & R. Sudarshan. (ed), (2002). *India's living constitution ideas, practices, controversies*. New Delhi, Permanent Black,
- Madhav Khosla, (2012) *Indian Constitution*, New Delhi, Oxford University Press,
- Chowdhary, Sujit, Madhav Khosla, Pratap Bhanu Mehta (2017) (eds) *The Oxford Handbook of the Indian Constitution*, New Delhi: Oxford University Press
- Bhattacharyya, Harihar and Koing Lion. (2016). *Globalisation and Governance in India*, Routledge, London.
- Krishnaswamy, S. (2010). *Democracy and constitutionalism in India: A study of the basic structure doctrine* Oxford University Press.

Semester-II

Paper: XII Code: SSH POS01 (111) DEC 4004 (ii)

International Organizations

Couse objective

This course is intended to provide a brief introduction of the historical genesis of international organization, efforts of converting jungle into the zoo. It further provides a brief introduction of the institutional setup of the United Nations. Moving ahead this course will also provide a brief introduction of formal agencies through the UN and Regional Organization as well.

Course learning outcomes:

After the completion of the course, students will be able to:

CLO 01. Students will be able to understand how the International Organization came into existence and its aims and objective.

CLO 02. Students will be able to develop a depth understanding of U.N system.

CLO 03. Students will be able to know about the engagement of world governments through UN system and beyond UN system.

CLO 04. Students will be able to understand the difference between Regional organizations from World organizations and develop an understanding of the aims and objectives of some measure Regional Organizations.

Unit – 1

- Historical evolution of International Organizations, Concept of Europe, Hague Systems, Genesis of League

Unit – 2

- United Nations: Aims, Objectives, and Structure

Unit – 3

- North-South Dialogue, WTO, G-20

Unit - 4

- Regional Organizations: ASEAN, SCO, European Union, BIMSTEC, QUAD

Suggested Readings:

- Aggrawal, H.O., (2021). *International Organization.* Central Law Publications
- Cogan, J. K., Hurd, I., & Johnstone, I. (Eds.). (2016). *The Oxford Handbook of International Organizations*. Oxford University Press.
- Dalal, Rajbir Singh. (2015), *Impact of Globalization on Urbanization and Migration in India: An Introspection,* The Administrative Change, Jaipur, XL1-XL2, 1(2).
- Dijkstra, H. (2016). *International organizations and military affairs*. Routledge.
- Dingwerth, K., Witt, A., Lehmann, I., Reichel, E., & Weise, T. (2019). *International organizations under pressure: Legitimating global governance in challenging times*. Oxford University Press.
- Hanhimäki, J. M. (2015). *The United Nations: A very short introduction*. Oxford University Press, USA
- Kille, K. J., & Lyon, A. J. (2020). *The United Nations: 75 years of promoting peace, human rights, and development*. ABC-CLIO.
- Muldoon, J. P. (2018). *The architecture of global governance: an introduction to the study of international organizations*. Routledge.
- Panke, D., & Stapel, S. (2020). *Comparing regional organizations: Global dynamics and regional particularities*. Policy Press.
- Park, S. (2018). *International organizations and global problems: Theories and explanations*. Cambridge University Press.
- Schiavone, G. (2016). *International organizations: A dictionary and directory*. Springer
- Weiss, T. G., & Daws, S. (2018). *The Oxford Handbook on the United Nations*. Oxford University Press.
- Kumar, Ramesh (2017), *North-South Dialogue in UN and outside: An analysis,* Think India, 20(4).

Semester-II

Paper: XIII Code: SSH POS01 (111) DEC 4004 (iii)

Governance: Issues and Challenges

Course Objective:

The paper is designed in a manner that will facilitate the students in getting themselves equipped with the topics concerning the emergence of Governance as a distinct concept in contemporary. The students will be making themselves involved with issues and challenges surrounding the concept like good governance, types, significance, and the emerging debates from the National as well as International arena.

Course learning outcomes:

CLO1: Students shall be able to comprehend the genealogy of the term Governance and would provide their interpretation of the concept

CLO2: Students shall be able to analyse the factors in nexus with democracy and civil society in connection with governance

CLO3: The broader debates concerning the significance and attributes of good governance shall be well further contributed to by the students in an ever-enhanced interpretation

CLO4: The diversity in types of governance shall provide new avenues for the students to explore their career choices and overall knowledge of the paper

UNIT I

Governance: An Introduction
Contemporary Debates in India and abroad

Good Governance: Emergence and Attributes

Future Prospects and Challenges

UNIT II

Democracy and Good Governance, E-Governance, and E-Democracy

Right to Information (RTI) Act, Right to Service (RTS) Act,

Citizens Charter, Civil Society

UNIT III

Institution of Ombudsman: Lokpal, Lokayukta

Judicial Review, Judicial Activism and Media Trial

UNIT IV

Types of Governance: Corporate Governance, Health Governance, Environmental Governance

Participatory Governance: Local Governments, Mass/Public Participation

Suggested Readings:

- Blokdyk, G. (2021). *E Governance Initiatives A Complete Guide - 2020 Edition*. 5STARCooks.
- Dalal, Rajbir Singh (2016). *Impact of Right to Information Act, 2005 on Good Governance: An Evaluation***.** Indian Journal of Public Administration, IIPA, New Delhi, Vol. LXII, No. 4.
- Dalal, Rajbir Singh (2016). *Jan Suchana Adhikar Adhiniyam Ka Kriyanvan: Haryana Pardesh key sandharbh mein ek Samiksha***.** Lok Parshasan, IIPA, New Delhi, Vol 8, No. 2,
- Dalal, Rajbir Singh. (2017). *Bhart ke Sushasan me Nagarik Sahbhagita aur Parshasnik Uterdayitava***,** Lok Prashashan, IIPA New Delhi, Vol. 09, No. 2,, pp 229-240.
- Dhaka, Rajvir S.(2018), *Right to Information and Good Governance,* New Delhi: Concept.
- Dalal, Rajbir Singh. (2011). *Good Governance: The Conceptual Dimensions, Prashasnika,* HCMRIPA, Jaipur, 39(1).
- Dhawan, R. K. (2021). *Public Grievances and the Lokpal*. Raj Publication.
- Edwards, M. (2020). *Civil Society* (4th ed.). Polity.
- Fine, G. A. (2021). *The Hinge: Civil Society, Group Cultures, and the Power of Local Commitments* (First ed.). University of Chicago Press.

- Gupta, R. P. (2019). *Your Vote Is Not Enough: A Citizens' Charter to Make a Difference*. Speaking Tiger Books.
- Hanumanthappa, D. G. (2016). *Global Approach to E-Governance*. LAP LAMBERT Academic Publishing.
- Hashmi, S. W. G. A., & Arnold, B. (2021). *Governance and Leadership in Health and Safety* (1st ed.). Routledge.
- Jha, H., Mukherjee, R., Mitra, S. K., & Jha, R. (2021). *Capturing Institutional Change: The Case of the Right to Information Act in India (Institutions and Development in South Asia)*. Oxford University Press.
- Klöck, C., Castro, P., Weiler, F., & Blaxekjær, L. Ø. (2020). *Coalitions in the Climate Change Negotiations (Global Environmental Governance)* (1st ed.). Routledge.
- Pal, M. (2020). *Rural Local Governance and Development* (1st ed.). SAGE Publications Pvt. Ltd.
- Pandey, S. P. (2020). *Law related to Judicial Review in India: An Evaluation*. LAP LAMBERT Academic Publishing.
- Parkhurst, J. (2017). *The Politics of Evidence: From evidence-based policy to the good governance of evidence (Routledge Studies in Governance and Public Policy)* (1st ed.). Routledge.
- Perry, J. L., & Volcker, P. A. (2020). *Public Service and Good Governance for the Twenty-First Century*. University of Pennsylvania Press.
- Ronchi, A. M. (2019*). e-Democracy: Toward a New Model of (Inter)active Society (1st ed. 2019 ed.)*. Springer.
- Solomon, J. (2020). *Corporate Governance and Accountability (*5th *ed.*). Wiley.
- Towah, W. D. (2019). *The Impact of Good Governance and Stability on Sustainable Development*. LAP LAMBERT Academic Publishing.
- Welland, H. (2021). *Political Economy and Imperial Governance in Eighteenth-Century Britain (Routledge Studies in Eighteenth-Century Cultures and Societies) (1st ed.)*. Routledge
- Bhattacharyya, Harihar, & Koing, Lion. (2016) *Globalisation and Governance in India*, Routledge, London.

Offered to other Departments:(GEC)

Semester-II

Paper-XIV Code: (SSH POS01 (112) GEC4004

Introduction to Indian Constitution

Course Objective: -

Its aim is to develop a better understanding of the Indian constitution and different organs of the government among the readers. They will be able to appreciate the philosophy of the Indian constitution basic principles of governance and centre state relations as well as the overall functioning of the Indian federation.

Course learning outcomes:

The learning outcomes are as follow: -

CLO 1: To understand the philosophy of the Indian Constitution

CLO 2: To understand the Fundamental Rights, Duties and Directive principle of state policy.

CLO 3: To learn about the structure and functioning of the Union government.

CLO 4: To learn about the structure and function of state government.

CLO 5: To appreciate the centre state relations in India.

Unit-I

Evolution, formation and Philosophy of Indian Constitution

Unit-II

Fundamental Rights and Duties

Directive Principles of State Policy

Unit-III

Union Legislature, Executive and Judiciary

State legislature, Executive and Judiciary

Unit-IV

Centre State relations in India, Election and Electoral Process.

Suggested Readings:

- Ananth, K. V. (2015). *The Indian Constitution and Social Revolution: Right to Property since Independence (SAGE Series in Modern Indian History)* (First ed.). SAGE Publications Pvt. Ltd.
- Austin, G. (1999). *The Indian Constitution: Cornerstone of a Nation*. Oxford University Press.
- Bakshi, P. M. (2020). *The Constitution Of India* (17th ed.). Lexis Nexis, New Delhi.
- Baruah, P., & Rouleau, N. (2011). Democracy, Representation, and Self-Rule in the Indian Constitution. *Verfassung Und Recht in Übersee / Law and Politics in Africa, Asia and Latin America, 44*(2), 177-195. Retrieved August 24, 2021, from http://www.jstor.org/stable/43239606
- Basu, D.,(2021). *Introduction to the Constitution of India* (25th ed.). Prentice-Hall.
- Choudhry, S., Khosla, M., & Mehta, P. B. (2016). *The Oxford Handbook of the Indian Constitution*. Oxford University Press.
- De, R. (2018). *A People's Constitution: The Everyday Life of Law in the Indian Republic (Histories of Economic Life Book 18)* (Illustrated ed.). Princeton University Press.
- Dalal, Rajbir Singh, (2009) *Fundamental Rights Enshrined in Indian Constitution: Provisions and Practices*, Indian Journal of Political Science, 70(3).
- Kannabiran, K. (2012). *Tools of Justice: Non-discrimination and the Indian Constitution* (1st ed.). Routledge India.
- Khosla, S., & Semwal, M. (2011). Human Rights Jurisprudence In Indian Constitution Right To Equality And Life: Concept And Substance. *The Indian Journal of Political Science, 72*(4), 927-936. Retrieved August 24, 2021, from http://www.jstor.org/stable/41856528
- Panwar, N. (2010). *Directive Principles Of State Policy Envisioned In Indian Constitution: A Critical Review of its Implementation in Madhya Pradesh*. The Indian Journal of Political Science, *71*(1), 323-332. Retrieved August 24, 2021, from http://www.jstor.org/stable/42748390
- Pylee, M. V. (2017). *India's Constitution, 16th Edition*. S CHAND & Company Limited.
- Rajaram, M. (2009). *Indian Constitution*. New Age International Publishers.

- Sinha, D. (2013). Reading of the Indian Constitution. *Economic and Political Weekly, 48*(11), 34-36. Retrieved August 24, 2021, from http://www.jstor.org/stable/23391417
- Bhatiya, Udit. (ed), (2018). *The Indian Constituent Assembly: Deliberations on Democracy*. Routledge, London.
- Bhargava, Rajeev. (ed), (2008). *Politics and Ethics of the Indian Constitution.* Oxford University Press.
- Hasan, Zoya, Sridharan, E, & Sudarshan, R. (ed), (2002). *India's living constitution ideas, practices, controversies.* Permanent Black, New Delhi.
- Kosla, Madhav. (2012). *Indian Constitution.* Oxford University Press.
- Khosla, Madhav. (2020). I*ndia's founding moment: The constitution of a most surprising democracy.* Harvard University Press, Harward.
- Krishnaswamy, S. (2010). *Democracy and constitutionalism in India: A study of the basic structure doctrine*. Oxford University Press.
- Chowdhary, Sujit, Khosla, Madhav, Mehta, Pratap Bhanu. (ed), (2017). *The Oxford Handbook of the Indian Constitution*, Oxford University Press.

Semester-II

Paper-XV Code: (SSH POS01 (113) GEC 4004

Basics of International Politics

Course Objective: -

This course is aimed to provide a basic understanding of the historical genesis of word politics. It further supplements students with prominent theories of International Politics. In the end, this also gives a brief introduction of major international actors and their activeness in promoting Disarmament and Arms control.

Course Learning Outcome

After the completion of the course, the students will be able to:

CLO 01. Students will be able to understand the historical genesis of International Politics.

CLO 02. Students will be able to understand the difference between National policy-making and international policy-making.

CLO 03. Students will be able to develop in-depth understanding of very prominent theories of International Politics.

CLO 04. Students will be able to know about the role of UNO and its activeness in promoting international peace through Arms Control and Disarmament Measures.

Unit – 1

International Politics: Meaning, Nature, Scope, Stages of Growth

Unit – 2

Major Concepts: National Power, National Interest, World Public Opinion

Unit – 3

Traditional Approaches: Realism, System, Marxian

Unit – 4

UNO: An Introduction, Arms Control and Disarmament

Suggested Readings:

- Basu, R. (2004). *The United Nations: Structure & functions of an international organisation*. Sterling Publishers Pvt.
- Bellamy, A. J., & Williams, P. (2014). *Peace operations and global order*. Routledge.
- Carvalho, B. D., Lopez, J. C., & Leira, H. (2021). *Routledge handbook of historical international relations*. Routledge.
- Dunne, T., Kurki, M., & Smith, S. (2021). *International Relations Theories: Discipline and diversity*. Oxford University Press, USA.
- Foradori, P., Giacomello, G., & Pascolini, A. (Eds.). (2017). *Arms Control and Disarmament: 50 Years of Experience in Nuclear Education*. Springer.
- Garner, R., Ferdinand, P., & Lawson, S. (2020). *Introduction to Politics*. Oxford University Press, USA.
- Ghosh, P. (2020). *International Relations* (5th ed.). PHI Learning Pvt.
- Hanhimäki, J. M. (2015). *The United Nations: A very short introduction*. Oxford University Press, USA.
- Jindal, N., & Kumar, K. (2020). *International Relations: Theory and practice*. Sage Publications Pvt.
- Kille, K. J., & Lyon, A. J. (2020). *The United Nations: 75 years of promoting peace, human rights, and development*. ABC-CLIO.
- Koops, J., MacQueen, N., Tardy, T., & Williams, P. D. (2015). *The Oxford Handbook of United Nations Peacekeeping operations*. Oxford University Press.
- Koops, J., MacQueen, N., Tardy, T., & Williams, P. D. (2015). *The Oxford Handbook of United Nations Peacekeeping operations*. Oxford University Press.
- Kuusisto, R. (2019). *International Relations narratives: Plotting world politics*.
- Mingst, K., McKibben, H., & Arreguin-Toft, I. (2018). *Essentials of international relations* (8th ed.). W.W. Norton & Company.
- Peter, M., & Coning, C. D. (2020). *United Nations peace operations in a changing global order*.
- Weiss, T. G., & Daws, S. (2018). *The Oxford handbook on the United Nations*. Oxford University Press.

Semester: III

Paper: XVI Code: SSHPOS01 (114) C5005

Research Methodology

Course Objective

This course introduces approaches and methodologies in the social sciences, to stimulate students to actively engage with social science research and help them apply appropriate research methodologies to the research areas of their choosing.

Course learning outcomes:

This course will—

CLO 1: Enable the students to understand and undertake the scientific study of politics

CLO 2: Help students use the basic tools and techniques needed to critically examine and produce scholarly research in political science.

CLO 3: Provide the students with a series of strategies to design their research

CLO 4: Help students develop an integrated approach to quantitative and qualitative analysis.

Unit-I

Research: Meaning, Nature and Scope

Scientific Research: Meaning, Nature and Steps

Concepts, Variables, Hypothesis, Theory

Unit-II

Identification of Research Problem

Research Design

Steps involve in Research Design

Qualitative and Quantitative Research

Unit-III

Methods of data collection: Quantitative and Qualitative Research

Experimental Research

Case Research

Interpretive Research

Unit-IV

Techniques of Data Analysis and Interpretation

Report/Paper writing

Referencing, Citation and Bibliographic intext

Suggested Readings:

- Babbie, Earl (2010): *The Practice of Social Research,* 12th ed., Belmont: Wadswort.
- Bryman, Alan (2012): *Social Research Methods*, 4th ed., Oxford: Oxford University Press.
- Bryman, Alan, (2018), *Social Research Methods,* (5th ed.). New Delhi: Oxford University Press.
- Della Porta, Donatella and Michael Keating (2008): ―How Many Approaches in the Social Sciences? An Epistemological Introduction‖, in: Donatella della Porta and Michael Keating (eds.), *Approaches and Methodologies in the Social Sciences, Cambridge:* Cambridge University Press.
- Denzin, Norman and Yvonna Lincoln (2013): ―*Introduction: The Discipline and Practice of Qualitative Research*‖*, in Norman Denzin and Yvonna Lincoln, Collecting and Interpreting Qualitative Materials*, London: Sage.
- Giri, Arunangshu, Biswas, Debasish, (2019), *Research Methodology For Social Sciences,* New Delhi: Sage Publications India Pvt Ltd.
- Kumar, Ranjit, (2019), *Research Methodology: A Step-By-Step Guide For Beginners,* (5th ed.). New Delhi: Sage Publications Asia-Pacific Ltd.
- Lune, Howard, Berg, Bruce, L. (2017), *Qualitative Research Methods For Social Sciences,* (9th ed.). Pearson India.
- Neuman, W. Lawrence, (2014), *Social Research Methods: Qualitative and Quantitative Approaches,* (7th ed.). U.S.A: Pearson Education Limited.
- Weber, Max & Edward Shils (1949): *The Methodology of the Social Sciences*, New York, Free Press

Semester-III

Paper-XVII Code: SSH POS01 (115) C5005

Foreign Policy of India

Course Objectives

The paper aims at acquainting the students with the core elements of India's foreign policy and its relations vis-à-vis other states. Introduce the students to the main tenets of Indian foreign policy. Challenge the students to acquaint and familiarize with the nature and scope of Indian Foreign Policy.

Under the subject following topics will be dealt -

- To introduce the factors that led to the genesis and foundation of Indian foreign policy
- India's relation with major powers from historical to critical perspective, India's ability, and strategy to engage with powerful nations in order to secure its national interest
- India's role in the process of disarmament and arms control, India's nuclear policy, India dealing with discriminatory NPT and CTBT
- India and the process of globalization and world environmental governance
- Historical relations with neighboring countries, Major issues affecting the neighboring countries, Areas of cooperation and agreements between the countries, Bilateral relations with the countries
- India's engagement with different regional organizations such as SAARC, ASEAN, EU, The Commonwealth and the Central Asian Republic.

Course learning outcomes:

After the completion of the course, the student will be able to:

CLO 1: Understand the factors that led to the genesis and foundation of Indian Foreign Policy

CLO 2: Understand the basic principles of Indian Foreign Policy such as Non-Alignment Movement, Panchsheel to Panchamrit, peaceful settlement of international disputes etc.

CLO 3: Have an understanding of India's involvement with major powers in past and present world order, analyse the major deals that took between these major powers such as- Indo-US Nuclear Deal, Visa issues with USA, etc.

CLO 4: Analyse the role of India in the global disarmament process and arms control, understand India's nuclear doctrine such as 'No First Use'

CLO 5: Develop a deeper understanding of globalisation and its effect on Indian social-political culture and economy

CLO 6: Understand the historical backgrounds of neighbouring countries, analyse the major agreements and issues that took between neighbouring countries such as the Shimla agreement with Pakistan, land boundary agreement with Bangladesh, Indus water treaty with Pakistan, India Nepal peace treaty, etc.

UNIT 1-

Genesis and foundation of India's foreign policy

India's Foreign Policy: Principles and Objectives

UNIT 2-

Emerging patterns of post-war global politics: India's Perspectives

India and the Major powers: USA, China, and Russian Republic (erstwhile USSR)

Unit-3

India's perspectives; Disarmament and Arms Control

India's Soft Power and Non-conventional Security Issues

Unit-4

India's Neighborhood Foreign Policy

India and partnership with Strategic Organisations: European Union, SAARC, ASEAN, BIMSTEC, SCO, BRICS, IBSA, QUAD, IOR-ARC

Suggested readings-

- Alam, Mohammed, Badrul, (2014), *Contours of India's Foreign Policy: Changes and Challenges.* Ess Ess Pubns.
- Appadorai,A. (1981). *Domestic Roots of India's Foreign Policy 1947-1972*. New Delhi: Oxford University Press.
- Arora, Prem, (2019), *Foreign Policy of India,* (2021 ed.). Heed Editorial-Cosmos Bookhive's.
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- Singh, Subash. (ed.). (2019), *India's Foreign Policy: Reshaping in the contemporary World.* Delhi: Meena Book Publications.
- Tanham, George K. (1992). *Indian Strategic Thought: An Interpretative Essay. Santa Monica*, CA: RAND.
- Singh, Shantesh Kumar (2017), *India's Foreign Policy: Continuity with Difference under Modi Government (ed.)*, Manak Publications, New Delhi, ISBN: 9378314392.
- Singh, Shantesh Kumar (2021), *Emerging trends in India's Foreign Policy*, HP Hamilton Limited, UK.
- Singh, Shantesh Kumar, Shri Prakash Singh (2022), *Non-traditional Security Concerns in India: Issues and Challenges, Palgrave MacMillan*, London, UK, ISBN 978-981-16-3734-6.

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Semester-III

Paper-XVIII: SSH POS 01 (116) C5005

Indian Political Thinkers

Course Objective: -

To inculcate the values, dedication and devotion towards our nation and it is helpful in understanding the vision of Indian political thinkers in broader way

Course learning outcomes:

Some of the learning outcomes are as follow: -

CLO 1: To Understand the origin of Dharma, Varna system, administrative skills, Diplomacy and Raj dharma.

CLO 2: To understand various social and religious reform movements and efforts by social reformers to revive the golden era of ancient India

CLO 3: To learn about the different visions in freedom struggle (Moderates, Extremists -revolutionaries)

CLO 4: To learn about role and relevance of Gandhian ideas and vision of Dr. B.R. Ambedkar

CLO 5: To understand the idea of Hindutva and cultural nationalism

Unit-I

Manu

Kautilya

Shanti Parva

Unit-II

Gopal Krishna Gokhale

Bal Gangadhar Tilak

Aurobindo Gosh

Unit –III

M K Gandhi

Dr. B.R. Ambedkar

Unit-IV

J.P. Narayan

V D Savarkar

M.S. Golwalkar

***Suggested Readings*:**

- Ambedkar, R. B. (2014). *Annihilation of Caste*. Delhi: Blumoon Books.
- Ambedkar, R. B. (2003). *Castes in India: Their Mechanism, Genesis and Development.* New Delhi: Dalit Book Trust.
- Gandhi, M. (1927). *An Autobiography or the story of my experiments with Truth.* Ahmedabad: Navajivan Publishing House.
- Gandhi, M. (1938). *Hind Swaraj*. Ahmedabad: Navajivan Publishing House.
- Golwalkar, M. (1966). *Bunch of Thoughts*. Sahitya Sindhu Prakashan.
- Rangarajan), K. (1992). *Kautilya: The Arthashastra [est. 300 BCE - 150 AD]*. Penguin Books India.
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- Roy, Himanshu, Singh, M.P. (2017), *Indian Political Thought: Themes and Thinkers.* Pearson India.
- Sengupta, Dr. Lopamudra. (ed.). (2021), *Indian Political Thought and Its Contemporary Relevance.* New Delhi: Atlantic Publishers and Distributors.
- Sharma, Urmila, Sharma S.K. (2014), *Indian Political Thought.* New Delhi: Atlantic Publishers and Distributors.
- Singh, Akash, and Mohapatra, Silika. (ed.). (2010), *Indian Political Thought.* New Delhi: Routledge.

Semester-III

Paper XIX-Code: SSH POS01 (117) C5005

Contemporary Socio-Economics Issues in India

Objectives:

Following are the objectives of the course;

- The need and rationale of rapid industrialization; the constraints on rapid industrialization; different phases of industrialization in an emerging economy;
- The relationship between social behavior and economics; their impacts on each other;
- The agricultural development strategies like the green revolution and land reforms etc.
- The basic concept of economic development and reforms; liberalization and privatization**;**
- The process and trends that influenced the social issues (like caste discrimination and gender inequality);
- The origin and elements of social movements (like peasants and tribal movements etc.); their historical perspective and transformation with time.

Course learning outcomes:

Some of the learning outcomes that the students of this course are expected to exhibit:

CLO 1: Understanding the strategies and policies like Protectionist policies for domestic industries, Green Revolution and LPG reforms of 1990s etc;

CLO 2: Discuss and debate on major features and deficiencies of industrial economy and need for future reforms;

CLO 3: Discuss and debate the causes and after effects of land reforms and green revolution;

CLO 4: Understanding of Five-Year Plan strategies for economic development; and Debate on the FDI or TNCs affecting Indian economy;

CLO 5 Understand the factors affecting the social movements their emergence and after-effects; the State intervention to deal with social issues in India;

CLO 6: Analyse and discuss the social issues and movements like Tribal and Peasants movements, Caste, and Gender-related issues.

Unit-I

Development Strategies: Industrial & Agrarian

Model of Mixed economy

Unit-II

Socio-Economic Issues

Land Reforms and Green Revolution

Unit –III

Economic Reforms: Liberalization, Privatization

Rise of Middle Classes

Unit-IV

Social Issues and Social Movements: Tribe, Caste, Gender, Peasant

Suggested Readings:

- Chatterjee,P., (2000) *Development Planning and the Indian State.* in Zoya Hasan (ed.). Politics and the State in India, New Delhi: Sage, pp.116-140. P.

- Dalal, Rajbir Singh. (2013), *District Rural Development Agency: Expectations and Prospects*. Public Administration Review, 14, (1).
- Dalal, Rajbir Singh (2013) *Samajik Nyaya aur Samaveshi Vikas: Ek Samiksha.* Lok Parshashan, IIPA, New Delhi, 5 (2).
- Dalal, Rajbir Singh (2015) *Satat Vikas: Bharat key Sandharbh mein ek Samiksha*. Prashasnika, HCMRIPA, Jaipur, XXXIV, (1-2,)
- Mozoomdar, (1994) *The Rise and Decline of Development Planning in India', in T. Byres (ed.)* The State and Development Planning in India. Delhi: Oxford University Press, pp. 73-108.
- Nayar (1989). *India's Mixed Economy: The Role of Ideology and its Development*. Bombay: Popular Prakashan
- Suri,K., (2006). *Political economy of Agrarian Distress*. in Economic and Political Weekly, XLI (16).
- M. Mohanty, (2002) *The Changing Definition of Rights in India.* in S. Patel, J. Bagchi, and K. Raj (eds.) Thinking Social Sciences in India: Essays in Honour of Alice Thorner Patel, New Delhi: Sage.
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- Ramana,P., (2011). *India's Maoist Insurgency: Evolution, Current Trends and Responses*. in M. Kugelman (ed.) India's Contemporary Security Challenges, Woodrow Wilson International Centre for Scholars Asia Programme, Washington D.C., pp.29-47.
- Patnaik and C. Chandrasekhar, (2007) *India: Dirigisme, Structural Adjustment, and the Radical Alternative.* in B. Nayar (ed.), Globalization and Politics in India. Delhi: Oxford University Press, pp. 218-240.
- P. Joshi, (1979) *Land Reforms in India: Trends and Perspectives*. New Delhi: Allied publishers.
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- Singh, Rajbir, (2004) *Rural Development Administration*, New Delhi: Anmol Publication.
- V. Chibber, (2005). *From Class Compromise to Class Accommodation: Labor's Incorporation into the Indian Political Economy*. in R. Ray, and M.F. Katzenstein (eds.) Social Movements in India, Delhi: Oxford University Press, pp 32-60.
- Singh, R. (2010). *Citizenship, Exclusion & Indian Muslims*. The Indian Journal of Political Science, 71(2), 497-510. http://www.jstor.org/stable/42753712
- Sharma, Chanchal Kumar. (2011). "*A Discursive Dominance Theory of Economic Reform Sustainability: The Case of India*." India Review (Taylor & Francis, U.K.) 10(2): 126–184.
- Varshney, (2010) *Mass Politics or Elite Politics? Understanding the Politics of India's Economic Reforms in R. Mukherji (ed.).* India's Economic Transition: The Politics of Reforms, Delhi: Oxford University Press, pp 146-169

Semester-III

Paper XX Code: SSH POS01 (118) DEC4004 (i)

Federalism in India

Course Objective

This course aims at familiarising the students with all the dimensions of Indian federalism. More specifically, the objective is to help students understand how the union government and the states interact in various dimensions of public policy making and implementation.

Course learning outcomes:

CLO 1: The students will understand what federalism is and why it matters.

CLO 2: The students will be able to compare Indian federalism from federalism practiced in other developed and developing countries.

CLO 3: Students will understand and appreciate the role and significance of non-centralization, decentralization, interdependent policy making and power-sharing in India.

CLO 4: Students will be able to identify researchable issues in Indian Federalism.

Unit-I

Principles and Practice of Federalism

Comparative Federalism: Concepts and Theories

Unit -II

Nature of Federalism in India

Evolution of Indian Federalism since 1947

Unit-III

Political Parties, Party System and Federalism in India

Second Chambers in Federal States: Rajya Sabha in Perspective

Unit-IV

Federalism and Foreign Relations in India

The Political Economy of Fiscal Federalism

Suggested Readings:

- Dalal, Rajbir Singh. (2012), *Bhartiya Sanghvad: Aantrik Suraksha Ek Chunoti,* Lok Prasashan, IIPA, New Delhi, 4(2).
- Dalal, Rajbir Singh., Kumar, Sarban. (2018), *Cooperative Federalism:An Evaluation in Indian Context,* Indian Journal of Political Science, 79(4).
- Jha, Chandra, Prakash, (2019), Current Trends and Issues in Indian Federalism. *Indian Journal of Public Administration, 65* (8), 377-389. DOI: 10.1177/0019556119844591.
- Khan, R (1997). Rethinking Indian Federalism, *Shimla, Indian Institute of Advanced Studies.*
- Kohli, A. (1991). *Democracy and Discontent: India's Growing Crises of Governability*, Cambridge: Cambridge University Press.
- Kothari, R (1988). *State Against Democracy: In Search for Humane Governance,* Delhi: Ajanta.
- Kumar, Dr. Chanchal, (2014). *Federalism in India*. Journal of Business Management and Social Sciences 3, (9), 31-43.

- Leonard T. J (1963). *Federalism In the Commonwealth: A Bibliographic Commentary*, London.
- Lobo, Lancy, Sahu, Mrutuyanjaya and Shah Jayesh. (eds.). (2014), *Federalism in India: Towards A Fresh Balance of Power*. Jaipur: Rawat Publications.
- Singh, Mahendra, Prasad, (2016), *Indian Federalism an Introduction.* Delhi: National Book Trust.
- Tillin, Louise, (2019), *Indian Federalism: Oxford India Short Introductions.* New Delhi: Oxford University Press.
- Sharma, Chanchal Kumar, and Wilfried Swenden, eds. (2017). *Understanding Contemporary Indian Federalism: Competing Perspectives, New Challenges and Future Directions*. 1 edition. U.K.: Routledge.
- Sharma, Chanchal Kumar, and Wilfried Swenden. (2018) "*Modi-fying Indian Federalism? Centre-State Relations Under Modi's Tenure as Prime Minister*." Indian Politics and Policy 1(1): 51–81.
- Sharma, Chanchal Kumar. (2009) *Emerging Dimensions of Decentralisation Debate in the Age of Globalisation*. Indian Journal of Federal Studies 19(1): 47–65.
- Sharma, Chanchal Kumar (2015) *Reimagining Federalism in India: Exploring the Frontiers of Collaborative Federal Architecture*. Asia-Pacific Social Science Review (De La Salle University, Manila) 15(1): 1–25.
- Sharma, Chanchal Kumar, Sandra Destradi, and Johannes Plagemann. (2020) *Partisan Federalism and Subnational Governments' International Engagements: Insights from India*. Publius: The Journal of Federalism 50(4): 566–592.
- Wilfried Swenden & Rekha Saxena (2021) *Policing the federation: the Supreme Court and judicial federalism in India, Territory, Politics, Governance*. DOI: 10.1080/21622671.2021.1887756

Semester-III

Paper XXI Code: SSH POS01 (118) DEC4004 (ii)

Local Self-Government in India

Course Objective:

The Paper aims to introduce students to the historical genesis and institutional setup of the local Self-governance in India and its relevance.

Course learning outcomes:

After the completion of the course, the student will be able to:

CLO 01. Familiarization with the historical genesis of the Panchayati Raj institution in India and its contemporary relevance.

CLO 02. The introduction of73rd and 74th Amendment act will acquaint students with constitutional provisions of local governance.

CLO 03. When Students will be able to know the basic Organizational setup of the Local government and its functions and proceedings, they will become vigilant and active citizens.

CLO 04. Students will be able to understand how the Local Self Government is playing an important role in empowerment of people in India.

Unit- I

Growth and Evolution of Local Self Government in India.

Unit-II

73rd & 74th Constitutional Amendment, Local Self-Government and Empowerment in India.

Unit -III

Organization, Function, and Structure of Urban Local Bodies and Panchayati Raj Institutions.

Unit- IV

E-Governance, NITI Aayog, NHRM, MGNREGA

Suggested Readings:

- Ali Ashraf, (2001). *Government and Politics of Big cities: an Indian case study*. Concept publishing company, Delhi.
- Barthwal CP, (2005). *Local Self-Government.* Sulabh Parkashan*, Lucknow*. (Hindi)
- Bavel, Basanti Lal, (2008). *Panchayti raj evam gramin vikas yojnaye*. Rajsthan Hindi Granth Academy, Jaipur.
- Dalal, Rajbir Singh. (2014). *Shahari Sthaniya Nikayon Ke Samaksh Chunotiyan: Ek Samiksha,* Bhartiya Rajniti Vigyan Shodh Patrika, 6(1).
- Dalal, Rajbir Singh. (2013). *Panchayat (Extension) to Scheduled Areas (Act, 1996): A Remedy to Rising Naxalism,* Dynamics of Public Administration, 30(2).
- Dalal, Rajbir Singh. (2011). *Good Governance in Urban Local Bodies: Issues and Challenges,* Nagar Lok, IIPA, New Delhi, 43(2).
- Dalal, Rajbir Singh. (2009). *Problems of Skilled Youths: Prospects and Perspectives,* Indian Journal of Political Science, 70(1).
- Dalal, Rajbir Singh. (2010). *Attempts Towards Good Governance Through Democratic Decentralization and RTI Act, 2005,* Dynamics of Public Administration, 27(1).
- Debidas Nanda, (1993). *Municipal Administration in India*, Ganga. Kaveri Publishing House, Varanasi.
- Deshmukh, Priyaka, (2018). *Local Self Governance.* New Delhi: Global Vision Publishing House.

- Joshi, R.P., evam Roopa Manglani (2006). *Bharat me Panchayati Raj*. Rajasthan Hindi granth Academy, Jaipur.
- Maheshwari, S.R (2003). *Bharat me Sthaniya Shasan*. Laxminarayan Agrawal, Agra.
- Pal, Mahi, (2020). *Rural Local Governance and Development.* New Delhi: Sage Publications India Private Limited.
- Rao, C. Nagaraja, (2016), *Urban Governance in India.* New Delhi: Gyan Books.
- Saha, Sanpati, Bagchi, Kanak, Kanti, (2019), *Reservation in Local Self-Government and Socio-Economic Empowerment Women*. New Delhi: Abhijeet Publications.
- Sharma, Rashmi, (2009). *Local Self Government in India, Policy and Practice with Special Reference to a Field Study of Decentralisation in Kerela.* New Delhi: Manohar Publishers and Distributors.
- Sharma Ashok (2012)*, Bharat Mein Sthaniya Swasasha*n. Jaipur: RBSA Publication.

Semester-III

Paper: XXII Code: SSH POS01 (118) DEC 4004 (iii)

Introduction to Public Administration

Course Objective:

To study the theoretical framework of public administration, its evolution, different administrative theories, principles of organization and budget, and public policy issues.

Course learning outcomes:

CLO 1: To enable, to understand and analyze different theories of administration, evolution and generic of public administration.

CLO 2: To appreciate the principles of organization with the nature and type of chief executive and its extended agencies.

CLO 3: To have an insight regarding the evolution and development of administrative theories and concepts.

CLO4: To be enabled to understand the budgetary process and public policy perspectives.

UNIT I

Public Administration: Meaning, Nature Scope and Significance, Public and Private Administration, New Public Administration (NPA), New Public Management (NPM)

UNIT II

Administrative Theories: Scientific Management Theory (F.W.- Taylor), Classical Theory (Henry Fayol, Gulick and Urwick), Max Weber and Bureaucratic Approach, Human

Relation Theory (Mayo), Decision making Model (Herbert Simon), Ecological Theory (F.W. Riggs)

UNIT III

Principles of Organization: Organization: Nature and Concept, Structure of Organization: Chief Executive, Line, Staff and Auxiliary Agencies, Principles of Organization: Hierarchy, Unity of Command, Span of control, Authority and Responsibility, Delegation, Co-ordination, Communication.

UNIT IV

Budget and Public Policy: Budget: Meaning and Principles of Budget, Process of Budget in India. Public Policy: Concept, formulation and implementation

Suggested Readings:

- Bidyut Chakrabarty and Prakash Chand,(2017) Public Administration in a Globalizing World: Theories and Practices, Sage, New Delhi,
- Appleby, P.H. (1957). *Policy and Administration*. Alabama: University of Alabama Press.
- Basu, Rumki, (2006), *Public Administration: Concepts and Theories,* Sterling. (Original Work Published 1986)
- C.P. Bhambri (1971). *Administrators in a Changing Society: Bureaucracy and Politics in India,* Delhi: Vikas Publishers.
- Durant, Robert F. (2012). *Debating Public Administration: Management Challenges, Choices, and Opportunities,* Routledge.
- Fadia,B.L, Kuldeep, (2020), *Public Administration in India.* Agra: Sahitya Bhawan.
- Myneni,R. (2016), *Principles of Public Administration.* Faridabad: Allahabad Law Agency.
- Overeem, Patrick (2012). *The Politics-Administration Dichotomy: Toward a Constitutional Perspective,* (2nd ed.), Routledge.
- Sharma, M.P and Sadhana B.L. (2001), *Public Administration in Theory and Practice*, Allahabad: Kitab Mahal.
- Theodoulou, Stella, Z. Roy, Ravi, K. (2016), *Public Administration: A Very Short Introduction.* Oxford University Press.

- Vries, Michiel, S. De. (2016), *Understanding Public Administration,* London: Palgrave Macmillan.
- Sahni, Pradeep., (2016) *Administrative Theory*, New Delhi: Prentice Hall.

Semester-III

Offered to the Other Department:

Paper: XXIII Code: SSHPOS01 (119) GEC4004

Politics in India

Course Objective: -Its main objective is to develop a better understanding of constitutional values and changing character of Indian politics in the post-Independence Era.

Course learning outcomes:

Some of the learning outcomes are as follow: -

CLO 1: To Understand the salient features of the Indian Constitution, Fundamental Rights, and DPSP.

CLO 2: To understand the working of the Indian parliament and judiciary.

CLO 3: To understand the changing character of Indian politics and party system, the rise of communalism, and the Indian concept of secularism.

CLO 4: To learn about various social movements in the post-independence era.

Unit-I

Indian Constitution: Basic features, debates on Fundamental Rights and Directive Principles

Unit-II

Institutional Functioning: Parliament, Judiciary

Unit –III

Parties and Party systems in India

Religion and Politics: Debates on Secularism and Communalism

Unit-IV

Social Movements: Workers, Peasants, Women, Environment.

Suggested Readings:

- Ayub, Sheikh, Javaid, (2015), *Understanding Indian Politics*. New Delhi : Partridge India.
- Chandoke, Neera (2019). *Rethinking Pluralism, Secularism, and Tolerance*. New Delhi: Sage.
- De, Rohit. A People's Constitution (2018): *The Everyday Life of Law in the Indian Republic.* New Delhi: Oxford University Press.
- Dalal, Rajbir Singh (2016). *Electoral Reforms attempts Towards Good Governance in India: An appraisal,* International Journal of Research in Social Sciences, 6(1).
- Dalal, Rajbir Singh (2015). *Indian Democracy: Some Internal Challenges*, International Journal of Physical And Social Sciences, 5(6).
- Fadia, B.L, Kuldeep, (2020). *Indian Government and Politics,* (17th ed.). Agra: Sahitya Bhawan.
- Jayal, Niraja Gopal (2011). *The Oxford Companion to Politics in India.* New Delhi: Oxford University Press.
- Kohli, Atul, et.al. (2018) *Routledge Handbook of Indian Politics.* New Delhi: Routledge.
- Kothari, Rajni, (2012). *Politics in India,* (2nd ed.). Hyderabad: Orient Blackswan pvt. ltd.
- Mitra, K. Subrata. *Politics in India: Structure, Process and Policy*. London: Routledge, 2011. Revised edition, Delhi: Oxford University Press, 2014. Second Routledge edition, 2017.

- Roy, Himanshu, Singh, Mahendra, Prasad, (2018). *Indian Political system,* (4th ed.). Bangalore: Pearson India
- Wilkinson, Steven (2017). *Army and the Nation.* Ranikhet: Permanent Black.
- Sharma, Chanchal Kumar, and Wilfried Swenden. 2020. *Economic governance: Does it make or break a dominant party equilibrium? The case of India.* International Political Science Review 41(3): 451–65.

Semester-III

Paper: XXIV Code - SSHPOS01(120) 120GEC4004

Introduction to National Security

Objectives: The structure of the course has been organized so as to ensure that there is a minimum core component which students of National Security shall have to study the basic requirement of the subject. This core component revolves around the following major subject areas:

- To understand the basics and various dimensions of National Security.
- To understand contemporary non-conventional security issues like terrorism, environment etc.
- To understand the security concerns, policies and treaties in contemporary world.
- To understand the India's strategic and diplomatic moves to maintain peace.
- To understand the contemporary nuclear, cyber or social media related threats for national security.

Course Learning Outcomes:

Some of the learning outcomes that the students of this course are expected to exhibit:

CLO 1-Understanding the basics and importance of the National security and related issues.

CLO 2-Understanding the relationship between national interest and foreign policy.

CLO 3-Discuss and debate on the contemporary security issues and solutions.

CLO 4-Understanding the factors affecting peace and security of a Nation.

Unit-I

National Security: Evolution, Theory and Practice

Key Concepts: Non-Alignment, Balance of Power, Collective Security, Comprehensive Security and Human Security

Unit-II

National vs. International Security: Issues, debates and Challenges in Contemporary World

National Security vs. Human Security

Arms Race vs. Disarmament

War vs. Peace

Unilateralism vs Multilateralism

Unit-III

Non-Conventional Security Concerns: Local, National and Global

Terrorism and Counterterrorism

Cyber, Environmental and Health Security: Preparedness & Response

Social Media, Diplomacy & National Security

Unit-IV

Issues and Challenges to India's National Security

India's Security and Strategy vis-a-vis US, Russia, Pakistan and China

Threats to India's National Security; The Boundary Dispute, Terrorism and Migration

***Suggested Readings*:**

- Ayoob, Mohammed (1995).*The Third World Security Predicament: State Making, Regional Conflict, and the International System.* Boulder: Lynne Rienner.
- Azar, Edward E. and Chung-in Moon, (eds.) (1988). *National Security in the Third World: The Management of Internal and External Threats*. College Park: Centre for International Development and Conflict Management, University of Maryland.
- Bajpai, P. Kanti, Pant, Harsh, V. (eds.). (2013), *India's National Security: A Reader (Critical Issues in Indian Politics).* New Delhi: Oxford University Press.
- Biba, Sebastian, (2016), New Concerns, More Cooperation? How Non-traditional Security Issues Affect Sino-Indian Relations. *Journal of Current Chinese Affairs, 45* (3). 3-30.
- Collins, Alan (ed.) (2010). *Contemporary Security Studies*. Oxford: Oxford University Press.
- Dalal, Rajbir Singh (2015). *Indian Democracy: Some Internal Challenges*, International Journal of Physical And Social Sciences, 5(6).
- Dadwal, Shebonti, Ray and Sinha, Uttam Kumar, (eds.). (2015), *Non-traditional Security Challenges in Asia: Approaches and Responses.* New Delhi: Routledge.
- Job, Brian L. (ed.) (1992). *The (In)Security Dilemma: National Security of Third World States.* Boulder: Lynne Rienner.
- Kumar, Ashok, Anekant,, Vipul, (2019), *Challenges to Internal Security of India,* (4th eds.). Noida: MacGraw Hill Education (India) Private Limited.
- Kumar, Satish. (ed.). (2017), *India's National Security: Annual Review 2016-17.* New Delhi: Routledge India.
- Migdal, Joel S. (1988) *Strong Societies and Weak States: State-Social Relations and State Capabilities in the Third World*. Princeton: Princeton University Press.
- Bajpai Kanti and Mattoo Amitabh (ed) Securing India: Strategic Thought and Practice (New Delhi: Manohar, 1996)
- Singh, Shantesh Kumar, Shri Prakash Singh (2022), *Non-traditional Security Concerns in India: Issues and Challenges*, Palgrave MacMillan, London, UK, ISBN 978-981-16-3734-6.
- Singh, Shantesh Kumar. *Infectious Diseases, National Security and Globalisation*. *World Affairs: The Journal of International Issues*, Vol. 23, No. 1, Spring 2019, Jan-March.

- Singh, Shantesh Kumar. *Global Health Diplomacy*. India Foundation Journal, New Delhi, September-October-2017.

Semester-III

Paper: XXV Code: SSHPOS01(121) GEC4004

Exclusion and Inclusive Policy in India

Course Objective: This course aims to introduce basic issues and perspectives concerning the concepts of social exclusion and inclusion. The concept of social exclusion envelops the understanding of poverty, deprivation and goes beyond this conventional wisdom to include the social and other conditions of all sorts of inequalities. The course takes a critical look at the traditional understanding of exclusion and tries to identify the ways and means of inclusion of the excluded categories.

Course Outcomes

This course will—

- CLO 01: Able to understand the various aspects of intersecting inequalities and also the reproduction of inequalities.
- CLO 02: Able to understand the current issues related to caste, class, gender and other forms of social stratification.
- CLO 03: Discuss the various contesting identity and issues that intensifies resentment and collective action.
- CLO 04: Describe reasons and outcomes of important social movements which shaped our present day political and social order.

Unit- I

Understanding Exclusion and Marginalization: Inequality, exclusion and justice.

Unit-II

Social Exclusion and its consequences:

Regional Disparities and its consequences

Unit- III

Major Reformist thinkers in India

Jyotirao Phule, Periyar, M.K Gandhi, Baba Saheb Ambedkar, Ram Manohar Lohia

Unit-IV

Democratic Inclusion: Policies of Protective Discrimination and Representation

Suggested Readings:

- Ahmed, Imtiaz (ed.) (2000). *Pluralism and Equality-Values in Indian Society and Politics,* Sage: New Delhi.
- Brass, P.R. 2005, *Language, Religion and Politics in North India*. Blackinprint.com publications.
- Dalal, Rajbir Singh(2013) *Samajik Nyaya aur Samaveshi Vikas: Ek Samiksha*. Lok Parshashan, IIPA, New Delhi, 5 (2)
- Dalal, Rajbir Singh, (2017), Democratization and the Increasing demand for Inclusive Development, Public Administration Review, 18(1).
- Desai, A R. (2016), *Social Background of Indian Nationalism.* Sage, New Delhi
- Drèze, Jean and Sen, Amartya, (2002). *Democratic Practice and Social Inequality in India*. Journal of Asian and African Studies, Sage Journal. https://journals.sagepub.com/doi/10.1177/00219096020370020
- Ghosh, Jayati, (2016). *Inequality in India: Drivers and Consequences*. World Social Science Report, UNESCO. https://en.unesco.org/inclusivepolicylab/analytics/inequality-india-drivers-and-consequences.
- Guha, Ramchandra, 2007. *India after Gandhi: The History of the World's Largest Democracy* (Chapter 9: Redrawing the Map), Harper Collins publications.

- Jaffrelot, Christopher, 2006. *The Impact of Affirmative Action in India: More Political than Socioeconomic*. India Review, 5:2, 173-189.
- Singh Rajeev (2009), *Manual Scavenging in India: A case Study,* Economic and Political Weekly, 26-27, June, 2009. https://www.jstor.org/stable/40279798
- *Singh Rajeev (2010), Citizenship, Exclusion and Indian Muslim,* Indian Journal of Political Science, April-June 2010. https://www.jstor.org/stable/42753712
- Shah, G. et al. (2010*), Untouchability in Rural India, Sage,* New Delhi.
- Srinivas M. N. (ed.) (1996*) Caste: Its Twentieth Century Avatar,Viking,* New Delhi.
- Srinivas M.N. (1995*) Social Change in Modern India.* Orient Longman, New Delhi.

(Semester: IV)

Paper: XXVI Code: SSH POS01 (122) C8008

Dissertation

(Semester: IV)

Paper: XXVII Code: SSH POS01 (123) C4004

Field Study

(Semester: IV)

Paper: XXVIII Code - SSH POS01 (124) C5005

Contemporary Indian Political Thinkers

Course Objective:

To inculcate the values, dedication and devotion towards our nation and it is helpful in understanding the vision of Indian political thinkers in broader way.

Course learning outcomes:

Some of the learning outcomes are as follow: -

CLO 1: To understand the role and contribution of Pandita Ramabai, Sister Nivedita and Savitri Bai Phule in Indian political thought and women empowerment in India.

CLO 2: To understand the views of M.N. Roy and J.P. Narayan on Socialism and Democracy.

CLO 3: To understand the views of R.M. Lohia and J.L. Nehru on Socialism and Democracy.

CLO 4: To understand the views of Rabindranath Tagore on nationalism and cosmopolitanism.

CLO 5: To understand the social and political views of M. K. Gandhi and Bhimrao Ambedkar and their contribution for Indian society.

Unit-I

Pandita Ramabai

Sister Nivedita

Savitri Bai Phule

Unit-II

Rabindranath Tagore

M. K. Gandhi

Bhimrao Ambedkar

Unit –III

R.M. Lohia

J.L. Nehru

Unit-IV

M.N. Roy

Jayaprakash Narayan

Suggested Readings:

- Bhattacharya, Alak (2010). *Nivedita: Synthesis of East and West*. Northern Book Centre: New Delhi.
- Som, Reba (2017). *Margot: Sister Nivedita of Swami Vivekananda*. Penguin Random House India Private Limited.
- P. Ramabai , (2013). *The High Caste Hindu Woman*. Critical Quest, Delhi.
- G. Omvedt, (2008). *Ramabai: Women in the Kingdom of God', in Seeking Begumpura: The Social Vision of Anti Caste Intellectuals*. New Delhi: Navayana. pp. 205-224.
- Amiya P.Sen ed.,(2014) *Religion and Rabindranath Tagore: Select Discourses, Addresses and Letters in Translation*. New Delhi: Oxford University Press.
- Bhattacharya, Sabyasachi (2011). *Rabindranath Tagore*. New Delhi: Viking, Penguin Books India.

- B. R Ambedkar, Babasaheb Ambedkar Writing and Speeches. (2013) Vol. 13. *Maharashtra: Education Department Government of Maharashtra*. .
- S. Sinha, (2010). *Lohia's Socialism: An underdog's perspective.* in Economic and Political Weekly, Vol. XLV (40) pp. 51-55.
- Kumar, (2010). *Understanding Lohia's Political Sociology: Intersectionality of Caste, Class, Gender and Language Issue.* in Economic and Political Weekly, Vol. XLV (40), pp. 64-70.
- Bidyut Chakrabarty (ed.). (2014) *Nonviolence: Challenges and Prospects*. New Delhi: Oxford University Press.
- Mehta, V.R. and Pantham, Thomas (eds.) (2006). *Political Ideas in Modern India: Thematic Explorations*. New Delhi, Sage.
- V.P. Verma, (1974). *Modern Indian Political Thought*, Lakshmi Naryan Aggarwal, Agra.
- T. Pantham, and K. Deustch (eds.), (1986) *Political Thought in Modern India*. Sage Publishers, New Delhi.
- Chakrabarty, B., & Pandey, R. (2009). *Modern Indian Political Thought*. New Delhi: SAGE Publications India Pvt. Ltd.
- Kumar, R. (2006). *Modern Indian political thought*. New Delhi.
- Padhey, K.S. (2011). *Indian Political Thought*. Delhi: PH Learning.
- Ranjan, R. (2010). *Indian Political Thought. New Delhi*: Anmol Publications Pvt.Ltd.
- Ray, B., & Misra, R. (2012). *Indian Political Thought*. New Delhi: Kaveri Books.
- Sharma, A. (2000). *Classical Hindu thought.* New Delhi: Oxford University Press.
- Singh, A., & Mohaptra, S. (2010). *Indian Political Thought*: *A Reader* (Its ed.). Abingdon, Oxon: Routledge.
- Roy Himanshu and Singh, Mahendra Prasad., (2017) *Indian Political Thought: Themes and Thinkers* (2nd Edition). Noida: Pearson.
- Gauba, O. P., (2021) *Indian Political Thought,* New Delhi: National.

Semester: IV

Paper: XXIX Code: SSH POS01 (125) DEC4004 (i)

Contemporary Issues in World Politics

Course Objectives:

- To understand the issue of Identity crisis and the emergence of ethnic conflicts and the status in contemporary time
- To develop an empathetic outlook towards the issue of cross border terrorism
- To debate and develop insightful gains around the role of INGOs/IGOs
- To acquire holistic and sensitive approach to comprehend environmental issues
- To understand the crisis related to energy and the world politics to secure the energy
- To discuss, debate and develop thought provoking ideas around the issues of armed conflicts, civil war, terrorism

Course learning outcomes:

CLO 1: Students shall be able to identify the challenges to democracy in the world and provide their own suggestions to tackle the same

CLO 2: The terms like Banana Republics being understood through debates and discussion shall be identified in real life

CLO 3: Students shall be able to identify the factors causing energy crisis and debate towards the probable solution of the issue

CLO 4: The broader debates concerning Nuclear Proliferations shall be well understood and further contributed to by the students

CLO 5: Issues of armed conflicts, civil war and terrorism shall be critically reviewed, debated and understood

Unit I

Democratic Challenges in the World

Authoritarian Regimes

Identity Issues and Ethnic Conflicts

Unit II

Cross Border Terrorism and Non-State Actors

Globalization and INGOs/IGOs

Unit III

Environmental Issues and debate on Climate Change

Energy Crisis and World Politics

Unit IV

Nuclear Proliferations and New World Order,

Non-Conventional Security Issues: Migration, Disaster, Food Security, Cyber Security

Suggested Readings:

- Art Robert and Robert Jervis, 2009, *International Politics – Enduring Concepts and* *Antonescu, M. V. (2019). Food Security in the Context of a Global Food Crisis and the Rise of" Food Powers"-Several Considerations*. In Romanian Military Thinking International Scientific Conference Proceedings (pp. 102-119). Central ethnic-editorial al armatei.

- Bahrampour, H., Marnani, A. K. B., Askari, M. B., & Bahrampour, M. R. (2020). *Evaluation of renewable energies production potential in the Middle East: confronting the world's energy crisis*. Frontiers in Energy, 14(1), 42-56.
- Black-Branch, J. (2017). *Nuclear Terrorism by States and Non-state Actors: Global Responses to Threats to Military and Human Security in International Law*. Journal of Conflict and Security Law, 22(2), 201-248.
- Bonvecchi, A., & Simison, E. (2017). *Legislative institutions and performance in authoritarian regimes*. Comparative Politics, 49(4), 521-544.
- Chen, J., & Xu, Y. (2017). *Information manipulation and reform in authoritarian regimes.* Political Science Research and Methods, 5(1), 163-178.
- Doyle, J. (2016). *Mediating climate change*. Routledge.
- Ezrow, N. (2017). *Global politics and violent non-state actors*. Sage.
- Harkabi, Y., Shenkman, Y., Dowty, A., & Orlans, D. (2017). *Nuclear war and nuclear peace*. Routledge.
- Hughes, H. (2018). *Environmental security. In Global Environmental Politics* (pp. 66-82). Routledge.
- Mechkova, V., Lührmann, A., & *Lindberg, S. I. (2017). How much democratic backsliding?* Journal of Democracy, 28(4), 162-169.
- Nordås, R., & Gleditsch, N. P. (2015). *Climate change and conflict*. In Competition and Conflicts on Resource Use (pp. 21-38). Springer, Cham.
- Pogoson, A. I. (2018). *Non-state actors, terrorism and the new global reality.* The Nigerian Journal of Sociology and Anthropology (NJSA), 16(1), 152.
- Rosow, S. J. (2000). *Globalisation as democratic theory*. Millennium, *29*(1), 27-45.
- Sinaulan, R. L. (2017*). Transformation of Legal System across the Globalized World.* JL Pol'y & Globalization, 62, 63.
- Stavenhagen, R. (2016). *Ethnic conflicts and the nation-state*. Springer.
- Tu, Y. (2018). *Urban debates for climate change after the Kyoto Protocol*.
- Von Soest, C., & Grauvogel, J. (2017). *Identity, procedures and performance: how authoritarian regimes legitimize their rule*. Contemporary Politics, 23(3), 287-305.
- Von Soest, C. (2015). *Democracy prevention: The international collaboration of authoritarian regimes*. European Journal of Political Research, 54(4), 623-638.

Semester-IV

Paper: XXX Code: SSH POS01 (125) DEC4004 (ii)

Comparative Federalism

Course Objectives:

The main objective of this course is to understand the normative theory of federalism and how it is applied in practice in federal systems. In this course, we will explore the logic of centralization, decentralization, self-rule and shared rule. The course will also look into the relationship between federalism and political democracy & conflict on the one hand and federalism and economic growth on the other.

Course Learning Outcomes

Upon successful completion, students will have the knowledge and skills to:

CLO1-Explain the concept of federalism, its origin and its intended purposes;

CLO2-Assess the nature of federalism (the content of self-rule and shared rule) in a country and how it works within its context;

CLO3-Demonstrate understanding of the principles of designing federalism in different contexts;

CLO4-Demonstrate understanding of comparative Federalism in presentations and research.

Unit I:

The Meaning, Origin and Purposes of Federalism

Unit II:

Principles of Designing Federalism

Unit III:

Assignment of Taxation and Spending Authority

Unit IV:

Federalism and Political Conflicts

Federal Governance and Economic Growth

Suggested Readings:

- Beramendi, Pablo. 2007. *Federalism. In C. Boix and S. Stokes (Eds).* Oxford Handbook of Comparative Politics.
- Singh, Mahendra Prasad. "*Federalism." Max Planck Encyclopedia of Comparative Constitutional Law.* https://oxcon.ouplaw.com/view/10.1093/law-mpeccol/law-mpeccol-e279?prd=MPECCOL
- William Riker. 1964. *Federalism: Origin, Operation, Significance*. (Boston: Little, Brown and Company). Chapter 2.
- Alfred Stepan, *"Federalism and Democracy: Beyond the U.S. Model,"* Journal of Democracy 10: 4 (October 1999), p. 19-33.

- Jacob Levy. 2007. "*Federalism, Liberalism and the Separation of Loyalties*", APSR 101(3): 459-477.
- Filippov, M., Peter Ordeshook, and Olga Shvetsova. 2004. *Designing Federalism: A Theory of Self-Sustainable Federal Institutions*. (Cambridge, UK: Cambridge University Press).
- Bednar, Jenna. 2009. *The Robust Federation: Principles of Design*. New York: Cambridge University Press.
- Sharma, Chanchal Kumar, and Wilfried Swenden. 2018. "*Modi-Fying Indian Federalism? Center-State Relations Under Modi's Tenure as Prime Minister*." Indian Politics and Policy 1(1): 51–81.
- Oates, Wallace. 1999. "*An Essay on Fiscal Federalism,*" Journal of Economic Literature. Vol. 37 (3). p 1120-49.
- Sharma, Chanchal, and Alice Valdesalici. "*Fiscal Federalism." Max Planck Encyclopedia of Comparative Constitutional Law*. https://oxcon.ouplaw.com/view/10.1093/law-mpeccol/law-mpeccol-e287?prd=MPECCOL
- Bakke, K. 2015. *Decentralization and Intrastate Struggles: Chechnya, Punjab, and Quebec*, Cambridge, CUP.
- Arend Lijphart, "*The Puzzle of Indian Democracy: A Consociational Interpretation*," American Political Science Review 90: 2 (June 1996), p. 258-268.
- Beramendi, P; Garmendia, A; Leon, S. 2019. *Fiscal Decentralization and Competitive Politics: Explaining the Survival of Subnational Governmen*ts. WP-Duke UC3M.
- Weingast, Barry. 1995. "*The Economic Role of Political Institutions: MarketPreserving Federalism and Economic Growth*," Journal of Law, Economics, and Organization 11: 1-31.
- Rodden, Jonathan and Susan Rose-Ackerman. 1997. "*Does Federalism Preserve Markets?*" Virginia Law Review 83, 7: 1521-72.

Semester-IV

Paper-XXXI-Code (SSHPOS01 (125) DEC4004 (iii)

Political Ideologies

Course Objective:

This course aims to introduce students to the concept of ideology and its relationship with other political concepts such as power and legitimacy. We will explore the main features of several major political ideologies of the world and their role in the creation and functioning of the governmental structures and system.

Course Learning Outcome:

CLO 1-Demonstrate an understanding of the central themes of the political ideologies examined

CLO 2-Critically read and analyses modern and contemporary texts by key thinkers

CLO 3-Illustrate and evaluate the development of the central tenets of political ideologies

CLO 4-Compare and contrast different ideological tradition

CLO 5-Apply political ideologies to the analysis of real-world political, economic and social institutions

Unit- I

Liberalism

Marxism

Unit-II

Nationalism

Anarchism

Unit -III

Conservatism

Fascism

Unit-IV

Feminism

Cosmopolitanism

Environmentalism

Suggested Reading:

- Michael Freeden, Lyman Tower Sargent, and Marc Stears (eds.) (2000). *The Oxford Handbook of Political Ideologies*. Oxford University Press Delhi.
- Haleh Arshar (ed.) (1996). *Women and Politics in the Third World*. London: Routledge.
- United Nations (2000). *The World's Women 2000: Trends and Statistic*s. New York: United Nations
- Baradat Leon P, (2006). *Political ideologies*. prentice Hall, New Delhi
- Heywood Andrew, (2016). *Political Ideologies*. Palgrave Macmillan
- Ebenstein, (1996). *Today's Ism*. Prentice Hall,
- Adams Ian, (1993). *Political Ideologies Today*. Manchester, Manchester University Press
- Bhole Bhaskar, (2002). *Rajakiya Siddhanta ani Vishleshan*. Nagpur, Pimplapure
- Goodin Robert and Philip Petit (eds.), (1993). *A Companion to Contemporary Political Philosophy*. London, Blackwell
- Graham Gordon, (1986). *Politics in its Place- A Study of Six Ideologies*. Oxford, Clarendon Press

- Macridis Roy C, (1985). *Contemporary Political Ideologies*. Boston, Little Brown and Co.
- Vincent Andrew, (1992). *Modern Political Ideologies*. London, Blackwell
- Bhole Bhaskar, (2002). *Rajakiya Siddhanta ani Vishleshan*. Nagpur, Pimpalapure
- Blakely Georgina & Valerie Bryson (eds.), (2002). *Contemporary Political Concepts*. London, Pluto Press
- Goodwin Barbara, (2004). *Using Political Ideas*. Chichester, John Wiley & Sons
- Hampton Jean, (1998). *Political Philosophy*. New Delhi, OUP
- Hawkesworth Mary and Maurice Kogan (eds.), (1992), *Encyclopaedia of Government and Politics (Vol. I)*, London, Routledge
- Knowles Dudley, (2001). *Political Philosophy, London*. Routledge
- Pierson Christopher, (2004). *The Modern State, London*. Routledge
- Vandana Shiva, (1998). *Staying Alive: Women Ecology and Development in India*. New Delhi: Kali for Women,
- Nivedita Menon, (1999). *Gender and Politics in India*. New York, OUP,
- Vandana Shiva (ed) (1994). *Close to Home: Women Reconnect, Ecology, Health and Development Worldwide*. Philadelphia New Society Publishers
- Haleh Arshar (ed.) (1996). *Women and Politics in the Third World, London: Routledge*.

Semester-IV

Paper-XXXII Code: (SSH POS01 (126) GEC4004

Modern Indian Political Philosophy

Course Objective: - To inculcate the values, Dedication, and devotion towards our nation and it helps understand the vision of Indian political thinkers in a broader way.

Course Learning Outcome: -

some of the learning outcomes are as follow: -

CLO 1-To understand various social and religious reform movements and efforts by social reformers to revive the golden era of ancient India.

CLO 2-To learn about the different visions in freedom struggle (Moderates, Extremists, revolutionaries)

CLO 3-To learn about the role and relevance of Gandhian ideals and vision of Dr. B.R. Ambedkar.

CLO 4-To understand the idea of Hinduism and cultural nationalism.

Unit-I

Hinduism

Vedanta

Unit-II

Nationalism

Secularism

Unit –III

Socialism

Humanism

Unit-IV

Feminism

Environmentalism

Suggested Readings:

- Verma, V.P. (1974). *Modern Indian Political Thought*. Lakshmi Naryan Aggarwal, Agra.
- Appadorai(1992). *Indian Political Thinking through the Ages*. Khanna Publishers, Delhi.
- Bandopandhyay, J. (1969). *Social and Political Thought of Gandhi*. Allied Publishers, Bombay,
- Pantham, T. and Deutsch. K. (eds.), (1986). *Political Thought in Modern India*. Sage Publishers, New Delhi.
- Jha. M.N. (2016) *Political Thought in Modern India*. Meenakshi Prakashan, Meerut.
- Mehta, V.R. (1996). *Indian Political Thought, Manohar*. New Delhi.
- Dharampal (2017) revised. *Bhartiya Chitta, Manas and Kala In Essential Writings of Dharampal.* Bharat Peetham, India.
- Godbole Madhav. (2018). *Dharmnirpekshta: Dorahe par Bharat*. Sage Bhasha, New Delhi
- Guava O.P(2019). *Bhartiya Rajneeti Vicharak*. National Paperback

- Habib S. Irfan (2017). *Indian Nationalism: The Essential Writings*. Aleph Book Company
- Malik S.K, Tomar Ankit. (2021). *Revisiting Modern Indian Thought: Themes and Perspectives*. Routledge India
- Pantham Thomas and Deutsch Kenneth (2017). *Bha ofrat Mein Rajneetik Vichar*. Sage Bhasha, New Delhi
- Thapar Romila, Noorani A.G, Menon S. (2016). *On Nationalism*. Lulu.Com. U.N. Ghosal, A History of Indian Political Ideas, OUP, Mumbai.
- Appadurai. A. *Indian Political Thinking*. Oxford University Press,New Delhi.
- Verma.V.P. (2015), Ancient *and Medieval Indian Political Thought*. Agra: Laxhmi Narayan Agrawal.

Semester-IV

Paper: XXXIII Code - SSHPOS01(127) GEC4004

Introduction to Peace and Conflict Resolution

Course Objectives-

The paper aims at acquainting the students with the core elements of peace and conflict studies. The course is designed to meet the following objectives:

- Develop the understanding of origin of peace and conflict studies
- Develop the understanding of concepts such as peace keeping, peace-making, peace building
- To have an understanding from theoretical to practical perspective

- Role of international institutions in the peace and conflict management
- Basic understanding of Major conflict areas around the world
- Issues related with human rights and humanitarian intervention

Course Outcome-

After the completion of the course students will be able to: -

CLO1-Understand the factors led to the development of peace and conflict studies

CLO2-Understand the meaning of peace keeping, peace-making, peace building, responsibility to protect, Agenda for peace etc

CLO3-Understand the theoretical developments

CLO4-Understand the nature and types of conflicts

CLO5-Understand the roles played by international organisations, institutions, state and individual to promote international peace

CLO6-Understand the mechanisms of conflict resolution – negotiations, mediations, facilitation and arbitration

CLO7-Understand the major conflicts of different nations

UNIT I

Introduction to Peace and Conflict studies

Origin, Growth and Development of Peace and Conflict Studies

Key Concepts of Peace and Conflict: Peace Keeping, Peace Making, Peace Building, Conflict Resolution, Prevention and Transformation

UNIT II

Understanding Peace and Conflict

Theories of Peace and Conflict: Liberal, Marxist, Gandhian and Feminist

Types of Conflict: Clash of Civilization, Environmental Conflict, Ethnic Conflict and Terrorism

UNIT III

Conflict Resolution and Strategy of Peace Making

Role of Multilateral Organisations in Conflict Resolution,

Contemporary Initiatives for Conflict Resolution: Agenda for Peace, Responsibility to Protect (R2P) and Beyond

The strategy of Peace Making: Actors; - Approaches; – Facilitation, Mediation, and Arbitration, Processes; – Negotiations, Institutions, Individuals and State,

UNIT IV

Contemporary International Conflicts and Human Rights

Contemporary Conflicts: Rwanda, Afghanistan, Kosovo, Palestine, Syria and Ukraine

Human Rights and Humanitarian Intervention in Conflict Prone Zones

Suggested readings

- Backer, D., Bhavnani, R., & Huth, P. (Eds.). (2016). *Peace and Conflict 2016*. Routledge.
- Barash, D. P., & Webel, C. P. (2016). *Peace and conflict studies*. Sage Publications.
- Bellamy, A. J., & Luck, E. C. (2018). *The responsibility to protect: from promise to practice*. John Wiley & Sons.
- Bellamy, A., & Dunne, T. (Eds.). (2016). *The Oxford Handbook of the Responsibility to Protect*. Oxford University Press.
- Byrne, S., Matyók, T., Scott, I. M., & Senehi, J. (2019). *Peace and conflict studies in the 21st century: Theory, substance, and practice*. In Routledge companion to peace and conflict studies (pp. 3-21). Routledge.
- Cengiz, S. (2020). *Assessing the Astana peace process for Syria: Actors, approaches, and differences.* Contemporary Review of the Middle East, 7(2), 200-214.
- De Coning, C. (2020). *Insights from Complexity Theory for Peace and Conflict Studies.*
- Fossati, F. (2018). *Contemporary conflict resolution processes: diagnoses and therapies.*
- Jeong, H. W. (2017). *Peace and conflict studies: An introduction*. Taylor & Francis.
- McLeod, L., & O'Reilly, M. (2019). *Critical peace and conflict studies: Feminist interventions*. Peacebuilding, *7*(2), 127-145.
- Reimer, L. E., Schmitz, C. L., Janke, E. M., Askerov, A., Strahl, B. T., & Matyók, T. G. (2015). *Transformative change: An introduction to peace and conflict studies*. Lexington Books.
- Taras, R., & Ganguly, R. (2015). *Understanding ethnic conflict*. Routledge.
- Tellidis, I., & Toros, H. (Eds.). (2015). *Researching terrorism, peace and conflict studies: Interaction, synthesis and opposition*. Routledge.
- Wallensteen, P. (2018). *Understanding conflict resolution*. Sage Whitworth, Sandra. 2006. Men, Militarism and UN Peacekeeping: A Gendered Analysis. New Delhi: Viva Books Pvt. Ltd
- Bose, Sumantra. 2005. *Kashmir: Roots of Conflict, Paths to Peace*. Cambridge, MA: Harvard University Press.
- Bush, Kenneth D. 2003. *The Intra-group Dimensions of Ethnic Conflict in Sri Lanka: Learning to Read Between the Lines.* Basingstoke: Palgrave Macmillan.

- Field, M.M. Merry and R.C. Remy, eds. 1995. *Teaching About International Conflict and Peace*. New York: State University of New York Press.
- Finkelstein, Norman G. 2003. *Image and Reality of the Israel-Palestine Conflict*. New York: Verso.
- Christie, D. J., Wagner, R. V., & Winter, D. D. N. (Eds.). (2001). *Peace, conflict, and violence: Peace psychology for the 21st century*. Prentice Hall/Pearson Education.
- Matyók, T., Senehi, J., & Byrne, S. (2011). *Critical Issues in Peace and Conflict Studies: Theory, Practice, and Pedagogy.*
- Gourevitch, Philip. 1998. *We Wish to Inform You That Tomorrow We Will be Killed with Our Families: Stories from Rwanda*. New York: Picador.
- Jeffery J. Roberts. 2003. *The Origins of Conflict in Afghanistan*. Westport: Praeger Publishers.
- Nye, Joseph S. 2007. *Understanding International Conflicts: An Introduction to Theory and History*. New York: Longman.
- Philip Clark, 2009, *After Genocide: Transitional Justice, Post-Conflict Reconstruction, and Reconciliation in Rwanda and Beyond.* New York: Columbia University Press.
- Rashid, Ahmed. 2009. *Descent into Chaos: The U.S. and Disaster in Afghanistan, Pakistan, and Central Asia*. New York: Penguin.
- Thompson, S. W., and K. M. Jensen, eds. 1991. *Approaches to Peace: An Intellectual Map*. Washington, D.C: United States Institute of Peace.
- Volkan, Vamik. 1997. *Chosen Traumas: Unresolved Mourning*. In Bloodlines: From Ethnic Pride to Ethnic Terrorism,36-49. Boulder, CO: Westview Press.

Central University of Haryana

Department of Psychology

Minutes of BoS

19 and 20 August, 2021

Offline meeting of Board of Studies was held on 19th and 20th August, 2021 at 10:00 A.M. Following members were present in the meeting:

1. Dr. V.N. Yadav (Convenor)
2. Prof. (Retd.) Umed Singh (External Expert)
3. Dr. Payal Chandel (Member)
4. Dr. Pradeep Kumar (Member)
5. Dr. Vishnu N. Kucheriya (Special Invitee)
6. Dr. Ravi Pratap Pandey (Special Invitee)
7. Dr. Ritu Sharma (Special Invitee)

At the outset, Dr. V.N. Yadav welcomed to esteemed members of BoS and presented all agenda items. Agenda items were discussed and resolved accordingly.

Item No.	Agenda	Minutes
1.	To consider and approve the Scheme of B.Sc. Psychology Honors programme w.e.f. 2021-2022	Scheme of the B.Sc. Psychology Honors was discussed and finalized.
2.	To consider and approve the Syllabi of Semester- I & II of B.Sc. Psychology Honors programme	Syllabi of 1st and 2nd Semesters of B.Sc. Psychology Honors were discussed and approved.
3.	To discuss and approve the panel of examiners (paper setting, practical exams etc.) for B.Sc. Psychology Honors programme	The panel of examiners (paper setting, practical exams etc.) for B.Sc. Psychology Honors programme was discussed and approved.
4.	To consider and approve the Syllabus of Semester- III & IV of M.A. Psychology programme	Syllabus of Semester- III & IV of M.A. Psychology programme was discussed and finalized.
5.	To discuss and approve the panel	Panel of examiners (paper setting,

	of examiners (paper setting, practical exams, dissertation etc.) for M.A. Psychology programme	practical exams, dissertation etc.) for M.A. Psychology programme was discussed and approved.
6.	To consider and approve the syllabi of PG Diploma in Rehabilitation Psychology (PGDRP) and Advance Diploma in Child Guidance and Counseling (ADCGC).	Syllabi of PG Diploma in Rehabilitation Psychology (PGDRP) and Advance Diploma in Child Guidance and Counseling (ADCGC) were considered and finalized that the syllabi of Rehabilitation Council of India (RCI, New Delhi) may be implemented for both the courses.
7	To revise the coding of M.A. Psychology Programme.	The coding of M.A Psychology Programme was revised. Earlier it was **SAHS** (School of Arts, Humanities and Social Sciences) and now changed as **SHSS** (School of Humanities and Social Sciences).

20.08.2021
Dr. V.N. Yadav (Convenor)

20.8.21
Prof. (Retd.) Umed Singh (External Expert)

20/8/21
Dr. Payal Chandel (Member)

20/08/21
Dr. Pradeep Kumar (Member)

20.08.2021
Dr. Vishnu N. Kucheriya (Special Invitee)

20-8-2021.
Dr. Ravi Pratap Pandey (Special Invitee)

Dr. Ritu Sharma (Special Invitee)

Central University of Haryana

Department of Psychology

Scheme and Syllabus of Advance Diploma in Child Guidance and Counselling

STRUCTURE OF PROGRAMME

Semester-I						
Sr.	**Course Title**	**Course Code**	**L**	**T**	**P**	**Credits**
Core Courses						
1	Child Development	SHSSS PSY 05 01 01 C 3126	3	1	2	6
2	Exceptional Variations in Child Development	SHSSS PSY 05 01 02 C 3126	3	1	2	6
3	Techniques of Child and Adolescent Assessment	SHSSS PSY 05 01 03 C 3126	3	1	2	6
4	Child's Rights and Policy	SHSSS PSY 05 01 04 C 3126	3	1	2	6
Semester-II						
Sr.	**Course Title**	**Course Code**	**L**	**T**	**P**	**Credits**
Core Courses						
1	Group Work & Community Interventions	SHSSS PSY 05 02 05 C 3126	3	1	2	6
2	Family Interventions	SHSSS PSY 05 02 06 C 3126	3	1	2	6
3	Interventions For Children	SHSSS PSY 05 02 07 C 3126	3	1	2	6
4	Intervention For Adolescents	SHSSS PSY 05 02 08 C 3126	3	1	2	6
5	Integrating Interventions	SHSSS PSY 05 02 09 C 3126	3	1	2	6
6	Field Work	SHSSS PSY 05 02 10 C 0202	0	2	0	2
7	Internship	SHSSS PSY 05 02 11 C 0202	0	2	0	2

Semester – I

CHILD DEVELOPMENT

Paper Code: SHSSS PSY 05 01 01 C 3126

Lectures: 3, Tutorial: 1, Practical's: 2

Total Credits: 6

Objectives

To study theoretical frameworks to understand characteristics of children at different age epochs.
To critically examine the bi-directional relationship between the child and his /her ecological context of development.
To identify attributes of positive parenting.

Unit I
Development of Children: Theoretical Perspectives
(Basic constructs and application)

Principles of Growth and Development
Development of Cognition: Piaget
Development of Personality: Psychosocial Theory – Erikson
Moral Development: Piaget, Vygotsky, Bandura and Sears
Theory of Attachment
Theories of Play Development; Piaget, Erikson, Axiline, Hildreth, Parton, Smilansky

Unit II
Developmental Characteristics of Children
(Infancy and Early Childhood)

Development during Prenatal Period
Infancy and Toddlerhood: Developmental Characteristics across Domains (bio social behavioral shifts)
Early Childhood Years: Developmental Characteristics across Domains (bio social, behavioral shifts)
Developmental Progression in Play Behaviour, Functions of Play and types of Play
Play Activities and Games for Pre-school Children

Unit III
Developmental Characteristics of Children
(Middle Childhood and Adolescence)

Middle Childhood Years: Developmental Characteristics across Domains (bio social, behavioral shifts)
Middle Childhood Years: Developmental Progression in Play Behaviour and Play Activities and Games
Adolescence: Developmental Characteristics across Domains (bio social, behavioral shifts)
Adolescence: Developmental Progression in Play Behaviour and Play Activities and Games

Unit IV

Acquisition of Skills

School Readiness Skills
Reading Skills
Spelling Skills
Writing Skills
Arithmetic

PRACTICAL

A) Field Work Tasks

• Study the development of the child over a period of 6-8 months and analyze the role of his context in his development.
• Studying the micro processes of a pre-school programme. • Observation of Children at Different Age Epochs

B) Self Development Workshops

• Streamlining Life Styles
• Learning Styles

SCHEME OF TEACHING

A) Process of Developing Skills

• Students would observe children across ages, domains, settings and social class to understand developmental gradations and individual variations. Synthesis workshops would be organized to integrate data from the field.
• Workshops would be organized on Storytelling and Creative work with children.

• Students would understand long term case studies of two children at two different age epochs over a period of 6 months.

B) Application

The students would be required to apply their understanding of positive correlates of development by designing Parent Education material and address parenting issues across developmental stages.

C) BREAK-UP OF CONTENTS INTO KNOWLEDGE SKILL AND APPLICATION AREAS

Knowledge	Skills	Applications
Basic Introduction to Child Development Development of Children: Theoretical Perspectives Developmental Characteristics of Children Key Issues across Developmental Stages Play Development in Children Play activities and games of children across developmental stages. Development of skills in children	Interpreting behaviour and development of children with reference to 'Developmental' and 'Ecological' context Playing with children across developmental stages ***(The above would be carried out through assignments of observing children in naturalistic settings, field placements and subsequent discussions and interpretations of these observations during skill workshops and group discussions)***	• Play activities of children across ages • Developmental characteristics of child • Micro processes of pre-school education

Suggested Readings

Berk, E. L. (1996). *Child development* (3rd edn.)

Berk, E. L. (2017). *Child development.* Pearson Education. (3rd edn.)

Charlesworth, R. (2016). *Understanding child development*. Cengage Learning

Cox, M. (2005). *The Pictorial World of the Child,* Cambridge University Press

Ghosh, S. (1999). *The Penguin Guide to Adolescent Behaviour.* Penguin, New Delhi

Harris, C. A. (1985). *Child Development,* International Edition, West Publishing Company

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Moyles, J. R. (1989). *Just Playing: The Role and Status of Play in early Childhood Education*, Philadelphia: Open University

Schiamberg, L. B. (1998). *Child & Adolescent Development*, Macmillan Publishing Company, New York

Shaffer, D. R., & Kipp, K. (2013). *Developmental psychology: Childhood and adolescence*. Cengage Learning

Sinha, D. (1981). *Socialization of Indian Child*. Asia Composing Agency, Naryana .

Smith, R. M. (1969). *Teacher Diagnosis of Educational Difficulties*, Charles E. Merrill Publishing Co

Veeraraghavan, V. (2005). *Teenage Blues*. Mosaic Book, New Delhi

EXCEPTIONAL VARIATIONS IN CHILD DEVELOPMENT

Paper Code: SHSSS PSY 05 01 02 C 3126

Lectures: 3, Tutorial: 1, Practical's: 2
Total Credits: 6

OBJECTIVES

To appreciate the concept and strategies of promotion of mental health
To understand manifestation and causes of behavior and learning problems in children
To understand types and causes of disabilities in children.
To appreciate the concept and strategies for prevention of disabilities & behavior & learning problems in children

THEORY

Unit I

Basics of Mental Health and Disabilities

Concept of Mental Health: Indian & Western Perspectives
Learning & Behavior Problems: Manifestation, Causal Associates; Risk Factors, Protective Mechanism, and Resilience
Classification System of Childhood & Adolescent Psychiatric Disorders: Need and Types
Concept of Disability: Medical Model, Social Model, Levels of Interventions and Strategies of Prevention of Disabilities)

Unit II

Childhood Disabilities and Developmental Disorders

Cerebral Palsy and Disability of Movement, Disability of Sight; Disability of Hearing; (Causes, Early Identification, Management & Prevention).
Epilepsy: Manifestation, Causes, Types and Management (first aid)
Mental Retardation: Definition; Classification; Causes; Associated Problems; Prevention & Early Identification; Assessment; Prognosis and Types of Interventions.
Speech and Language Problems of Children: Assessment of Language, Types of Speech Problems and Types of Interventions

Autism Spectrum Disorders: Manifestation (Asperger and Autism); Causal Associates; Early Identification and Assessment; Prognosis and Types of Interventions.

Unit III

Learning Problems

Scholastic Backwardness: Casual Associates; Framework of Assessment; and Types of Interventions
Learning Disabilities: Definition, Causal Associates; Associated Problems; Assessment; Prognosis and Types of Interventions
Workshops for Spot Diagnosis

Unit IV
Internalizing Problems and Externalizing Problems

(Manifestation, Causes & Management)

Fear & Anxieties including School Phobia and Examination Stresses
Depression & Suicide
Conversion Reaction
Obsessive Compulsive Reaction Disorder
Conduct Disorders
Attention Deficit Hyperactive Disorder
Substance Abuse

PRACTICAL

A) Field Work Tasks

• Participant's observations of professional working with children with disability / Learning and Behaviour problems
• Observe process of work of assessment for diagnosis of at least four different types of disability / learning and behaviour problems

B) Self Development Workshops

• Examination Stress

SCHEME OF TEACHING

A) PROCESS OF DEVELOPING SKILLS

• Students would be attending Child & Adolescent Guidance and Counselling Centres to observe children with different Disabilities, Behaviour & Learning Problems

• Student would be conducting participant observations of professionals working with children with disability / learning and behaviour problems.

• Workshops for spot diagnosis of children with L & B problems in CGC / AGSC on the basis of manifestation of disorders

B) APPLICATIONS

- The student would study at least four children with Disability or Learning & Behaviour Problems to comprehensively study the manifestations, multidisciplinary assessments and interventions.
- Student would identify criteria for differential diagnosis of different learning and behavior problems.

Knowledge	Skills	Applications
Basic Introduction to Child Development Development of Children: Theoretical Perspectives Developmental Characteristics of Children Key Issues across Developmental Stages Play Development in Children Play activities and games of children across developmental stages. Development of skills in children	Interpreting behavior and development of children with reference to 'Developmental' and 'Ecological' context Playing with children across developmental stages ***(The above would be carried out through assignments of observing children in naturalistic settings, field placements and subsequent discussions and interpretations of these observations during skill workshops and group discussions)***	Play activities of children across ages Developmental characteristics of child Micro processes of pre-school education

Speech and Language problems of children: Types; Prognosis; Management and Assessment of Language.

Learning Problems

Scholastic Backwardness: Casual Associates; Framework of Assessment; Management.

Learning Disabilities: Definition, Causal Associates; Assessment; Prognosis and Management

Borderline Intelligence: Manifestation assessment & Types of Interventions

Behavior Problems

Internalizing problems

(Manifestation Causes & Management)

Externalizing Problems

(Manifestation, Causes, Management)

Suggested Readings

Butcher, J. N., Mineka, S., & Hooley, J. M. (2013). *Abnormal psychology*. Boston: Pearson

Mane, P. (1993) *Mental Health in India (Issues and Concerns)*, Tata Institute Gandevia, Katy of Social Sciences.

Ollendick, T. H. & Harsen, M. (1989) *Handbook of Child Psychopathology*, Plenum Press, New York

Hayden, A. H., Smith, R. K., & Hippel, C. S. V. (1978). *Children with Learning Disabilities: Guide for Teachers, Parents.,* US Department of Health and Human Services (Head Start Bureau)

Riper, C. V. & Erickson R. L. (1996). *Speech Correction,* Allyn & Bacon, U.S.A

Cheng, K., Myers, K. M., & Ovid Technologies, Inc. (2011). *Child and adolescent psychiatry: The essentials*. Philadelphia: Wolters Kluwer/Lippincott Williams and Wilkins Health.

Wicks-Nelson, R., & Israel, A. C. (2015). *Abnormal child and adolescent psychology, with DSM-V updates*. Boston: Pearson

Walker, C.E. & Roberts, M. C. (1992). *A Handbook of Clinical Psychology*. John Wiley & Sons

Neisworth J. T. & Smith R. M. (1978). *Retardation (Issues, Assessment and Intervention)*. McGraw Hill Book Company

Maloney, M. P., & Ward, M. P. (1979). *Mental retardation and modern society*. New York: Oxford University Press

Kumar, S. (2007) *Children with Mental Retardation and Associated Disabilities*. Kanishka, New Delhi

Sadock, B. J., Sadock, V. A., Ruiz, P., & Kaplan, H. I. (2017). *Kaplan and Sadock's comprehensive textbook of psychiatry* (10th ed.). Wolters Kluwer.

Trevarthen, C., Aitken, K., & Papoudi, D. (1998). *Children with Autism – Diagnosis and Interventions to Meet Their Needs* (2nd ed..). Jessica Kingsley Publishers

Karanth, P. (2009). *Children with Communication Disorders*. Orient Black Swan, New Delhi

TECHNIQUES OF CHILD AND ADOLESCENT ASSESSMENT

Paper Code: SHSSS PSY 05 01 03 C 3126

Lectures: 3, Tutorial: 1, Practical's: 2

Total Credits: 6

OBJECTIVES

To acquire an understanding of issues & processes of assessment of children across ages.
To familiarize with the measures of assessments across domains.
To develop an understanding of usage and application of selected measures of assessment.
To gain competency in skills of conducting observations and interview as methods of assessment of children and adolescents.

THEORY

Unit I

Interviewing and Observation as a Method of Assessment

Understanding Interview as a method.
Interviewing Skills (Listening, Leading, Reflecting, Interpreting & Summarizing)
Questioning Skills in Clinical Interview (Socratic Questioning, Circular Questioning etc.)
Application of Interviewing Skills: Case History; Family Functioning Assessment; Exploring Parental Concerns and Interviewing Adolescents
Understanding Observation Method
Types of Observations
Process of Conducting Observations
Process of Conducting Play Sessions
Recording and Interpreting Observations across Domains
Denver Developmental Screening Test

Unit II

Assessment of Intelligence and Adaptive Behavior

Concept & Theory of Intelligence
Concept of Adaptive Behaviour
Wechsler's Intelligence Scale for Children (WISC III) and Indian norms of WISC (Father Malin's)
Stanford Binet Intelligence Test
Ravens Progressive Matrices
Vineland Adaptive Behavior Scale
Assessment of Home Environment: HOME Inventory and Family Environment Scale.

Unit III

Assessment of Temperament, Personality and Socio Emotional Development

Scope of Personality Assessment
Personality Inventories 16 Personality Factor Questionnaire
Semi Projective Tests; Incomplete Sentences Blank; House Tree Person Test

Projective Tests: Children's Apperception Test

Unit IV

Psycho Educational Assessment

Components of Educational Assessment (Reading, Comprehension, Spellings and Writing, Written Expression and Arithmetic)
Process of Educational Assessment; skill Workshops on each of the basic skills
Recording, Interpretation and Analysis of Educational Assessment

PRACTICAL

A) Field Work Tasks

During the placement in CGC / AGSC the students would undertake

- Case history
- Play observations
- Interview adolescents
- Adaptive behavior assessment
- Psycho educational assessment
- Personality assessment

Interpreting clinical observation and assessment undertaken by the professionals in CGC / AGSC

B) Self Development Workshops

• Responding styles
• Listening skills

SCHEME OF TEACHING

A) PROCESS OF DEVELOPING SKILLS

Workshops would be planned for students to develop interviewing and questioning skills.
Students would be familiarized with the specific tests, scales, checklists etc. through demonstrations and mock sessions and simulated practice.
Students would be facilitated to appreciate process of assessments across ages through observations of professionals at work during field placements.
Student would do simulated practice on their long-term case.

B) APPLICATIONS

Students would apply their understanding about different measures of assessment by interpreting the clinical observations and assessments undertaken by professionals.

C) BREAKUP OF THE CONTENTS INTO KNOWLEDGE, SKILLS & APPLICATION AREAS

Knowledge	Skills	Applications
• Professional Practices in Assessment of Children and Adolescents • Interviewing as a Method	• Identifying appropriate measures that can be used for children of different ages to assess their development /skills and	Clinical work: • Case History • Play observation, • Adolescent

- Observation as a Method
- Process and measures of assessment of Infants & Pre-schoolers
- Process and measures of assessment of school aged children
- Process and measures of assessment of Adolescents
- Psycho Educational Assessment: need scope and process

abilities.

- Interviewing and questioning Skills
  - Listening
  - Leading
  - Reflecting
  - Summarizing
  - Setting Boundaries
  - Interviewing Parents and Care Givers to understand Developmental history, Family Functioning
  - Skills and methods of observation
  - Conducting observations of children across developmental stages and across settings
- Conducting psycho-educational assessment.

Interviews,

- VABS
- Multiple Intelligences
- Learning styles

(All the above would be actualized through skill workshops, field placement and observations of professionals at work)

Suggested Readings

Anastasi, A. U. (2006). *Psychological Testing* Pearson Education. New Delhi

Bracken B. A. (1991) *The Psychoeducational Assessment of Preschool Children* (2nd Ed.), Allyn and Bacon

Brammer, L. M., & Mac D. G. (2003). *The Helping Relationship*. Allyn and Bacon, Boston

Cooper, J. D., & Kiger N. D. (2005). *Literacy Assessment- Helping Teachers Plan Instruction*. (2nd Ed.), Houghton Miffin Company

Hirisave, U., Kapur, M., & Oomman, A. (2002). *Psychological Assessment of Children in the Clinical Setting*. NIMHANS, Bangalore

Ingram, C. F. (1980). *Fundamentals of Educational Assessment* D. Van Nostrand Company

Morgan, L. D. (1998). *Focus Groups as Qualitative Research*. Sage Publication, New Delhi

Reynolds, Cecil. R., & Kamphaus, R. W. (1990). *Handbook of Psychological and Educational Assessment of Children Intelligence and Achievement*, The Guilford Press, New York

Smith, M. R. (1969) *Teacher Diagnosis of Educational Difficulties*. Charles & Mecrill Publishing Co.

Smith, M. R. (1969). Teacher Diagnosis of Educational Difficulties Charles & Merrill Publishing Co.

Terry O. (2003). *Assessing Learners with Special Needs An Applied Approach* (4th Ed.), Merrill Prentice Hall

CHILD'S RIGHTS AND POLICY

Paper Code: SHSSS PSY 05 01 04 C 3126

Lectures: 3, Tutorial: 1, Practical's: 2

Total Credits: 6

OBJECTIVES

To analyze programmes and services for children with respect to Right Based Programming.
To analyze the school from the system's perspective
To demonstrate skills in assessing Family Functioning.

THEORY

Unit I

Child Rights

• Convention on the Rights of the Child
• Differentiating between Needs and Rights of Children
• Understanding Right's Based Programming for Children
• Analyzing and Strengthening Institutions & Programmes from Rights Perspective
• Synthesis Workshops

Unit II

Laws related to Disability and Children in Difficult Circumstances

• The Persons with Disabilities (Equal Opportunities, Protection of Rights and Full Participation) Act 1995
• The National Trust Act 1998
(The processes of implementation & utilization of the above Acts)
• Juvenile Justice Act
• Immoral Traffic Prevention Act
• Acts related to Adoption
(The processes of implementation & utilization of the above Acts)

Unit III

Understanding School as a Social System

• Critical Appraisal of Educational System in India
• Understanding School Processes with respect to Teaching, Learning, Evaluation, Communication etc.
• Analyzing and Strengthening School as a System
• Mental Health Activities in School; Levels of Interventions

Unit IV

Understanding Family as a Social System

• Theoretical Framework for Understanding Family (Ecological, Developmental and Systems Approach)

• Family Assessment: Genogram, Circular questioning, Mc Masters Model of Family Assessment

PRACTICAL

A) Field Work Tasks

• Studying the School from a 'Systems Perspective'
• Studying micro-processes related to school mental health / counselling services
• Studying the implementation processes related to PWD Act, Certification process for Children with Disability / JJ Act, Juvenile Courts, Child Welfare Committee / Adoption

B) SELF DEVELOPMENT WORKSHOPS

• Negotiation Skills

SCHEME OF TEACHING

A) PROCESS OF DEVELOPING SKILLS

• Workshops would be organized to familiarize the students with Rights based programming on CRC (Convention on the Rights of the Child)

• The students would study Institutions working with children. During these visits they would observe programme components and activities and delivery mechanism of these Institutions and analyse them from the Rights Perspective. The students are also expected to then suggest ways of strengthening the institution.

• Field Visits for understanding implementation processes related to PWD Act, JJ Act, Adoption etc (e.g. Juvenile Courts, Child Welfare Committee, Certification process for Children with Disability etc).

• A set of workshops would be planned for students to develop skills in understanding school processes. Simultaneously placement in a school setting would enable observation & analysis of school processes. The students would after studying the school processes suggest alternative processes that would facilitate positive mental health of students.

• Student would be appraised of Mc Master Model of Assessment of Family functioning through demonstration, mock sessions, simulations & guided skills workshops

B) APPLICATION

1. The student would be required to apply their understanding of Rights and Systems perspective to analyze processes of any one of the following Institutions/programmes:
• Children's Institution
• Programme for Street and Working Children.

2. The student would be required to apply their understanding of school as a system to analyze its processes.

C) BREAK-UP OF THE CONTENTS INTO KNOWLEDGE, SKILLS AND APPLICATION AREAS

Knowledge	Skills	Application
• Situational Analysis of Children in India and National Policies and Programmes for children • Introduction to Right's Perspective towards Planning Programmes for Children • Laws related to Children : Processes of implementation and utilization of Acts • Understanding School as a System • Understanding Family as a Social System • Understanding the Framework for assessment of family functioning	• Observing programmes of children and understanding programme components and delivery mechanisms • Analyzing school from the System's Perspective ***(The above would be actualized through Skill Workshops and Observational Visits and Field Work)*** Rights perspective School processes / observation of children Legislation Micro-processes related to school mental health and counselling services	• Studying School as a System • Micro process related to school mental health • Studying Children's Institutions from 'Rights' perspective

Suggested Readings

Singh D. (2001). *Child Rights and Social Wrong: Volume 1 An Analysis of Contemporary Realities,* Kanishka Publishers.

Singh D. (2001). *Child Rights and Social Wrong: Volume 2 An Analysis of Contemporary Realities,* Kanishka Publishers.

Thukral E.G. et al. (2005). *Status of Children in India, HAQ: Centre for Child Rights*, New Delhi

Gaur M. (2008). *Child Abuse: A Reality, Alfa*, New Delhi

World Bank, (2004). *Reaching Out to the Child: An Integrated Approach to Child Development.* Washington, DC. © World Bank.

Hussain Z. (1990). *Family Systems Therapy: A monograph, Child Guidance Memorial Society*, Dr. Zakir Hussain Memorial Society, Jamia Millia Islamia, New Delhi

Carter and McGoldrick (1980), *The Family Life Cycle*, Gardner Press, New York

Gitanjali (2004). *The Great Indian Family*, Sage Publication.

Sharma N. (2004*). Understanding Childhood Disability in India in Childhood* in South Asia

Semester–II

GROUP WORK & COMMUNITY INTERVENTIONS

Paper Code: SHSSS PSY 05 02 05 C 3126

Lectures: 3, Tutorial: 1, Practical's: 2
Total Credits: 6

OBJECTIVES

To develop an understanding of the nature and scope of group work interventions
To acquire beginning skills in planning & designing group work intervention with children and adolescents
To acquire skills in conducting group work interventions
To develop an understanding of the community, its challenges, concerns and issues.
To acquire skills in integrating mental health interventions for children in community-based programme.

Unit I
Group Work as a Method

Definition, Purpose, and Relevance
Types of Groups: Treatment Groups and Task Groups
Principles of Group Work
Applications of Group Work for Life Skill Development: Self-awareness Communication, Interpersonal Skills and Empathy, Problem solving and Decision making, Creative thinking and Critical thinking and Coping with Emotions and Stress.
Stages of Group Work
(Planning, Working and Ending stages)

Unit II
Group Work Process and Dynamics

Programme Media and Processing Group Work Activities (Role plays, Games, Simulations)
Frameworks for Designing Group Work Intervention (Donna Walker Cycle, Addie Model)
Group Dynamics: Concept and Components
Leadership Styles and Facilitation Skills

Mock Sessions and Synthesis Workshops

Unit III

Community Organization as a Method

Definition, Purpose & Principles of Community Organization
Stages of Community Organization
Techniques of Knowing the Community (Participatory Learning & Action)
Types and Levels of Community Participation; Self Help Groups; Participatory Monitoring and Sustainability
Community Awareness

Unit IV

Community Based Organizations: Structure and Functioning

• Relevance of Community Organisation to Mental Health
• Community Mental Health Service Systems
• Studying Community Based Programmes Working in the area of Disability / Child Care / Adolescent Development
• Strengthening and Integrating Mental Health Activities into existing Programmes for Children

PRACTICAL

A) Field Work Tasks

• Conducting Focus Group Discussion with Adolescents for need assessment

• The student would plan, organize and evaluate group work intervention with Children or Adolescents in a school)

• Critical study of Community Based Organization with respect to the programme activities, service delivery and involvement of community in the programme mechanisms.

B) Self Development Workshops

• Conflict Resolution

• Self Exploration

SCHEME OF TEACHING

A) PROCESS OF ACQUIRING SKILLS

• Skill Workshops on different programme media (Simulations, games. Role plays)

• Skill Workshops on frameworks for Designing Group Work Interventions
• Skill Workshops for developing skills of understanding Group Processes and Conflict Resolution.
• Skill Workshops to undertake Life Skill Education with children and adolescents.
• Skill Workshops on Participatory Learning Appraisal Techniques.
• Skill Workshop on Designing Community Awareness Programme.

B) APPLICATION

• The student would plan, organize and evaluate group work intervention with Children or Adolescents in a school)

• The student would critically study Community Based Organization with respect to the programme activities, service delivery and involvement of community in the programme mechanisms.

C. BREAKUP OF THE CONTENTS INTO KNOWLEDGE, SKILLS AND APPLICATION AREAS

Knowledge	Skills	Application
• Group Work as a Method : Definition, Purpose, and Relevance, Principles and Types of Group Group Dynamics • Stages of Group Work Community Organization as a Method Stages and Techniques of Community Organization Structure and Functioning of Community Based Organization Building on Community	• Conducting Focus group Discussions for need assessment of adolescents • Using programme media Games , simulations and role plays for conducting group work intervention • Developing facilitation skills for group work. • Skills of planning Group Work Intervention. • Skills of Conducting Life Skill Education • Techniques of conducting Participatory Learning Appraisal • Conducting Community Awareness Programme	• Undertaking Group Work Interventions in a school or Children's institution • Studying Community Based Organization with respect to the programme activities, service delivery and involvement of community in the programme mechanisms. • Studying Legislative processes of the Children's Institution.

Suggested Readings

Conyne, R. K. (1999). *Failures in Group Work: How We can Learn from Our Mistakes*, Sage Publications India, New Delhi

Garvin, C. D. (1981). *Contemporary Group Work*, Prentice Hall Inc., USA
Lindsay, T and Orton (2008) *Group Work Practice in Social Work,* Learning Matters Ltd.

Morgan D. L. (1988). *Focus Groups as Qualitative Research*, Sage Publications, New Delhi.
Ross, M.G. (1967*). Community Organization*, Harper & Row, New York
Siddique, H.Y. (1997). *Working with Communities*, Hira Publications, New Delhi.
Siddiqui, H. Y. (2008). *Group Work: Theories and Practices*, Rawat, New Delhi

Toseland R.W. and Rivas R.F, (2005), *An Introduction to Group Work Practice*, Massachusetts
Werner, D. (1994). *Disabled Village Children (Indian Edition),* Voluntary Health Association of India.
WHO. (1997). *Life Skills Education in School Programme on Mental Health*, WHO, Geneva.

FAMILY INTERVENTIONS

Paper Code: SHSSS PSY 05 02 06 C 3126

Lectures: 3, Tutorial: 1, Practical's: 2

Total Credits: 6

OBJECTIVES

To develop a basic understanding of the 'Approaches' and Types of Counselling Interventions.
To acquire beginning skills in Guiding & Counselling families.
To acquire beginning skills in Parent Training

THEORY

Unit I
Guidance and Counselling: Basic Concepts

Guidance, Counselling and Psychotherapy: Definitions and Critical Differences.
Basic Essential Skills in Counselling (Interview and Communication Skills etc.)
Types of Family Interventions: Family Guidance, Family Counselling and Family Therapy

Unit II
Social Casework Practice

Definition and Principles of Social Casework Practice
Process of Social Casework Practice, Study: Thinking in Problem Solving; and Diagnostic Work up; Joint Solution Finding and Goal Setting; Implementation of Plan and Termination (on CGC cases)
Case worker - Client relationship, Role of Case worker
Social investigations; Home visit & School visit

Unit III
Family Guidance

(For Parents of Children with Disabilities)
Guidance Messages for Parents of Children with Mental Retardation, ADHD Learning Disability and Pervasive Developmental Disorders
Sensitization Workshop (Empowered Parents)
Skills of Undertaking Family Guidance (Guided Skill Workshop)
Indications and Contraindications
Practice Guidelines

Unit IV
Parent Training and Therapy

• Parent Child Interaction Therapy (PCIT):

- Theoretical Constructs; Framework and Content
- Process of PCIT
- Indications & Contraindications
- Practice Guidelines

• Behavioral Modification: Theoretical Constructs and Principles

- Functional Analysis of Behavior
- Behavior Modification Techniques
- Developing Behavior Modification Plan
- Indications & Contraindications
- Practice Guidelines

PRACTICAL

A) Field Work Tasks

• During the placement in Child Guidance Centre / Adolescent Guidance Service Centre the students would undertake the following:

- Social Investigations
- Parent Guidance and Counselling
- Parent Training / PCIT

B) Self Development Workshops

• Emotional Intelligence
• Myers Briggs Type Indicator
• Empathy: Losses Exercise

SCHEME OF TEACHING

A) PROCESS OF DEVELOPING SKILLS

• Skills in family guidance & counselling would be honed through listening to Experiences of Empowered Parents, Guided Workshops, Simulated Practice and Role Plays.

• Skills Parent training for Behaviour Management and PCIT would be honed through Guided Skill Workshops and case studies to understand clinical applications of Behaviour Modification.

• Assignment on Eco-mapping of services

B) APPLICATIONS

1. Students would undertake Family Guidance / Counselling with families of children with Learning, Behaviour or Developmental Disorders

2. Student will undertake Behavior Modification / PCIT during their field placements in Clinics / Institutions.

3. Student would undertake Social Investigation and Restructuring of Home Environment for two cases.

C. BREAKUP OF CONTENTS INTO KNOWLEDGE, SKILL AND APPLICATION AREA

Knowledge	Skills	Applications
• Concept of Guidance counselling and psychotherapy • Approaches to counselling: Theoretical Orientations • Types of Family Interventions • Social Casework Practice: Principles, Stages and Process • Family Guidance: Framework • Guidance messages for parents of children with Disability, ADHD Learning Disability, Border Line Intelligence and Pervasive Developmental Disorders • Concept Process and Techniques of Parent Training • Theoretical Constructs of PCIT • Framework and Process of conducting PCIT • Behaviour Modification Theoretical Constructs • Principles and Methods • Functional Analysis of Behaviour • Behaviour Modification Techniques	• Basic Skills in Counselling (Rapport Formation, Interview, Communication and Skills, for promoting disclosures etc.) • Skills of Family guidance • Skills for Conducting Parent training for Behaviour Management and Parent child Interaction Therapy ***(All there would be honed through workshops demonstrations, mock sessions, and role plays.)***	Clinical Work (I Term): • Diagnostic workup, • Social investigations (Home visit, HOME, school visit etc.) Clinical Work (II Term): • Parent Counselling, • Home based intervention with parents, parent training, PCIT, • Clinical case report

LIST OF READINGS

Cantwell D. P. (1975). *The Hyperactive Child– Diagnosis, Management, Current Research,* Spectrum Publications

Carter and McGoldrick. (1980). *The Family Life Cycle,* Gardner Press, New York

Cristiani, Therese Psychotherapy, Prentice Hall, Inc. Englewood Cliffs, New

George, R. L. (1981). Theory; Methods and Processes of Counselling &

Gladding, S. T. (1992). Counselling: A Comprehensive Profession (Resource

Kaslow, F.W. (2002). *Comprehensive Handbook of Psychotherapy* - Volume 2 Patterson, Terence (Cognitive Behavioural Approaches), John Wiley and Sons, New York

Mathew, G. (1992). *An Introduction to Social Case Work,* Tata Institute of Social Sciences, Bombay

Misra, G. (1999). *Psychological Perspectives on Stress and Health*, Concept, New Delhi

Neisworth J. T. (1978). *Retardation (Issues, Assessment and Intervention*) Mc Graw

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Thompson, C. L. (1983). *Counselling Children*, Brooks /Glen Publishing Company

Venkatesan, S. (1992). *Behavioural Assessment Scales for Indian Children with Mentally Retardation (BASIC-MR)*, NIMH, Secunderabad, Bangalore, 1992

Venkatesan, S. (1992). *Children: A Manual for Teachers*, NIMH, Secunderabad, Bangalore

Wasik, B.H and Bryant, D.M. (1990). *Home Visiting*, Sage Publication, New Delhi

INTERVENTIONS FOR CHILDREN

Paper Code: SHSSS PSY 05 02 07 C 4004

Lectures: 3, Tutorial: 1, Practical's: 2

Total Credits: 6

OBJECTIVES

To acquire beginning skills in Play Therapy for children with Emotional and Behavior problems.
To acquire understanding of strategies for enhancing skills development in children with Disabilities and Emotional Problems.
To critically appreciate the strategies for reworking the school environment for children with Disabilities & Learning problems

THEORY

Unit I

Directive Play Therapy

Play for Therapy with Children

Communicating with Children; Promoting Disclosures

Directive Play Therapy: Theoretical underpinnings

Framework and Role of Therapist

Using different Play Media with Children

Practice Guidelines

Indications and Contraindications

Applications of Play Therapy

Unit II

Non-Directive Play Therapy

Theoretical Underpinnings

Exploring Non-directive Play Therapy: A Case Study Approach

Role of the Therapist

Setting up of Play room

Stages of Play Therapy

Practice Guidelines

Indications and Contraindications

Unit III

Skill Training

Concept of Skills Training

Activities of Daily Living and Communication Skills (Ref. to Mentally Challenged Children); Activities and Methods

Social Skills Training (Ref. to children with Emotional / Behavioral Disorders) Sequence, Activities and Methods

Unit IV

Reworking School Environment

Modifications in Teaching, Learning and Evaluation Processes for Children with ADHD, Aspergers and Learning Disability

Provision by CBSE & Alternative Education Systems

Mainstreaming, Integration and Inclusion; Concept & Scope

Creating Least Restrictive Environment in School: Some Models

PRACTICAL

A) Field Work Tasks

• Students would apply Play Techniques for counselling children with behaviour and emotional difficulties

• Students would psycho-educate parents for reworking school environment of the child

B) Self Development Workshops

• Enhancing Self Esteem

SCHEME OF TEACHING

A) PROCESS OF DEVELOPING SKILLS

• Students would be exposed to the process of undertaking 'Play Therapy' with children through simulations, role plays, demonstrations & practice sessions.

• Students would be exposed to the process of undertaking Family Life Education with Adolescents through self-development workshops, facsimile experiences and practice sessions with groups of adolescents.

B) APPLICATIONS

1. Students would undertake short term Play Therapy with an abused child or child having an emotional problem.
2. Student would design a context specific module on Family Life Education for Adolescents in small groups.
3. Student would document in groups 'Best Practice' in inclusive / alternative education for children with learning problems.

C) BREAKUP OF CONTENTS INTO KNOWLEDGE, SKILL AND APPLICATION AREAS

Knowledge	Skills	Applications
• Play Techniques for Children: Theoretical Underpinnings. • Directive Play Therapy • Non Directive Play Therapy • Skill Training • Family Life Education • Reworking School Environment	Process of undertaking Play Therapy with children Negotiating towards joint solutions for creating least restrictive environment for the child. (All these would be honed though workshop, demonstrations, mock sessions & role plays)	• Case study of the child • Direct intervention with the child (0-12years) in the clinic / institution (individual counselling, play therapy or using play techniques)

Suggested Readings

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INTERVENTION FOR ADOLESCENTS

Paper Code: SHSSS PSY 05 02 08 C 4004

Lectures: 3, Tutorial: 1, Practical's: 2

Total Credits: 6

OBJECTIVES

To acquire beginning skills in undertaking Cognitive Behaviour Therapy with Adolescents.
To acquire beginning skills in undertaking Family Life Education with Adolescents
To acquire beginning skills in conducting Career Guidance and Counselling with Adolescents.
To develop an understanding of Group Counselling Technique

THEORY

Unit I

Cognitive Behaviour Therapy

Theoretical Underpinnings
Basic Concepts of Cognitive Behaviour Therapy, Core Beliefs; Negative Automatic Thoughts; Thought Feeling Action Cycle; Cognitive Distortions
Process of Cognitive Behaviour Therapy
Case Conceptualization
Mental Status Examination
Identifying Cognitive Distortion

Unit II

Cognitive Behavior Therapy: Application

Cognitive Techniques of Interventions
Behavioral Techniques of Intervention
Matching Techniques to Common Problems of Adolescents: Anxiety, Depression and Common Developmental Issues
Practice Guidelines
Indications & Contraindications
Documentation

Unit III

Family Life Education

Concept of Family Life Education and Scope

Designing and implementing of FLE Programme

Sexuality & Gender (Self Development Workshop)

Reproductive Health and HIV AIDS

Unit IV

Career Guidance and Counselling

• Need and Scope of Career Guidance
• Basic Concepts of Career Guidance: Characteristics of Career; World of Work; Influences on Career Choices
• Domain of Career Assessment: Interests; Aptitude; Personality; Academic Profiling and Informal Methods
• Planning and Conducting Career Talks
• Individual Profiling
• Process of Career Counselling

PRACTICAL

A) Field Work Tasks

Student would:

• Conduct Career Talks

• Undertake Individual profiling of two students for undertaking Career Guidance • Undertake Cognitive Behaviour Therapy with one or two adolescents

B) Self Development Workshops

• Sexuality and Gender • Cognitive Beliefs

• Addressing Irrational Cognitive beliefs

SCHEME OF TEACHING

A) PROCESS OF DEVELOPING SKILLS

• Student would be exposed to Techniques of Cognitive Behaviour Therapy through role plays, demonstrations and practice sessions.

• Skill workshops would be designed for conceptualizing a case, evolving working hypothesis & planning interventions through case studies and life presentation of cases being handled by students in the field.

• The student would be exposed to conducting career talks through mock sessions in class room & practice sessions in schools.

• The student would be familiarized with different measures for understanding career assessment of students.

• Students would be exposed to the process of undertaking 'Skill Training' with children through simulations, role plays, demonstrations & practice sessions.

APPLICATIONS

• The student would be able to undertake Career Guidance with three students.

• The student would undertake CBT with 1 -2 Adolescents.
• The student would design a context specific Family Life Education Programme for Adolescents

Knowledge	Skills	Applications
CBT Theoretical underpinning and Basic Concept and Techniques. ,CBT –process Application of CBT to common problems and development mental issues of adolescents Family Life Education Group Counselling **Career Guidance :** Concept ,Process of Individual and Group Guidance	Skills of Cognitive Behaviour Therapy Assessment. Case Studies for case conceptualization Demonstration of Behavioural & Cognitive Intervention through role plays, video feedback rehearsals. Planning CBT Interventions Skills of conducting career talks Interpreting findings of vocational profiling. Collection of data on different careers.	• Career Guidance and Profiling • Direct intervention with the adolescents (Practice skill of Cognitive Behaviour Therapy, Supportive Counselling etc.)

Suggested Readings

Beck, J. S. (1995). *Cognitive Therapy: Basics and Beyond*. NY: Guilford Press.

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INTEGRATING INTERVENTIONS

Paper Code: SHSSS PSY 05 02 09 C 4004

Lectures: 3, Tutorial: 1, Practical's: 2

Total Credits: 6

I. OBJECTIVES

1. To integrate assessment and therapeutic intervention skills in context of the situation, need and age.
2. To design, monitor and evaluate mental health interventions at individual, group or community level.

THEORY

Unit 1. Planning School Mental Health Programme

Concept

WHO Model of School Mental Health
Need Assessment Strategies
Designing the Services

Pedagogy for Training
Developing Workshops for Parents and Teachers

Unit 2 Planning Intervention for Children: Clinical Work at CGC/ AGSC

Conceptualizing Assessment
Integrating Assessment to reach Diagnostic Workup
Planning Interventions

Unit 3 Planning Intervention for Children in Difficult Circumstances

Understanding impact of Trauma and Abuse on Children
Planning intervention for children affected by trauma and abuse

Issues in Pre & Post Adoptive Counselling of Parents
Supportive Counselling
Crisis Intervention

Unit 4 Ethical Issues in Counselling

Role of an Effective Counsellor
Conceptual Framework for Ethical Decision Making

Good Practices of Counselling Services in School
Application of Ethical considerations (Simulated Exercises)

III. PRACTICAL

A) Field Work Tasks

Undertaking supportive interventions for Children in Difficult Circumstances.

Undertaking interventions with children with learning and behaviour problems in Child Guidance Centre and Adolescents Guidance Service Centre.

B) Self Development Workshops

Stress Management

Child Sexual Abuse

IV. SCHEME OF TEACHING

A) PROCESS OF DEVELOPING SKILLS

The paper is essentially a skill based one wherein the student would integrate assessment and interventions learnt across papers to address issues, concerns and problems of children at individual, group and community level. The students will practice these skills during their placements in Clinics, Schools and Institutions for children in difficult circumstances. The students would be provided individualized supervision through faculty and outside professionals. Skill workshops would also be conducted to facilitate the students to integrate frameworks of assessments and interventions.

B) APPLICATIONS

The students would be given the following assignments to apply the key skills learnt during the programme:

The student would formulate Intervention plans for two children with (Diagnostic workup given) Learning & Behaviour Problem

The student would design an Individual & Group Intervention for children who are trafficked or are affected by violence or abuse.

The student would identify 'best practice' of interventions with children in difficult circumstances based on field work experiences

The student would evolve school mental health programme in context of study of their school.
The student would Design Training Sessions / Modules along specific data collected

during Training Need Assessment

Students would plan workshops in small groups on positive parenting in a school setting.

Developing career guidance service.

C) BREAKUP OF CONTENTS INTO KNOWLEDGE SKILL AND APPLICATION AREAS

Knowledge	Skills	Applications
• Planning & organizing Workshop	• Workshop on Need Assessment & designing Training for Parent and Teachers	• Case Study of Self
• Planning Interventions for Children with Learning & Behaviour Problems	• Sensitization Workshops to understand impact of Trauma, Abuse and Neglect	• Undertake supportive Interventions for children in difficult circumstances
• Planning Interventions for Children in Difficult Circumstances	• Workshop on issues of Pre adoptive & Post Adoptive Counselling	• Design and implement context specific family life Education program for Children & adolescents
• Planning School Mental Health Programme Ethical Issues in Practice	• Workshops on Integrating Assessments to draw intervention plans Adoptive Counselling	• Designing and implementing need-based training. • Any other

LIST OF READINGS

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WHO (1994). *Mental Health Programs in Schools*, WHO, Geneva.

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Paper-10

Field Work

SHSSS PSY 05 02 10 C 0202

Objectives

1. To facilitate the development of thinking, feelings and attitude relevant to professional practice.
2. To provide exposure opportunities to work with children and child related systems to develop sensitivity about issues and concerns of children.
3. To enable students develop core skills relating to preventive, promotive & clinical activities with children across settings.
4. To develop among students, the ability to integrate theoretical learning with practice experience

Settings

The students would have opportunity of working in the following settings

- School
- Child Guidance Centre & Adolescent Guidance Service Centre
- Children's Institution

Tasks

Sl. No.	Subject	Task to be undertaken
1	Child Development	□ Micro processes of pre-school education □ Developmental characteristics of child □ Play activities of children across ages
2	Exceptional Variations in Child Development	Clinical work: □ Educational Assessment Personality Assessment □ Corner's etc.) □ Special diagnostic rating scales (CARS, Spot diagnosis □ Play sessions (II level) □

3	Techniques of Child & Adolescent Assessment	Clinical work: □ Case History □ Play observation □ Adolescent Interviews □ Vineland Adaptive Behaviour Scale □ Multiple Intelligences □ Learning styles

4	Child Rights & Policy	□ Studying School as a System □ Micro process related to school mental health □ Studying Children‟s Institutions from „Rights‟ perspective
5	Group Work & Community Interventions	□ Designing and Conducting Developmental group work with adolescents □ Legislative processes of the Children‟s Institution
6	Family Interventions	Clinical work (Term I): □ Diagnostic workup □ Social investigations (home visit, HOME, school visit etc.) Clinical work (Term II): □ Parent Counselling □ Home based intervention with parents, parent training, PCIT □ Clinical case report
7	Intervention for Children	□ Case study of the child □ Direct intervention with the child (0-12years) in the clinic / institution (individual counselling, play therapy or using play techniques)
8	Intervention for Adolescents	□ Career guidance and profiling

		□ Direct intervention with the adolescents (Practice skill of cognitive behaviour therapy, supportive counselling)
9	Integrating Interventions	□ Supportive group interventions in the institutions □ Case study of self

School: During the placement in the school the following tasks would be undertaken by the students:-

- Studying School as a System
- Micro process related to school mental health
- Designing and Conducting Developmental group work with adolescents
- Micro processes of pre-school education
- Career guidance and profiling

Child / Adolescent Guidance Service Centre: The students would conduct assessments, plan and monitor interventions with children & their families. Following tasks would be undertaken:-

- Case History
- Play observation
- Adolescent Interviews
- Vineland Adaptive behavior Scale
- Educational Assessment
- Personality Assessment
- Special diagnostic rating scales
- (CARS, Corner‟s etc.)
- Play sessions (II level)
- Spot diagnosis
- Diagnostic workup
- Social investigations (home visit, HOME, school visit etc.)
- Parent Counselling
- Home based intervention with parents, parent training, PCIT
- Clinical case report
- Restructuring school environment
- Direct intervention with the child (0-12years) in the clinic / institution (individual counselling, play therapy or using play techniques)
- Direct intervention with the adolescents (Practice skill of cognitive behaviour therapy, supportive counselling)

Children's Institution: In the Children's Institution the following tasks would be undertaken by the students:-

Studying Children's Institutions from 'Rights' perspective and their legislative processes

Direct intervention with the children and adolescents (Practice skill of Play Therapy, Cognitive behavior Therapy, Supportive Counselling etc.)

Supportive group interventions in the institutions

Other Field Assignments: The student would undertake following other assignments:-

Case study on self

Case study of one child

Placements in the Field

Time Schedule / Days: Every student has to spend a minimum of 15 hours a week (2 days) on field work.

During the first term students would be placed primarily in the schools (Every Tuesday) and AGSC/CGC and also carry out their free flowing assignments related to case studies

(Every Saturday). By the end of the first term they would start visiting Children's

Institutions for 3 – 4 hours on a Saturday.

During the second term students would be placed primarily in Children's Institutions (Every Tuesday) and AGSC/CGC and also carry out their free flowing assignments related to case studies (Every Saturday). The students would be briefly provided opportunity to work in schools to carry out their tasks related to career guidance.

The placement in the CGC/AGSC will be carried out on rotation in batches on **Tuesdays** and **Fridays** afternoons as per the roster drawn out for the purpose. This placement will be carried out through the year.

Attendance Requirement

The students are required to attend at least 90 percent of total field work days during concurrent field work placement.

Reporting of Field work

Students would get a **Log Sheet** in which they will fill up the work done in the field work agency. The agency supervisor would duly sign the log sheets.

During the first term the students would be expected to submit **field work reports** on **every Monday**. The report would be based on 'process recording' of experiences in the field. Thereafter they would make **synthesis report** for each of the field work tasks. The synthesis report would comprise all the process recordings of a particular task along with 'Analysis'(i.e. relating field experiences to theory or Learning's) and 'Self in relation to the task'(i.e. Self growth or Feelings).

During the Second term the students would be only submitting Synthesis reports.
However, for the purpose of supervision they will be required to make fieldwork diaries.

The Synthesis reports would be the basis of field work evaluation at the end of the programme along with Viva voice.
The internal evaluation will be based on classroom presentations of field work tasks, observations of student's work and process recordings

Field Work Supervision

Every student will be supported through intensive process of individual supervision. The student would get on opportunity of 40 - 45 minutes of individual interaction time with his / her supervisor once in a fortnight (Tuesday afternoons). Group supervision will also be provided to enhance integration of theory & practice and to develop skills.

The students will also be provided clinical supervision for their work in CGC/AGSC.

Paper-11

Internship

SHSSS PSY 05 02 11 C 0202

In addition to concurrent field work the students are also required to undergo two months of internship training immediately after appearing in their final examination. Students are not eligible to the award of degree unless they successfully complete this training. Preferences for the area and organizational setting during Internship are invited by February - March every year. The students are expected to make choices in order of preference. The Institute tries to arrange suitable organizations for placement. If in spite of best efforts the Institute may not be able to accommodate preference of the student, they will have to accept the alternative placements

Annexure-XIX

Central University of Haryana
Department of Psychology
Scheme and Syllabus
P.G. Diploma in Rehabilitation Psychology

STRUCTURE OF PROGRAMME

Type of Course	Course Title	Course Code	L	T	P	Credits
Semester-I						
Core	Disability and Rehabilitation	SHSS PSY 04 01 01 C 4105	**4**	**1**	**0**	**5**
Core	Psychosocial Issues in Disability	SHSS PSY 04 01 02 C 4105	**4**	**1**	**0**	**5**
Core	Practical-Rehabilitation Interventions and Viva Voce (Vocational Training for One Special Need Children)	SHSS PSY 04 01 03 C 0055	**0**	**0**	**5**	**5**
						Total Credits:15
Semester-II						
Core	Rehabilitation Assessment and counseling	SHSS PSY 04 02 04 C 4105	**4**	**1**	**0**	**5**
Core	Community Based Rehabilitation	SHSS PSY 04 02 05 C 4105	**4**	**1**	**0**	**5**
Core	Internship	SHSS PSY 04 02 06 C 0505	**0**	**5**	**0**	**5**
						Total Credits:15

Paper–I
Disability and Rehabilitation
SHSS PSY 04 01 02 C 4105
Hours: 60 Hours

Unit-I

Introduction–Overview of the profession, history and growth of rehabilitation field, areas of specialization, current issues and trends in different areas of rehabilitation, magnitude and incidence of disability, cost of disability, major national reports and surveys

Unit II

Concepts and theory – Impairment, disability and handicap, types and causes of impairments, realms of impairments, concept of functional capacity, coping and well-being, quality of life and

its functional domains, content areas, methods of assessment, specific and global indicators of quality of life

Unit III

Disability and Rehabilitation – Models of disability and rehabilitation, enabling–disabling processes, impact of the physical, social and psychological environments on the enabling–disabling processes, effects of disability on participation, psychosocial theories of adjustment, strategies to enhance adjustment, functional limitations and strategies to reduce and accommodate limitations

Unit IV

Disability through life-cycle – Specific problems pertaining to each stage of life - childhood, adolescence, young adulthood, middle age, and older adulthood, and adapting strategies

Unit V

Ethics and policy issues – Rehabilitation ethics, rehabilitation policies and Acts(Persons with Disabilities Act, The National Trust Act, Mental Health Care Act, Rehabilitation Council of India Act, UNCRPD), assistance, concessions, social benefits and support from government, and voluntary organizations; contemporary challenges, civil rights and legislation, empowerment issues

References

Encyclopedia of Disability, Gary L. Albrecht, Vol. 1 – 5, Sage Publications, Chicago, 2006

Encyclopedia of Disability and Rehabilitation, Arthur E. Dell Orto and Robert P.Marinelli (Eds.), MacMillan Reference Books, 1995 Perspectives on Disability and Rehabilitation: Contesting Assumptions, Challenging Practice,

Perspectives on Disability and Rehabilitation: Contesting Assumptions, Challenging Practice, Karen Whalley Hammell, Churchill Livingstone, 2006

Status of Disability in India – 2012, Rehabilitation Council of India, New Delhi.

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The handbook of Autism: A guide for parents and professionals, Aarons, M. and Glittens, T., Routledge, New York, 1992

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The National Trust for Welfare of Persons with Autism, Cerebral Palsy, Mental Retardation and Multiple Disabilities Act, Government of India, New Delhi, 1999

Yuker, H. E. (Ed). (1988). Attitudes Toward Persons with Disabilities. New York: Springer Publishing Company

Dell Orto, A. E., & Marinelli, R. P. (Eds.) (1995). Encyclopedia of disability and rehabilitation. NY: Simon & Schuster Macmillan.

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Jena, S.P.K. (2013). Learning Disabilities: Theory to Practice, New Delhi. Sage Publication
Sagar, R. (Ed.) (2014). Specific Learning Disorder: Indian Scenario. New Delhi: Department of Science and Technology, Govt. of India
Smart, J. (2012). Disability across the Developmental Life Span: For the rehabilitation counselor. New York: Springer Publishing Company

Paper II

Psychosocial Issues in Disability

SHSS PSY 04 01 02 C 4105

Hours: 60 Hours

Unit-I

Stress and Coping Style – Stress due to disability, threat to life and physical wellbeing, body image, independency, autonomy and control, self-concept, self-esteem, life goals and future plan, invisible disabilities, marginalization, Denial, regression, compensation, rationalization, emotional reaction – grief, loss, guilt and fear, coping styles and strategies, stages of adaptation and adjustment, factors impeding adjustment to disability and disabling processes, psychological control

Unit-II

Mental health issues – Psychopathological reactions such as anxiety, depression, adjustment problems, other co-existing mental morbidity, emotional and behavioral disorders in children and adolescents, problems related to marital and sexual life, abuse and exploitation, substance use, interventions for mental illnesses

Unit-III

Family issues – Relationship issues with family, problems of families of disabled adults and children, impact of disability on family, family burden, needs of family and models of family adaptation, intervention to strengthening family support to disabled

Unit-IV

Social issues – Societal attitudes toward disabilities, measurement of attitude and strategies for attitude change, social environment, social participation, social interaction, social network and support, disabling factors, prejudice, stigma, discrimination, marginalization, gender disparity

Unit-V

Vocational issues - Career competency, career development issues, work related stress, economic independence, well-being, assistive devices for activities of daily living, mobility aids, at work place, sensory devices, environment modifications and universal designs, needed support system

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Paper-III
Practical
SHSS PSY 04 01 03 C 0055

Rehabilitation Interventions and Viva Voce (Vocational Training for One Special Need Children)

Internal Assessment of Semester-I

In each subjects of Group – A, 30% marks shall be determined on the basis of two internal exams (theory and practical), each conducted for 50 marks. The marks so obtained are added to the marks allocated to the respective subjects in the final examinations. The results of the final examinations will be declared on the basis of the total so obtained.

Semester-II

Paper IV

Rehabilitation Assessment and Counseling

SHSS PSY 04 02 04 C 4105

Hours: 60 Hours

Unit-I

Assessment – Need for assessment in counseling, assessment based model for decision making, planning, and implementing individualized interventions, various instruments used for assessing cognitive, learning, behavioral, and emotional functioning, social and emotional development, assessment of perception of the problems and potential to participate and benefit from interventions, and assessing intervention efficacy

Unit-II

Theory and concepts – Definition and goals of rehabilitation counseling, theories and techniques, counselor role, boundaries of confidentiality, ethical guidelines in counseling activities, concept of dual relationships, professional challenges in counseling and conflict resolutions, models, spiritual, culture and gender issues in counseling

Unit-III

Intervention Approaches – Individual counseling approaches viz. non-directive, existential, humanistic, person-centered, cognitive and behavioral counseling, and behavior modification, techniques of remedial training for scholastic/learning problems

Unit-IV

Specific Interventions – Specific intervention for developing social skills, academic skills, assertiveness, anger management, addressing anxiety/mood disorders, assessing family functioning, its strengths and resources, family counseling, crisis intervention

Unit-V

Vocational counseling – Assessment and components of vocational counseling viz. identifying interests, goals and plans, and counseling during the training and job placement processes, scheme related to skill development

References

Carpener B, (2002). Families in Context, Emerging Trends in Family Support and Intervention, David Fulton Publishers Ltd., London.

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Rohe, D. E., & Athelstan, G. T. (1985). Change in vocational interests after disability. Rehabilitation Psychology, 30 (3), 131-143.

Rohe, D. E. & Krause, J. S. (1998). Stability of Interests After Severe Physical Disability: An 11-Year Longitudinal Study. Journal of Vocational Behavior, 52, 45-58.

Szymanski, E. M. (2000). Disability and vocational behavior. In R. G. Frank & T. R. Elliott (Eds.), Handbook of Rehabilitation Psychology. Washington, D.C.: American Psychological Association

Gladding, S. T. (2014). Counselling: A comprehensive profession. Pearson Education Inc. (Published by Dorling Kindersley (India) Pvt. Ltd., Noida for India).

Hough, M. (2014). Counselling Skills and Theory. Italy: Hodder Education.

Whiston, S. C. (2009). Principles and Applications of Assessment in Counselling. CA: Brooks/Cole Cengage Learning.

Paper-V

Community Based Rehabilitation

SHSS PSY 04 02 05 C 4105

Hours: 60 Hours

Unit-I

Goals and Objectives–Definition of CBR, Goals and objectives, key principles - equality, social justice, solidarity, integration and dignity

Unit-II

Components–Creation of a positive attitude, provision of rehabilitation services, education and training opportunities, creation of micro and macro income generation opportunities, provision of long term care facilities, prevention of causes of disabilities and monitoring & evaluation

Unit-III

Role of CBR professionals–As local advocates, liaison and continuity of care, continued supervision of home programs, community initiatives to remove barriers that affect exclusion, advocacy

Unit-IV

Initiatives – Social counseling, training in mobility and daily living skills, community awareness raising, facilitating access to loans, vocational training, information for local self-help groups, contacts with different authorities, school enrolment

Unit-V

Empowerment issues – Approaches for empowering - social mobilization, political participation, communication, self-help groups and organization working for persons with disabilities

References

Helander Einar (1999). Prejudice and Dignity: An Introduction to Community Based Rehabilitation, Second Edition, United Nations Development Program, NY

Community Based Rehabilitation and the health care referral services (1994), World health Organization

Community Based rehabilitation for and with people with disabilities (1994), UNESCO (Special Education) , WHO

Jonsson Ture (1994). Inclusive Education – United Nations Development Program David Werner. Disabled Village Children: a guide for community health workers, rehabilitation workers families, The Hesperian Foundation, USA.

Einar Helander (1984). Rehabilitation For All: a guide to the management of CBR

M.C. Narasimhan and A.K. Mukherjee. Disability: a Continuing Challenge, Wiley Eastern Ltd., Training Manual for Village Rehabilitation Workers, District Rehabilitation Centre Scheme, Ministry of Welfare, Govt. of India published by Wiley Eastern Ltd.

Mrs.Achala Pahwa (Ed.). Manual on Community Based Rehabilitation. Ministry of Social Welfare, Govt. of India. Pilling, A. (1991). Rehabilitation and Community Care. London: Routledge

Paper-VI
Internship
SHSS PSY 04 02 06 C 0505

Submission: Five fully worked-out Rehabilitation Counseling Records which include case formulation, problem areas elicited, type and technique/s employed to resolve the problems, and the processes of counseling. Out of five records, two shall be related child cases including one from multiple disabilities.

Minimum prescribed clinical work during the training.

By the end of I year

_____

1) Assessment & workup of client and/or family	25
2) Counseling of persons and/or family with disability	25

(Out of 25 cases 5 shall be related to children)

Internal Assessment of Semester-II

In each subjects of Group – A, 30% marks shall be determined on the basis of two internal exams (theory and practical), each conducted for 50 marks. The marks so obtained are added to the marks allocated to the respective subjects in the final examinations. The results of the final examinations will be declared on the basis of the total so obtained.

Annexure-XX

Central University of Haryana
Department of Psychology
Scheme and Syllabi of B.Sc. Psychology (Honors)

STRUCTURE OF PROGRAMME

Semester-I						
Type of Course	**Course Title**	**Course Code**	**L**	**T**	**P**	**Credits**
FC	Introduction to Psychology	SHSS PSY 03 01 01 FC 5106	5	1	0	6
FC	Experimental Psychology	SHSS PSY 03 01 02 FC 5106	5	1	0	6
FC	Practicum-I	SHSS PSY 03 01 03 FC 4046	4	0	4	6 (4+4/2)
AECC	General English: Essentials of Communications	SHSS PSY 03 01 01 AECC 3104	3	1	0	4
GEC	GEC-I	To be opted from other departments	5	1	0	6*
Total Credits:			**28**			
Semester-II						
Type of Course	**Course Title**	**Course Code**	**L**	**T**	**P**	**Credits**
FC	Physiological Psychology	SHSS PSY 03 02 04 FC 5106	5	1	0	6
FC	Cognitive Psychology	SHSS PSY 03 02 05 FC 5106	5	1	0	6
FC	Practicum-II	SHSS PSY 03 02 06 FC 4046	4	0	4	6 (4+4/2)
AECC	Environmental Sciences	SHSS PSY 03 02 02 AECC 3104	3	1	0	4
GEC	GEC-II	To be opted from other departments	5	1	0	6*
			28			
Semester-III						
Type of Course	**Course Title**	**Course Code**	**L**	**T**	**P**	**Credits**
Core Courses						
FC	Social Psychology	SHSS PSY 03 03 07 FC 5106	5	1	0	6

FC	Introduction to Personality	SHSS PSY 03 03 08 FC 5106	5	1	0	6
SBC	Understanding the Self and Others	SHSS PSY 03 03 01 SBC 2044	2	0	4	4 (2+4/2=4)
GEC	GEC-III	To be opted from other departments	5	1	0	6*
Total Credits:			**22**			
Semester-IV						
Type of Course	**Course Title**	**Course Code**	**L**	**T**	**P**	**Credits**
Core Courses						
FC	Basics of Research Methodology	SHSS PSY 03 04 09 FC 5106	5	1	0	6
FC	Developmental Psychology	SHSS PSY 03 04 10 FC 5106	5	1	0	6
SBC	Psychology of Relationships	SHSS PSY 03 04 02 SBC 2044	2	0	4	4 (2+4/2=4)
GEC	GEC-4	To be opted from other departments	5	1	0	6*
Total Credits:			**22**			
Semester-V						
Type of Course	**Course Title**	**Course Code**	**L**	**T**	**P**	**Credits**
Core Courses						
FC	Psychological Testing	SHSS PSY 03 05 11 FC 5106	5	1	0	6
FC	Practicum-III	SHSS PSY 03 05 12 FC 4046	4	0	4	6 (4+4/2)
DSC	Statistics in Psychology	SHSS PSY 03 05 01 DSC 5106	5	1	0	6
DSC	Introduction to Indian Psychological Thoughts	SHSS PSY 03 05 02 DSC 5106	5	1	0	6
Total Credits:			**24**			
Semester-VI						
Type of Course	**Course Title**	**Course Code**	**L**	**T**	**P**	**Credits**
Core Courses						

FC	Abnormal Psychology	SHSS PSY 03 06 13 FC 5106	5	1	0	6
FC	Psychology of Individual Differences	SHSS PSY 03 06 14 FC 5106	5	1	0	6
DSC	Positive Psychology	SHSS PSY 03 06 03 DSC 5106	5	1	0	6
DSC	Research Methodology and Statistics	SHSS PSY 03 06 04 DSC 5106	5	1	0	6
Total Credits:			**24**			
General Elective Course (Semester-I) (To be opted by students of other departments)						
GEC	General Psychology	SHSS PSY 03 01 01 GEC 5106	5	1	0	6*
GEC (Semester-II)						
GEC	Intergroup Relations	SHSS PSY 03 02 02 GEC 5106	5	1	0	6*
GEC (Semester-III)						
GEC	Psychology and Mental Health	SHSS PSY 03 03 03 GEC 5106	5	1	0	6*
GEC (Semester-IV)						
GEC	Community Psychology	SHSS PSY 03 04 04 GEC 5106	5	1	0	6*

FC= Foundational Course
SBC= Skill Based Course
DSC= Discipline Specific Course
GEC=Generic Elective Course**(For Non-Psychology students / To be offered to other departments)**
AECC= Ability Enhancement Compulsory Course

B.Sc Psychology, (Honors)

Semester-I

INTRODUCTION TO PSYCHOLOGY
SHSS PSY 03 01 01 FC 5106

Objective

This course will provide a basic and elementary knowledge of the history, schools, major contributors and basic concepts of psychology.

Learning Outcomes

After the completion of the course the student will be able to

1. *Identify and explain the origin, nature and scope of Psychology.*
2. *Describe various schools of psychology & the difference among them.*
3. *Compare and criticize the contributions of major psychologists.*
4. *Develop the ability to understand basic concepts in psychology.*

UNIT-I

Psychology: Nature, Psychology as a Science, Fields of Psychology, Psychology and Related Disciplines-Sociology, Education, Economics.

Methods: Experimental, Observation, and Case Study.

Case study/Research article: Analysis of a phobia in a five-year-old boy (Freud, 2001).

UNIT-II

Schools of Psychology: Basic Tenets of Structuralism, Functionalism. Behaviorism and Gestalt.

Case study/Research article: Behaviour as seen by the actor and as seen by the observer (Nisbet, 1973).

UNIT-III

Learning: Nature, Methods, and Factors Affecting.

Types of Learning: Trial and Error, Insight, Observational and Social learning.

Case study/Research article: The Case of Zinermon v. Burch (1990): The Importance of Capacity.

UNIT-IV

Motivation: Nature, Physiological and Psychological Motives.

Emotion: Types and Theories- James-Lange, Canon Bard.

Case study/Research article: Conditioned emotional reactions (Watson & Rayner, 1920).

Suggested Readings

Baron, R. & Misra. G. (2013). *Psychology*. Pearson.

Chadha, N.K. & Seth, S. (2014). *The Psychological Realm: An Introduction*. Pinnacle Learning, New Delhi.

Ciccarelli, S. K., &White, J.N. Adapted by Misra. (2018). Psychology,(15th Ed.). New Delhi: Pearson Education.

Passer, M.W. & Smith, R.E. (2010). *Psychology: The science of mind and behaviour*. New Delhi: Tata McGraw-Hill.

Freud, S. (2001). *Analysis of a phobia in a five-year-old boy*. Standard edition, 10. Gross, R. (2012). Key Studies in Psychology 6th Edition.

Hachette UK. Hook, R. R. (1999). *Forty studies that changed Psychology*. New Jersey: Prentice.

Hall. Meyer, R. G., & Weaver, C. M. (2013). *Law and mental health: A case-based approach.* Guilford Publications.

Nisbett, R. E., Caputo, C., Legant, P., &Marecek, J. (1973). Behavior as seen by the actor and as seen by the observer. *Journal of Personality and Social Psychology*, *27*(2), 154.

Experimental Psychology

SHSS PSY 03 01 02 FC 5106

Objective

Through this course, the students will be introduced to the fields of Psychology. The students will be taught popular theories related with the field and will be acquainted with fundamentals of conducting a Psychology experiment in laboratory setting.

Learning Outcomes

After completing the course, students will be able to:

- *Identify the basic principles of empiricism*
- *Explain the basic principles of experimental psychology applied to implementation of research.*
- *Apply the principle of carrying out an experiment to address questions of causation.*

Unit I

Experimental Psychology: Meaning, Nature and History.

Weber's and Fechner's' Law.

Experimental Method: Meaning and steps.

Unit II

Sensation: Nature and Types.

Psychophysics: Meaning, Problem and Methods.

Unit III

Perception: Meaning, Nature, Organization of stimulus and Factors Affecting.

Perception of Figure-ground, Form and Time.

Unit IV

Classical Conditioning: Meaning, Nature and Steps.

Transfer of Learning: Meaning and Types.

Reaction Time: Meaning and Types.

Suggested Readings

Anderson, D. C., & Borkowski, J. G. (1978). *Experimental Psychology: Research Tactics and their Applications*. Illinois: Scott foreman.

Chance. (1988). *Learning and Behaviour*. California: Wadsworth.

D'Amato, M. R. (1970). *Experimental Psychology: Methodology, Psychophysics, and Learning*.New Delhi, Tata Mc-Graw Hill Publishing Company.

Domjan, M. (2003). *The Principles of Learning and Behaviour*. California: Wadsworth, Thomson.

Flaherty, C. F., Hamilton, L. W., Gandelman, R. J., & Spear, N. E. (1977). *Learning and Memory*. Chicago: Rand McNally.

Goldstein, E. R. (2007). *Psychology of Sensation and Perception*. New Delhi: Cengage Learning.

Kantowitz, B. H., Roediger, H. L., &Elmes, D. G. (2014). *Experimental Psychology*. Cengage Learning.

Liberman, D. A. (1990). *Learning: Behaviour and Cognition*. California: Wadsworth

Riggs, L. A., Woodworth, R. S., Schlosberg, H., & Kling, J. W. (1972). *Woodworth & Schlosberg's Experimental Psychology*. London: Methuen.

Woodworth, R. S., & Schlosberg, H. (1971). *Experimental Psychology*. New Delhi Oxford and IBH.

PRACTICUM-I

SHSS PSY 03 01 03 FC 4046

Objective

This course will enable students to understand and apply the general concepts of psychology through experiments & psychological tests.

Learning Outcomes

At the end of this course, you should be able to able to independently administer the instruments for testing purpose.

Ten of the following practicals shall be conducted during the semester. One practical will be allotted to the candidate during examination and evaluation will be based on Practical Conduction, Report and Viva-Voce during the practical Exam.

1. Simple Reaction Time
2. Transfer of Training
3. Span of Attention
4. Muller-Lyer Illusion
5. Weber Law
6. Intelligence Testing
7. Perception of Time
8. Figural After Effect
9. Maze Learning
10. Depth Perception
11. Mapping of Color Zones

12. Determination of AL
13. Determination of DL
14. Study of Emotions (Facial Expression)
15. Sound Localization
16. Color Mixture
17. Color Contrast
18. Retinal After Image

GEC-I

General Psychology

SHSS PSY 03 01 01 GEC 5106

Objective

This course will introduce the students with the basic principles of Psychology. It will further introduce students with the recent advancements in the general Psychology

Learning Outcomes

At the end of this course students will be able to:

- *Define and explain the basic principles in Psychology.*
- *Demonstrate the principles of the Psychology in daily life.*

UNIT-I

Psychology: Nature and Scope, Schools of Psychology.

Methods of Study: Experimental, Observation, and Case Study.

UNIT-II

Sensation: Nature and Types

Perception: Nature, and Perceptual Organization.

UNIT-III

Motivation: Nature; Theories – Drive and Need Hierarchy Theory.

Emotion: Emotional expression, and Theories of Emotions - Canon-Bard, James-Lange.

UNIT-IV

Intelligence: Nature, Theories- Two Factor, Group Factor, and Multiple Intelligence.

Personality: Nature, Determinants, Theories of H.J. Eysenck, R.B.Cattell.

Suggested Readings

Baron. A. Robert (2002). *Psychology*. (5th Edition) Pearson Education. New Delhi.

Clifford T. Morgan, Richard King, John R. Weis, and John Schopler (1993). *Introduction to Psychology (7th Edition).* Tata McGraw Hill Book Co. New Delhi.

Ernest R. Hillgard, Richard C. Atkinson, Rita L. Atkinson (1975). *Introduction to Psychology. (6th Edition),* Oxford IBH publishing Co. Pvt. Ltd. New Delhi.

Gazzaniga, M. Heatherton, T. Halpern, D. & Heine Steve (2012). *Psychological Science.* WW Norton & Company. Inc. New York.

Foundation Course

Physiological Psychology

SHSS PSY 03 02 04 FC 5106

Objective

This paper is designed to provide an understanding about the physiological bases of behaviour. It will further introduce the structure and functions of neural organization

L*earning Outcomes*

- *Appreciating the biological bases of human behavior including neural, biochemical, evolutionary, and genetic mechanisms.*
- *Developing critical thinking to use scientific techniques for biological psychology and developing an awareness of ethical issues accompanying them.*
- *Having basic knowledge about the structures of nervous system, division and functions.*
- *Understanding biological mechanisms involved in psychological processes such as motivation and emotion.*

UNIT-I

Physiological Psychology: Nature and Scope.

Methods- Stimulation, Imaging techniques, Ablation, Recording Techniques.

Case study/Research article: Never, ever shake a baby (Heffelfinger, 2010).

UNIT-II

Cell: Structure and Functions. Neuron: Structure, Types and Functions.

Neurotransmitters.

Case study/Research article: Association of specific overt behavior pattern with blood and cardiovascular findings (Friedman & Rosenman, 1959).

UNIT-III

Nervous System: Central Nervous System- Brain and Spinal Cord; Peripheral Nervous System- Somatic and Autonomic.

Case study/Research article: Brain abnormalities in murderers indicated by positron emission topography (Raine, Buchsbaum&LaCasse, 1997).

UNIT-IV

Glandular System: Hormones and their action; Physiological bases of Motivation and Emotion; Exocrine vs Endocrine.

Endocrine Gland: Structure, Location, and Functions.

Case study/ Research article: Development of the Adolescent brain (Blakemore & Choudhury, (2006).

Suggested Readings

Breedlove, S. M., Rosenzweig, M. R., & Watson, N. V. (2007) *Biological Psychology: An introduction to behavioral, cognitive, and clinical neuroscience*, 5th Edition. Sinauer Associates, Inc., Sunderland, Massachusetts.

Carlson, N. R. (2012). *Foundations of physiological psychology*. (Sixth Edition). Delhi: Pearson Education.

Green, S. (1995). *Principles of biopsychology*. UK: Lawrence Erlbaum Associates Ltd. Pinel, J. P. J. (2011). Biopsychology, 8th Edition. Pearson Education, New Delhi.

pps, J. N., & Roberts, L. W. (2008). *Pediatric Neuropsychology Case Studies*. Springer.

Blakemore, S. J., & Choudhury, S. (2006). Development of the adolescent brain: implications for executive function and social cognition. *Journal of child psychology and psychiatry*, 47(3-4), 296-312.

Friedman, M., & Rosenman, R. H. (1959). Association of specific overt behaviour pattern with blood and cardiovascular findings: blood cholesterol level, blood clotting time, incidence of arcus senilis, and clinical coronary artery disease. *Journal of the American medical association*, 169(12), 1286-1296.

Gross, R. (2012). *Key Studies in Psychology* (6th Ed.). UK.

Hachette Heffelfinger, K. (2010). *Never, Ever Shake a Baby: Pass It On. In Pediatric Neuropsychology Case Studies* (pp. 13-22). Springer, New York, NY.

Hook, R. R. (1999). Forty studies that changed Psychology. New Jersey: Prantice Hall.

Raine, A., Buchsbaum, M., &LaCasse, L. (1997). *Brain abnormalities in murderers indicated by positron emission tomography*. Biological psychiatry, 42(6), 495-508.

Foundation Course

Semester-II

COGNITIVE PSYCHOLOGY

SHSS PSY 03 02 05 FC 5106

Objective

The main objective is to develop core competency in the area of cognitive psychology. To acquaint students with the different approaches of cognitive psychology. To explain the various models of attention and memory, and basic understanding of thinking, language acquisition, and problem-solving behavior. They will be able to explain how the human brain interprets and manipulates information.

Learning Outcomes

After completing the course, students will be able to:

- *Comprehend various cognitive phenomena*
- *Elaborate different approaches of cognitive psychology.*
- *Describe various models of attention, memory, and forgetting.*

UNIT–I

Cognitive Psychology: Historical Background, Scope, Approaches- Top-Down, Bottom-Up, and Information Processing.

Case study/Research article: An Analysis of Thoughts, Behaviours, and Emotions in Daily Decision-Making (Kalahasthi, Bhuptani, & Kapoor, 2017).

UNIT- II

Attention: Nature, and Capacity. Selective Attention: Nature, Models- Filter and Attenuation. Divided Attention.

Case study/Research article: An adapted serial reaction time task for sequence learning measurements (Sengottuvel, & Rao, 2013).

UNIT-III

Memory: Nature, Types, Models-Atkinson and Shiffrin, Levels of Processing.

Forgetting: Nature, Factors, and Theories-Interference and Decay.

UNIT-IV

Thinking: Nature and Types. Problem Solving- Nature and Strategies.

Language: Nature, Process and Acquisition.

Suggested Readings

Benjafield, J. G. (2000). *Cognition*. Oxford University Press, Delhi.

Eysenck, M.W., and Keane, M. P. (2000). *Cognitive Psychology: A student's guide*. Psychology Press.

Galotti, K. M. (2011). *Cognitive Development*. Sage Publication.

Galotti, K. M. (2000). *Cognitive Psychology in and out of the Laboratory*. Delhi: Thomson.

Goldstein, B. E. (2005). *Cognitive Psychology*. Wadsworth, London.

Kellogg, R. T. (2012). *Fundamentals of Cognitive Psychology*. Lab Angles: Sage.

Solso, R. L. (2001). *Cognitive Psychology*. Delhi: Pearson Education.

Sternberg, R. J. (2007). *Cognitive Psychology*. Delhi: Thomson.

Sternberg, R. J., & Sternberg, K. (2011). *Cognitive Psychology. 8th Edition*. Wadsworth Publishing Co Inc; International edition.

Thomas, A. M. & Matlin, M. W. (2019). *Cognition (10th Ed.)*. New York: Wiley.

Dunbar, G. (2008). *Evaluating research methods in psychology: A case study approach*. John Wiley & Sons. Gross, R. (2012). *Key Studies in Psychology 6th Edition*. Hachette UK. Hamlin,

J. K., Mahajan, N., Liberman, Z., & Wynn, K. (2013). Not like me bad: Infants prefer those who harm dissimilar others. *Psychological science, 24*(4), 589-594

Treffert, D. A., & Christensen, D. D. (2005). *Inside the mind of a savant. Scientific American, 293*(6), 108-113.

PRACTICUM-II

SHSS PSY 03 02 06 FC 4046

Objectives

To enable the students to acquire skills in various experiment and applying those skills and information in conducting experiments.

Learning Outcomes

After completing the course, student will be able to conduct the various experiments to verify the psychological theories.

Ten practicals shall be conducted during the semester. One practical will be allotted to the candidate during examination and evaluation will be based on Practical Conduction, Report and Viva-Voce during the practical Exam.

1. Short Term Memory (STM)
2. Long Term Memory
3. Concept Formation.
4. Retroactive Inhibition.
5. Proactive Inhibition
6. Serial Position Effect
7. Forgetting Curve
8. Divided Attention
9. Hemispheric Specialization.
10. Stroop Test
11. Sociometry
12. Problem Solving
13. Bender-Gestalt Test
14. Visual Activity
15. Finger Dexterity

AECC

Environmental Science

SHSS PSY 03 02 02 AECC 3104

Objective

This paper is designed to help in the understanding of the environment. It includes key concepts which are necessary for developing a clear idea about the environment, various types of pollutions, effective pollution management strategies and human behaviour in relation to the environment around us.

Unit-I

Multidisciplinary Nature of Environmental Studies: Definition, Scope and Importance, Need for Public Awareness. Natural Resources: Renewable and Non-Renewable Resources.

Case study/Research article: The induction of sustained recycling behaviour through the foot-in-the-door technique (Arbuthnot et al., 1977).

Unit – II

Environmental Pollution: Causes and Effects. Control Measures for Air Pollution, Water Pollution, Soil Pollution, Thermal Pollution and Nuclear Hazards.

Solid Waste Management: Causes, Effects of solid waste. Control Measures for Urban and Industrial Waste.

Case Study/Research article: The influence of urban green environments on stress relief measures A field experiment (Tyrvainen et al., 2014).

References

Bechtel, R. B., & Churchman, A. (Eds.). (2003). *Handbook of environmental psychology*. John Wiley & Sons.

Bharucha, E. (2005). *Textbook of Environmental studies*. Hyderabad, University press.

Bonnes, M., & Secchiardi, G. (1982). *Environmental Psychology*. London.

Cunningham, W. P., Cooper, T. H., Gorhani, E., & Hepworth, M. T. (2001). *Environmental Encyclopedia*. Mumbai:Jaico publication House.

Fisher, J. D., Prell, P. A., & Baum, A. (1984). *Environmental Psychology*. New York: Holt, Rineheart and Winston.

Fleury-Bahi, G., Pol, E., & Navarro, O. (Eds.). (2017). *Handbook of Environmental Psychology and Quality of Life Research*. Springer International Publishing.

GEC-II Semester

INTER-GROUP RELATIONS

SHSS PSY 03 01 02 GEC 5106

Objective

This course will enable the student to understand group dynamics & apply their knowledge in improving relationship.

Learning Outcomes

- *Understanding Group dynamics*
- *Identify the nature of relationships between groups.*
- *Recognizing social Categorization & its consequences*
- *Identify and apply the ways of conflict resolution*

UNIT-I

Group Dynamics: Stages and Formation. Nature and Types of Groups**;** Group Norms- Nature, Formation and Functions.

Nature of Intergroup Relations: Cooperation vs. Competition

UNIT-II

Group Conflicts: Social Categorization, In-group vs. Out-group; Consequences of Social Categorization: Cognitive Biases and Stereotypes, Conflicts, Prejudice and Discrimination.

UNIT-III

Attitude: Nature, Types, Formation and Changes.

Prejudice: Nature, Formation and Changes.

UNIT-IV

Cultural Aspects of Intergroup Relations**:** Social Identity.

Leadership- Nature, Styles and Theories.

Resolving Intergroup Conflict: Intergroup Contact; Promoting Intergroup Cooperation; Conflict Management Strategies.

Suggested Books

Baron, R. A., Branscombe, N. R., Byrne, D., & Bhardwaj, G. (2009*) Social psychology*. New Delhi: Pearson.

Keyton, J. (2006). *Communicating groups-building relationships in group effectiveness.* New York: Oxford University Press.

Smith, P. B., Bond, M. H., & Kagitcibasi, C. (2006). *Understanding social psychology across culture.* New Delhi: Sage Publications.

Zorsyth, D. R. (2009). *Group Dynamics*. Broke/Cole: Wadsworth.

Annexure-XXI

CENTRAL UNIVERSITY OF HARYANA

Master of Arts in Psychology (Syllabus)

STRUCTURE OF PROGRAMME

Semester-I						
Sr.	**Course Title**	**Course Code**	**L**	**T**	**P**	**Credits**
Core Courses						
1	Theoretical Foundations of Psychology	SHSS PSY 01 01 01 C 4004	4	0	0	4
2	Experimental Psychology	SHSS PSY 01 01 02 C 4004	4	0	0	4
3	Research Methodology	SHSS PSY 01 01 03 C 4004	4	0	0	4
4	Statistics in Psychology	SHSS PSY 01 01 04 C 4004	4	0	0	4
5	Practicum-I (Experiments and Profiling)	SHSS PSY 01 01 05 C 00105	0	0	10	5
Elective Courses (GEC)						
1	General Psychology	SHSS PSY 01 01 01 GEC 4004	4	0	0	4
Semester-II						
Sr.	**Course Title**	**Course Code**	**L**	**T**	**P**	**Credits**
Core Courses						
1	Biopsychology	SHSS PSY 01 02 06 C 4004	4	0	0	4
2	Cognitive Psychology	SHSS PSY 01 02 07 C 4004	4	0	0	4
3	Research Methodology & Statistics	SHSS PSY 01 02 08 C 4004	4	0	0	4
4	Applied Social Psychology	SHSS PSY 01 02 09 C 4004	4	0	0	4
5	Review Article	SHSS PSY 01 02 10 C 0202	0	2	0	2
6	Practicum-II (Experiments and Profiling)	SHSS PSY 01 02 11 C 00105	0	0	10	5
Elective Courses (DCEC)						
1	Personality	SHSS PSY 01 02 01 DCEC 4004	4	0	0	4
2	Sports Psychology	SHSS PSY 01 02 02 DCEC 4004	4	0	0	4
3	Motivation and	SHSS PSY 01 02 03 DCEC	4	0	0	4

	Emotion	4004				
4	Indian Psychology	SHSS PSY 01 02 04 DCEC 4004	4	0	0	4
5	Child Psychology	SHSS PSY 01 02 05 DCEC 4004	4	0	0	4
6	Environmental Psychology	SHSS PSY 01 02 06 DCEC 4004	4	0	0	4
Elective Course (GEC)						
1	Psychology in Everyday Life	SHSS PSY 01 02 02 GEC 4004	4	0	0	4

Semester-III

Sr.	Course Title	Course Code	L	T	P	Credits
Core Courses						
1	Psychopathology	SHSS PSY 01 03 12 C 4004	4	1	0	4
2	Mental Abilities	SHSS PSY 01 03 13 C 4004	4	1	0	4
3	Psychological Testing	SHSS PSY 01 03 14 C 4004	4	1	0	4
4	Practicum-III (Psychological Tests)	SHSS PSY 01 03 15 C 4004	0	0	10	5
Elective Courses (DCEC)						
1	Dissertation	SHSS PSY 01 03 07 DCEC 0404	4	0	0	4
2	Rehabilitation Psychology	SHSS PSY 01 03 08 DCEC 4004	4	0	0	4
3	Military Psychology	SHSS PSY 01 03 09 DCEC 4004	4	0	0	4
4	Criminal and Forensic Psychology	SHSS PSY 01 03 10 DCEC 4004	4	0	0	4
5	Organizational Behaviour and Training	SHSS PSY 01 03 11 DCEC 4004	4	0	0	4
6	Positive Psychology	SHSS PSY 01 03 12 DCEC 4004	4	0	0	4
7	Human Resource Management	SHSS PSY 01 03 13 DCEC 4004	4	0	0	4
8	Consumer Behaviour and Marketing	SHSS PSY 01 03 14 DCEC 4004	4	0	0	4
Elective Course (GEC)						
1	Social and Community Psychology	SHSS PSY 01 03 03 GEC 4004	4	0	0	4

Semester-IV

Sr.	Course Title	Course Code	L	T	P	Credits

Core Courses						
1	Clinical Psychology	SHSS PSY 01 04 16 C 4004	4	0	0	4
2	Psychometrics	SHSS PSY 01 04 17 C 4004	4	0	0	4
3	Guidance and Counselling	SHSS PSY 01 04 18 C 4004	4	0	0	4
4	Practicum-IV (Psychological Tests)	SHSS PSY 01 04 19 C 4004	0	0	10	5
Elective Course (DCEC)						
1	Dissertation	SHSS PSY 01 04 15 C 0404	4	0	0	1
2	Cyber Psychology	SHSS PSY 01 04 16 DCEC 4004	4	0	0	4
3	Educational Psychology	SHSS PSY 01 04 17 DCEC 4004	4	0	0	4
4	Developmental Psychology	SHSS PSY 01 04 18 C 4004	4	0	0	4
5	Health Psychology	SHSS PSY 01 04 19 C 4004	4	0	0	4
6	Cross-Cultural Psychology	SHSS PSY 01 04 20 C 4004	4	0	0	4
7	Asian/Indian Healing Psychotherapies	SHSS PSY 01 04 21 C 4004	4	0	0	4
8	School Counselling	SHSS PSY 01 04 22 C 4004	4	0	0	4
9	Exceptional Children	SHSS PSY 01 04 23 C 4004	4	0	0	4
Elective Courses (GEC)						
1	Stress and Health	SHSS PSY 01 04 04 GEC 4004	4	0	0	4

Semester I

CORE COURSE-I

THEORETICAL FOUNDATIONS OF PSYCHOLOGY

SHSS PSY 01 01 01 C 4004

Credits: 4 (Hrs. /week: 4) *Total: 100 marks*

Internal Assessment: 30 Marks

Examination: 70 marks

Objective

To give an overview of historical foundations of Psychology and the developments within the discipline.

Learning Outcomes

After completing the course, student will be able to understand:

- *Emergence of Psychology as a discipline.*
- *Historical antecedents making Psychology a science.*
- *Contributions of different schools of thoughts in Psychology.*
- *Various methodological issues of Psychology.*
- *Various approaches used in the study of subject matter of Psychology.*
- *Various systems and theories of Psychology.*

UNIT – I

Emergence of Psychology– Psychology as Science, Nature and Scope of Psychology. Schools of Psychology: Basic Tenets of Structuralism, Functionalism

UNIT – II

Classical Psychoanalysis: Freud, Adler, Jung, Sullivan, Horney.

Behaviorism and Gestalt psychology.

UNIT- III

Theories of Learning: Thorndike, Hull, Guthrie, Tolman, Bandura.

Motivation: Lewin, Maslow.

Emotions: James Lange, Cannon- Bard, Schachter- Singer.

UNIT- IV

Type Theories of Personality: Sheldon, Kretchmer. Trait theories: Allport, Eysenck, Cattell.

Eastern Models of Psychology: Vedic and Buddhist.

Suggested Readings

Brenman, J. F. (2004). *History and Systems of Psychology* (6thEd). Delhi. Pearson Pub.

Cornelissen, M; Mishra, G & Verma, S. (2013). *Foundations of Indian Psychology*. New Delhi; Pearson Education.

Dalal, A.K. & Mishra, G. (2002). *New Directions in Indian Psychology: Social Psychology, Vol.1*. New Delhi, Sage Publications.

Marx, M.H. &Hillix, W.A. (1978). *Systems and Theories in Psychology*. New Delhi: Tata McGraw-Hill. Publication Ltd.

Schultz, D. & Schultz, S. (2000). *A History of Modern Psychology*. U.S.A.: Harcourt Brace & Co.

Shiraev, E. (2015). *A History of Psychology- A Global Perspective*. New Delhi. SAGE

Viney, W. & King, D. (1998). *History of Psychology*. Boston: Allyn and Bacon.

Wolman, B.B. (1995). *Contemporary Theories and Systems in Psychology*. Delhi: Freeman.

CORE COURSE-II

EXPERIMENTAL PSYCHOLOGY
SHSS PSY 01 01 02 C 4004

Credits: 4 (Hrs. /week: 4) *Total: 100 marks*

Internal Assessment: 30 Marks

Examination: 70 marks

Objective

Through this course, the students will be introduced to branch fields of Psychology. The students will be taught popular theories related with the field and will be made acquainted with fundamentals of conducting a Psychology experiment in laboratory setting.

Learning Outcomes

After completing the course, student will be able to:

- *Identify and explain the principles of empiricism, including how these are applied to implementation of research.*
- *Describe the distinct differences and distinguish between the goals of basic vs. applied scientific research.*
- *Describe the fundamental differences between the methods of carrying out an experiment vs. systematic observation and their effect on questions of causation.*

UNIT-I

Experimental Psychology: Nature, Historical Background, Contribution of Weber, Fechner, Wundt and Galton. Sensory Processes: Visual and Auditory; Structure and Functions of Eye and Ear.

UNIT- II

Perceptual Processes: Nature, Perception of Form, Size, Space, Movement, and Time.

Perceptual Constancy, Illusions, Subliminal Perception.

UNIT-III

Psychophysics: Problems and Methods of Classical Psychophysics.

Signal Detection Theory: Basic Concepts, Assumptions, Methods and Applications.

UNIT- IV

Classical Conditioning: Nature and Process; Factors affecting Classical Conditioning.

Instrumental and Operant Conditioning: Basic Concepts, Schedules of Reinforcement; Applications

Verbal Learning: Methods, Organizational Processes, Discrimination Learning: Nature and Paradigms.

Suggested Readings

Anderson, D.C. and Borkowski, J.G. (1978). *Experimental Psychology: Research Tactics and their Applications*. Illinois: Scott foreman.

Chance. (1988). *Learning and Behaviour*. California: Wadsworth.

D'Amato, M.R. (1970). *Experimental Psychology: Methodology, Psychophysics, and Learning*. New Delhi, Tata Mc-Graw Hill Publishing Company.

Domjan, M. (2003). *The Principles of Learning and Behaviour*. California: Wadsworth, Thomson.

Flaherty, C.F., Hamilton, L.W., Gandelman, R.J., & Spear, N.E. (1977). *Learning and Memory*. Chicago: Rand McNally.

Goldstein, E.R. (2007). *Psychology of Sensation and Perception*. New Delhi: Cengage Learning.

Kantowitz, B. H., Roediger, H. L., &Elmes, D. G. (2014). *Experimental Psychology*. Cengage Learning.

Liberman, D.A. (1990). *Learning: Behaviour and Cognition*. California: Wadsworth

Riggs, L. A., Woodworth, R. S., Schlosberg, H., & Kling, J. W. (1972). *Woodworth & Schlosberg's Experimental Psychology*. London: Methuen.

Woodworth, R. S., & Schlosberg, H. (1971). *Experimental Psychology*. New Delhi Oxford and IBH.

CORE COURSE-III
RESEARCH METHODOLOGY
SHSS PSY 01 01 03 C 4004

Credits: 4 (Hrs. /week: 4) *Total: 100 marks*

Internal Assessment: 30 Marks

Examination: 70 marks

Objectives

This course introduces the students to the field background and understanding of the scientific foundation of Psychology. It will enable students to develop a knowledge base of human behavior across the broad areas of psychology. It introduces students with research methods used in psychology, apply their knowledge in research design and data analysis. It will enable the students like conduct the psychological research in the professions associated with psychology.

Learning Outcomes

After completing the course student will be able to:

- *Demonstrate the knowledge of research approaches and findings in Psychology*
- *Critically access information related to the study of behavior and mental processes and use the critical assessment in forming conclusions and arguments.*
- *Develop a set of skills that extend beyond the field of Psychology*
- *Use technology for studying concepts and conducting research*
- *Able to communicate their ideas in writing and speech.*

UNIT-I

Psychological Research: Nature, Characteristics, Need. Univariate vs. Multivariate Approach; Variables: Types, Control of relevant variables

Research Problem: Formulation, Sources, and Criteria.

Hypothesis: Types and basic concepts related with hypotheses testing, and Virtues of problem and hypothesis

UNIT-II

Psychological Research: General Steps, Types-Experimental (Field and Laboratory), Ex Post facto, Field studies, Longitudinal, Cross sectional, Cross-cultural and Correlational.

UNIT-III

Sampling: Basic Principles, Probability and Non-Probability sampling techniques. Data Collection Techniques: Case Study, Observation, Interview, Questionnaire.

UNIT-IV

Quantitative v/s Qualitative Research-Nature, Methods-Grounded Theory, Ethnography, In-Depth Interview and Focused Group Discussion.

Analysis- Thematic Analysis, Narrative Analysis, Conversation Analysis and Content Analysis

Suggested Readings

Berg, B. L. (2001). *Qualitative Research Methods for Social Sciences*. Pearson. M.A.

Kerlinger, F.N. (1973). *Foundation of Behavioural Research*. New York: Holt Rinehart and Winston.

McGuigan, F.J. (1983). *Experimental Psychology: Methods of Research (4th Ed.).* New Jersey: Prentice Hall.

Richards Lyn and Morcse Janice M. (2013). *Read Me First for A User's Guide to Qualitative methods.* (3rd Ed.). Sage Publication.

Shaughnessy, J.J. & Zechmeister, E.B. (1997). *Research Methods in Psychology.* New York: Mc Graw Hill.

Singh, A.K. (1986). *Tests, Measurements and Research Methods in Behavioural Sciences.* New Delhi: Tata McGraw Hill.

CORE COURSE-IV

STATISTICS IN PSYCHOLOGY

SHSS PSY 01 01 04 C 4004

Credits: 4 (Hrs. /week: 4) *Total: 100 marks*

Internal Assessment: 30 Marks

Examination: 70 marks

Objective

This course introduces the students to the field of statistics and hypothesis testing. This is the first of the "basic skills" courses for Psychology majors and it is a required course for students in several other disciplines. It is a course concerned with data – or the information we collect when we do empirical research.

Learning Outcomes

At the end of this course, students will be able to:

- *Completely describe a data set (a set of scores) using appropriate descriptive statistics,*
- *Understand the logic and application of hypothesis testing,*
- *Interpret a set of descriptive statistics and understand the limitations of each measure,*
- *Apply the appropriate inferential statistical technique to situations covered in class,*
- *Interpret the results of an inferential test and understand the limitations of each procedure, and*
- *Compute descriptive and inferential statistics using a calculator and computer.*

UNIT-I

Statistics: Aims and Objectives, Descriptive and Inferential Statistics, Parametric and Non-Parametric Statistics. Organizing Data: Frequency Distribution, Graphical Presentation-Histogram, Polygon, Pie and Ogive.

UNIT-II

Four Levels of Measurement; Measures of Central Tendency- Mean, Median, and Mode. Measures of Variability- Range, Average Deviation, Quartile Deviation, Standard Deviation, and Variance.

UNIT-III

Normal Probability Curve: Characteristics, Applications; Divergence from Normality-Skewness and Kurtosis. Hypothesis Testing: Chi-square- Testing, Equal Probability, Normal Probability and Independence Hypothesis; z/t-test.

UNIT-IV

Correlation: Concept, Product-Moment and Rank Difference Methods. Other methods of correlation: Biserial, Point Biserial, Tetra-choric, Phi-Coefficient. Partial Correlation (first order), Multiple Correlation (three variables).

Suggested Readings

Coolican, H. (2004). *Research methods and Statistics in Psychology*. Hoddes Arnold. London.

Heiman, G.W. (2001). *Understanding research methods and statistics: An integrated introduction for psychology (2nd Ed.).* Houghton Mifflin Company. Boston

Garrett, H.E. (1981). *Statistics in Psychology and Education*. Bombay: Vakils.

Guilford, J.P. (1981). *Fundamental Statistics in Psychology and Education (6th Ed.)*. New Delhi: McGraw Hill.

Howell D.C. (1997). *Statistical Methods for Psychology (4th Ed).* Duxbury. Pacific Grove, CA.

Winer, B.J. (1971). *Statistical principles and experimental design*. Kogakusha: McGraw.

CORE COURSE-V
PRACTICUM-I (EXPERIMENTS AND PROFILING)
SHSS PSY 01 01 05 C 00125

Credits: 5 (Hrs. /week: 10) *Total: 100 marks*

Internal Assessment: 30 Marks

Examination: 70 marks

Objective

This course will enable students to understand and apply the general concepts of psychology through experiments & psychological tests.

Learning Outcomes

At the end of this course, you should be able to:

- *Know about the profile basic experiments and instruments in Psychology.*
- *Able to independently administer the instruments for testing purpose.*

Part-A

Any ten practicals out of the following are to be conducted during the semester. One Practical will be allotted to the candidate during examination, and evaluation will be based on Conduction, Report, and Viva-Voce.

1. Depth Perception
2. Perceptual Constancy
3. Discrimination Learning.
4. Perception of Time
5. Muller Lyer Illusion
6. Retinal Colour Zones

7. Experiment of Classical Conditioning
8. Maze Learning
9. Autokinetic Movement
10. Verbal Learning.
11. Achievement Motivation
12. Emert's Law/ Weber Law
13. Determination of AL/ DL
14. Incidental Versus Intentional Learning
15. Signal Detection Theory (SDT)
16. Survey.
17. Phi-Phenomenon
18. Data Entry and analysis using SPSS/Excel
19. Colour Contrast.
20. Colour Mixture.

Part-B Profiling of Equipment-

Candidate is required to prepare profile of 5 equipments. Profile of one equipment will be allotted to the candidate during the examination and evaluation will be based on Profile Record, Report and Viva –Voce.

GENERIC ELECTIVE COURSE-I
GENERAL PSYCHOLOGY
SHSS PSY 01 01 01 GEC 4004

Credits: 4 (Hrs. /week: 4) *Total: 100 marks*

Internal Assessment: 30 Marks

Examination: 70 marks

Objective

This course will introduce the students with the basic principles of Psychology. It will further introduce students with the recent advancements in the general Psychology

Learning Outcomes

At the end of this course students will be able to:

- *Define and explain the basic principles in Psychology.*
- *Demonstrate the principles of the Psychology in daily life.*

UNIT-I

Psychology: Nature and Scope and Schools of Psychology

Methods of Study: Case Study, Observation, Interview and Experimental Method

UNIT-II

Sensation: Nature and Types

Perception: Nature, and Perceptual Organization.

UNIT-III

Learning: Definition, how do we learn: Trial and Error, Insight, Conditioning and Social Learning

Motivation: Nature, Theories: Drive Theory, Maslow's Need Hierarchy Theory Emotion: Emotional expression, and Theories of Emotions.

UNIT-IV

Intelligence: Nature, Theories: Two Factor and Group Factor Theories and Measurement of Intelligence.

Personality: Nature, Determinants and Measurement.

Suggested Readings

Baron. A. Robert (2002). *Psychology.* (5th Edition) Pearson Education. New Delhi.

Clifford T. Morgan, Richard King, John R. Weis, and John Schopler (1993). *Introduction to Psychology (7th Edition).* Tata McGraw Hill Book Co. New Delhi.

Ernest R. Hillgard, Richard C. Atkinson, Rita L. Atkinson (1975). *Introduction to Psychology. (6th Edition),* Oxford IBH publishing Co. Pvt. Ltd. New Delhi.

Gazzaniga, M. Heatherton, T. Halpern, D. & Heine Steve (2012). *Psychological Science.* WW Norton & Company. Inc. New York.

SEMESTER-II

CORE COURSE-VI

BIOPSYCHOLOGY
SHSS PSY 01 02 06 C 4004

Credits: 4 (Hrs. /week: 4)

Total: 100 Marks
Internal Assessment: 30 Marks
Examination: 70 Marks

Objectives

By the end of this course, students will be able to recognize different methods of studying the brain and its structure. They will be able to recognize the structure of the human brain, how transmission of information takes place within its structures. They will be able to explain the neural organization by which the coordination in the body takes place along with the associated systems which help in making neural coordination effective and how different physiological processes such as hunger, thirst and sleep are regulated by bodily functions.

Learning Outcomes

After completing the course, students will be able to:

- *Recognize various methods to study the brain, structure of neurons, and organization of the nervous system.*
- *Describe various functions of neurons, synapse's, neurotransmitters, and endocrine glands.*
- *Explain the mechanism involved in various physiological processes such as hunger, thirst and sleep.*
- *Apply the information of different methods to study the brain and its structure and physiological processes in understanding and managing human behavior.*

UNIT- I

Biopsychology: Nature, Scope and Approaches; Methods of study: Lesion, Ablation, Brain Stimulation, Scanning methods – CT, MRI, fMRI and PET; Electrophysiological Recordings - EMG, EEG, AEP.

UNIT-II

Cell: Structure and Functions, Neuron: Structure, Functions and Types; Supporting Cells in Nervous System: Structure and Functions of Glial Cells.

Nerve Impulse: Conduction; Synaptic Transmission: Structure of Synapse, Process of Synaptic Transmission (Chemical events at synapse); Neurotransmitters: Types and functions.

UNIT-III

Nervous System: Organization; CNS: Structure and Functions.

Peripheral Nervous System: Somatic System, Spinal and Cranial Nerves; Autonomic Nervous System: Sympathetic and Parasympathetic.

UNIT-IV

Endocrine Glands: Structure, Location and Functions. Ingestive Behaviour: Neural Mechanisms of Hunger and Thirst. Physiological mechanisms of Sleep and Waking; Stages and Types of sleep; Sleep Disorders.

Suggested Readings

Bannett, T. L. (1977). *Brain and Behaviour*. California: Brooks/Cole.

Carlson, N. R. (2005). *Foundations of Physiological Psychology*, 6th ed. Pearson Education and Dorling Kindersley (India): New Delhi.

Gazzaniga, M. S., Lvry, R. B., & Mangun, G. R. (2002). *Cognitive Neuroscience*: The Biology of the Mind 2nd Edition. New York; W.W. Norton & Company, Inc.

Kalat, J. N. (2001*). Biological Psychology*. California: Wadsworth.

Pinel, John P. J., & Stevens, J. B. (2016). *Introduction to Biopsychology.* 9th ed. Pearson

Pearson (India): New Delhi.

CORE COURSE-VII
COGNITIVE PSYCHOLOGY
SHSS PSY 01 02 07 C 4004

Credits: 4 (Hrs. /week: 4) *Total: 100 Marks*
Internal Assessment: 30 Marks

Examination: 70 Marks

Objectives

By the end of this course, students will be able to develop core competency in the area of cognitive psychology. They will be able to define various cognitive phenomena and explain various models of attention, memory, and basic process of thinking, language acquisition, and problem-solving behavior. They will be able to explain how the human brain interprets and manipulates information.

Learning Outcomes

After completing the course, student will be able to:

- *Define various cognitive phenomena*
- *Describe different approaches of cognitive psychology.*
- *Describe various models of attention and memory, basic process of thinking, language acquisition, and problem-solving behavior.*
- *Evaluate the impact of research done in the area of cognition.*

UNIT–I

Cognitive Psychology: Historical Background, Scope, Approaches- Top down, Bottom-Up, and Information Processing, Methods of study- Behavioral and Physiological.

UNIT- II

Attention: Nature, Capacity, and Information Processing. Selective Attention: Nature, Models Filter and Attenuation. Divided Attention. Pattern Recognition: Template Matching, and Feature Analysis.

UNIT-III

Memory: Nature, Methods of Study; Types of Memory, Models of Memory: Atkinson and Shiffrin, Levels of Processing, Parallel Distributed Processing. Autobiographical memory.

Eye-Witness Testimony. Mnemonics. Forgetting: Nature, Factors, and Theories.

UNIT-IV

Thinking: Nature; Problem Solving: Nature and Strategies. Concept Formation.

Language: Properties; Structure; and Processes of Language Acquisition. Reasoning: Nature and Types.

Suggested Readings

Benjafield, J. G. (2000). *Cognition*. Oxford University Press, Delhi.

Eysenck, M.W., and Keane, M.P (2000). *Cognitive Psychology: A student's guide*. Psychology Press.

Galotti, K. M. (2011). *Cognitive Development*. Sage Publication.

Galotti, K.M. (2000). *Cognitive Psychology in and out of the Laboratory*. Delhi: Thomson.

Goldstein, B. E. (2005). *Cognitive Psychology*. Wadsworth, London.

Kellogg, R. T. (2012). *Fundamentals of Cognitive Psychology*. Lab Angles: Sage.

Solso, R. L. (2001). *Cognitive Psychology*. Delhi: Pearson Education.

Sternberg, R. J. (2007). *Cognitive Psychology*. Delhi: Thomson.

Sternberg, R. J., & Sternberg, K. (2011). *Cognitive Psychology*. 8th Edition. Wadsworth Publishing Co Inc; International edition.

Thomas, A. M. & Matlin, M. W. (2019). *Cognition (10th Ed.)*. New York: Wiley.

CORE COURSE-VIII
RESEARCH METHODOLOGY & STATISTICS

SHSS PSY 01 02 08 C 4004

Credits: 4 (Hrs. /week: 4) *Total: 100 Marks*
Internal Assessment: 30 Marks
Examination: 70 Marks

Objectives

By the end of this course, students will be able to provide basic understanding of different types of research designs and know about various techniques of statistics. Further, to demonstrate and describe the basic understanding of SPSS and research writing format. To provide a foundation for better understanding of research methodology and the uses of the right statistical tool for conducting research meaningfully.

Learning Outcomes

After completing the course, student will be able to:

- *Identify different types of research designs.*
- *Identify the appropriate statistical tools and tests for a research study.*
- *Identify and control the errors in a research study.*
- *Acquaint themselves with SPSS and format of research writing.*

UNIT-I

Research Design: Criteria and Principles, Between Groups and Within Groups Designs: Single Factor and Factorial.

Quasi-experimental designs: Non-equivalent comparison groups and Time Series.

UNIT-II

Analysis of Variance: Basic Concepts, One way ANOVA (Separate and Repeated measures). Two Way ANOVA: (Separate groups), Post-Hoc Tests: Newman-keuls Test, Duncan Multiple Range Test, Tukey Test; Trends Analysis.

UNIT-III

Nonparametric Statistics: Importance, Sign Test, Wilcoxon Signed Ranks Test, MannWhitney-Wilcoxon U-Test. Median Test, and Kendall Coefficient of Concordance; ANOVA: Kruskal-Wallis One Way ANOVA, Friedman Two Way ANOVA.

UNIT-IV

Regression Prediction (bivariate); Multiple Regression (three variables); Factor Analysis:

Basic Concepts.

Ethical Issues in Research; Preparing a Research Proposal (APA Style).

Suggested Readings

Bordens, K. S., & Abbott, B. B. (2006). *Research Design and Methods: A Process Approach.* 10th Edition. McGraw Hill.

Broota, K. D. (1989). *Experimental Design in Behavioral Research.* New Delhi: Wiley Eastern.

Coolican, H. (2017). *Research methods and statistics in psychology*. Psychology Press.

Goodwin, C. J., & Goodwin, K. A. (2016). *Research in psychology methods and design*. John Wiley & Sons.

Gravetter, F. J., & Forzano, L. B. (2018). *Research Methods for Behavioral Sciences.* 6th Edition. Cengage Learning, Canada.

Gravetter, F. J., & Wallnau, L. B. (2016). *Statistics for the Behavioral Sciences.* 10th Edition. Cengage Learning, Canada.

Guilford, J. P. (1954). *Psychometric Methods.* McGraw-Hill Inc., US.

Kerlinger, F. N. (1973). *Foundation of Behavioral Research*. New York: Holt Rinehart and Winston.

McGuigan, F. J. (1983). *Experimental Psychology: Methods of research (4th Ed.).* New Jersey: Prentice Hall.

Shaughnessy, J. J., & Zechmeister, E.B. (1997). *Research Methods in Psychology*. New York: McGraw Hill.

Siegel, S., & Castellan, N. J. (1988). *Nonparametric statistics for the behavioral sciences.* Kogakusha: McGraw Hill.

Singh, A. K. (2017). *Tests, measurements, and research methods in behavioral sciences.* New Delhi: Tata McGraw Hill.

Winer, B. J. (1971). *Statistical principles and experimental design*. Kogakusha: McGraw Hill.

CORE COURSE-IX

APPLIED SOCIAL PSYCHOLOGY

SHSS PSY 01 02 09 C 4004

Credits: 4 (Hrs. /week: 4) *Total: 100 Marks*
Internal Assessment: 30 Marks
Examination: 70 Marks

Objectives:

By the end of this course, students will be able to describe the nature and application of social psychology, research methods used in understanding social behavior. They will be able to describe, discuss and analyze major issues and concepts in the field of Social Psychology. They will be able to describe the ways of attitude formed and changed. They will be able to define and describe the concept and theories of pro-social behavior, aggression, interpersonal attraction and intergroup relations.

Learning Outcomes:

After completing the course, student will be able to:

- *Define Social Psychology and methods of study.*
- *Identify various processes of socialization, social perception and social influence.*
- *Describe the formation and change of attitudes.*
- *Explain the theories and dynamics of groups (roles, norms, and cohesiveness).*
- *Compare and apply various theories of aggression.*

UNIT-I

Introduction: Nature and Scope of Social Psychology

Methods: Experimental, Survey, Ethnography, and Sociometry.

Ethical Issues in Social Psychological Research.

UNIT-II

Socialization Processes: Nature, Approaches, Agencies

Social Perception: Communication, Attribution, Impression Formation and Management.

Group: Types, Dynamics and Norms. Social Identity, Crowd Behavior.

UNIT-III

Attitude: Nature, Formation, Maintenance and theories of Change (Heider and Festinger)

Social Influence: Conformity, Compliance, and Obedience.

Stereotyping, Prejudice, and Discrimination: Causes and Effects.

UNIT-IV

Aggression: Nature, Sources; and Theories- Biological, Social Learning and Cognitive.

Strategies of Aggression Control.

Helping Behavior: Altruism and Prosocial Behavior, Bystander Effect.

Application of Social Psychology: Health, Environment, Law and Personal Space.

Suggested Readings:

Baron, R. A., & Byrne, D. (2004). *Social Psychology*. Singapore: Pearson Education

Baron, R. A., Byrne, D., & Johnson, B. T. (1998). *Exploring Social Psychology*. USA: Allyn and Bacon.

Fiske, S. T., Gilbert, D. T., & Lindzey, G. (Eds.). (2010). *Handbook of Social Psychology.* (Vol. 1 & 2). John Wiley and Sons.

Myers, D. G., Sahajpal, P., & Behera, P. (2012). *Social Psychology*. New Delhi: Tata McGraw-Hill.

Taylor, S. E., Peplau, L. A., & Sears, D. O. (2006). Social psychology. *New Jersey: Pearson Prentice Hall*.

CORE COURSE-X

REVIEW ARTICLE
SHSS PSY 01 02 10 C 0202

Credits: 2 (Hrs. /week: 2) *Total: 50 Marks*
Internal Assessment: 50 Marks

Objectives

By the end of this course, students will be able to enable the students to conduct review of literature on specific areas of interest. To enable the students to develop the ability to infer specific outcomes from a large pool of research studies.

Learning Outcomes

After completing the course, student will be able to:

- Practice *their critical thinking and writing skills which will be useful to further their career prospects*

- Conduct *review of literature and make practical conclusions and scope of research from it.*

At the end of their semester the students shall submit the written review article as per the Guidelines prescribed below.

Briefing Session

A briefing session for all the students and concerned faculty guides will be organized by the department in the beginning/mid of even semester to enable them to prepare well & proceed for the course as per guidelines and to make sure that the students are able to finalize the broad area of work.

Finalization and approval of topic of Review and schedule of activities

Students shall finalize the broad area /topic, and work schedule of his / her review article in consultation with the faculty guide. The area/topic, work schedule of review article shall be approved by the department.

Allocation of Faculty Guide

Each student shall be assigned a faculty guide for their review article well in advance in a formal manner depending on the number of students per faculty member, the available specialization among the faculty guides by department. - The faculty guide must closely interact with the student and monitor the progress of the student.

The layout guidelines for the submission of the Report

The final review paper is compulsory for the semester. Therefore, students must adhere to the following parameters.

Word length: 3000 to 4000 words.

No. of Copies 01,

Spiral binding

Language: English

Paper: A4

Margin: According to APA guidelines

Suggested Readings

American Psychological Association. (2010). Publication manual of the American.

Hartley, J. (2008). *Academic writing and publishing: A practical handbook*. Routledge.

Sternberg, R. J., & Sternberg, K. (2016). *The psychologist's companion: a guide to professional success for students, teachers, and researchers*. Cambridge University Press.

CORE COURSE- XI
PRACTICUM-II (EXPERIMENTS AND PROFILING)
SHSS PSY 01 02 11 C 00105

Credits: 5 (Hrs. /week: 5) *Total: 100 Marks*
Internal Assessment: 30 Marks
Examination: 70 Marks

Objectives

By the end of this course, students will be able to acquire skills in various experiments. To acquaint students with the profiling of various experimental instruments. Further, to enable students in applying those skills and information in conducting experiments.

Learning Outcomes

After completing the course, student will be able to:

- *Conduct the various experiments to verify the psychological theories.*
- *Prepare profile of the experimental Equipment.*

Part-A Any ten practical's out of the following are to be conducted during the semester. One practical will be allotted to the candidate during examination and evaluation will be based on Practical Conduction, Report and Viva-Voce during the practical Exam.

1. Dichotic Listening
2. Measurement of divided/ Selective Attention.
3. Transfer of Training.
4. Short Term Memory (STM)
5. Long Term Memory (LTM)
6. Zeigarnik Effect
7. Schedule of Reinforcement (Instrumental Conditioning)
8. Concept Formation.
9. Forgetting.
10. TAT
11. Sociometry
12. Study of Emotions (Facial Expression)
13. GSR – Galvanic Skin Response
14. Data entry and Analysis using Software (SPSS/Excel).

15. Hemispheric Specialization.
16. Measurement of Motives
17. Complex Reaction Time
18. Stroop Test.
19. Tower of Hanoi
20. Psytoolkit, IOWA Gambling Task

Part-B Profiling of Equipment's- Candidate is required to prepare a profile of 5 equipment's. Profiles of one equipment will be allotted to the candidate during the examination and evaluation will be based on Profile Record, Report and Viva –Voce.

DISCIPLINE CENTRIC ELECTIVE COURSE-I
PERSONALITY
SHSS PSY 01 02 01 DCEC 4004

Credits: 4 (Hrs. /week: 4) *Total: 100 Marks*
Internal Assessment: 30 Marks
Examination: 70 Marks

Objectives

By the end of this course, students will be able to define and describe various aspects of personality. They will be able to identify various factors affecting personality. They will be able to conduct personality profiling and techniques to assess an individual's personality. They will be able to compare and contrast various theories of personality.

Learning Outcomes:

After completing the course, student will be able to:

- *Identify various aspects of personality.*
- *Describe and predict personality assessment profile.*
- *Compare and contrast various theories of personality.*
- *Administer different personality assessment techniques.*

UNIT- I

Introduction: Nature, Conceptual History; Basic Assumptions about Human Nature; Genetic and Environmental Determinants of Personality.

Type Theories: Galen's Theory, Personality Typology (Sheldon and Kretschmer), and Triguna theory.

UNIT- II

Approaches to Study Personality: Psychoanalytic, Individual, Analytic, Cognitive, Social Learning, and Humanistic.

UNIT-III

Trait Theories: Allport's Theory, Cattell's Theory; Basic Concepts, Identification of Temperament, Ability, and Dynamic traits.

Eysenckian Model: Structure, Physiological Basis and Behavioural Correlates.

Emergence and Structure of Five Factor and Alternative Five Factors Models of Personality.

UNIT-IV

Assessment of Personality: Questionnaire and Self Report (16 PF, EPQ-R, Neo-PI-R);
Projective Techniques; Rorschach, TAT, SIS, Rotter's Incomplete Sentences Blank; Objective Analytic Tests.

Suggested Readings

Boyle, G. J., Matthews, G., & Saklofske, D. H. (Eds.). (2008). *The SAGE handbook of personality theory and assessment, (Vol. 1&2) Personality theories and models.* Sage Publications, Inc.

Cattell, R. B., & Kline, P. E. (1977). *The scientific analysis of personality and motivation*. Academic Press.

Eysenck, H. J. (1981). *Model for personality.* New York: Springer-Verlag. Page 23 of 52

Eysenck, H. J., & Eysenck, M. W. (1985). *Personality and Individual Differences: A Natural Science Approach.* Plenum Press- New York and London

Hall G. S., & Lindzey, G. (1988). *Theories of Personality (4Ed.)* New Delhi: Wiley Eastern.

Hjelle, L. L., & Ziegler, D. J. (1992). *Personality theories: Basic assumptions, research, and applications* (3rd Ed.). McGraw-Hill Book Company.

John, O. P., Robins, R. W., & Pervin, L. A. (2008). *HB of Personality: Theory and Research (3rd Ed.).* NY: Oxford Press.

Larsen, R. J., & Buss, D. M. (2011). *Personality Psychology: Domains of Knowledge about Human Nature.* New Delhi: Tata McGraw-Hill.

Pervin, L. A. (1978). *Personality Theory Assessment and Research.* New York: John Wiley

Rao, K. R., Paranjpe, A. C., & Dalal, A. K. (2008). *HB of Indian Psychology.* Delhi: Foundation Sons.

Verma, N. & Singh, U. (2019). *Personality Assessment Objective Analytic Test Approach.* Index International. ISBN- 978-8193618523.

DISCIPLINE CENTRIC ELECTIVE COURSE-II
SPORTS PSYCHOLOGY
SHSS PSY 01 02 02 DCEC 4004

Credits: 4 (Hrs. /week: 4) *Total: 100 Marks*
Internal Assessment: 30 Marks
Examination: 70 Marks

Objectives

By the end of this course, students will be able to acquaint themselves with the key aims and concerns of sport psychology. To enable students, explore the role of different psychological aspects, group dynamics and leadership on performance of sports persons. This will enable the students to establish the links among personality, motivation and sports.

Learning Outcomes

After completing the course, students will be able to:

- *Identify the aims of sports psychology, and aspects that affect the performance of a sports person.*
- *Describe the role of various psychological factors, group dynamics, and leadership on overall well-being and performance.*
- *Explain the importance of personality, motivation, leadership, group dynamics strategies to reduce stress among sports persons.*
- *Apply the knowledge of personality, motivation, leadership and group dynamics to reduce stress and enhance the performance and overall well-being of sports persons.*

UNIT-I

Sports Psychology: Nature, History, Regulatory Bodies (National and International)

Sports Psychology as a Profession: Roles and Ethics.

Type of Sports: Individual Sports, Team Sports, and Combat Sports.

Competition and Cooperation: Concept, Methods to Enhance.

UNIT-II

Personality and Sports: Major perspectives of Personality; Personality and Sports Performance; Examining cognitive strategies and success.

Motivation: Nature; Major approaches of Motivation; Achievement Motivation in Professional Practice; Psychological Momentum in Sports.

UNIT-III

Leadership and Coaching: Components of effective Leadership; Sports oriented interactional approaches to Leadership; Recognizing Breakdowns and Communication, Dealing with Confrontation.

Team cohesion: Nature; Relationship between Cohesion and Performance, Strategies for enhancing Cohesion; Building Self-confidence; Effectiveness of Goal setting.

UNIT-IV

Sports and Psychological Well-Being: Reducing Anxiety and Depression with Exercise Enhancing Quality of Life with Exercise; Relationship between Stress and Injury, Role of Sports Psychology in Injury Rehabilitation.

Overtraining and Burnout: Factors leading to Athlete; Relaxation strategies for Sports: Progressive Relaxation, Autogenic Training, Yoga, Meditation and Biofeedback Training

Suggested Readings

Cox, R. H., & Cox, R. H. (2002). *Sport psychology: Concepts and applications.*

Singh, R. (2014). *Sport Psychology.* New Delhi: Friends Publications.

Weinberg, R.S., Gould, D. (2011). *Foundations of Sport and Exercise Psychology.* United States of America. Human Kinetics.

Woods, R.B. (2011). *Social Issues in Sport.* U.S.A.: Human Kinetics.

DISCIPLINE CENTRIC ELECTIVE COURSE
MOTIVATION & EMOTION
SHSS PSY 01 02 03 DCEC 4004

Credits: 4 (Hrs. /week: 4)

Total: 100 Marks
Internal Assessment: 30 Marks
Examination: 70 Marks

Objectives:

By the end of this course, students will be able to acquaint themselves with various aspects of motivation and emotions. Enable students to gain meaning, nature, and various components. Enable students to identify different techniques of measuring motivation. Facilitate students to understand various theories related to motivation and emotion.

Learning Outcomes:

After completing the course, students will be able to:

- *Identify the meaning and various components of motivation and emotion.*
- *Describe the nature of motivation and emotion.*
- *Compare and contrast various theories related to motivation and emotion.*
- *Apply various theories into day to day life.*

UNIT-I

Motivation: Meaning and Nature. Basic Motivational Concepts

Types of Motives: Biological, Psychological and Social.

Measurement of Motives: Projective Technique, Questionnaire Method, Situational Tests, Analysis of Historical Events.

UNIT-II

Theories of Motivation: Instinct Theories, Drive Theory, Incentive Theories, Opponent Process Theory, Optical-Level Theory, Need Hierarchy Theories, Vector Valence Theory

UNIT-III

Emotions: Nature, Characteristics, Types, Functions, and Physiological Correlates.

Role of Hemisphere in Emotions, Facial Feedback Hypothesis, Emotional Stroop, Measurement of Human Emotions.

UNIT-IV

Theories of Emotions: James-Lange's Theory, Cannon-Bard's Theory, Schachter-Singer, Lazarus Theory of Emotion, Lindzey Activation Theory, Papez-Maclean, Affective Events Theory.

Suggested Readings:

Borod, J. (Ed.) (2000*). The neuropsychology of emotions*. Oxford: Oxford University Press.

Campbell, J. B., Hall, C. S., & Lindzey, G. (2007). *Theories of Personality*. 4th Ed. Wiley: India

Carlson, N. R. (2007). *Foundations of physiological psychology*. N.D.: Pearson Edu.

Ekman, P. E., & Davidson, R. J. (1994). *The nature of emotion: Fundamental questions*. Oxford University Press.

Franken, R. E. (2007). *Human motivation*. USA: Thomson Higher Education.

Oatley, K. & Jenkins, J. M. (1992). *Understanding emotions.* Cambridge: Blackwell publishers

Salovey, P. E., & Sluyter, D. J. (1997). *Emotional development and emotional intelligence: Educational implications*. Basic Books.

Weiner, B. (2012). *Human Motivation.* 2nd Ed. Springer.

DISCIPLINE CENTRIC ELECTIVE COURSE
INDIAN PSYCHOLOGY
SHSS PSY 01 02 04 DCEC 4004

Credits: 4 (Hrs. /week: 4) *Total: 100 Marks*
Internal Assessment: 30 Marks
Examination: 70 Marks

Objectives:

By the end of this course, students will be able to acquaint themselves with knowledge, nature and applicability of Indian Psychology and the importance of Indian Mythology in the field of psychology. To develop understanding of Psychological Perspectives of Indian Psychology. To help students understand Personality, Self, Motivation and Emotion in Indian perspective. To enable them to understand the role of Indian Psychology in the field of Mental Health, Education and Social Conflicts.

Learning Outcomes:

After completing the course, student will be able to:

- *Elaborate the contribution of Indian knowledge systems in generating a comprehensive system of psychology.*
- *Compare and contrast various systems of philosophy in India.*
- *Describe core psychological concepts available in the Indian traditions.*
- *Demonstrate the inherent holism in Indian thought – a view of the person as a biopsychosocial-spiritual entity.*

UNIT- I

The Core and context of Indian Psychology

The Indian paradigm on psychological knowledge.

Science and Spirituality: Avidya and Vidya.

UNIT-II

Introduction to Indian Perspectives: Upanishads, Samkhya, Vedanta, Jainism, Buddhism, Nyaya, Charvak, Bhagavad Gita.

UNIT –III

Personality in Indian Psychology; Self and Identity in Indian Psychology;

Motivation and Emotion in Indian Psychology.

UNIT –IV

Applications of Indian Psychology: Management of Mental Health, Resolution of Social Conflicts, Yoga: Health and Well-Being

Suggested Readings:

Cornelissen, M., R.M., Mishra, G., & Verma, S. (2014). *Foundations and applications of Indian psychology*. Indian: Pearson.

Guba, E. G. (1990). *The alternative paradigm dialog*. In E.G. Guba (Ed.), the Paradigm Dialog, pp. 17-30, New Delhi: Sage.

Heehs, P. (Ed.) (2002). *Indian Religions*: The spiritual traditions of South Asia. Delhi: Permanent Black.

Perry, C. (1985). Ajaya, Swami. Psychotherapy East and West: A Unifying Paradigm. Honesdale, Pennsylvania, The Himalayan International Institute o. *Journal of Analytical Psychology*, *30*(2), 216-217.

Rao, K. R., Paranjpe, A.C., & Dalal, A. K. (2008). *Handbook of Indian Psychology*. New Delhi: Foundation Book

Smith, H. (1994). *The illustrated world's religions: A guide to our wisdom traditions* (p. 256). San Francisco: Harper San Francisco.

DISCIPLINE CENTRIC ELECTIVE COURSE-V
CHILD PSYCHOLOGY
SHSS PSY 01 02 05 DCEC 4004

Credits: 4 (Hrs. /week: 4) *Total: 100 Marks*
Internal Assessment: 30 Marks
Examination: 70 Marks

Objectives

By the end of this course, students will be able to understand various aspects of child psychology through several theories. To enable them to understand about various developmental stages of a child and also to identify the different methods to study a child's behavior.

Learning Outcomes

After completing the course, students will be able to:

- *Distinguish different stages of child development.*
- *Describe different research methods to study a child's behaviour.*
- *Explain and predict a child's behaviour in day-to-day life.*

UNIT-I

Child Psychology: Nature and Scope, Genetic and Environmental Determinants of Development, Heredity-Environment interaction. Basic Issues in study of Child Development

Methods of study: Case Study, Interview, Observation, Longitudinal, and Cross-sectional.

UNIT-II

Prenatal Development: How life begins, Birth Process, Major periods in Prenatal Development, Prenatal Environmental Influences, Maternal Factors.

Postnatal Development: Adjustment to Postnatal Life, Complications, and Postpartum Period.

UNIT-III

Physical Development: Course of Physical Growth, Development of Brain, Factors affecting Physical Growth.

Motor Development: Development in Early and Middle Childhood, Hormonal Influences, Sex Differences in Motor Development and Perceptual

UNIT-IV

Theories of Development: Contribution of Freud, Erikson, Piaget, Vygotsky, and Kohlberg.

Stages of Development and related issues.

Suggested Readings

Berk, L. E. (2017). *Child Development*. 9th Ed. Pearson, India

Demon, W. and Lerner, R. M. (2008). *Child and Adolescent Development*. Wiley. Hoboken, New Jersey.

Hurlock, EB (2004): *Developmental Psychology: A Life span Approach* (5th Ed. New Delhi) Tata McGraw- Hill publishing Co. Ltd.

Sandrock, J.W. (2017). *Life-Span Development*. 13th Ed. Mc-Graw Hill, India.

Sandrock, J.W. (2017). *Child Development*. 13th Ed. Mc-Graw Hill, India.

Valsiner, J. & Connolly, K. (2003). *Handbook of Developmental Psychology*. New Delhi: Sage Publication.

DISCIPLINE CENTRIC ELECTIVE COURSE-VI
ENVIRONMENTAL PSYCHOLOGY
SHSS PSY 01 02 06 DCEC 4004

Credits: 4 (Hrs. /week: 4) *Total: 100 Marks*
Internal Assessment: 30 Marks
Examination: 70 Marks

Objectives

By the end of this course, students will be able to provide acquaintance with the contribution of psychology in understanding people's responses to environmental problems. It will enable students to understand the psychological and social consequences of environmental degradation, pollution, crowding, congestion, and encroachment of personal space. To acquaint students with the human-environment transaction, and possibility of behavioral intervention strategies to minimize the adverse effects. At the end, students will be able to understand how pro-environment behaviour is needed to reduce the ill effects of environmental quality.

Learning Outcomes

After completing the course, students will be able to:

- *Identify the people's responses to environmental problems.*
- *Describe the psychological and social consequences of environmental degradation, pollution, crowding, congestion, and encroachment of personal space.*
- *Explain the human-environment transaction, and possibility of behavioral intervention strategies to minimize the adverse effects.*
- *Apply the techniques of pro-environment behaviour which is highly needed to reduce the ill effects of environmental quality.*

Unit-I

Emergence of Environmental Psychology: Nature, History and Scope. Research Methods of Environmental Psychology: Laboratory Experiments, Field Studies, Case Studies. Questionnaires, and Computer Simulation.

Environmental stress: Concept and type of stress.

Sources of stressors: Cataclysmic, ambient stressors, daily hassles.

Pollutions: noise, air, water, chemicals and their consequences.

Unit-II

Human-environment transaction: Personal space, territoriality, crowding.

Indian research on crowding and personal space.

Theoretical models: stimulus overload, behavioral constraint, ecological and adaptation.

Unit-III

Human-Nature Interaction: Concept, Mechanism, Green-Space and Public Health.

Restorative Environment: Concept Theories, Application and Implication.

Unit-IV

Pro-environmental Behaviour: Concept Model and Information Strategies

Intervention: Changing the environmental destructive mind-set, Environmental Education, Environmental Prompts, and Cues,

Suggested Readings

Jain, U. (1987). *The psychological consequences of crowding*. Sage Publications, Inc.

Jain, U., & Palsane, M. N. (2004). Environment and behaviour. *Psychology in India revisited: Developments in the discipline, 3*, 261-308.

Pandey, J. (Ed.). (2004). *Psychology in India Revisited-Developments in the Discipline, Volume 3: Applied Social and Organizational Psychology* (Vol. 3). Sage.

Steg, L., Berg, A. E. V. D., & DeGrooth, J. I. M. (2013). *Environmental Psychology*. Wiley, UK.

GENERIC ELECTIVE COURSE-II

PSYCHOLOGY IN EVERYDAY LIFE

SHSS PSY 01 02 02 GEC 4004

Credits: 4 (Hrs. /week: 4) *Total: 100 Marks*

Internal Assessment: 30 Marks

Examination: 70 Marks

Objectives

By the end of this course, students will be able to gain the knowledge and to get them acquainted with the applications of basic concepts in different fields of psychology. To enable students, identify different methods to study psychology, to explore one's self, personality, and Intelligence. Further to make students understand how attitude is formed and how it can be altered in a time of need. To gain the science of influencing. Enabling students to know about the science of abnormal behaviour, its definition and Disorders as per the diagnostic manual.

Learning Outcomes

After completing the course, students will be able to:

- *Understand & apply psychology in daily life.*
- *Describe various components of human behaviour.*
- *Apply the knowledge of self, attitude change and social influence to manage one's own and other's behaviour.*
- *Identify the Abnormal behaviour, stress and related health problems.*

UNIT-I

Psychology: Nature, Scope and Applications

Methods of Study: Experimental, Interview, Cross-Cultural, Observation; and Case Study

UNIT-II

Know Thyself: I & Me, Real-Self, Self-Concept, Self-Esteem; and Self-Efficacy.

Personality: Nature, Development and Assessment.

Intelligence: Nature, Theories and Measurement.

UNIT-III

Social Group: Nature, Types and Norms.

Attitude: Formation, Functions and Change of Attitude

Social Influence: Conformity, Compliance and Obedience; Helping Behaviour- Altruism and Prosocial Behaviour

UNIT-IV

Abnormality: Meaning, Nature, Criteria. Mental Disorders: Symptoms and Causes of Anxiety, Mood, Psychosomatic, and Eating Disorders.

Suggested Readings

Baron, R.A. & Byrne, D. (2004). *Social Psychology*. Singapore: Pearson Education

Carson, R.C., Butcher, J. N., Mineka, S., & Hooley, J. M. (2007). *Abnormal Psychology* (13). Ed. Pearson Education. New Delhi, India.

Heatherton, T., Halpern, D., & Heine S. (2012). *Psychological Science*. WW Norton & Company. Inc. New York.

Larsen, R.J. & Buss, D.M. (2011). *Personality Psychology: Domains of Knowledge about Human Nature*. New Delhi: Tata McGraw-Hill.

SEMESTER-III

CORE COURSE

PSYCHOPATHOLOGY
SHSS PSY 01 03 12 C 4004

Credits: 4 (Hrs/Week:4) *Total Marks=100*
Internal Assessment = 30 marks
Examination: 70 marks

Objective

By the end of this course the students will get acquaint with various types of abnormality and psychological disorders, identification of various factors affecting various psychological disorders and will be able to explain various models of abnormality. This will provide an understanding of clinical pictures and causes of several psychological disorders.

Learning Outcomes

After completing the course contents, students would be able to;

- *Examine various aspects and factors affecting of abnormality.*
- *Understand various models of abnormality.*
- *Understand classification system (DSM-5 and ICD-11) of abnormality.*
- *Understand the clinical pictures and causes severe mental disorders like, schizophrenia and Bipolar disorders.*

UNIT – I

Psychopathology: Meaning, Criteria, Models of Clinical Psychology-Psychodynamic, Behavioural, Phenomenological and Interpersonal.
Classification of Abnormal Behaviour: Meaning, Purpose. Classification Systems–DSM-5 and ICD-11.

UNIT – II

Clinical Picture and Etiology: GAD, Panic Disorder, Phobia, OCD, Conversion Disorder, Dissociative disorders, and Post-Traumatic Stress Disorder.

UNIT- III

Clinical Picture and Etiology: Schizophrenia, Delusional Disorders, Mood Disorders, Organic Mental Disorders, and Alcoholism.

UNIT- IV

Clinical Picture and Etiology: CHD, Asthma, Hypertension, Peptic Ulcer, Sexual and Gender Identity Disorders, ADHD, Conduct Disorders, and Mental Retardation.

Suggested Readings

American Psychiatric Association (2013). *Diagnostic and statistical manual of mental disorders:* DSM-5. American Psychiatric Pub.

Barlow, D. H. & Durand, V. M. (1999). *Abnormal psychology: An integrative approach* (2nd Ed). Pacific Grove: Brooks/Cole.

Buss. A. H. (1999). *Psychopathology.* New York: John Wiley.

Butcher, J.N. (2014). *Abnormal Psychology.* New Delhi: Pearson Education

Carson, R. C., Butcher, J. N., & Mineka, S. (2001). *Abnormal psychology and modern life* (11th Ed.). New York. Allyn and Bacon

Kaplan, H. J., &Sadock, B. J. (2004). *Synopsis of comprehensive textbook of psychiatry* (10th Ed.). Baltimore: Williams &Wlkins.

Sarason. I. G. &Sarason, B. R. (2006). *Abnormal psychology*. (11thEd). Delhi: Prentice Hall India.

Carr, A. (2012).*Clinical Psychology: An Introduction*, New York: Rout ledge.

Carson, R. C., Butcher, T. N., & Mineka, S. (2014).*Abnormal Psychology.*(16thed.). Pearson. New Delhi

Comer, R. J. (2003). *Abnormal Psychology*, New York: Freeman

CORE COURSE

MENTAL ABILITIES
SHSS PSY 01 03 13 C 4004

Credits: 4 (Hrs/Week:4) *Total Marks=100*
Internal Assessment = 30 marks
Examination: 70 marks

Objective

This course will acquaint the students with various aspects of individual differences in terms of mental abilities, identify various factors affecting of intelligence and creativity and understand various theories of intelligence and creativity. It will provide an understanding of assessment techniques of intelligence, and will make intelligence profiling. Help them in identifying various dimensions of creativity, and to learn programs and strategies for enhancement of creativity.

Learning Outcomes

After completing the course contents, students would be able to:

- *Examine various aspects and factors affecting of intelligence and creativity.*
- *Understand various theories of intelligence and creativity.*
- *Prepare profiling of intelligence through various techniques of assessment.*
- *Identify dimensions of creativity through projective and psychometric methods.*
- *Apply enhancement programs and strategies for creativity.*
- *Apply aspects of intelligence and creativity in day to day life.*

UNIT–I

Intelligence: Nature, Historical Views, Neurological Foundation, Genetic Basis, Environmental Influences. Racial and Gender differences.

Theories of Intelligence: Spearman, Thurstone, Guilford, Cattell, Horn, Carroll, and Gardner's Multiple Intelligence.

UNIT–II

Information Processing Theories: Jensen, Sternberg, Goleman, Das, Kar & Parrila.

Measurement of Intelligence: Issues and approaches- Psychometric Tests, Biological Measures.

Aptitude: Nature, Types and Measurement.

UNIT- III

Creativity: Nature and Theories-Psychodynamic, Humanistic, Developmental, and Psychometric. Factors Affecting Creativity: Genetic, Neurobiological, and Sociocultural.

UNIT- IV

Creativity and Intelligence, Creativity and Personality, Creativity and Motivation, Creativity and Culture, Creativity in Everyday Life, Creativity in Eminent People.

Assessment of Creativity: Projective-Inkblot, Word Association; Psychometric Batteries-Torrance, Guilford. Enhancing Creativity: Programs and Strategies.

Suggested Readings

Anastasi, A. (1988). *Psychological Testing* (6th Ed.). New York: McMillan.

Cattell, R.B. (1987). *Intelligence: Its Structure, Growth, and Action*. North Holland: Amsterdam

Eysenck, H.J. (1982). *A Model for Intelligence.* New York: Springer-Verlag.

Guilford, J.P. (1967). *The nature of Human Intelligence.* New York: McGraw Hill.

Kaufman, J.C.,& Sternberg, R.J. (2010). *The Cambridge Handbook of Creativity*. NY: Cambridge University Press.

Rickards, T., Runco, M.A.,&Moger, S. (2009). *The Routledge Companion to Creativity.* London: Routledge.

Runco, M.A. (2007). *Creativity Theories and Themes: Research Development and Practice.* NY: Academic Press.

Sternberg, R. J., & Berg, C.A. (1992). *Intellectual Development*. London: Cambridge University Press.

Sternberg, R.J.,&Grigorenko, E.(1997). *Intelligence, Heredity, and Environment.* London: Cambridge University Press.

Sternberg, R.J. (1990). *Metaphors of Mind: Conceptions of the Nature of Intelligence.* London: Cambridge University Press.

Sternberg, R.J. (1999). *Handbook of Creativity.* NY: Cambridge University Press.

Sternberg, R.J.(1982).*Advances in the Psychology of Human Intelligence* (Vol.1.).NJ: Erlbaum.

Sternberg, R.J.(2003).*Handbook of Human Intelligence*. London: Cambridge University Press.

Torrance, E.P. (1965). *Rewarding Creative Behaviour*, NJ: Prentice Hall.

Wolman, B.B. (1985). *Handbook of Intelligence: Theories, Measurements and Applications*. New York: John Wiley & Sons.

Core Course
PSYCHOLOGICAL TESTING
SHSS PSY 01 03 14 C 4004

Credits: 4 (Hrs/Week:4)

Total Marks=100
Internal Assessment = 30 marks
Examination: 70 marks

Objective

By the end of this course students will be familiar with the field of psychological testing in general and will be able to understand the nature and uses of psychological test.

Learning Outcomes

After completing the course contents, students would be able to:

- *Create critical understanding of measurement issues and techniques in psychological inquiry.*
- *Apply knowledge and skills in selecting a good test according to the research needs.*
- *Assess intelligence, personality, interest, attitude and values using suitable tests*
- *Explore how psychological tests may be applied to various fields.*

UNIT–I

Psychological Test: Meaning, Characteristics, Types and Uses.

Historical Antecedents, Modern Testing, Ethics in Psychological Testing.

UNIT–II

Ability Testing: Types of Intelligence Tests.

Stanford Binet Intelligence Scales, Wechsler Intelligence Scales, DAS-Naglieri Cognitive Assessment Scales, RPM, Culture Fair Tests, Bhatia Battery.

UNIT- III

Personality Testing: Types of Personality Tests- Self-Report Questionnaires and Objective Analytic Tests. Projective Techniques: Unstructured Tests- RIT, SIS; Semi-Structured Tests-TAT, Draw A Man; Structured Tests-WAT, Sentence Completion Test.

UNIT- IV

Interest and Aptitude Testing: Interest Inventories; Differential Aptitude Test.

Application of Psychological Testing: Educational Settings, Counselling, Guidance and Organizational Settings.

Suggested Readings

Aiken, L. R., &Groth-Marnet, G. (2009). *Psychological Testing and Assessment* (12th Ed.). New Delhi: Pearson Education.

Anastasi, A., & Urbina, S. (2003*). Psychological Testing* (7th Ed.). New Delhi, India: Prentice – Hall of India Pvt. Ltd.

Barve, B. N., &Narake, H. J. (2008). *Manomapan. Nagpur*, India: VidyaPrakashana.

Desai, B., & Abhyankar, S. (2007). *Manasashatriyamapan.* Pune, India: Narendra Prakashana.

Gregory, R. J. (2014). *Psychological testing: History, principals and applications.* (6th Ed.). Boston: Pearson Education.

Husain, A. (2012). *Psychological testing*. New Delhi, India: Pearson Education.

Kaplan, R. M., &Saccuzzo, D. P. (2012). *Psychological testing: Principles, applications and issues* (8th Ed.). New Delhi, India: Cengage.

Rust, J., &Golombok, S. (2009). *Modern psychometrics: The science of psychological assessment.* London and New York: Routledge.

Practicum-III (Psychological Tests)
SHSS PSY 01 03 15 C 4004

Credits: 5 (Hrs. /week: 5) *Total: 100 Marks*
Internal Assessment: 30 Marks
Examination: 70 Marks

Objectives

By the end of this course, students will be able to acquire skills in various tests. To acquaint students with the administration of various tests. Further, to enable students in applying those skills and information in conducting tests.

Learning Outcomes

After completing the course, student will be able to;

- *Administer the various psychological tests in different areas.*
- *Interpretation and assessments of the test scores.*

Total fifteen practicals out of the following are to be conducted during the semester. One practical will be allotted to the candidate during examination and evaluation will be based on Practical Conduction, Report and Viva-Voce during the practical Exam.

1. Clinical Analysis Questionnaire (CAQ)
2. Minnesota Multiphasic Personality Inventory (MMPI)
3. Millon Clinical Multiaxial Inventory (MCMI)
4. Post Graduate Institute Battery of Brain Dysfunctions (PGI-BBD)
5. Beck Depression Inventory
6. Bender Visual Motor Gestalt Test
7. Anxiety Test
8. Raven's Progressive Matrices
9. Weschler Adult Intelligence Scales (WAIS)
10. Cattell's Culture Fair Test of Intelligence
11. Koh's Block Design Test
12. Relationship of Level-I and II abilities

13. Intelligence-Creativity Relationship
14. Torrance Tests of Creative Thinking (Verbal and Figural Forms)
15. Aptitude Test
16. Head size and Intelligence
17. Organizational Commitment
18. Job Satisfaction
19. Autism
20. ADHD
21. Seguin Form Board

DCEC

DISSERTATION

SHSS PSY 01 03 07 DCEC 0404

Credits: 4 (Hrs/Week:4) Total Marks=100

Internal Assessment = 30 marks

Examination: 70 marks

At the end of their semester the students shall submit the research dissertation on any selected topic in Psychology.

Objective

This course will enable the students to write their dissertation on specific areas of interest, learn research methodology by applying in their dissertation. And will make them aware about different types of research problems, hypothesis, process of data collection and writing a scientific research paper.

Learning Outcomes

After completing the course contents, students would be able to:

- *Practice their critical thinking and writing skills which will be useful to further their career prospects*
- *Conduct review of literature and make practical conclusions and scope of research from it.*

- *Examine research problems, hypothesis, process of data collection and writing a scientific research paper.*

Briefing Session

A briefing session for all the students and concerned faculty guides will be organized by the department in the beginning/mid of semester to enable them to prepare well & proceed for the dissertation work as per guidelines and to make sure that the students are able to finalize their dissertation on time.

Finalization and approval of topic and schedule of activities

a) Student shall finalize the broad area /topic, and work schedule of his / her dissertation in consultation with the faculty guide.
b) The area/topic, work schedule of the dissertation shall be approved by the department.

Allocation of Faculty Guide

Each student shall be assigned a faculty guide for their dissertation well in advance in a formal manner depending on the number of students per faculty member, the available specialization among the faculty guides by department. - The faculty guide must closely interact with the student and monitor the progress of the student.

The layout guidelines for the submission of the Report

Students must adhere to following parameters.

Word length: 6000 to 7000 words.

No. of Copies 03,

Spiral binding

1. Language: English
2. Paper: A4

Margin: According to APA guidelines

Suggested Readings

American Psychological Association. (2010). *Publication manual of the American Psychological Association* (6thed.). Washington, DC: American Psychological Association. Essential Reading / Recommended Reading

Hartley, J. (2008). *Academic Writing and Publishing: A Practical Guide,* New York: Taylor and Francis.

Sternberg, R. J. & Sternberg, K. (2010). *The Psychologist's Companion: A guide to writing scientific papers for students and researchers* (5th Ed.). Cambridge University Press.

REHABILITATION PSYCHOLOGY
SHSS PSY 01 03 08 DCEC 4004

Credits: 4 (Hrs/Week:4) *Total Marks=100*
Internal Assessment = 30 marks
Examination: 70 marks

Objective

By the end of this course the student will learn profession of Rehabilitation Psychology, Psychological Assessment of persons with disabilities, Psychological Interventions and dealing with families.

Learning Outcomes

After completing the course contents, students would be able to:

- *Recognize the psychological problems, needs and setting goals as relevant to rehabilitation of persons with disabilities.*
- *Recognize the network of psychological, social, biological, and environmental factors that affect the functioning and impeding the rehabilitation process.*
- *Plan interventions for lifestyles and personality functioning to accommodate performance limitations and to successfully deal with situations involving conflict/crisis.*
- *Understand the characteristics of various disabilities.*

UNIT- I

Introduction to Rehabilitation Psychology: Nature, Scope, Historical Background, Needs of Persons with Disabilities. Role of Psychologist in Rehabilitation, Current Issues and Trends.

UNIT-II

Models of Rehabilitation: Medical, Psychological, Socio-cultural, Institutional, and Bio-Psycho-Social.

UNIT-III

Personality Development of Persons with Disabilities.

Lifespan Development of Persons with Disabilities.

Rehabilitation Problems in India.

UNIT-IV

Psychological Approach to Rehabilitation: Assessment, Diagnosis, Treatment, and Certification. Understanding Psychological Needs of Caregivers and Working with Families of Persons with Disabilities. Acts in the areas of Disability.

Suggested Readings

B. Van Hasselt, P. S., Strain, & M. Hersen.(1988). *Handbook of Developmental and Physical Disabilities*. Pergamon Press, New York. Vincent

Murickan, J., &Kaveparampil. (1995) – *Persons with disabilities in society.*

Nirbhay, N., & Singh,(1998). *Comprehensive Clinical Psychology: Application in Diverse Populations,* Volume 9, Elsevier Science, Pergamon.

Robert, G., Frank, T. R., &Elliott. (2000). *Handbook of Rehabilitation Psychology*, APA Washington.

Zigler, E., Gates, D.B. (1999). *Personality development in individuals with Mental Retardation,* New York: Cambridge University Press.

MILITARY PSYCHOLOGY
SHSS PSY 01 03 09 DCEC 4004

Credits: 4 (Hrs/week: 4) *Total: 100 marks*
Internal Assessment: 30 marks
Examination: 70 marks

Objective

The course will help you to explore the nature of work a military psychologist engages in. Further it will provide the detail step-by-step process in the selection and training procedure and role of psychological testing. Later you will be identifying the nature of leadership in the military setup and explore the ways to make it effective. At last, you will acknowledge the sources of human errors and ways to eliminate them how military is a unique organization.

Learning Outcomes

After completing the course contents, students would be able to:

- *Identify the unique nature of military as an organization, the process of selection and training, nature of leadership and human error and ways to eliminate it.*
- *Describe the need of psychological testing, in personnel selection and training, leadership and its effectiveness and cause of various human errors.*
- *Apply the knowledge of psychological testing and assessment in selection training and leadership and in ways to reduce human error.*

UNIT- I

Military Psychology: Nature, Scope, Historical Perspective, Application, Developments, Contemporary Issues and Emerging Trends. Use of Psychological Tests in Selection in the Defence Services

UNIT-II

Selection and Training of Military Personnel: Assessment of Psychomotor, Spatial Abilities, Interest, Aptitudes, and Personality; Training- Training Needs Analysis, Types and Methods of Training, Evaluation and Monitoring.

UNIT- III

Leadership in Military: Effective leadership, Leading small and large units, Leadership in peace and war, Leadership for change and stability, Leadership and subordination, Group cohesion and morale.

UNIT- IV

Human Factors in Military Organizations: Human Errors, Safety and Accidents, Ergonomics and System Design; Vigilance, Complacency.

Military as a Unique Organization: Structural and Functional Issues and Future Perspectives. Issues relating to Training and Performance in Special Situations, Futuristic Warfare.

Suggested Readings

Budd, F.C.,& Kennedy, C. H. (2006). *Introduction to Clinical Military Psychology*. New York, NY: Guilford Press.

Kennedy, C. H., & McNeil, J. A. (2006). *A History of Military Psychology*. New York, NY: Guilford Press.

Kennedy, C. H., &Zillmer, E. A. (2006). *Military psychology: Clinical and operational applications.* New York, NY: Guilford Press.

Morgillo, F. S., Moore, B. A., & Freeman, A. (2009). *Living and Surviving in Harm's Way: A Psychological Treatment Handbook for Pre-and Post-Deployment of Military Personnel*. New York, NY: Routledge

CRIMINAL AND FORENSIC PSYCHOLOGY
SHSS PSY 01 03 10 DCEC 4004

Credits: 4 (Hrs/week: 4) *Total: 100 marks*
Internal Assessment: 30 marks
Examination: 70 marks

Objective

The course will help you to explore to explore the reasons individuals and their experiences that causes them to commit crime and/or to become criminals. Further, it focuses on theory – 'explaining' crime and criminality using an integrative approach. At last, you will understand how forensics works in coordination with justice system and role of eye witness and different tools in profiling of the criminals such as polygraph.

Learning Outcome

After completing the course contents, students would be able to:

- *Identify the reasons and the different types of criminals*
- *Describe the theories associated with varied type of criminality.*
- *Explain the reasons and biological, social and psychological context of criminality.*
- *Apply the knowledge in identifying the actual criminals and ways for their correction and reformation.*

UNIT-I

Nature and History of Criminal and Forensic Psychology; Social context of Crime: Extent of Criminality,

Changing nature of Crime: Conservative and Radical interpretations in view of complexity of victimization.

UNIT-II

Types of Offenders: Juvenile Offender: Criminogenic factors in child and adult antisocial behavior. Specific explanations of antisocial behavior in Childhood: Moral Reasoning and Cycles of Abuse.

Violent Offenders: Media influences and Research Statistics, Theories of Homicide: Psychological disposition, Socio-Biological theory and Multi-Factorial Approach.

UNIT-III

Sexual Offenders: Nature of Rape, Rape myths, Theories: Feminist theory, Social learning and Evolutionary theory. Mental Illness and Crime: Problem of evidence; Mental illness and Crime in general.

Eyewitness Testimony: Accuracy of witness evidence in Court, Witness confidence and improving the validity of line-up

UNIT- IV

Profile Analysis: Polygraph process and detection of lying. Measures to prevent and control Crime: Role of Jury decision rules and real Jury deliberations;

Risk assessment and dangerousness issues: Political context, Clinical approaches in Risk and danger assessment.

Suggested Readings

Howitt, D. (2002) (5th Ed.). *Introduction to Forensic and criminal psychology. England:* Pearson education ltd.

Petherick, Turvey, B. E. & Ferguson, C. E. (2010). *Forensic Criminology.* Elsevier Academic Press.

Shipeay, S., & Arrigo, B. (2012). *Introduction to forensic Psychology.* USA: Academic press.

Canter, D. (2010). *Forensic Psychology: A Very Short Introduction*. Oxford University Press.

ORGANIZATIONAL BEHAVIOUR

SHSS PSY 01 03 11 DCEC 4004

Credits: 4 (Hrs/week: 4)

Total: 100 marks
Internal Assessment: 30 marks
Examination: 70 marks

Objective

By the end of this course the students will be able to understand concepts, theories and research of industrial psychology. And learn applications of industrial psychology in various organizational settings.

Learning Outcomes

After completing the course contents, students would be able to:

- *Describe concepts of psychology in the process of manpower training.*
- *Enable to apply knowledge in the working of training & development process of an organizations.*
- *Apply various methods in organizational setting*.

UNIT-I

Organizational Behavior: Historical Background, Nature and Scope. Theories: Cognitive, Behaviorist, Social and Cognitive.

Trends & Challenges of OB: Globalization, Diversity, and Ethics. Organizational Culture: characteristics, purpose, types, creating and transmitting organizational culture.

UNIT-II

Organization Structure and Design: Classical and Contemporary Designs (Matrix, Vertical, Horizontal, Network). Motivating by Structuring Jobs: VIE model, Porter & Lawler model, Quality of Work Life model, job enrichment and job enlargement.

Motivation in Organization: Motivating by Meeting Needs and Managerial Applications: Maslow, Alderfer, Herzberg, and McClelland.

UNIT-III

Leadership and Empowerment: Meaning, process, and programs. Behavioral Approach to Leadership Style. Contingency Approach to Leadership: Fiedler's contingency model; Hersey & Blanchard's situational leadership model; path goal model; and Vroom's decision-making model.

Emerging Approaches to Leadership: Transactional leadership, transformational leadership; substitutes and enhancers for leadership; and self & super leadership.

UNIT-IV

Organizational Communication: Meaning, functions, directions types (formal-informal, electronic) and techniques for improving communication skills.

Conflict and Stress: Conflicts- Types, Sources and Resolutions. Stress- Sources, Consequences and Management.

Suggested Readings

Greenberg, J., & Baron R.A. (2005).*Behavior in Organizations*. Pearson Education. New Delhi.

Ivancevich, J.M.,Konsopaske R.,& Matteson M.T. (2005). *Organizational behavior and management.* Tata McGraw-Hill. New Delhi.

Luthans, F. (2013). *Organizational Behavior: An Evidence-based Approach* (12thEd.) McGraw-Hill Edu. (India) Pvt. Ltd. New Delhi.

Muchinsky, P. (2001). *Psychology Applied to work*. (6th Ed.). Wadsworth. New Delhi.

Mullins, L.J. (2007). *Management and organizational behavior* 7 ed. Pearson Edu. New Delhi.

Newstrom, J. W. (2007). *Organizational behavior: Human behavior at work*. Tata McGrawHill. New Delhi.

Pareek, U., &Rao, T.V. (2003). *Designing and managing human resource system*. Oxford & IBH. New Delhi.

Robbinns, S. (2001). *Organization behaviour*. (9th ed.). Prentice Hall of India. New Delhi.

Robbins, S.P., Judge T.A., &Sanghi, A. (2009). *Organizational Behavior* Pearson Prentice Hall. New Delhi.

Sinha, J.B.P. (2008). *Culture & Organization Behaviour*. Sage. New Delhi.

POSITIVE PSYCHOLOGY

SHSS PSY 01 03 12 DCEC 4004

Credits: 4 (Hrs/week: 4)

Total: 100 marks
Internal Assessment: 30 marks
Examination: 70 marks

Objective

This course will provide students with an introduction to the core ideas of theories on happiness, well-being and human flourishing as well as acquainting them with the growing body of research evidence on creating, maintaining and developing positive individuals, relationships, organizations and communities.

Learning Outcomes

After completing the course contents, students would be able to:

- *Explore the context in which the field of positive psychology has emerged.*
- *Identify and explain their character strengths.*
- *Explain the role of positive emotions in psychological wellbeing and health.*
- *Explore the importance of close relationships.*

UNIT-I

Introduction to Positive Psychology: Origin, Assumptions and Goals of Positive Psychology, Eastern Perspective of Positive Psychology. Virtues and Strengths of Character: Classification and measurement of Human Virtues and Strengths.

UNIT-II

Positive Emotional States and Well- being: Broaden and Build theory of Positive Emotions; Positive Emotions and Health Resources- Physical, Psychological and Social.
Happiness, Flow and Savoring: Different viewpoints of Happiness.

UNIT-III

Cognitive States and Processes: Wisdom, Self-efficacy, Hope and Optimism;
Mindfulness and Well-being. Life satisfaction and fulfillment and Gratitude and Forgiveness

UNIT-IV

Close relationships: Characteristics of close relationships;

Love and Flourishing relationships

Pro-Social Behavior: Empathy, Altruism.

Suggested Readings

Baumgardner, S. R., &Crothers, M. K. (2009). *Positive psychology*. New Delhi, India: Pearson.

Bryant, F.B., &Veroff (2007). *Savoring: A new model of positive experience.* Mahwah, New Jersey:Lawrence Erlbaum.

Carr, A. (2013). *Positive psychology: The science of happiness and human strengths*. Routledge.

David, S. A., Boniwell, I., & Ayers, A. C. (2013). *The Oxford handbook of happiness. Oxford*: Oxford University Press.

Joseph, S. (Ed.) (2015*). Positive psychology in practice: Promoting human flourishing in work, health, education, and everyday life.* Hoboken, NJ: John Wiley & Sons.

Lopez, S. J., Pedrotti, J. T., & Snyder, C. R. (2018). *Positive psychology: The scientific and practical explorations of human strengths*. Sage Publications.

Seligman, M. E. (2004). *Positive psychology in practice* (pp. 713-731). P. A. Linley, & S. Joseph (Eds.). Hoboken, NJ: Wiley.

Snyder, C. R., & Lopez, S. J. (2002). *Handbook of positive psychology*. New York: Oxford University.

Snyder, C.R., & Lopez, S.J. (2008). *Positive Psychology: The Scientific and Practical Explorations of Human Strengths.* New Delhi: Sage

HUMAN RESOURCE MANAGEMENT
SHSS PSY 01 03 13 DCEC 4004

Credits: 4 (Hrs/week: 4)

Total: 100 marks
Internal Assessment: 30 marks
Examination: 70 marks

Objective

This course will provide each student with an exposure to aspects of Planning, Recruitment & Selection as HR personnel. From the initial phase of understanding the basic HR policies and practices, students will be introduced to planning process for the hiring personnel in an organization. Useful models and frameworks, complemented by practical advice and guidelines, shall provide students with a solid foundation to apply Planning, Recruitment & Selection.

Learning Outcomes

After completing the course contents, students would be able to:

- *Design and develop viable innovative techniques for recruitment and selection.*
- *Analyze and attract the vital resources required to turn a planning of the selection procedure into reality.*
- *Identify the need for strategic planning for recruitment and selection.*
- *Apply the concept of recruitment and selection process at workplace.*

UNIT-I

Human Resource Management: Concept, Scope and Importance.

HRM-Models, HRM in Dynamic Environment.

Unit II

HRM Planning: Nature, Process and Importance.

Job analysis: Nature, Process and Barriers and Role of Psychological Testing, Induction, Placements and Socialization.

UNIT-III

Training and Development: Nature, need, methods, impediments of effective training and evaluation of training Programme; Career Planning and Development; Performance and potential appraisal. HR policies in India.

Unit IV

Contemporary issues in HRM: Work force diversity management, work family balance, Sexual Harassment at workplace, Pressures of Globalization, e-HRM.

Suggested Readings

Bhatia R. C. (2011). *Business Organization and Management*.Ane Books Pvt. Ltd., New Delhi India.

Chhabra, T. N. (2009). *Business Organization and Management*. Sun India Publications, New Delhi, India.

Gupta, C. B. (2014). *Business Organization and Management*. Mayur Paperbacks, Noida, India.

Kaul, V. K. (2011). *Business Organization and Management.*Text and Cases, Pearson Education.

Rao,V .S. P. (2012). *Business Organization and Management.* Himalaya Publishing House, New Delhi India.

CONSUMER BEHAVIOUR AND MARKETING

SHSS PSY 01 03 14 DCEC 4004

Credits: 4 (Hrs/week: 4)

Total: 100 marks
Internal Assessment: 30 marks
Examination: 70 marks

Objective

After completing this course, you will be able to explore how consumer analysis is a powerful tool not only for organizing consumer behavior knowledge but also for understanding consumers and for guiding the development of successful marketing strategies. Further you will be able to recognize how the consumer behavior is linked with the consumers affect and cognition along with their environment. It will help you to design the market strategies to guide you to shape your consumers to reach out to the product and services of your needs.

Learning Outcomes

After completing the course contents, students would be able to:

- *Identify the component of wheel of consumer analysis.*
- *Describe the role of each component in understanding and shaping the consumers.*
- *Explain how they are interlinked with each other.*
- *Apply the conceptual knowledge in developing the marketing strategies to shape and guide the consumers to reach out your services and products.*

Unit I

Consumer Behavior: Nature, Scope and appreciation, Framework of Consumer Analysis.

Marketing Strategies: Introduction, Cognitive and Affective aspects, Product knowledge and Involvement, Attention and Comprehension, Attitude and Intention, Consumer decision making.

Unit II

Behavior and Marketing Strategy: Introduction; Conditioning and Learning Process; Influencing Consumers Behavior.

UNIT III

Environment and Marketing Strategy: Introduction, Cultural and Cross-Cultural Influences; Subculture and Social Class; Reference groups and Family.

Unit IV

Consumer Analysis and Marketing strategy: Market Segmentation and Product Positioning; Consumer Behavior and Product Strategy; Consumer Behavior and Promotion Strategy; Consumer Behavior and Pricing Strategy; Consumer Behavior, Electronic Commerce and Channel Strategy

Suggested Readings

East, R., Singh J., Wright, M., &Vanhuele, M. (2016). *Consumer Behavior: Applications in Marketing*.SAGE Publications Ltd.

Mothersbaugh, D.L., Hawkins, D.I.,&Mookerjee, A. (2019*). Consumer Behavior: Building Marketing Strategies* (13th Ed.).McGraw-Hill.

Peter, J.P.,& Olson, J.C. (2010).*Consumer behavior & marketing strategy (9th Ed.*). The *McGraw-Hill Companies, Inc.*

Schiffman, L.G. (2010). *Consumer Behavior*. (10thEd.).Pearson.

GENERIC ELECTIVE COURSE

SOCIAL AND COMMUNITY PSYCHOLOGY

SHSS PSY 01 03 03 GEC 4004

Credits: 4 (Hrs/week: 4) *Total: 100 marks*
Internal Assessment: 30 marks
Examination: 70 marks

Objective

This course attempts to understand people in their social contexts. It integrates social phenomena and psychological research in culturally diverse contexts. The purpose of this course is to introduce the student to the breadth of topics, social issues, and research approaches that characterize community psychology

Learning Outcomes

After completing the course contents, students would be able to:

- *Compare and contrast the concepts, empirical findings, methods and techniques used in social psychology*
- *Explain major concepts and perspectives in social psychology*
- *Implement the understanding in social psychology to explain human behavior*
- *Integrate different perspectives to explain human behavior in community life*

UNIT-I

Introduction- Nature and Scope of Social Psychology;

Social Psychology of Everyday (Social Perception)

Methods- Survey, Ethnography, Cross-Cultural; and Sociometric.

UNIT-II

Attitude: Formation, Functions and Factors contributing on Change of Attitude

Social Influence: Conformity, Compliance and Obedience

Helping Behavior- Altruism and Pro-Social Behavior

UNIT-III

Community psychology: Nature, and Scope.

Use of small groups in social action

Arousing community consciousness and action for handling social problems;

UNIT-IV

Group decision making and leadership for social change; Effective strategies for social change.

The concepts of disadvantaged & deprivation: Social, physical, cultural and economic

Consequences of disadvantaged and deprived groups

Suggested Readings

Alcock, J., & Sadava, S. (2014). *An Introduction to School Psychology*: Global Perspectives. New Delhi: Sage Publication.

Baron, R. A., & Byrne, D. (2004). *Social Psychology*. Singapore: Pearson Education

Baron, R. A., Byrne, D., & Johnson, B. T. (1998). *Exploring Social Psychology*. USA:Allyn and Bacon.

Kloos, B., Hill, J., Thomas, E., Wandersman, A., & Elias, M. (2011). *Community psychology: Linking individuals and communities*. Nelson Education.

Moritsugu, J., Vera, E., Wong, F. Y., & Duffy, K. G. (2019). *Community psychology*. Routledge.

Myers, D. G., Sahajpal, P., & Behera, P. (2012). *Social Psychology*. New Delhi:Tata McGraw-Hill.

Taylor, S. E., Peplau, L. A. & Sears D. O. (2006).*Social Psychology* (12th Ed.). Pearson. Prentice Hall.

SEMESTER-IV

CORE COURSE

CLINICAL PSYCHOLOGY

SHSS PSY 01 04 16 C 4004

Credits: 4 (Hrs/week: 4) *Total: 100 marks*
Internal Assessment: 30 marks
Examination: 70 marks

Objectives

Acquaint the students with nature, scope and history of clinical psychology. To illustrate the different models of clinical psychology, and provide the basic understanding of various techniques and tests of clinical assessment. Further, use the neuropsychological assessment. Also provide the detail description of several psychotherapies. Moreover, help the students about intervention techniques.

Learning Outcomes

After completing the course, students will be able to:

-Identify various aspects of clinical psychology.

-Understand various models of clinical psychology.

- Acquaint with various methods of clinical assessment.

-Understand the different therapeutic techniques and intervention programme of clinical psychology.

UNIT– I

Clinical Psychology: Nature, Scope and History. Role of Clinical Psychologist-Training, Professional Regulations and Ethics.

Models: Biological, Psychodynamic, Behavioral, Cognitive and Humanistic.

UNIT- II

Clinical Assessment: Meaning and purposes. Case History, Interview, Mental Status Examination.

Neuropsychological Assessment. AIIMS Battery, Bender Visual Motor Gestalt Test, Halstead–Reitan Neuropsychological Battery.

UNIT- III

Psychotherapies: Nature, Goals and course. Psychoanalysis, Hypnosis, Behavior, Cognitive and CBT.

Clinical Intervention-I: Biological Therapies- ECT, Chemotherapy / Drugs.

UNIT- IV

Clinical Intervention-II: Stress Inoculation, Client-Centered Therapy, Family Therapy, Group Therapy.

Community Intervention: Meaning, Principles, Methods. Crisis intervention- Concept, conditions and techniques. Eastern Approaches: Yoga, Meditation and Vipasana.

Suggested Readings

Bellack, A.S., & Hersen, M. (1980). *Introduction to Clinical Psychology*. Oxford University Press, New York.

Hales, R. E., Yudofsky, S. C. & Talbott, J. A. (1999). *Textbook of Psychiatry Vol. I & II.* Washington: American Psychiatric Press.

Hecker, J. E., & Thorpe, G. L. (2005).*Introduction to Clinical Psychology: Science, Practice, and Ethics.* Pearson Education, Delhi.

Kolb. L.C., & Brodie, H.K.H. (1982). *Modern Clinical Psychiatry*. (10th Ed.). London: Saunders.

PSYCHOMETRICS

SHSS PSY 01 04 17 C 4004

Credits: 4 (Hrs/week: 4)

Total: 100 marks
Internal Assessment: 30 marks
Examination: 70 marks

Objectives

To acquaints the students with various aspects of Psychological Measurement and learn different methods of Psychological Scaling. To understand the steps of test construction and standardization.Thoroughly understanding about Factor Analysis, advanced statistical technique.

Learning Outcomes

After completing the course contents, students would be able to:

-Understand various aspects of Psychological Measurement and methods of Psychological Scaling.

-Understand and apply process of test construction and standardization.

- Acquaint and apply Factor Analysis through theoretical, and SPSS demonstration.

-Learn for psychometric evaluation.

UNIT-I

Psychological Measurement: Nature and Theory, Errors in Measurement, Levels of Measurement

Psychological Scaling: Nature, Methods–Paired Comparisons, Rank Order, and Equal Appearing Interval.

UNIT-II

Psychological Test: Meaning and Classification. Test Construction: Meaning, Steps.

Item Writing: General Guidelines. Item Analysis (Index of Difficulty and Discrimination).

UNIT-III

Reliability: Meaning, Rationale, Methods to Estimate, and Sources of Unreliability.

Validity: Meaning, Methods to Estimate, and Influencing Factors.

Norms: Meaning and Types (Grade, Age, Percentile and Standard).

UNIT-IV

Factor Analysis: General Concepts, Assumptions; Methods: Centroid and Principal Components.

Rotation of Factors: Criteria, Orthogonal and Oblique Approaches; Applications and Major Pitfalls of Factor Analysis.

Suggested Readings

Anastasi, A. (1988). *Psychological testing (6thEd.).* New York: McMillan.

Guilford, J.P. (1954). *Psychometric Methods (2nd Ed.)* New York: McGraw Hill.

Gulliksen, H. (1950). *The Theory of Mental Tests*. NY: John Wiley.

Nunnally, J. (1978). *Psychometrics Theory (2nd Ed.).* New York: McGraw Hill.

Singh, A.K. (2017). *Tests, Measurements and Research Methods in Behavioural Sciences.* New Delhi: Bharat Bharti.

Chadha, N. K. (2009). *Applied Psychometry*. SAGE, New Delhi.

Edward, A.L. (1983). *Technique of Attitude Scale Construction*. Irvington Publishers, New York

GUIDANCE & COUNSELLING

SHSS PSY 01 04 18 C 4004

Credits: 4 (Hrs/week: 4) *Total: 100 marks*
Internal Assessment: 30 marks
Examination: 70 marks

Objectives

To provide the basic skills of guidance and counseling by applying principles of psychology. Acquaint the students about different counseling processes in different areas like career, family, marital etc. Further, familiarize the students about different assessment techniques and testing process.

Learning outcomes

After the completion of course student will be able to:

- *Understand basic skills of guidance and counseling.*
- *Apply different counseling processes in the areas of career, family, marital etc.*
- *Learn several assessment techniques of guidance and counseling.*
- *Apply psychometric tests.*

UNIT- I

Guidance and Counselling: Nature, Scope. Skills of a counselor, Building Counselling Process. Historical Developments in Counselling and Guidance, Trends in Counselling and Guidance. Guidance movement in India. Ethical and legal issues.

UNIT- II

Assessment in Guidance and Counseling: Interview, Observation, Rating scales Anecdotal Records, Autobiography

Psychological Test-Neo FFI, EPQ-R, Projective techniques: Inkblot tests, TAT, CAT, Sentence Completion Tests.

UNIT- III

Career Development Theories: Trait-and-Factor theory, Developmental Theories, Social Cognitive Career Theory (SCCT) Career Planning and Decision Making in Schools,

Counselling Approaches: Psychoanalytic, Behavioristic approaches: Systematic Desensitization, Flooding, Aversive Therapy, Biofeedback Technique, Assertiveness Training.

UNIT-IV

Cognitive: REBT, CBT, Humanistic & Existential Therapies: Roger's Client Centered, Gestalt Therapy, Reality Therapy and Logo Therapy.

Multicultural Counselling: Difficulties and issues, Marriage, Couple, family and Group Counselling.

Suggested Readings

Capuzzi's (2008). *Counselling and Psychotherapy (4th Ed.).* New Delhi. Pearson Education.

Gibson, R.L. & Mitchell, M.H.(2005). *Introduction to Counseling and Guidance*. New Delhi: Pearson education.

Gladding, S.T. (2014).*Counseling: A Comprehensive Profession. (7th Ed.)* Dorling Kindersley Pvt. Ltd. of Pearson Education. New Delhi, India.

Kottler, J.A., & Shepard, D.S. (2008). *Counselling theory and Practices*. Cengange learning India Pvt. Ltd. New Delhi.

Rao, S.N. (2006). *Counseling and Guidance (2nd Ed).* Tata McGraw-Hill Publishing Co. Ltd. New Delhi.

Practicum-IV (Psychological Tests)

SHSS PSY 01 04 19 C 4004

Credits: 5 *Total: 100 marks*
Internal Assessment: 30 marks
Examination: 70 marks

Objectives

To provide the detail understanding of course contents through practical demonstration. Further, conduct the psychological tests and report their results.

Learning Outcomes

After the completion of course students will be able to;

- *Know about psychological tests.*
- *Able to conduct the tests and report their results.*

Total fifteen practicals out of the following are conducted during the semester. One practical to be allotted to the candidate during examination and evaluation will be based on conduction, report, and viva-voce.

1. California Psychological Inventory (CPI)
2. Personality Assessment Inventory (PAI)
3. Differential Aptitude Test (DAT)
4. IPAT Anxiety Scale
5. Beck's Suicide Ideation Scale
6. Eight State Questionnaire
7. Aggression Questionnaire
8. Ways of Coping Questionnaire
9. Internal Consistency Reliability
10. Test-retest Reliability
11. Alternate Form Reliability
12. Construct Validity
13. Eysenck Personality Questionnaire -R
14. 16 PF
15. Indian Adaptation of Zuckerman-Kuhlman Personality Questionnaire
16. Subjective Well-Being Scale
17. Motivational Analysis Test

18. General Health Questionnaire
19. Guidance Need Inventory
20. Chatterjee Non -language Preference Record
21. Vocational Interests Inventory

DCEC IV SEMESTER

DISSERTATION

SHSS PSY 01 03 07 DCEC 0404

Credit: 04

Total: 100 marks
Internal Assessment: 30 marks
Examination: 70 marks

Students will continue the dissertation work which was started from semester 3rd and same will be submitted at the end of semester. The process of opted dissertation work for students and allocation of supervisors is already described in 3rd semester.

Objectives

Enable the students to write their dissertation on specific areas of interest. Provide the basic training of research aptitude and writing skills. Further, familiarize about different steps of research methodology. Train regarding summarize the findings of previous studies and compare with present findings.

Learning Outcomes

After completing the course, students will be able to:

- *Practice their critical thinking and writing skills which will be useful to further their career prospects.*
- *Search the review of literature and summarize the findings in view of research gaps.*
- *Very much aware about formulation of research problem and hypotheses, process of data collection and analyses.*

CYBER PSYCHOLOGY

SHSS PSY 01 04 16 DCEC 4004

Credits: 4 (Hrs/week: 4) *Total: 100 marks*
Internal Assessment: 30 marks
Examination: 70 marks

Objectives

To explore the field of Cyber psychology in terms of individuals, societies and digital technologies and the psychology of how these interact. To enable with psychological theory to explain how individuals interact in cyberspace and how these interactions might affect our offline lives. To engage students with novel and relevant issues–encouraging them to critically evaluate the current literature and to take their own personal stance on particular issues.

Learning Outcomes

After completing the course, students will be able to:

- *Identify how individual interacts in cyberspace with society and digital technology.*
- *Describe psychological theories of individuals' interactions with cyber space.*
- *Explain the individual-cyberspace interaction in various setup and its related hazards.*
- *Apply real-world problems and events, and considers how theories in this field might shed further light on our understanding of these issues.*

UNIT-I

Cyber psychology: Introduction, "Self" in cyberspace, Disembodied Self in cyber space, Cyber-self, Possible self in Cyberspace, Social identities in cyber space.

UNIT-II

Online Relationships: Traditional Relations in online realm, applying old and new theories to online relationships, contemporary online space, interacting in various spaces, Future development.

Online Dating: Meaning, Online dating sites, Motives behind using, Psychological characteristics of online daters, presenting oneself on online dating sites, Dating deception, Stages in online dating process.

UNIT-III

Children and Teens use of digital technologies: Internet Usages, the digital divide, Illegal content and illegal activities, Cyber-bullying and cyber harassment, Scam children and teens, Identity development, Activism, Radicalization.

Online Education: Technology and learning, E-learning, E-learning versus Face-to-face learning, synchronous and Asynchronous communication within E learning, Media Richness Theory, Salmon's stage Model of E-learning, 3-D learning Environment.

UNIT-IV

Online Crimes I: Cyber Harassment and Stalking, Psychological Profiling of Criminals and Victims; Hate Crimes; and Cyber Warfare, Surveillance and Monitoring.

Online Crimes II: Child pornography and Paedophilia-Introduction, Pseudo-photographs, Types of offenders, Characteristics of offenders, Theories and approaches.

Recommended Books

Attrill, A. (2015). *Cyberpsychology*. Oxford

Norman, K. (2017). *Cyberpsychology: An Introduction to Human-Computer Interaction* (2nd Ed.). Cambridge University Press.

Serna, J.M.D.L. (2019). *Cyberpsychology: Mind and InternetRelationship*. Itlay: Tektime.

Witty, M.T.,& Young, G. (2017). *Cyberpsychology: the study of individuals, society and digital technologies*. UK:British Psychological Society and John Wiley & Sons, Ltd.

Educational Psychology

SHSS PSY 01 04 17 DCEC 4004

Credits: 4 (Hrs/week: 4) *Total: 100 marks*
Internal Assessment: 30 marks
Examination: 70 marks

Objectives

Illustrate the nature and scope of educational psychology in view of the fundamental aspects of psychology. To familiarize about different methods like experimental, clinical and differential of educational psychology. To define cognitive development in the areas of theories related to learning, motivation, and transfer of learning. Further, describe individual differences and problems of adjustment in the classroom.

Learning Outcomes

After completion of the course students will be able to:

- *Understand and Apply knowledge of various concepts of psychology in educational setup.*
- *Acquaint about different methods suited to educational psychology.*
- *Learn development based theories of learning, motivation, adjustment and personality.*

UNIT-I

Educational Psychology: Nature, Scope, Methods-Differential, Clinical and Experimental. Exceptional Children: Gifted, Mental Retardation, Educational Implications.

UNIT-II

Physical, Cognitive, Social and Emotional Development during childhood and adolescence.

UNIT-III

Learning: Nature & Theories, Trial Error Insight, Conditioning, ; Gestalt, Perpetual approach to learning; Gagne's hierarchy of learning types; Factors influencing learning, Educational Implications.

UNIT-IV

Individual Differences: Concept and Areas, Determinants of Individual Differences, Implications of Individual differences for organizing educational programs, Trait and type approaches to personality.

Role of teacher in fostering individual's personality.

Suggested Readings

Mangal, S. K. (2011).*Advanced Educational Psychology*. Prentice Hall of India Pvt. Ltd.

Murlidhar, D.,&Neena, D.(2003). *Fundamentals of Educational Psychology.* Atlantic Publishers & Distributors, New Delhi.

Vygotsky, L. S. (1999).*Educational Psychology*.Vanit Books, New Delhi.

Prithi., R. K. (2004).*Educational Psychology*. Discovery Publishing House, New Delhi.

DEVELOPMENTAL PSYCHOPATHOLOGY

SHSS PSY 01 04 18 DCEC 4004

Credits: 4 (Hrs/week: 4) *Total: 100 marks*
Internal Assessment: 30 marks
Examination: 70 marks

Objectives

To acquaint students with the nature, scope, and assessment methods of Developmental Psychopathology. To provide the basic understanding of the classification of Childhood Disorders. Further explain the students in detail about the Understanding of assessment, aetiology, symptoms, and management of the major developmental psychological disorders.

Learning Outcome

After completing the course, students will be able to:

• Identify the scope and describe the nature of the Developmental Psychopathology.

• Use terms of abnormal psychology especially as outlined in the Diagnostic and Statistical Manual to understand the Developmental Psychopathology.

• Identify the various aetiological factors of the Developmental Psychopathology.

• Apply the knowledge related to the study of abnormal psychology with respect to how to manage the childhood disorders better.

UNIT- I

Developmental Psychopathology: Nature, Scope, and Clinical Assessment & Diagnosis.

Classification of Childhood Disorders: Principles and Models.

UNIT-II

Mental Retardation: Classification, Aetiology, Diagnosis and Management.Pervasive Developmental Disorder: Autistic Disorder, Asperger's Disorder, Rett's Disorder, and Childhood Disintegrative Disorder.

UNIT-III

Internalizing Disorders: Anxiety disorder- Generalized Anxiety Disorder, Separation Anxiety Disorder, Social Phobia, Obsessive Compulsive Disorder and Panic Disorder.

Childhood Mood Disorders, Somatic Complaints, and Teenage Suicide.

UNIT-IV

Externalizing Disorders: Attention Deficit Hyperactivity, Disorder Conduct disorder, and Oppositional Defiant Disorder.

Eating and Elimination Disorders.

Suggested Readings

American Psychiatric Association, (2013). *Diagnostic and statistical manual of mental Disorders* (5th ed.) Arlington, VA: American Psychiatric Publishing.

Cicchetti, D., & Cohen, D. J. (Eds.). (2006). *Developmental Psychopathology: Theory and Method (IInded.)*. John Wiley & Sons, Inc..

Comer, R. J. (2010). *Abnormal Psychology (7th ed.),* Worth Publishers, New York.

Freedom, A., Felgoise, S. H., & Davis, D. D. (2008).*Clinical Psychology: Integrating Science and Practice*, John Wiley & Sons, New Jersey.

Nevid, J. S., Rathus, S. A., & Greene, B. S. (2017). *Abnormal Psychology in a Changing World* (10th ed.). Pearson.

Nietzel, M.T.,& Bernstein, D. A. (1987).*Introduction to Clinical Psychology*. New Jersey: Prentice Hall.

Sameroff, A. J., Lewis, M., & Miller, S. M. (Eds.). (2000). *Handbook of Developmental Psychopathology (2nd ed*.). Kluwer Academic Publishers.

Trull, T.J. (2005).*Clinical Psychology (7th ed.).* Wadsworth Cengage learning. Australia.

World Health Organization, (1992). *The ICD -10 classification of mental and behavioral disorders: clinical descriptions and diagnostic guidelines*, WHO Press. Geneva.

DCEC

HEALTH PSYCHOLOGY

SHSS PSY 01 04 19 DCEC 4004

Credits: 4 (Hrs/week: 4) *Total: 100 marks*
Internal Assessment: 30 marks
Examination: 70 marks

Objective

To acquaint the students with meaning and concept of health psychology. To understand the different models, cross cultural perspective and approaches of health psychology. To help them understand physiology and psychology of pain and its management. To help them understand the different curative and promotive aspect of health. To identify the different approaches of health promotion.

Learning Outcomes

After completing the course contents, students would be able to;

-Learn meaning and concept of health psychology.

-Understand various models and approaches of health psychology.

-Understand the curative and promotive aspect of health.

-Identify the various system of health, choice of medicinal system in India.

UNIT- I

Introduction- Meaning and Concept of Health, Aims and future of Health Psychology, Historical Development, Individual and Cross-Cultural Perspectives.

Approaches to study Health psychology, Bio-Psycho-Social Model of Health.

UNIT-II

Social Environment and Health: Global health trends; Health care systems, socio-economic factors in health; Gender and health.

Stress and Health: Definition, nature, types, causes and consequences of stress. Stress management. Stress disorders. Health promoting and health endangering lifestyles and beliefs.

UNIT-III

Pain and Pain Management: Physiology of Pain. Gate Control Theory. Psychological influences on Pain Perception. Specific Pain treatment methods, Medical Settings and Patient Behavior

Hospitalization. Coping with chronic illness. Complementary Health-Care systems in India.

UNIT-IV

Health problems: Management, Prevention, and Cure, choice of medicinal systems; patient-doctor relationship, treatment adherence.

Health Promotion: Definition and Meaning, Health Promotion Approaches: Community Development Approach, Self-Empowerment Approach, Behavior change Approach, Ideology of Health Promotion

Suggested Readings

Baum. A., Gatchel, R. J., & Krantz, D.S. (1997). *An Introduction to Health Psychology*. New York: McGraw Hill.

Baum, A., Revenson, T.A.,&Singer, J.E. (2001). *Handbook of Health Psychology.*New Jersy, Lawrence Erlbaum.

Dimmateo, M.R., & Martin, L.R. (2002). *Health Psychology*. Boston: Allyn and Bacon.

Feist, J., & Linda, B. (1992). *An Introduction to Behavior and Health*. *(2nd Ed.)* Books/Publishing Company.

Marks, D., Murray, M., Evans, B.,&Willig, C. (2002). *Health Psychology: Theory, Research and Practice.* New Delhi: Sage.

School Counseling

SHSS PSY 01 04 22 DCEC 4004

Credits: 4 (Hrs/week: 4)

Total: 100 marks
Internal Assessment: 30 marks
Examination: 70 marks

Objective

To enable the students to develop an understanding of counseling within school setup, which is collaborative work of counselor and other school staff. It would also focus on prevention and intervention of mental health and disorders of children and adolescents. It presents various approaches & amp; strategies (interventions & amp; prevention) for use when counseling children and adolescents.

Learning Outcomes

After the completion of course students will be able to;

- *Apply guidance & counseling skills in schools at various level.*
- *Analyze career counseling as an important aspect of assessment.*
- *Design and develop holistic plan for various types of students and their needs.*
- *Comprehend the challenges and risk involved in the management of a classroom with individual differences.*

UNIT-I

Historical and Current Issues, Need, Scope of School Counselling, Difference between Educational Psychologist and School Counsellor, Transformations of the Roles, Responsibilities; skills of School Counselors; Professional and Ethical Codes.

Guidance & Counseling, Need and importance of guidance and counseling at school settings.

UNIT-II

Professional Roles of School Counsellor: Program Coordinator, Educational Leader, The Guidance Curriculum/Demonstrating Accountability, Becoming a Systematic Change Agent-Advocacy.

Counselling at different levels: Elementary School, Middle School, Secondary School; Higher Secondary School.

UNIT-III

Counseling and Curriculum Development; Counseling; Family Intervention for Children

Counselling & School Management, Holistic Model-5 aspects: Personal, Temperamental, Professional, Social, Environmental.

UNIT-IV

Working with problematic students: mental and emotional disorders; Substance Dependence, Oppositional Deviance Disorder ; Anger Control, ADHD, Depression, Suicide Ideation, Self-esteem/ social anxiety disorder, Eating disorders, Sexual Abuse.

Suggested Readings

Belkin, G.S. (1998).*Introduction to Counselling.* W.C.: Brown Publishers

Nelson, J. (1982).*The Theory and Practice of Counselling Psychology.* New York: Hollt Rinehart & Winston.

Ben, N., &Ard, Jr. (1997).*Counselling and Psychotherapy: Classics on Theories and Issues*, Science and Behavior Books Co.

Brammer, L.M.,&Shostrom, E.L. (1977).*Therapeutic Psychology: Fundamentalsof Counselling Psychotherapy*. (3 rd Ed.) , Englewood Cliffs: PrenticeHall.

Udupa, K.N. (1985). *Stress and its Management by Yoga*. Delhi: MotiLalBansariDas.

Windy, D. (1988).*Counselling in Action*; New York: Sage Publication.

EXCEPTIONAL CHILDREN

SHSS PSY 01 04 23 DCEC 4004

Credits: 4 (Hrs/week: 4)

Total:100 marks
Internal Assessment: 30 marks
Examination: 70 marks

Objectives

To acquaint students with the nature, scope, concept, and history of Special Education. To provide the basic understanding of the Exceptional children and their characteristics. Further, know the students in detail about the understanding of assessment, aetiology, symptoms, and management of the major developmental psychological disorders.

Learning Outcomes

After completing the course, students will be able to:

- *Identify the scope, understand the concept, and describe the nature of Special Education.*
- *Identify the characteristics of Exceptional Children.*
- *Understand characteristics and needs of students who are members of special populations.*
- *Identify various disabilities and impairments related to Exceptional Children.*
- *Identify techniques for communicating effectively to support collaboration with families and other professionals serving.*
- *Explore the roles of Apex Bodies on Special Education.*

UNIT- I

Special Education: Concept, Nature, History, Objectives, Need and Scope of Special Education.

Exceptional Children: Meaning and Characteristics of Exceptional Children.

UNIT-II

Intellectual Disability: Classification, Aetiology, Diagnosis and Management.

Gifted Children: Definition, Characteristics, and Classification. Causes and Problems of Gifted Children, Teaching Strategies.

Learning Disabilities, ADHD and Autism. Identification, Causes, Prevention, and Teaching Strategies.

UNIT-III

Physical Disabilities: Definition and Classification, Cause, and Problems of Physical Challenged. Teaching Strategies.

Various Impairments: Visual Impairment, Hearing Impairment, Speech Impairment, Language Disorder, Emotional or Behaviour Problems.

UNIT-IV

Apex bodies on Special Education: RCI, NIMH, NIVH, NIOH.

Rehabilitation of exceptional children: Role of Peers, Role of Family, Role of Community and Government.

Suggested Readings

American Psychiatric Association, (2013). *Diagnostic and statistical manual of mental Disorders* (5th ed.) Arlington, VA: American Psychiatric Publishing.

Cicchetti, D., & Cohen, D. J. (Eds.). (2006). *Developmental psychopathology: Theory and method (2nd ed.).* John Wiley & Sons, Inc..

Comer, R. J. (2010).*Abnormal Psychology (7th ed.)*, Worth Publishers, New York.

Freedom, A., Felgoise, S. H., & Davis, D. D. (2008).*Clinical Psychology: integrating science and practice*, John Wiley & Sons, New Jersey.

Nevid, J. S., Rathus, S. A., & Greene, B. S. (2017). *Abnormal psychology in a changing world* (10th ed.). Pearson

Nietzel, M.T.,& Bernstein, D. A. (1987).*Introduction to clinical Psychology*. New Jersey: Prentice Hall.

Sameroff, A. J., Lewis, M., & Miller, S. M. (2000). *Handbook of Developmental Psychopathology* (2nd ed.). Kluwer Academic Publishers.

Trull, T.J. (2005).*Clinical Psychology* (7th ed.). Wadsworth Cengage learning. Australia.

World Health Organization, (1992). *The ICD -10 classification of mental and behavioral disorders: clinical descriptions and diagnostic guidelines*, WHO Press. Geneva.

GENERIC ELECTIVE COURSE

STRESS AND HEALTH

SHSS PSY 01 04 04 GEC 4004

Credits: 4 (Hrs/Week:4)

Total Marks: 100
Internal Assessment: 30 marks
Examination: 70 marks

Objectives

To provide the option to other discipline students to understand the role of stress and health aspect of life. Acquaint the students with different aspect of stress, its impact and consequences. To help them identify various factors affecting the health of individuals. Explain various theories and models of stress. To provides understanding of severe consequences of stress on immune system, on mental health and on cancer. Identify the role of commonly used drugs and their relation with stress and health. Identify various stress management techniques, like, assertiveness training, vipasana and yoga.

Learning Outcomes

After completing the course contents, students would be able to:

- *Able to learn various aspects and factors affecting the health.*
- *Able to understand various theories and models of stress.*
- *Identify the physical, social and biological stressors and its consequences on health.*
- *Identify the consequences of prolonged stress, effect of stress on immune system and mental health.*
- *Understand and apply the techniques of stress management.*

UNIT-I

Stress: Meaning, Impact and Sources, Stress Cycle, Appraisal of Stress. Coping Styles.

GAS and Transaction models of Stress. The Fight or Flight Response (Stress and Physiology).

UNIT-II

Stressors- Physical, Social, Biological, Familial and Psychological (Bio-psychosocial Aspects).

Life Events and Daily Hassles. Habits and Stress. PTSD. Hardiness.

UNIT-III

Stress Responses: Consequences of prolonged stress, stress and immune system. Stress and Cardiovascular Illness, Stress and Musculoskeletal Illness, Stress and Mental Health. Stress and Cancer.

UNIT-IV

Assertiveness Training, Communication Skills and Time Management

Meditation and Visualization, Vipasana, Relaxation Techniques and Yoga.

Suggested Readings

Brehm, A. B. (1998).*Stress Management: Increasing Your Stress Resistance.*Pearson, New Delhi.

Sarafino, E.P. & Smith, T.W. (2012).*Health Psychology: Bio-psychosocial Interactions.* Wiley, New Delhi.

Komoroff, A. L. (2008).*Stress Management: Approaches for Preventing and Reducing Stress*. Boston, Harvard University, Harvard Health Publication.

Lovallo, W.R. (2016).*Stress & Health: Biological and Psychological Interactions.* Sage Publcation, Oklahoma, USA.

Meting of the Board of Studies Held on 28.08.2021 at 1.00PM to 3.00 PM. - Proceedings.

2 messages

Annexure-XXII

HOD Sanskrit <hodsanskrit@cuh.ac.in> Tue, Sep 7, 2021 at 3:23 PM
To: sanskritisadan2@gmail.com, sanskritisadan@yahoo.com

A Meeting of the Board of Studies in Sanskrit was held on 28/08/2021 on online mode.
The Following Members were present -

1. Prof Ranvir Singh,
   Coordinator, Department of Sanskrit
   Central University of Haryana, Mahendergarh.
2. Prof Uma Vaidya
   Ex-Vice Chancellor,
   Kavikulaguru Kalidas Sanskrit University
   Ramtek, Maharashtra
3. Prof. Surendra Kumar,
   Professor, Department of Sanskrit
   M.D. University, Rohtak.

Following items were discussed and passed unanimously -

1. Introduction of a new course of two credits in the First Semester of M.A.Sanskrit, i.e. Functional Sanskrit w.e.f. the ensuing first semester (October 2021). This syllabus is prepared according to the guidelines of NEP 2020. The proposed Syllabus was thoroughly discussed and passed.
2. Syllabus of First Semester to Third semester of MA Sanskrit, with the addition of Objectives and Course Level Learning Outcome as required by NEP 2020.The proposed Syllabus was thoroughly discussed and passed.
3. list of the Moderators/Paper Setters/Examiners for all semesters and all papers including the latest added viz. Functional Sanskrit. Internal experts for the purpose of scrutiny of Question Papers for final examination are also included. The proposed Syllabus was thoroughly discussed and passed.

The Convener expressed heartfelt thanks to the outside experts for their cooperation and valuable suggestions for the improvement of the syllabus concerned.

Please approve the above proceedings and send as soon as possible.

सादर / Regards
आत्मीय / Yours sincerely
डॉ. रणवीर सिंह / Dr. Ranvir Singh
पीठ आचार्य / Chair Professor
स्वामी दयानन्द सरस्वती पीठ / Swamy Dayanand Saraswati Chair
शैक्षणिक ब्लॉक क्र. 04, प्रकोष्ठ क्र. 229 /Academic Block No.04, Room No.229
अध्यक्ष/Head : संस्कृत विभाग /Sanskrit Department
हरियाणा केन्द्रीय विश्वविद्यालय / Central University of Haryana
जांट-पाली / Jant-Pali, महेन्द्रगढ़ / Mahendergarh - 123 031
हरियाणा / Haryana
चलद्वरभाष / Mobile : 09416334660

2 attachments

Syllabi, 1st -3rd Semester with LOCF final.docx
240K

list (F) of Expert Panel I-IV Semesters (1) (1).docx
116K

Surendra Kumar <sanskritisadan2@gmail.com> Tue, Sep 7, 2021 at 4:22 PM
To: HOD Sanskrit <hodsanskrit@cuh.ac.in>
Cc: sanskritisadan@yahoo.com

Approved.

Re: Online Meeting of School Board- School of Humanities and Social Sciences at 11:00 AM on 09.09.2021

2 messages

Reema Gill <hodsociology@cuh.ac.in> Sun, Sep 12, 2021 at 1:38 PM
To: School Of Humanities and Social Science <deanshss@cuh.ac.in>
Cc: HOD ENGLISH <hodenglish@cuh.ac.in>, Hodhindi <hodhindi@cuh.ac.in>, narender parmar <narenderparmar@cuh.ac.in>, Political Science <hodpolscience@cuh.ac.in>, HOD Sanskrit <hodsanskrit@cuh.ac.in>, Hodhistory <hodhistory@cuh.ac.in>, HOD Psychology <hodpsychology@cuh.ac.in>, HOD JMC <hodjmc@cuh.ac.in>, "Dr. Sanjiv Kumar" <sanjivkumar@cuh.ac.in>, CUH Rajbir Dalal Pol Sc Prof <rajbirdalal@cuh.ac.in>, "Ms. Rinu" <rinueng@cuh.ac.in>, arvindtejawat@cuh.ac.in, surender bargujar <sbargujar@gmail.com>, "Dr. Chanchal Kumar Sharma" <chanchalsharma@cuh.ac.in>, "Dr. Rajeev Kumar Singh" <rajeevsingh@cuh.ac.in>, "Dr. Payal Chandel" <paayalchandel@cuh.ac.in>, pradeeppsy@cuh.ac.in, reema gill <reemagill@cuh.ac.in>, "Dr. Kumuda Prasad Acharya" <kumuda@cuh.ac.in>, rajeshgill@pu.ac.in, Ramesh Kumar Gautam <rameshkgautam.du@gmail.com>, Jaiveer Dhankhar <jaiveer3133@gmail.com>, C R Darolia <crdarolia@yahoo.com>, vkaushik24@gmail.com, "C.R. DAROLIA" <crdarolia@kuk.ac.in>

Dear Sir, it is Approved from my side

On Thu, 9 Sep, 2021, 12:30 School Of Humanities and Social Science, <deanshss@cuh.ac.in> wrote:

> Dear Sir/Madam
> First of all, I extend my heartfelt thanks for your active contribution in the academic planning and revision of curriculum as approved by the Board of Studies. Now, may I request you to please incorporate all the suggestions given by the School Board and email the final draft of the revised curriculum by today evening so that the same may be submitted as the final draft for the approval of the School Board. Regards
>
> On Wed, Sep 8, 2021 at 9:01 PM School Of Humanities and Social Science <deanshss@cuh.ac.in> wrote:
>
> > Dear Sir/Madam
> > May I kindly request all the esteemed HODs and TICs of various departments under the School of Humanities and Social Sciences to join the School Board meeting scheduled at 11:00 tomorrow. Kindly keep the BoS approved minutes and syllabi with you for ready reference during the deliberations.
> > Best regards and thanks
> >
> > Dr Sanjiv Kumar, Professor,
> > Department of English and Foreign Languages, Dean (Academic) and Dean Planning
> > Central University of Haryana, 123031
> >
> > Begin forwarded message:
> >
> > **From:** School Of Humanities and Social Science <deanshss@cuh.ac.in>
> > **Date:** 8 September 2021 at 2:45:08 PM IST
> > **To:** "Dr. Sanjiv Kumar" <sanjivkumar@cuh.ac.in>, HOD Psychology <hodpsychology@cuh.ac.in>, Political Science <hodpolscience@cuh.ac.in>, CUH Rajbir Dalal Pol Sc Prof <rajbirdalal@cuh.ac.in>, "Ms. Rinu" <rinueng@cuh.ac.in>, arvindtejawat@cuh.ac.in, narender parmar <narenderparmar@cuh.ac.in>, HOD JMC <hodjmc@cuh.ac.in>, surender bargujar <sbargujar@gmail.com>, "Dr. Chanchal Kumar Sharma" <chanchalsharma@cuh.ac.in>, "Dr. Rajeev Kumar Singh" <rajeevsingh@cuh.ac.in>, "Dr. Payal Chandel" <paayalchandel@cuh.ac.in>, pradeeppsy@cuh.ac.in, reemagill@cuh.ac.in, "Dr. Kumuda Prasad Acharya" <kumuda@cuh.ac.in>, rajeshgill@pu.ac.in, Ramesh Kumar Gautam <rameshkgautam.du@gmail.com>, Jaiveer Dhankhar <jaiveer3133@gmail.com>, C R Darolia <crdarolia@yahoo.com>, vkaushik24@gmail.com, "C.R. DAROLIA" <crdarolia@kuk.ac.in>, hodhistory@cuh.ac.in
> > **Cc:** Academic Branch <academicbranch@cuh.ac.in>, Vice Chancellor <vc@cuh.ac.in>, financeofficer@cuh.ac.in
> > **Subject: Re: Online Meeting of School Board- School of Humanities and Social Sciences at 11:00 AM on 09.09.2021**
> >
> > Kindly find the link of the online meeting as under:
> > https://meet.google.com/myn-twqv-ezz

<deanshss@cuh.ac.in> wrote:

Dear Sir/Madam

In view of the meeting of the Academic Council likely to be held next week, the Online meeting of the School Board is scheduled to be held at 11:00 AM on 09.09.2021.

The main agenda of the meeting is to consider and approve the revised syllabi of various PG programmes offered by various departments under the School of Humanities and Social Sciences.

All the esteemed members are requested to join.

The soft copies of the syllabi and the link of the meeting shall be shared prior to the meeting.

Looking forward to meaningful academic deliberations during the meeting,

Best regards and thanks

Yours Sincerely,

Sanjiv Kumar
Dean, School of Humanities and Social Sciences

Dr. Rajeev Kumar Singh <rajeevsingh@cuh.ac.in> Sun, Sep 12, 2021 at 1:45 PM
To: Reema Gill <hodsociology@cuh.ac.in>
Cc: School Of Humanities and Social Science <deanshss@cuh.ac.in>, HOD ENGLISH <hodenglish@cuh.ac.in>, Hodhindi <hodhindi@cuh.ac.in>, narender parmar <narenderparmar@cuh.ac.in>, Political Science <hodpolscience@cuh.ac.in>, HOD Sanskrit <hodsanskrit@cuh.ac.in>, Hodhistory <hodhistory@cuh.ac.in>, HOD Psychology <hodpsychology@cuh.ac.in>, HOD JMC <hodjmc@cuh.ac.in>, "Dr. Sanjiv Kumar" <sanjivkumar@cuh.ac.in>, CUH Rajbir Dalal Pol Sc Prof <rajbirdalal@cuh.ac.in>, "Ms. Rinu" <rinueng@cuh.ac.in>, Arvind Singh Tejawat <arvindtejawat@cuh.ac.in>, surender bargujar <sbargujar@gmail.com>, "Dr. Chanchal Kumar Sharma" <chanchalsharma@cuh.ac.in>, "Dr. Payal Chandel" <paayalchandel@cuh.ac.in>, pradeeppsy@cuh.ac.in, reema gill <reemagill@cuh.ac.in>, "Dr. Kumuda Prasad Acharya" <kumuda@cuh.ac.in>, rajeshgill@pu.ac.in, Ramesh Kumar Gautam <rameshkgautam.du@gmail.com>, Jaiveer Dhankhar <jaiveer3133@gmail.com>, C R Darolia <crdarolia@yahoo.com>, vkaushik24@gmail.com, "C.R. DAROLIA" <crdarolia@kuk.ac.in>

Acknowledged and Approved from my side.
Regards
[Quoted text hidden]

CENTRAL UNIVERSITY OF HARYANA
MAHENDERGARH

(Established vide Central Universities Act 2009)
NAAC Accredited 'A' Grade University

SCHEME, SYLLABUS AND COURSES OF READING

Offered by the Department of Sanskrit
for
M. A. SANSKRIT
(w.e.f. the Academic Session : 2021-2022)
Revised According to NEP- 2020

Semester – I
Semester – II
Semester – III
Semester – IV

(Approved in the Meeting of BOS, School Board & Academic Council)

School of Humanities and Social Sciences

DEPARTMENT OF SANSKRIT

Credit Matrix for M.A. Sanskrit
w.e.f. 2021-2022

Semesters	Core Course (CC)	Specialized Elective Courses (SE)	Interdisciplinary/ Generic Elective Course (GEC)	Viva Voce	Total
I	22	-	-	-	22
II	20	-	4	2	26
III	8	12	4	-	24
IV	20	8	-	-	28
Total	70	20	8	2	100

Instructions for the Students:

Course Type

Core Course (CC): There are core courses in every semester. These courses are to be compulsorily studied by a student as a core course to complete the requirement of a programme in a said discipline of study.

Specialized Elective Courses (SE): These are Elective courses and can be chosen from a pool of papers in Semester III and IV. It will be supportive to gain in depth reach in a particular field of Sanskrit and mandatory as per course curriculum. In fourth Semester a provision of **Dissertation** is made to train the students for research. The topic of the Dissertation will be related to the stream chosen out of four specialized groups. Medium of the Dissertation will be Sanskrit only.

Generic Elective Course (GEC): Generic Elective Course may be from an unrelated discipline. It is interdisciplinary/open elective as per course curriculum. Available/offered by the departments included in the School or can be taken from the GEC Course offered by the Dept. of Sanskrit.

DEPARTMENT OF SANSKRIT
M.A. SANSKRIT
CHOICE BASED CREDIT SYSTEM

Semester-I (w.e.f. 2021-2022)

Course Code	Title of Paper	L	T	P	Credits
SHSS SKT 1101 C 3104	Saṁhitā Upaniṣat Ca	3	1	0	4
SHSS SKT 1102 C 3104	Vyākaraṇaṁ Bhāṣāvijñānaṁ Ca (1)	3	1	0	4
SHSS SKT 1103 C 3104	Bhāratīyadarśanam (1)	3	1	0	4
SHSS SKT 1104 C 3104	Kāvyaṁ Nāṭakaṁ ca	3	1	0	4
SHSS SKT 1105 C 3104	Dharmaśāstram (1)	3	1	0	4
SHSS SKT 1106 C 2002	Vyāvahārikaṁ Saṁskṛtam	2	0	0	2
Total		17	05	0	22

Semester-II (w.e.f. 2021-2022)

Course Code	Title of Paper	L	T	P	Credits
SHSS SKT 1207 C 3104	Brāhmaṇam Vedāñgāni Ca	3	1	0	4
SHSS SKT 1208 C 3104	Vyākaraṇaṁ Bhāṣāvijñānaṁ ca (2)	3	1	0	4
SHSS SKT 1209 C 3104	Bhāratīyadarśanam (2)	3	1	0	4
SHSS SKT 1210 C 3104	Kāvyaṁ Kāvyaśāstraṁ Ca	3	1	0	4
SHSS SKT 1211 C 3104	Dharmaśāstram (2)	3	1	0	4
SHSS SKT 1201 V 0002	Viva-Voce (will be held only in Sanskrit Medium).	0	0	0	2
SHSS SKT 1201 GE 3104	Prācīnabhāratīyasaṁskṛtiḥ Darśanaṁ Bhāṣāvijñānaṁ Ca (1)	3	1	0	4
Grand Total		18	6	0	26

Semester-III (w.e.f. 2021-2022)

Course Code	Title of Paper	Type	L	T	P	Hrs.	Credits
SHSS SKT 1312 C 3104	Prācya-Vāṅmayasya Viśiṣṭamadhyayanam – (1)[Common paper for all Groups (A, B, C, D)	C	3	1	0	4	4
SHSS SKT 1313 C 3104	Saṁskṛta-kavayaḥ Kāvyaśāstraṁ Ca – (1) [Common paper for all Groups (A, B, C, D)	C	3	1	0	4	4
Option (I) - Group-A (Veda) Specialized Elective							
SHSS SKT 13A 01 SE 3104	Ṛk-saṁhitā Yajus-saṁhitā Ca	SE	3	1	0	4	4
SHSS SKT 13A 02 SE 3104	Brāhmaṇa-sāhityam	SE	3	1	0	4	4
SHSS SKT 13A 03 SE 3104	Kalpa-sāhityaṁ	SE	3	1	0	4	4
Option (II) - Group-B (Grammar) Specialized Elective							
SHSS SKT 13B 04 SE 3104	Vyākaraṇa-paramparā -(1)	SE	3	1	0	4	4
SHSS SKT 13B 05 SE 3104	Vyākaraṇa-darśanam - (1)	SE	3	1	0	4	4
SHSS SKT 13B 06 SE 3104	Vyākaraṇa-prakriyā - (1)	SE	3	1	0	4	4
Option (III) - Group-C (Literature) Specialized Elective							
SHSS SKT 13C 07 SE 3104	Nāṭya-śāstram	SE	3	1	0	4	4
SHSS SKT 13C 08 SE 3104	Nāṭya-sāhityam	SE	3	1	0	4	4
SHSS SKT 13C 09 SE 3104	Saṁskṛta-padya-sāhityam	SE	3	1	0	4	4
Option (IV) - Group-D (Indian Philosophy) Specialized Elective							
SHSS SKT 13 D 10 SE 3104	Bhāratīyadarśanasya Itihāsaḥ	SE	3	1	0	4	4
SHSS SKT 13 D 11 SE 3104	Nyāyadarśanam, Pūrvamīmāṃsādarśanaṁ Kāśmīraśaivadarśanaṁ Ca	SE	3	1	0	4	4
SHSS SKT 13 D 12 SE 3104	Pramukha-dārśanika-siddhāntāḥ	SE	3	1	0	4	4
SHSS SKT 1302 GE 3104	Prācīna-bhāratīya-saṁskṛtiḥ, Darśanaṁ Bhāṣā-vijñānaṁ Ca- (2)	GE	3	1	0	4	4

Semester-IV(w.e.f. 2021-2022)

Course Code	Title of Paper	Type	L	T	P	Credits
SHSS SKT 1414 C 3104	Prācya-Vāṅmayasya Viśiṣṭamadhyayanam – (2) [Common paper for all Groups (A, B, C, D)	C	3	1	0	4
SHSS SKT 1415 C 3104	Saṁskṛta-kavayaḥ Kāvya-śāstraṁ Ca – (2) [Common paper for all Groups (A, B, C, D)	C	3	1	0	4
SHSS SKT 1416 C 001212	Dissertation[According to the Group chosen] (A/ B/C/D)	C	0	0	12	12
Option (I) - Group-A (Veda) Specialized Elective						
SHSS SKT 14A 13 SE 3104	Atharvasaṁhitā Sāmasaṁhitā Ca	SE	3	1	0	4
SHSS SKT 14A 14 SE 3104	Āraṇyakopaniṣatsāhityam	SE	3	1	0	4
Option (II) - Group-B (Grammar) Specialized Elective						
SHSS SKT 14B 15 SE 3104	Vyākaraṇaparamparā (2)	SE	3	1	0	4
SHSS SKT 14B 16 SE 3104	Vyākaraṇadarśanam (2)	SE	3	1	0	4
Option (III) - Group-C (Literature) Specialized Elective						
SHSS SKT 14C 17 SE 3104	Padya-gadya-campū-sāhityam	SE	3	1	0	4
SHSS SKT 14C 18 SE 3104	Kāvyaśāstram	SE	3	1	0	4
Option (IV) - Group-D (Indian Philosophy) Specialized Elective						
SHSS SKT 14 D 19 SE 3104	Yogadarśanam Ādhunika-Yogadārśanikāśca	SE	3	1	0	4
SHSS SKT 14 D 20 SE 3104	Advaitavedāntadarśanam, Dārśanikasiddhāntāḥ Ādhunikavijṅānaṁ Ca	SE	3	1	0	4

M. A. Sanskrit Semesters
योजना, पाठ्यक्रमः, पाठचर्या च
(2021-2022 शैक्षिकसत्रतः प्रस्तावितम्, 2020-तमीयाः राष्ट्रियशिक्षानीत्यनुगुणं संशोधितः)

SCHEME, SYLLABUS AND COURSES OF READING
(Proposed w.e.f. the Academic Session : 2021-2022, Revised according to NEP-2020)

एम०ए० (संस्कृत)-कक्ष्यायाः प्रथमवर्षीयपाठ्यक्रमः सत्रद्वये (प्रथमसत्रे द्वितीयसत्रे च) विभक्तः वर्तते। तत्र प्रतिसत्रम् अध्ययनार्थं **पञ्च** पत्राणि निर्धारितानि सन्ति। द्वितीयसत्रस्य पाठ्यक्रमसमाप्तेः पश्चात् प्रथमद्वितीयसत्रयोः अधीतं पाठ्यक्रमम् आश्रित्य छात्राणां **संस्कृतमाध्यमेन** मौखिकी परीक्षा आयोजयिष्यते। द्वितीयसत्रे तृतीयसत्रे च चयनाधारितश्रेयोदानपद्धत्यनुसारेण विश्वविद्यालयस्य संस्कृतेतरछात्रेभ्यः एकैकं वैकल्पिकं पत्रं प्रस्तुतं वर्तते।

The first year syllabus of M.A. Sanskrit class is bifurcated into two semesters, namely, Semester-I and Semester-II. Five papers are prescribed for study in each Semester. Viva-Voce of the students, based on the syllabus covered in their 1st and 2nd Semester courses, will be conducted through **Sanskrit medium** after the completion of the syllabus of M.A. Sanskrit, Second Semester. In the Second and Third Semesters one GE Course each for the students of streams of other than Sanskrit is available.

एम०ए० (संस्कृत) कक्षायाः द्वितीय-वर्षस्य पाठ्यक्रमः सत्रद्वये (तृतीय-सत्रे चतुर्थ-सत्रे च) विभक्तः वर्तते। तत्र प्रत्येकं सत्रे **चत्वारः** वैकल्पिक-वर्गाः [(क) वेद-वर्गः, (ख) व्याकरण-वर्गः, (ग) साहित्य-वर्गः, (घ) भारतीय–दर्शन–वर्गश्च] प्रस्तुताः सन्ति, येषां मध्ये विद्यार्थी/परीक्षार्थी यथेच्छं कमपि **एकं** वर्गं चेष्यति। तृतीयसत्रे प्रत्येकं वर्गे अध्ययनार्थं त्रीणि पत्राणि निर्धारितानि सन्ति, अपि च चतुर्थसत्रे प्रत्येकं वर्गे पत्रद्वयं निर्धारितमस्ति। एतदतिरिक्तं तृतीते सत्रे द्वे अनिवार्यपत्रे, चतुर्थे सत्रे त्रीणि अनिवार्याणि पत्राणि निर्धारितानि सन्ति। यथा तृतीये सत्रे **अनिवार्यं पत्रम् –१२ : प्राच्य-वाङ्गमयस्य विशिष्टमध्ययनम् (१); अनिवार्यं पत्रम् –१३: संस्कृत-कवयः काव्यशास्त्रं च (१)**। चतुर्थे सत्रे **अनिवार्यं पत्रम् –१४ – प्राच्य-वाङ्गमयस्य विशिष्टमध्ययनम् (२); अनिवार्यं पत्रम् –१५ – संस्कृत-कवयः काव्यशास्त्रं च (२); अनिवार्यं पत्रम् –१६ – लघुशोधप्रबन्धश्च।** एतदतिरिच्य छात्राः तेषां क्रेडिट् (credit)–इति पूरणार्थम् अन्यविभागेभ्यः प्रदत्तेभ्यः पत्रेभ्यः एकं ततोधिकं वा पत्राणि चेतुं समर्थाः सन्ति।

The syllabus of M.A. Sanskrit (Final) Class is bifurcated into two semesters, namely, Semester-III and Semester-IV. There are four optional Groups (Group-A: Veda; Group-B: Grammar; Group-C: Literature; Group-D: Indian Philosophy) out of which the student/examinee can opt any one Group for the both semesters. In third Semester three papers are given in each Group and 2 papers are given in each Group in fourth Semester. Besides, two and three compulsory papers are prescribed in third and fourth Semesters respectively, e.g. for the third Semester **Compulsory paper- 12: *Prācya-vāṅmayasya Viśiṣṭamadhyayanam (1);* Compulsory paper- 13*: Saṁskṛtakāvayaḥ Kāvyaśāstraṁ Ca (1)*** and for the 4th Semester **Compulsory paper-14**: ***Prācya-vāṅmayasya Viśiṣṭamadhyayanam (2);* Compulsory paper- 15*: Saṁskṛtakāvayaḥ Kāvyaśāstraṁ Ca (2);* Compulsory paper- 16: Dissertation.** Besides, the students may opt one or more GE courses from other Departments to meet their credit requirements.

एम०ए० संस्कृतम् , द्वितीयवर्षीय-पाठ्यक्रमस्य तृतीय-चतुर्थ-सत्रयोः वैकल्पिकाः वर्गाः –

Optional Groups for 3rd& 4th Semesters of M.A. Sanskrit (Final) Course -

विकल्पः (Option)	समूहः (Group)	समूह-नाम (Name of Group)
I	क/ A	वेदः(Veda)
II	ख/ B	व्याकरणम्(Grammar)
III	ग/ C	साहित्यम्(Literature)
IV	घ/D	भारतीय–दर्शनम् (Indian Philosophy)

लिखितपत्राणां विस्तृतः पाठ्यक्रमः

(2021-2022 शैक्षिकसत्रतः संशोधितः)

Detailed Syllabus for written papers
(Proposed w.e.f. Academic Session 2021-2022)
एम० ए० संस्कृतम् प्रथमं सत्रम्

M.A. SANSKRIT FIRST SEMESTER
COURSE CODE: SHSS SKT 1101 C 3104

प्रथमपत्रम् : संहिता उपनिषत् च

Paper-I : Saṁhitā Upaniṣat Ca

L	T	P	Credits
3	1	0	4

उद्देश्यः/Objective:

1. अध्येतृणां भारतीयज्ञानविज्ञानसंपद्भूते वैदिकवाङ्मये प्रवेशः; 2. वैदिकश्रुतिपरम्परायाः सम्यक् परिचयः; 3. प्राचीनार्वाचीन–व्याख्यानग्रन्थानां परिशीलनेन सह वैदिकसूक्तानामध्ययनम्; 4. ईश-केनोपनिषदयोः निहित–ब्रह्मविद्यायाः परिचय अनुभवं च; 5. वैदिकसाहित्याध्ययन–माध्यमेन प्राचीनभारतीय-जीवन-मूल्यानां संस्कृत्याश्चावबोधनम्।

2. पाठ्यक्रमाध्ययनस्य फलम् / Course Level Learning Outcome:

1. अध्येतृभ्यः वैदिकसाहित्ये निहितस्य ज्ञानवैभवस्य परिचयःभवेत् ।
2. वैदिक-मन्त्र-सूक्त-देवतानां परिचयः जायेत।
3. वेदोपनिषत्सु निहिताध्यात्मिकतत्त्वानुसारि जीवननिर्वहणाय प्रेरणा आप्नुयात्।
4. उपनिषदामध्ययनात् तत्र निहितस्य ज्ञानमार्गस्य ब्रह्मतत्त्वस्य चावधारणं भूयात्।
5. अध्ययनानन्तरं वेदविषयस्योपरि शोधकार्यार्थम् उपजीविकाप्राप्त्यर्थञ्चापि साहाय्यं लभेत्।

पाठ्यक्रमः

अधोलिखितवैदिकसूक्तानां पारम्परिक्या आधुनिक्या आलोचनात्मकपद्धत्या च गहनमध्ययनम् -

घटकम्-1: ऋग्वेदः - अग्निः (1.1); सविता (1.35); विष्णुः (1.154); इन्द्रः (2.12); रुद्रः (2.33); बृहस्पतिः (4.50); उषा (5.80); वरुणः (7.88); सोमः (9.80)

घटकम्-2: ऋग्वेदः - पुरुषः (10.90); हिरण्यगर्भः (10.121); नासदीयम् (10.129); वाक् (10.125); सरमा-पणि-संवादः (10-108); विश्वामित्र-नदी-संवादः (3.33)

घटकम्-3: यजुर्वेदः - शिवसंकल्पमन्त्राः 34.1-6; **अथर्ववेदः** (शौनकः) ब्रह्मचर्यसूक्तम् (11.5) भूमिसूक्तञ्च (12.1)

घटकम्-4: ईशावास्योपनिषदः केनोपनिषदश्च मन्त्राणां विशदव्याख्या।

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14. वैदिक साहित्य और संस्कृति, बलदेव उपाध्याय, शारदा संस्थान, वाराणसी, 1989

★★★

COURSE CODE : SHSS SKT 1102 C 3104
द्वितीयपत्रम् : व्याकरणं भाषाविज्ञानञ्च (1)
Paper-II : Vyākaraṇaṁ Bhāṣāvijñānaṁ Ca (1)

L	T	P	Credits
3	1	0	4

उद्देश्यः/Objective:

1. प्राचीनभारतीय-महावैयाकरणस्य पाणिनेः व्याकरणपरम्परायाश्च परिचयः; 2. संज्ञा–सन्धि-सुबन्त-तिङन्त-रूपाणां सिद्धिनियमैः सह परिचयः; 3. रूपसिद्धिप्रक्रियया सह संबद्धानामष्टाध्याय्याः सूत्राणां चावबोधनम्; 4. भाषाविज्ञाने विवेचितानां कानिचित् प्रमुख-सिद्धान्तानामवगमनम्।

पाठ्यक्रमाध्ययनस्य फलम् / Course Level Learning Outcome:

1. विद्यार्थीनां व्याकरणाध्ययनाय प्रवृत्तिर्जायेत, येन शब्दशुद्धिर्भाषाशुद्धिश्च भूयात्।
2. दोषशून्यं संस्कृत-सम्भाषणाय लेखनाय च कौशलं वर्धेत।
3. संज्ञा–सन्धि-सुबन्त-तिङन्त-रूपाणां सिद्धिप्रक्रियायाः अष्टाध्याय्याः संबद्धसूत्राणां सह परिज्ञानं संभवेत्।
4. व्याकरणेन सह भाषाशास्त्रस्याध्ययनं बहुलाभप्रदम्, अनेन एतयोः विश्लेषणे सम्बन्धस्थापने च प्रवृत्तिरुत्पद्येत।

पाठ्यक्रमः

लघुसिद्धान्तकौमुद्याः अधोलिखित-प्रकरणेष्वागतानां रूपाणां सिद्धिः सूत्रव्याख्या च -

घटकम्-1: वरदराजः - लघुसिद्धान्तकौमुदी :

(क) सञ्ज्ञाप्रकरणम्; (ख) सन्धिप्रकरणम्।

घटकम्-2: वरदराजः - लघुसिद्धान्तकौमुदी : सुबन्तप्रकरणम् -

(क) अजन्तपुँल्लिङ्गप्रकरणम्- राम, सर्व, हरि, सखि, गो।

(ख) अजन्तस्त्रीलिङ्गप्रकरणम्- रमा, सर्वा, मति, स्त्री।

(ग) अजन्तनपुँसकलिङ्गप्रकरणम्- ज्ञान, वारि, दधि, मधु।

(घ) हलन्तपुँल्लिङ्गप्रकरणम्- विश्ववाह्, मघवन्, राजन्, विद्वस्, तद्, युष्मद्, अस्मद्।

घटकम्-3: वरदराजः - लघुसिद्धान्तकौमुदी :

(क) तिङन्ते भ्वादिप्रकरणम्- √भू, √एध (एतयोः सर्वे लकाराः)। (ख) पूर्वकृदन्तप्रकरणम्।

घटकम्-4: भाषाविज्ञानम् :

भाषाविज्ञानस्य परिभाषा क्षेत्रञ्च। भाषायाः परिभाषा वैशिष्ट्यञ्च। भाषागतपरिवर्तनं तद्भेदाश्च। भाषापरिवर्तनस्य कारणानि। भाषापरिवाराः (रूपरेखामात्रम्)। भाषाणां वर्गीकरणम् (परिवारमूलकम् आकृतिमूलकञ्च)। भारोपीयपरिवारः (सामान्यमध्ययनम्)। इण्डो-इरानियन-शाखा (विशिष्टमध्ययनम्)।

अनुशंसितग्रन्थाः

1. लघुसिद्धान्तकौमुदी, व्याख्या० श्रीधरानन्दशास्त्री, मोतीलाल बनारसीदास, दिल्ली, 2015
2. लघुसिद्धान्तकौमुदी, वरदराज, व्याख्या० भीमसेन शास्त्री, भैमी प्रकाशन, दिल्ली, 1949
3. भाषा और भाषिकी, देवीशंकर द्विवेदी, प्रशान्त प्रकाशन, कुरुक्षेत्र विश्वविद्यालय, कुरुक्षेत्र, 1974
4. पदपदार्थसमीक्षा, बलदेव सिंह, कुरुक्षेत्र विश्वविद्यालय, कुरुक्षेत्र, 1969
5. भाषा-विज्ञान, भोलानाथ तिवारी, किताब महल, इलाहाबाद, 1971
6. Introduction to Comparative Philology, P.D. Gune, Poona Oriental Book House, Pune, 1950. (Hindi Translation is also available), 2005
7. Transformational Grammar, Ratford, A., Cambridge Univ. Press, 1988
8. Introduction to Linguistics, Ratford, A. *et. al.,* Cambridge Univ. Press, 1999
9. Introduction to Theoretical Linguistics, Lyons, John, 1968
10. Linguistic Semantics, Lyons, John, Cambridge University Press, 1995
11. General Linguistics - An Introductory Survey, Robins, R. H., Indiana Press, Bloomington, 1964
12. भाषाविज्ञान की भूमिका, देवेन्द्रनाथ शर्मा, राधाकृष्ण, नई दिल्ली, 1978
13. Linguistics, An Introduction to Language and Communication, Akmaijan, A.R. Demers and R. Hamish, Cambridge Mass, MIT Press. 1979
14. पाणिनीयव्याकरणस्य भाषावैज्ञानिकमनुशीलनम्, घनश्याम उनियालः, अमर ग्रन्थ, दिल्ली, 2002

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COURSE CODE : SHSS SKT 1103 C 3104

तृतीयपत्रम् : भारतीयदर्शनम् (1)

Paper-III : Bhāratīyadarśanam (1)

L	T	P	Credits
3	1	0	4

उद्देश्यः/Objective:

1. अध्येतृषु भारतीयदार्शनिकसिद्धान्तानां सम्यक् परिचयः; 2. केशवमिश्रप्रणीतायाः तर्कभाषायाः पाठनेन न्यायदर्शने प्रवेशः तस्य परिचयः च; 3. ईश्वरकृष्णप्रणीतायाः सांख्यकारिकाया अनुशीलनेन सांख्यदर्शने प्रवेशः तस्य परिचयः च; 4. भारतीयदर्शनपरम्परायाः षडास्तिकदर्शनेषु सांख्य-न्यायदर्शनयोः तत्त्वानुशीलनपूर्वकं विषयविशदीकरणम्।

पाठ्यक्रमाध्ययनस्य फलम् / Course Level Learning Outcome:

1. परम्परयावगतानां विभिन्नानां दार्शनिकसिद्धान्तानां विचाराणां च परिशीलने रुचिः समुत्पद्येत।
2. न्यायदर्शनस्य प्रामाणिक-ग्रन्थ-तर्कभाषायाः सम्यगनुशीलनेन सत्यानुसन्धानपुरःसरं तार्किक-योग्यतायाः विकासः संभवेत्।
3. सांख्यदर्शनस्य सर्वप्रामाणिक-ग्रन्थ-सांख्यकारिकायाः अध्यापनेन सांख्यसिद्धान्तानां परिचयः सञ्जायेत।
4. सांख्य-न्यायदर्शनाभ्यां सिद्धान्तानामवधारणेन अन्यदर्शनैः सह तुलनात्मकमध्ययनाय प्रेरयिष्यत्ययं पाठ्यक्रमः।

पाठ्यक्रमः -

सन्दर्भाणां कारिकाणां च व्याख्या दार्शनिकप्रश्नाश्च -

घटकम्-1: केशवमिश्रः-तर्कभाषा : आरम्भतः प्रत्यक्षप्रमाणपर्यन्तम्

घटकम्-2: तर्कभाषा : अनुमानप्रमाणतः प्रामाण्यवादपर्यन्तम्

घटकम्-3: ईश्वरकृष्णः-सांख्यकारिका (तत्त्वकौमुदी) : आरम्भतः 25 कारिकापर्यन्तम्

घटकम्-4: सांख्यकारिका (तत्त्वकौमुदी) : 26 कारिकातः समाप्तिपर्यन्तम्

अनुशंसितग्रन्थाः

1. तर्कभाषा, व्याख्याकार श्रीनिवास शास्त्री, साहित्य भण्डार, मेरठ
2. तर्कभाषा, व्याख्याकार बदरीनाथ शुक्ल, मोतीलाल बनारसीदास, दिल्ली, 1968
3. तर्कभाषा, व्याख्याकार गजानन शास्त्री मुसलगाँवकर, चौखम्बा, वाराणसी, 1995
4. Tarkabhāṣā, Eng. Tr. S.R. lyer, Varanasi
5. Tarkabhāṣā, Eng. Tr. A.B. Gajendragadkar, 1934
6. सांख्यकारिका, जगन्नाथ शास्त्री, मोतीलाल बनारसीदास, दिल्ली, 1983
7. सांख्यकारिका, सम्पादन तथा व्याख्याकार गजाननशास्त्री मुसलगाँवकर, चौखम्बा, वाराणसी
8. सांख्यकारिका, सम्पादन तथा व्याख्याकार हरिदत्त शास्त्री, साहित्य भण्डार, मेरठ, 1976
9. Sāṃkhyakārikā, Eng. Tr. by Wilson, Delhi, 2015
10. भारतीय दर्शन, उमेश मिश्र, प्रकाशन ब्यूरो, उत्तरप्रदेश सरकार, लखनऊ,1957

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COURSE CODE : SHSS SKT 1104 C 3104

चतुर्थपत्रम् : काव्यं नाटकं च

Paper-IV : Kāvyaṁ Nāṭakaṁ Ca

L	T	P	Credits
3	1	0	4

उद्देश्यः/Objective:

1. काव्यनाटकरूपेणोपलब्धानां प्राचीनसाहित्यिक–ग्रन्थरत्नानां परिचयप्रदानम्; 2. महाकवि-माघकृत-शिशुपाल-वधस्य सम्यगध्ययनाध्यापनम्; 3. सुप्रसिद्धनाटकोत्तररामचरितस्यानुशीलनेन करुणरसस्य धारायामवगाहनम्; 4. पूर्वमेघस्य पठन-पाठनेन महाकवि-कालिदासस्य प्रतिभायाःपरिचयः।

पाठ्यक्रमाध्ययनस्य फलम् / Course Level Learning Outcome:

1. कालिदास-माघ-भवभूत्यादीनां कवीनां विषये गहनाध्ययनात् तेषां कवित्वपरिचयः सञ्जायेत।
2. शिशुपाल-वधस्य परिशीलनेन महाकवि-माघस्य काव्यगुणानां परिचयः संभवेत्।
3. उत्तररामचरित-नाटकस्याध्ययनेन संस्कृतनाट्यविद्यायाः सम्यगवगमनं भूयात्।
4. मेघदूतस्यानुशीलनेन कविकुलगुरु-कालिदासस्य कवित्वसम्पदः काव्यालंकारप्रयोगस्य च परिचयः भवितुं शक्नुयात्।
5. एषां काव्यनाटकानामनुशीलनेन तदानीन्तनभारतीय–सामाजिकार्थिक–राजनीतिकादीनां स्थितीनां परिज्ञानं सञ्जायेत।

पाठ्यक्रमः –

अधोलिखित-काव्यनाटकेषूपलभ्यमानानां श्लोकानां व्याख्या साहित्यिकप्रश्नाश्च -

घटकम्-1: माघः - शिशुपालवधम्, प्रथमः सर्गः

घटकम्-2: भवभूतिः - उत्तररामचरितम्, 1-3 अङ्काः

घटकम्-3: उत्तररामचरितम्, 4-7 अङ्काः

घटकम्-4: कालिदासः – मेघदूतम् (पूर्वमेघः)

अनुशंसितग्रन्थाः

1. शिशुपालवध, व्याख्या० आचार्य शेषराज शर्मा, वाराणसी
2. उत्तररामचरित, व्याख्या० आनन्दस्वरूप, मोतीलाल बनारसीदास, दिल्ली, 1970
3. शिशुपालवध (प्रथम सर्ग), व्याख्या० डॉ० श्रीनिवास शास्त्री, साहित्य भण्डार, मेरठ
4. Uttararāmacarita of Bhavabhūti, M.R. Kale, Motilal Banarsidass, Delhi, 2016
5. उत्तररामचरित, सम्पा० तारिणीश झा, मोतीलाल बनारसीदास, दिल्ली, 1970
6. संस्कृत साहित्य का इतिहास, ए० बी० कीथ, अनु० मंगलदेव शास्त्री, मोतीलाल बनारसीदास, दिल्ली, 1978
7. संस्कृत साहित्य का इतिहास, बलदेव उपाध्याय, शारदा निकेतन, वाराणसी, 1978
8. संस्कृत नाटककार, कान्तिकिशोर भरतिया, प्रकाशन शाखा, सूचना विभाग, उत्तरप्रदेश, 1959
9. संस्कृत नाटक समीक्षा, प्रो० इन्द्रपालसिंह 'इन्द्र', साहित्य निकेतन, कानपुर, 1960
10. The Meghadūta of Kālidāsa, M.R. Kale, Motilal Banarsidass, Delhi-2015
11. संस्कृत साहित्य का इतिहास, उमाशंकर शर्मा ऋषि, चौखम्बा भारत अकादमी, वाराणसी, पुनर्मुद्रण-2019
12. संस्कृत साहित्य का इतिहास, प्रीतिप्रभा गोयल, राजस्थानी ग्रन्थागार, जोधपुर, 1998

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COURSE CODE : SHSS SKT 1105 C 3104
पञ्चमपत्रम् : धर्मशास्त्रम् (1)
Paper-V : Dharmaśāstram (1)

L	T	P	Credits
3	1	0	4

उद्देश्यः/Objective:

1. भारतीयपरम्परानुगुणं धर्मसूत्रेषु वर्णितस्य धर्मतत्त्वस्य सम्यगवधारणम्; 2. स्मृतिग्रन्थानुसारं धर्मतत्त्वस्य परिपालनाय परिरक्षणाय च प्रशिक्षणम्; 3. भारतीयजीवनपद्धतौ धर्मशास्त्रस्योपयोगितास्थापनं तदनुगुणं जीवननिर्वहणञ्च; 4. धर्मशास्त्रपरम्परायां स्मृतिग्रन्थानां तत्रोल्लिखितानामनुशासनानां तत्त्वानाञ्च साङ्गोपाङ्गविवेचनम्।

पाठ्यक्रमाध्ययनस्य फलम् / Course Level Learning Outcome:

1. धर्मशास्त्रस्येतिहासाध्ययनेन शास्त्रपरम्परायाः कालानुसारं विकासः तात्त्विकपरिशीलनं च प्राप्येत।
2. विभिन्नानां स्मृतिग्रन्थानामध्ययनेन स्मृतिपरम्परायाः तत्रत्यानां सिद्धान्तानां विषये च विश्लेषणात्मकचिन्तन-दृष्टिः गृह्येत।
3. धर्मस्यार्थोपपादनानां, वर्णाश्रमव्यवस्थायाः कर्तव्यानां च विषये परिज्ञानं भवेत्।
4. मनुस्मृतेः अध्ययनेन दैनन्दिनजीवने व्यवहारोपयोगीनां विधीनां सम्यगवधारणं क्रियेत।
5. याज्ञवल्क्यस्मृतेः दायभागस्य परिशीलनेन व्यावहारिकदृष्ट्या साामाजिकजीवने प्राप्तानां विधीनां सम्यक् परिज्ञानं ग्रहणं च जायेत।

पाठ्यक्रमः -

घटकम्-1: पी० वी० काणे-धर्मशास्त्रस्येतिहासः- प्रथमभागः– प्रथमखण्डः– धर्मस्य अर्थः, धर्मस्य उपादानानि, गौतमधर्मसूत्रः, बौधायनधर्मसूत्रः, आपस्तम्ब–धर्मसूत्रः, हिरण्यकेशि–धर्मसूत्रः, वसिष्ठ–धर्मसूत्रश्च– एतेषां पञ्चधर्मसूत्राणां सामान्यः परिचयः

घटकम्-2: पी० वी० काणे-धर्मशास्त्रस्येतिहासः- प्रथमभागः, द्वितीयखण्डः – वर्णाः, वर्णानां कर्तव्यानि, आश्रमाः, तेषां कर्तव्यानि, विवाहः, अन्ये संस्काराः

घटकम्-3: मनुस्मृतिः, प्रथमोऽध्यायः (कुल्लूकभट्टटीका)

घटकम्-4: याज्ञवल्क्यस्मृतिः (मिताक्षराटीका), दायादभागः

अनुशंसितग्रन्थाः

1. मनुस्मृतिः, मन्वर्थमुक्तावलीसहिता, सं० वासुदेव शर्मा काशीकरः, निर्णयसागर प्रेस, मुम्बई, 1909
2. मनुस्मृतिः, मेधातिथि-मनुभाष्य-समेता, सम्पा० गङ्गानाथ झा, परिमल पब्लिकेशन्स, दिल्ली, 1998
3. History of Dharmashastra, Dr. P.V. Kane, Bhandarkar Oriental Research Institute, Pune, 1962
4. याज्ञवल्क्यस्मृति, मिताक्षरा टीका सहित, वेंकटेश्वर मुद्रायन्त्र, मुम्बई, 1894
5. धर्मशास्त्र का इतिहास, पी० वी० काणे, 2014

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COURSE CODE: SHSS SKT 1106 C 2002
षष्ठपत्रम् : व्यावहारिकं संस्कृतम्
Paper-VI : Functional Sanskrit

L	T	P	Credits
2	0	0	2

उद्देश्यः/Objective:

1. प्राचीनभारतीय साहित्यिक-सांस्कृतिक-सम्पदनुशीलनार्थं संस्कृतस्य व्यावहारिकपक्षाभ्यसनम्; 2. संस्कृत-माध्यमेन वाचन-लेखनाभ्यास-द्वारा संस्कृतेन व्यवहारसौकर्य-सम्पादनम्; ३. व्यावहारिकाभ्यासार्थम् अध्येतृभ्यः अवसरप्रदानम्; 4. अन्यासां भाषाणां उपयोगि-ग्रन्थानां संस्कृतेन अनुवादनार्थं सामर्थ्यविकासः।

पाठ्यक्रमाध्ययनस्य फलम् / Course Level Learning Outcome:

1. अध्येतृभ्यः संस्कृत-सम्भाषणस्य विधि-प्रविधीनां सम्यगवधारणं शक्नुयात्।
2. संस्कृतेन लेखनानुवादकौशले प्रवीणता जरीगृह्येत।
3. शब्दरूपाणां, धातुरूपाणां, लिङ्गानां, विशेष्य-विशेषणसम्बन्धानामभ्यसनं कुर्वीत, तेन चैतेषां भाषायाः व्यवहारे सौकर्यं जायेत।
4. अनेन पाठ्यक्रमेण संस्कृतभाषा-संरचनायाः मूलतत्त्वानामवधारणं संजायेत।

पाठ्यक्रमः -

घटकम्-1: वर्णपरिचयः, स्थानप्रयत्नानि, शब्दरूपाणां, धातुरूपाणां परिचयः अभ्यासश्च

घटकम्-2: संस्कृतभाषायां व्यवहृतानां लिङ्गानां सम्यक् परिचयः अभ्यासश्च (पुंलिङ्गम्, स्त्रीलिङ्गम्, नपुंसकलिङ्गम्), विशेष्यविशेषण–सम्बन्धः

घटकम्-3: संस्कृते वाक्यगठनम्, वाच्यपरिवर्तनम्, कारकाणां समासानाञ्च सामान्यपरिचयः

घटकम्-4: इतरभाषाभ्यः संस्कृतेनानुवादकौशलम्

अनुशंसितग्रन्थाः

1. द्विवेदी, कपिलदेव, *प्रौढरचनानुवादकौमुदी,* विश्वविद्यालय प्रकाशन, वाराणसी, 2017(Reprint)
2. हेगडे, जनार्दन, *अभ्यासदर्शिनी*, संस्कृत–भारती, बेङ्गलुरु, 2016
3. बाबूराम सक्सेना, *संस्कृत व्याकरण प्रवेशिका*, प्रयाग, चतुर्थ संस्करण-2015 सं.
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5. हेगडे, जनार्दन, *शुद्धिकौमुदी*, संस्कृत–भारती, बेङ्गलुरु, 2015
6. द्विवेदी, कपिलदेव, *प्रारम्भिक रचनानुवादकौमुदी*, विश्वविद्यालय प्रकाशन, वाराणसी, 2013(Reprint)
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8. Bhandarakr, R.G., *First Book of Sanskrit*, Chowkhamba Sanskrit Series Office, Varanasi, 2001
9. नरेन्द्र, *संस्कृतस्य व्यावहारिकस्वरूपम्,* संस्कृतकार्यालयः, श्री–अरविन्दाश्रमः, पुदुच्चेरी, 1916

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एम० ए० संस्कृतम्, द्वितीयं सत्त्रम् (2021-22 शैक्षिकसत्त्रतः)

M.A. SANSKRIT, SECOND SEMESTER (w.e.f. Academic Session : 2021-22)

लिखितपत्राणां विस्तृतः पाठ्यक्रमः – Detailed Syllabus for Written Papers

COURSE CODE : SHSS SKT 1207 C 3104

सप्तमपत्रम् : ब्राह्मणं वेदाङ्गानि च

Paper-VII : Brāhmaṇaṁ Vedāṅgāni Ca

L	T	P	Credits
3	1	0	4

उद्देश्यः/Objective:

1. वैदिकानुसङ्गिकसाहित्यस्य परिचयार्थमध्ययनं तत्त्वानुशीलनं च; 2. ऐतरेयब्राह्मणस्य सूक्ष्माध्ययनात् तत्कालिक-समाजस्य संस्कृतेश्च परिचयप्रदानम्; 3. वेदार्थावबोधे वेदाङ्गानां भूमिकाप्रतिपादनाय निरुक्तगत-निर्वचन-परम्परायाः अवबोधनम्; 4. वेदस्य नैरुक्तव्याख्यापक्षस्योद्घाटनम्; 5. वैदिकव्याकरणप्रक्रियायाः सम्यक् प्रतिपादनमवबोधनं च।

पाठ्यक्रमाध्ययनस्य फलम् / Course Level Learning Outcome:

1. अस्य पाठ्यक्रमस्याध्ययनेन ब्राह्मणसाहित्यस्य विशेषतया शुनःशेपोपाख्यानस्य परिचयः तात्कालिक-सामाजिकमूल्यानां परिज्ञानं च प्राप्येत।
2. निरुक्ताध्ययनात् निर्वचन-विज्ञानावगमः, वेदार्थावबोधे सौकर्यं च संजायेत।
3. वैदिकव्याकरणज्ञानेन वैदिकवाङ्मयस्यान्तःप्रवेशाय गूढार्थबोधनाय च सौकर्यमुत्पद्येत।
4. वैदिक–लौकिकभाषयोः सम्बन्धस्यावधारणं भाषायाः विकाससोपानस्यावगमनं च संभवेत्।
5. वैदिकविषयाननुसृत्य स्वाध्यायानुशीलनं संजायेत, शोधक्षेत्रं प्रति मार्गं च प्रशस्तीभवेत्।

पाठ्यक्रमः –

अधोलिखित-ग्रन्थयोः सन्दर्भव्याख्या, समालोचनात्मक-प्रश्नाः निर्वचनानि च -

घटकम्-1: ऐतरेयब्राह्मणम् : अध्यायः 33 (शुनःशेपाख्यानम्)

घटकम्-2: निरुक्तम् – प्रथमोऽध्यायः

घटकम्-3: निरुक्तम् – द्वितीयोऽध्यायः(1-5 पादाः); सप्तमः अध्यायः(1-7 पादाः)

घटकम्-4: वैदिकं व्याकरणम् - वैदिकभाषायाः स्वरूपम्; वैदिकलौकिकभाषयोः भेदः; सन्धिः; पदपाठः; वैदिकस्वरः; लुङ् लकारः; लेट् लकारः; **प्रत्ययाः** - शतृ, शानच्, क्वसु, कानच्, तुमर्थकाः

अनुशंसितग्रन्थाः

1. ऐतरेय-ब्राह्मण (द्वितीय भाग), सायणभाष्यसहित, सम्पादक एवम् अनुवादक डॉ० सुधाकर मालवीय, तारा प्रिंटिंग वर्क्स, वाराणसी-1983
2. निरुक्त, हिन्दी अनुवादक पं० शिवनारायण शास्त्री, इण्डोलॉजिकल बुक हाऊस, दिल्ली
3. निरुक्त (भाग 1-2), स्कन्द-महेश्वर-कृत निरुक्तभाष्यटीका-सहित,संपा० लक्ष्मण स्वरूप, प्रका० पाणिनि, नई दिल्ली-1982
4. निरुक्त, दुर्गाचार्य-कृत वृत्ति-सहित, आनन्दाश्रम, पूना-1921
5. निरुक्तसम्मर्शः, ब्रह्ममुनि परिव्राजक, वैदिक यन्त्रालय, अजमेर-1966
6. हिन्दी निरुक्त (अध्याय 1, 2, 7), व्याख्या० कपिलदेव शास्त्री, साहित्य भण्डार, मेरठ
7. वैदिक व्याकरण (भाग 1-2), रामगोपाल, नैशनल पब्लिशिंग हाऊस, दिल्ली- भाग 1-1965 , भाग 2- 1969
8. A Vedic Grammar for Students, A.A. Macdonell, Motilal Banarsidass, Delhi-2010
9. Nighantu and Nirukta, Dr. Laxman Sarup, Motilal Banarsidass, Jawahar Nagar, New Delhi-2009
10. ए वैदिक ग्रामर फॉर स्टुडेन्टस, ए.ए. मैकडॉनल, अनु० सत्यव्रत शास्त्री, मोतीलाल बनारसीदास, दिल्ली, 1971

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COURSE CODE : SHSS SKT 1208 C 3104
अष्टमपत्रम् : व्याकरणं भाषाविज्ञानं च (2)
Paper-VIII : Vyākaraṇaṁ Bhāṣāvijñānaṁ Ca (2)

L	T	P	Credits
3	1	0	4

उद्देश्यः/Objective :

1. संस्कृतभाषा-संरचनायाः व्याकरणसम्बन्धितत्त्वानां च ज्ञानम्; 2. तिङन्त-नामधातु-कारक-तद्धित-समासादि-प्रकरणानां च सम्यगवधारणम्, तेषां प्रायोगिकरूपाणां च सुष्ठुतयाभ्यसनम्; 3. भाषाविज्ञानस्य तत्त्वानुसन्धान-पूर्वकमर्थ-ध्वनि-रूप-वाक्यादिविज्ञानानां सम्यगवधारणम्; 4. भारोपीयभाषापरिवारे भारतीयार्यभाषाणामन्तः-सम्बन्धस्यावलोकनमवबोधनं च।

पाठ्यक्रमाध्ययनस्य फलम् / Course Level Learning Outcome:

1. व्याकरणस्य परिनिष्ठित-ज्ञानेन प्रायोगिक–संस्कृतस्य परिप्रकाशनं सौकर्यं च संजायेत।
2. कारक-समासादीनामध्ययनेन वाक्यसंरचनायां सौकर्यम्, सम्भाषण-लेखनादिषु च प्रौढ़ताप्राप्तिः जायेत।
3. भाषाविज्ञानाध्ययनात् भाषाशास्त्रीयानुशीलने प्रवृत्तिः वर्धेत, येन वैदेशिक भाषाणामध्ययनेऽपि रुचिः संजायेत।
4. व्याकरण–भाषाविज्ञानयोः ज्ञानेन प्रायोगिकक्षेत्रेऽपि योग्यताप्राप्तिः साक्षात्कारेषु सौकर्यञ्च जनयेत्।

पाठ्यक्रमः -

लघुकौमुद्याः सिद्धान्तकौमुद्याश्चाधोलिखितानां प्रकरणस्थानां सूत्राणां सोदाहरणं व्याख्या सूत्रोल्लेखपूर्वकं रूपसिद्धिप्रक्रिया च -

घटकम्-1: वरदराजः - लघुसिद्धान्तकौमुदी

(क) तिङन्ते अदादिप्रकरणम् :- √अद्, √अस्, (एतयोः सर्वे लकाराः)

(ख) नामधातुप्रकरणम्। (ग) आत्मनेपदप्रक्रिया। (घ) परस्मैपदप्रक्रिया

घटकम्-2: वरदराजः - लघुसिद्धान्तकौमुदी

(क) समासप्रकरणम्। (ख) तद्धितप्रकरणम् (चातुरर्थिकपर्यन्तम्)

घटकम्-3: भट्टोजिदीक्षितः - सिद्धान्तकौमुदी : कारकप्रकरणम्

घटकम्-4: भाषाविज्ञानम् -

संस्कृतभाषा (वैदिकी लौकिकी च), अर्थविज्ञानम् - अर्थपरिवर्तनस्य कारणानि दिशश्च

ध्वनिविज्ञानम् - उच्चारणावयवाः तेषां प्रकार्याणि च; ध्वनीनां वर्गीकरणम्

रूपविज्ञानम् - शब्दनिर्माणम्; शब्दानां तत्त्वानि; धातुः प्रत्ययश्च; वाक्यविज्ञानम् - परिभाषा, स्वरूपं घटकाश्च

अनुशंसितग्रन्थाः

1. लघुसिद्धान्तकौमुदी, वरदराज, व्याख्याकार भीमसेन शास्त्री, भैमी प्रकाशन, दिल्ली, 2015
2. लघुसिद्धान्तकौमुदी, व्याख्याकार, श्रीधरानन्द शास्त्री घिल्डियाल, मोतीलाल बनारसीदास, दिल्ली, 2015
3. वैयाकरणसिद्धान्तकौमुदी (पूर्वार्द्ध), भट्टोजिदीक्षित, मोतीलाल बनारसीदास, दिल्ली-2014
4. वैयाकरणसिद्धान्तकौमुदी (1-2 भाग), व्याख्या० गोपालदत्त पाण्डेय, चौखम्बा सुरभारती प्रकाशन, वाराणसी, 2019
5. कारक-प्रकरण (सिद्धान्तकौमुदीस्थ), सम्पादक तथा व्याख्याकार श्रीनिवास शास्त्री, साहित्य भण्डार, मेरठ

6. भाषा और भाषिकी, देवीशंकर द्विवेदी, प्रशान्त प्रकाशन, कुरुक्षेत्र विश्वविद्यालय, कुरुक्षेत्र, 1964
7. पदपदार्थसमीक्षा, बलदेव सिंह, कुरुक्षेत्र विश्वविद्यालय, कुरुक्षेत्र,1969
8. भाषा-विज्ञान, भोलानाथ तिवारी, किताब महल, इलाहाबाद, 1971
9. भाषा-विज्ञान की भूमिका, देवेन्द्रनाथ शर्मा, राधाकृष्ण, नई दिल्ली, 1978
10. पाणिनीय-व्याकरणस्य भाषावैज्ञानिकमनुशीलनम्, घनश्याम उनियालः, अमर ग्रन्थ, दिल्ली, 2002
11. Introduction to Comparative Philology, P.D. Gune, Pune; (Its Hindi translation is also available)-2005
12. Transformational Grammar, Ratford, A., Cambridge University Press, 1988
13. Introduction to Linguistics, Ratford, A. *et. al.,* Cambridge University Press, 1999
14. (a) Introduction to Theoretical Linguistics, Lyons, John, 1968
    (b) Linguistic Semantics, Lyons, John, Cambridge University Press, 1995
15. General Linguistics, An Introductory Survey, Robins, R. H., Indiana Press, Bloomington, 1964
16. An Introduction to the Science of Meaning, Oxford Blackwell, Semantics, 1962
17. Sanskrit Syntax, J.S. Speijer, Motilal Banarasidass, Delhi
18. An Introduction to Language, Fromkin, V. and R. Rodman, New York etc. Harcourt, Brace Jovenovich College Publishers, 1992
19. The Principles of Semantics, Blackwell, Ullmann, Stephen, 1957
20. Semantic Analysis, Ithaca, N.Y. Ziff, Paul, Comell University Press, 1960
21. Linguistics, An Introduction to Language and Communication, Akmaijan, A.R. Demers and R. Hamish, Cambridge Mass, MIT Press, 1979

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COURSE CODE : SHSS SKT 1209 C 3104
नवमपत्रम् : भारतीयदर्शनम् (2)
Paper-IX : Bhāratīyadarśanam (2)

L	T	P	Credits
3	1	0	4

उद्देश्यः/Objective:

1. भारतीयदर्शनस्य षट्सम्प्रदायान्तर्गतानां वेदान्तशास्त्रस्य पूर्वोत्तरमीमांसाशास्त्रयोः च सम्यक् परिचयः; 2. लौगाक्षि-भास्करकृतस्य अर्थसंग्रहस्याध्ययनाध्यापनेन पूर्वमीमांसाशास्त्रस्य सिद्धान्तानां परिज्ञानम्; 3. सदानन्दयोगीन्द्रकृतस्य वेदान्तसारस्य सम्यक् परिशीलनेन शाङ्करवेदान्तस्य तत्त्वानां परिचयः।

पाठ्यक्रमाध्ययनस्य फलम् / Course Level Learning Outcome:

1. अर्थसङ्ग्रहस्य सम्यगध्ययनेन पूर्वमीमांसाशास्त्रस्य गभीरानुशीलनस्य प्रवृत्तिःजायेत।
2. वेदान्तसारस्य पठन-पाठनेन शाङ्करवेदान्तसम्प्रदायस्य प्रकरणग्रन्थानां परिशीलने रुचिः समुत्पद्येत।
3. एतयोः सम्यगध्ययनेन भारतीयदार्शनिकपरम्परायाः ज्ञानमनुशीलनं च भवेत्।
4. अन्य-दार्शनिक-सम्प्रदायानां सिद्धान्तैः सह तुलनात्मकमध्ययनाय मनोवृत्तिरुत्पद्येत।

पाठ्यक्रमः –

सन्दर्भाणां व्याख्या आलोचनात्मक-प्रश्नाश्च -

घटकम्-1: लौगाक्षिभास्करः - अर्थसङ्ग्रहः (आरम्भतः विधिभागपर्यन्तम्)

घटकम्-2: अर्थसङ्ग्रहः (निषेधभागतः समाप्तिपर्यन्तम्)

घटकम्-3: सदानन्दयोगीन्द्रः - वेदान्तसारः (आरम्भतः अध्यारोपप्रकरणपर्यन्तम्)

घटकम्-4: वेदान्तसारः (अपवादप्रकरणतः समाप्तिपर्यन्तम्)

अनुशंसितग्रन्थाः

1. अर्थसंग्रह, सम्पा० तथा व्याख्याकार वाचस्पति उपाध्याय, चौखम्बा ओरियण्टालिया, दिल्ली, 1977
2. अर्थसंग्रहः, व्याख्याकार दयाशङ्कर शास्त्री, कानपुर
3. अर्थसंग्रहः, व्याख्याकार सत्यप्रकाश शर्मा, साहित्य भण्डार, मेरठ
4. Arthasaṅgraha, Eng. Tr. by A.B. Gajendragadkar and R.D. Karmakar, Motilal Banarsidass, Delhi, 2016
5. Arthasaṅgraha, Eng. Tr. by G. Thibaut, Delhi
6. वेदान्तसारः, हिन्दीरूपान्तर-तत्त्वपारिजाताभिध-हिन्दीव्याख्या-संवलितः, सन्तनारायण श्रीवास्तव्य, पीयूष प्रकाशन, प्रयाग,1968
7. वेदान्तसार, व्याख्याकार बदरीनाथ शुक्ल, मोतीलाल बनारसीदास, वाराणसी, 2012
8. वेदान्तसार, सम्पादक तथा व्याख्याकार राममूर्ति शर्मा, चौखम्बा पब्लिशर्स, दिल्ली
9. वेदान्तसार, व्याख्याकार गजानन शास्त्री मुसलगाँवकर, वाराणसी
10. वेदान्तसार, सम्पादक तथा व्याख्याकार डॉ० आद्याप्रसाद मिश्र, अक्षयवट प्रकाशन, इलाहाबाद
11 Vedāntasāra, Eng. Tr. by M. Hiriyanna
12. Vedāntasāra, Eng. Tr. by Swami Nikhilananda, Advaita Ashram, 2014
13. Outline of Indian Philosophy, Radhakrishnan, OUP India, 2009
14. भारतीय दर्शन, बलदेव उपाध्याय, चौखम्बा ओरियन्टालिया, दिल्ली
15. भारतीय दर्शन, उमेश मिश्र, प्रकाशन ब्यूरो, सूचना विभाग, उत्तर प्रदेश सरकार, लखनऊ,1957

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COURSE CODE : SHSS SKT 1210 C 3104
दशमपत्रम् : काव्यं काव्यशास्त्रञ्च
Paper-X : Kāvyaṁ Kāvyaśāstraṁ Ca

L	T	P	Credits
3	1	0	4

उद्देश्यः/Objective:

1. संस्कृतगद्यकाव्यपरम्परायां बाणभट्टस्य शैल्याः सम्यगध्यापनम्, शुकनासोपदेशे प्रदर्शितानां नीतिमूलक–तत्त्वानामनुशीलनमवधारणं च; 2. उत्तरमेघानुशीलनेन कालिदास-वर्णितस्य प्राचीनभारतीय-ज्ञानवैभव-सम्पदः परिचयः, रसालङ्कार-रीत्यादीनां काव्यतत्त्वानां सम्यगवगमनं च; 3. काव्यशास्त्र-विषयक-प्राचीनभारतीय-खण्डनमण्डन-प्रक्रियायाः सम्यक् परिचयः; 4. काव्यशास्त्रे साहित्यशास्त्रे वा व्यवहृतानां शब्दशक्तीनां विशदीकरणमनुशीलनं च।

पाठ्यक्रमाध्ययनस्य फलम् / Course Level Learning Outcome:

1. संस्कृतकाव्यधारायाः काव्यशास्त्रसम्प्रदायानां च सम्यगवधारणं क्रियेत।
2. शुकनासोपदेशवर्णनानुगुणं जीवने उत्कृष्टता-प्रापणाय प्रेरणा जनिष्येत।
3. उत्तरमेघस्याध्ययनेन कविकुलगुरुकालिदास्य प्रतिभायाः परिज्ञानं संभवेत्।
4. काव्यशास्त्रस्य पारिभाषिक-शब्दानामवधारणं संजायेत।
5. साहित्यदर्पण-नामक-प्रसिद्धग्रन्थस्यानुशीलनेन काव्यशास्त्रस्य सम्यक् बोधः संजायेत ।

पाठ्यक्रमः -

सन्दर्भव्याख्या, काव्यसौन्दर्यात्मकाः काव्यशास्त्रात्मकाः प्रश्नाश्च -

घटकम्-1: बाणभट्टः - कादम्बरी (शुकनासोपदेशः)

घटकम्-2: कालिदासः - मेघदूतम् (उत्तरमेघः)

घटकम्-3: विश्वनाथः - साहित्यदर्पणम् - प्रथमः परिच्छेदः; द्वितीयः परिच्छेदः - अभिधानिरूपणम् (कारिका-संख्या 4 पर्यन्तम्)

घटकम्-4: साहित्यदर्पणम् - द्वितीयः परिच्छेदः - लक्षणानिरूपणम् व्यञ्जनानिरूपणं च (कारिकाः 5-20)

अनुशंसितग्रन्थाः

1. कादम्बरी, शुकनासोपदेशः, सम्पा० आचार्यः रामनाथः शर्मा राजेन्द्रकुमारः शास्त्री च, साहित्यभण्डारम्, मेरठनगरम्, 2001
2. कादम्बरी, शुकनासोपदेशः, सम्पा० आचार्य कपिलदेव गिरि, वाराणसी
3. कादम्बरी : एक सांस्कृतिक अध्ययन, डॉ० वासुदेवशरण अग्रवाल, 2016
4. बाणभट्ट का साहित्यिक अनुशीलन, अमरनाथ पाण्डेय, 2020
5. साहित्यदर्पण, सम्पादक पी०वी० काणे, मोतीलाल बनारसीदास, दिल्ली, 1956
6. साहित्यदर्पण, व्याख्याकार कृष्णमोहन शास्त्री, 1947
7. साहित्यदर्पण, सम्पादक शालिग्राम शास्त्री, मोतीलाल बनारसीदास, दिल्ली, 2009
8. साहित्यदर्पण, व्याख्याकार डॉ० श्रीनिवास शास्त्री, साहित्य भण्डार, सुभाष बाजार, मेरठ, 1970
9. The Meghadūta of Kalidāsa, M.R. Kale, Motilal Banarsidass, Delhi, 2015

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COURSE CODE : SHSS SKT 1211 C 3104
एकादशपत्रम् : धर्मशास्त्रम् (2)
Paper-XI : Dharmaśāstram (2)

L	T	P	Credits
3	1	0	4

उद्देश्यः/Objective:

1. गीताज्ञानमाध्यमेन भारतीयधर्मधारायाः सम्यक् परिचयः; 2. स्वामिदयानन्दसरस्वतीप्रणीतस्य सत्यार्थप्रकाशानुगुणं परमेश्वरस्य सत्यस्वरूप-प्रकाशनम्, परमात्मनः गुण-कर्म-स्वभावानुसारमसंख्यनामभ्यः शतनाम्नां व्युत्पत्ति-निर्वचनपूर्वकमर्थज्ञानम्; 3. मानवजीवने श्रेष्ठगुणसंपादनाय संस्काराणामनिवार्यता-प्रतिपादनम्; 4. प्राचीनभारतीयजीवनपद्धतौ संस्काराणां महनीयताप्रकाशनाय स्वामिना दयानन्देन प्रदर्शित-मार्गस्यानुशीलनम्।

पाठ्यक्रमाध्ययनस्य फलम् / Course Level Learning Outcome:

1. गीतायां विश्वरूपदर्शनस्यानुशीलनेन परमात्मन अपरिमितशक्त्याः सम्यक् परिज्ञानं भूयात्।
2. गीतायां वर्णित-भक्तियोगस्य विधिवत् परिचयेन जीवने आध्यात्मिकतायाः संचारः संभवेत्।
3. सत्यार्थप्रकाशस्य प्रथमे समुल्लासे वर्णितानां विविधनामानुशीलनेन परमात्मनः स्वरूपं सम्यक् जानीयात्।
4. संस्कारविधौ पञ्चमहायज्ञानां पठन-पाठनेन जीवनं संस्कारपूर्णं संभवेत्, फलस्वरूपं च समाजस्य उन्नतिः स्यात्।
5. उपनयन-वेदारम्भसंस्कारयोः सम्यगध्ययनादनुपालनाच्च वैदिकसंस्कृतेः प्रकाशनं सञ्जायेत।

पाठ्यक्रमः -

घटकम्-1: श्रीमद्भगवद्गीता, एकादशोऽध्यायः द्वादशोऽध्यायश्च

घटकम्-2: महर्षि-दयानन्दः - सत्यार्थप्रकाशः, ईश्वरनामविषयः प्रथमः समुल्लासः – क) व्युत्पत्ति-निर्वचनपूर्वकं

शतनाम्नामर्थग्रहणम्; ख) तदनुगुणमीश्वरस्वरूप-समीक्षणम्

घटकम्-3: महर्षि-दयानन्दः संस्कारविधिः, सामान्यप्रकरणम्

घटकम्-4: महर्षि-दयानन्दः - संस्कारविधिः, उपनयनं वेदारम्भसंस्कारश्च

अनुशंसितग्रन्थाः

1. श्रीमत्स्वामी-दयानन्दसरस्वती, सत्यार्थप्रकाशः, सं० युधिष्ठिर मीमांसक, रामलाल कपूर ट्रस्ट, रेवली, सोनीपत, 2007
2. महर्षिदयानन्दसरस्वतीस्वामिविरचितः, सत्यार्थप्रकाशः, शोधकर्ता, समीक्षक, सम्पादक, भाष्यकार डॉ० सुरेन्द्रकुमार, सत्यधर्म प्रकाशन, प्राप्तिस्थान - विजयकुमार गोविन्दराम हासानन्द, 4408, नई सड़क, दिल्ली-6, 2014
3. सटिप्पणः सत्यार्थप्रकाशः, टिप्पणीकर्त्ता - स्वामी-वेदानन्दः तीर्थः, विरजानन्द वैदिक संस्थान, गाजियाबाद, सं.2016
4. दयानन्द -ग्रन्थावलि,भाग 1, सत्यार्थप्रकाशः, वैदिक पुस्तकालय, दयानन्द आश्रम, केसरगंज, अजमेर, चतुर्थ आवृत्ति-2019
5. श्रीमत्स्वामी-दयानन्दसरस्वती, संस्कारविधि, वैदिक पुस्ताकालय, दयानन्द आश्रम, केसरगंज, अजमेर-305001, 2017
6. श्रीमद्भगवद्गीता, संपा० वासुदेवलक्ष्मण शास्त्री पणशीकर, आठ भाष्यों व टीकाओं सहित, मुंशीराम मनोहरलाल पब्लिशर्स प्रा० लि०, नई दिल्ली-110055, 1966
7. श्रीमद्भगवद्गीता, गीता प्रैस, गोरखपुर-2015

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एम० ए० संस्कृतम्, द्वितीयं सत्रम्

M. A. SANSKRIT, SECOND SEMESTER

COURSE CODE : SHSS SKT 1201 V 0002

मौखिकी परीक्षा : VIVA-VOCE

L	T	P	Credits
0	0	0	2

उद्देश्याः/Objective:

1. अध्येतृणां बौद्धिक-वाचिक-शक्त्योः आत्मविश्वास-सम्पादनम्; 2. अधीतानां सर्वेषां पाठ्यक्रमाणां साङ्गोपाङ्ग-संस्कारः मस्तिष्के संस्थापनम्; 3. संस्कृतेन सम्भाषणस्य प्रायोगिकपक्षस्याभ्यासः।

पाठ्यक्रमाध्ययनस्य फलम् / Course Level Learning Outcome:

अस्य पाठ्यक्रमस्याध्येतृभ्य अपेक्षिताः पाठ्यक्रमस्तरे केचन अध्ययन–परिणामाः अधोलिखितास्सन्ति –

1. मौखिकीपरीक्षायाः सम्यगभ्यासेन भविष्ये सम्भावितानां साक्षात्काराणां कृते योग्यता संभवेत्।
2. प्रथमवर्षान्तर्गते सत्रद्वयेऽधीतानां पाठ्यग्रन्थानां पुनरवलोकलनाय अनुशीलनाय च प्रेरणां जनिष्येत।
3. साक्षात्कारविषयक-शङ्कायाः दूरीकरणे साहाय्यं भूयात्, प्रतिस्पर्धायाः भावना च संजायेत।

टिप्पणी : एम०ए० (संस्कृतम्)-द्वितीयसत्रस्य पाठ्यक्रमसमाप्ते अनन्तरं प्रथमद्वितीयसत्रयो अधीतं पाठ्यक्रममाश्रित्य मौखिकी परीक्षा **संस्कृतमाध्यमेन** आयोजयिष्यते।

Note:- Viva-Voce of the students, based on the syllabus covered in their 1st and 2nd Semester-courses, will be conducted through **Sanskrit medium** after the completion of the syllabus of M.A. Sanskrit, Second Semester.

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CHOICE BASED CREDIT SYSTEM

Generic Elective Course

COURSE CODE: SHSS SKT 1201 GE 3104

प्राचीनभारतीयसंस्कृतिः, दर्शनं भाषाविज्ञानं च (1)

Prācīnabhāratīyasaṁskṛtiḥ, Darśanaṁ Bhāṣāvijñānaṁ Ca (1)

माध्यमः – संस्कृत/हिन्दी/आंग्लभाषा

Medium – Sanskrit/Hindi/English

L	T	P	Credits
3	1	0	4

उद्देश्यः/Objective:

1. संस्कृतेतर-विषयाणामध्येतृभ्यः संस्कृताध्ययनाय सौकर्योत्पादनम्; 2. भारतीयज्ञानसंपदाधारभूतानां वेदादि-शास्त्राणामुपनिषदां च रुचिरुत्पादनम्; 3. संस्कृतेनोपनिबद्धानां नीतिवाक्यानां गीतायां वर्णितस्य कर्मयोगस्य च तत्त्व-संधारणाय यत्नः; 4. सामान्य-भाषाविज्ञानस्य परिचयः।

पाठ्यक्रमाध्ययनस्य फलम् / Course Level Learning Outcome:

1. अध्येतारः वेदादि-शास्त्राणामुपनिषदां च तत्त्वान् ज्ञात्वा स्वाध्याय प्रयत्नशीलाः भवेयुः।
2. व्यावहारिकदृष्ट्या संस्कृतज्ञानेन अन्यविषयाणामध्येतारः तत्तद् स्वविषयानुगुणं संस्कृतभाषायामुप-लभ्यमानानां ग्रन्थानां प्रति यत्नशीलाः स्युः।
3. वेदोपनिषत्–गीता–नीतिशास्त्र–भाषाशास्त्रादीनां विषयाणां सम्यगध्ययनेनास्माकं पूर्वजानां वैदुष्येण परिचयः संजायेत।
4. भारतीय-चिन्तनपरम्परायाः समृद्धिं ज्ञातुमयं पाठ्यक्रमः प्रकृष्टमाध्यमः संजायेत।

पाठ्यक्रमः

मन्त्राणां सन्दर्भानां श्लोकानां च व्याख्या सारसंक्षेपश्च –

घटकम्-1: (क) यजुर्वेदः (34. 1-6)-शिवसंकल्पमन्त्राः; (ख) तैत्तिरीयोपनिषद् - शिक्षावल्ली (अनुशासनोपनिषद्)

घटकम्-2: भर्तृहरिः- नीतिशतकम् : 1-50 श्लोकाः

घटकम्-3: भगवद्गीता – तृतीयाध्यायः (कर्मयोगः)

घटकम्-4: सामान्यभाषाविज्ञानम्- (क) वर्णमाला, वर्णानाम् उच्चारणस्थानानि प्रयत्नाश्च; (ख) भाषाविज्ञानस्य सामान्यः परिचयः, भाषापरिवर्तनस्य कारणानि, अर्थपरिवर्तनस्य कारणानि च

अनुशंसितग्रन्थाः -

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3. तैत्तिरीयोपनिषद्, हिन्दी व्याख्याकार - स्वामी प्रखर प्रज्ञानन्द सरस्वती, काशी, 2013
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6. श्रीमद्भगवद्गीता (हिन्दी अनुवाद सहित), गीता प्रैस, गोरखपुर, 2015
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8. देवीदत्त शर्मा, भाषिकी और संस्कृत भाषा, हरियाणा साहित्य अकादमी, चण्डीगढ़, 1990
9. कपिलदेव द्विवेदी, भाषा-विज्ञान एवं भाषा-शास्त्र, विश्वविद्यालय प्रकाशन, चौक, वाराणसी, 2012
10. कर्णसिंह, भाषाविज्ञान, साहित्य भण्डार, मेरठ
11. Burrow, T., The Sanskrit Language, 2016
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एम० ए० संस्कृतम्, तृतीयं सत्त्रम् (2021-22 शैक्षिकसत्त्रतः प्रस्तावितम्)

M.A. SANSKRIT, THIRD SEMESTER (w.e.f. Academic Session : 2021-22)

तृतीय-सत्त्रस्य पत्त्राणां विस्तृतः पाठ्यक्रमः - Detailed Syllabus of Third Semester Papers

COURSE CODE: SHSS SKT 1312 C 3104

द्वादशपत्त्रम् : प्राच्यवाङ्मयस्य विशिष्टमध्ययनम् - (1)

Paper- XII : Prācya-vāṅmayasya Viśiṣṭamadhyayanam - (1)

L	T	P	Credits
3	1	0	4

उद्देश्यः/Objective:

1. विद्यार्थीभ्यः प्राच्यवाङ्मयस्य सम्यगवबोधनम्; 2. वेदज्ञान-परिप्रकाशकानां प्रमुखवेदव्याख्याकाराणां व्याख्या-वैशिष्ट्यं जीवनी-कृतीत्यादीनां परिज्ञानम्; 3. वेदेषूपनिबद्धानां वैज्ञानिकतत्त्वानां परिचयः; 4. संस्कृतस्य आधुनिक-साहित्य-धारायाः सम्यक् परिज्ञानम्; 5. व्याकरणशास्त्रस्य प्रामाणिकेतिहासस्य सम्यक् परिचयः; 6. प्राचीन-पालिभाषायाः साहित्यस्य संक्षिप्तपरिचयः।

पाठ्यक्रमाध्ययनस्य फलम् / Course Level Learning Outcome:

1. प्राच्यवाङ्मयस्य सम्यक् परिचयेन तदध्ययनार्थं शोधकार्यार्थं च दिशानिर्देशं प्राप्नुयुः विद्यार्थिनः।
2. प्रमुखवेदव्याख्याकाराणां योगदानविषये ज्ञात्वा तेषां वेदव्याख्यानानां परिशीलनाय रुचि उत्पद्येत।
3. स्वामिनः दयानन्दस्य वेदभाष्ये प्रकाशितानां वैज्ञानिकविचाराणां परिज्ञानं संभवेत्।
4. वैदिकविज्ञानस्य आधुनिकवैज्ञानिक-गतिविधिभिः सह सम्बन्धस्थापनं भूयात्।
5. आधुनिकसंस्कृतसाहित्येन सह परिचयात् संस्कृतेन लेखनाय प्रवृत्ति संजायेत।
6. व्याकरणशास्त्रस्य प्रामाणिकेतिहासाध्ययनात् संस्कृतभाषायाः गौरवस्य प्राचीनतायाश्च परिचयः स्यात्।
7. पालिभाषाज्ञानेन पालिभाषया सह संस्कृतस्य सम्बन्धज्ञानं पालिसाहित्यस्य परिचयप्राप्तिः च भूयात्।

पाठ्यक्रमः –

घटकम्-1: वेदव्याख्यायाः पारम्परिकं स्वरूपम्; स्कन्दस्वामी, षड्गुरुशिष्यः, सायणः, दयानन्दः, अरविन्दः – एषां वेदभाष्यकाराणां भाष्याणां च परिचयः

घटकम्-2: वेदे विज्ञानम् - स्वामिदयानन्दसरस्वतीकृत–**ऋग्वेदादिभाष्यभूमिकातो**ऽग्रेलिखिताः विषयाः – पृथिव्यादि-लोक-भ्रमणविषयः, आकर्षणानुकर्षणविषयः, प्रकाश्यप्रकाशकविषयः, गणितविद्याविषयः, नौविमानादि-विद्याविषयः, तारविद्यामूलम्; वराहमिहिरकृत-**बृहत्संहितातः** - वास्तुशास्त्रं वृक्षायुर्वेदश्च, आयुर्वेद-शास्त्रम्

घटकम्-3: आधुनिक-संस्कृतसाहित्यस्य सामान्य-परिचयः - पद्यसाहित्यं, गद्यसाहित्यं, अनुवादसाहित्यं, कथासाहित्यं,

बालसाहित्यं च

घटकम्-4: युधिष्ठिर-मीमांसक-कृतः संस्कृत-व्याकरणशास्त्रस्येतिहासः(परिचयात्मक-रूपेणैव)

घटकम्-5: पालि-भाषायाः साहित्यस्य च सामान्यपरिचयः

अनुशंसितग्रन्थाः -

1. ऋग्वेदादिभाष्यभूमिका, स्वामी दयानन्द सरस्वती, आर्ष साहित्य प्रचार ट्रष्ट, नई दिल्ली, 1993
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COURSE CODE: SHSS SKT 1313 C 3104

त्रयोदशं पत्रम् : संस्कृत-कवयः काव्यशास्त्रं च – (1)

Paper- XIII: Saṁskṛta-kavayaḥ Kāvyaśāstraṁ Ca – (1)

L	T	P	Credits
3	1	0	4

उद्देश्यः/Objective:

1. मुख्यकवीनां जीवन-कृतित्व-विषये परिज्ञानम्; 2. काव्यशास्त्रस्य तत्त्वानां विभिन्न-सम्प्रदायानां मतानुशीलन-पुरःसरं गभीराध्ययनम्; 3. काव्यशास्त्रस्याधारभूते भरतमुनिकृत-नाट्यशास्त्रे वर्णितस्य काव्यात्मभूतस्य रसस्य सम्यग् ज्ञानम्; 4. काव्ये प्रयुक्तानां काव्यतत्त्वानां सम्यक् परिशीलनम्।

पाठ्यक्रमाध्ययनस्य फलम् / Course Level Learning Outcome:

1. संस्कृतसाहित्यजगतः प्रमुखकवीनां काल-कृति-विषये परिनिष्ठितं ज्ञानं प्राप्नुयात्।
2. संस्कृत-काव्यशास्त्रस्य आद्यप्रवर्तकाचार्य-भरतस्य नाट्यशास्त्रस्य परिचयेन सह रसविषयकोपादानस्य परिज्ञानं भूयात् ।
3. काव्यशास्त्रे प्रचलितानां विभिन्नानां सम्प्रदायानां विषये सम्यगभिज्ञानं स्यात्।
4. काव्यप्रकाशस्य परिचयेन सह काव्यशास्त्रीयतत्त्वानां विषये सम्यगवधारणं संभवेत्।

पाठ्यक्रमः –

घटकम्-1: अग्रेलिखित-कवीनां काव्यालोचन-पूर्वकं जीवन-कृतित्वस्य सामान्यः परिचयः - भासः, अश्वघोषः, कालिदासः, शूद्रकः, विशाखदत्तः, भारविः, माघः, हर्षः, बाणभट्टः, दण्डी, भवभूतिः, भट्टनारायणः, बिल्हणः, श्रीहर्षः

घटकम्-2: भरतकृत–नाट्यशास्त्रस्य षष्ठः अध्यायः (रस-भाव-विचारः)

घटकम्-3: अधोलिखितानां विषयाणां शास्त्रनिर्देश-पुरःसरं **काव्यप्रकाशानुसारं** सम्यगध्ययनम् - काव्यलक्षणम्, काव्यप्रयोजनम्, काव्यहेतुः, काव्यभेदः, शब्दशक्तिः, अभिहितान्वयवादः, अन्विताभिधानवादः, रसस्वरूपः, रससूत्रविमर्शः, रसदोषाः, काव्यगुणाः

घटकम्-4: काव्यशास्त्रस्य षट् सम्प्रदायानां परिचयः विवेचनं च - रस-सम्प्रदायः, अलङ्कार-सम्प्रदायः, रीति-सम्प्रदायः, ध्वनि-सम्प्रदायः, वक्रोक्ति-सम्प्रदायः, औचित्य-सम्प्रदायः

अनुशंसितग्रन्थाः -

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22. *मम्मटकृत–काव्यप्रकाशः—वामन–झलकीकरकृत–टीकया समलङ्कृतः*, भाण्डारकर ओरियण्टल रिसर्च इन्स्टीट्यूट, पूना, 1933
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25. कृष्णकुमार, *अलङ्कारशास्त्र का इतिहास*, साहित्य भण्डार, सुभाष बाजार, मेरठ

26. शास्त्री, श्रीनिवास (सम्पा०), *काव्यप्रकाश*, साहित्य भण्डार, सुभाष बाजार, मेरठ

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Option (I)
वर्गः 'क' वेदः
Group-A (Veda)

चतुर्दशपत्रम् : ऋक्संहिता यजुस्संहिता च

Paper- XIV: Ṛk-saṁhitā Yajus-saṁhitā Ca

COURSE CODE: SHSS SKT 13A 01 SE 3104

L	T	P	Credits
3	1	0	4

उद्देश्यः/Objective:

1. वेदस्य वैदिकसाहित्यस्य च विशिष्टज्ञानप्राप्तिः; 2. ऋग्यजुसंहितयोः प्रमुखसूक्तानां सम्यगध्ययनम्; 3. विभिन्नानां प्राच्य-पाश्चात्य-भाष्यकाराणां भाष्यानुसन्धानपुरःसरं वैदिकज्ञानराशेः अवगमनम्।

पाठ्यक्रमाध्ययनस्य फलम् / Course Level Learning Outcome:

1. स्नातकोत्तरकक्षायाः विद्यार्थिनः सम्यक् पाठनात् वेदविषये विदिताः भवेयुः, निरन्तरस्वाध्यायेन च विशिष्टविद्वांसः स्युः।
2. ऋग्यजुर्वेदयोः विशिष्टसूक्तानां साङ्गोपाङ्गाध्ययनेन ऋषि-देवता-छन्द-विषयक-ज्ञानमपि प्राप्नुयुः ।
3. विभिन्नानां प्राच्य-पाश्चात्य-भाष्यकाराणां भाष्यैः सह सम्यक् परिचयः सम्भवेत्।
4. विशिष्टे वैदिकतत्त्वानुशीलने वैदिकसंहितानामध्ययने च रुचिः संजायेत।

पाठ्यक्रमः

ऋग्यजुर्वेदयोः अधोनिर्दिष्ट-सूक्तानां दयानन्दसहितं पारम्परिक-पाश्चात्य-भाष्यकारानुसारं गहनमध्ययनम् -

घटकम्-1: ऋग्वेदः - अग्निः (1.19), सूर्यः (1.115), ब्रह्मणस्पतिः (2.23), मित्रः (3.59), उषाः (3.61), पर्जन्यः (5.83)
घटकम्-2: ऋग्वेदः - पूषन् (6.53), वास्तोष्पतिः (7.54), सरस्वती (7.95), मण्डूकः (7.103), अक्षः (10.34), ज्ञानम् (10.71)
घटकम्-3: यजुर्वेदः (माध्यन्दिन - वाजसनेयि), अध्यायः 31-32 (सम्पूर्णम्)
घटकम्-4: यजुर्वेदः (माध्यन्दिन- वाजसनेयि), 33-दध्यायः (1-50 मन्त्राः)

अनुशंसितग्रन्थाः -

1. सरस्वती, स्वामी दयानन्द, *ऋग्वेदभाष्यम्*, परोपकारिणी सभा, वैदिक पुस्तकालय, अजमेर, राजस्थान, पञ्चमावृत्ति – 2008
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4. सातवलेकर, पं० श्रीपाद दामोदर, ऋग्वेद का सुबोध भाष्य, पारडी, 1985
5. *सायणकृतम् ऋग्वेदभाष्यम्*, वैदिक संशोधन मण्डल, पुण्यपत्तनम्, द्वितीय संस्करण – 1983
6. Ram Gopal, *A History and Principles of Vedic Interpretation*, Delhi, 1983
7. Griffith, Ralph T.M., *Hymns of the Ṛgveda*, Motilal Banarsidass, New Delhi, 2017
8. Macdonell, A.A., Vedic Reader for Students, Low Price Publications, 2002
9. शास्त्री, जगदीशलाल (सं.), *शुक्ल-यजुर्वेद-संहिता, उव्वट-महीधरकृत भाष्य सहित*, मोतीलाल बनारसीदास, दिल्ली, 1971

10. सूर्यकान्त (अनुवाद), *वैदिक देवशास्त्र*, Yugantar Press, Dufrin Pool, New Delhi, 1961
11. Peterson, P., *Hymns from the Ṛgveda*, Bhandarkar Oriental Research Institute, Pune, 1938
12. रामनाथ वेदालंकार, *वेदभाष्यकारों की वेदार्थ-प्रक्रियाएँ*, वि. वि. भारत-भारती अनुशीलन संस्थान, पंजाब विश्व., होशिआरपुर, 1980
13. त्रिपाठी, गयाचरण, *वैदिक देवता : उद्भव और विकास (भाग 1-2)*, भारतीय विद्या प्रकाशन, दिल्ली

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पञ्चदशपत्रम् : ब्राह्मण-साहित्यम्

Paper-XV: Brāhmaṇa-sāhityam

COURSE CODE: SHSS SKT 13A 02 SE 3104

L	T	P	Credits
3	1	0	4

उद्देश्य:/Objective:

1. ब्राह्मणसाहित्यस्य सम्यक् परिचयप्रदानम्; 2. वेदार्थावबोधने ऐतरेय-शतपथब्राह्मणयोः अवदानस्य परिज्ञानम्; 3. एतरेय-शतपथ-ब्राह्मणान्तर्गतानां आख्यानोपाख्यानानां परिचयः; 4. एतरेय-शतपथ-ब्राह्मणान्तर्गतानां सांस्कृतिकै-तिहासिकादि-विशिष्टविषयाणां सविस्तरमध्ययनम्।

पाठ्यक्रमाध्ययनस्य फलम् / Course Level Learning Outcome:

1. ऐतरेय-शतपथब्राह्मणयोः विषयवस्तूनां सम्यगवधारणं भवेत्।
2. ब्राह्मणद्वयस्य वेदार्थावबोधन-विषयकावदानस्य सम्यगवगमनं जायेत।
3. ब्राह्मणद्वये आगतानामध्यायानामुपाख्यानानां च तत्त्वानुसन्धानपूर्वकमनुशीलनं सम्भवेत्।
4. अन्येषां शास्त्राणामध्ययने ब्राह्मणग्रन्थानामुपयोगित्वस्य ज्ञानं भूयात्।

पाठ्यक्रम:

एतरेय-शतपथ-ब्राह्मणयोः अधोलिखितानामध्यायानां पारम्परिकाधुनिक-भाष्यदृशाध्ययनम् -

घटकम्-1: ऐतरेय-ब्राह्मणम्, अध्यायः 34

घटकम्-2: ऐतरेय-ब्राह्मणम्, अध्यायः 35

घटकम्-3: शतपथ-ब्राह्मणम्, काण्डः 1, अध्यायः 8, ब्राह्मणम् 1-2 (मनु-मत्स्याख्यानम्)

घटकम्-4: शतपथ-ब्राह्मणम्, काण्डः 5 (चरक-सौत्रामणी), अध्यायः 5, ब्राह्मणः 4

अनुशंसितग्रन्था: -

1. Eggeling, J. (Eng. Tr.), *The Śatapath-Brāhmaṇa vols.1-3*, Eastern Book Linkers, Delhi, 2009
2. कीथ, ए० बी०, *द ऋग्वैदिक ब्राह्मणाज़*, Motilal Banarsidass, Delhi, 1998
3. Haug, Martin, *The Aitareya Brāhmaṇa of the Ṛgveda*, Bhartiya Publishing House, 1976
4. उपाध्याय, गंगाप्रसाद, (सम्पा०), शतपथ-ब्राह्मण (भाग 1 तथा 3), प्राचीन वैज्ञानिक अध्ययन-अनुसन्धान संस्थान, दिल्ली, 1967
5. सामश्रमी, सत्यव्रत, *ऐतरेयालोचनम्*, Kolkata, 1963
6. मालवीय, डॉ० सुधाकर (सम्पा०), *ऐतरेय-ब्राह्मणम् (सायणभाष्य एवं सरल हिन्दी व्याख्या)*, तारा प्रिंटिंग वर्क्स, वाराणसी, 1950
7. *शतपथ-ब्राह्मण (सायणभाष्य)*, नाग प्रकाशन, दिल्ली
8. शर्मा, उर्मिला देवी, *शतपथ-ब्राह्मण : एक सांस्कृतिक अध्ययन*, मेहरचन्द लछमनदास पब्लिकेशन्स, नई दिल्ली

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षोडशपत्रम् : कल्प-साहित्यम्

Paper- XVI: Kalpa-sāhityam
COURSE CODE : SHSS SKT 13A 03 SE 3104

L	T	P	Credits
3	1	0	4

उद्देश्यः/Objective:

1. वेदेषु निहितानां वैज्ञानिकतत्त्वानां उत्तरवैदिके साहित्ये यदुद्घाटनमस्ति तत्पक्षस्य परिचयः; 2. दैनन्दिनजीवने सम्मुखीभूतविभिन्न-विषयेषु वैदिकसूत्रग्रन्थानुसारं समाधान-विवेचनम्; 3. वेद-ब्राह्मणारण्यक-ग्रन्थेषु निर्दिष्टानां याज्ञिक-कर्मकाण्डानां सूत्रग्रन्थानुसारं विनियोजनस्य विशदव्याख्यानम्; 4. कल्पसूत्रेषु शूल्बसूत्रेषु च वर्णितानां रेखागणितादीनां विद्यानां प्रासङ्गिकत्व-प्रकाशनम्।

पाठ्यक्रमाध्ययनस्य फलम् / Course Level Learning Outcome:

1. सूत्रग्रन्थेषु वर्णितानां विभिन्नानां यागादिनां कर्मणां सम्यगवधारणं क्रियेत।
2. यज्ञसम्पादने प्रयुक्तानां विभिन्नानां विधीनां तत्त्वानुशीलनपूर्वकमध्ययनाय सामर्थ्यं जायेत।
3. कल्पसाहित्यस्योपरि कृताणां भाष्याणां गहनाध्ययनाय रुचिः संपद्येत।
4. कल्पसाहित्ये वर्णितायाः सामाजिक-सांस्कृतिक-सामग्र्या सम्यगवलोकने प्रयोक्तुं च समर्थाः भवन्तु।

घटकम्-1: कात्यायन-श्रौतसूत्रम् - अध्यायः 2, कण्डिका 1-4 (दर्शपौर्णमासः), कर्कभाष्यानुसारं विशदमध्ययनम्
घटकम्-2: कात्यायान-श्रौतसूत्रम्, अध्यायः 2, कण्डिका 5-8 (दर्शपौर्णमासः), कर्कभाष्यानुसारं विशदमध्ययनम्
घटकम्-3: पारस्कर-गृह्यसूत्रम्, प्रथमः काण्डः, हरिहर-गदाधर-कर्क-भाष्यानुसारमध्ययनम्
घटकम्-4: कात्यायन-शुल्बसूत्रम्, प्रथमः अध्यायः, विशदमध्ययनम्

अनुशंसितग्रन्थाः -

1. Kularia, D.P. (Eng. & Hindi transl.), Kātyāyana Śulbasūtra, with the Com. of Karka, Mahidhara, Devesh Publications, Rohtak, 2009
2. डॉ० वेदपाल, *पारस्करगृह्यसूत्र*, सत्यार्थप्रकाशन न्यास, कुरुक्षेत्र, 2008
3. दाश शर्मा, डॉ० रमेशचन्द्र, *कात्यायनशुल्बसूत्रम् (सोपपत्तिकं पर्यालोचनम्)*, नाग प्रकाशन, दिल्ली, 1994
4. *कात्यायन-श्रौतसूत्रम्, विद्याधर-शर्मा-कृत सरलावृत्ति*, अच्युत ग्रन्थमाला, वाराणसी, 1987
5. नेने, गोपालशास्त्री एवं पन्त, नित्यानन्द, *कात्यायन-श्रौतसूत्रम् (भाग 1-2)*, चौखम्बा संस्कृत सीरीज, वाराणसी, 1985
6. *कात्यायन-श्रौतसूत्रम् (कर्कभाष्यसहितम्)*, प्रथम भाग, श्री लाल बहादुर शास्त्री केन्द्रीय संस्कृत विद्यापीठ, दिल्ली, 1982-85
7. वेबर, डॉ० ए०, *कात्यायन-श्रौतसूत्रम्– कर्कभाष्य,* चौखम्बा संस्कृत सीरीज, वाराणसी, 1972
8. मालवीय, डॉ० सुधाकर (अनुवाद), पारस्करगृह्यसूत्र, तारा प्रिंटिंग वर्क्स, वाराणसी
9. खेमराज श्रीकृष्णदास, पारस्करगृह्यसूत्र, मुंबई
10. डॉ० जगदीशचन्द्र (सम्पा०), *पारस्करगृह्यसूत्र (हरिहरगदाधर-भाष्य),* चौखम्बा संस्कृत सीरीज, वाराणसी
11. शास्त्री, डॉ० हरिदत्त, *पारस्करगृह्यसूत्र (हरिहरभाष्यसहित)*, भारतीय विद्या प्रकाशन, दिल्ली
12. *कातीयशुल्बसूत्र, विद्याधरगौड-कृत सरलावृत्ति*, अच्युत ग्रन्थमाला, वाराणसी
13. *कातीयशुल्बसूत्र, कर्क-महीधर-वृत्ति-सहित*, चौखम्बा संस्कृत सीरीज, वाराणसी

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Option (II)
वर्गः 'ख' व्याकरणम्
Group-B (Grammar)

चतुर्दशपत्रम् : व्याकरण-परम्परा (1)

Paper- XIV: Vyākaraṇa-paramparā (1)
COURSE CODE: SHSS SKT 13B 04 SE 3104

L	T	P	Credits
3	1	0	4

उद्देश्यः/Objective:

1. भारतीयज्ञानमनीषोद्भूतायाः व्याकरणपरम्परायाः गभीरं विवेचनम्; 2. पाणिनिपूर्वाचार्याणां पाणिनीय-परम्परायाश्च सम्यक् परिचयः 3. काशिकावृत्तिदृशा अष्टाध्याय्याः सूत्राणां सम्यगवगमनम्; 4. काशिकासाहित्यस्य कौमुदीसाहित्यस्य च तुलनात्मकं परिचयः।

पाठ्यक्रमाध्ययनस्य फलम् / Course Level Learning Outcome:

1. पाणिनिपूर्वाचार्याणां पाणिनेः च व्याकरणपद्धतेः परम्परायाश्च विषये सम्यगवधारणं संजायेत।
2. काशिकादृशा पाणिनेः अष्टाध्याय्या अवगमनेन व्याकरणस्यान्तःप्रवेशाय सौकर्यं भूयात्।
3. संस्कृतव्याकरणस्य-व्याख्यानपरम्परायाः प्रमुखग्रन्थानामनुशीलनं सम्भवेत् ।
4. वैयाकरणसम्प्रदायानां विषये सम्यक् ज्ञानेन व्याकरणशास्त्र-विकासस्य सम्यगवधारणं जायेत।

पाठ्यक्रमः -

घटकम्-1: पाणिनि-पूर्वाचार्याः (शाकटायनः, आपिशलिः, काशकृत्स्नः, व्याड़ी), पाणिनिः कात्यायनश्च

घटकम्-2: पाणिनिः, अष्टाध्यायी, प्रथमोऽध्यायः, प्रथमः पादः, सञ्ज्ञाविधायक-सूत्राणां काशिका-दृशा सोदाहरणं व्याख्या
घटकम्-3: पाणिनिः, अष्टाध्यायी, प्रथमोऽध्यायः, द्वितीयः पादः, सूत्राणां काशिका-दृशा सोदाहरणं व्याख्या
घटकम्-4: काशिका-साहित्यं कौमुदी-साहित्यं च - विवेचनात्मकमनुशीलनम्

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11. मीमांसक, युधिष्ठिर, संस्कृत-व्याकरणशास्त्र का इतिहास (भाग 1-2), रामलाल कपूर ट्रस्ट, रेवली, सोनीपत, 1963
12. वर्मा, सत्यकाम, संस्कृत व्याकरण का उद्भव और विकास, मोतीलाल बनारसीदास, दिल्ली
13. मिश्र, श्रीनारायण, काशिका-हिन्दी-टीका

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पञ्चदशपत्रम् : व्याकरण-दर्शनम् (1)

Paper- XV: Vyākaraṇa-darśanam (1)

COURSE CODE: SHSS SKT 13B 05 SE 3104

L	T	P	Credits
3	1	0	4

उद्देश्यः/Objective:

1. संस्कृत-व्याकरणदर्शनस्योद्भव-विकास-विषये परिचयप्रदानम्; 2. व्याकरणशास्त्रे ख्यातेषु त्रिमुनिष्वन्यतमस्य भाष्यकारपतञ्जलेः महाभाष्यस्य विषयविवेचनं सममेव च व्याकरणशास्त्रस्य प्रयोजनादि-विषयानां परिचयः; 3. भर्तृहरेः स्थापितस्य स्फोटवादस्यानुशीलम्; 5. वाक्यपदीयान्तर्ग-ब्रह्मकाण्डे विवेचितानां दार्शनिकत्त्वानां गहनपरिज्ञानाम्।

पाठ्यक्रमाध्ययनस्य फलम् / Course Level Learning Outcome:

1. व्याकरणदर्शनविषये विवेचनात्मकरीत्या सम्यगवधारणम्।
2. भाष्यकारपतञ्जलेः महाभाष्यस्य पस्पशाह्निके परामृष्टानां पाणिनीय-व्याकरणस्य मौलिक-सिद्धान्तानां विषये सम्यक् संज्ञानं भूयात्।
3. भर्तृहरेः वाक्यपदीय-गत-ब्रह्मकाण्डस्याध्ययनेन शब्दब्रह्मविषये स्फोटवादस्यो च विषये सम्यगवगमनम्।

पाठ्यक्रमः

घटकम्-1: पतञ्जलिकृत-महाभाष्यस्य प्रथममाह्निकम् (पस्पशाह्निकम्), आरम्भतः 'सिद्धे शब्दार्थसम्बन्धे' पर्यन्तम्
घटकम्-2: पतञ्जलिकृत-महाभाष्यस्य प्रथमम् आह्निकम् (पस्पशाह्निकम्) – 'यथा लौकिकवैदिकेषु' इत्यतः समाप्तिं यावत्
घटकम्-3: भर्तृहरिकृत-वाक्यपदीयस्य ब्रह्मकाण्डम्, कारिकाः 1-73
घटकम्-4: भर्तृहरिकृत-वाक्यपदीयस्य ब्रह्मकाण्डम्, कारिकाः 74तः समाप्तिं यावत्

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21. मीमांसक, युधिष्ठिर (व्याख्या०), महाभाष्यम् (प्रथमो भागः), रामलाल कपूर ट्रस्ट, रेवली, सोनीपत
22. मिश्र, मथुराप्रसाद (व्याख्या० तथा सम्पा०), व्याकरणमहाभाष्यम् (आह्निक 1-5), चौखम्बा विद्याभवन, वाराणसी
23. भाण्डारी, माधव शास्त्री एवं विद्यावाचस्पति, वेदप्रकाश (व्याख्या०), व्याकरणमहाभाष्य (आह्निक 1-2), मेहरचन्द लछमनदास पब्लिकेशन्स, दिल्ली
24. शुक्ल, रामगोविन्द (हिन्दी व्याख्या०), वाक्यपदीयम् (ब्रह्मकाण्डम्), काशी संस्कृत ग्रन्थमाला
25. वामदेवाचार्य (व्याख्या०), वाक्यपदीयम् (ब्रह्मकाण्डम्), कृष्णदास अकादमी, वाराणसी
26. पाण्डेय, रामाज्ञा, व्याकरणदर्शनभूमिका, सम्पूर्णानन्द संस्कृत विश्वविद्यालय, वाराणसी

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षोडशपत्रम् : व्याकरण-प्रक्रिया (1)

Paper- XVI: Vyākaraṇa-prakriyā (1)

COURSE CODE: SHSS SKT 13B 06 SE 3104

L	T	P	Credits
3	1	0	4

उद्देश्यः/Objective:

1. विशिष्ट-प्रक्रियाग्रन्थस्य सिद्धान्तकौमुद्याः समीचीनतया अध्ययनाय प्रयत्नः; 2. षड्लिङ्गरूपाणां स्त्रीप्रत्ययानां च सम्यगध्ययनाध्यापनम्; 3. समास-तद्धितादि विशिष्टपदानां रचना-प्रक्रियायाः सम्यगवगमनम्; 4. पदरचनाप्रक्रियायाः सम्यगवबोधनेन संस्कृत-भाषायाः लेखने वादनेऽन्यव्यवहारे च सम्यक् सामर्थ्य-विकासः।

पाठ्यक्रमाध्ययनस्य फलम् / Course Level Learning Outcome:

1. संस्कृत व्याकरणदृशा प्रमुख-प्रक्रिया-ग्रन्थस्य सिद्धान्तकौमुद्याः सम्यगध्ययनाध्यापनं भूयात्।
2. सिद्धान्तकौमुद्याः बालमनोरमा-तत्त्वबोधिन्यादीनां व्याख्यानामपि सम्यक् परिशीलनं संभवेत्।
3. शास्त्रीयव्यवहारार्थं व्याकरणस्य विशिष्टतत्त्वानां समुचितरीत्या षड़लिङ्ग-स्त्रीप्रत्यय-समास-तद्धितादि विषयाणामवधारणम्।
4. आगामी-शोधकार्यार्थं विद्यार्थीनां मार्गप्रशस्तिः, विभिन्न-शास्त्राणां पाठन-लेखन-विवेचनादि रीत्या सम्यग् परिश्रमेण संभवेत्।

पाठ्यक्रमः –

अधस्तनेषु प्रकरणेषु सोदाहरणं सूत्र-वार्तिक-व्याख्या सूत्र-वार्तिकोल्लेखपूर्वकं रूपसिद्धिश्च -

घटकम्-1: भट्टोजिदीक्षितकृत-वैयाकरणसिद्धान्तकौमुदी (पूर्वार्द्धम्) (बालमनोरमा-तत्त्वबोधिनीसहिता) – अजन्त-पुंलिङ्ग-प्रकरणाद् आरभ्य अजन्त-नपुंसकलिङ्ग-प्रकरणं यावत्

घटकम्-2: स्त्रीप्रत्यय-प्रकरणम्

घटकम्-3: समासः - अव्ययीभावसमासप्रकरणम्, तत्पुरुषसमासप्रकरणम्

घटकम्-4: तद्धितेष्वपत्याधिकार-प्रकरणे 'समर्थानां प्रथमाद् वा' (सूत्रसंख्या 1072) इति सूत्रादारभ्य 'क्षुद्राभ्यो वा' (सूत्रसंख्या 1137) इति सूत्रं यावत्

अनुशंसितग्रन्थाः

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7. पाण्डेय, गोपालदत्त (व्याख्या०), वैयाकरण-सिद्धान्तकौमुदी (भाग 1-2), चौखम्बा सुरभारती, वाराणसी

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Option (III)
वर्गः 'ग' संस्कृतसाहित्यम्
Group-C (Sanskrit Literature)

चतुर्दशपत्रम् : नाट्य-शास्त्रम्

Paper- XIV: Nāṭya-śāstram

COURSE CODE: SHSS SKT 13C 07 SE 3104

L	T	P	Credits
3	1	0	4

उद्देश्यः/Objective:

1. संस्कृतसाहित्यस्य विशिष्टविधायाः नाट्यशास्त्रस्याध्ययनम्; 2. ऐतिहासिकानुशीलनेन सह नाट्यशास्त्रीयग्रन्थानां तेषां कर्तृणां च विषये सम्यक् परिज्ञानम्; 3. नाट्यशास्त्रकार-भरतदृष्ट्या नाट्यमण्डपस्य रङ्गभूमेः वा सम्यगवबोधनम्; 4. महाकवि-धनञ्जयकृत-दशरूपकग्रन्थाधारेण दशानां रूपकाणां तेषां लक्षणोदाहरणानां च विवेचनम्; 5. प्राचीनभारतीयनाट्यकलायाः विषये विद्यार्थीभ्यः परिचय-प्रदानम्।

पाठ्यक्रमाध्ययनस्य फलम् / Course Level Learning Outcome:

1. प्राचीन-भारतीय-नाट्यशास्त्रीयपरम्परायाः सम्यक् पाठनं भूयात्।
2. ऐतिहाहिकदृष्ट्या कालक्रमानुसारं च नाट्यशास्त्रीयाणां ग्रन्थानां सम्यगवबोधनं स्यात्।
3. रङ्गभूमौ प्रयुक्तानां तत्त्वानां गहनमध्ययनमनुशीलनं क्रमिक-विकासस्य च विवेचनं भवेत् ।
4. नाट्यशास्त्रे दशरूपके च वर्णीतानां विषयाणां तुलनया परामर्शः शक्नुयात्।

पाठ्यक्रमः -

घटकम्-1: नाट्यशास्त्रस्य इतिहासः **(परिचयः -** भरतः, रामचन्द्रगुणचन्द्रौ, सागरनन्दी, धनञ्जयः, विश्वनाथः, शिंगभूपालः, रूपगोस्वामी, शारदातनय एतेषां नाट्यग्रन्थानां च परिशीलनम्**)**

घटकम्-2: भरतकृत-नाट्यशास्त्रम् द्वितीयोऽध्यायः (रङ्गभूमिः)

घटकम्-3: धनञ्जयकृत-दशरूपकम्, प्रथमः प्रकाशः - कारिकाव्याख्या आलोचनात्मकः प्रश्नश्च

घटकम्-4: दशरूपकम्, तृतीयः प्रकाशः - टिप्पण्यात्मकः प्रश्नः

अनुशंसितग्रन्थाः -

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18. Mukund, D.R., Types of Sanskrit Drama, Urmi Prakashan Mandir, Karachi, 1936
19. महाराज, श्रीचरण तीर्थ (सम्पा०), दशरूपक, चौखम्बा प्रकाशन, वाराणसी
20. रमाकान्त त्रिपाठी, संस्कृत नाट्यसिद्धान्त, चौखम्बा विद्याभवन, वाराणसी
21. नाट्यशास्त्रम्, सम्पूर्णानन्द संस्कृत विश्वविद्यालय, वाराणसी

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पञ्चदशपत्रम् : नाट्य-साहित्यम्

Paper- XV: Nāṭya-sāhityam

COURSE CODE: SHSS SKT 13C 08 SE 3104

L	T	P	Credits
3	1	0	4

उद्देश्यः/Objective:

1. भासकृतरूपकयोः कर्णभार-प्रतिमयोः शूद्रकस्य च मृच्छकटिकस्य सम्यगध्ययनमनुशीलनम्; 2. रूपकाणां प्रायोगिक-पक्षस्य विवेचनात्मकः परिचयः 3. भास-शूद्रकयोः नाट्यशैल्याः मौलिकतायाः प्रतिपादनम्; 4. रूपकेषु निहितानां प्राचीनभारतीय-सामाजिक-राजनीतिक-सांस्कृतिकादि-विषयगतानां तत्त्वानां सम्यक् प्रतिपादनम्।

पाठ्यक्रमाध्ययनस्य फलम् / Course Level Learning Outcome:

1. नाट्यशास्त्रीयपरम्परायाः ज्ञानेन साकं नाटकानामध्ययनात् नाट्यतत्त्वानां ज्ञानं परिनिष्ठितं भवेत्।
2. अयं पाठ्यक्रमः रूपकेषु विभिन्नायामानां परिचयेन सह तेषां प्रयोगार्हतामपि प्रदर्शयेत्, येन विद्यार्थिनः नाट्यसाहित्याध्ययने इच्छुकाः भवेयुः।
3. परस्पर-परिचर्चया संस्कृत-रूपकाणां विकास-पक्षः सम्यक् परिज्ञायेत।

4. भास-शूद्रकयोः नाट्य-रचनाशैलीं ज्ञात्वा समालोचनात्मकमध्ययने सौकर्यं जायेत।

पाठ्यक्रमः -

घटकम्-1: भासकृतं कर्णभारम्

घटकम्-2: भासकृतं प्रतिमानाटकम्

घटकम्-3: शूद्रकस्य मृच्छकटिकम् (1-6 अङ्काः)

घटकम्-4: शूद्रकस्य मृच्छकटिकम् (7-10 अङ्काः)

अनुशंसितग्रन्थाः -

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षोडशपत्रम् : संस्कृत-पद्यसाहित्यम्

Paper-XVI: Saṁskṛta-padyasāhityam

COURSE CODE: SHSS SKT 13C 09 SE 3104

L	T	P	Credits
3	1	0	4

उद्देश्यः/Objective:

1. कालिदास-कृतयोः महाकाव्ययोः रघुवंशकुमारसंभवयोः परिचयेन साकं प्रथमपञ्चमयोः सर्गयोः यथाकाव्यं सम्यगध्ययननुशीलनं च; 2. भारविकृतस्य किरातार्जुनीय-महाकाव्यस्य परिचयः प्रथमसर्गस्य च सम्यगध्ययनम्; 3. श्रीहर्षकृतस्य नैषधीयचरितस्य परिचयः प्रथमसर्गस्य च सम्यगध्ययनम्; 4. त्रयाणामेतेषां महाकवीनां जीवन-कृतित्वस्य सम्यक् परिज्ञानम्; 5. एषु महाकाव्येषु प्रयुक्तानां तत्त्वानां रस-छन्दोऽलंकाराणामपि च सम्यक् परिचयः।

पाठ्यक्रमाध्ययनस्य फलम् / Course Level Learning Outcome:

1. काव्यशास्त्रीयतत्त्वानां परिशीलनपूर्वकं काव्यानामध्ययनेन काव्यगुणानां सुष्ठुः परिचयः भवेत्।
2. अयं पाठ्यक्रमः विशिष्टकाव्यगतानां विभिन्नानामायामानां परिचयेन सह तेषां काव्यसौन्दर्यस्य कक्षायां विवेचनं भवतु।

3. एतेषां काव्यानामध्ययनेन सांस्कृतिकैतिहासिकज्ञानवृद्धिः जायेत।
4. विभिन्नकवीनां रचनाशैल्याः सह कालिदास–भारवि–श्रीहर्षैः कृतानां काव्यानां समालोचनात्मक-मध्ययनेन काव्यतत्त्वानां परिज्ञाने सौकर्यं संभूयात्।

पाठ्यक्रमः –

घटकम्-1: कालिदासकृतं रघुवंशम् (प्रथमः सर्गः)
घटकम्-2: कालिदासकृतं कुमारसम्भवम् (पञ्चमः सर्गः)
घटकम्-3: भारवीकृतं किरातार्जुनीयम् (प्रथमः सर्गः)
घटकम्-4: श्रीहर्षकृतं नैषधीयचरितम् (प्रथमः सर्गः)

अनुशंसितग्रन्थाः -

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9. Unni, N. P., Raghuvaṁśa of Kālidāsa, New Bharatiya Book Corporation, Delhi, 2013
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Option (IV)
वर्गः - घ (भारतीयदर्शनम्)
Group-D (Indian Philosophy)

COURSE CODE : SHSS SKT 13 D 10 SE 3104
चतुर्दशपत्रम् : भारतीयदर्शनस्य इतिहासः
Paper- XIV: Bhāratīyadarśanasya Itihāsaḥ

L	T	P	Credits
3	1	0	4

उद्देश्यः/Objective:

1. वैदिकपरम्परायामुपलभ्यमानानां दार्शनिकतत्त्वानां परिचयः; 2. भारतीय-दर्शनस्य आस्तिक-नास्तिक-धारयोः सम्यक् परिज्ञानम्; 3. दर्शनशास्त्रस्यैतिह्यस्य गभीरमध्ययनम्।

पाठ्यक्रमाध्ययनस्य फलम् / Course Level Learning Outcome:

1. भारतीयदार्शनिकपरम्परायाः विकासस्य सम्यगवधारणं भवेत्।
2. आस्तिक-नास्तिक-धारयोः तुलनात्मकानुशीलनेन तयोः विचार-भेदस्य ज्ञानं लभेत्।
3. षड्दर्शनानां प्रतिपाद्यानुशीलनेन तेषां परस्परपूरकत्वमनुभूय अविरोधित्वं जानीयात्।
4. दार्शनिकग्रन्थानामध्ययनेनानुशीलनेन च प्रौढ़शास्त्रेषु गति-प्रवृत्तिः समुत्पद्येत।

पाठ्यक्रमः -

घटकम्-1: वैदिक-दर्शनम् (वेदेषु, ब्राह्मणग्रन्थेषु उपनिषत्सु च विद्यमानानां दार्शनिकतत्त्वानां परिचयः), पुराण-दर्शनम् (अग्निपुराणे विद्यमानानां दार्शनिकतत्त्वानां परिचयः) च

घटकम्-2: नास्तिक-दर्शनानि (षड्-नास्तिकदर्शनानां – माध्यमिकः, योगाचारः, सौत्रान्तिकः, वैभाषिकः, चार्वाकः दिगम्बरश्च – सामान्यपरिचयः)

घटकम्-3: सांख्यदर्शनम्, योगदर्शनम्, न्यायदर्शनम्, वैशेषिकदर्शनम् - सामान्यपरिचयः

घटकम्-4: पूर्वमीमांसा-दर्शनम्, उत्तरमीमांसा-दर्शनम् - सामान्यपरिचयः

अनुशंसितग्रन्थाः

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30. उपाध्यायः, वाचस्पति, मीमांसादर्शनविमर्शः, भारतीय विद्या प्रकाशन, दिल्ली

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COURSE CODE : SHSS SKT 13 D 11 SE 3104

पञ्चदशं पत्रम् : न्यायदर्शनम्, पूर्वमीमांसादर्शनं काश्मीरशैवदर्शनं च

Paper-XV : Nyāyadarśanam, Pūrvamīmāṃsādarśanaṁ Kāśmīraśaivadarśanaṁ Ca

L	T	P	Credits
3	1	0	4

उद्देश्यः/Objective:

1. न्यायवैशेषिक-परम्परायाः सम्यगवधारणम्; 2. विश्वनाथ-भट्टाचार्यकृत-भाषापरिच्छेदस्य कारिकावल्यपरनाम्नः ग्रन्थस्य सुष्ठुरूपेण प्रशिक्षणम्; ३. स्वोपज्ञटीकायाः न्यायमुक्तावल्याः दिनकरी-रामरुद्री-मंजूषाद्यन्यटीकानामपि च तत्त्वानुशीलनपूर्वकं विषयविशदीकरणम्; 4. मानमेयोदयस्य षट्त्रिंशत्तत्त्वसन्दोहस्य च दार्शनिकसिद्धान्तानां विचारविनिमय–माध्यमेन सम्यगनुशीलनम्।

पाठ्यक्रमाध्ययनस्य फलम् / Course Level Learning Outcome:

1. स्वोपज्ञ-न्यायमुक्तावली-सहितस्य भाषापरिच्छेदस्य परिशीलने रुचिः जायेत।
2. न्यायदर्शन-प्रत्यक्षप्रमाणस्याध्ययनं भाषापरिच्छेद-सन्दर्भेण कुर्यात् ।
3. प्रौढग्रन्थस्य मानमेयोदयस्य गभीराध्ययनेन तस्य परिज्ञानं सम्भवेत्।
4. लघुग्रन्थः षट्त्रिंशत्तत्त्वसन्दोहः त्रिकाभिधस्य काश्मीरशैवदर्शनस्य मूलग्रन्थः, अस्यानुशीलनेन काश्मीरशैवदर्शनस्य ज्ञानं संभवेत्।

पाठ्यक्रमः -

घटकम्-1: भाषापरिच्छेदः न्यायमुक्तावलीसहितः, प्रत्यक्षखण्डः - (1-32 कारिकाः)
घटकम्-2: भाषापरिच्छेदः न्यायमुक्तावलीसहितः, प्रत्यक्षखण्डः - (33-65 कारिकाः)
घटकम्-3: मानमेयोदयः (केवलं मेयभागः)
घटकम्-4: षट्त्रिंशत्तत्त्वसन्दोहः राजानकानन्दवृत्तिसहितः
अनुशंसितग्रन्थाः –

1. मिश्र, सच्चिदानन्द, न्यायदर्शनम्, भारतीय विद्या प्रकाशन, दिल्ली, 2018
2. शास्त्री, धर्मेन्द्रनाथ (व्या०), न्यायसिद्धान्तमुक्तावली, प्रत्यक्षखण्डः, मोतीलाल बनारसीदास, दिल्ली, 2017

3. Swami Lakshmanjoo, Kashmir Shaivism, The Secret Supreme, Ishwar Ashram Trust, Srinagar, 2016
4. मुसलगांवकर, गजानन शास्त्री मुसलगांवकर (व्या०), न्यायसिद्धान्तमुक्तावली, प्रत्यक्षखण्डः, चौखम्बा, वाराणसी, 2014
5. मुसलगांवकर, गजानन शास्त्री मुसलगांवकर (व्या०), मीमांसापरिभाषा, चौखम्बा, वाराणसी, 2014
6. शर्मा, डॉ० चन्द्रधर, भारतीय दर्शन का तात्त्विक सर्वेक्षण, मोतीलाल बनारसीदास, दिल्ली, 2013
7. स्वामी योगीन्द्रानन्दः (व्या०), मानमेयोदयः नारायणद्वयीप्रणीतः, चौखम्बा विद्याभवन, वाराणसी, 2009
8. शास्त्री, अशोक चन्द्र गौर, न्यायसिद्धान्तमुक्तावली, दिनकरी-रामरुद्री-टीकासहिता, चौखम्बा, वाराणसी, 2005
9. वेदवाचस्पति, प्रियव्रत, वेद और उसकी वैज्ञानिकता, गुरुकुल काँगड़ी विश्वविद्यालय, हरिद्वार, 2005
10. वेदालंकार, जयदेव, भारतीय दर्शन (तत्त्व और ज्ञानमीमांसा के मौलिक सम्प्रत्यय), न्यू भारतीय बुक कॉर्पोरेशन, नई दिल्ली, 2004
11. भार्गव, दयानन्द, वेद-विज्ञान-वीथिका, नाग प्रकाशन, दिल्ली, 1996
12. वेदालंकार, जयदेव, भारतीय दर्शन की समस्याएँ, प्राच्य विद्याशोध प्रकाशन, हरिद्वार, 1986
13. अवस्थी, डॉ० प्रेमा, मीमांसादर्शन का उद्भव और विकास, चौखम्बा सुरभारती प्रकाशन, कानपुर, 1982
14. Bharatiya, M.C., Causation in Indian Philosophy, Vimal Prakashan, Ghaziabad, 1973
15. Jha, Ganganath, Pūrva Mīmāṁsā in its source, Banaras Hindu University, Varanasi, 1942
16. Jha, Ganganath, The Philosophical Discipline, Calcutta University, Calcutta, 1928
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18. शास्त्री, टी. गणपति, मानमेयोदयः नारायणभट्ट–नारायणपण्डिताभ्यां प्रणीतः, तिरुवनन्तपुरम्, 1912
19. Jha, Ganganath, The Prabhakara School of Purva Mimamsa, Allahabad University, Allahabad, 1911
20. सिंह, चन्द्रधारी (व्या०), न्यायसिद्धान्तमुक्तावली, भारतीयविद्या प्रकाशन, दिल्ली
21. Swami Madhavananda (Eng. Tr. & Notes), Bhāṣāpariccheda with Muktāvalī, Advaita Ashram, Calcutta
22. Shastri, Surya Narayan (Eng. Tr. & Comm.), Mānameyodaya by Narayan-duo, Theosophical publishing House, Adyar, Madras, 1933
23. उपाध्याय, वाचस्पति, मीमांसादर्शनविमर्शः, भारतीयविद्याप्रकाशन, दिल्ली
24. पण्डित, बलजिन्नाथ, काश्मीर शैवदर्शन
25. झा, अनिरुद्ध, तत्त्व-मीमांसा की रूपरेखा, दिल्ली
26. वेदालंकार, जयदेव, भारतीय दर्शन (तत्त्व और ज्ञानमीमांसा के मौलिक सम्प्रत्यय), मोतीलाल बनारसीदास, दिल्ली
27. भारतीय, महेश, भारतीय दर्शन की मुख्य समस्याएँ, गाजियाबाद
28. भार्गव, दयानन्द, वेद-विज्ञान-वीचिका, नाग प्रकाशन, दिल्ली

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COURSE CODE: SHSS SKT 13 D 12 SE 3104

षोडशं पत्रम् : प्रमुखदार्शनिकसिद्धान्ताः

Paper- XVI: Pramukha-dārśanika-siddhāntāḥ

L	T	P	Credits
3	1	0	4

उद्देश्यः/Objective:

1. अध्येतृभ्यः भारतीयदार्शनिकपरम्परायाः बौद्धार्हत-सिद्धान्तयोः सम्यगवधारणम्; 2. रामानुज-दर्शनस्य सुष्ठुरूपेण प्रशिक्षणम्; 3. पूर्णप्रज्ञदर्शनस्य तत्त्वानुशीलनपूर्वकमध्यापनम्; 4. विभिन्न-दार्शनिकसिद्धान्तानां विचारविनिमयपूवर्कं सम्यगनुशीलनम्।

पाठ्यक्रमाध्ययनस्य फलम् / Course Level Learning Outcome:

1. भारतीय-दार्शनिकसिद्धान्तेषु नास्तिकपरम्परायाः बौद्धार्हत-सिद्धान्तयोः परिशीलने रुचिः कुर्यात्।
2. अद्वैतवेदान्ते ब्रह्मसूत्रोपरि रामानुजभाष्याध्ययने अनुशीलने च प्रवृत्तिः जायताम्।

3. द्वैतदर्शने माध्ववेदान्त-धारायां पूर्णप्रज्ञस्य आनन्दतीर्थापरनाम्नः ग्रन्थानां परिशीलने प्रेरणां लभेत्।

4. विभिन्न-दार्शनिकसिद्धान्तानामध्ययनात् प्राच्य-पाश्चात्य-दर्शनयोः परितोलने प्रवर्तेत।

पाठ्यक्रमः -

घटकम्-1: सर्वदर्शनसंग्रहः, माधवाचार्यकृतः - बौद्धदर्शनम्

घटकम्-2: सर्वदर्शनसंग्रहः, माधवाचार्यकृतः - आर्हतदर्शनम्

घटकम्-3: सर्वदर्शनसंग्रहः, माधवाचार्यकृतः - रामानुजदर्शनम्

घटकम्-4: सर्वदर्शनसंग्रहः, माधवाचार्यकृतः - पूर्णप्रज्ञदर्शनम्

अनुशंसितग्रन्थाः

1. शर्मा, उमाशंकर ऋषि (व्या०), सर्वदर्शनसंग्रहः, चौखम्बा विद्याभवन, वाराणसी (पुनर्मुद्रित), 2019
2. रटाते, माधव जनार्दन (व्या.), सर्वदर्शनसंग्रहः, भारतीय विद्या प्रकाशन, दिल्ली, 2011
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4. शास्त्री, कैलाशचन्द्र, जैन धर्म, आचार्य शांतिसागर 'छाणी' स्मृति ग्रन्थमाला, मथुरा, 2007
5. सर्वदर्शनसंग्रहः, आनन्दाश्रम, पुणे, 1999
6. Rani, Vijaya, Buddhist Philosophy as Presented in Mīmāṁsāślokavārtika, Parimal Publications., Delhi, 1982
7. जैन, धर्मचन्द्र, अभिधर्मदेशना : बौद्ध सिद्धान्तों का विवेचन, कुरुक्षेत्र, 1982
8. शास्त्री, श्रीनिवास (व्या०), न्यायबिन्दुटीका, साहित्य भण्डार, सुभाष बाजार, मेरठ, 1975
9. शास्त्री, महेन्द्र कुमार, जैनदर्शन, श्री गणेशप्रसाद वर्णी जैन ग्रन्थमाला, वाराणसी, 1974
10. नथमल, मुनि, जैनदर्शन, मनन और मीमांसा, आदर्श साहित्य संघ प्रकाशन, चुरु, 1973
11. शास्त्री, श्रीनिवास, वाचस्पति मिश्र द्वारा बौद्ध दर्शन का विवेचन, कुरुक्षेत्र विश्वविद्यालय, कुरुक्षेत्र, 1968
12. उपाध्याय, बलदेव, बौद्धदर्शनमीमांसा, शारदा मन्दिर, वाराणसी, 1946
13. सांकृत्यायन, राहुल, बौद्धदर्शन, किताब महल, इलाहाबाद 1944
14. Cowell, E.B. & Gough A.E. (Eng. Tr.), Sarvadarśanasaṁgraha, Trubner & Co, Ludgate Hill, London, 1882
15. अभ्यङ्करः, काशीनाथ वासुदेव, माधवाचार्यकृतः सर्वदर्शनसंग्रहः, संस्कृतटीका, पुणे
16. कौठिया, , दरबारी लाल , जैनदर्शन और प्रमाणशास्त्र-परिशीलन

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CHOICE BASED CREDIT SYSTEM

Generic Elective Course

प्राचीन-भारतीय-संस्कृतिः, दर्शनं भाषाविज्ञानं च (2)

Prācīna-bhāratīya-saṁskṛtiḥ, Darśanaṁ Bhāṣāvijñānaṁ Ca (2)

Course Code: SHSS SKT 1302 GE 3104

माध्यमः – संस्कृतम्/हिन्दी/आङ्ग्लभाषा

Medium – Sanskrit/Hindi/English

L	T	P	Credits
3	1	0	4

उद्देश्यः/Objective:

1. संस्कृतेतर-विषयाणामध्येतृभ्यः संस्कृताध्ययनाय रुचिरुत्पादनम्; 2. भारतीयज्ञानसंपदाधारभूतानां ईशोपनिषद्-गीता-नीतिशतकादि-ग्रन्थानां परिचयार्थमौत्सुक्यजननम्; 3. संस्कृतेनोपनिबद्धानां नीतिवाक्यानां गीतायां वर्णितस्य आत्मसंयमयोगस्य च महत्त्वप्रतिपादनम्; 4. भाषाशास्त्रस्य सामान्य-परिचयः, अस्याध्ययनाय प्रेरणाप्रदानम्।

पाठ्यक्रमाध्ययनस्य फलम् / Course Level Learning Outcome:

1. अध्येतारः ईशोपनिषदः तत्त्वं ज्ञात्वा अध्यात्मोन्नतिं प्रति प्रयत्नशीलाः भवेयुः।
2. इतरविषयाणामध्येतारः संस्कृतज्ञानेन तेषां प्रमुख-विषयानुगुणं संस्कृतभाषायामुपलभ्यमानानां ग्रन्थानां प्रत्याकृष्टाः भवितुं शक्नुयुः।
3. भारतीयसांस्कृतिकज्ञानस्यानुशीलनेन अध्येतृणां सर्वाङ्गीणा प्रोन्नतिः संभवेत्।
4. उपनिषद्–गीता–नीति–भाषाशास्त्रादीनां विषयाणां सम्यगध्ययनेनास्माकं सांस्कृतिक-परम्परायाः ज्ञानं भवेत्।

पाठ्यक्रमः -

घटकम्-1: ईशावास्योपनिषद्

घटकम्-2: भगवद्गीता - आत्मसंयमयोगो नाम षष्ठोऽध्यायः

घटकम्-3: भर्तृहरिकृतं नीतिशतकम् (51-100 श्लोकाः)

घटकम्-4: प्रमुख-भाषापरिवाराणामध्ययनम्, भारतीय-भाषाणामुद्भवो विकासश्च

अनुशंसितग्रन्थाः -

1. गोयन्दका, हरिकृष्णदास, ईशादि नौ उपनिषद् (शाङ्करभाष्य), गीता प्रेस, गोरखपुर, 2017
2. Śrīmadbhagavadgītā (with English Translation), Gita Press, Gorakhpur, 2016
3. ईशावास्योपनिषद् (शाङ्करभाष्य), गीता प्रेस, गोरखपुर, 2015
4. स्वामी, रामसुखदास, श्रीमद्भगवद्गीता (हिन्दी अनुवाद सहित), गीता प्रेस, गोरखपुर, 2013
5. मुसलगाँवकर, राजेश्वरशास्त्री, नीतिशतकम् with नीतिपथ हिन्दी व्याख्या, चौखम्भा प्रकाशन, वाराणसी, 2011
6. Radhakrishnan, S., The Bhagavadgītā, Harper Collins, Noida, Uttar Pradesh, 2011
7. कुमार, डॉ. सुरेन्द्र (संपा.), संक्षिप्तनीतिशतकम्, देवेश पब्लिकेशन्स, नई दिल्ली, 2008
8. Radhakrishnan, S., The Principal Upanisads, Harper Collins, Noida, Uttar Pradesh, 2006
9. Vidyabhusan, Baladev, Isopanishad, Bhanu Swami Books, 2006
10. Panda, Rabindra Kumar, Satakakāvyas of Bhartṛhari, Bharatiya Kala Prakashan, Delhi, 2006
11. Goyandaka, Jayadayal, Śrīmadbhagavadgītā (with Tattvabodhinī commentary and English Translation), Vishnu Vimal Publication, Vrindavan, 2000
12. शर्मा, देवेन्द्रनाथ, भाषाविज्ञान की भूमिका, राधाकृष्ण प्रकाशन प्रा. लि., नई दिल्ली, 1992
13. सक्सेना, बाबूराम, सामान्य भाषाविज्ञान, हिन्दी साहित्य सम्मेलन, प्रयाग, 1947
14. शर्मा, रामजी, भर्तृहरि–शतक, महाशय श्यामलाल वर्मा आर्य–बुक सेलर, बरेली, 1926

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Annexure-XXIII

Minutes of the Meeting of The Board of Studies

The meeting of the Board of Studies of the Department of Sociology was held on 7th September, 2021, Tuesday through online mode. The following members participated in the discussion:

Dr. Reema Gill, Chairperson and TIC, Department of Sociology, Central University of Haryana	***Prof. Kanwar Chauhan*** External Expert, Professor, Department of Sociology, Maharshi Dayanand University, Rohtak, Haryana
Prof. Sanjiv Kumar, *Head, Department of Sociology, Central University of Haryana*	

Agenda Item 1 To consider andapprove the DRC minutes of the meetings held on 21 May, 2021 and 13 August, 2021.	The expert was appraised regarding the DRC meetings held in May and August, 2021. The DRC had approved synopsis of 2 M.Phil. and 4 Ph.D. Scholars: The synopsis of the following Ph.D. Scholars wasapproved: Name: **Mayank Kumar Mishra** Roll. No. **190527** Title: **Stigma and Life Trajectories: A Study of Hijras in Delhi** Supervisor: **Dr. Reema Gill** Name:**Shalu Yadav** Roll. No. **200496** Title:**Living Experiences of 'Childlessness' Among Females: A Study of Involuntary Infertility in NCR Region of Haryana** Supervisor: Dr. T. Longkoi Khiamniungan Name: **Narendra Singh** Roll No. **200494** Title: **Political Mobilization of Nishad Community in Uttar Pradesh: A Sociological Study** Supervisor:**Dr. T. LongkoiKhiamniungan**

Reema Gill

	Name: **Seema** Roll No. **200495** Title: **Changing Identity Among Scheduled Castes in Haryana: A Sociological Study** Supervisor: **Dr. Yudhvir** The synopsis of the following M.Phil. Scholars wasapproved: Name: **B. Radha Krishna Murthy** Roll No. **200487** Title: **Challenges of Online Teaching and Learning During Covid-19 – A Sociological Study** Supervisor: **Dr. Yudhvir** Name: **Poras Yadav** Roll No. **200488** Title: **Social Stigma During the Covid-19 Pandemic: A Sociological Study of Problems Faced by the Doctors in Mahendergarh District of Haryana** Supervisor: **Dr. Reema Gill**
Agenda Item 2 Regarding the exemption Ms. Seema and Ms. Shalu Yadav, Ph.D. Scholars from Ph.D. coursework.	It was discussed that both Ms. Seema and Ms. Shalu Yadav had submitted an application to the Head of the Department requesting an exemption from Ph.D. coursework indicating that they had already completed their M.Phil. from MDU and CUH, respectively. As per the CUH ordinance II[1], available on the CUH website, it was resolved that as both Ms. Seema and Ms. Shalu Yadav have already completed their M.Phil., from MDU And CUH respectively, they shall be exempted from the Ph.D. coursework.

[1]ORDINANCE- II (A) DEGREE OF DOCTOR OF PHILOSOPHY (Ph.D.) (Amended in accordance with the University Grants Commission (Minimum Standards and Procedure for Award of M.Phil./Ph.D. Degrees) (2nd amendment) Regulations, 2018) (Effective from the Academic Session 2016-17

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Agenda Item 3 To consider and approvethe names of question paper setters and moderators for the term end examination to be held in 2021 and 2022.	The names of question paper setters and evaluators for the term end examination to be held in 2021 and 2022 were considered and approved by the Board of Studies**(Annexure I).**
Agenda Item 4 To inform regarding the admission process adopted by the university due to corona pandemic scenario	The expert was appraised regarding the conduct of CUCET examination in September, 2021 and the results of PG and Research Programmes. The expert was informed that first round of admission to the university is yet to start and will be done by the end of September/October, 2021.

The meeting ended with a vote of thanks to the Chair.

Kanwar Chauhan

Reema Gill

Sanjiv Kumar **Kanwar Chauhan** **Reema Gill**

Question paper setters and moderators for term end examination to be held in 2021-2022 (Annexure I)

S.N.	Course	Nomenclature of Subjects with subject code	Name of the Evaluator & Question Paper Setter
1	M.A. Sociology Semester I	Methodology of Social Sciences	**1. Prof. Rajesh Gill,** Dept. of Sociology, Panjab University, 01722770054, rajeshgill@pu.ac.in **2. Prof. (Retd.) Abdul Matin,** Aligarh Muslim University, Aligarh, 9219173127, amatinamu@gmail.com **3. Dr. Reema Gill,** Assistant Professor,011-26704426, avijit@mail.jnu.ac.in Central University of Haryana, M-9899470775, reemagill@cuh.ac.in

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2		Classical Sociological Tradition	**1. Prof. Paramjit Singh Judge,** Department of Sociology,GNDU, Amritsar, Punjab, E Mail: paramjit.judge@gmail.com, 9417007828 **2. Prof. Abha Chauhan,** Dept. of Sociology, University of Jammu, Jammu M-9419797709, abhaveer@gmail.com **3. Dr. Yudhvir,** Assistant Professor, Central University of Haryana, M-946680715, yudhvirzaildar609@gmail.com
3		Indian Society: Structure and Process	**1. Prof. J.K.Pundir,** Dept. of Sociology, CCS Meerut, CCS Meerut, U.P., M- 9412356649, jk pundir@rediffmail.com **2. Prof. Khazan Singh,** Dept. of Sociology, MDU Rohtak, M- 9896393160, kssangwanmdur@gmail.com **3.Ms. Tanvi Bhati,** Assistant Professor, Department of Sociology, Central University of Haryana, tanvibhati@cuh.ac.in, 9990132161
4		Sociology of Social Stratification in India	**1. Prof. Ajit Pandey**, Professor,Dept. of Sociology, Banaras Hindu University, M-9670554628, ajitpandey2010@yahoo.com 2. **Dr. Martin kamodang,**Assistant Professor, Dept. of Sociology, Jamia MilliaIslamia, M-9899339451, mkamodang@jmi.ac.in 3. **Dr. T. Longkoi,** Assistant Professor, Central University of Haryana, M-7838048537, longkoi2009@gmail.com
5		The Study of Society (GEC)	1. **Dr. Chudamani Basnet,** Assistant Professor, department of sociology, South Asian University, cbasnet@gmail.com, 9818124344 **2. Dr.Neerja Ahlawat**, Assistant Professor, Department of Sociology, M.D.University, Rohtak, 9896062829, neerja mdu@yahoo.com **3. Ms. Tanvi Bhati,** Assistant Professor, Department of Sociology, Central University of Haryana, tanvibhati@cuh.ac.in, 9990132161
6	M.Phil./PhD. Sociology Semester I	Advanced Sociological Theories	**1. Dr. Dr. Sunil Babu C T**, Department of Sociology, Delhi School of Economics, M-8826761879, sunilbabujnu@gmail.com **2. Dr. Temjensosang,** Assistant Professor, Department of Sociology, Nagaland University, M-9436605205,

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			temjenimsong1@gmail.com 3. **Dr. T. Longkoi,** Assistant Professor, Central University of Haryana, M-7838048537, longkoi2009@gmail.com
7		Methodological Perspectives and Techniques of Social Research	1. **Prof. Debal K Singharoy**, Department of Sociology, IGNOU, 011-29536874, 29572718, debal_singharoy@yahoo.co.in **2. Dr.Asheesh Kumar**, Assistant Professor,Dept. of Sociology, JNU, New Delhi, M- 9953665058 asheeshjnu@gmail.com 3. **Dr. Reema Gill,** Assistant Professor, Central University of Haryana, M-9899470775, reemagill@cuh.ac.in
8	M.A. Sociology Semester II	Sociological Theory	**1. Dr. T. Longkoi,** Assistant Professor, Central University of Haryana, M-7838048537, longkoi2009@gmail.com **2. Dr. Neerja Ahlawat**, Assistant Professor, Department of Sociology, M.D.University, Rohtak, 9896062829, neerja_mdu@yahoo.com **3. Dr. Dr. Sunil Babu C T**, Department of Sociology, Delhi School of Economics, M-8826761879, sunilbabujnu@gmail.com
9		Family Life and Kinship in India	**1. Dr. Ankur Dutta,** Department of Sociology, South Asian University, Delhi, ankurdatta@soc.ac.in , 9810170668 **2. Prof. Nilika Mehrotra,** Department of Sociology, JNU, M-9868763516, nilikam@gmail.com 3.**Ms. Tanvi Bhati, A.P,** Assistant Professor, Central University of Haryana, M-8826239638, tabh34@gmail.com
10		Sociology of Gender	**1. Dr. Janaki Abraham,** Associate Professor, Department of Sociology, Delhi School of Economics, DU, M-9891466735, janaki.abraham@gmail.com **2. Dr. Papori,** Assistant Professor, Department of Sociology, JNU, M-011-26708962, paporibora@mail.jnu.ac.in 3. **Dr. T. Longkoi,** Assistant Professor, Central University of Haryana, M-7838048537, longkoi2009@gmail.com
11		Polity and Society in India	**1.Dr. Yudhvir,** Assistant Professor.Central University of Haryana, M- 946680715,

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			yudhvirzaildar609@gmail.com 2. **Prof. K.S.Sangwan,** Retired Professor, MDU, H.N.1169, Sector-1, Rohtak -124001, M-9896393160, kssangwanmdur@gmail.com 3. **Prof. J.K.Pundir,** Dept. of Sociology, CCS Meerut, U.P., M-9412356649, jk_pundir@rediffmail.com
12		Environment and Society	**1. Prof. Jasmeet Sandhu,** Department of Sociology, GNDU, Amritsar, Punjab, M-9872480088, jsmtsandhu@yahoo.com **2. Prof. K.S.Sangwan,** Retired Professor, MDU, H.N.1169, Sector-1, Rohtak -124001, M-9896393160, kssangwanmdur@gmail.com **3.Ms. Tanvi Bhati,** Assistant Prof., Department of Sociology, Central University of Haryana, 9990132161, tanvibhati@cuh.ac.in
13	M.A. Sociology Semester II	Population and Society in India	**1. Prof. Mohan Rao,** Retired Professor, Jawaharlal Nehru University, M-9818498302, mohanrao2008@gmail.com **2. Prof. Ehsanul Haq,** Retired Professor, Jawaharlal Nehru University, M-9868663944, haqjnu@yahoo.com **3.Dr. Reema Gill,** Assistant Professor, Central University of Haryana, M-9899470775, reemagill@cuh.ac.in
14	M.A. Sociology Semester III	Anthropological Theories	**1. Prof. Nilika Mehrotra,** Department of Sociology, JNU, M-9868763516, nilikam@gmail.com **2. Prof. Susan Vishwanathan,** Department of Sociology, JNU, Susanvisvanathan@gmail.com 3. **Dr. T. Longkoi,** Assistant Professor, Central University of Haryana, M-7838048537, longkoi2009@gmail.com
15		Religion and Society in India	1. **Dr. Tanweer Fazal**, Associate Professor, Department of Sociology, JNU, 011-26704426, fazaltanweer@yahoo.co.in 2. **Dr. Amit Kumar Sharma,** AssociateProfessor, CSSS, JNU, 011-26704410, amitjnu@yahoo.com 3. **Ms. Tanvi Bhati, A.P,** Assistant Professor, Central University of Haryana, M-8826239638, tabh34@gmail.com

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16		Economy and Society in India	**1. Prof. Desraj,** Dept of Sociology, MDU, 9416357414, desraj.sabharwal@yahoo.in **2. Prof. Abha Chauhan,** Dept of Sociology, University of Jammu, M-9419797709, abhaveer@gmail.com 3. **Dr. Yudhvir,** Assistant Professor,Central University of Haryana, M- 946680715, yudhvirzaildar609@gmail.com
17		Sociology of Education	**1. Dr. Diya Mehra,** Assistant Professor, Department of Sociology, South Asian University, diya.mehra@sau.ac.in, 9891312908 **2. Dr. Divya Vaid,** Assistant Professor, CSSS, Jawaharlal Nehru University, New Delhi-110067, M-9810055820, divyavaid@mail.jnu.ac.in 3. **Ms. Tanvi Bhati, A.P,** Assistant Professor, Central University of Haryana, M-8826239638, tabh34@gmail.com
18	M.A. Sociology Semester IV	Sociology of Development	**1. Prof. J.K.Pundir,** Dept. of Sociology, CCS Meerut, U.P., M-9412356649, jk_pundir@rediffmail.com **2. Dr. Supriti,** Professor, Dept. of Sociology, MDU Rohtak, 9729680188, supritisocio@gmail.com **3. Dr. Yudhvir,**Assistant Professor, Central University of Haryana, M- 946680715, yudhvirzaildar609@gmail.com
19		Techniques of Social Research	**1. Dr. Divya Vaid,** Assistant Professor, CSSS, Jawaharlal Nehru University, New Delhi-110067, M-9810055820, divyavaid@mail.jnu.ac.in **2. Prof. Rajiv Gupta,** Retired Professor, Rajasthan University, Jaipur, M-9414053641, dr.gupta.rajiv@gmail.com **3. Dr. Reema Gill,** Assistant Professor, Central University of Haryana, M-9899470775, reemagill@cuh.ac.in
20	M.A. Sociology Semester IV	Dissertation Viva Voce, MA. Semester IV	**1.Prof. Kanwar Chauhan,** Dept. of Sociology, MDU Rohtak, M-9416211324, kscmdu@gmail.com **2.Prof. Tanweer Fazal**, Professor, Hyderabad University, fazaltanweer@yahoo.co.in **3. Dr. Amit Kumar Sharma,** AssociateProfessor, CSSS, JNU, 011-26704410, amitjnu@yahoo.com **4.Prof.Arvinder A. Ansari**, Dept. of

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			Sociology, Jamia Millialslamia

Moderators

1. **Prof. Debal K Singharoy**, Department of Sociology, IGNOU, 011-29536874
2. **Prof. Desraj,** Dept of Sociology, MDU, 9416357414, desraj.sabharwal@yahoo.in
3. **Prof. (Retd.) Abdul Matin,** Aligarh Muslim University, Aligarh, 9219173127, amatinamu@gmail.com
4. **Prof. Ajit Pandey,** Professor, Dept. of Sociology, Banaras Hindu University, M- 9670554628, ajitpandey2010@yahoo.com
5. **Prof. K.S.Sangwan,** Department of Sociology, M.D.U, Rohtak, Haryana, 9896393161, kssangwanmdur@gmail.com

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Sanjiv Kumar

Kanwar Chauhan 07/09/24
Prof. Kanwar Chauhan

NEP and Learning Outcome-based Curriculum Framework (LOCF)

For

Master of Arts in Sociology

(Semester-Wise Structure)

Department of Sociology

School of Humanities and Social Sciences

2021

Programme Specific Outcomes

On completion of M. A. in Sociology, the students shall be able to realize the following outcomes:

1. Demonstrate a critical understanding of diverse sociological literature, theoretical perspectives, conceptual issues, and debates in Sociology.

2. Use different sociological theories, concepts, propositions, and methodological perspectives to explain or interpret human behaviour, social issues, and sociological questions.

3. Demonstrate an in-depth understanding of the Indian Society and its various structures and institutions.

4. Describe the fundamental differences in the purposes and procedures of qualitative and quantitative research design.

5. Develop the ability to conduct sociological research, culminating in the successful completion of a Master's thesis under the mentorship of program faculty.

6. Communicate clearly and coherently in written and oral communication to convey sociological concepts and understandings to a broader audience.

7. Evaluate and respond to inequalities that emerge due to gender, class, caste, ethnicity, race, and other primordial identities.

Postgraduate Attributes

Postgraduate students of the M.A. Sociology program are expected to develop and demonstrate the following postgraduate attributes:

Academic Competence: Ability to comprehend current issues in the discipline; ability to engage in current critical debates within the discipline and the ability to communicate complex ideas to expert and non-expert audiences both.

Research Competence: Ability to design and undertake research projects through the use of appropriate methodology; ability to solve complex problems in novel situations.

Critical Self-Awareness and Personal Competence: Demonstrate commitment to continuous self-improvement; ability to lead and organize self and others; make sound and appropriate decisions and to inspire and interact with others in diverse environments.

Digital and ICT Competence: Ability to use a range of technologies for personal, academic, and professional use; ability to use appropriate technology to search for high-quality information; ability to critically evaluate and engage with the information obtained and reflect on it further.

Competencies for Global Citizenship: Show cross-cultural awareness and value human diversity; have knowledge of global perspectives on how disciplinary knowledge is created, represented, and understood within different cultures; awareness of own culture and perspectives; ability to develop the confidence to question one's own values and those of others ethically and with responsibility; actively engage with issues of equity and social justice, sustainability, and reduction of prejudice, stereotyping and discrimination; capacity and willingness to interact and collaborate effectively with others including in teams, in the workplace, and in culturally diverse contexts.

Central University of Haryana

Master of Arts in Sociology (Semester-wise structure)

Semester I

S.No.	Course code	Course title	L	T	P	Credit
1.	SAHS SC 1 1 01 CC 4105	Classical Sociological Tradition	4	1	0	5
2.	SAHS SC 1 1 02 CC 4105	Indian Society - Structure and Process	4	1	0	5
3.	SAHS SC 1 1 03 CC 4105	Methodology of Social Sciences	4	1	0	5
4.	SAHS SC 1 1 04 CC 4105	Sociology of Social Stratification in India	4	1	0	5
5.	GEC	***To be taken from other department***	4	0	0	4

Semester II

1.	SAHS SC 1 1 05 CC 4105	Family Life and Kinship in India	4	1	0	5
2.	SAHS SC 1 1 06 CC 4105	Sociological Theory	4	1	0	5
3.	SAHS SC 1 1 07 CC 4105	Polity and Society in India	4	1	0	5
4.	SAHS SC 1 1 08 CC 4105	Sociology of Gender	4	1	0	5
5.	SAHS SC 1 1 05 GEC 2002	Environment and Society (Compulsory)	2	0	0	2
6.		***Any one of the following five courses***	4	1	0	5
	SAHS SC 1 1 01 DCEC 4105	Population and Society in India				
	SAHS SC 1 1 02 DCEC 4105	Rural Society and Agrarian Change				
	SAHS SC 1 1 03 DCEC 4105	Social Movements				
	SAHS SC 1 1 04 DCEC 4105	Urban Life in India				
	SAHS SC 1 1 05 DCEC 4105	Cinema and Society				

Semester III

1.	SAHS SC 1 1 09 CC 4105	Anthropological Theories	4	1	0	5
2.	SAHS SC 1 1 10 CC 4105	Religion and Society in India	4	1	0	5
3.	SAHS SC 1 1 11 CC 4105	Economy and Society in India	4	1	0	5
4.	SAHS SC 1 1 10 DCEC 0202	Seminar Paper (compulsory)	0	2	0	2
5.	GEC	To be taken from other department	4	0	0	4
6.		Any one of the following four courses	4	1	0	5
	SAHS SC 1 1 06 DCEC 4105	Sociology of Education				
	SAHS SC 1 1 07 DCEC 4105	Sociology of Knowledge				
	SAHS SC 1 1 08 DCEC 4105	South Asian Social Thought				
	SAHS SC 1 1 09 DCEC 4105	Sociology of Health and Medicine				

Semester IV

S.No.	Course code	Course title	L	T	P	Credit
1.	SAHS SC 1 1 12 CC 4105	Techniques of Social Research	4	1	0	5
2.	SAHS SC 1 1 13 CC 4105	Sociology of Development	4	1	0	5
3.	**Skill Enhancement Elective Course (SEEC) (Exclusively for Sociology students)**		**L**	**T**	**D**	**Credit**
	SAHS SC 1 1 01 SEEC 001616	Dissertation	0	0	12	12

List of Generic Elective Course (GEC) offered by the department to students of other departments

S.No.	Course code	Course title	L	T	P	Credit
		Offered in Semester I				
1.	SAHS SC 1 1 01 GEC 4004	The Study of Society	4	0	0	4
2.	SAHS SC 1 1 02 GEC 4004	Women and Society	4	0	0	4
		Offered in Semester III				
3.	SAHS SC 1 1 03 GEC 4004	Indian Society	4	0	0	4
4.	SAHS SC 1 1 04 GEC 4004	Social Movements	4	0	0	4

Semester 1

Course Title: Classical Sociological Tradition

Course Code: SAHS SC 1 1 01 CC 4105

Credits: 5

Course Objectives

The course is designed to introduce the learners of Sociology to the various frameworks, concepts, and theories related to Classical Social Tradition so that they can reflect on the nature and dynamics of society to become independent scholars who might undertake future research in the same.

How to critically analyze the theoretical arguments? How to get the fundamental insights of various sociological theories that further support understanding modern and postmodern sociological theories? How to apply sociological theories in the practical world? These are some of the questions that will be dealt with in the course.

Course Level Learning Outcomes

Upon the completion of the course, some of the learning outcomes that the students of this course are expected to demonstrate are:

1. Students will be able to understand original texts of sociological theorists.
2. They will be able to analyze the theoretical arguments of different scholars critically.
3. Students will be able to reflect and critically analyze the modern and postmodern sociological theories.
4. Students will be able to apply sociological theories to understand the social phenomenon in the practical world.

Unit I: The Positivist Tradition:

Auguste Comte: Social Statics and Social Dynamics; Law of Three Stages; Positive Method.

Herbert Spencer: The Science of Sociology, The Functionalist Doctrine; Organic Analogy.

Emile Durkheim: Study of Society as Things; Social Fact; Division of Labour; Suicide

and Social Interpretation of Religion.

Unit II: The Structural-Functional Tradition:

Bronisław Malinowski: Functionalist in Social Anthropology; Field and Participant Observation; Theory of Needs; Magic, Religion and Science.

Radcliffe Brown: Structural-Functional Approach; Social Structure;

Ethnography Levi Strauss: Social Structure; Conscious and Unconscious

Model

Unit III: The Conflict Tradition:

Karl Marx: Historical Materialism; Mode of Production; Alienation; Class

StruggleLewis Coser: Causes of Conflict; Function of Social Conflict.

Unit IV: Action Theorists:

Max Weber: Sociology of Action; Ideal Types; Authority; Bureaucracy Protestant Ethicsand Spirit of Capitalism

Vilfredo Pareto: Logical and Non-Logical Action; Residue and Derivatives; Circulationof Elites.

George Herbert Mead: Mind, Self and Society

Suggested Readings

Aron, Raymond, 1998. *Main Currents of Sociological Thought Vol. 1 and Vol. 2*. New York: BasicBooks.

Coser, Lewis, 1977. *Masters of Sociological Thought*, HBJ: New York. [Chapters on Marx,Weber and Durkheim]

Durkheim, Emile, 1958. *The Rules of Sociological Method,* Free Press. [Chapter on Social Facts]

Durkheim, Emile, 1977. *Division of Labour in Society*. Free Press, Macmillan. [Chapters I, II & III]

Durkheim, Emile, 2002. *Suicide*: *A Study in Sociology.* London: Routledge, 2002.

George, Simmel, 1971. *On Individuality and Social Forms: Selected Writings*, Chicago: University of Chicago Press. [Chapter II, II and V]

Gerth, H. H. and C. Wright Mills, 1981. *From Max Weber*, Essays in Sociology, OUP.

Giddens, Anthony, 1994. *Capitalism and Modern Social Theory,* Cambridge: CUP. [Especially Chapter Introduction]

Karl, Lowith, 1986. *Max Weber and Karl Marx: Controversies in Sociology*, London: UnionPublication [Chapter on Rationalization]

Marcuse, Herbert, 1967. *Reason and Revolution,* London: Routledge & Kegan Paul, pp. 323-360.

Marx, Karl and Friedrich Engels, 1970. *The German Ideology,* International Publishers Co.

Marx, Karl, 1970. *Contribution to the Critique of Political economy of Progress,* Moscow: Progress Publishers, 1970 pp. 221-30.

Marx, Karl, 1977. *Economic and Philosophical Manuscripts of 1844.* Progress Publication. [Profit of Capital, pp. 36-51, Estranged Labour pp.66-87]

Marx, Karl, 2007. *Capital: A Critique of Political Economy, Volume 1, The Process of Production ofCapital.* New York: Penguin Books, 1993

McLellan, David, 1971. *The Thought of Karl Marx: An Introduction*. London: Macmillan. Pp.117 -192.

Randall, Collins, 1986. *Max Weber - A Skeleton*, California: Sage. [Chapter on Social Action andTypology]

Weber, M, 1949. *The Methodology of Social Sciences*. New York: Free Press.

Weber, M. 1978. *Economy and Society: An Outline Interpretative Sociology* (edited by G. Rothand C. Wittich) Vol. 1., Berkeley: University of California Press. [Part-I, Chapters 1, 2].

Weber, M., 2002. *The Protestant Ethic and the Spirit of Capitalism*, Los Angeles: Blackwell Publishers.

Weber, Max, Hans Gerth and C Wright Mills, 1980. *From Max Weber: Essays in Sociology.* NewYork: Oxford University Press.

Course Title: Indian Society: Structure and Process

Course Code: SAHS SC 1 1 02 CC 4105

Credits: 5

Course Objectives

This course aims to familiarize the students with the various theoretical perspectives, conceptual issues, and debates on Indian society. Learners will also get an opportunity to engage with and understand the various approaches of different scholars while also examining how Indian society has undergone multiple changes over the years. What is the role of the state in the transformation of Indian society? Questions such as these will also be discussed in the present course.

Course Level Learning Outcomes

Upon the completion of the course, some of the learning outcomes that the students of this course are expected to demonstrate are:

1. Develop an understanding of the factors that promote diversity in Indian society.
2. Identify the diverse theoretical perspectives, conceptual issues, and debates in the study of Indian society.
3. Trace the trajectory of social transformation in India.
4. Critically analyze the role of the state, civil society, and other processes such as globalization, urbanization, industrialization, and secularization in Indian society.
5. Utilize their comprehension, analytical, and research skills to undertake independent research on Indian Society in the future if the need arises.

Unit I: Conceptualizing Indian Society

Unity and Diversity: Factors promoting Unity; Factors accounting for social cultural diversity: Caste, religion, ethnicity, region and language.

Unit II: Theoretical Perspectives (a)

- Indological/Textual: G. S. Ghurye and Louis Dumont:
- Structural and Functional Perspectives: M.N Srinivas, S. C. Dube
- Perspective from Below: Dr. B.R. Ambedkar

Unit III: Theoretical Perspectives (b)

- Marxian and Subaltern perspective-D.P. Mukherjee, A.R. Desai, and Ranajit Guha
- Civilizational Perspective-N.K. Bose, and Surajit Sinha

Unit IV: Processes of Change

Social legislations related to land reforms; planned strategy of development, Community Development Plan (CDP) Panchayati Raj Institutions as a statutory body of local self government, industrialization, urbanization, secularization and globalization, role of a state and civil society organizations in social transformations.

Suggested Readings

Ahmad, Imtiaz. et. al., 2000. *Pluralism and Equality: Values in Indian Society and Politics,* New Delhi: Sage.

Alvares, Claude, 1991. *Decolonizing History.* Goa: The Other India Press.

Basham, A. L. (ed), 1975. *A Cultural History of India.* New Delhi: OUP.

Bhargava, Rajeev (ed.), 1998. *Secularism and Its Critics.* New Delhi: OUP.

Barrington, Moore, 1966. *Social Origins of Dictatorship and Democracy: Lord and Peasant in the Making of the Modern World*, Boston: Beacon Press.

Cohn, B. S., 2000. *India: The Social Anthropology of a Civilization*. New Delhi: OUP.

Das, Veena, 1998. *Critical events: An anthropological Perspective on Contemporary India. New Delhi:* OUP.

Dube, S. C., 1990. *Indian Society*, New Delhi: National Book Trust.

Giddens, Anthony, 2013. *Sociology*. New Delhi: John Wiley and Sons.

Dube, S. C. (ed.), 1977. *India Since Independence; Social Report on India 1947-1972,* New Delhi: Vikas.

Dumont, L., 1980. *Homo Hierarchicus*. Chicago: Chicago University Press.

Giri, A. K., 1998. *Global Transformations*. Jaipur: Rawat.

Guha, Ramchandra and Jonathan P. Parry, (eds.), 1999. *Institutions and Inequality: Essays in Honour of Andre Beteille.* New Delhi: OUP.

Inden, Ronald, 1990. *Imaging India*, Oxford: Basil Blackwell.

Kothari, Rajni, 1995. 'Globalisation and Revival of Tradition: Dual Attack on Nation Building', *Economic and Political Weekly*, 625-633.

Madan, T. N., 1987. *Non-Renunciation: Themes and Integrations of Hindu Culture*. New Delhi: OUP.

_____ (ed.), 1991. *Religion in India*, New Delhi: OUP.

Masan, Philip, 1967. *India and Ceylon: Unity and Diversity*, London: OUP.

Mukherjee, Radhakamal, 1965. *The Cosmic Art of India: Symbol (Murti), Sentiment (Rasa) and Silence (Yoga)*, Bombay: Allied.

Nandy, Ashis (ed.), 1998. *The Secret Politics of our Desires: Innocence, Culpability and Indian popular Cinema*, New Delhi: OUP.

Oommen, T. K. and P. N. Mukherji (eds.), 1986. *Indian Sociology: Reflections and Introspections.* Bombay: Popular Press.

Oommen, T. K., 1995. *Alien Concepts and South Asian Reality,* New Delhi: Sage.

_____ 1990. *Protest and Change: Studies in Social Movements*, New Delhi: Sage.

Panikkar, P., 1971. 'Indology as a Cross-Cultural Catalyst: A New Task of Indological Studies', *Cross-Cultural Fertilisation, Numen*, 18 (3), 173-179.

Ram, Nandu, 1995. *Beyond Ambedkar,* New Delhi: Har Anand.

Rudolph, L. I. and S. Rudolph, 1967. *Modernity of Tradition*, New Delhi: Orient Longman.

Singh, Y., 1986. *Modernization of Indian Tradition*, Jaipur: Rawat.

_____ 2000. *Culture Change in India: Identity and Globalization*. Jaipur: Rawat.

Srinivas, M. N. (ed.), 1997. *Caste: Its Twentieth Century Avatar*, New Delhi: Penguin.

Thapar, Romila (ed.), 1977. *Tribe, Caste and Religion in India.* New Delhi: Macmillan.

_____ (ed), 2000. *India: Another Millennium*? New Delhi: Viking.

Uberoi, J.P.S., 1999. *Religion, Civil Society and The State*: *A Study of Sikhism,* New Delhi: OUP.

Unnithan (et al), 1965. *Towards a Sociology of Culture in India: Essays in Honour of Professor D.P. Mukerji,* New Delhi: Prentice-Hall of India (P) Ltd.

Venugopal, C. N., 1998. *Religion and Indian Society*: *A Sociological Perspective*. New Delhi: Gyan.

Course Title: Methodology of Social Sciences

Course Code: SAHS SC 1 1 03 CC 4105

Credits: 5

Course Objectives

The main objective of the course is to comprehend 'science' as a body of knowledge, and its relationship with sociological methods. The course will examine some of the fundamental methodological debates in classical sociology and reflect on the emerging issues relating to methodology in social sciences.

Course Level Learning Outcomes

Upon the completion of the course, some of the learning outcomes that the students of this course are expected to demonstrate are:

1. Learning about 'Scientific' Method, Objectivity and Subjectivity in Research.
2. Understanding of different theoretical perspectives and the nature of knowledge generated by them.
3. Familiarization with the Methodologies a researcher/learner can employ to study a social phenomenon.

Unit I: Introduction to Research Methodology

1. Social research: Scientific Method
2. Objectivity in Research.
3. Science and Common Sense

Unit II: Science as a Body of Knowledge

1. Baconian Induction and Cartesian Deduction
2. Grounded Theory-Glaser and Strauss
3. The Structure of Scientific Revolution-Thomas Kuhn

Unit III: Scientific sociology: Positivism and other Traditions

1. Sociology as Science – Positivism-Auguste Comte
2. Interpretive Sociology-Verstehen-Max Weber

3. Historical/Dialectical Materialism-Karl Marx

Unit IV: Emerging Debates

1. Theory of Structuration-Anthony Giddens
2. Deconstruction and Difference- Jacques Derrida

Suggested Readings

Popper, K. R. (1968). *The logic of scientific discovery.* New York: Harper & Row.

Abraham, F. M. (2014). *Contemporary Sociology: An Introduction to Concepts and Theories.* New Delhi: Oxford University Press.

Betteille, Andre, (1996). Sociology and Common Sense. *Economic and Political Weekly , 31* (35/37), 2361-2365.

Buechler, S. M. (2014). *Critical sociology.* Boulder, CO: Paradigm Publishers.

Durkheim, E. (1958). *The Rules of Sociological Method.* New York: The Free Press.

Coser, L. A. (2014). *Masters of Sociological Thought: Ideas in Historical and Social Context.* Jaipur: Rawat.

Giddens, A. (1993). *New Rules of Sociological Method.* Stanford: Stanford University Press.

Emmanuel, S. M., & Goold, P. A. (2002). *Modern philosophy, from Descartes to Nietzsche: An anthology.* Malden, Mass: Blackwell Publishers.

Bacon, F. (1970). On the Interpretation of Nature and the Empire of Man. In J. E. Curtis, & J. W. Petras, *The Sociology of Knowledge: A Reader* (pp. 89-96). London: Duckworth.

Kuhn , T. (1962). *The Structure of Scientific Revolutions.* Chicago: The University of Chicago.

Marx, K., & Engels, F. (1970). *The German Ideology.* New York: International Publishers Co.

Morrison, K. (2006). *Marx, Durkheim, Weber: Formations of Modern Social Thought.* London: Sage.

Sallis, J. (1987). *Deconstruction and Philosophy: The Texts of Jacques Derrida.* Chicago: University of Chicago.

Turner, J. H. (2013). *Theoretical Sociology: 1830 to the Present.* Thousand Oaks, California: Sage.

Weber, M. (1949). *The Methodology of the Social Sciences.* New York: Free Press.

Adorno, T. W. (1999). *Introduction to Sociology.* Stanford: Stanford University Press.

Babbie, R. E. (2010). *The Practice of Social Research.* Belmont, CA: Thomson Wadsworth.

Flick, U. (2006). *An Introduction to Qualitative Research.* London: Sage.

Gray, D. E. (2014). *Doing research in the real world.* London: Sage.

Luckmann, T. (1978). *Phenomenology and Sociology: selected readings.* New York: Penguin.

Course Title: Sociology of Social Stratification in India

Course Code: SAHS SC 1 1 04 CC 4105

Credits: 5

Course Objectives

This course will familiarize the learners with the concepts of hierarchy, differences, and social mobility. It will also examine the notion of purity and pollution, inequality, politics associated with caste in India. Furthermore, class and occupation, agrarian class, middle class, and industrial society, which form a basis while understanding class in India, will be discussed in this course. The course will also have readings on patriarchy, subordination of women, family and inequality, gender, work and entitlements, community, state, and patriarchy to discuss the domain of gender and stratification.

Course Level Learning Outcomes

Upon the completion of the course, some of the learning outcomes that the students of this course are expected to demonstrate are:

1. Develop a more nuanced understanding of the inequality that exists in society.
2. Understanding of the intricacies of social stratification like caste, class, gender, etc.
3. Identify and reflect on the diverse concepts that exist in the domain of Social Stratification.

Unit I: Social Stratification; Concepts

Social Stratification; Hierarchy and Differences, Social Mobility.

Unit II: Caste in India

Purity and Pollution (Louis Dumont) Sanskritization (M. N. Srinivas), Inequality (A. Beteille). Caste and Politics (Rajni Kothari) Hierarchy and Differences (Dipankar Gupta)

Unit III: Class in India

Class and Occupation (Marx, Weber, Davis, Parsons); Agrarian Class in India; India's Middle Class, Industrial Society in India.

Unit IV: Gender and Stratification

Patriarchy and the Subordination of Women; the Family as a Site of Inequality; Gender, Work and Entitlements; The Community, State and Patriarchy.

Suggested Readings

Agarwal, B, 1988. *Structures of Patriarchy: State, Community and Household in Modernising Asia.* New Delhi: Kali for Women.

_____ 1994. *A Field of One's Own: Gender and Land Rights in South Asia.* New Delhi: Foundation Books.

Ahmad, Imtiaz and Helmut Reifeld (ed.), 2001. *Middle Class Values in India and Western Europe. New Delhi*: Social Science Press. (esp. Chapters 1, 4, 8, 11 and 12).

Banks, M., 1996. *Ethnicity: Anthropological Constructions.* London: Routledge.

Bayly, S. 1999 *Caste, Society and Politics in India from Eighteenth Century to the Modern Age*. Cambridge: Cambridge University Press.

Bendix, R. and S. M. Lipset, 1966. *Class, Status and Power.* New York: Free Press.
Beneria, L (ed.), 1982. *Women and Development: The Sexual Division of Labour in Rural Societies*. New York: Praeger.

Beteille, A., 1917. *Inequality among Men*. Oxford: Basil Blackwell (Chapter on Race).

Bhaduri, A, 1984. The Economic Structure of Backward Agriculture. Delhi: Macmillan.

Bhalla, S, 1976. "New Relations of Production in Haryana Agriculture". *Economic and Political Weekly*. Vol. 11(13), pp. 23-30.

Bhalla Ajit and Frederic Lapeyre, 1997. 'Social Exclusion: Towards an Analytical and Operational Framework', *Development and Change,* Vol. 28 pp. 413-433.

Crompton Rosemary and Michael Mann (eds.), 1986. *Gender and Stratification*, Cambridge: Polity Press. (esp. Chapters 1, 2, 3, 4, 7, 9, 13, 14)

Dahrendorf, R., 1959. *Class and Class Conflict in Industrial Society*, CA: Stanford University Press.

Das, Veena, 1990. *Mirrors of Violence: Communities, Riots and Survivors in South Asia*, Delhi: Oxford University Press. (Chapters 1, 12 and 14).

Desai, A. R., l948. *Social Background of Indian Nationalism*, Bombay: Popular Prakashan.

Dirks, N. B., 2001. *Castes of Mind: Colonialism and the Making of Modern India.* Princeton: Princeton University press.

Edgell, Stephen, 1993. *Class (Key Ideas series)*. London: Routledge.

Frankel, F. and Rao, 1999; 2000. *Domination and State Power in Modern India: Decline of a Social Order*, Volumes I & 11, Delhi: Oxford University Press.

Fuller, C. J., 1996. *Caste Today,* Delhi: Oxford University Press.

Giddens, A., 1980, *The Class Structure of the Advanced Societies*. London: Unwin.

_____ 1989. Sociology. Cambridge: Polity Press.

Gupta, Dipankar, 1991. Social Stratification. Delhi: Oxford University Press.

_____2000. Interrogating Caste: Understanding Hierarchy and Difference in Indian Society. New Delhi: Penguin (Chapter 4).

Hechter, M. and D. Okamoto, 2001. 'Political Consequences of minority Group Formation', *Annual Review of Political Science*. 4:189- 215.

Jodhka S. S., 2005. 'Caste and Democracy: Assertion and Identity among the Dalits of Rural Punjab. *Sociological Bulletin*.

Klass, M., 1983. *Caste: The Emergence of the South Asian Social System.* Philadelphia: ISHA.

Ludden, D., 1997. *Making India Hindu: Religion: Community and the Politics of Democracy in India*. Delhi: Oxford University Press.

Marshall, T. H., 1950. *Citizenship and Social Class. Cambridge*, Cambridge University Press (essay on citizenship).

Marx K. and F. Angels, 1962. 'Manifesto of the Communist Party', in *Selected Works Vol. I.* Moscow: Progress Publishers.

Mies, M., 1981. 'Dynamics of Sexual Division of Labour and Capital Accumulation: Women Lace-Workers of Narsapur', *Economic and Political Weekly*, Vol. XVI no. 10, 11, 12.
Mishra, B. B., 1961. *The Indian Middle Class: Their Growth in Modern Times*, Bombay: Oxford University Press.

Moffat, M., 1979. *An Untouchable Community in South India*, Princeton: Princeton University Press

Mukherjee, A., 2002. *Imperialism, Nationalism and the Making of the Indian Capitalist Class, 1920-1947,* Delhi: Sage Publications.

Pandey, G., 1999. 'Can a Muslim be an India?', *Comparative Study of Society and History*. Pp. 608-629.

Parsons, T. et. al., 1967. *Theories of Society: Foundations of Modern Sociology Vol. I.*, Glencoe: The Free Press.

Quibriathe M. G., 2003. Puzzle of Social: Capital A Critical Review*, Asian Development Review*, vol. 20, no. 2, pp. 19-39

Quigley, D., 1993, *The Interpretations of Caste*, Delhi: Oxford University Press.

Raheja G. G., 1988. *The Poison in the Gift: Ritual, Presentation and the Dominant Caste in a North Indian Village,* Chicago: University of Chicago Press.

Rao, Anupama (ed.), 2003. *Gender And Caste*, New Delhi: Women Unlimited.

Sease Richard, 1992. *Class,* Buckingham: Open University Press.

Shah, A.M. et.al. (eds.), 1996. *Social Structure and Change*, Vol. 2. (Women in Indian Society). New Delhi: Sage Publications.

Sharma, K. L., 1997. *Social Stratification in India: Issues and Themes,* New Delhi: Sage Publications. (Chapter 3, 4 and 6).

Singh, Y., 1977. *Social Stratification and Social Change in India,* Manohar: Delhi. Sorokin, P. A., 1927. *Social Mobility,* New York: Harper.

Srinivas, M. N., 1962. 'Varna and Caste', in *Caste in Modern India and Other Essays*.

_____ (ed.), 1996. *Caste: Its Twentieth Century Avatar*, New Delhi: Penguin.

_____ 1994. *The Dominant Caste and Other Essays,* Delhi: Oxford University Press.
Thorner, A., l982. 'Semi-Feudalism or Capitalism?, Contemporary Debate on Classes and Modes of Production in India', *Economic and Political Weekly,* Vol. 17(49-51) pp. 993-99; 2061-86.

Tumin Melvin, M., 1987. *Social Stratification: the forms and functions of inequality,* New Delhi: Prentice-Hall of India.

Unni, Jeemol. 'Earnings and Education among Ethnic Groups in Rural India', Working Paper Series No. 79, New Delhi: NCERT

Varma, P. K., 1998. *The Great Indian Middle Class*, New Delhi, Viking.

Gerth, H. and C. Wright Mills (eds.), 1948. *From Max Weber*, London: Routledge and Kegan Paul.

Wiener, M., 1978. *Sons of the Soil: Migration and Ethnic Conflict in India*, Princeton: Princeton University Press.

Xaxa, V., 2003. 'Tribes in India', in Veena Das (ed.) *Oxford India Companion to Sociology and Social Anthropology*, Volume I, pp. 373-408, Delhi: Oxford University Press.

Semester II

Course Title: Family Life and Kinship in India

Course Code: SAHS SC 1 1 05 CC 4105

Credits: 5

Course Objectives

This course aims to introduce the students to the universally acknowledged concept/institution of family, marriage, and kinship. This course will also familiarize the students with different approaches, issues, and debates in studies of family, marriage, kinship, and the changing nature of family and kinship relations in the modern world. Moreover, exposure to the different approaches, issues, and debates in studies of kinship and family in India will enable the student to understand the social structure of their society.

Course Level Learning Outcomes

Upon the completion of the course, some of the learning outcomes that the students of this course are expected to demonstrate are:

1. Understanding of the specialized terminology associated with the subject.
2. Identify the diverse theoretical perspectives, conceptual issues, and debates in the study of family and kinship.
3. Distinguish between the alliance and descent models in the study of kinship.
4. Elaborate on the nature of family, marriage, and household in India and the forces of change.

Unit I: General Principles and Basic Concepts

Nature and significance of the subject; Kinship studies in the world and in India;
Approaches: Historical and Evolutionary, Structural Functional, Structural, Cultural, Gender perspective.

Unit II: Descent Model

Kinship as an organizing principle: Descent: Patrilineal, Matrilineal, Double and Cognate descent, Complimentary Filiation, Descent groups, Corporate groups and Local groups.

Unit III: Alliance Model, Marriage and Affinity

Alliance theory: Symmetrical and Asymmetrical exchange; Prescriptive and Preferential marriage; Monogamy and Polygamy; Marriage transactions; Stability of marriage; Rules of residence: Virilocal, Uxorilocal, Neolocal and Natolocal residence.

Unit IV: Family, Marriage and Household in India

Family: Nature of the family; Family and Household; Elementary and extended family; Family and marriage in India: Regional diversities; Forces of change.

Suggested Readings

Ahmad, Imtiaz (ed.), 1976. *Family, Kinship and Marriage among Muslims in India,* New Delhi: Manohar

Das, Veena, 1973. 'The structure of marriage preference: An account from Pakistan fiction', *Man*, (n.s.) Vol. 8, No. 1, pp. 3045.

Dube, Leela, 1974. *Sociology of Kinship: An analytical survey of Literature*, Bombay: Popular Prakashan.

_____ , 1997. Kinship and Women. Delhi: Vistaar Publications

Dumont, L., 1961. 'Descent, Filiation and Affinity', *Man* 61, 11, pp. 24-25.

Dumont, L., 1983. *Affinity as a Value: Marriage alliance in South India with comparative essays on Australia*, Chicago: University of Chicago Press.

Fortes, Mayer, 1953. 'The Structures of Unilineal Descent Groups', *American Anthropologist* 55, pp. 17-41 (Reprinted in M. Fortes, 1970, *Time and Social Structure and other essays*. London: Athlone Press).

Fuller. C. J., 1976. *The Nayars Today,* Cambridge: Cambridge University Press.

Goody. J., 1976. *Production and Reproduction: A Comparative study of the Domestic Domain*, Cambridge: CUP.

Goody, J. and Tambiah. S. J., 1973. *Brideswealth and Dowry*, Cambridge: CUP.

Goode, William. J. 1987. The Family. New Delhi: Prentice-Hall of India, Private Limited. Ch.10: Understanding Family Change: Theory and Method. Pp. 168-178.

Gough, Kathleen, 1959. 'Nayars and the Definition of Marriage', *Journal of Royal Anthropologist Institute,* R9, pp. 23-34, (Reprinted in P. Uberoi (ed.) 1993.)

Gray, John N. and Mearus. David J., 1989. Society from the Inside Out, New Delhi: Sage (esp. Introduction).

Hershman, Paul, 1981. *Punjabi Kinship and Marriage*, Delhi: Hindustan Publishing Corporation.

Karve, Iravati, 1953/65/68. *Kinship Organization in India*. Bombay: Asia Publishing House, (3rd revised edition). Sec also, Karve, "The Kinship Map of India," in P. Uberoi (ed.), 1993, pp. 50-73.

Kath, W. 1991. Families we Choose, Lesbians, Gays, Kinship. New York: Columbia University.

Kolenda, Pauline, 1987. *Regional Differences in Family Structure in India*, Jaipur: Rawat.
Leach, E. R., 1961. *Rethinking Anthropology,* London: Athlone Press. (esp. Chapters 1 &3).

Levi-Strauss, Claude, 1969. *Elementary Structure of Kinship*, London: Eyre and Spottiswoode.

Madan, T. N., 1965/89. *Family and Kinship: A Study of Pandits of Rural Kashmir*, Delhi: OUP, (2d revised edition).

_____ , 1965. 'Structural Implication of Marriage in North India: Wife givers and Wife Takers among the Pandits of Kashmir', *Contribution to Indian Sociology*, n. s. 9(2). pp. 217-43.

Mayer, Adrian C., 1960. *Caste and Kinship in Central India: A Village and its Region*, London: Routledge and Kegan Paul.

Maynes, Mary Jo et al, 1996. *Kinship, Gender and Power: A Comparative and Interdisciplinary History*, New York: Routledge.

Murdock, G. P., 1949. *Social Structure*, New York: Free Press.

Nakane, Chie, 1967. *Garo and Khasi: A Comparative Study in Matrilineal Systems*, Paris: Mouton.

Papanek, Hannah, 1989/90. "Socialization for Inequality: Issues for Research and Action', *Samya Shakti: A Journal of Women's Studies*, 4 &5 pp l-10.

Pahl, R & Spencer. L. 2010. 'Family, Friends and Personal Communities: Changing Models-in-the-Mind', Journal of Family Theory & Review 2. September, pp.197-210.

Palriwala R. and C. Risseeuw (eds.), 1996. *Shifting Circles of Support; Contextualising Kinship and Gender in South Asia and Sub Saharan Africa*, Delhi: Sage.

Parry, Jonathan, 1979. *Caste and Kinship in Kangra*, London: Routledge and Kegan Paul.

Patel, T. (ed.).2005. The Family in India: Structure and Practice. New Delhi: Sage

Radcliffe-Brown, A. R. and Daryl Forde, (eds.) 1950. *African Systems of Kinship and Marriage*, London: OUP. (esp. Introduction and chapter by A. L. Richards).

Raheja G. G., 1988. *The Poison in the Gift: Ritual, Presentation and the Dominant Caste in a North Indian Village,* Chicago: University of Chicago Press.

Sen, Amartya, 1983. 'Economics and the Family', in *Asian Development Review*. 1 &2 pp. 14-26. (Reprinted in P. Uberoi, 1993).

Schneider, D. and K. Gough, 1961. *Matrilineal Kinship*. Berkeley: University of California Press.

Shah, A. M., 1973. *The Household Dimension of the Family in India*, Delhi: Orient Longman.

Sharma, Ursula, 1980. *Women, Work and Property in N. W India*. London: Tavistock.

Simpson, B. 2004, "Gays, Paternity and Polyandry: Making Sense of New Family Forms in Contemporary Sri Lanka", in Radhika Chopra, Caroline Osella and Filippo Osella (eds.), South Asian Masculinities: Context of Change, Sites of Continuity, Delhi: Kali for Women, pp. 160-174.

_____, 1984. "Dowry in North India: Its Consequences for Women," in Renee Hirschon (ed.) *Women and Property: Women as Property*, London: Croom Helm, pp. 62-74.

Srinivas, M. N., 1984. *Some Reflection on Dowry*, Delhi: OUP.

Trautman, Thomas R., 1981. *Dravidian Kinship*, Cambridge University Press.

Uberoi, Patricia, (ed.), 1993. *Family, Kinship and Marriage in India*, Delhi: OUP.

Uberoi, Patricia. 2009. Your Law and My Custom: Legislating the Family in India. New Delhi: Critical Quest. Pp. 1-24.

Vatuk, Sylvia, 1975. 'Gifts and Affines in North India,' *Contributions in Indian Sociology*, No. 9, pp. 155-96.

Wilt, Richard R. and Robert Me L. Netting, 1984. 'Households: Changing forms and Functions' in Netting et al. (eds.) *Households: Comparative and Historical Studies of the Domestic Group,* Berkley, University of California Press, pp. 1-28.

Course Title: Sociological Theory

Course Code: SAHS SC 1 1 06 CC 4105

Credits: 5

Course Objectives

Having a sound knowledge of various theories in the domain of Sociology is essential for the learners of this discipline to analyze the social phenomenon through a Sociological lens and undertake future research on the same. Thus, this course has been designed with the aim to acclimatize the students with advanced Sociological theory. While doing that, the focus will be to build on the prior knowledge of the students. This course has units to make them well acquitted with theories that form an integral part of sociological studies.

Course Level Learning Outcomes

Upon the completion of the course, some of the learning outcomes that the students of this course are expected to demonstrate are:

1. Sound understanding of Sociological theories that would be useful for research in the future.
2. Identify the theoretical base and draw the practical knowledge.

Unit I: Functional and Non-functional

T. Parsons: Social systems, Pattern Variables.
R. K Merton: Latent and Manifest Functions, Conformity and Deviance, Reference Groups
Middle Range Theory, New Functional Theory
Jeffrey Alexander: Neo -Functionalist

Unit II: Structuralist Theory:

S. F. Nadel: Social Structure
A. Giddens: Theory of Structuration
M. Foucault: Idea of Power

Unit III: Critical and new Marxian Theory

J. Habermass: Theory of Communication
Louis Althusser: Marxist Structuralism
Gramsci: Hegemonic Theory

Unit IV: Phenomenology and Ethnomethodology:

Alfred Schultz: Phenomenology of Social World

Peter Berger and Luckmann: Social Construction of Reality
Erving Goffman: Dramaturgical Theory

Suggested Readings

Alexander, Jeffrey C. (ed.), 1985. *Neofunctionalism*, London: Sage.

Althusser, L., 1971. *Lenin and Philosophy and Other Essays,* New York: Monthly Review Press.

Appelrouth, Scott and Laura D. Edles, 2008. *Classical and Contemporary Sociological Theory: Text and Readings*. Los Angeles: Pine Forge Press.

Bourdieu, Pierre, 1990. *In Other Words: Essays Towards a Reflexive Sociology*, Oxford: Polity Press.

Connerton, Paul (ed.), 1976. *Critical Sociology*, Harmondsworth: Penguin.

Dahrendorf, Ralf, 1979. Class and Class Conflict in Industrial Society, London: Routledge and Kegan Paul.

Giddens, Anthony, 2004. *In Defense of Sociology*. Cambridge: Polity Press.

Giddens, Anthony and Turner, J. H. (ed.), 1987. *Social Theory Today*. Cambridge: Polity Press.
Gouldner, Alvin, 1971. *The Coming Crisis of Western Sociology*. London: Heinemann.

Gramsci, Antonio, 1971. *Selections from the Prison Notebooks*, London: Lawrence and Wishart.

Luckmann, Thomas. (ed.) 1978. Phenomenology and Sociology: Selected Readings. New York: Penguin Books.

Mennell, Stephen, 1980. *Sociological Theory: Uses and Unities.* Surrey: Thomas Nelson and Sons, 2nd Edition.

Merton, Robert K., 1968. *Social Theory and Social Structure*, New York: Free Press.

Parsons, Talcott (et al.), 1965. *Theories of Society: Foundations of Modern Sociological Theory*, New York: Free Press.

Rabinow, Paul (ed.), 1986. *The Foucault Reader*, Harmondsworth: Penguin.

Ritzer, George (ed.), 2007. *The Blackwell Encyclopedia of Sociology*, Oxford: Blackwell.

Seidman, Steven and Alexander, J. C. (ed.), 2001. *New Social Theory Reader: Contemporary Debates,* London: Routledge.

Skinner, Quentin (ed.), 1990. *The Return of Grand Theory in the Human Sciences.* Cambridge: Cambridge University Press.

Smith, Dorothy E., 1999. *Reading the Social: Critique, Theory and Investigations,* Toronto: University of Toronto Press.

Wright, Mills, C., 1959. *The Sociological Imagination,* New York: Oxford University Press.

Course Title: Polity and Society in India

Course Code: SAHS SC 1 1 07 CC 4105

Credits: 5

Course Objectives

The course is designed to introduce the learners of Sociology to the various frameworks, concepts, and theories related to the role of polity in Indian society so that they can reflect on the nature and dynamics of political movements in Indian society.

How and when do groups mobilize and resist power? What is the role of ideology and leadership in Society? What are the reasons for the emergence of different political movements in society? How crucial are human rights and political movements in social change? Questions such as these will be discussed in the course.

Course Level Learning Outcomes

Upon the completion of the course, some of the learning outcomes that the students of this course are expected to demonstrate are:

1. Understanding about the social system of Indian society.
2. Knowledge about the importance of human rights, responsibilities, human dignity, and democratic modes of governance.
3. Students can understand and learn about the meaning and importance of sustainable development.
4. They will be able to actively participate in social and political activities of their society
5. It will help students in critical and independent thinking.
6. It will help students in capacity building for engagement in peaceful and democratic means of resolving conflicts.
7. It will help students inculcate a sense of care and respect for others and value diversity in all areas of human life within the parameters of human rights principles.

Unit I: Meaning, Definition and Scope of Political Sociology; Inter-Relationship between Political and Society; Distinctive Approaches of Political Sociology.

Unit II: Indian Society and its Power Matrix: Caste and Class, Gender and Politics, Politics of Minorities, Crime Politics Nexus.

Unit III: Political Modernization; Forms of Government; Political Culture– Meaning and Significance; Political Socialization– Meaning, Significance and Agencies.

Unit IV: Political Parties: Characteristics, Social Composition of Parties, Political Apathy: Its Causes and Consequences, Media and Politics, Politicization of social life, Contemporary trends in Political Sociology in India.

Suggested Readings

Anderson, Benedict, 1983. *Imagined Communities: Reflections on the origin and Spread of Nationalism*, London: Beso.

Bayly, Susan, 2000. *Caste, Society and Politics*, Cambridge: OUP.

Beteille, A., 1966. *Caste, Class and Power*, Cambridge: OUP.

Biswas, Dipti Kumar, 1989. *Political Sociology*, Calcutta: Firma KLM Private.

Blau, P., 1956. *Bureaucracy in Modern Society*. Random House: New York.

Bottomore, T. B., 1979. *Political Sociology*, New Delhi: OUP.

Chatteijee, P., 1997. *State and Politics in India,* Delhi, OUP.

Cohn, B. S., 1989. *An Anthropologist Among Historians and Other Essays*, New Delhi OUP.

Desai, A. R., 1968. *Social Background of Indian Nationalism* Bombay: Popular.

Dowse, R. E. & Hughes 1971. *Political Sociology*, New York: Basic Book.

Drez, J. and Amartya Sen, 1997. *Indian Development,* Delhi: OUP.

Frankel, Fand and M.S.A. Rao, 1989. *Dominance and State Power in Modem India*, Delhi: OUP.

Gabriel, Almond A. et.al., 1973. *Crises, Choice and Change: Historical Studies of Political Development*, Boston.

Gandhi, M. K.. 1968. *Hind Swaraj*, Ahmedabad: Nayjeevan.

Horowitz, Irving L., 1972. *Foundation of Political Sociology*, New York: Harper and

Huntington, Samuel P., 1969. *Political Order in Changing Societies*. Yale University Press: New Haven.

Kaviraj, Sudipta, 1997. *Politics in India,* New Delhi: OUP.

Kohli, Atul, 2002, *The Success of India's Democracy*, Cambridge: OUP.

Kothari, Rajani (ed), 1973. *Caste in Indian Politics*, New Delhi: Orient Longmans Ltd.

_____ 1979. *Politics in India*, New Delhi: Orient Longmans Ltd.

Kumar, Anand, 1989. *State and Society in India*, New Delhi: Radiant.

_____, 2000, *Nation Building in India*, New Delhi: Radiant.

Lipset, S. M., 1959. *Political Man*, H.E.B.

Michels, Robert, 1949. *Political Parties*, Glencko: Free Press.

Mills C. W. and Hans Gerth, 1946. *Essays in Sociology*. Oxford: New York

Mitra, Subratha K., 1992. *Power Protest and Participation – Local Elites and the Politics of Development in India*. Delhi: Routledge.

Moore, Barrington Jr., 1958. *Political Power and Social Theory*, Cambridge: Harvard University Press.

Oommen. T. K. 1990. *State and Society in India*, New Delhi: Sage.

Rao, M.S.A. 1978. *Social Movements in India*, New Delhi: Monohar.

Rudolph, L. and S. Rudolph, 1978. *In pursuit of Laxmi*, New Delhi: OUP. Singh,

Yogendra, 1978. *Modernization of Indian Tradition*, Delhi: Thompson.

_____, 2000. *Cultural Change in India*, New Delhi, 2000

Course Title: Sociology of Gender

Course Code: SAHS SC 1 1 08 CC 4105

Credits: 5

Course Objectives

Over the years, in academics, Gender as a field of study has gained popularity. Sociology is not an exception to it. Hence, this course will study the dual relationship between Gender and Sociology. To make this course engaging and fitting for the intellectual quest of the students, this course will provide audio-visual aids, and there will be interactions regarding various topics.

Course Level Learning Outcomes

Upon the completion of the course, some of the learning outcomes that the students of this course are expected to demonstrate are:

1. Understanding of the social construction of Gender.
2. Reflect on Liberalist, Radical, Marxist, and Post-Marxist theories of Gender relations.
3. Ability to delve into the discourse of politics of Gender.
4. Analyse development policies on Gender.

Unit I: Basic Concepts: Sex and Gender; Gender as a Social Construct; Social Structure and Inequality; Patriarchy-Matriarchy; Division of Labour- Production and Reproduction; Gender Roles.

Unit II: Theories of Gender Relations: Liberalist, Radical, Marxist and Post-Modernist.

Unit III: Politics of Gender: Complementarity; Inequality; Dependence; Subordination

Unit IV: Gender and Development: Development Policies on Gender; Gender, Development and Empowerment.

Audio-Visual aids will be part of the Classroom Lectures and Interactions.

Suggested Readings

Beauvoir, Simone De, 1983. *The Second Sex*, Harmondsworth: Penguin.

Cavallaro, Dani, 2003. *French Feminist Theory,* New York: Continuum.

Chakrawarti, Uma, 2006. *Gendering Caste: Through a Feminist Lens*, Kolkata: Stree.

_____ 1993. 'Conceptualizing Brahmanical Patriarchy in Early India: Gender,Caste and Class the State'. *Economic and Political Weekly*, 28 (14), 579-585.

_____ 1995. Gender, Caste and Labour Ideological and Material Structure of Widowhood. *Economic and Political Weekly*, 30(36), 2248-2256.

Chowdhry, Prem, 2014. "Masculine Spaces: Rural Male Culture in North India". *Economic and Political Weekly*, 49 (47), 41-49.

DeVault, Marjorie L., 1996. 'Talking Back to Sociology: Distinctive Contributions of Feminist Methodology', *Annual Review of Sociology,* 22, 29-50.

Engels, F., 2010. *The origin of the Family, Private Property and the State,* New Delhi: Peoples Publishing House.

Agnes, Flavia, 2000 *Women, Marriage and the Subordination of Rights in Community, Gender and Violence.* Subaltern Studies XI. New Delhi: Permanent Black.

Gopal, M., 2013. Ruptures and Reproduction in Caste/ Gender/ Labour, *Economic and Political Weekly*, 48(18) 91-97.

Ghosh, G. K. and Shukla Ghosh, 1997. *Dalit Women*. New Delhi: A.P.H Publication. Giddens, Anthony, 2013. *Sociology.* New Delhi: John Wiley and Sons.

Guru, G., 1995. 'Dalit Women Talk Differently', *Economic & Political Weekly*, 14, (21), 2548 49.

Halberstam, Judith, 1998. *Female Masculinity,* London: Duke University Press.

Harding, Sandra (ed,.), 1987. *Feminism and Methodology,* Bermington USA: Indiana University Press.

_____ 1991. *Whose Science? Whose Knowledge: Thinking from Women's Lives,* Ithaca, New York: Cornell University Press.

Hasan, Zoya and Menon Ritu, 2004. *Unequal Citizens: A Study of Muslim Women in India.* New Delhi: Oxford University Press.

Kannabiran, V. and Kannabiran. K. 2003. 'Caste and Gender: Understanding Dynamics of Power and Violence, in Anupama Rao (ed). *Gender and caste*, New Delhi: Kali for Women.

Bhasin, Kamla, 2000. *Understanding Gender* (Kali Primaries) New Delhi: Kali for Women.

Kent, K. Susan, 2012. *Gender and History.* England: Palgrave Macmillian.

Khiamniungan, Longkoi, T., 2013. 'Gender and Democracy: Disparity in Women's Political Representation in Nagaland', *Eastern Quarterly,* 9 (III-IV).

Kimmel, S. Michale and Amy Aroson, 2008. *The Gendered Society,* New York: OUP.

Menon, Nivedita, 2000. 'Embodying the Self: Feminism, Sexual Violence and the Law', in Partha Chatterjee and Pradeep Jeganathan (eds.) *Subaltern Studies XI: Community, Gender and Violence.* New Delhi*:* Permanent Black.

_____ 2000. 'Elusive Women: Feminism and Women's Reservation Bill', *Economic and Political Weekly*, 35, (43/44), 53835-3844.

Nongbri, Tiplut, 2003. *Development, Ethnicity and Gender: Select Essays on Tribes in India,* New Delhi: Rawat Publications.

Oakley, Ann, 1972. *Gender, Sex and Society,* London: Maurice Temple Smith Ltd.

Panjabi. Kavita and Paromita Chakravarti, 2012. *Women Contesting Culture: Changing of Gender Politics in India,* Kolkata: Stree.

Puwar, Nirmal and Parvati Raghuram. 2003. *A Kiss is Just a Kiss OR is it? South Asian Lesbian and Bisexual Women and the Construction of Space*, New York: Berg Publishers.

Rao, Anupama, 2002. *Issues in Contemporary Indian Feminism: Gender and Caste*, New Delhi; Kali for Women.

Rege, Sharmila. 1998. 'Dalit Women Talk Differently: A Critique of 'Difference' and Towards Dalit Feminist Standpoint Position', *Economic and political Weekly*, 31(6) 39-46.

_____ 2000. 'Real Feminism' and Dalit Women: Scripts of Denial and Accusation', *Economic and Political Weekly*. 35, (6), 492-495.

Tong, Marie, 2009 "Feminist Thought: A More Comprehensive Introduction". North Carolina: West View Press.

Course Title: Environment and Society

Course Code: SAHS SC 1 1 05 GEC 2002

Credits: 2

Course Objective

The objective of the course is to familiarize the students with the conceptual and theoretical perspectives related to Environment and Society.

Course Level Learning Outcomes

Upon the completion of the course, some of the learning outcomes that the students of this course are expected to demonstrate are:

1. Understanding of the different types of environmental issues and problems.
2. Identify the diverse theoretical perspectives and conceptual issues in environmental Sociology.
3. Understanding of the different theoretical perspectives of scholars on environmental concerns.
4. Elaborate on the issues pertaining to development and sustainability.

Unit I: Environmental Sociology:

The Rise, Decline and Resurgence of Environmental Sociology

Environmental Discourse: The trajectory of social ecology, Global Environmental problem.

Unit II: Classical Sociological Tradition

Marx, Durkheim and Weber on Environmental Concerns; R. Mukherjee and Ramachandra Guha; Elements and Basic Categories of Social Ecology

Unit III: Environmental Issues and Problems: Population, Water, Sanitation, Energy, Housing, Urban development and rural poverty.

Unit IV: Environment and Interest Groups: Issues and Concerns in the context of Nationhood and State; issues pertaining to Development and Sustainability as Social Change; emergence model of Environment and Society.

Suggested Readings

Agrawal, Arun & K. Sivaramakrishnan (ed.), 2001. *Social Nature: Resources, Representations and Rule in India.* New Delhi: OUP.

Barry, Commoner, 1971. *The Closing Circle: Nature, Man and Technology*. New York: Random House Inc.

Brara, Rita. 2003. 'Ecology and Environment' in Veena Das (Ed.) The Oxford India Companion to sociology and social anthropology.

Chaudhary, Sukant K., 2014. *Sociology of Environment*. New Delhi: Sage Publications

Dave & Katewa, 2012. *Textbook of Environment Studies*, New Delhi: Cengage Learning India.

Descola, Philippe and Gisli Palsson. 1996. Nature and society. Anthropological perspectives. Routledge; London.

Eugene. 1989. Foundations of environmental ethics. Prentice Hall; New Jersey.

Franklin, Adrian, 2002. *Nature and Social Theory*. London: Sage.

Giddens, Anthony, 2013. *Sociology.* New Delhi*:* John Wiley and Sons.

Goldfrank, Walter, David Goodman, and Andrew Szasz (Ed.), 1999. Ecology and the world- system. Greenwood Press: London.

Gosling, David, 2001. Religion and Ecology in India and South Asia. Routledge.

Grove, Richard, Vinita Damodaran and Satpal Sangwan (Ed.), 1998. Nature and the orient. OUP: New Delhi.

Guha, Ramachandra (ed.), 1994. *Social ecology*, New Delhi: OUP.

_____ 2000. *Environmentalism: A Global History*. New Delhi: OUP.

Guha, Sumit, 1999. *Environment and Ethnicity in India 1200-1991,* Cambridge: Cambridge University Press.

Hughes, Jonathan, 2000. Ecology and Historical Materialism, Cambridge University Press; Cambridge.

Jeffery, Roger and Nandini Sunder (ed.), 1999. *A New Moral Economy for India's forests?: Discourses of Community and Participation*, New Delhi: Sage.

Martell, Luke, 1995. *Ecology and Society: An Introduction*. U. K.: Polity Press. Mukherjee, Radhakamal, 1942. *Social Ecology.* London: Longmans.

Murphy, Raymond, 1994. *Rationality and Nature: A Sociological Enquiry into a Changing Relationship.* USA: West view Press.

Pepper, David, 1996. *Modern Environmentalism: An Introduction,* London: Routledge.

Redclift, M. and Ted Benton, (ed.), 1994. *Social Theory and Global Environment,* London: Routledge.

Course Title: Population and Society in India

Course Code: SAHS SC 1 1 01 DCEC 4105

Credits: 5

Course Objectives

The course aims at making the learner aware of the relationship between demography and sociology. The course will provide an overview of the major processes bringing change in the population of a society. It will help the students develop an understanding of how different aspects of the population are affected by various socio-cultural, political, economic, health, and other factors. The learners will get an overview of the major theoretical orientations in the field. A field-based report will be part of the course to provide in-depth knowledge about the implementation of population policy in the country.

Course Level Learning Outcomes

Upon the completion of the course, some of the learning outcomes that the students of this course are expected to demonstrate are:

1. Understanding the interface between population and society.
2. Familiarization with different theoretical approaches to population.
3. Learn about different demographic processes and policies with reference to Indian Society.

Unit I: Population and Society: a general overview

Nature, scope and characteristics of social demography and its relationship with sociology, economics, history and politics

Unit II: Theoretical Approaches to Social Demography

1. Malthusian
2. Demographic Transition
3. Marxist

Unit III: Demographic Processes

1. Fertility
2. Mortality
3. Migration.

Unit IV: Implementation of Population Policy in India: Learnings from the Field

A Report based on the implementation of population policy and family planning programme at the selected District and State Level.

Suggested Readings

Agarwal, S. N. (1977). *India's Population Problems.* Bombay: Tata McGraw-Hill.

Agnihotri, S. B. (2000). *Sex- Ratio Patterns in Indian Population: A fresh exploration.* New Delhi: Sage.

Becker, G. S. (1960). An Economic Analysis of Fertility. In G. B. Roberts, *Demographic and Economic Change in Developed Countries* (pp. 209-240). Massachusetts: National Bureau of Economic Research.

Bhende, A. A., & Kanitkar, T. (1994). *Principles of Population Studies.* Bombay: Himalaya Publishing House.

Bose, A. (1996). *Demography of Religion in India.* Delhi: B.R. Publication.

Bose, A. (1998). *Demographic Diversity in India.* Delhi: B.R. Publication.

Caldwell , J. C. (1996). Demography and Social Science. *Population Studies, 50*(3), 305-333.

Chandrasekhar, S. (2010). *Infant Mortality, Population Growth and Family Planning in India: An Essay on Population Problems and International Tensions.* London: Routledge.

Cox, P. R. (1970). *Demography.* Cambridge: Cambridge University Press.

D'Souza, V. S. (1988). *Economic Development, Social Structure and Population Growth.* New Delhi: Sage.

Davis, K. (1951). *The Population of India and Pakistan.* New York: Princeton University.

Djurfeldt, G., & Lindberg, S. (1975). *Pills against poverty: a study of the introduction of western medicine in a Tamil village.* Stockholm: Sweden: Studentlitt.

Drèze, J., & Sen, A. (2002). *India: Development and Participation.* New Delhi: Oxford University Press.

Epstein, T. S., & Jackson, D. (1975). *The Paradox of poverty: socioeconomic aspects of population growth.* Delhi: Macmillan.

Ford, T. R., & DeJong, G. F. (1970). *Social Demography.* New Jersey: Engelwood Cliffs (NJ).

Gill, R. (2011). Nursing Shortage in India with special reference to International Migration of Nurses. *Social Medicine, 6*(1), 52-59.

Haq, E. (2007). *Sociology of Population in India.* New Delhi: Macmillan.

Hartman, B., & Rao, M. (2015). India's Population Programme: Obstacles and Opportunities. *Economic and Political Weekly, 50*(44), 10-13 .

Hassan, M. I. (2005). *Population Geography.* Jaipur: Rawat.

International Institute for Population Sciences. (1992-93, 1997-98, 2005-06 & 2015-16). *National Family Health Survey, India.* Bombay: International Institute for Population Sciences.

James, K. S., Pandey , A., Bansod, D. W., & Subaiya, L. (2010). *Population, Gender and Health in India: Methods, Processes And Policies.* New Delhi: Academic Foundation.

Jeffery , P., & Jeffery, R. (2002). We Five, Our Twenty-five: Myths of population out of control in contemporary India. In M. Nichter, & M. Lock, *New Horizons in Medical Anthropology* (pp. 172-199). London & New York: Routledge.

Jeffery, P., & Jeffery, R. (2002). A Population out of Control? Myths about Muslim Fertility in Contemporary India. *World Development, 30*(10), pp. 1805-1822.

Jeffery, R., & Jeffery, P. (1997). *Population, Gender and Politics: Demographic Change in Rural North India .* Cambridge: Cambridge University Press.

Jeffery, P., & Jeffery, R. (2006). *Confronting Saffron Demography: Religion, Fertility, and Women's Status in India.* New Delhi: Three Essays Collective.

Jones, A. (2012). *Human Geography: The Basics.* New York: Routledge.

Kamat, A. R. (1969). *Population Problems of India.* Delhi: Central Family Planning Institute.

Kapur , D. (2010). *Diaspora, Development, and Democracy: The Domestic Impact of International Migration from India.* New Delhi: Oxford University Press.

Lorimer, F. (1958). *Culture and Human Fertility.* New York: Greenwood.

Majumdar , P. K. (2013). *India's Demography: Changing Demographic Scenario in India.* Jaipur: Rawat.

Majumdar, P. K. (2010). *Fundamentals of Demography.* Jaipur: Rawat.

Malthus, T. R. (1973). *An Essay on the Principle of Population.* Westminster: Penguin Classics.

Mamdani, M. (1972). *Myth of Population Control: Family, Caste and Class in an Indian Village.* New York: Monthly Review Press.

Mandani, M. (1972). *The Myth of Population Control.* London: Monthly Review Press.

Mandelbaum, D. G. (1974). *Human fertility in India: Social components and policy perspectives.* Berkeley: University of California Press.

Marx, K., Engels, F., & Meek, R. L. (1971). *Marx and Engels on the population bomb; selections from the writings of Marx and Engels dealing with the theories of Thomas Robert Malthus.* Berkeley: Calif.: Ramparts Press.

Mukherjee, R. (1976). *Family and Planning in India.* New Delhi: Orient Longman.

Patel, T. (1994). *Fertility Behaviour: Population and Society in a Rajasthan Village.* New Delhi: Oxford University Press.

Premi, M. K. (2001). The Missing Girl Child. *Economic and Political Weekly, XXXVI*(21), 1875-1880.

Premi, M. K. (2003). *Social Demography: A Systematic Exposition.* New Delhi: Jawahar.

Premi, M. K. (2010). *India's Changing Population Profile.* New Delhi: National Book Trust.

Premi, M. K., Bambawale, U., & Ramanamma, A. (1983). *An Introduction to Social Demography.* New Delhi: Vikas Publishing House.

Rao, M. (2004). *From Population Control to Reproductive Health.* New Delhi: Sage.

Rao, M. S. A (1986). *Studies in Migration: internal and international migration in India.* New Delhi: Manohar Publications.

Rubenstein, J. M. (2015). *Contemporary Human Geography.* Noida: Pearson India.

Sandhya, S. (1991). *Socio-economic and Cultural Correlates of Infant Mortality.* Delhi: Concept Publications.

Singh, J. P. (1998). *Studies in Social Demography.* New Delhi: M.D. Publications.

Sollund , R. A. (2012). *Transnational Migration, Gender and Rights, Advances in Ecopolitics- Volume 10.* Warrington: Emerald Group Publishing Limited.

Srinivas, M. N., & Ramaswamy, E. A. (1977). *Culture And Human Fertility In India .* New Delhi: Oxford University Press.

United Nations. (1953). *Population Studies, No. 17 The Determinants and Consequences of Population Trends.* New York: United Nations.

United Nations Development Programme. (2017). *Human Development Report 2016: Human Development for Everyone.* New York: United Nations Development Programme.

Wyon, J. B., & Gordon, J. E. (1971). *The Khanna Study: Population Problems in the Rural Punjab.* Cambridge, Massachusetts: Harvard University Press.

Course Title: Rural Society and Agrarian Change

Course Code: SAHS SC 1 1 02 DCEC 4105

Credits: 5

Course Objectives

This course aims to familiarize the students with the various theoretical perspectives, conceptual issues, and the roles of the agrarian community in Indian society. Learners will also get an opportunity to engage with and understand the various approaches of different scholars while also examining how rural society has undergone multiple changes over the period of time.

What is the role of agrarian relations in the transformation of Indian society? How to critically evaluate various Govt. welfare schemes for peasant society? Questions such as these will also be discussed in the present course.

Course Level Learning Outcomes

Upon the completion of the course, some of the learning outcomes that the students of this course are expected to demonstrate are:

1. The students will learn about the agrarian social structure.
2. They will learn about major theoretical approaches regarding agrarian society.
3. Students will learn how to review development projects and prepare reports on the same.
4. Students can critically analyze various Govt. welfare schemes regarding agrarian community.
5. The students can critically analyze the various agrarian movements.

Unit I: Study of Agrarian Social Structure and Change:

'Peasant Studies', `Sociology of Agriculture': Theories, Concepts and Methods; State interventions in Agrarian Relations: Land Reforms, Green Revolution and their Impact; Select Case Studies.

Unit II: Mode of Production Debate (MOPD) in Agriculture

Primitive mode of production, Colonial Mode of Production, Feudal Mode of Production and Semi-Feudal Mode of Production and Capitalist Mode of Production.

Unit III. Agrarian Movements

A typology of Movements: Agrarian Movements in India; New Farmers; Movements; Land and Caste; Tribal Movements; Gender and Land Rights.

Unit IV: Contemporary Agrarian Conditions

Changing Relations in Indian Agriculture: Crisis and Emerging Trends; Globalisation and its impact on agriculture; Issues of Development, Decentralization, and Migration; Food Security, Droughts, and other Calamities.

Suggested Readings

Agarwal, Bina, 1994. *Field of One's own: Gender and Land Rights in South Asia*. Cambridge: Cambridge University Press.

Asthana M. D. and Pedro Madrano (ed.), 2001. *Towards Hunger Free India: Agenda and Imperatives*. New Delhi: Manohar.

Bandyopadhyay, D., Saila K. Ghosh and Buddadeb Ghosh, 2003. Dependency versus India. Delhi: Concept Publications.

Beteille, A., 1974. *Studies in Agrarian Social Structure*. New Delhi: OUP. (Introduction and Chapter 1).

Brass, T., 1994. 'New Farmer's Movements in India'. *Journal of Peasant Studies*, 21 (3,4). Special issue. pp. 3-25.

Breman Jan, Peter Kloos and Ashwani Saith, 1997. The Village in Asia Revisited. Delhi: OUP.

Desai, A. R., 1967. *Rural Sociology in India*, Delhi: Popular Prakashan.

Dhanagare, D. N., 1983. *Peasant Movements in India*, 1925-1950. OUP, I & II Chapter.

Dreze, Jean, 2004. 'Democracy and Right to Food'. *Economic and Political Weekly*, Vol.39, No.17, pp. 1723-31.

Frankel, F., 1971. *India's Green Revolution*, Bombay: OUP, pp.3-46, 191-215.

Guha, R., 1982. Subaltern Studies I. Pp. 1-8.

Gupta, Dipankar, 2005. 'Whither the Indian Village: Culture and Agriculture in `Rural' India', Economic and Political Weekly; 40, 8; 751-758

Hardiman, David (1992). *Peasant Resistance in India*. Delhi: OUP.

Harriss-White, Barbara, 2004. India's Socially Regulated Economy. *The Indian Journal of Labour Economics*, 47(1): 49-68.

Joshi, P. C., 1976. *Land Reforms in India.* Delhi: Allied Publishers.

Kloppenburg, Jack Ralph Jr., 1990. First the Seed: The Political Economy of Plant Biotechnology, 1492-2000. Cambridge: CUP.

Kodoth, Praveena, 2004. Gender, Property Rights and Responsibility for Farming in Kerala. Economic and Political Weekly, May 8, pp. 1911-1920.

Kolenda, Pauline, 1983. Caste, Cult and Hierarchy. Meerut: Folklore Institute.

Kumar, Dharma, 1992. *Land and Caste in South India*. Delhi: Manohar.

Macdougall, John, 1980. 'Two Models of Power in Contemporary rural India'. *Contributions to Indian Sociology,* n.s. 14: 77-94.

Mearns, Robin, 2000. *Access to Land in Rural India: Policy Issues and Options*.

Newby, H., 1980. 'Trend Report: Rural Sociology'. *Current Sociology*, 78 (Spring). pp.5-10, 23-30; 36-53; 76-93.

Sahai Suman (2001). The TRIPS Agreement: Implications for Developing Countries.

Sen, A. K., 1981. Poverty and Famines: An Essay on Entitlement and Deprivation. Delhi: OUP.

Sengupta Nirmal, 1990. 'The Social and Economic Basis of Current Tribal Movements'. *Social action*, vol.40, No.4, p.336.

Shah, Ghansyam (ed.), 1991. 'Report of the National Commission on Rural Labour'. New Delhi: Ministry of Labour.

Shanin, T., 1987. Peasants and Peasant Societies. pp.1-11, 176-184; 331-337; 447-475.

Shiva, Vandana (2001). Patents: Myths and Reality. New Delhi: Penguin Books India.

Singh, K. S., 1982. *Tribal Movements in India*. Vol.1 & 2., New Delhi: Manohar.

Singh, Rajendra, 2001. *Social Movements: Old and New A Post-modern Critique*. New Delhi: Sage.

Suri, K. C. 2006. 'Political Economy of Agrarian Distress'. *Economic and Political Weekly*, XL (16), pp. 1523-29.

Vasavi, A. R., 2005. 'Individualization of Agriculture: Suicides and the making of Agrarian Distress'. Unpublished paper.

Thomas P et.al (1994). Dunkel Text: Implications for Rural Sector, Economic and Political Weekly, 26, March.

Thorner Alice, 1982. 'Semi-Feudalism or Capitalism', Economic and Political Weekly, December, pp.1961-8, 1993-9, 2061-6.

Thorner, Daniel, 1956. *The Agrarian Prospect in India*. Delhi: University Press.

Thorner, Daniel, 1966. *The Theory of Peasant Economy*, Delhi: University Press.

Course Title: Social Movements

Course Code: SAHS SC 1 1 03 DCEC 4105

Credits: 5

Course Objectives

The course is designed to introduce the learners of Sociology to the various frameworks, concepts, and theories related to Social Movements so that they can reflect on the nature and dynamics of Social Movements to become independent Scholars who might undertake future research in the same.

How and when do groups mobilize and resist power? What is the role of ideology and leadership in Social Movements? What are the reasons for the emergence of different Social Movements? Questions such as these will be discussed in the course. The students will also get an opportunity to reflect on the empirical cases of social movements in India and the historical trajectory they have taken over the years.

Course Level Learning Outcomes

Upon the completion of the course, some of the learning outcomes that the students of this course are expected to demonstrate are:

1. Identify the diverse theoretical perspectives, conceptual issues, and debates in the study of social movements.
2. Understand the role of ideology and leadership in social movements.
3. Recognize the various types of social movements in India and elaborate on how they have evolved historically.
4. Develop a sociological lens to analyze social movements.
5. Utilize their comprehension, analytical, and research skills to undertake independent research on Social Movements in the future if the need arises.

Unit I: Conceptual Issues

Nature, Definition, Classification; Genesis, Ideology and Identity; Collective Mobilization and Leadership.

Unit II: Theories of Social Movement

Collective Behaviour and Social Unrest (H. Blumer); Structural Restrain theory (Smelser); Resource Mobilization and New Social Movements.

Unit III: Types of Movements in India

Peasant, Backward Class movement, Religious Sectarian movement.

Unit IV: Politics of Transcendence

Tribal and Dalit Movement, Women and Environment movement.

Suggested Readings

Barrington, Moore, 1966. *Social Origins of Dictatorship and Democracy: Lord and Peasant in the Making of the Modern World*, Boston: Beacon Press.

Della, Pord and Diani M., 2006. *Social Movements and Introduction*. New Delhi: OUP.

Desai, A. R., 1982. *Peasant Struggle in India:* New Delhi: OUP.

Dourain, A., 1981, *The Voice and the Eye: An Analysis of Social Movement*, Cambridge: Cambridge University.

Frankel, R. F. and M.S.A Rao, 1989. *Dominance and State Power in Modern Power: Decline of Social Order-* Vol. I & II*,* New Delhi: OUP.

Giddens, Anthony, 2013. *Sociology,* New Delhi: John Wiley and Sons.

Goodwill, J and Jasper J. (eds.), 2002. *The Social Movements: Reader Cases and Concepts*, Oxford: Wiley Blackwell.

Habermass, J., 1981. *New Social Movements, Telos,* No.49 (Fall), pp. 33-37.

_____ 1989. *The Structural Transformation of the Public Sphere,* Cambridge: MIT Press.

Hardtmann, Eva Maria, 2009. *The Dalit Movement in India: Local Practices, Global Connections.* New Delhi: OUP.

Jaffrelot, C., 2003. *India's Silent Revolution: The Rise of Lowe Castes in North Indian Politics.* London: Hurst Publishers.

Melucci, A., 1989. *Nomads of the Prison: Social Movement and Individual Needs in Contemporary Society,* London: Hutchinson Radius.

Oddie, G. A (ed.), 1977. *Religion in South Asia: Religious Conversion and Revival Movements in South Asia in Medieval and Modern Times,* Cambridge*:* Cambridge University Publications.

Omvedt, Gail, 2015. *Dalits and the Democratic Revolution: Dr. Ambedkar and the Dalit Movement in Colonial India*, New Delhi: Sage.

Prasad, Jitender and Sangita Thakur, 2015. *Gandhi, Ambedkar in Dalits Emancipation*, New Delhi: Academic Excellence.

Prasad, Jitender, 2005. *Tribal Movements in India,* New Delhi: Kilaso Publications.

Rao, M. S. A., 1979. Social Movements and Social Transformation: A Study of Two Backward Classes Movements in India. New Delhi: Macmillan.

Shah, Ghanshyam, 2001. *Dalit Identity and Politics*, New Delhi: Sage.

Smelser, N. J. C., 1962. *Theory of Collective Behavior*, London: Routledge and Kegan Paul.

Snow, D. A., Soule, S. A., & Kreisi, H. (2004). *The Blackwell Companion to Social Movements.* UK: Blackwell Publishing Limited.

Tarrow, S., 1998. *Power and Movement: Social Movement, Collective and Politics*. New Delhi: Cambridge University Press.

Thorat, Sukhadao, 2009. *Dalits in India: Search for Common Destiny*. New Delhi: Sage.

Course Title: Urban Life in India

Course Code: SAHS SC 1 1 04 DCEC 4105

Credits: 5

Course Objectives

More than half of the world's population is currently living in cities, and most of us have first-hand experience of urban life in different cities. Have you ever wondered why your neighborhood is changing and what processes are behind it? Would you like to make sense of your daily observations and understand them in a broader sociological context?

This course will introduce learners to urban processes and patterns in India. The students will be introduced to the major sociological, anthropological, and other allied traditions of understanding Urban space and life. The course will also attempt to understand how urban spaces are also sites of difference and contestation.

Course Level Learning Outcomes

Upon the completion of the course, some of the learning outcomes that the students of this course are expected to demonstrate are:

1. Understanding of the different theoretical perspectives/literatures used in the study of Urban.
2. Reflect on the nature of social stratification in cities.
3. Critically evaluate the changes in gender, kinship, and family relations in the urban society.
4. Demonstrate a critical understanding of why cities are crucial sites in the negotiation of identity and difference.
5. Possess the ability to deploy specific social science techniques to describe and critically analyze the social life of urban spaces.

Unit I: Theorizing Urbanism: Space, Place and Urban

Classical structuralist; Marxist; postmodern/post structuralist literature on space and place-making; modern history of urban planning; Urban space and social processes. Factors influencing urban space: the built environment and urban life. Rural Urban Contrasts and continuum, rurbanisation, peri-urbanization.

Unit II: Stratification in Cities

Social stratification in cities: class, caste, status, ethnicity, and power.

Unit III: Urban Society and Culture

Aspects of urban society and culture: changes in gender, kinship and family relations.

Unit IV: Continuities and Change

Continuity and change: tradition and modernity in urban India; the Indian city in the context of globalization; Urban Villages.

Suggested Readings

Advani, Mohan, 2009. *Urbanization, Displacement and Rehabilitation: A Study of People Affected by Land Acquisition*. Jaipur: Rawat.

Appadurai, A. 1996. Modernity At Large: *Cultural Dimensions Of Globalization*. Minneapolis: University Of Minnesota Press

Baviskar, A. 2003. Between Violence and Desire: Space, Power And Identity in The Making Of Metropolitan Delhi, *International Social Science Journal*, Vol. 55, no. 175, pp. 89-98.

Bergel, Egon E., 1955. *Urban Sociology.* New York: McGraw-Hill.

Beteille, A., 1974. *Studies in Agrarian Social Structure,* Delhi: Oxford University Press.
Castells, Manuel, 1977. *The Urban Question: A Marxist Approach*, (Translated by: Alan Sheridan, Edward Arnold, Bath), London: Edward Arnold Publishers.

Das, V. (ed) 1990. Mirrors Of Violence — Communities, Riots and Survivors In South Asia New Delhi: Oxford University Press

Desai, A. R., 1968. *Rural Sociology in India*, Bombay: Popular Prakshan.

Dickey, S. 2000. Permeable Homes: Domestic Service, Household Space and The Vulnerability Of Class Boundaries In Urban India, American Ethnologist, no. 27, pp. 462–489.

Dube, S. C., 1955. *Indian Village,* London: Routledge and Kegan Paul.

Dube, S.C., 1990. *Indian Society,* New Delhi: National Book Trust.

Gottdiener, Mark and Leslie Budd, 2005. *Key Concepts in Urban Studies*, London: Sage.

Gupta, Dipankar, 2005. 'Whither the Indian Village: Culture and Agriculture in Rural India', *Economic and Political Weekly*, XL(8), 751-8.

Harvey, David, 1989. *The Urban Experience,* Baltimore: John Hopkins Press.

Hansen, Thomas Blom. 2001. Wages of Violence: Naming And Identity In Postcolonial Bombay. Princeton, N.J.: Princeton University Press.

Hutchinson, Ray (ed.), 2010. *Encyclopaedia of Urban Studies*, California: Sage, Thousand Oaks.

Jodhka, Surinder S. (ed.), 2012. *Village Society,* Hyderabad: Orient Blackswan.

Joshi, P. C., 1975. *Land reforms in India: Trends and Perspectives*, Bombay: Allied Publishers.

Kolenda, Pauline, 1983. *Caste, Cult and Hierarchy,* Meerut: Folklore Institute.

Kumar, Dharma, 1992. *Land and Caste in South India,* Delhi: Manohar.

Lefebvre, Henri, 2007 (1991). *The Production of Space*, (Translated by: Donald Nicholson- Smith), Delhi: Blackwell Publishing.

LeGates, Richard T. and Frederic Stout, 1996. *The City Reader*, London: Routledge.

Low, Setha. 1996. Spatializing Culture: The Social Production and Social Construction Of Public Space, American Ethnologist, Vol. 23, no. 4, pp. 861-879

Mehta, D and Chatterji, R. 2007. *Living With Violence: An Anthropology of Events And Everyday Life*. Delhi: Routledge

Park, R. E., E. W. Burgess & R. D. McKenzie, 1967 (1925). *The City*, Chicago The University of Chicago Press.

Patel, Sujata and Kushal Deb (ed.), 2006. *Urban Studies.* Delhi: Oxford.

Phillips, W. S. K., 1990. *Social Stratification and Mobility in Urban India.* New Delhi: Rawat.

Qadeer, M. A., 1974. 'Do Cities 'Modernize' the Developing Countries? An Examination of the

South Asian Experience', *Comparative Studies in Society and History*, 16(3), pp. 266-283.

Rao, M. S. A. (ed.), 1991. *A Reader in Urban Sociology,* New Delhi: Orient Longman.

Rao, M.S.A. (ed.), 1974. *Urban Sociology in India*, Delhi: Orient Longman.

R. Ramachandran , 1998. India's Urbanization, OUP.

Redfield, R and Singer M. 1954, "The Cultural Role of Cities", *Economic Development and Cultural Change*, Number 4.

Sassen, Saskia (ed.), 2007. *Urban Sociology in the 21st Century.* Columbia: Sage Publications.

Sassen, Saskia, 1995. Cities in a World Economy, Sage Publications.

Saunders, Peter, 1981. *Social Theory and the Urban Question* (2nd Edition), London: Routledge.

Sharma, Rajendra K. 1997. *Urban Sociology,* New Delhi: Atlantic Publishers and Distributors.

Srinivas, M.N, 1972. Social Change in Modern India, Orient Longman.

Tambiah, Stanley J, 1997. "Friends, neighbours, enemies, strangers: Aggressor and victim in civilian ethnic riots." *Social Science & Medicine* 45.8: 1177-1188.

Taylor, Peter J. (ed.), 2007. *Cities in Globalization: Practices, Policies and Theories,* London: Routledge.

Weber, Max (ed.), 1958. *The City,* (Translated by: Don Martindale and Gertrud Newirth), London: The Free Press.

Vatuk, Sylvia, 1972. Kinship and Urbanization, University of California Press.

Course Title: Cinema and Society

Course Code: SAHS SC 1 1 05 DCEC 4105

Credits: 05

Course Objective

The course aims to introduce the importance of Cinema and Society as one of the essential aspects of understanding society. In varied ways, the projection about society gets reflected through cinema. The course will familiarize the students with how cinema can be seen as a symbolic game of knowledge and Power. The course will also discuss the cultural history and political economy of Indian Cinema.

Course Level Learning Outcomes

Upon the completion of the course, some of the learning outcomes that the students of this course are expected to demonstrate are:

1. Ability to reflect on the relationship between society and cinema.
2. Awareness that cinema is not just a reflection of the society but has its own cultural, economic and political importance.
3. Understanding of the theoretical orientations and methodological constrains in the study of Cinema and culture in India

Unit I: Theoretical Orientations and Methodological Constrains in the Study of Cinema and Culture in India

Western Tradition: Semiology, Semiotics, Critical Theory, Structural and Post Structural Theory, Cultural Analysis and Feminist Theory.

Indic Tradition: Traditional, Modern, Colonial, Post-Colonial

Unit II: Cinema and Culture in India

Cultural History of Indian Cinema

The Political Economy of Indian Cinema

Popular Genres of Indian Cinema

Unit III: The Texts of Indian Cinema

Evolution of Indian Cinema as a Symbolic Text in Indian Culture

Dialectics of Technology and Culture: Transmission of Oral Myths as Cinematic Texts Canonization of Texts in Indian Cinema

Unit IV: Sociology of Indian Cinema

Sociology of Blockbusters in Indian Cinema

Cinema as a Symbolic game of Knowledge and Power

Cinema and Audience

Suggested Readings

Basu, Anustup, 2012. *Bollywood in the Age of New Media*. Hederabad: Orient Blackswan.

Bharat, Meenakshi and Nirmal Kumar (eds.), 2008. *Filming the Line of Control: The Indo-Pak Relationship through the Cinematic Lenses*, New Delhi: Sage.

Bhattacharya, Meheta, Rini and R. V. Pandharipande (eds.) 2011. *Bollywood and Globalization: Indian Popular Cinema, Nation, and Diaspora*. Delhi: Anthem Press.

Coomarswamy, A. K., 2004. *The Transformation of Nature in Art*. New Delhi: Munshiram Manoharlal Publishers.

Dayal, Samir, 2015*. Dream Machine*. Philadelphia: Temple University Press.

Dwyer, R. and C. Pinney (eds.) 2001. *Pleasure and Nation: The History, Politics andConsumption of Public Culture in India.* New Delhi: OUP.

Dudrah, Rajendra Kumar, 2006. *Bollywood: Sociology Goes to the Movies*. New Delhi: Sage.

Garg, B. D., 2006. *The Art of Cinema: An Insider's Journey through Fifty Years of Film History*.New Delhi: Penguin/Viking.

Jain, Jasbir (ed.), 2011. *Muslim Culture in Indian Cinema*. Jaipur: Rawat. Joshi,

Priya, 2015. *Bollywood's India*. New York: Columbia University Press.

Juluri, Vamsee, 2013, *Bollywood Nation: India through Its Cinema.* New Delhi: Penguin.

Kabir, Nasreen Munni, 1999, *Talking Films: Converstions on Hindi Cinema with Javed Akhtar*. Delhi: OUP.

Kazmi, Fareed, 1999. *The Politics of India's Conventional Cinema: Imaging a Universe, Subverting the Multiverse*. New Delhi: Sage.

Lal, Vinay and Ashis Nandy (ed.), 2006. *Fingerprinting Popular Culture: The Mythic and theIconic in Indian Cinema.* New Delhi: OUP.

Mazumdar, Ranjani, 2007. *Bombay Cinema: An Archive of the City*, Ranikhet: Permanent Black.

Mishra, Vijay, 2002. *Bollywood Cinema: Temples of Desire*. New York: Routledge.

Parasad, M. Madhayan, 1998. *Ideology of the Hindi Film: A Historical Construction*. New Delhi: OUP.

Rajadhyaksha, Ashish, 2009. *Indian Cinema in the Time of Celluloid.* New Delhi: Tulika Books.

Sarkar, Bhaskar, 2010. *Mourning the Nation: Indian Cinema in the Wake of Partition.*

Hyderabad: Orient Blackswan Pvt. Ltd. (2nd Edition)

Raghavendra, M. K., 2008. *Seduced by the Familiar.* New York: Oxford University Press.

Sharma, Amit Kumar, 2011a, *Religion and Culture in Indian Civilization: Essays in the Honorof C. N. Venugopal.* New Delhi: D K Printworld.

_____ 2011b, *Symbols of Kinship Identity in a North Indian Village,* Germany: Lap Lambart Academic Publishing Company.

Vaasanthi, 2006. *Cut-Outs, Caste and Cinestars: The World of Tamil Politics*, New Delhi: Penguin.

Vasudevan, Ravi S. (ed.), 2000. *Making Meaning of Indian Cinema,* New Delhi: OUP.

_____ 2011. *The Melodramatic Public: Film Form and Spectatorship in Indian Cinema.* Ranikhet: Permanent Black.

Vatsyayan, Sachchidanand Hiranand, 1996. *A sense of time: An Exploration of Time in Theory, Experience,* and Art. New Delhi: OUP

Vitali, Valentina, 2008. *Hindi Action Cinema: Industries, Narratives, Bodies*. New Delhi: OUP.

Semester III

Course Title: Anthropological Theories

Course Code: SAHS CC 1 1 09 CC 4105

Credits: 5

Course Objectives

The disciples of Anthropology and Sociology are involved in studying social and cultural lives in a systematic manner. This course will discuss the various cause and consequences that are the result of human action while interacting with the social environment. The introductory part of the course will deal with the basics of anthropology, and subsequently, it will have readings on anthropological theory and its founders. It will also have lectures on the approaches that emerged in the early Twentieth century and the new debates in anthropological theory that have surfaced in the recent past.

Course Level Learning Outcomes

Upon the completion of the course, some of the learning outcomes that the students of this course are expected to demonstrate are:

1. Understanding of the cultural patterns of the society
2. Demonstrate nuanced comprehension of human history.
3. Reflect on the multiple anthropological approaches.
4. Discuss the new debates in anthropological theory.

Unit I: Anthropology: Basics

Defining anthropology, distinguishing cultural differences from physical ones, what is culture, how anthropologist look at culture.

Unit II: Rise of Anthropological Theory: The Founders

E.Taylor-Evolution of Culture, L.H. Morgan-Evolution of Society, F.Boas- Culture in Context.

Unit III: Early Twentieth Century Approaches

Functionalism (B. Malinowki), Structural Functionalism (Radcliffe Brown).

Theory at Mid Century: Structuralism (Levi Strauss), Interpretative Sociology (C.Geertz).

Unit IV: New Debates and Anthropology Theory

Feminist anthropology (Ortner), Global Ethnoscapes (Appadurai)

Suggested Readings

Appadurai, Arjun, 2005. *Modernity at Larger: Cultural Dimensions of Globalization*. Minneapolis: University of Minnesota Press.

Benedict, Ruth, 1934. *Patterns of Culture.* Boston: Houghton Mifflin Co.

Boas, F, 1896. "The Limits of the Comparative Method of Anthropology". *American Association for the Advancement of Science.* 4.103: 901-908.

Boas, Franz, 1932."The Aims of Anthropological Research". Science. New Series. 76. 1983, 605-613.

Bourdieu, P, 1990. *The Logic of Practice*. Cambridge: Polity Press.

Bourdieu, P, 1977. *Outline of a Theory of Practice*. London: Cambridge University Press.

Clifford, James and George Marcus (eds.). 1986. *Writing Culture: The Poetics and Politics of Ethnography.* Berkeley: University of California Press.

Douglas, Mary, 1966. *Purity and Danger: An Analysis of Concepts of Pollution and Taboo*. London: Routledge.

Evans-Pritchard, 1981, *E E.A History of Anthropological Theory*. New York: Basic Books.

Gayle, Rubin, 1975. "The Traffic in Women: Notes on the 'Political Economy' of Sex". In Rayna Reiter (ed.).Toward an Anthropology of Women. New York: Monthly Review Press: 157-210.

Geertz , Clifford, 1973. The Interpretation of Cultures. New York: Basic Books. [Chapter on "Thick Description", "The Impact of the Concept of Culture on the Concept of Man", "Deep Play: Notes on the Balinese Cockfight"].

Gupta, A and J Ferguson (ed.), 1997. *Culture, Power, Place: Explorations in Critical Anthropology*. Durham: Duke University Press.

Harris, Marvin, 1966. "The Cultural Ecology of India's Sacred Cattle". *Current Anthropology*, 7:51-66.

Harris, Marvin, 1968. *The Rise of Anthropological Theory*. New York: Crowell.

Harris, Marvin, 1977. *Cannibals and Kings: The Origins of Cultures*. New York: Vintage.

Kuper, A, 1983. *Anthropology & Anthropologists: The Modern British School*. London: Routledge.

Leach, Edmund, 1961. *Rethinking Anthropology*. London: Athlone Press.

Leslie White, 1943. "Energy and the Evolution of Culture". *American Anthropologist,* 45: 335-356.

Levi-Strauss, Claude, 1963. *Structural Anthropology*. Trans. Claire Jacobson. New York: Basic Books.

(Introduction chapter, Structural Analysis in Linguistics and Anthropology)

Levi-Strauss, Claude, 1969. *Totemism*. Boston Beacon Press.

Lowie, Robert, 1937. *History of Ethnological Theory*. Holt: Rinehart and Winston.

Malinowski, B, 1944. *A Scientific Theory of Culture*. Chapel Hill: University of North Carolina Press.

Malinowski, B, 1961. *Argonauts of the Western Pacific*. New York: E.P. Dutton.

Mead, Margaret,1963. *Sex and Temperament in Three Primitive Societies*. Morrow Quill: New York.

Nadel, S F, 1969. *Foundations of Social Anthropology*. London: Cohen & West.

Ortner, Sherry, 1974. "Is Female to Male as Nature is to Culture?". In Michelle Z. Rosaldo and Louise Lamphere (ed.). *Woman, Culture, and Society*, Stanford: Stanford University Press: 6887.

Ortner, Sherry B. and Harriet Whitehead (ed.), 1981. *Sexual Meanings: The Cultural Construction of Gender and Sexuality*. New York: Cambridge University Press, 1981.

Ortner, Sherry, 1984. “Theory in Anthropology since the 1960s”. *Comparative Studies in Society and History*, 6: 126 -166.

Radcliffe-Brown, A R, 1924. *Structure and Function in Primitive Society*. Glencoe II: The Free Press.

Sahlins, Marshall, 1987. *Islands of History.* Tavistock.

Tylor, E B, 1871. *Primitive Culture*. New York: Harper & Row.

Tylor, Stephen, 1969. *Introduction to Cognitive Anthropology*. New York.

Course Title: Religion and Society in India

Course Code: SAHS SC 1 1 10 CC 4105

Credits: 5

Course Objectives

Religion is a ubiquitous phenomenon, and its relation to society, culture, and polity raise important sociological issues. This paper introduces the students to the subfield of sociology of religion. After analyzing the basic concepts and key interpretations of religion, it focuses on the interface between religion and society in India and the contestation over religion in contemporary times.

While discussing the substantive themes and issues in relation to religion, the focus will be on the distinctive analytical perspective of sociology/anthropology rather than on the normative view of theology/ethics.

Course Level Learning Outcomes

Upon the completion of the course, some of the learning outcomes that the students of this course are expected to demonstrate are:

1. Develop an understanding of the various theories of religion.
2. Identify the diverse theoretical perspectives, conceptual issues, and debates in the study of religion.
3. Critically analyze the relationship of religion with society, culture, and polity.
4. Analyze the concepts of secularism, fundamentalism, communalism, and proselytism in India through a sociological lens.

Unit I:
The scope of sociology of Religion: Concepts: Magic, Religion and Science; Elements of religious experience; Typology of religion.

Unit II:
Sociological Interpretations of Religion: Durkheim, Weber, Levi-Strauss, Karl Marx and Malinowski.

Unit III:
Religions of India: Buddhism, Christianity, Hinduism, Islam, Jainism, and Sikhism and tribal religion.

Unit IV:
Social change and Religion: Socio-religious movements; Popular religion and emerging cults; Fundamentalism; Communalism; Secularism; Proselytism.

Suggested Readings

Baird, Robert D. (ed.), 1995. *Religion in Modern India*, New Delhi: Manohar.

Durkheim, E., 1957. *The Elementary Forms of Religions Life,* London: Allen & Unwin Ltd.

Jones, Kenneth W., 1989. *Socio-religious reform movements in British India*, Hyderabad: Orient Longman.

Kakar, Sudhir, 1982. *Shamans, Mystics and Doctors*, New Delhi: OUP.

Madan, T. N. (ed.), 1992. *Religion in India*, New Delhi: Oxford University Press.

Malinowski, B., 1948. *Magic, Science and Religion,* Tambiah, Boston: Beacon Press.

Muzumdar, H. T., 1986. *India's Religious Heritage*. New Delhi: Allied.

Regunathan, Sudhamahi, 1999. 'Sunshine on Faith: Life and Belief in Some Arunachal Communities', *India International Centre Quarterly*, 26 (2), 138-147.

Roberts, Keith A., 1984. *Religion in Sociological Perspective*, New York: Dorsey Press.

Shakir, Moin (ed.), 1989. *Religion, state and politics in India*, Delhi: Ajanta Publications.

Srinivas, M. N., 1952. *Religion and Society Among the Coorgs*, New Delhi: Asia Publishing House.

Turner, Bryan S., 1991. *Religion and Social Theory.* London: Sage.

Weber, M., 1958. *The Protestant Ethic and the Spirit of Capitalism. London: Allen* & Unwin.

Visvanathan, Susan, 1993. *The Christians of Kerala*, Delhi: OUP.

Course Title: Economy and Society in India

Course Code: SAHS SC 1 1 11 CC 4105

Credits: 5

Course Objectives

This course aims to familiarize the students with the various theoretical perspectives and conceptual issues about the role of the economy in Indian society. Learners will also get an opportunity to engage with and understand the various approaches of different scholars while also examining how Indian society has undergone multiple changes over the years with the change in the economy.

What is the role of economic development in the transformation of Indian society? How to critically evaluate various Govt. welfare schemes regarding different sections of the society? Questions such as these will also be discussed in the present course.

Course Level Learning Outcomes

Upon the completion of the course, some of the learning outcomes that the students of this course are expected to demonstrate are:

1. The students will learn about the relationship between the economy and society.
2. They will learn about major theoretical approaches in economic sociology.
3. Students will learn about how to review development projects and prepare reports on the same.
4. Students can critically analyze various Govt. welfare schemes regarding different sections of the society.

Unit I: Economic anthropology/sociology as a field: perspectives in economic sociology: formalism and substantivism, various forms of exchange. New economic sociology, distinction between 'new' and 'old' institutional economics.

Unit II: Sociology of markets: Market as a form of exchange, market efficiency and social efficacy, need for market regulation, market and society in India. Trends in contemporary globalization.

Unit III: Industrialization and trends towards knowledge economy: Changing pattern of industrialization, growth of service sector, industrial corporations and corporate governance, the challenge of globalization: foreign capital versus indigenous enterprise. labor policy and the decline of trade unions.

Unit IV: Human economy and the question of unequal development: Impact of liberalisation on poverty and inequalities. The political economy of caste and communalism, the moral economy of corruption, gender issues in development.

Suggested Readings

Bagchi, Amiya Kumar (ed.), 1999. *Economy and Organization: Indian Institutions under the Neoliberal Regime*, New Delhi: Sage.

Bhaduri, Amit & Deepak Nayyar, 1996. *A Political Economy of Agricultural Markets in South India: Masters of the Countryside*, New Delhi: Sage Publications.

_____, 1996. *The Intelligent Person's Guide to Liberalization,* Penguin.

Bhagwati, Jagdish, 2001. Free Trade Today, Delhi: Oxford University Press.

Breman, Jan, 1990. 'Even Dogs are Better Off: The Ongoing Battle Between Capital and Labour', *Journal of Peasant Studies*, Vol. 17.

_____ 1993. *Beyond Patronage and Exploitation: Changing Agrarian Relations in South Gujarat*, Delhi: Oxford University Press.

Chakravarty, Sukhamoy, 1987. *Development Planning: The Indian Experience*, Oxford: Clarendon Pres.

Drahos, Peter and John Braithwaite, 2002. *Information Feudalism: Who Owns the KnowledgeEconomy*, Delhi: Oxford University Press.

Dutta, Sudipt, 1997. *Family Business in India*, New Delhi: Response Books.

Gilpin, Robert, 2000. *The World Economy: Challenge of Global Capitalism in the 21st Century*, Princeton: Princeton University Press.

Goody, Jack, 2004. *Capitalism and Modernity: The Great Debate*, Polity Press.

Granovetter, M., 1985, Economic Action and Social Structure: The Problem of Embeddedness,

American Journal of Sociology, Vol. 91, No.3 (Nov), pp. 481 - 507.

Gupta, Akhil, 1998. *Postcolonial Developments: Agriculture in the Making of Modern India*, Duke University Press.

Hann, C. and K. Hart, 2011. *Economic Anthropology: History, Ethnography, Critique*, Cambridge: Polity.

Harriss-White, Barbara, 2003. *India Working: Essays on Society and Economy*, Cambridge: Cambridge University Press.

_____, 2005. *India's Market Society: Three Essays in Political Economy*, Gurgaon: Three Essays Collective.

Harvey, David, 2005. *A Brief History of Neoliberalism,* OUP: Oxford/NY. (Chapter 3).

Holmström, Mark, 1985. *Industry and Inequality: The Social Anthropology of Indian Labour*, Cambridge, Cambridge University Press.

Imtiaz Ahmad and Helmut Reifeld, 2002. *Middle Class Values in India and Western Europe*, New Delhi: Social Science Press.

Jenkins, Rob, 1999*. Democratic Politics and Economic Reform in India*, Cambridge: Cambridge University Press.

Jodhka, Surinder, 2003. 'Agrarian Structures and Their Transformations', in Veena Das (ed.), *The Oxford India Companion to Sociology and Social Anthropology*, Delhi: Oxford University Press,pp. 1213-1242.

Kohli, Atul, 1987. *The State and Poverty in India: The Politics of Reform,* Cambridge: Cambridge University Press.

Kumar, Arun, 1999. *The Black Economy in India*, New Delhi: Penguin India.

Lal, Deepak, 1988. *The Hindu Equilibrium: Volume I: Cultural Stability and Economic Stagnation, India, c.1500 BC-AD 1980*, Oxford: Clarendon Press.

Mamkootam, Kuriakose, 2003. 'Labour, Technology and Industry' in Veena Das (ed.), *The Oxford India Companion to Sociology and Social Anthropology*, Delhi: Oxford University Press.

Marx, Karl, 1867. *Capital: A Critique of Political Economy*, (Chapter 1, Section 4: The Fetishism of Commodities and the Secret Thereof).

Mauss, M., 1924. *The Gift: Forms and Functions of Exchange in Archaic Societies*, London: Cohen and West.

Moddie, A. D. (ed.), 1990. *The Concept of Work in Indian Society*, New Delhi: Manohar Publications.

Navlakha, Suren, 1989. *Elite and Social Change: A Study of Elite Formation in India*, New Delhi: Sage Publication.

Omvedt, Gail, 1994. *Dalits and the Democratic Revolution: Dr. Ambedkar and the DalitMovement in Colonial India*, New Delhi: Sage Publications.

Pandey, Gyanendra, 1990. *The Construction of Communalism in Colonial North India*, Delhi: Oxford University Press.

Parry, J., Breman, J. and K. Kapadia (eds.), 1999. 'The Worlds of Indian Industrial Labour.' in *Contributions to Indian Sociology*. Sage Publications: New Delhi

Piore, Michael & Charles Sabel, 1984. *The Second Industrial Divide*: Possibilities for Prosperity,New York: Basic Books.

Rajagopal, Arvind, 2001, *Politics after Television: Hindu Nationalism and the Reshaping of the Public in India*, Cambridge: Cambridge University Press.

Rudolph, Lloyd I. and S. H. Rudolph, 1987. *In Pursuit of Lakshmi: The Political Economy of the Indian State*, New Delhi: Orient Longman.

Sachidananda & B. B. Mandal, 1985. *Industrialisation and Social Disorganization Study of Tribes in Bihar*, New Delhi: Concept publishing House.

Sassen, Saskia . 2007. *A Sociology of Globalization*, London: W.W. Norton & Co.

Scott, James, 1985. *Weapons of the Weak: Everyday Forms of Peasant Resistance*, New Haven: Yale University Press.

Sen, Amartya, 1981. *Poverty and Famines*, Delhi: Oxford University Press.

_____, 2000. *Development as Freedom*, Delhi: Oxford University Press.

Shah, A. M., B. S. Baviskar and E. A. Ramaswamy, 1997. *Social Structure and Change- Volume3: Complex Organisations*, New Delhi: Sage.

Sheth, Narayan, 2003. 'Labour and Trade Unions' in Veena Das (ed,) *The Oxford India Companion to Sociology and Social Anthropology*, Delhi: Oxford University Press, pp. 1243-65.

Singh, K. S., 1982. *Economics of the Tribes and Their Transformation*, New Delhi: Concept Publishing House.

Sinha, J.B.P. 1990, *Work Culture in the Indian Context*, New Delhi; Sage Publications.

Smelser, Neil. J. and Richard Swedberg, 1994. 'The Sociological Perspective on the Economy', in N.J. Smelser and Richard Swedberg (eds), *The Handbook of Economic Sociology,* New York: Russell Sage Foundation.

Streefkerk, H., 1985. *Industrial Transition in Rural India: Artisans, Traders and Tribals in South Gujarat*, Bombay: Popular Prakashan.

Swedberg, R., 1991. Major Traditions of Economic Sociology, *Annual Sociological Review*, Vol.17, pp 251-276.

The Economist, 2002. *Globalisation: Making Sense of an Integrating World*, London: Profile Books.

Tonkiss, Fran, 2006. *Contemporary Economic Sociology*. London: Routledge, (Chapter 1, Capitalism and Globalization. Pp. 3-28).

Ward, Peter M. (ed.), 1989. *Corruption, Development and Inequality*, London: Routledge.

Weber, Max, 1978. Economy and society. an outline of interpretative sociology Edited by Guenther Roth and Claus Wittich. Berkely: University of California Press

Weber, Max, *The Protestant Ethic and the Spirit of Capitalism*, Translated by Talcott Parsons, Routledge: London. (Chapter 2)

Zelizer, Viviana A. 1989. 'The Social Meaning of Money: Special Monies', *American Journal of Sociology*, Vol.95. (Sept.)

Course Title: Sociology of Education

Course Code: SAHS SC 1 1 06 DCEC 4105

Credits: 5

Course Objectives

This course aims to introduce the learners to the universally acknowledged concept/institution of education. They will be able to examine the structure and process of education in contemporary society. This course will also familiarize them with different approaches to the Sociology of Education. Moreover, they will also get opportunities to reflect on education and analyze its intersections with other key socio-cultural developments.

Course Level Learning Outcomes

Upon the completion of the course, some of the learning outcomes that the students of this course are expected to demonstrate are:

1. Understanding of the nature, characteristics, and scope of Sociology of Education.
2. Identify the diverse theoretical perspectives, concepts, and approaches of Sociology of Education.
3. Elaborate on the relationship between Education with Society.
4. Reflect on the social dimensions of education and its dialectical relationship to the production and reproduction of various social structures, categories, and identities.

Unit I: Sociology of Education

Nature, Characteristics and Scope of Sociology of Education: relationship between society and education; concepts of education; aims and importance of inclusive education.

Unit II: Issues and Processes

School as a Social System Parsons, school as a Process Ivan Illich.

Unit III: Approaches to Sociology of education

Functionalist (Durkheim, Marxist, Althusser; Cultural reproduction Bourdieu; Symbolic Theory (Labov)

Unit IV: Relationship of Sociology of education with Society

Evolution and Social Context; Education and Socialization, education and stratification, Patterns of education and social Change; role of the State and social transformation through education.

Suggested Readings

Apple, Michael. 2013. 'The Other Side of the Hidden Curriculum: Culture as Lived- l' in *Knowledge, Power and Education: The Selected Works of Michael W. Apple*. New York: Routledge. pp. 132-151

Sen, Amartya and Jean Dreze, 1996. *India Economic Development and Social Opportunity*, New Delhi: OUP.

_____1997. *Development: Selected Regional Perspectives*, New Delhi: OUP.

Banks, Olive, 1971. *Sociology of Education,* London: Batsford.

Chanana, Karuna, 1988. *Socialization, Education and Women: Explorations in Gender Identity*. New Delhi: Orient Longman.

Chanana, Karuna. 2006. Educate Girls. Prepare them for Life? In Ravi Kumar ed. The Crisis of Elementary Education in India. New Delhi: Sage. pp. 200-223

_____ 2001, *Interrogating Women Education***,** Jaipur: Rawat.

Davies, Bronwyn. 2004. 'The Discursive Production of the Male/Female Dualism in School Settings' in Ball, S. J. (ed). The Routledge Falmer Reader in Sociology of Education. London: Routledge Falmer. pp. 128-139

Deshpande, Satish and Apoorvanand. 2018.'Exclusion in Indian Higher Education Today' in India Exclusion Report. New Delhi: Yoda Press. pp. 191-218

Durkheim, E., 1967. *Education and Sociology,* New York: Free Press.

Durkheim, Emile. 1977. 'On Education and Society' in Karabel, J. And Halsey, A.H. (eds.) *Power and Ideology in Education*. New York: Oxford University Press. pp. 92-104

Gore, M. S., 1975. *Papers on Sociology of Education in India,* New Delhi: NCERT

Gupta, Latika. 2014. 'Ethos as a Gendering Device: Muslim Girls in a Minority School' in *Economic and Political Weekly*. Vol. 49. No. 32. pp.65-72

Humayan, Kabir, 1961. *Indian Philosophy of Education*. New Delhi: Allied Publishers.

Illich, Ivan, 1973. *De-schooling Society*, London: Penguin.

Jayaram, N., 1990. *Sociology of Education in India,* Jaipur: Rawat Publication.

Jeffrey, Craig., 2011. 'Great Expectations: Youth in Contemporary India' in Clark Deces, Isabelle. ed. *A Companion to Anthropology in India*. UK: Blackwell. pp. 62-79

Jeffrey, Roger et.al., 2006. 'Parhai Ka Mahaul: An Educational Environment in Bijnor, Uttar Pradesh', in Neve, G. De and Donner, H. (eds.) *The Meaning of the Local: Politics of Place in Urban India*. Abingdon, Oxon: UCL Press.

Kappuswamy, B., 1975. *Social Change in India***,** New Delhi: Vikas Publications.

Kamat, A. R., 1985. *Education and Social Change in India,* Somaiya: Bombay.

Kumar, Krishna.1989. 'Learning to be Backward' in *Social Character of Learning*. New Delhi: Sage. pp. 59-77

Kumar, Krishna. 2009. *What is Worth Teaching?* New Delhi: Orient Blackswan. Chapters 1 ('What is Worth Teaching') &2 ('Origins of India's Textbook Culture'). pp. 1-22; 23-41.

Morris, Iror, 1978. *Sociology of Education*, London: Allan and Unvin.

Sarangapani, Padma., 2003. *The End of Childhood' in Construction of School Knowledge*. New Delhi: Sage. Pp 72-101.

Parsons, Talcott., 1959/2008. 'The School Class as a Social System' in Ballantine. J. H. And Spade, J. Z. (eds.). *Schools and Society: A Sociological Approach to Education*. 3rd Ed. California: Pine Forge Press. (pp. 80-85).

Haralambos M. and R.M. Heald, 2002. *Sociology: Theme and Perspective*, New Delhi: OUP.

Robinson, P., 1987. *Perspective in the Sociology of Education: An Introduction.* London: Routledge and Kegan Paul.

Ramachandra, V., 2004. *Gender and Social Equity in Primary Education***,** New Delhi: Sage.

Thapan, Meenakshi. 2006. ‘Docile’ bodies, ‘good’ citizens or ‘agential’ subjects? Pedagogy and Citizenship in Contemporary Society’ in *Economic and Political Weekly*. Vol. 41, No. 39. pp.4195-4203

Woods, Peter. 1983. *Sociology and the School. An Interactionist Perspective*. London: Routledge and Kegan Paul.

Course Title: Sociology of Knowledge

Course Code: SAHS SC 1 1 07 DCEC 4105

Credits: 5

Course Objectives

This course aims to introduce the learners to the domain of Sociology of Knowledge. What is knowledge? Are there different "knowledges" and "ways of knowing"? What are some of the philosophical theories of Knowledge in India? Questions such as these will be discussed in the course.

Learners will also get an opportunity to understand that how the social organization of a particular society (nature, culture, and politics) can affect the form that knowledge will take in the society.

Course Level Learning Outcomes

Upon the completion of the course, some of the learning outcomes that the students of this course are expected to demonstrate are:

1. Understanding of initial and emerging perspectives in the Sociology of Knowledge.
2. Identify the diverse approaches to the study of Science, Technology, and Society.
3. Reflect on the relationship between knowledge and power.
4. Critically evaluate Orientalism, Occidentalism, and their application in Social Sciences.

Unit I: Sociology of Knowledge - Initial and Emerging Perspectives

Karl Mannheim's proposal for sociology of knowledge; Philosophical theories of knowledge in India;

Ambedkar's enquiry into the inner and outer dimensions of knowledge.

Unit II: Approaches to the Study of Science, Technology and Society

Science and technological studies; Science and capital - new alliances

Unit III: Knowledge and Power

Sciences and the history of science**;** Colonialism and knowledge; Nature, culture and politics.

Unit IV: Sociology of Social Science Knowledge:

Modern myths and the social sciences**;** Orientalism, Occidentalism and the social sciences.

Suggested Readings

Ambedkar, B. R., 2008. *'Buddha or Karl Marx',* in Dr. Babasaheb Ambedkar, *Writings and speeches,* pp. 441—464.

Andresky, S., 1993. *Social Sciences as Sorcery*, St. Merton's: New York.

Benton, Ted, 1977. *Philosophical Foundations of Three Sociologies,* London: Routledge.

Berger, Peter and Thomas Luckmann, 1966. *The Social Construction of Reality: A Treaties in the Sociology of Knowledge,* London: Penguin.

Brodbeck, May, 1968. *Readings in the Philosophy of Social sciences*, New York: Macmillan.

Chakrabarty, Dipesh, 2011. 'History and the Politics of Recognition', in Anjan Ghosh, Tapati

Guha Thakurtha and Janaki Nair (eds.), *Theorizing the Present,* New Delhi*:* Oxford.

Davis, Kingsley, 1949. *Human Society,* New York: Macmillan.

Foucault, Michel, 1969, *Archaeology of knowledge*. London: Routledge.

_____ 1971. *The Order of Things: The Archaeology of the Human Sciences,* New York: Pantheon.

Giddens, Anthony, 1993. *New Rules of Sociological Methods*, Stanford: Stanford University Press.

Habermass, J., 1971. *Knowledge and Human Interest* (Translated: Jeremy J. Shabiro), Boston: Beacon Press.

Kuhn, Thomas, 2012. *The Structure of Scientific Revolutions*, Chicago: University of Chicago Press.

Mannheim, Karl, 1982. *Structures of Thinking*, London: Routledge and Kegan Paul, pp. 37-46, 55-66)

_____ 1982. 'The Sociology of Knowledge', in James E. Curtis and John W. Petras (eds.), *The Sociology of knowledge. A Reader*, London: Gerald Duckworth and Co., pp. 109-130.

_____ 1968. *Social Theory and Social Structure*, New York: Free Press.

Merton, K. Robert, 1979. *Sociology of Science: Theoretical and Empirical Investigations,* Chicago: University of Chicago Press.

Mills, C. Wright, 1959, *The Sociological Imagination*. New York: OUP.

Nagel, Ernest, 1979. *The Structure of science: Problems in the Logic of Scientific Explanation,* Santiago: Harcourt, Brace & World.

Nandy, Ashis, 1989. *The Intimate Enemy: Loss and Recovery of Self Under Colonialism,* Delhi: OUP.

Needham, Joseph, 1969. 'Science and Society in the East and the West' in *The Grand Titration*. London: George Allen and Unwin.

Omvedt, Gail, 2013. *Buddhism in India: Challenging Brahmanism and Caste,* New Delhi: Sage.

Sunder R. Kaushik, 2005. 'Subjects of Speculation: Emergent life sciences and Market Logics in the United States and India,' *American Anthropologist,* 107(1), 19-23.

Theodre, W. Adorno, 1976, *The Positive Dispute in German Sociology* (Translated: Glyn Adey and David Frisby), London: Heinemann.

Winch, Peter, 1958. *The Idea of Social Science and its Relation to Philosophy*. London: Routledge.

Course Title: South Asian Social thought

Course Code: SAHS SC 1 1 08 DCEC 4105

Credits: 5

Course Objective

South Asia is a bureaucratic category as well as a region defined in both geographical and ethnocultural terms. It is also a space where most of the modern nation-states have grappled with colonialism. This course aims to develop an informed first-hand understanding of some of the key ideas propounded by the South Asian thinkers and leaders usually not discussed in western social theory. The aim is to introduce learners to critical South Asian texts and ideas so that they can further reflect and research on the same.

Course Level Learning Outcomes

Upon the completion of the course, some of the learning outcomes that the students of this course are expected to demonstrate are:

1. An informed understanding of essential ideas of some significant personalities who shaped modern South Asia.
2. Understanding of contemporary South Asian socio-political situation in reflection of those ideas.
3. Reflect on the tradition of dissent in South Asia and how do different writers contest caste, religion, and gender.
4. Inclination towards reading innovative literature and ideas of various intellectuals.

Unit I: Examining Modernity

1. Necessity of Modernity: Raja Ram Mohan Roy and Sir Syed Ahmad Khan.
2. Pursuit of another Modernity: Rabindranath Tagore.
3. Critique of Modernity: Mohandas Karamchand Gandhi.

Unit II: Religion and Politics in South Asia

1. Composite nationalism: Maulana Muhammad Ali Jauhar and Maulana Abul Kalam Azad.
2. Muslim nationalism and the expedition for separatism: Muhammad Iqbal and Muhammad Ali Jinnah.
3. Essentialised religion and othering: M. S. Golwalkar and V. D. Savarkar.
4. Secular politics: Jawaharlal Nehru and Sheikh Mujibur Rahman.

Unit III: The Tradition of Dissent in South Asia

1. Literary dissent and responsible art: Krishan Chander and Mahasweta Devi
2. Questioning caste and religious order: Mahatma Jyotirao Phule, B.R. Ambedkar

3. Questioning Patriarchy: Pandita Ramabai and Tarabai Shinde.

Unit IV: Present Times

1. Ashish Nandy: Marginalized systems of Knowledge.
2. Eqbal Ahmad: Politics and The Roots of Religious Right
3. Gananath Obeyesekere and the world of the irrational.

Suggested Readings

Ahluwalia, B. K. (ed.), 1970, *M. K. Gandhi: Select Writings*, Delhi: Sagar Publications.

Alam, Fakhrul and Radha Chakrabarthy (eds.) 2011, *The Essential Tagore*, Harvard: Harvard University Press.

Chakravarty, Amiya (ed.), 1961, *A Tagore Reader*, New York: The MacMillan Company.

Devkota, Laxmi Prasad, *Haai! Haai! Angreji* (trans. Michael Hutt), Available at http://himalaya.socanth.cam.ac.uk/collections/journals/ebhr/pdf/EBHR_44_15.pdf

Deshpande, Govind P. (ed.), 2002, *Selected Writings of Jotirao Phule*, New Delhi: New Delhi.

Guha, Ramachandra (ed.), 2012, *Makers of Modern India*, New Delhi: Penguin.

Ghose, Jogendra Chunder (ed.), [1906] 1945, *The English Works of Raja Rammohun Roy – Volume I*, Calcutta: Sadharan Brahmo Samaj.

Iqbal, Afzal (ed.), 1963, *Select Writings and Speeches of Mohamed Ali: Volume I and II*, Lahore: Sh. Muhammad Ashraf.

Iyengar, Uma (ed.), 2007, *The Oxford India Nehru, New Delhi*: Oxford University Press.

Iyer, Raghavan (ed.), 2003, *The Essential Writings of M. K. Gandhi, New Delhi*: Oxford University Press.

Muhammad, Shan (ed.), 1972, *Writings and Speeches of Sir Syed Ahmad Khan*, Bombay: Nachiketa.

Nag, Kalidas and Debajyoti Burman (eds.), 1945, *The English Works of Raja Rammohun Roy – Part I*, Calcutta: Sadharan Brahmo Samaj.

Nandy, Ashis, 2004, *Bonfire of Creeds*, New Delhi: OUP.

Nehru, Jawaharlal, 2012 (1946), *The Discovery of India*, New Delhi: Penguin.

Obeyesekere, Gananath, 1992, T*he Apotheosis of Captain Cook: European Mythmaking in the Pacific*, Princeton: Princeton University Press.

Parel, Anthony (ed.), 1997, *Hind Swaraj and other writings*, Cambridge: Cambridge University Press.

Roy, M. N., 1952, *Radical Humanism*, New Delhi: Janta Press.

Shahabuddin, Syed (ed.), 2007, *Maulana Abul Kalam Azad: Selected Speeches and Writings*, Gurgaon: Hope India.

Sherwani, Latif Ahmad (ed.), 2006, *Speeches, Writings and Statements of Iqbal*, New Delhi: Adam Publishers.

Tagore, Rabindranath, 2010, *Crisis in Civilisation and Other Essays*, New Delhi: Rupa Publications.

Tharu, Susie and K. Lalita (eds.), 1991, *Women Writing in India*, Volume I, New York: The Feminist Press.

1956, *Speeches of Maulana Azad: 1947-1955*, Delhi: Publications Division, Ministry of Information and Broadcasting, Government of India.

Course Title: Sociology of Health and Medicine

Course Code: SAHS SC 1 1 09 DCEC 4105

Credits: 5

Course Objective

The aim of the course is to help the learner develop an understanding of inter-disciplinary knowledge in the domain of health and medicine. The difference between Sociology of Medicine and Sociology in Medicine will be taught along with the important theoretical orientations in the concerning domain of knowledge. The learner will also get a chance to understand the different health issues faced by the population in India and the underlying causal factors behind these problems. With the intent of making the students learn in-depth practically about the nature and working of health services in the country, they will be made to submit a field-based project on the district health system functioning or health programme in the selected state.

Course Learning Outcomes

Upon the completion of the course, some of the learning outcomes that the students of this course are expected to demonstrate are:

1. Understanding of the concepts related to Sociology of Health and Medicine
2. Familiarization with different social processes affecting health
3. Ability to comprehend health and illness from different theoretical perspectives
4. Familiarity with the health services delivery in India

Unit I: Introduction
Nature, definition and scope of Medical Sociology and its relationship with other social sciences

Unit II: Theoretical Perspectives
Functionalist, Marxist, Feminist, Symbolic Interactionist, Medical Pluralism

Unit III: Social Determinants of Health
The Social Demography of Health in India: Class, Gender, Caste, Religion and Education

Unit IV: Learnings from the Field
A Field Based Report on the nature and working of District Health Services or implementation of selected Health Programme at State level

Suggested Readings

Annandale , A. (2001). *The Sociology of Health and Medicine - A Critical Introduction.* Cambridge: Polity Press.

Banerji, D. (1985). *Health and Family Planning Services in India: An Epidemiological Socio Cultural and Political Analysis and a Perspective.* New Delhi: Lok Paksh.

Popper, K. R. (1968). *The logic of scientific discovery.* New York: Harper & Row.

Abraham, F. M. (2014). *Contemporary Sociology: An Introduction to Concepts and Theories.* New Delhi: Oxford University Press.

Andre, B. (1996). Sociology and Common Sense. *Economic and Political Weekly , 31* (35/37), 2361-2365.

Buechler, S. M. (2014). *Critical sociology.* Boulder, CO: Paradigm Publishers.

Durkheim, E. (1958). *The Rules of Sociological Method.* New York: The Free Press.

Coser, L. A. (2014). *Masters of Sociological Thought: Ideas in Historical and Social Context.* Jaipur: Rawat.

Giddens, A. (1993). *New Rules of Sociological Method.* Stanford: Stanford University Press.

Emmanuel, S. M., & Goold, P. A. (2002). *Modern philosophy, from Descartes to Nietzsche: An anthology.* Malden, Mass: Blackwell Publishers.

Bacon, F. (1970). On the Interpretation of Nature and the Empire of Man. In J. E. Curtis, & J. W. Petras, *The Sociology of Knowledge: A Reader* (pp. 89-96). London: Duckworth.

Kuhn , T. (1962). *The Structure of Scientific Revolutions.* Chicago: The University of Chicago.

Marx, K., & Engels, F. (1970). *The German Ideology.* New York: International Publishers Co.

Morrison, K. (2006). *Marx, Durkheim, Weber: Formations of Modern Social Thought.* London: Sage.

Sallis, J. (1987). *Deconstruction and Philosophy: The Texts of Jacques Derrida.* Chicago: University of Chicago.

Turner, J. H. (2013). *Theoretical Sociology: 1830 to the Present.* Thousand Oaks, California: Sage.

Weber, M. (1949). *The Methodology of the Social Sciences.* New York: Free Press.

Adorno, T. W. (1999). *Introduction to Sociology.* Stanford: Stanford University Press.

Babbie, R. E. (2010). *The Practice of Social Research.* Belmont, CA: Thomson Wadsworth.

Flick, U. (2006). *An Introduction to Qualitative Research.* London: Sage.

Gray, D. E. (2014). *Doing research in the real world.* London: Sage.

Luckmann, T. (1978). *Phenomenology and Sociology : selected readings.* New York: Penguin.

Zurbrigg, S. (1984). *Rakku's Story: Structures of Ill Health and the Source of Change.* Bangalore: Centre for Social Action.

Semester IV

Course Title: Techniques of Social Research

Course Code: SAHS SC 1 1 12 CC 4105

Credits: 5

Course Objectives

The main objective of this course is to inculcate research orientation and aptitude among the learners. The course aims at making them acquainted with the basics of methods and tools used for conducting research. The students will be given an overview of different quantitative and qualitative tools for conducting social research. The course will also provide knowledge on report writing and other associated topics.

Course Learning Outcomes

Upon the completion of the course, some of the learning outcomes that the students of this course are expected to demonstrate are:

1. Knowledge the framework of research process.
2. Familiarization with the basics of research designs and methods.
3. Ability to identify different sources available for literature review.
4. Understanding of the procedure of data collection.
5. Developing the ability to undertake report writing.
6. Awareness of different referencing styles and plagiarism issues.

Unit I: Nature and Scope of Social Science Research

1. Introduction to Social Research
2. Different types of Research
3. Steps in Research Process
4. Types of Research Design

Unit II: Hypothesis, Research design and Sampling

1. Formulation and Characteristics of Hypothesis
2. Sampling Techniques: Purposive and Non-Purposive

Unit III: Tools of Social Science Research

1. Quantitative Research Methods: Survey, Observation, Questionnaire, Interview

2. Qualitative Research Methods: Participant observation, Case study, Content analysis, Oral history, Life history

Unit IV: Ethical Issues in social science research, Report Writing, Referencing and Plagiarism issues

1. Ethical Issues in Conducting Social Science Research
2. Report Writing
3. Referencing
4. Plagiarism Issues

Suggested Readings

Ahuja, R. (2001). *Research Methods.* Jaipur: Rawat.

Asthana, H. S., & Bhushan, B. (2016). *Statistics for social sciences (with SPSS applications).* Delhi: PHI Learning Pvt. Ltd.

Babbie, E. R. (2010). *The Practice of social Research.* Belmont, CA: Thomson Wadsworth.

Bailey, K. D. (1978). *Methods of Social Research.* New York: Free Press.

Blumer, H. (1986). *Symbolic Interactionism: Perspective and Method.* Berkeley: University of California.

Bose, P. K. (1995). *Research Methodology.* New Delhi: Indian Council of Social Sciences Research.

Bryman, A. (1988). *Quality and Quantity in Social Research.* London: Pluto Press.

Bryman, A. (1990). *Quantitative data Analysis for Social Sciences.* London: Routledge.

Bryman, A. (2012). *Social Research Methods.* New Delhi: Oxford University Press.

Creswell, J. W. (2011). *Research design: Qualitative, Quantitative, and Mixed Methods Approaches.* New Delhi: Sage.

Flick, U. (2006). *An Introduction to Qualitative Research.* London: Sage.

Geertz, C. (1973). *The Interpretation of Cultures.* New York: Basic Books.

Gibson, W. J., & Brown, A. (2009). *Working with Qualitative Data.* London: Sage.

Goode, W. J., & Hatt, P. K. (1952). *Methods in Social Research.* New York: McGraw Hill.

Gray, D. E. (2014). *Doing research in the real world.* London: Sage.

Hahn, C. (2008). *Doing Qualitative Research Using your computer: A Practical Guide.* New Delhi: Sage.

Harding, S. (1987). *Feminism and Methodology.* Bloomington: Indiana University Press.

Kothari, C. R., & Garg, G. (2014). *Research Methodology: Methods and Techniques.* New Delhi: New Age International.

Madan, T. N., & Beteille, A. (1975). *Encounter and Experience.* New Delhi: Vikas.

Madge, J. (1965). *The Tools of Social Science.* New York: Doubleday Anchor.

Mehrotra, N. (2004). Women and Movement Politics: Some Methodological Reflections. *The Eastern Anthropologist, 58*(2), 149- 170.

Moser, S. C., & Kalton, G. (1971). *Survey Methods in Social Investigation.* London: Heinmann.

Mueller, J. H., & Schuessler, K. F. (1961). *Statistical Reasoning in Sociology.* New Delhi: Oxford University Press.

Mukherjee, P. N. (2000). *Methodology in Social Research: Dilemmas and Perspectives.* New Delhi: Sage.

Neuman, W. L. (2000). *Social Research Methods: Qualitative and Quantitative Approaches.* Boston: Allyn and Bacon.

Olsen, W. (2012). *Data collection: Key Debates and Methods in Social Research.* London: Sage.

Payne, G. (1989). *Sociology and Social Research.* London: Routledge.

Rosaldo, R. (1991). *Culture and Truth: The Remaking of Social analysis.* Boston: Beacon Press.

Scheyens, R., & Storey, D. (2003). *Development Field work: A Practical Guide.* New Delhi: Sage.

Selltiz, C., Jahoda, M., Deutsch, M., & Cook, S. (1959). *Research Methods in Social Relations.* New York: Henry Holt and Co.

Sieber, J. (Ed.) (1982). *The Ethics of Social Research: Surveys and Experiments*. New York: Springer.

Sjoberg, G., & Nett, R. (1968). *A Methodology for Social Research.* New York: Harper and Row.

Srinivas, M. N., & Shah, A. M. (1979). *The Field Worker and the Field.* New Delhi: Oxford University Press.

Srivastava, V. K. (2004). *Field Work and Methodology.* New Delhi: Oxford University Press.

Wagner, W. E. (2013). *Using IBM SPSS statistics for Research Methods and Social Science Statistics.* Sage: California.

Yin, R. K. (1984). *Case Study Research: Design and Methods.* California: Sage.

Young, P. V. (1988). *Scientific Social Surveys and Research.* New Delhi: Prentice Hall.

Course Title: Sociology of Development

Course Code: SAHS SC 1 1 13 CC 4105

Credits: 5

Course Objectives

This course aims to familiarize the students with the various theoretical perspectives, conceptual issues, and debates on the relationship between society and development. Learners will also get an opportunity to engage with and understand the various approaches of different scholars while also examining how the Indian model of development has undergone change over the years.

What is the role of the state in the development of Indian society? How to critically analyze the development debates and the relationship between culture and development? How to critically evaluate various development plans and projects implemented in India? These are some of the questions that will be discussed in the course.

Course Learning Outcomes

Upon the completion of the course, some of the learning outcomes that the students of this course are expected to demonstrate are:

1. The students will learn about the relationship between society and development, development debates, and the relationship between culture and development.
2. They will learn about theories of development.
3. They will also learn about various development plans and projects implemented in India.
4. From the practical components, they will learn about how to review development projects and prepare reports on the same.

Unit I: Conceptual issues related to development:

Economic Growth, Human Development, Social Development, Ecological Development and Sustainable Development.

Unit II: Theories of Underdevelopment:

Liberal: Marx, Weber and Gunnar Myrdal, Dependency Theory: A. G. Frank (Core-Periphery), Uneven Development-Samir Amin; World System Theory: Immanuel Wallerstein.

Unit III: Paths of Development:

Modernization and Globalization; Socialist; Mixed; Gandhian.

Unit IV: Social Structure and Development:

Social Structure as Facilitator or Inhibitor; Development and Socio-Economic Disparity; Gender Dimensions of Development; Challenges of Development in Indian Society.

Suggested Readings:

Alavi, Hamza and Teodor Shanin (ed.),1982. *Introduction to the Sociology of Developing Societies*.London: Macmillan.

Alexander, K C., 1994. *The Process of Development of Societies*. New Delhi: Sage.

Blomstrons, M. and B Hettne., 1984. *Development Theory in Transition: The Dependency Debate and Beyond: Third World Responses*. London: Zed.

Chandhoke, Neera., 1995. *State and Civil Society: Explorations in Political Theory*. New Delhi: Sage.

Cooke, Bill and Uma Kothari (ed.)., 2001. *Participation: The New Tyranny?* London: Zed.

Escobar, Arturo, 1995. *Encountering Development: The Making and Unmaking of the Third World*. New Jersey: Princeton University Press.

Esteva, Gustavo, 2010. "Development". In Wolfgang Sachs (ed.). *The Development Dictionary*. London: Zed: 1-23.

Feldman, Shelley, 1997. "NGOs and Civil Society: (Un)stated Contradictions". *Annals of the AmericanAcademy of Political and Social Science*: *The Role of NGOs: Charity and Empowerment*, 554: 46-65.

Frank, Andre Gunder, 1967. *Capitalism and underdevelopment in Latin America: Historical Studies of Chile and Brazil.* New York: Monthly Review Press.

Freire, Paulo, 1972. *Pedagogy of the Oppressed*. New York: Herder and Herder.

Gandhi, M K., 1945. *Constructive Programme: Its Meaning and Place*. Ahmedabad: Navajivan Press.

_____1993. *An Autobiography: The Story of My Experiments with Truth*. Boston: Beacon Press.

Ghosh, Biswajit, 2009. "NGOs, Civil Society and Social Reconstruction in Contemporary India".*Journal of Developing Societies*, 25.2 (2009): 229 – 252.

Gusfield, J R., 1967. "Tradition and Modernity: Misplaced Polarities in the Study of Social Change". *American Journal of Sociology,* 72.4: 351-362.

Illich, Ivan., 1978. *Towards a History of Needs*. New York: Pantheon Books.

Kaviraj, Sudipta and S. Khilnani (ed.), 2001. *Civil Society: History and Possibilities*. Cambridge: Cambridge University Press.

Lauer, Robert H and Jeanette C Lauer, 2013. *Social Problems and the Quality of Life.* Ohio: McGraw- Hill Education.

Lerner, Daniel., 1958. *The Passing of Traditional Society: Modernizing the Middle East*. Illinois: Free Press.

Meadows, Donella H., 1972. *The Limits to Growth: A Report for the Club of Rome's Project on thePredicament of Mankind.* New York: Universe Books.

Moore, Wilbert Ellis., 1963. *Social Change*. New Jersey: Prentice-Hall Inc.

Morris-Suzuki, Tessa., 2000. "For and Against NGOs: The Politics of the Lived World". *New Left Review*, 2: 63-84.

Nederveen, Pieterse J., 2010. *Development Theory: Deconstructions/reconstructions*. Los Angeles:Sage.

Rahnema, Majid, and Victoria Bawtree.,1997. *The Post-Development Reader*. London: Zed Books.

Rudolph, Lloyd I and Susanne H Rudolph., 1967. *The Modernity of Tradition: Political Development inIndia*. Chicago: University of Chicago Press.

Sachs, Wolfgang., 1992. *The Development Dictionary: A Guide to Knowledge as Power*. London: ZedBooks.

Schuurman, Frans J (ed.).,2001. *Globalization and Development Studies*. New Delhi: Vistaar.

Wallerstein, Immanuel M., 2004. *World-Systems Analysis: An Introduction*. Durham: Duke UniversityPress.

Generic Elective Courses (GEC)

Course Title: The Study of Society

Course Code: SAHS SC 1 1 01 GEC 4004

Credits: 4

Course Objectives

This course aims to familiarize the students from a non-sociology discipline with the theoretical perspectives, ways, and processes of engaging in the study of society. The course begins with discussion on the emergence of Sociology in Europe as a separate discipline in the particular socio-historical circumstances. The main concern here would be to understand the context in which the disciple emerged and evolved in the various institutional practices. The learners will also get an opportunity to reflect on sociology's specialized nature, thereby negating the common sensical assumptions about it.

What is society? What are the different institutions that exist in society? What functions do they play in society? These are some of the questions that will also be discussed during the course journey. In the end, the course will provide students an opportunity to develop a sociological lens to understand the world around them.

Course Level Learning Outcomes

Upon the completion of the course, some of the learning outcomes that the students of this course are expected to demonstrate are:

1. Develop an understanding about the history, origin, and the nature of sociology and its relationship with other social sciences.
2. Understand the diverse theoretical lens such as positivism, functionalism, conflict, and humanism that can be used to study society.
3. Identify the meanings and definitions of basic concepts such as community, association, institution, culture, social groups, etc.
4. Critically analyze processes such as Globalization, Modernization, Westernization, and Sanskritization in Indian society.
5. Develop a holistic understanding of the relationship between the individual the society.

Unit I:

History, origin and the nature and definition of Sociology; its relationship with other social sciences, Social Anthropology, Psychology, History, Economics and Politics.

Unit II:

Basic Concepts: Community, Association, Institution, Culture, Social Groups, its Types-Primary and Secondary Group

Unit III:

Theoretical Orientation: Positivism, Functionalism, Conflict and Humanism.

Unit IV:

Structure and Dynamics of Society: Status and Role, Multiple Roles, Role Conflict; Sanskritization, Westernization, Modernization and Globalization.

Suggested Readings

Abraham, Francis M., 2006. *Contemporary Sociology: An Introduction to Concepts and Theories*, New Delhi: OUP.

Bose, N. K., 1967. *Culture and Society in India*, Bombay: Asia Publishing House.

Bose, N. K., 1975. *Structure of Hindu Society*, New Delhi: National Book Trust.

Dube, S. C., 1958. *India's Changing Villages*, London: Routledge and Kegan Paul.

_____ 1990. *Society in India*, New Delhi: National Book Trust.

_____ 1995. *Indian Village*, London: Routledge.

Giddens, Anthony, 2013. *Sociology,* New Delhi: John Wiley and Sons.

Haralambos, M., 1997. *Sociology: Themes and Perspectives*, New Delhi: OUP.

Karve, Irawati, 1961. *Hindu Society: An Interpretation*. Poona: Deccan College.

Ken, Morrison, 1998. *Marx Weber, Durkheim,* New Delhi: Sage.

Lannoy, Richard, 1971. *The Speaking Tree: A Study of Indian Society and Culture* New Delhi: OUP.

Mandelbaum, D. G., 1970. *Society in India,* Bombay: Popular Prakashan.

Rao, C., 2003. *Sociology: Primary principles. New Delhi:* S. Chand & Company Ltd.

Singh, Yogendra, 1973. *Modernization of Indian Tradition.* New Delhi: Thomson Press.

Srinivas, M. N., 1963. *Social Change in Modern India*, Berkeley: University of California Press.

Srinivas, M. N., 1980. *India: Social Structure,* New Delhi: Hindustan Publishing Corporation.

Uberoi, Patricia. (1993). *Family, Kinship and Marriage in India*. New Delhi: OUP.

Course Title: Women and Society

Course Code: SAHS SC 1 1 02 GEC 4004

Credits: 4

Course Objectives

This course will try to make the learners understand the different nuances between women and society. The history of women's position in Indian society will be the introductory theme, under which there will be a discussion on the position of women from Vedic times to the present, along with women's participation in the Independence movement and post-independence period. Additionally, there will be readings on the social construction of gender and gender roles. Concerns relating to various issues faced by the women in India will be comprehensively covered in this course. Empowerment of women through the measures taken by the State, the interrelation between women and civil society, as well as women and social movements in India will be discussed in this course.

Course Level Learning Outcomes

Upon the completion of the course, some of the learning outcomes that the students of this course are expected to demonstrate are:

1. Ability to comprehend women's position at the different time periods in India.
2. Understanding of social construction of gender and gender roles.
3. Identify the problems and concerns of women in India.
4. Critically analyze the empowerment measures taken by the state and civil society for women empowerment.

Unit I: History of Women's Position in Indian Society

Women's position from Vedic times to the present, Women's participation in India's Independence movement; Post independence period.

Unit II: Social Construction of Gender and Gender Roles

Socialization- Stages of socialization, Agencies of Socialization – Family, Peer group, Mass Media - Gender Socialization– Gender Identity, Concepts in Feminism- Feminism, Masculinity, Gendered Division of Labour.

Unit III: Women in India: The Concerns

Marriage- problems faced by married women, Women and Health issues, Violence against women; women and globalization- nature of women's labour, discriminatory wages, changing working conditions and workplace related issues.

Unit IV: Empowerment of Women

Empowerment measures taken by the State, Women and Civil Society, Women and Social Movements in India.

Suggested Readings:

Altekar, A S. The Position of Women in Hindu Civilization. Delhi: Motilal Banarasidass, 1983.

Caeden, Maren L. The New Feminist Movement. Russell Sage Foundation: New York, 1974.

Calman, Leslie. Towards Empowerment: Women and Movement Politics in India. Colardo: Westview, 1992.

Caplan, Patricia. Class and Gender in India: Women and Their Organizations in a South Indian City. London: Tavistock, 1985.

Carr, Marilyn, Martha Alter Chen and Renana Jhabvala (ed.). Speaking Out Women's Economic Empowerment in South Asia. New Delhi: Vistaar, 1996.

Connell, R W. Masculinities. Berkeley: University of California Press, 1995.

De Beauvoir, Simone. The Second Sex. Trans. H.M. Parshley. New York: Vintage, 1974.

Desai, N and M Krishnaraj. Women and Society in India. Delhi: Ajantha, 1987.

Desai, Neera and Vibhuti Patel. Indian Women: Change and Challenge in the International Decade, 1975-85. Mumbai: Popular Prakashan, 1985.

Dines, Gain And Jean M Humez. Gender, Race and Class in Media. California: Sage, 1994.

Forbes, G. Women in Modern India. Cambridge: Cambridge University Press, 1998.

Friedan, Betty. The Feminine Mystique. London: Norton, 1963.

Glover, David and Cora Kaplan. Genders. London: Routledge, 2007.

Goffman, Erving. Gender and Advertisement. New York: Harper and Row, 1976.

Gutmann, Amy. Liberal Equality. New York: Cambridge University Press, 1978.

Jain, Jasbir (ed.). Women's Writing- Text and Context. Jaipur: Rawat, 1997.

Jayawardena, Kumari. Feminism and Nationalism in the Third World. London: Zed, 1986.

Kaplan, Patricia (ed.). The Cultural Construction of Sexuality. London: Tavistock, 1987.

Mulvey, Laura. "Visual Pleasure and Narrative Cinema". In Leo Braudy and Marshall Cohen (ed.). Film Theory and Criticism: Introductory Readings. New York: OUP, 1999: 833-44.

Macdonald, Myra. Representing Women: Myths of Femininity in the Popular Media. London: E.Arnold, 1995.

Mac Cormark, Carol P. and Marilyn Strathern (ed.). Nature, Culture and Gender. Cambridge: Cambridge University Press, 1980.

Mohanty, C T. Feminism Without Borders: Decolonising Theory Practising Solidarity. DurhamN.C: Duke University Press, 2003.

Myers, Kristen A, Cynthia M Anderson and Barbara Risman. Feminist Foundations: Toward Transforming Sociology (A Gender & Society Reader). London: Sage, 1998.

Oakley, Ann. Sex, Gender and Society. New York: Maurice Temple Smith Ltd, 1972.

Rich, Andrienne. Of Women Born: Motherhood as Experience and Institution. New York: Norton, 1976.

Sharma, S R. Perspectives on Feminism. Jaipur: Ritu, 2008.

Sharmila Rege (ed.). Sociology of Gender: The Challenge of Feminist Sociological Knowledge. London: Sage, 2003.

Krishna, Sumi. Livelihood and Gender Equity in Community Resource Management. New Delhi: Sage, 2004.

Thakur, B S and Binod C Agarwal. Media Utilisation for the Development of Women and Children. New Delhi: Concept, 1989.

Van Zoonen, Lisbet. Feminist Media Studies. New Delhi; Sage, 1994.

Whyte, R O and P Whyte. The Women of Rural Asia. Colardo: Westview, 1982.

Course Name: Indian Society

Course Code: SAHS SC 1 1 03 GEC 4004

Credits: 4

Course Objectives

This course aims to familiarize the students with the various theoretical perspectives, conceptual issues, and debates on Indian society. Learners will also get an opportunity to engage with and understand the various approaches of different scholars while also examining how Indian society has undergone multiple changes over the period of time.

How society affect peoples' way of life? How can people affect society? Questions such as these will also be discussed in the present course.

Course Level Learning Outcomes:

Upon the completion of the course, some of the learning outcomes that the students of this course are expected to demonstrate are:

1. Develop an understanding of the factors that promote diversity in Indian society.
2. Identify the diverse theoretical perspectives, conceptual issues, and debates in the study of Indian society.
3. Trace the trajectory of social transformation in India.
4. Critically analyze the role of the state, civil society, and other processes such as globalization, urbanization, industrialization, and secularization in Indian society.

Unit I: Features of Indian Society

Unity and Diversity: Cultural, Regional, Linguistic, Religious and Ethnic

Unit II: Components of Indian Society

Caste, Class, Gender, Family, Kinship, Tribal, Rural and Urban Society

Unit III: Contemporary Issues and Problems of Indian Society

Population and associated issues, Poverty and Urbanization: its problems and remedies

Unit IV: State and Society

Social Empowerment and Development, Role of Civil Society in Social Transformation

Suggested Readings

Abraham, Francis M. (2014). *Contemporary Sociology: An Introduction to Concepts and Theories*, New Delhi: Oxford University Press.

Beteille Andre. (1999). 'Empowerment'. *Economic and Political Weekly*, Vol. 34(10/11), 589-597

Beteille Andre. (2003). *Poverty and Inequality.* 38 (42), 4455-4463

Beteille Andre. (1974). *Six Essays in Comparative Sociology*. New Delhi: OUP.

Bhattacharya Prabir C. (2002). 'Urbanisation in Developing Countries'. *Economic and Political Weekly*, Vol. 37 (41), 4219-4218.

Bose, Ashish, (1978) *India's Urbanisation 1901-2001,* New Delhi: Tata McGraw Hill.

Castells, Manuel., 1983. *The City and the Grassroots*. London: Edward Arnold.

_____. *The Urban Question: A Marxist Approach*. London: Edward Arnold, 1977.

Dube, S.C, (1990). *Indian Society*. New Delhi: National Book Trust.

Dube, S.C. (ed). (1977). *India Since Independence; Social Report on India 1947-1972.* New Delhi. Vikas.

D'Souza Victor S. (1975). 'Social Inequalities and Development in India'. *Economic and Political Weekly*, 10 (19), 770-773.

Haq, Ehsanul. (2017). *Sociology of Population in India*, New Delhi: Macmillan.

Harris, John (2007). Antimonies of Empowerment Observations on Civil Society, Politics and Urban Governance in India, *Economic and Political Weekly*, 42 (26), 2716-2724.

Hartman, Betsy & Rao, Mohan (2015). 'India's Population Programme: Obstacles and Opportunities', *Economic and Political Weekly*, 50 (44), 10-13.

Kasarda, John D and Edward M Crenshaw. (1991). "Third World Urbanization: Dimensions, Theories,and Determinants". *Annual Review of Sociology,* 17, 467-501.

Kohli, Atul, (2001) *The Success of India's Democracy,* Cambridge: Cambridge University Press.

Kosambi Meera. (1994). *Urbanisation and Urban Development in India*. New Delhi: ICSSR.

Kothari, Rajni (ed.). (1970). *Caste in Indian Politics,* Mumbai: Orient Longman

Kothari, Rajni, (2012). *Politics in India*, Hyderabad: Orient BlackSwan.

Masan, Philip. (1967). *India and Ceylon: Unity and Diversity*. London: London.

Modi Ishwar. (2014). *Polity, Civil Society and Development: Essays in Honour of ProfessorYogendra Singh*. Jaipur: Rawat

Mohan Sudha, (2002). 'Role and Relevance of Civil Society Organisations'. *The Indian Journalof Political Science,* 63 (2/3), 193-211.

Mohanty, Bidyut (ed.) (1993). *Urbanisation in Developing Countries: Basic Services and CommunityParticipation.* New Delhi: Institute of Social Sciences and Concept Pub.

Nath, V and S K Aggarwal, (2007). *Urbanization, Urban Development, and Metropolitan Cities in India.* New Delhi: Concept Pub.

Social Movements in India

SAHS SC 1 1 04 GEC 4004

Credits: 4

Course Objectives

The course is designed to introduce the learners to the various frameworks, concepts, and theories related to Social Movements so that they can reflect on the nature and dynamics of Social Movements.

How and when do groups mobilize and resist power? What is the role of ideology and leadership in Social Movements? What are the reasons for the emergence of different Social Movements? Questions such as these will be discussed in the course. The students will also get an opportunity to reflect on the empirical cases of social movements in India and the historical trajectory they have taken over the years.

Course Level Learning Outcomes

Upon the completion of the course, some of the learning outcomes that the students of this course are expected to demonstrate are:

1. Identify the diverse theoretical perspectives, conceptual issues, and debates in the study of social movements.
2. Understand the role of ideology and leadership in social movements.
3. Recognize the various types of social movements in India and elaborate on how they have evolved historically.
4. Develop a sociological lens to analyze social movements.

Unit I: Conceptual Issues

Nature, Definition, Classification; Genesis, Ideology and Identity; Collective Mobilization and Leadership.

Unit II: Theories of Social Movement

Collective Behaviour and Social Unrest (H. Blumer); Structural Restrain theory (Smelser); Resource Mobilization and New Social Movements.

Unit III: Types of Movements in India

Peasant, Backward Class movement, Religious Sectarian movement.

Unit IV: Politics of Transcendence

Tribal and Dalit Movement, Women's, and Environment movement.

Suggested Readings

Barrington, Moore, 1966. *Social Origins of Dictatorship and Democracy: Lord and Peasant in the Making of the Modern World*, Boston: Beacon Press.

Della, Pord and Diani M., 2006. *Social Movements and Introduction*. New Delhi: OUP.

Desai, A. R., 1982. *Peasant Struggle in India:* New Delhi: OUP.

Dourain, A., 1981, *The Voice and the Eye: An Analysis of Social Movement*, Cambridge: Cambridge University.

Frankel, R. F. and M.S.A Rao, 1989. *Dominance and State Power in Modern Power: Decline of Social Order*- Vol. I & II*,* New Delhi: OUP.

Giddens, Anthony, 2013. *Sociology,* New Delhi: John Wiley and Sons.

Goodwill, J and Jasper J. (eds.), 2002. *The Social Movements: Reader Cases and Concepts*, Oxford: Wiley Blackwell.

Habermass, J., 1981. *New Social Movements, Telos,* No.49 (Fall), pp. 33-37.

_____ 1989. *The Structural Transformation of the Public Sphere,* Cambridge: MIT Press.

Hardtmann, Eva Maria, 2009. *The Dalit Movement in India: Local Practices, Global Connections.* New Delhi: OUP.

Jaffrelot, C., 2003. *India's Silent Revolution: The Rise of Lowe Castes in North Indian Politics.* London: Hurst Publishers.

Melucci, A., 1989. *Nomads of the Prison: Social Movement and Individual Needs in Contemporary Society,* London: Hutchinson Radius.

Oddie, G. A (ed.), 1977. *Religion in South Asia: Religious Conversion and Revival Movements in South Asia in Medieval and Modern Times,* Cambridge*:* Cambridge University Publications.

Omvedt, Gail, 2015. *Dalits and the Democratic Revolution: Dr. Ambedkar and the Dalit Movement in Colonial India*, New Delhi: Sage.

Prasad, Jitender and Sangita Thakur, 2015. *Gandhi, Ambedkar in Dalits Emancipation*, New Delhi: Academic Excellence.

Prasad, Jitender, 2005. *Tribal Movements in India,* New Delhi: Kilaso Publications.

Rao, M. S. A., 1979. Social Movements and Social Transformation: A Study of Two Backward Classes Movements in India. New Delhi: Macmillan.

Shah, Ghanshyam, 2001. *Dalit Identity and Politics*, New Delhi: Sage.

Smelser, N. J. C., 1962. *Theory of Collective Behavior*, London: Routledge and Kegan Paul.

Snow, D. A., Soule, S. A., & Kreisi, H. (2004). *The Blackwell Companion to Social Movements.* UK: Blackwell Publishing Limited.

Tarrow, S., 1998. *Power and Movement: Social Movement, Collective and Politics*. New Delhi: Cambridge University Press.

Thorat, Sukhadao, 2009. *Dalits in India: Search for Common Destiny*. New Delhi: Sage.

To: ashok prasad <ashokenzyme@yahoo.com>, "Dr. Rajesh Malhotra" <malhotra_ksrk@yahoo.co.in>, "Dr. Harish Kumar" <harishkumar@cuh.ac.in>, "Dr. Manoj Gupta" <mkgupta@cuh.ac.in>, Deansobs@cuh.ac.in, "Dr. Vinod Kumar" <vinodkumar@cuh.ac.in>

Esteemed Members of the Board of Studies
Department of Chemistry
Central University of Haryana
Mahendergarh, Haryana

Dear Sir,
I am sending the minutes of the Board of Studies (BoS) meeting held on 09-09-2021 for your kind consideration and online **approval**, please.
All relevant documents/files after rectification are attached herewith for your kind perusal.

Minutes of the Meeting of Board of Studies (BoS)

A meeting of the Board of Studies (BoS) of the Department of Chemistry, School of Basic Sciences, Central University of Haryana (CUH) was convened in the office of Head, Department of Chemistry on 09-09-2021 (Thursday) at 10:00 AM onwards. The meeting was conducted in both offline and online modes (Google Meet Link: meet.google.com/pfq-rwtv-uqi).

The following members were present in the meeting:

	Presence Mode
• **Dr. Vinod Kumar** (Associate Professor, Head, Department of Chemistry, CUH & Chairperson of BoS)	Offline
• **Dr. Harish Kumar** (Associate Professor, CUH, Member)	Offline
• **Dr. Manoj Kumar Gupta** (Assistant Professor, CUH, Member)	Offline
• **Prof. Rajesh Malhotra**, Department of Chemistry, Guru Jambheshwar University of Science and Technology, Hisar (*External Subject Expert*)	Online

विभागाध्यक्ष / Head
रसायन विज्ञान विभाग
Department of Chemistry
हरियाणा केंद्रीय विश्वविद्यालय
Central University of Haryana
महेन्द्रगढ़ 123031, हरियाणा
Mahendergarh-123031, Haryana

The following agenda items were deliberated and resolved in the meeting.

Agenda Item No.	Agenda Items	Attachment(s)	Action Taken
01	Consideration and approval of the Scheme and Syllabi of M.Sc. (Chemistry), two year	Annexure-I	Approved

	Programme w.e.f. Academic Session 2021-2022. ~~Attach~~		
02	Consideration and approval of the Scheme of first three years and syllabi of first year of Integrated B.Sc.-M.Sc. (Chemistry), a five-year Programme w.e.f. Academic Session 2021-2022.	Annexure-II	Approved
03	Consideration and approval of the Scheme and Syllabi of Ph.D. (Chemistry) course work w.e.f. Academic Session 2021-2022	Annexure-III	Approved
04	Consideration and approval of the panel External Examiners for practical examinations / Project Dissertation for PG/Integrated B.Sc.-M.Sc. Programme in the Department of Chemistry	Annexure-IV	Approved
05	Consideration and approval of the panel of External Examiners for TEE Question papers setting for PG/Integrated B.Sc.-M.Sc. Programmes in the Department of Chemistry	Annexure-V	Approved
06	Consideration and approval of the panel of External Examiners for TEE Question paper moderation for PG/Integrated B.Sc.-M.Sc. Programme in the Department of Chemistry	Annexure-VI	Approved
07	Consideration and approval of the panel of External Examiners for setting question papers for Term End Examination(s) of Ph.D. Programme in chemistry.	Annexure-VII	Approved
08	Consideration and approval of panel of External Experts for Departmental Research Committee (DRC) in the Department of Chemistry	Annexure-VIII	Approved
09	Consideration and approval of minutes of the Departmental Research Committee (DRC) held on 26-07-2021.	Annexure-IX	Approved.

The meeting ended with thanks to the Chair.

विभागाध्यक्ष / Head
रसायन विज्ञान विभाग
Department of Chemistry
हरियाणा केंद्रीय विश्वविद्यालय
Central University of Haryana
महेन्द्रगढ़ 123031, हरियाणा
Mahendergarh-123031, Haryana

Dr. Manoj Kumar Gupta

Dr. Harish Kumar

(Approved via email)

Prof. Rajesh Malhotra
(External Expert Member)

Dr. Vinod Kumar

With Warm Regards

Head
Department of Chemistry
School of Basic Sciences
Central University of Haryana
Mahendergarh, Haryana-123031

[Quoted text hidden]

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9 attachments

- **Annexure-I M.Sc. CHEM-SBS CURRICULUM DRAFT F.pdf**
  1006K
- **Annexure-II Annexure-II Integrated B.Sc.-M.Sc. CHEM-SBS CURRICULUM DRAFT F.pdf**
  605K
- **Annexure-III Ph D Chemistry 2021 scheme and syllabi.pdf**
  224K
- **Annexure-IV.pdf**
  253K
- **Annexure-V.pdf**
  250K
- **Annexure-VI.pdf**

विभागाध्यक्ष / Head
रसायन विज्ञान विभाग
Department of Chemistry
हरियाणा केंद्रीय विश्वविद्यालय
Central University of Haryana
महेन्द्रगढ़ 123031, हरियाणा
Mahendergarh-123031, Haryana

194K

Annexure-VII.pdf
189K

Annexure-VIII.pdf
208K

Annexure-IX.pdf
5609K

Dr. Harish Kumar <harishkumar@cuh.ac.in> Sun, Sep 12, 2021 at 10:37 PM
To: "HoD, Chemistry" <hodchemistry@cuh.ac.in>
Cc: ashok prasad <ashokenzyme@yahoo.com>, "Dr. Rajesh Malhotra" <malhotra_ksrk@yahoo.co.in>, "Dr. Manoj Gupta" <mkgupta@cuh.ac.in>, Deansobs@cuh.ac.in, "Dr. Vinod Kumar" <vinodkumar@cuh.ac.in>

Agenda items no. 01 to 09 are approved.
[Quoted text hidden]

Dr. Manoj Gupta <mkgupta@cuh.ac.in> Sun, Sep 12, 2021 at 11:06 PM
To: "HoD, Chemistry" <hodchemistry@cuh.ac.in>
Cc: ashok prasad <ashokenzyme@yahoo.com>, "Dr. Rajesh Malhotra" <malhotra_ksrk@yahoo.co.in>, "Dr. Harish Kumar" <harishkumar@cuh.ac.in>, Deansobs@cuh.ac.in, "Dr. Vinod Kumar" <vinodkumar@cuh.ac.in>

Dear Sir,

Thanks for sharing the minutes of BoS meeting and corrected files as Annexure I to IX. I have thoroughly checked all attachments (Annexure I to IX) and it looks perfect. **Now the Minutes of BoS with agenda item numbers 1 to 9 are approved from my side.**

Thanks with regards,
Manoj

****

डॉ मनोज कुमार गुप्ता / Dr. Manoj Kumar Gupta
सहायक आचार्य / Assistant Professor
रसायनविज्ञान विभाग / Department of Chemistry
हरियाणा केन्द्रीय विश्वविद्यालय / Central University of Haryana
महेंद्रगढ़ -123 031 / Mahendergarh - 123 031
हरियाणा, भारत / Haryana, India
ईमेल / Email: mkgupta@cuh.ac.in / manojiict@gmail.com
मोबाइल नंबर / Mobile No. +91 9728739075



विभागाध्यक्ष / Head
रसायन विज्ञान विभाग
Department of Chemistry
हरियाणा केंद्रीय विश्वविद्यालय
Central University of Haryana
महेन्द्रगढ़ 123031, हरियाणा
Mahendergarh-123031, Haryana

[Quoted text hidden]

HoD, Chemistry <hodchemistry@cuh.ac.in> Mon, Sep 13, 2021 at 2:18 PM

To: "Dr. Manoj Gupta" <mkgupta@cuh.ac.in>
Cc: ashok prasad <ashokenzyme@yahoo.com>, "Dr. Rajesh Malhotra" <malhotra_ksrk@yahoo.co.in>, "Dr. Harish Kumar" <harishkumar@cuh.ac.in>, Deansobs@cuh.ac.in, "Dr. Vinod Kumar" <vinodkumar@cuh.ac.in>

Dear Members (BoS)
The minutes of BoS meeting held on 09-09-2021 are approved from my side with a few corrections in total number of credits in Annexure-II. In the corrected file total credits are 148 in place of 140 and annexure II is also attached herewith for your kind information and approval.

With Deep Regards

Head
Department of Chemistry
School of Basic Sciences
Central University of Haryana
Mahendergarh, Haryana-123031

[Quoted text hidden]

Annexure-II Integrated B.Sc.-M.Sc. CHEM-SBS CURRICULUM DRAFT F.pdf
2328K

Dr. Manoj Gupta <mkgupta@cuh.ac.in> Mon, Sep 13, 2021 at 4:01 PM
To: "HoD, Chemistry" <hodchemistry@cuh.ac.in>
Cc: ashok prasad <ashokenzyme@yahoo.com>, "Dr. Rajesh Malhotra" <malhotra_ksrk@yahoo.co.in>, "Dr. Harish Kumar" <harishkumar@cuh.ac.in>, Deansobs@cuh.ac.in, "Dr. Vinod Kumar" <vinodkumar@cuh.ac.in>

Dear Sir,

It is approved .

Thanks & Regards,
Manoj

****

डॉ मनोज कुमार गुप्ता / Dr. Manoj Kumar Gupta
सहायक आचार्य / Assistant Professor
रसायनविज्ञान विभाग / Department of Chemistry
हरियाणा केन्द्रीय विश्वविद्यालय / Central University of Haryana
महेंद्रगढ़ -123 031 / Mahendergarh - 123 031
हरियाणा, भारत / Haryana, India
ईमेल / Email: mkgupta@cuh.ac.in / manojiict@gmail.com
मोबाइल नंबर / Mobile No. +91 9728739075

विभागाध्यक्ष / Head
रसायन विज्ञान विभाग
Department of Chemistry
हरियाणा केंद्रीय विश्वविद्यालय
Central University of Haryana
महेन्द्रगढ़ 123031, हरियाणा
Mahendergarh-123031, Haryana

[Quoted text hidden]

Dr. Harish Kumar <harishkumar@cuh.ac.in> Mon, Sep 13, 2021 at 4:04 PM
To: "Dr. Manoj Gupta" <mkgupta@cuh.ac.in>
Cc: "HoD, Chemistry" <hodchemistry@cuh.ac.in>, ashok prasad <ashokenzyme@yahoo.com>, "Dr. Rajesh Malhotra" <malhotra_ksrk@yahoo.co.in>, Deansobs@cuh.ac.in, "Dr. Vinod Kumar" <vinodkumar@cuh.ac.in>

Corrections in total credit in Annexure-II are approved from my side.
[Quoted text hidden]

Dr. Rajesh Malhotra <malhotra_ksrk@yahoo.co.in> Mon, Sep 13, 2021 at 4:49 PM
To: hodchemistry@cuh.ac.in

Approved
Rajesh Malhotra

Sent from my iPhone

> On 13-Sep-2021, at 4:04 PM, Dr. Harish Kumar <harishkumar@cuh.ac.in> wrote:
>
> [Quoted text hidden]

विभागाध्यक्ष / Head
रसायन विज्ञान विभाग
Department of Chemistry
हरियाणा केंद्रीय विश्वविद्यालय
Central University of Haryana
महेन्द्रगढ़ 123031, हरियाणा
Mahendergarh-123031, Haryana

Dean School Of Basic Sciences <deansobs@cuh.ac.in>

Fwd: Approval of the BoS minutes

1 message

HoD, Chemistry <hodchemistry@cuh.ac.in> Mon, Sep 13, 2021 at 10:07 AM
To: ashok prasad <ashokenzyme@yahoo.com>, "Dr. Rajesh Malhotra" <malhotra_ksrk@yahoo.co.in>, "Dr. Harish Kumar" <harishkumar@cuh.ac.in>, Deansobs@cuh.ac.in, "Dr. Vinod Kumar" <vinodkumar@cuh.ac.in>, "Dr. Manoj Gupta" <mkgupta@cuh.ac.in>

Dear Members (BoS)
I am forwarding the email received from Professor Rajesh Malhotra (External Expert, BoS) regarding approval of the minutes of the BoS meeting held on 09-09-2021 for your information.
Warm Regards
Head
Department of Chemistry
School of Basic Sciences
Central University of Haryana
Mahendergarh, Haryana-123031

——— Forwarded message ———
From: **Dr. Rajesh Malhotra** <malhotra_ksrk@yahoo.co.in>
Date: Mon, Sep 13, 2021 at 7:55 AM
Subject: Approval of the BoS minutes
To: <hodchemistry@cuh.ac.in>

Sir,
I have gone through the minutes of the BoS send to me by you and approve the same.
Regards
Rajesh Malhotra

Sent from my iPhone

विभागाध्यक्ष / Head
रसायन विज्ञान विभाग
Department of Chemistry
हरियाणा केंद्रीय विश्वविद्यालय
Central University of Haryana
महेन्द्रगढ़ 123031, हरियाणा
Mahendergarh-123031, Haryana

1/9 1/1

Dean School Of Basic Sciences <deansobs@cuh.ac.in> Sep 23, 2021, 8:13 PM (12 days ago)
to gonme_kahlon, talk2pawan, ckjaggi, sukhdeepsingh.cse, amitach1, achandra, HoD, hodphysics, harishkumar, surajarya, Manish, Rajeshgupta, rachitkajla47, Suneel, Rakesh, kapilst

Esteemed Members of the **School Board**
School of Basic Sciences
Central University of Haryana
Mahendergarh, Haryana

Respected Madam/Sir,
First of all I would like to thank to all esteemed members of the board for attending the meeting. Specially, I would like to pay sincere regards and gratitude to our External Subject Experts for giving valuable and quite relevant suggestions to make the Schemes and Syllabi of different programmes in a good shape in all respects.
Please find herewith the minutes of the meeting of the School Board held on 20-09-2021 for your kind consideration and online approval.

School of Basic Sciences

Minutes of Meeting of the School Board

A meeting (Online/Offline; Online Meeting ID: https://meet.google.com/bfq-kisi-egz) of the School Board of School of Basic Sciences was held on 20-09-2021 at 10:30 A.M. in the office of the Dean, School of Basic Sciences, First Floor, Academic Block-1, Central University of Haryana, Mahendergarh.
Following members were present in the meeting:

1. **Dr. Vinod Kumar** (**Chairman**, Joined offline)
Dean, School of School of Basic Sciences,
Central University of Haryana, Haryana

2. **Prof. Pawan Kumar Sharma**, (**External Subject Expert**, Joined offline)
Department of Chemistry,
Kurukshetra University,
Kurukshetra, Haryana

3. **Prof. Chandra K Jaggi** (**External Subject Expert**, Joined online)
Departmental of Operational Research
Faculty of Mathematical Sciences
University of Delhi-110007

4. **Prof. Sukhdip Singh**, (**External Subject Expert**, Joined offline)
Department of Computer Science and
Engineering, DCRUST, Murthal,
Sonipat

5. **Prof. Amita Chandra** (**External Subject Expert**, Joined online)
Department of Physic and Astrophysics
North Campus, University of Delhi

6. **Prof. Simrit Kahlon**, (**External Subject Expert**, Joined online)
Department of Geography,
Panjab University, Chandigarh

7. **Dr. Rajesh Kumar Gupta**, (**Member**, Joined offline)
Head, Department of Mathematics,
Central University of Haryana, Haryana

8. **Dr. Suneel Kumar**, (**Member**, Joined offline)
Head, Department of Physic and Astrophysics,
Central University of Haryana, Haryana

9. **Dr. Harish Kumar** (**Member**, Joined offline)
Associate Professor
Department of Chemistry
Central University of Haryana, Haryana

10. **Dr. Manoj Kumar Gupta**, (**Member**, Joined offline)
Assistant Professor,
Department of Chemistry,
Central University of Haryana, Haryana

11. **Dr. Manish Kumar**, (**Member**, Joined offline)
TIC, Department of Geography,
Central University of Haryana, Haryana

12. **Dr. Arun Kajla** (**Member**, Joined offline)
Assistant Professor
Department of Mathematics,
Central University of Haryana, Haryana

13. **Dr. Kapil Kumar**, (**Member**, Joined offline)
Assistant Professor,
Department of Statistics,
Central University of Haryana, Haryana

14. **Dr. Devendra Kumar**, (**Special Invitee**, Joined offline)
TIC, Assistant Professor,
Department of Statistics,
Central University of Haryana, Haryana

अधिष्ठाता / Dean
मौलिक विज्ञान पीठ
School of Basic Sciences
हरियाणा केंद्रीय विश्वविद्यालय
Central University of Haryana
महेन्द्रगढ़ 123031, हरियाणा
Mahendergarh-123031, Haryana

The following members could not attend the meeting:

1. **Sh. Suraj Arya,** **(Member)**
Assistant Professor,
Department of Computer Science and Information Technology,
University of Haryana, Haryana

2. **Dr. Rakesh Kumar,** **(Member)**
Assistant Professor,
Department of Physic and Astrophysics,
Central University of Haryana, Haryana

At the outset, Dean, School of Basic Sciences welcomed all esteemed members of the School Board. In the meeting, the following agenda items were discussed in details and resolved:

Item No	Description and Recommendation	Annexure
1	**To consider and approve the minutes of the meeting of Board of Studies (BOS) of Department of Chemistry, School of Basic Sciences held on 09- 09-2021.**	
	Resolved that minutes of meeting of the BoS of the Department of Chemistry held on 09-09-2021, be approved.	Annexure-A
1a	**To consider and approve the Scheme and Syllabi of M.Sc. (Chemistry), two-year Programme (w.e.f. Academic Session 2021-2022) as approved in BOS meeting of Department of Chemistry held on 09-09-2021 and to recommend the same to the Academic Council for consideration and approval.**	
	Discussed and recommended that course contents in IV unit of the course **Organic Chemistry-VI (Medicinal Chemistry)**, may be reduced and the topic "Anti-fertility Drugs" may be incorporated. Accordingly, minor changes were made in the course. Resolved that Scheme and Syllabi of M.Sc. (Chemistry), two-year Programme (w.e.f. Academic Session 2021-2022) as approved in BOS meeting of Department of Chemistry held on 09-09-2021, with minor changes as mentioned above be approved and recommended the same to Academic Council for consideration and approval.	Annexure-I-CH
1b	**To consider and approve the Scheme of first three years and Syllabi of first year of integrated B.Sc.-M.Sc. (Chemistry), a five-year Programme (w.e.f. Academic Session 2021-2022) as approved in BOS meeting of Department of Chemistry held on 09-09-2021 and to recommend the same to Academic Council for consideration and approval.**	
	The Board appreciated that starting of this programme is good initiative and expressed the concern that for smooth running of the programme there must be availability of a sufficient number of teachers as per teaching load at the department level. Hence, after discussion it was resolved that as per teaching load more faculty members of different expertise are needed in addition to infrastructure. If faculty crunch prevails, research scholars may be involved. The Board also recommended that in this programme there should be multiple exit/entry options for the students as per relevant ordinances of CUH and guidelines of Ministry of Education and UGC. Resolved that Scheme of first three years and Syllabi of first year of integrated B.Sc.-M.Sc. (Chemistry), a five-year Programme (w.e.f. Academic Session 2021-2022) as approved in BOS meeting of Department of Chemistry held on 09-09-2021, be approved and recommended the same to Academic Council for consideration and approval.	Annexure-II-CH
1c	**To consider and approve the Scheme and Syllabi of Ph.D. (Chemistry) course work (w.e.f. Academic Session 2021-2022) as approved in BOS meeting of Department of Chemistry held on 09-09-2021 and to recommend the same to the Academic Council for consideration and approval.**	
	Discussed and recommended that in the course **Spectroscopic Techniques for Chemists**, the topics "COSY, NOESY, ROESY, TOCSY, HSQC, HMBC" may be incorporated in III Unit. Accordingly, changes were made in the course. Resolved that Scheme and Syllabi of Ph.D. (Chemistry) course work (w.e.f. Academic Session 2021-2022) as approved in BOS meeting of Department of Chemistry held on 09-09-2021, with minor changes as mentioned above be approved and recommended the same to Academic Council for consideration and approval.	Annexure-III-CH
2.	**To consider and approve the minutes of the meeting of Board of Studies of Department of Physics and Astrophysics, School of Basic Sciences held on 08-09-2021.**	
	Resolved that minutes of meeting of the BoS of the Department of Physics and Astrophysics, School of Basic Sciences held on 08-09-2021, be approved.	Annexure-B
2a	**To consider and approve the scheme and syllabi of M.Sc. (Physics), two-year programme (w.e.f. Academic Session 2021-2022) as approved in BOS meeting of Department of Physics and Astrophysics held on 08- 09-2021 and to recommend the same to the Academic Council for consideration and approval.**	
	Resolved that the scheme and syllabi of M.Sc. (Physics), two-year programme (w.e.f. Academic Session 2021-2022) as approved in BOS meeting of Department of Physics and Astrophysics held on 08- 09-2021, be approved and recommended the same to the Academic Council for consideration and approval.	Annexure-I-PH
2b	**To consider and approve the Scheme and Syllabi of first year of integrated B.Sc.-M.Sc. (Physics), a five-year Programme (w.e.f. Academic Session 2021-2022) as approved in BOS meeting of Department of Physics and Astrophysics held on 08-09-2021 and to recommend the same to Academic Council for consideration and approval.**	
	The Board appreciated that starting of this programme is good initiative and expressed the concern that for smooth running of the programme there must be availability of a sufficient number of teachers as per teaching load at the department level. Hence, after discussion it was resolved that as per teaching load more faculty members of different expertise are needed in addition to infrastructure. If faculty crunch prevails, research scholars may be involved. The Board also recommended that in this programme there should be multiple exit/entry options for the students as per relevant ordinances of CUH and guidelines of Ministry of Education and UGC. Resolved that Scheme and Syllabi of first year of integrated B.Sc.-M.Sc. (Physics), a five-year Programme (w.e.f. Academic Session 2021-2022) as approved in BOS	Annexure- II PH

अधिष्ठाता / Dean
मौलिक विज्ञान पीठ
School of Basic Sciences
हरियाणा केंद्रीय विश्वविद्यालय
Central University of Haryana
महेन्द्रगढ़ 123031, हरियाणा
Mahendergarh-123031, Haryana

	meeting of Department of Physics and Astrophysics held on 08-09-2021, be approved and recommended the same to Academic Council for consideration and approval	
3.	**To consider and approve the minutes of the meeting of Board of Studies of Department of Mathematics, School of Basic Sciences held on 04-09- 2021.**	
	Resolved that minutes of meeting of the BoS of the Department of Mathematics, Schoolof Basic Sciences held on 04-09-2021, be approved.	Annexure-C
3a	**To consider and approve the Scheme and Syllabi of M.Sc. (Maths), two-year Programme (w.e.f. Academic Session 2021-2022) as approved in BOS meeting of Department of Mathematics held on 04-09-2021 and to recommend the same to the Academic Council for consideration and approval.**	Annexure-I-MT
	Discussed and recommended that courses Automation Theory and Machine Learning should be the separate courses. Accordingly, changes were made in the syllabi. Resolved that the Scheme and Syllabi of M.Sc. (Maths), two-year Programme (w.e.f. Academic Session 2021-2022) as approved in BOS meeting of Department of Mathematics held on 04-09-2021, be approved with the changes as mentioned above and recommended the same to the Academic Council for consideration and approval.	
3b	**To consider and approve the Scheme of first three years and Syllabi of first year of integrated B.Sc.-M.Sc. (Mathematics), a five-year Programme (w.e.f. Academic Session 2021-2022) as approved in BOS meeting of Department of Mathematics held on 04-09-2021 and to recommend the same to Academic Council for consideration and approval.**	Annexure-II-MT
	The Board also recommended that in this programme there should be multiple exit/entry options for the students as per relevant ordinances of CUH and guidelines of Ministry of Education and UGC. Resolved that Scheme and Syllabi of first year of integrated B.Sc.-M.Sc. (Mathematics), a five-year Programme (w.e.f. Academic Session 2021-2022) as approved in BOS meeting of Department of Mathematics held on 04-09-2021, be approved and recommended the same to Academic Council for consideration and approval. It was also resolved that computer-based courses should be introduced in 4th and 5thyear of the programme.	
3c	**Permission to Ms. Varsha (10909), a student of M.Sc. Mathematics for the academic session 2017-19 for another chance to appear for Numerical Analysis (II Semester) end term examination.**	
	Resolved that owing to prevailing condition of COVID-19 in the country, Ms. Varsha is permitted for one another chance for the same as a special case and this should not be considered as a precedence.	Annexure-III-MT
3d	**Course work exemption permission of Mr. Shahid Ahmed, a research scholar of Department of Mathematics.**	
	This agenda item was not taken up in the Board as it has already been approved in the meetings of DRC and BoS of the Department of Mathematics as per ordinance.	Annexure-IV-MT
4.	**To consider and approve the minutes of the meeting of Board of Studies (BOS) of Department of Statistics, School of Basic Sciences held on 08- 09-2021.**	
	Resolved that the minutes of meeting of the BoS of the Department of Statistics, Schoolof Basic Sciences held on 08-09-2021, be approved.	Annexure-D
4a	**To consider and approve the Scheme and Syllabi of M.Sc. (Statistics), two-year Programme (w.e.f. Academic Session 2021-2022) as approved in BOS meeting of Department of Statistics held on 08-09-2021 and to recommend the same to the Academic Council for consideration and approval.**	
	Resolved that the Scheme and Syllabi of M.Sc. (Statistics), two-year Programme (w.e.f. Academic Session 2021-2022) as approved in BOS meeting of Department of Statistics held on 08-09-2021, be approved and recommended the same to the Academic Council for consideration and approval. It was also resolved that if faculty crunch prevails, research scholars may be involved. It was also suggested that by the end of the third semester department may announce the list of the students for project dissertation.	Annexure-I-ST
5.	**To consider and approve the minutes of the meeting of Board of Studies (BOS) of Department of Geography, School of Basic Sciences held on 13- 09-2021.**	
	Resolved that the minutes of meeting of the BoS of the Department of Geography,School of Basic Sciences held on 13-09-2021, be approved.	Annexure-E
5a	**To consider and approve the Learning Outcome-based Curriculum Framework (LOCF) Syllabus of M.Sc. Geography Programme (w.e.f. Academic Session 2021-2022) as approved in BOS meeting of Department of Geography held on 13-09-2021 and to recommend the same to the Academic Council for consideration and approval.**	
	Resolved that the Learning Outcome-based Curriculum Framework (LOCF) Syllabus of M.Sc. Geography Programme (w.e.f. Academic Session 2021-2022) as approved in BOS meeting of Department of Geography held on 13-09-2021, be approved and recommended the same to the Academic Council for consideration and approval.	Annexure-1-GY
6	**Any other item(s) with the permission of the Chair.** Not any.	

The meeting ended with a vote of thanks to the Chair.

Dr. Vinod Kumar **Prof. Pawan Kumar Sharma** **Prof. Sukhdip Singh**

Prof. Chandra K Jaggi **Prof. Amita Chandra** **Prof. Simrit Kahlon**

Dr. Rajesh Kumar Gupta **Dr. Suneel Kumar** **Dr. Harish Kumar**

Dr. Manoj Kumar Gupta **Dr. Manish Kumar** **Dr. Arun Kajla**

Sh. Suraj Arya **Dr. Rakesh Kumar** **Dr. Kapil Kumar**

अधिष्ठाता / Dean
मौलिक विज्ञान पीठ
School of Basic Sciences
हरियाणा केंद्रीय विश्वविद्यालय
Central University of Haryana
मेहेंदरगढ़ 123031, हरियाणा
Mahendergarh-123031, Haryana

Dr. Devender Kumar

Thanking you
With Warm Regards

Dean
School of Basic Sciences
Central University of Haryana
Mahendergarh, Haryana-123031

Chandra K. Jaggi <ckjaggi@yahoo.com> Sep 24, 2021, 11:37 AM (11 days ago)
to me

Dear Dr. Vinod Kumar
I approve the minutes of the meeting of the School Board held on 20-09-2021.
Kind Regards
CKJ

"Life Is Too Short To Waste Time Hating Anyone"
"Please do not print unless you really need to.
Please Promote a Green and Sustainable Environment"

Dr. Chandra K Jaggi
Professor & General Chair ETISCRM 2018
Chairman (Outstation)
Mathematical and Statistical Science Research Committee

Department of Operational Research
Faculty of Mathematical Sciences
New Academic Block
University Of Delhi
Delhi - 110 007

Chief Editor: International Journal of Inventory Control and Management
Former Head, Department of Operational Research, University of Delhi
Former Chairman, Governing Body, Sri Aurobindo College, University of Delhi
Former Treasurer, Governing Body, Acharya Narendra Dev College, University of Delhi
Former Member, Academic Council, University of Delhi
Former Member Governing Body, Shyam Lal College, University of Delhi
Former Member Governing Body, Dr. Bhim Rao Ambedkar College, University of Delhi

E-Mails: ckjaggi@gmail.com; ckjaggi@or.du.ac.in
Telefax: (+9111)27666672
Mobile : (+91)9891919399,(+91)9811012179

Resume
ORCID ID
MATHSCINET
dblp
Google Scholar

...

[Message clipped] View entire message

Simrit Kahlon Sep 24, 2021, 11:54 AM (11 days ago)
to me

Approved Items 1 to 6 of agenda of meeting of School of Basic Sciences held on September 20, 2021 please.
Regards,

Dr. Simrit Kahlon
Professor
Centre for Advanced Study in Geography
Panjab University
Chandigarh
Moblie : +91 9814163093

अधिष्ठाता / Dean
मौलिक विज्ञान पीठ
School of Basic Sciences
हरियाणा केंद्रीय विश्वविद्यालय
Central University of Haryana
महेन्द्रगढ़ 123031, हरियाणा
Mahendergarh-123031, Haryana

आचार्य पवन कुमार शर्मा Prof. Pawan K. Sharma Sep 25, 2021, 2:40 PM (10 days ago)
to Manoj, Devendra, me, bonnie_kahlon, ckjaggi, sukhdeepsingh.cse, amitach1, achandra, HoD, hodphysics, Harish, Suraj, Manish, Rajeshgupta, rachitkajla47, Suneel, Rakesh, Kapil,

Dear Dr. Vinod,

I hereby endorse the minutes of the meeting of the School Board.
With best wishes,

Pawan

Pawan K. Sharma, Ph.D.
Dean, Research & Development
Dean, Students' Welfare (2016-2020)
Fulbright-Nehru Fellow 2019
Professor, Department of Chemistry
Kurukshetra University
Kurukshetra-136119, INDIA
Tel: +91 1744 238410 ext 2683
***h*-Index = 29, i10-Index = 76**
Google Scholar Page

Sukhdeep Singh Sep 26, 2021, 12:28 AM (9 days ago)
to me, bonnie_kahlon, ckjaggi, amitach1, achandra, HoD, hodphysics, Harish, Suraj, Manish, Rajeshgupta, rachitkajla47, Suneel, Rakesh, Kapil, Vinod, Manoj, Devendra

Dear Dr. Vinod,
The minutes of meeting of School Board of Basic Sciences held on 20-20-2021 are approved from my side .

Thanks & Regards.

Prof. Sukhdip Singh
CSED , DCRUST Murthal

Sent from my iPhone

> On 25-Sep-2021, at 2:40 PM, आचार्य पवन कुमार शर्मा Prof. Pawan K. Sharma <talk2pawan@gmail.com> wrote:
>
> ...
>
> [Message clipped] View entire message

Dr. Devendra Kumar Sep 26, 2021, 8:41 PM (9 days ago)
to Sukhdeep, me, bonnie_kahlon, ckjaggi, amitach1, achandra, HoD, hodphysics, Harish, Suraj, Manish, Rajeshgupta, rachitkajla47, Suneel, Rakesh, Kapil, Vinod, Manoj

Dear Sir,
The minutes of the meeting of the School Board held on 20-09-2021 are approved from my side.

Regards
Dr. Devendra Kumar

amita chandra Sep 27, 2021, 11:25 AM (8 days ago)
to me

Dear Dr. Vinod Kumar,

In the Minutes of the meeting, please correct the spelling of "Physics" where an "s" is missing in my affiliation.

Also, I hope the necessary changes suggested in the syllabus regarding credits and minimum no. of students for an elective to run, etc. have been included in the revised syllabi.

Regards
Amita Chandra

अधिष्ठाता / Dean
मौलिक विज्ञान पीठ
School of Basic Sciences
हरियाणा केंद्रीय विश्वविद्यालय
Central University of Haryana
महेन्द्रगढ़ 123031, हरियाणा
Mahendergarh-123031, Haryana

amita chandra Sep 27, 2021, 11:32 AM (8 days ago)

...

[Message clipped] View entire message

Sep 25, 2021, 9:12 AM (10 days ago)

Dr. Manoj Gupta
to me

Dear Sir,

The minutes of the meeting of the School Board with the agenda for items 1 to 5 are approved.

Thanks with regards,
Manoj

****

डॉ मनोज कुमार गुप्ता / Dr. Manoj Kumar Gupta
सहायक आचार्य / Assistant Professor
रसायनविज्ञान विभाग / Department of Chemistry
हरियाणा केन्द्रीय विश्वविद्यालय / Central University of Haryana
महेंद्रगढ़ -123 031 / Mahendergarh - 123 031
हरियाणा, भारत / Haryana, India
ईमेल / Email: mkgupta@cuh.ac.in / manojiict@gmail.com
मोबाइल नंबर / Mobile No. +91 9728739075

...

[Message clipped] View entire message

Sep 25, 2021, 12:47 PM (10 days ago)

Mathematics Department
to bonnie_kahlon, Pawan, ckjaggi, sukhdeepsingh.cse, amitach1, achandra, HOD, harishkumar, Suraj, Manish, Rajesh, RACHIT, Suneel, Rakesh, Kapil, Vinod, Devendra, me, Manoj

All agenda items are approved from my side.

Sep 25, 2021, 1:00 PM (10 days ago)

Dr. Kapil Kumar
to me, bonnie_kahlon, Pawan, ckjaggi, sukhdeepsingh.cse, amitach1, achandra, HoD, HOD, Harish, surajarya, Manish, Rajesh, Arun, Suneel, Rakesh, Vinod, Manoj, Devendra

Dear Sir/Madam, minutes of the meeting of the School Board held on 20-09-2021 are confirmed from my side.

With Regards
Kapil Kumar

–
with warm regards

Dr. Kapil Kumar,
Assistant Professor,
Department of Statistics,
Central University of Haryana,
Mahendergarh-123031, India.
Ph. +91-9990561525
Google Scholar Profile: https://bit.ly/3mF2Bz7

Sep 25, 2021, 1:03 PM (10 days ago)

Dr. Manish Kumar
to VC, Registrar, Anand, me, bonnie_kahlon, Pawan, ckjaggi, sukhdeepsingh.cse, amitach1, achandra, HoD, HOD, harishkumar, Suraj, Rajeshgupta, rachitkajla47, Suneel, Rakesh, kap

Dear Sir/Madam,
Minutes of the meeting of the School Board held on 20-09-2021 are approved from my side.

With Regards

Sep 25, 2021, 2:11 PM (10 days ago)

RACHIT KAJLA
to me, bonnie_kahlon, Pawan, ckjaggi, sukhdeepsingh.cse, amitach1, achandra, HoD, hodphysics, harishkumar, surajarya, Manish, Rajeshgupta, Suneel, Rakesh, Kapil, Vinod

Dear Sir/Madam,
Minutes of the meeting of the School Board held on 20-09-2021 are approved from my side.

With Regards
Arun Kajla

On Thu, Sep 16, 2021 at 8:23 PM Dean School Of Basic Sciences <deansobs@cuh.ac.in> wrote:

–
ARUN KAJLA
DEPARTMENT OF MATHEMATICS

अधिष्ठाता / Dean
मौलिक विज्ञान पीठ
School of Basic Sciences
हरियाणा केंद्रीय विश्वविद्यालय
Central University of Haryana
महेन्द्रगढ़ 123031, हरियाणा
Mahendergarh-123031, Haryana

to me

Dear Dr. Vinod Kumar,

The Minutes of the meeting are Ok.

Regards
Amita Chandra

...

[Message clipped] View entire message

HOD Physics Sep 29, 2021, 2:22 PM (6 days ago)
to bonnie_kahlon, talk2pawan, ckjaggi, sukhdeepsingh.cse, achandra, HoD, harishkumar, surajarya, Manish, Rajeshgupta, rachitkajla47, Suneel, Rakesh, kapilstats, Vinod, vcoffice, reg

Dear All,

Minutes of the meeting are approved from my side.

With regards

On Thu, Sep 16, 2021 at 8:23 PM Dean School Of Basic Sciences <deansobs@cuh.ac.in> wrote:

--
With Best Regards

Dr. Suneel Kumar
Associate Professor
Head, Department of Physics & Astrophysics
Central University of Haryana
Jant-Pali
Mahendergarh-123029
Haryana
Email: hodphysics@cuh.ac.in

Dean School Of Basic Sciences <deansobs@cuh.ac.in> Sep 29, 2021, 8:07 PM (6 days ago)
to HOD, bonnie_kahlon, talk2pawan, ckjaggi, sukhdeepsingh.cse, amitach1, achandra, HoD, harishkumar, surajarya, Manish, Rajeshgupta, rachitkajla47, Suneel, Rakesh, kapilstats, Vi

Respected Members,
Thanks a lot for giving approval to the minutes of the meeting. I also approve the same from my side.
Looking forward to see you all soon.
With Warm Regards
Dean
School of Basic Sciences
Central University of Haryana
Mahendergarh, Haryana-123031

Dean School Of Basic Sciences <deansobs@cuh.ac.in> Sep 29, 2021, 8:15 PM (6 days ago)
to mkgupta, bonnie_kahlon, talk2pawan, ckjaggi, sukhdeepsingh.cse, amitach1, achandra, HoD, HOD, harishkumar, surajarya, Manish, Rajeshgupta, rachitkajla47, Suneel, Rakesh, kap

Respected Members,
Thanks a lot for giving approval to the minutes of the meeting. I also approve the same from my side.
Looking forward to see you all soon.
With Warm Regards
Dean
School of Basic Sciences
Central University of Haryana
Mahendergarh, Haryana-123031

Dr. Harish Kumar 12:02 PM (31 minutes ago)
to me

Dear Sir/Madam,
Minutes of the meeting of the School Board held on 20-09-2021 are approved from my side.

--

Dr. Harish Kumar
Associate Professor,
Department of Chemistry,

अधिष्ठाता / Dean
मौलिक विज्ञान पीठ
School of Basic Sciences
हरियाणा केंद्रीय विश्वविद्यालय
Central University of Haryana
महेन्द्रगढ़ 123031, हरियाणा
Mahendergarh-123031, Haryana

CENTRAL UNIVERSITY OF HARYANA

(*Established under the Central Universities Act, 2009*)

(NAAC Accredited 'A' Grade)

CBCS and LOCF and NEP-2020 Based

Curriculum and Syllabi

Of

M.Sc. Chemistry

(w.e.f. 2021)

DEPARTMENT OF CHEMISTRY
SCHOOL OF BASIC SCIENCES

Approved by :	**BOS**	**School Board**	**Academic Council**
Approval Status :	√	√	
Approval Date :	09-09-2021	20-09-2021	

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VISION AND MISSION

i) Vision and Mission of the University

Vision

To develop enlightened citizenship of a knowledge society for peace and prosperity of individuals, nation and the world, through promotion of innovation, creative endeavours, and scholarly inquiry.

Mission

To serve as a beacon of change, through multi-disciplinary learning, for creation of knowledge community, by building a strong character and nurturing a value-based transparent work ethics, promoting creative and critical thinking for holistic development and self-sustenance for the people of India. The University seeks to achieve this objective by cultivating an environment of excellence in teaching, research and innovation in pure and applied areas of learning.

ii) Vision and Mission of the Department

Vision

To establish a world-class teaching and research reputation of the department that contributes society through its innovative, creative and scholarly approach.

Mission

To educate the students by adopting highest academic and professional standards to meet the global competency in the field of chemical sciences. To establish and maintain a high quality of support, research facilities, multidisciplinary and skill-based learning opportunities to our staff, students and researchers to orient them to world class creative and innovative minds.

1. BACKGROUND

i) NEP-2020 and LOCF an integrated Approach

Considering the curricular reforms as instrumental for desired learning outcomes, all the academic departments of Central University of Haryana made a rigorous attempt to revise the curriculum of undergraduate and postgraduate programmes in alignment with National Education Policy-2020 and UGC Quality Mandate for Higher Education Institutions-2021. The process of revising the curriculum could be prompted with the adoption of "Comprehensive Roadmap for Implementation of NEP-2020" in 32nd meeting of the Academic Council of the University held on April 23, 2021. The Roadmap identified the key features of the Policy and elucidated the Action Plan with well-defined responsibilities and indicative timeline for major academic reforms.

The process of revamping the curriculum started with the series of webinars and discussions conducted by the University to orient the teachers about the key features of the Policy, enabling them to revise the curriculum in sync with the Policy. Proper orientation of the faculty about the vision and provisions of NEP-2020 made it easier for them to appreciate and incorporate the vital aspects of the Policy in the revised curriculum focused on 'creating holistic, thoughtful, creative and well-rounded individuals equipped with the key 21st century skills' for the 'development of an enlightened, socially conscious, knowledgeable, and skilled nation'.

With NEP-2020 in background, the revised curricula articulate the spirit of the policy by emphasising upon—integrated approach to learning; innovative pedagogies and assessment strategies; multidisciplinary and cross-disciplinary education; creative and critical thinking; ethical and Constitutional values through value-based courses; 21st century capabilities across the range of disciplines through life skills, entrepreneurial and professional skills; community and constructive public engagement; social, moral and environmental awareness; Organic Living and Global Citizenship Education (GCED); holistic, inquiry-based, discovery-based, discussion-based, and analysis-based learning;

exposure to Indian knowledge system, cultural traditions and classical literature through relevant courses offering 'Knowledge of India'; fine blend of modern pedagogies with indigenous and traditional ways of learning; flexibility in course choices; student-centric participatory learning; imaginative and flexible curricular structures to enable creative combination of disciplines for study; offering multiple entry and exit points initially in undergraduate programmes; alignment of Vocational courses with the International Standard Classification of Occupations maintained by the International Labour Organization; breaking the silos of disciplines; integration of extra-curricular and curricular aspects; exploring internships with local industry, businesses, artists and crafts persons; closer collaborations between industry and higher education institutions for technical , vocational and science programmes; and formative assessment tools to be aligned with the learning outcomes, capabilities, and dispositions as specified for each course. In case of UG programmes in Engineering and Vocational Studies, it was decided that the departments shall incorporate pertinent NEP recommendations while complying with AICTE, NBA, NSQF, International Standard Classification of Occupations, Sector Skill Council and other relevant agencies/sources. The University has also developed consensus on adoption of Blended Learning with 40% component of online teaching and 60% face to face classes for each programme.

The revised curricula of various programmes could be devised with concerted efforts of the faculty, Heads of the Departments and Deans of Schools of Study. The draft prepared by each department was discussed in series of discussion sessions conducted at Department, School and the University level. The leadership of the University has been a driving force behind the entire exercise of developing the uniform template and structure for the revised curriculum. The Vice Chancellor of the University conducted series of meetings with Heads and Deans to deliberate upon the vital parameters of the revised curriculum to formulate a uniform template featuring Background, Programme Outcomes, Programme Specific Outcomes, Postgraduate Attributes, Structure of Masters Course, Learning Outcome Index, Semester-wise Courses and Credit Distribution, Course-level Learning Outcomes, Teaching-Learning Process, Blended Learning, Assessment and Evaluation, Keywords, References

and Appendices. The experts of various Boards of Studies and School Boards contributed to a large extent in giving the final shape to the revised curriculum of each programme.

To ensure the implementation of curricular reforms envisioned in NEP-2020, the University has decided to implement various provisions in a phased manner. Accordingly, the curriculum may be reviewed annually.

ii) About Chemistry

Chemistry is the science of matter and its transformations. It addresses fundamental questions about the observable matter, ranging from its components, structure, properties and interconversions. As a system of knowledge, Chemistry not only explains the existence and behavior of matter around and within us, but also empowers us to manipulate the matter into new and improved forms for our use. From the ancient practices of rasayan vidya and alchemy, modern chemistry has grown over centuries into a formidable science that touches all aspects of human life. Humanity's progress in the last three centuries is pivoted on the contributions of chemistry, chemical industry and associated endeavors. The range of influence of chemistry in our life spans from essentials such as food (agrochemicals, preservatives), shelter (cement, metals, alloys, polymers) and health (drugs, cosmetics, soap, toothpaste), to advancements such as textiles (polymers, leather), beverages (flavoring and fermentation), crime fighting (forensics), weaponry (explosives), space travel (fuel) and cosmology (element detection). The list can go on endlessly. The most visible contribution of chemistry to civilization is achieved by the advancements in modern medicine that was fuelled by organic chemistry. This led to significant improvements in the living standards, extension of human average life span and fighting of dangerous diseases such as cancer and microbial infections.

Chemistry is placed centrally between the other two major branches of science, namely physics and biology. Therefore, it is often called the *central science*. It influences the developments in these two broad realms of science as much as it is influenced by the discoveries in them. The fundamental importance of chemistry and chemical industry in

sustaining human civilization demands for a steady supply of trained and skilled manpower. Thus, it is unsurprising that it is an essential and integral department in higher education institutions.

Education in chemistry not only imparts the technical know-how about structure, reactions and properties of matter, but also empowers the learner to raise fundamental questions about various natural phenomena, address local issues and come up with sustainable solutions, identify areas of life where intervention of chemistry can bring about progress and imbibe and spread the spirit of free enquiry and scientific temper.

iii) About the Programme (Nature, Extent and Aims)

The Post-Graduate Programme in Chemistry will impart advanced knowledge of basic and applied chemical sciences to the graduates. It will prepare the students for taking up challenging assignments in academia and industry and also empower them with skill and knowledge for generating employment for their own and others. The Programme introduces the students to advanced developments in chemical sciences as well as in the field of other allied sciences, by providing them multidisciplinary and interdisciplinary courses. The design of choice-based curriculum can enrich students with analytical and problem-solving capabilities. It is designed to bring out the best of the abilities of each student, allow them to sharpen the scientific temper and be abreast with the contemporary developments in the area.

The programme includes a balanced combination of Core, Electives and Skill based Courses. The courses are designed in such a way to cover the entire spectrum of chemical sciences from fundamentals (that will bring admitted students from various backgrounds to a common level) to most recent advancements in the field (that will make them ready to take up challenging assignments in the real world).

The M.Sc. (Chemistry) Programme is of two years duration which is divided into four semesters. The teaching and learning in the Programme will involve theory (lectures), practicals, tutorial and seminar-based classes. During the whole programme about 40 %

syllabus of each course may be delivered via online mode and with a blended teaching-learning approach.

The curriculum will be taught through formal lectures with the aid of pre-made presentations, audio and video tools whenever necessary. Other teaching aids can also be used as and when required. The additional requirements like industrial visits, summer training and project work are also incorporated into the curriculum.

The Aims of the programme include

- To inculcate basic and advanced knowledge of chemical sciences among students.
- To provide higher education, disciplinary and inter/multi-disciplinary research-oriented knowledge to the students to make them lifelong learners.
- To provide a learned, skilled and creative pool of graduates who are ready to take up challenging assignments in different kinds of chemical industries, research institutions and academia.
- To mould responsible, proactive citizens who are equipped with scientific thinking and skills to address problems of their locality
- Adequate blend of theory, computation and hands-on experiments.
- Modernized lab courses – close to recent/current research.

iv) Qualification Descriptors (possible career pathways)

On successful completion of the M.Sc. Chemistry Programme, students of the department are expected to be ready to take up opportunities all around the world in areas that demand skills in chemical and allied sciences. As the chemical industry is enormously vast and diverse, numerous opportunities and challenges await the graduates. The graduates are expected to satisfactorily address the professional expectations, maintain a work-life balance and lead productive and meaningful lives. Some of the possible career paths for the postgraduate students may be:

1. Teaching and Research in academia

2. Research scientists in pharmaceutical and other chemical and material industries

3. Research scientists in other allied sciences

4. Entrepreneurship in chemical science-based ventures

5. Administrative Assignments in various government and private agencies

6. Chemist/Scientist/Technician assignments in any of the following industries: pharmaceutical, polymers, petrochemicals, materials sciences, nanotechnology, fuels, non-conventional energy, renewable resources, agrochemicals, fermentation and processing, paints and pigments, metallurgy, packaging, cosmetics, cements, natural products, forensics, explosives, and any other various allied branches of chemistry.

2. PROGRAMME OUTCOMES (POs)

The overall aims of the programme may be achieved by addressing its various components that are incorporated into the curriculum as described below. Each of these components is designed to lead to specific outcomes that are desired after the successful completion of the programme.

PO-No.	Component	Outcomes
PO-1	Basic Knowledge	Capable of delivering basic disciplinary knowledge gained during the programme.
PO-2	In-depth Knowledge	Capable of describing advanced knowledge gained during the programme.
PO-3	Critical thinking and Problem-Solving abilities	Capable of analyzing the results critically and applying acquired knowledge to solve the problems.
PO-4	Creativity and innovation	Capable to identify, formulate, investigate and analyze the scientific problems and innovatively to design and create products and solutions to real life problems.
PO-5	Research aptitude and global competency	Ability to develop a research aptitude and apply knowledge to find the solution of burning research problems in the concerned and associated fields at global level.
PO-6	Holistic and	Ability to gain knowledge with the holistic and

	multidisciplinary education	multidisciplinary approach across the fields.
PO-7	Skills enhancement	Learn specific sets of disciplinary or multidisciplinary skills and advanced techniques and apply them for betterment of mankind.
PO-8	Leadership and Teamwork abilities	Ability to learn and work in a group and capable of leading a team even.
PO-9	Environmental and human health awareness	Learn important aspects associated with environmental and human health. Ability to develop eco-friendly technologies.
PO-10	Ethical thinking and Social awareness	Inculcate the professional and ethical attitude and ability to relate with social problems.
PO-11	lifelong learning skills and Entrepreneurship	Ability to learn lifelong learning skills which are important to provide better opportunities and improve quality of life. Capable to establish independent startup/innovation center etc.

3. PROGRAMME SPECIFIC OUTCOMES (PSOs)

The post graduates shall be able to realise the following specific outcomes by the end of program studies:

Number	Programme Specific Outcomes
PSO-1	To acquire a thorough knowledge about basic theoretical concepts and experimental aspects of chemistry.
PSO-2	To fully develop the skills for using the earned knowledge within different branches of chemistry.
PSO-3	To develop the attitude for identifying and solving problems using chemistry
PSO-4	To develop the capability to search, acquire and apply recent developments in research field of chemical sciences to problems
PSO-5	To develop an overview of the role of chemical sciences and chemical industry in sustaining civilization
PSO-6	To develop the skill to adopt the learned principles in various settings and innovate with the importance of sustainability in mind, if necessary

4. Postgraduate Attributes

On completion of the post graduate programme in chemistry, students are expected to be equipped with the skills of creative, critical and rational thinking associated with chemistry and its use for human society. The following attributes are expected from the students of M.Sc. Chemistry:

No.	P.G. Attributes
PGA-1	Disciplinary knowledge and solid foundation
PGA-2	Creative, critical and reflective Thinking
PGA-3	Attitudes and values
PGA-4	Principle and practical aspects of different instruments
PGA-5	Research skills
PGA-6	Think beyond which were never thought before
PGA-7	Information/digital literacy
PGA-8	Team work

5. STRUCTURE OF MASTER'S COURSE

The M.Sc. (Chemistry) Programme is of *two years* duration which is divided into four semesters. The programme under Choice-Based Credit System (CBCS) includes a balanced combination of *Core*, *Electives* and *Skill Courses* (**Table 1**).

As per P.G. Ordinance of Central University of Haryana, total credit requirement for completion of the programme shall be 96 (±4).

Total credit requirement of the present P.G. programme is **98**, however, 2 additional credit may be earned by the interested students from six weeks industrial summer training course (Programme Structure).

Table 1

Sr. No.	Types of Courses	Nature	Total Credit 98 (2 optional)	% (approx)
1	Core Courses (CC)	Compulsory Courses	48	49
2	Elective Courses (EC)	Discipline Specific Elective Courses	32	33
		Discipline Centric Elective Courses	4	4
		Generic Elective Courses	8	8
3	Skilled-based courses/ Self-study based courses	Discipline Centric Skill Courses	4	4
4	Swachh Bharat Internship at Institute Level	Compulsory	2	2
			98	100
5	Industrial Summer Training	Optional for interested students	2 (additional)	2

PROGRAMME STRUCTURE

Choice Based Credit System (CBCS) Based Course Structure of M.Sc. Chemistry Programme (2 Years) in Consonance with NEP-2020 and LOCF

YEAR 1

Semester-I

Course	Credit	Hrs.
IC-I (CC)	4	4
ICP-I (CC)	2	4
OC-I (CC)	4	4
OCP-I (CC)	2	4
PC-I (CC)	4	4
PCP-I (CC)	2	4
DCEC*	2	2
GEC§	4	4
Total Credit and Hrs.	**24**	**30**

IC-I: Inorganic Chemistry-I
ICP-I: Inorganic Chemistry Practical-I
OC-I: Organic Chemistry-I
OCP-I: Organic Chemistry Practical-I
PC-I: Physical Chemistry-I
PCP-I: Physical Chemistry Practical-I
*Can be chosen from the list of courses available
§GEC (Generic elective course) will be available for students from other Departments

Semester-II

Course	Credit	Hrs.
IC-II (CC)	4	4
ICP-II (CC)	2	4
OC-II (CC)	4	4
OCP-II (CC)	2	4
PC-II (CC)	4	4
PCP-II (CC)	2	4
DCSC*	2	2
GEC§	4	4
Total Credit and Hrs.	**24**	**30**

IC-II: Inorganic Chemistry-II
ICP-II: Inorganic Chemistry Practical-II
OC-II: Organic Chemistry-II
OCP-II: Organic Chemistry Practical-II
PC-II: Physical Chemistry-II
PCP-II: Physical Chemistry Practical-II
*Can be chosen from the list of courses available
§GEC (Generic elective course) will be available for students from other Departments

YEAR 2

Specialization will be offered at the beginning of semester-III
(Specializations: Inorganic Chemistry/Organic Chemistry/Physical Chemistry)

Semester-III

Course	Credit	Hrs.
Molecular Spectroscopy (CC)	4	4
Research Methodology and Software Applications (CC)	2	2
IC-III/OC-III/PC-III (DSEC-1)	4	4
IC-IV/OC-IV/PC-IV (DSEC -2)	4	4
DCEC*	2	2
Two Options (OPTION 1 and OPTION 2) are available. Students may choose any one in the beginning of Sem-III of second year)		
OPTION 1		
ICP-III/OCP-III/PCP-III (DSEP-I)	3	6
ICP-IV/OCP-IV/PCP-IV (DSEP-2)	3	6
Seminar	2	2
OPTION 2		
Dissertation–I (To be continued in Sem-IV)	8	14
Total Credit and Hrs.	**24**	**30**

IC-III and IV: Inorganic Chemistry-III and IV
OC-III and IV: Organic Chemistry-III and IV
PC-III and IV: Physical Chemistry-III and IV
ICP-III and IV: Inorganic Chemistry Practical-III and IV
OCP-III and IV: Organic Chemistry Practical-III and IV
PCP-III and IV: Physical Chemistry Practical-III and IV
*Can be chosen from the list of courses available

Semester-IV

Course	Credit	Hrs.
Applications of Spectroscopy (CC)	4	4
Seminar (Research paper based) (CC)	2	2
DCSC*	2	2
IC-V/OC-V/PC-1 (DSEC -3)	4	4
IC-VI/OC-VI/PC-VI (DSEC -4)	4	4
Options chosen in Sem-III shall be continued in Sem-IV		
OPTION 1		
ICP-V/OCP-V/PCP-V (DSEP-3)	3	6
ICP-VI/OCP-VI/PCP-VI (DSEP-4)	3	6
Scientific Report Writing in Emerging/Advanced Areas	2	2
OPTION 2		
Dissertation-II (Continued from Sem-III)	8	14
Total Credit and Hrs.	**24**	**30**

IC-V and VI: Inorganic Chemistry-V and VI
OC-V and VI: Organic Chemistry-V and VI
PC-V and VI: Physical Chemistry-V and VI
ICP-V and VI: Inorganic Chemistry Practical-V and VI
OCP-V and VI: Organic Chemistry Practical-V and VI
PCP-V and VI: Physical Chemistry Practical-V and VI
*Can be chosen from the list of courses available

Total Credit: 96 + 2 (Will be allotted randomly during the semesters-I to IV in order to implement Swachh Bharat Internship Programme) = **98** and 2 credits are optional
Total Marks for M.Sc. Programme = **2400**
Total Core Course Credit = **48**;Total Elective Course Credit = **50** (including 8 credit from GEC)
CC = Core Course; DCEC = Discipline Centric Elective Course; DSEC = Discipline Specific Elective Course; DSEP = Discipline Specific Elective Practical; DCSC = Discipline Centric Skill-based Course

Note:

1) A 02 Credit Summer Training (Optional) Self-study/Skill-based Course of six weeks will be available to interested students at the end of Semester-II.
2) A 02 Credit Course on the basis of Swachh Bharat Internship Programme will be available and mandatory to all students. The course will be allotted to the students in a batch-wise manner to earn max 02 credits in the duration of two years.
3) Students may choose option 2 in Sem-III on the basis of their interest in consultation with concerned faculty member(s). The students shall continue the dissertation work under the supervision of the same faculty member(s) to carry out second part of the dissertation in semester-IV.
4) **Choice Based Credit System (CBCS) based M.Sc. Chemistry programme will be awarded with a minimum of 98 credit (compulsory), although it can be a maximum of 100 credit.**

6. LEARNING OUTCOME INDEX

6.1 Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)

PSOs ⇨	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
POs ⇩						
PO1	√	√	X	X	X	X
PO2	√	√	√	√	X	√
PO3	√	√	√	√	√	√
PO4	√	√	√	√	√	√
PO5	√	√	√	√	√	√
PO6	X	√	√	√	√	√
PO7	X	√	X	√	√	√
PO8	√	√	√	√	√	√
PO9	√	X	√	√	√	√
PO10	X	√	√	√	√	√
PO11	X	√	√	√	√	√

6.2 Core Courses with PSOs

PSOs ⇨	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
Core Course No. ⇩						
CH-01	√	√	√	X	√	√
CH-02	√	√	√	X	√	√
CH-03	√	√	√	X	√	√
CH-04	√	√	√	X	√	√
CH-05	√	√	√	X	√	√
CH-06	√	√	√	X	√	√
CH-07	√	√	√	X	√	√
CH-08	√	√	√	X	√	√
CH-09	√	√	√	X	√	√
CH-10	√	√	√	X	√	√
CH-11	√	√	√	X	√	√
CH-12	√	√	√	X	√	√
CH-13	√	√	√	X	√	√
CH-14	√	√	√	√	√	√
CH-15	√	√	√	√	√	√
CH-16	√	√	X	√	√	√

6.3 Elective and Other Courses with PSOs

PSOs ⇨	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
Course No. ⇩						
CH-17	√	√	√	√	√	√
CH-18	√	√	√	√	√	√
CH-19	√	√	√	X	√	√
CH-20	√	√	√	X	√	√
CH-21	√	√	√	X	√	√
CH-22	√	√	√	X	√	√
CH-23	√	√	√	X	√	√
CH-24	√	√	√	X	√	√
CH-25	√	√	√	X	√	√
CH-26	√	√	√	X	√	√
CH-27	√	√	√	X	√	√
CH-28	√	√	√	X	√	√
CH-29	√	√	√	√	√	√
CH-30	√	√	√	√	√	√
CH-31	√	√	√	X	√	√
CH-32	√	√	√	X	√	√
CH-33	√	√	√	X	√	√
CH-34	√	√	√	√	√	√
CH-35	√	√	√	X	√	√
CH-36	√	√	√	X	√	√

CH-37	√	√	√	√	√	√
CH-38	√	√	√	√	√	√
CH-39	√	√	√	X	√	√
CH-40	√	√	√	X	√	√
CH-41	√	√	√	X	√	√
CH-42	√	√	√	√	√	√
CH-43	√	√	√	X	√	√
CH-44	√	√	√	X	√	X
CH-45	√	√	√	√	√	√
CH-46	√	√	√	X	√	√
CH-47	√	√	√	X	√	√
CH-48	√	√	√	√	√	√
CH-49	√	√	√	√	√	√
CH-50	√	√	√	√	√	√
CH-51	√	√	√	√	√	√
CH-52	√	√	√	X	√	√
CH-53	√	√	√	√	√	√
CH-54	√	√	√	√	√	√
CH-55A	√	√	√	√	√	√
CH-55B	√	√	√	√	√	√
CH-56	X	√	X	X	√	√
CH-57	√	√	X	X	√	√
CH-58	√	√	√	X	√	√
CH-59	√	√	√	X	√	√

CH-60	√	√	√	X	√	√
CH-61	√	√	√	X	√	√
CH-62	√	√	√	X	√	X

7. SEMESTER-WISE COURSES AND CREDIT DISTRIBUTION

A. LIST OF COURSES OFFERED BY DEPARTMENT OF CHEMISTRY

Sr. No	Course No	Course Name	Course Code	Course Type	Credit	Semester
CORE COURSES (CC)						
1	**CH-01**	Inorganic Chemistry-I	SBS CH 010101 C 4004	**CC**	**04**	**I**
2	**CH-02**	Organic Chemistry-I	SBS CH 010102 C 4004	**CC**	**04**	**I**
3	**CH-03**	Physical Chemistry-I	SBS CH 010103 C 4004	**CC**	**04**	**I**
4	**CH-04**	Inorganic Chemistry Practical-I	SBS CH 010104 C 0042	**CC**	**02**	**I**
5	**CH-05**	Organic Chemistry Practical-I	SBS CH 010105 C 0042	**CC**	**02**	**I**
6	**CH-06**	Physical Chemistry Practical-I	SBS CH 010106 C 0042	**CC**	**02**	**I**
7	**CH-07**	Inorganic Chemistry-II	SBS CH 010207 C 4004	**CC**	**04**	**II**
8	**CH-08**	Organic Chemistry-II	SBS CH 010208 C 4004	**CC**	**04**	**II**
9	**CH-09**	Physical Chemistry-II	SBS CH 010209 C 4004	**CC**	**04**	**II**
10	**CH-10**	Inorganic Chemistry Practical-II	SBS CH 010210 C 0042	**CC**	**02**	**II**
11	**CH-11**	Organic Chemistry Practical-II	SBS CH 010211 C 0042	**CC**	**02**	**II**
12	**CH-12**	Physical Chemistry Practical-II	SBS CH 010212 C 0042	**CC**	**02**	**II**
13	**CH-13**	Molecular Spectroscopy	SBS CH 010313 C 4004	**CC**	**04**	**III**
14	**CH-14**	Research Methodology and Software Applications	SBS CH 010314 C 2002	**CC**	**02**	**III**
15	**CH-15**	Applications of Spectroscopy	SBS CH 010415 C 4004	**CC**	**04**	**IV**
16	**CH-16**	Seminar (Research paper based)	SBS CH 010416 C 4004	**CC**	**02**	**IV**
DISCIPLINE SPECIFIC ELECTIVE COURSES (DSEC)						
17	**CH-17**	Inorganic Chemistry-III	SBS CH 010301 DSE 4004	**DSEC**	**04**	**III**
18	**CH-18**	Inorganic Chemistry –IV (Advanced Inorganic Chemistry)	SBS CH 010302 DSE 4004	**DSEC**	**04**	**III**
19	**CH-19**	Inorganic Chemistry Practical-III	SBS CH 010303 DSE 0063	**DSEC**	**03**	**III**

20	**CH-20**	Inorganic Chemistry Practical-IV	SBS CH 010304 DSE 0063	**DSEC**	**03**	**III**
21	**CH-21**	Organic Chemistry-III (Heterocycles and Natural Products)	SBS CH 010305 DSE 4004	**DSEC**	**04**	**III**
22	**CH-22**	Organic Chemistry-IV (Reagents and Reactions)	SBS CH 010306 DSE 4004	**DSEC**	**04**	**III**
23	**CH-23**	Organic Chemistry Practical-III	SBS CH 010307 DSE 0063	**DSEC**	**03**	**III**
24	**CH-24**	Organic Chemistry Practical-IV	SBS CH 010308 DSE 0063	**DSEC**	**03**	**III**
25	**CH-25**	Physical Chemistry-III (Statistical Mechanics, Surface and Interface Chemistry)	SBS CH 010309 DSE 4004	**DSEC**	**04**	**III**
26	**CH-26**	Physical Chemistry-IV (Solid State Chemistry & Electro-Analytical Methods)	SBS CH 010310 DSE 4004	**DSEC**	**04**	**III**
27	**CH-27**	Physical Chemistry Practical-III	SBS CH 010311 DSE 0063	**DSEC**	**03**	**III**
28	**CH-28**	Physical Chemistry Practical-IV	SBS CH 010312 DSE 0063	**DSEC**	**03**	**III**
29	**CH-29**	Inorganic Chemistry-V	SBS CH 010413 DSE 4004	**DSEC**	**04**	**IV**
30	**CH-30**	Inorganic Chemistry-VI (Frontiers in Inorganic Chemistry)	SBS CH 010414 DSE 4004	**DSEC**	**04**	**IV**
31	**CH-31**	Inorganic Chemistry Practical-V	SBS CH 010415 DSE 0063	**DSEC**	**03**	**IV**
32	**CH-32**	Inorganic Chemistry Practical-VI	SBS CH 010416 DSE 0063	**DSEC**	**03**	**IV**
33	**CH-33**	Organic Chemistry-V (Organic Synthesis)	SBS CH 010417 SE 4004	**DSEC**	**04**	**IV**
34	**CH-34**	Organic Chemistry-VI (Medicinal Chemistry)	SBS CH 010418 DSE 4004	**DSEC**	**04**	**IV**
35	**CH-35**	Organic Chemistry Practical-III	SBS CH 010419 DSE 0063	**DSEC**	**03**	**IV**
36	**CH-36**	Organic Chemistry Practical-IV	SBS CH 010420 DSE 0063	**DSEC**	**03**	**IV**
37	**CH-37**	Physical Chemistry-V (Polymer & Surface Chemistry)	SBS CH 010421 DSE 4004	**DSEC**	**04**	**IV**
38	**CH-38**	Physical Chemistry-VI (Applied Electrochemistry)	SBS CH 010422 DSE 4004	**DSEC**	**04**	**IV**
39	**CH-39**	Physical Chemistry Practical-V	SBS CH 010423 DSE 0063	**DSEC**	**03**	**IV**

40	**CH-40**	Physical Chemistry Practical-VI	SBS CH 010424 DSE 0063	**DSEC**	**03**	**IV**
41	**CH-41**	Seminar	SBS CH 010425 DSE 2002	**DSEC**	**02**	**III**
42	**CH-42**	Scientific Report Writing in Emerging/Advanced Areas	SBS CH 010426 DSE 2002	**DSEC**	**02**	**IV**
DISCIPLINE CENTRIC ELECTIVE COURSES (DCEC)						
43	**CH-43**	Reaction Mechanism: Structure and Reactivity	SBS CH 010101 DCEC 2002	**DCEC**	**02**	**I**
44	**CH-44**	Nuclear Chemistry	SBS CH 010102 DCEC 2002	**DCEC**	**02**	**I**
45	**CH-45**	Green Chemistry	SBS CH 010303 DCEC 2002	**DCEC**	**02**	**III**
46	**CH-46**	Carbohydrate Chemistry and its Applications	SBS CH 010304 DCEC 2002	**DCEC**	**02**	**III**
47	**CH-47**	Asymmetric Catalysis: Fundamentals to Frontiers	SBS CH 010305 DCEC 2002	**DCEC**	**02**	**III**
48	**CH-48**	Supramolecular Chemistry	SBS CH 010306 DCEC 2002	**DCEC**	**02**	**III**
49	**CH-49**	Introduction to Nanomaterials	SBS CH 010307 DCEC 2002	**DCEC**	**02**	**III**
50	**CH-50**	Molecular Magnetism	SBS CH 010308 DCEC 2002	**DCEC**	**02**	**III**
DISCIPLINE CENTRIC SKILL-BASED COURSES (DCSC)						
51	**CH-51**	Computational Chemistry	SBS CH 010201 DCSC 2002	**DCSC**	**02**	**II**
52	**CH-52**	Analytical Techniques in Chemistry	SBS CH 010202 DCSC 2002	**DCSC**	**02**	**II**
53	**CH-53**	Process Development of Active Pharmaceutical Ingredients	SBS CH 010403 DCSC 2002	**DCSC**	**02**	**IV**
54	**CH-54**	Chemistry of Industrially Important Products	SBS CH 010404 DCSC 2002	**DCSC**	**02**	**IV**
DISSERTATION						
55	**CH-55A**	Dissertation-I	SBS CH 010311 SE 001408	**DSEC**	**8**	**III**
56	**CH-55B**	Dissertation-II	SBS CH 010412 SE 001408	**DSEC**	**8**	**IV**
SWACHH BHARAT INTERNSHIP PROGRAMME (MANDATORY)						
57	**CH-56**	Activities at Department and University Level	SBS CH 010105 DCSC 2002	**DCSC**	**02**	**I-IV**
SUMMER TRAINING (OPTIONAL)						

58	**CH-57**	Summer Training (6 weeks)	SBS CH 010206 DCSC 2002	**DCSC**	**02**	**At end of Sem-II**
GENERIC ELECTIVE COURSE (GEC) [FOR STUDENTS OF OTHER DEPARTMENTS]						
59	**CH-58**	Chemistry for Biologists	SBS CH 010101 GE 4004	**GEC**	**04**	**I**
60	**CH-59**	Chemistry of Materials	SBS CH 010102 GE 4004	**GEC**	**04**	**I**
61	**CH-60**	Medicinal Chemistry	SBS CH 010203 GE 4004	**GEC**	**04**	**II**
62	**CH-61**	Drug, Design and Discovery	SBS CH 010304 GE 4004	**GEC**	**04**	**III**
63	**CH-62**	Magneto Nuclear Chemistry	SBS CH 010405 GE 4004	**GEC**	**04**	**IV**

B. GEC COURSE

- Various available GEC courses can be selected from other Departments.

8. COURSE-LEVEL LEARNING OUTCOMES

INORGANIC CHEMISTRY COURSES

THEORY COURSES

Course No: CH-01	Course Name: Inorganic Chemistry-I				Course Code: SBS CH 010101 C 4004		
Batch: 2021 Onwards	**Programme:** M.Sc. Chemistry	**Semester:** I	**L** 4	**T** 0	**P** 0	**Credit** 4	**Contact Hrs. per Week: 04** **Total Hrs.: 60**
Total Evaluation Marks: 100 **CIE:** **30** Marks **TEE:** **70** Marks		**Examination Duration:** 3 Hrs. **Pre-requisite of course:** Basic understanding of coordination chemistry, geometries and bonding models of coordination compounds.					
Course Objectives	*To provide students with basic understanding of symmetry, coordination chemistry, magnetic properties of coordination complexes, metal carbonyl/nitrosyl and metal clusters.*						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1:** Knowledge of molecular symmetry and point groups **CO2:** Understanding bonding models in coordination compounds **CO3:** Application the theories and models of chemical bonding in coordination compounds **CO4:** Understanding of skeleton electron pairs in non-transition compounds **CO5:** Introduction to metal carbonyls, nitrosyls and related compounds **CO6:** Scope of inorganic compounds						

COURSE SYLLABUS

NOTE:
i)Question no. 1 is compulsory and to be set from the entire syllabus. It will have four sub-parts and students need to answer any two. Each part carries three and half marks.
ii) Question nos. 2 to 5 are to be set from all four units one from each. Every question will have three sub-parts and students need to answer any two sub-parts of each question. Each part carries three and half marks.

Unit No.	Contents	Contact Hrs.
I	**MOLECULAR SYMMETRY, POINT GROUPS AND CHARACTER TABLES** Symmetry elements and symmetry operations, symmetry groups with examples from inorganic compounds, groups of very high symmetry, molecular dissymmetry and optical activity, molecular symmetry for compounds having coordination number 2 to 9, matrix representations of symmetry operators and their products. The great orthogonality theorem and its importance, character tables and there use in spectroscopy.	15
II	**BONDING MODELS** Valence bond theory, electroneutrality principle and its limitations. Crystal field theory, splitting of *d*-orbitals in octahedral, tetragonal, square planar and tetrahedral ligand environments. Ligand field theory, molecular orbital theory. MO treatment of simple diatomic (homo & hetero) and polyatomic systems. Spectroscopic electronegativity, concept of chemical hardness (η). Walsh diagrams (triatomic systems).	15

III	**CHEMISTRY OF NON-TRANSITION ELEMENTS** Structures and acidic behaviour of boron halides, Types and nomenclature of boron hydrides (boranes), Wade's polyhedral skeleton electron pair theory (PSEPT). W. N. Lipscomb's STYX rules and semi-topological structures of boranes. Preparation, and properties of boron hydrides, carboranes, metalloboranes and metallocarboranes. Preparation, structure and properties of boron-nitrogen, phosphorous-nitrogen, phosphorus-oxygen, sulphur-nitrogen compounds, silicates, interhalogens, chlorofluorocarbons, pseudohalides and noble gas compounds.	15
IV	**METAL CARBONYLS, NITROSYLS AND CLUSTERS** Molecular orbital diagram of carbonyl, classification of metal carbonyls, bonding in metal carbonyl, valence electron count (EAN rules), preparation and properties of mononuclear and polynuclear carbonyl complexes, bond lengths and stretching frequencies, carbonylate ions, carbonyl hydride complexes, isolobal fragments, structure and important reactions of transition metal nitrosyls. Bonding, preparation and properties of dinuclear metal cluster (dirhenium complex $[Re_2Cl_8]^{2-}$ ions), trinuclear and hexanuclear metal clusters.	15

Suggested Readings:

1. G. L. Miessler, P. J. Fischer and D. A. Tarr, Inorganic Chemistry, 5th Edition. *Pearson*, 2014.
2. B. N. Figgis and M. A. Hitchman, Ligand Field Theory and Its Applications, *Wiley-India*, 2010.
3. J. E. House, Inorganic Chemistry, *Academic Press*, 2008.
4. J. E. Huheey, E. A. Keiter, R. L. Keiter, O. K. Medhi, Inorganic Chemistry: Principles of Structure and Reactivity, 4thEdition. *Pearson Education*, 2006.
5. F. A. Cotton and Wilkinson, Advanced Inorganic Chemistry, 6thEdition. *John Wiley*, 2006.
6. D. F. Shriver, P.W. Atkins and C.H. Landgord, Inorganic Chemistry, 3rd Edition. *Oxford University Press*, 1998.
7. N. N. Greenwood and E. A. Earnshaw; Chemistry of elements, 2ndEdition. *Butterworth- Heinemann*, 1997.
8. J. D. Lee, Concise Inorganic Chemistry, *Chapman & Hall Ltd*., 1991.
9. F. A. Cotton, Chemical Applications of Group Theory, 3rd edition. *John Wiley & Sons*, 1990.

Course No:	Course Name:				Course Code:		
CH-07	Inorganic Chemistry-II				SBS CH 010207 C 4004		
Batch:	**Programme:**	**Semester:**	**L**	**T**	**P**	**Credit**	**Contact Hrs. per Week: 04**
2021 Onwards	M.Sc. Chemistry	**II**	4	0	0	4	**Total Hrs.: 60**

Total Evaluation Marks: 100 **CIE: 30** Marks **TEE: 70** Marks	**Examination Duration:** 3 Hrs. **Pre-requisite of course:** Basic understanding of electronic spectroscopy, magnetic properties and reaction mechanisms in coordination compounds.
Course Objectives	*To provide an understanding of the fundamentals of electronic spectroscopy of coordination compounds and advanced topics such as, reaction mechanism in complexes. Introductory nuclear chemistry and its theory will be discussed as well.*
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1:** Understanding of electronic properties of coordination compounds **CO2:** Knowledge of term symbols and Orgel diagrams **CO3:** Able to predict the allowed transitions between various molecular energy levels **CO4:** Understanding of anomalous magnetic behaviour **CO5:** Understanding of reaction mechanisms in coordination compounds **CO6:** Understanding of metal-ligand equilibria in solution in coordination compounds

COURSE SYLLABUS

NOTE:
i) Question no. 1 is compulsory and to be set from the entire syllabus. It will have seven sub-parts and students need to answer any four. Each part carries three and half marks.
ii) Question nos. 2 to 5 are to be set from all four units one from each. Every question will have three sub-parts and students need to answer any two sub-parts of each question. Each part carries seven marks.

Unit No.	Contents	Contact Hrs.
I	**ELECTRONIC SPECTROSCOPY AND MAGNETIC PROPERTIES-I** Spectroscopic ground states and the evaluation of energies of various *J* states of free ions, Term symbols, splitting of *S*, *P*, *D* and *F* terms under octahedral and tetrahedral electrostatic potential, correlation, Orgel and Tanabe-Sugano diagrams for transition metal complexes (d^1-d^9 states), calculations of *Dq*, *B* and β parameters, charge transfer spectra of complexes (both metal to ligand and ligand to metal). Spectroscopic method of assignment of absolute configuration in optically active metal chelates and their stereochemical information.	15
II	**ELECTRONIC SPECTROSCOPY AND MAGNETIC PROPERTIES-II** Brief review of different types of magnetic behaviors, spin-orbit coupling, quenching of orbital angular moments, temperature independence paramagnetism, anomalous magnetic moments. Crystal field theory and its application to explain magnetic properties of coordination compounds. Magnetic interactions in polynuclear systems, canting, spin frustration.	15
III	**REACTION MECHANISMS OF TRANSITION METAL COMPLEXES** Energy profile of a reaction, reactivity of metal complexes, inert and labile complexes,	15

	kinetic application of valence bond and crystal field theories, kinetics of octahedral substitution, acid hydrolysis, factors affecting acid hydrolysis, base hydrolysis, conjugate base mechanism, direct and indirect evidences in favour of conjugate mechanism, anation reactions, reactions without metal ligand bond cleavage. Substitution reaction in square planar complexes, *trans* effect, mechanism of the substitution reactions. Redox reactions, mechanism of inner-outer sphere type reactions, cross reactions and Marcus-Hush theory.	
IV	**METAL-LIGAND EQUILIBRIA IN SOLUTION** Stepwise and overall formation constants and their interaction, trends in stepwise constants, factors influencing stability of metal complexes dependent on size and charge, metal class, ligand preference, nature of transition metal ions, basic strength, chelate effect, ring size, steric strain, macrocyclic effect, thermodynamic and kinetic stability, determination of formation constants by pH-metry and spectrophotometry.	15

Suggested Readings:

1. G. L. Miessler, P. J. Fischer and D. A. Tarr, Inorganic Chemistry, 5th Edition. *Pearson*, 2014.
2. B. N. Figgis and M. A. Hitchman, Ligand Field Theory and Its Applications, *Wiley-India*, 2010.
3. J. E. House, Inorganic Chemistry, *Academic Press*, 2008.
4.
5. J. E. Huheey, E. A. Keiter, R. L. Keiter, O. K. Medhi, Inorganic Chemistry: Principles of Structure and Reactivity, 4thEdition. *Pearson Education*, 2006.
6. F. A. Cotton and Wilkinson, Advanced Inorganic Chemistry, 6thEdition. *John Wiley*, 2006.
7. D. F. Shriver, P.W. Atkins and C.H. Landgord, Inorganic Chemistry, 3rd Edition. *Oxford University Press*, 1998.
8. N. N. Greenwood and E. A. Earnshaw; Chemistry of elements, 2ndEdition. *Butterworth- Heinemann*, 1997.
9. J. D. Lee, Concise Inorganic Chemistry, *Chapman & Hall Ltd*., 1991.

Course No:	Course Name:				Course Code:		
CH-17	Inorganic Chemistry-III				SBS CH 010301 DSE 4004		
Batch:	**Programme:**	**Semester:**	**L**	**T**	**P**	**Credit**	**Contact Hrs. per Week: 04**
2021 Onwards	M.Sc. Chemistry	**III**	4	0	0	4	**Total Hrs.: 60**

Total Evaluation Marks:100 **CIE: 30** Marks **TEE: 70** Marks	**Examination Duration:** 3 Hrs. **Pre-requisite of course:** To provide basic theory of various spectroscopic techniques (IR, Raman, ESR, Mossbauer, NQR) and photophysical processes involved in molecules.
Course Objectives	*To provide exposure with various spectroscopic techniques required to characterize inorganic complexes and coordination compounds. Also covered an introduction of photoinorganic chemistry involving various photophysical processes.*
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1**: Basic understanding of IR, Raman, ESR, Mossbauer, NQR **CO2**: Basic theory of photophysical processes **CO3**: To understand spin orbit coupling **CO4**: To get insight of bond strength **CO5**: Mechanistic phenomenon **CO6**: Application of IR, Raman, ESR, Mossbauer, NQR

COURSE SYLLABUS

NOTE:

i)Question no. 1 is compulsory and to be set from the entire syllabus. It will have seven sub-parts and students need to answer any four. Each part carries three and half marks.

ii) Question nos. 2 to 5 are to be set from all four units one from each. Every question will have three sub-parts and students need to answer any two sub-parts of each question. Each part carries seven marks.

Unit No.	Contents	Contact Hrs.
I	**INFRARED AND RAMAN SPECTROSCOPY** Molecular vibrations, force constants, molecular vibrations and absorption of Infrared radiations. Raman spectroscopy, polarized Raman lines. Use of symmetry considerations to determine the number of lines in IR and Raman Spectra. Structural studies involving IR and Raman Spectroscopy of coordination compounds containing the following molecules/ions and ligands: NH_3, H_2O, OH, SO_4^{2-}, ClO_4^-, COO^-, NO_2, CN^-, SCN^-, NO, O_2, halides, acetylacetone. Hydrogen bonding and infrared spectra, metal ligand and related vibrations. Application of resonance Raman spectroscopy to structural elucidation of the active sites of heme and non-heme oxygen carriers.	15
II	**ELECTRON SPIN RESONANCE SPECTROSCOPY** Basic principle, selection rules, presentation of spectra, origin and interpretation of Lande's factor(g), factor affecting 'g-value', isotropic and anisotropic hyperfine coupling, super hyperfine coupling, spin-orbit coupling, line shape, zero field splitting, Kramer's degeneracy,	15

	quadrupolar interactions, ESR analysis of organic compounds, transition metal complexes of vanadium, chromium, manganese, iron, copper, cobalt and iron. Application of ESR spectroscopy: structure determination, interpretation of ESR spectra of simple organic radicals like benzene, naphthalene, toluene and xylene radical ions, study of unstable paramagnetic species.	
III	**MÖSSEBAUER AND NUCLEAR QUADRUPOLE RESONANCE SPECTROSCOPY** Mössebauer Spectroscopy: Introduction to Mössebauer effect-Basic principles, recoilless emission & absorption of γ-rays. Mössebauer experiment - Instrumentation, scheme of Mössebauer spectrometer, Mössebauer spectrum. Isomer shift, quadrapole splitting and hyperfine interactions, application of Mössebauer effect to the investigations of compounds of iron and tin. Nuclear Quadrupole Resonance Spectroscopy: Principle, nuclear quadrupole resonance experiment, structural information from NQR spectra, Interpretation of nuclear quadrupole coupling constants.	15
IV	**PHOTOINORGANIC PHENOMANON** Interaction of electromagnetic radiation with matter, Grotthus-Draper law, Stark-Einstein law of photochemical equivalence and Lambert-Beer's law, quantum yield, photodissociation, predissociation, photochemical reactions: photoreduction, photooxidation, photodimerization, photochemical substitution, photoisomerization, photosensitized reaction. Electronic transition, Frank-Condon principle, selection rules, electronically excited singlet states, life time of electronically excited state, construction of Jablonski diagram, electronic transitions and intensity of absorption bands, photophysical pathways of excited molecular system (radiative and non-radiative), chemiluminescence, phosphorescence and fluorescence.	15

Suggested Readings:

1. D. L. Pavia, G. M. Lampman, G. S. Kriz and J. R. Vyvyan; Introduction to Spectroscopy, 5th Edition. C*engage* India, 2015.
2. K. K. Rohatgi and K. K. Mukherjee; Fundamentals of Photochemistry, 3rd Edition. *New Age International (P) Ltd*., 2014.
3. N. J. Turro, V. Ramamurthy and J. C. Scaiano; Modern Molecular Photochemistry of Organic Molecules, 1st Edition. *University Science*, 2010.
4. K. Nakamoto; Infrared and Raman Spectra of Inorganic and Coordination Compounds, Part A and B, 6th Edition. *Wiley*, 2008.
5. J. R. Lakowicz, Principles of Fluorescence Spectroscopy, 3rd Edition. *Springer*, New York, 2006.
6. C. N. Banwell and E. M. McCash; Fundamentals of Molecular Spectroscopy, 4th Edition. *Tata McGraw Hill*, 1994.
7. I. Ninomiya and T. Naito; Photochemical Synthesis, 1st Edition. *Academic Press*, New York, 1989.

Course No: CH-18	Course Name: Inorganic Chemistry–IV (Advanced Inorganic Chemistry)				Course Code: SBS CH 010302 DSE 4004		
Batch: 2021 Onwards	**Programme:** M.Sc. Chemistry	**Semester:** **III**	**L** 4	**T** 0	**P** 0	**Credit** 4	**Contact Hrs. per Week: 04** **Total Hrs.: 60**
Total Evaluation Marks: 100 **CIE:** **30** Marks **TEE:** **70** Marks		**Examination Duration:** 3 Hrs. **Pre-requisite of course:** Basic knowledge of coordination chemistry, bioinorganic chemistry and supramolecular chemistry.					
Course Objectives	*To provide exposure of (i) various biomolecules containing metal ions that comprises many important proteins and enzymes (ii) supramolecular chemistry of life. This course would be highly beneficial for students who had minimal exposure of bioinorganic chemistry at the undergraduate level.*						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1:** Importance of metal ions in biology **CO2:** Understanding of membrane potential and its functions **CO3:** Knowledge of various enzymes and its activities **CO4:** Advanced applications of bioinorganic chemistry with regard to energy applications **CO5:** Understanding of supramolecular chemistry of life **CO6:** Knowledge of supramolecular accessories in biological systems						

COURSE SYLLABUS

NOTE:

i)Question no. 1 is compulsory and to be set from the entire syllabus. It will have seven sub-parts and students need to answer any four. Each part carries three and half marks.

ii) Question nos. 2 to 5 are to be set from all four units one from each. Every question will have three sub-parts and students need to answer any two sub-parts of each question. Each part carries seven marks.

Unit No.	Contents	Contact Hrs.
I	**BIOINORGANIC CHEMISTRY-I** Mineral origin of life. Archaeal, Eucarial and Bacterial domain. Transition metal ions in biology. Metallobiomolecules. Electron carriers, oxygen carriers, enzymes. Specific examples: Hemoglobin, Myoglobin, Hemocyanin, Hemrythrin, Cytochromes, Fe-S proteins, Cytochrome P-450, Nitrophorin, Ferritin, blue copper proteins, di- and tricopper proteins, ceruloplasmin.	15
II	**BIOINORGANIC CHEMISTRY-II** NO-synthase, peroxidase, catalase, cytochrome-C oxidase, Other enzymes like, hydrogenase, methane monooxygenase, dioxygenases, dehydratase, nitrogenase, molybdenum containing oxidase and reductase class of enzymes like sulfite oxidase, xanthine oxidase, nitrate reductase, DMSO reductase. Zn enzymes like carbonic anhydrase, carboxypeptidase, DNA and RNA polymerases, role of manganese in water splitting.	15

III	**DEVELOPING FACETS OF MODERN INORGANIC CHEMISTRY** Oxidative generation of molecular oxygen from water during photosynthesis, Its importance from the standpoint of non-conventional energy research, Reductive cleavage of the dioxygen bond, Reductive cleavage of dioxygen bond and novel organic transformations including methane to methanol performed by a large number of Fe containing metalloenzymes.	15
IV	**SUPRAMOLECULAR CHEMISTRY OF LIFE** Biological Inspiration for Supramolecular Chemistry; Alkali Metal Cations in Biochemistry; Membrane Potentials; Membrane Transport; Rhodopsin: A Supramolecular Photonic Device; Porphyrins and Tetrapyrrole Macrocycles; Supramolecular Features of Plant Photosynthesis; The Role of Magnesium Tetrapyrrole Complexes; Neurotransmitters and Hormones; Semiochemistry in the Natural World; Structure of DNA and its Function; Site-Directed Mutagenesis; Biochemical Self-Assembly.	15

Suggested Readings:

1. J. W. Steed, Supramolecular Chemistry: From Molecules to Nanomaterials, 8 Volume Set Edition. *John Wiley & Sons*, 2012.
2. J. W. Steed and J. L. Atwood, Supramolecular Chemistry, 2nd Edition. *Wiley*, 2009.
3. J. E. House, Inorganic Chemistry, *Academic Press*, 2008.
4. F. A. Cotton and Wilkinson, Advanced Inorganic Chemistry, 6thEdition. *John Wiley*, 2006.
5. J. E. Huheey, E. A. Keiter, R. L. Keiter, O. K. Medhi, Inorganic Chemistry: Principles of Structure and Reactivity, 4thEdition.*Pearson Education*, 2006.
6. J.-M. Lehn, Supramolecular Chemistry: Concepts and Perspectives. *Wiley*, 2006.
7. D. F. Shriver, P.W. Atkins and C.H. Landgord, Inorganic Chemistry, 3rd Edition. *Oxford University Press*, 1998.
8. S. J. Lippard and J. M. Berg, Principles of Bioinorganic Chemistry. *University Science Book, Mill Valley*, 1994.
9. I. Bertini, H.B. Gray, S. J. Lippard and J.S. Valentne, Bioinorganic Chemistry. *University Science Books, Mill Valley,* 1994.

Course No: CH-29	Course Name: Inorganic Chemistry-V						Course Code: SBS CH 010413 DSE 4004
Batch: 2021 Onwards	**Programme:** M.Sc. Chemistry	**Semester:** **IV**	**L** 4	**T** 0	**P** 0	**Credit** 4	**Contact Hrs. per Week: 04** **Total Hrs.: 60**
Total Evaluation Marks:100 **CIE: 30** Marks **TEE: 70** Marks		**Examination Duration:** 3 Hrs. **Pre-requisite of course:** Detailed study of bonding, structure, synthesis and reactions of various types of organometallic complexes. Metal complexes of carbons at various oxidation levels will be discussed. Synthesis and stability, precautions in handling, characterization techniques and utility or TM-complexes will be studied. The applications of metal complexes in catalysis will be studied in detail.					
Course Objectives	*Fundamental understanding of organometallic compounds, reactions of various organometallics and their usefulness.*						
Course Outcomes :	After completing this course, student is expected to learn the following: **CO1**: Basic understanding of organometallic compounds **CO2**: Synthesis of organometallic compounds **CO3**: Structural analysis of organometallic compounds **CO4**: To understand fluxional behavior in organometallic compounds **CO5**: To understand mechanistic study involved in organometallic compounds **CO6**: Scope of organometallic compounds						

COURSE SYLLABUS

NOTE:

i) Question no. 1 is compulsory and to be set from the entire syllabus. It will have seven sub-parts and students need to answer any four. Each part carries three and half marks.

ii) Question nos. 2 to 5 are to be set from all four units one from each. Every question will have three sub-parts and students need to answer any two sub-parts of each question. Each part carries seven marks.

Unit No.	Contents	Contact Hrs.
I	**METAL-ALKYLS, ARYLS, CARBENES AND CARBYNES** Synthesis, structure and bonding considerations of Zeise's salt; synthesis, stability and decomposition pathways of organocopper in organic synthesis; synthesis and reactivity of alkyl lithium; synthesis and reactivity of organozinc compounds. Metal carbenes: preparation, reactivity, structure and bonding considerations of Fischer and Schrock carbene complexes, Tebbe's reagent, Grubb's reagent, Petasis reagent, Metal carbynes: synthesis, reactivity, structure and bonding considerations of Fischer and Schrock carbyne complexes.	15
II	**TRANSITION METAL PI-CYCLIC COMPLEXES** Half and bent sandwich compounds, molecular orbitals of metallocenes, structures of cyclopentadienyl compounds, covalent versus ionic bonding, 18 electron rule, synthesis, structure, aromatic behaviour of Ferrocene, reactions such as metallation, Friedel Craft, Mannich reaction, sulphonation, nitration, halogenations reactions, Synthesis, structure and reactions of other metallocenes (with Cr, Ni and Zr metals).	15

III	**FLUXIONAL ORGANOMETALLIC COMPOUNDS AND COUPLING REACTIONS** Rates of rearrangement and techniques of study, NMR study of Fluxional behavior, Classification of fluxional organometallic Compounds, Mechanism of fluxionality in compounds of η^1-cyclopentadienyls and η^3–allyls. Stereochemical non-rigidity in case of coordination numbers- 4 & 5 (*cis-trans*, atomic inversion, Berry Pseudorotation). Tsuji-Trost, Mizoroki-Heck, Miyaura-Suzuki, Stille, Negishi, Sonogashira, Kumada, Hiyama, Buchwald-Hartwigamination or coupling reactions.	15
IV	**CATALYTIC PROCESSES INVOLVING TRANSITION METAL ORGANOMETALLIC COMPOUNDS** Oxidative addition, reductive elimination, insertion-migration reactions, C-H bond activation catalytic mechanism of hydrogenation, hydroformylation, oxidation and isomerization of alkenes, Monsanto acetic acid synthesis, olefin metathesis, Fischer-Tropsch synthesis and Ziegler-Natta polymerization of alkenes, water gas shift reaction, asymmetric and supported organometallic catalysis.	15

Suggested Readings:

1. G. L. Miessler and D. A. Tarr, Inorganic Chemistry, 3rdEdition. *Pearson*, 2018.
2. R. H. Crabtree, The Organometallic Chemistry of the Transition Metals, 5thEdition. *John Wiley*, 2009.
3. R. C. Mehrotra and A. Singh, Organometallic Chemistry, 2nd Edition. *New Age International*, 2007.
4. R. B. Jordan, Reaction Mechanism of Inorganic and Organometallic systems; 3rdEdition.*Oxford University Press*, 2007
5. J. E. Huheey, E. A. Keiter, R. L. Keiter and O. K. Medhi, Inorganic Chemistry: Principles of Structure and Reactivity, 4thEdition.*Pearson Education*, 2006.

Course No: CH-30	Course Name: Inorganic Chemistry-VI (Frontiers in Inorganic Chemistry)				Course Code: SBS CH 010414 DSE 4004		
Batch: 2021 Onwards	**Programme:** M.Sc. Chemistry	**Semester:** **IV**	**L** 4	**T** 0	**P** 0	**Credit** 4	**Contact Hrs. per Week: 04** **Total Hrs.: 60**
Total Evaluation Marks: 100 **CIE:** **30** Marks **TEE:** **70** Marks		**Examination Duration:** 3 Hrs. **Pre-requisite of course:** Basic idea of coordination chemistry, bonding models and lanthanides.					
Course Objectives	*To impart knowledge about advanced application of inorganic compounds as semiconductors, in imaging techniques, as solid adsorbents for energy applications.*						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1:** Knowledge of solid state inorganic materials and bonding models **CO2:** Application of inorganic compounds as superconductors **CO3:** Application of lanthanides as chemosensors and in imaging **CO4:** Preliminary knowledge about X-ray and its use in structural determination **CO5:** Introduction hybrid materials or coordination polymers **CO6:** Use coordination polymers in catalysis and energy applications						

COURSE SYLLABUS

NOTE:
i)Question no. 1 is compulsory and to be set from the entire syllabus. It will have four sub-parts and students need to answer any two. Each part carries three and half marks.
ii) Question nos. 2 to 5 are to be set from all four units one from each. Every question will have three sub-parts and students need to answer any two sub-parts of each question. Each part carries three and half marks.

Unit No.	Contents	Contact Hrs.
I	**INORGANIC MATERIALS** Brief introduction of solid state, metallic bond, Band theory (Zone model, Brillouin Zones, Limitations of the Zone model); Defects in solids, p-type and n-type; Inorganic semiconductors, its use in transistors, IC, etc.; Properties of inorganic materials: Electrical, Optical, Magnetic and Thermal. Superconductors, with special emphasis on the synthesis and structure of high temperature superconductors.	15
II	**ADVANCED APPLICATION OF LANTHANIDES** **Luminescence-based Chemosensors and Bio-imaging with Lanthanide Complexes:** Modulation of lanthanide luminescence and quenching, Chemosensor design principle, Time-resolved luminescence, Ln-based bioimaging, cellular imaging probes. **Lanthanide-base MRI Contrast Agents:** Principles of MRI, Contrast agents, Gadolinium-chelates as MRI contrast agents, water-exchange kinetics, Relaxivity, relaxation time, molecular parameters for relaxivity in MRI probes, Sensitivity and Selectivity of MRI probes, New generation MRI contrast agents.	15

III	**CRYSTAL AND MOLECULAR STRUCTURE DETERMINATION** Generation of X-rays, monochromators, safety, Concept of direct and reciprocal lattices, Bragg's law of X-ray diffraction in direct and reciprocal lattice, crystal systems, point groups, Bravais lattices, Rotational axes of symmetry, screw axes, glide planes, equivalent points, systematic absences, space groups.	15
IV	**COORDINATION POLYMERS** Introduction, Classification of Coordination Polymers, Design Strategies of Coordination Polymers-Metal Nodes and Linkers, Secondary Building Unit Concept, Topology and Interpenetration, Synthesis of Coordination Polymers-Solvothermal/Hydrothermal, Sonochemical, Microwave, Mechanochemical. Characterization: Diffraction and Spectroscopic Methods. Applications of Coordination Polymers in Gas Storage, Gas Separation, Catalysis and Drug Delivery.	15

Suggested Readings:

1. P. Martin-Ramos, M. Ramos-Silva, Lanthanide-Based Multifunctional Materials. *Elsevier*, 2018.
2. A. de Bettencourt–Dias, Luminescence of Lanthanide Ions in Coordination Compounds and Nanomaterials. *John Wiley and Sons*, 2014.
3. P. Hänninen, H. Härmä, Lanthanide Luminescence: Photophysical, Analytical and Biological Aspects. *Springer*, 2011.
4. S. R. Batten, S. M. Neville and D. R. Turner, Coordination Polymers: Design, Analysis and Application. *RSC Publishing*, 2009.
5. M.-C. Hong and L. Chen, design and Construction of Coordination Polymers. *Wiley*, 2009.
6. S. Cotton, Lanthanide and Actinide Chemistry. *John Wiley & Sons*,2006.
7. M. Ladd and R. Palmer, Structure Determination by X-ray Crystallography. *Kluwer Academic/Plenum, N.Y.*, 2003.
8. H. V. Keer, Principles of the Solid State. *Wiley Eastern Ltd.: New Delhi*, 1993.
9. A. R. West, Solid State Chemistry and its Applications. *John Wiley & Sons*, 1987.
10. J. P. Glusker and K. N. Trueblood, Crystal Structure Analysis- A Primer. *OUP, N.Y.*, 1985.
11. N. Hannay, Treatise on Solid State Chemistry. *Plenum*, 1976.
12. G. H. Stout and H. L. Jensen, X-ray Structure Determination- A Practical Guide. *Macmillan, N.Y.*, 1968.

PRACTICAL COURSES

Course No: CH-04	**Course Name:** Inorganic Chemistry Practical-I				**Course Code:** SBS CH 010104 C 0042		
Batch: 2021 Onwards	**Programme:** M.Sc. Chemistry	**Semester:** I	**L** 0	**T** 0	**P** 4	**Credit** 2	**Contact Hrs. per Week: 04** **Total Hours: 60**
Total Evaluation Marks: 50 **CIE:** 15 Marks **TEE:** 35 Marks	**Examination Duration:** 6 Hrs. **Pre-requisite of course:** Knowledge of bonding models in coordination compounds, handling of glassware and plastic ware in laboratory.						
Course Objectives	*To impart knowledge about water analysis and preparation of popular coordination complexes.*						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1:** Analysis of water samples available routinely **CO2:** Determination DO, COD and BOD in water samples **CO3:** Determination of solid impurity and turbidity present in water samples **CO4:** Preparation of coordination complexes **CO5:** Appreciate the morphology and color of coordination complexes **CO6:** Basic knowledge of inorganic preparation						

COURSE SYLLABUS

NOTE:
Two questions will be set, one from each of the UNIT. The candidates are required to attempt all the questions.

Unit No.	**Contents**	**Contact Hrs.**
I	**WATER ANALYSIS** 1. Determination of dissolved oxygen, DO of a given water sample. 2. Determination of chemical oxygen demand, COD of a given water sample. 3. Determination of biological oxygen demand, BOD of a given water sample. 4. Determination of total suspended solids and total dissolved solids. 5. Determination of turbidity of a water sample by nephlometer. 6. Determination of presence of Ca^{2+}, Mg^{2+}, Fe^{3+} and Fe^{2+} ions of a given water sample.	25
II	**PREPARATIONS AND RELATED COMPLEMENTARY WORK (ANY SIX)** 1. Reinecke Salt 2. $VO(acac)_2$ 3. $Mn(acac)_3$ 4. Prussian Blue/Turnbull's Blue 5. $Hg[Co(NCS)_4]$ 6. Potassium trioxalatoferate (III) Trihydrate 7. Potassium trioxaltochromate (III) 8. Cis, trans-dichlorobis(ethylenediammine)cobalt(III)chloride.	35

Suggested Readings:

1. J. Bassett, R. C. Denney, G. H. Jeffery and J. Mendham, Vogel's Textbook of Quantitative Analysis, revised, 5thEdition.*ELBS*, 1989.
2. G. Svehla, Vogel's Textbook of Macro and Semimicro Qualitative Inorganic Analysis, revised, 5thEdition.Longman, 1979.
3. Marr and Rocket, Practical Inorganic Chemistry, *Van Nostrand Reinhold*, 1972.

Course No: CH-10	Course Name: Inorganic Chemistry Practical-II				Course Code: SBS CH 010210 C 0042		
Batch: 2021 Onwards	**Programme:** M.Sc. Chemistry	**Semester:** II	**L** 0	**T** 0	**P** 4	**Credit** 2	**Contact Hrs. per Week: 04** **Total Hrs.: 60**
Total Evaluation Marks: 50 **CIE: 15** Marks **TEE: 35** Marks	**Examination Duration:** 6 Hrs. **Pre-requisite of course:** Basic knowledge of quantitative estimation and radical analysis gained during undergraduate courses.						
Course Objectives	*To impart knowledge of volumetric-redox and complexometric estimations and analysis of mixture of radicals, both acidic and basic.*						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1:** Detailed understanding of quantitative estimations **CO2:** Knowledge of volumetric-redox titrations **CO3:** Knowledge of complexometric titrations **CO4:** Advanced knowledge of qualitative analysis **CO5:** Analysis of acidic and basic radicals from mixture of radicals **CO6:** Analysis of interfering radicals present in a mixture of ions						

COURSE SYLLABUS

NOTE:
Two questions will be set, one from each of the UNIT. The candidates are required to attempt all the questions.

Unit No.	Contents	Contact Hrs.
I	**QUANTITATIVE ESTIMATION** Quantitative estimation (involving volumetric-redox and complexometry) of constituents in two and three component mixtures.	30
II	**SEMIMICRO QUALITATIVE ANALYSIS** Complete systematic analysis of Inorganic mixtures containing six ions including the interfering radicals.	30

Suggested Readings:

1. J. Bassett, R. C. Denney, G. H. Jeffery and J. Mendham, Vogel's Textbook of Quantitative Analysis, revised, 5thEdition. *ELBS*, 1989.
2. G. Svehla, Vogel's Textbook of Macro and Semimicro Qualitative Inorganic Analysis, revised, 5thEdition. *Longman*, 1979.
3. Marr and Rocket, Practical Inorganic Chemistry. *Van Nostrand Reinhold*, 1972.

Course No: CH-19	Course Name: Inorganic Chemistry Practical-III				Course Code: SBS CH 010210 DSE 0063		
Batch: 2021 Onwards	**Programme:** M.Sc. Chemistry	**Semester:** **III**	**L**	**T**	**P**	**Credit**	**Contact Hrs. per Week: 06**
			0	0	6	3	**Total Hrs.: 90**
Total Evaluation Marks: 75 **CIE:** **22.5** Marks **TEE:** **52.5** Marks		**Examination Duration:** 8 Hrs. **Pre-requisite of course:** Basic idea of oxidation and reduction process in inorganic complexes, vibrational and electronic spectroscopy.					
Course Objectives	*To impart knowledge of experimental spectroscopic techniques and oxidation-reduction processes in coordination complexes. The students will also be introduced about single-crystals, their synthesis and characterization.*						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1:** Experimental knowledge of UV-Visible and FTIR spectroscopy **CO2:** Protocol of characterizing coordination complexes by these techniques **CO3:** Experimental knowledge of oxidation-reduction reactions in coordination compounds **CO4:** Analyse and quantify inorganic samples using oxidation-reduction titrations **CO5:** Detailed understanding about single-crystals **CO6:** Synthesis and characterization of single-crystals						

COURSE SYLLABUS

NOTE:
Three questions will be set, one from each of the UNIT. The candidates are required to attempt all the questions.

Unit No.	Contents	Contact Hrs.
I	**SPECTROSCOPIC STUDIES** Measurement of FTIR and UV-Visible Spectra of coordination compounds, data plotting, analysis and characterization of coordination complexes/compounds using Infrared and UV-Visible Spectroscopy.	30
II	**OXIDATION-REDUCTION TITRATIONS** (i) Preparation of 0.1M cerium (IV) sulphate and its standardization with ammonium iron(II) sulphate or sodium oxalate. (ii) To determine the concentration of the nitrite ions in the sample solution using standardized cerium (IV) sulphate. (iii) To determine the percentage purity of the $NaNO_2$ using standardized cerium (IV) sulphate.	30
III	**SINGLE-CRYSTALS** Methods of growing single-crystals: (i) Diffusion method; (ii) Hydrothermal and Solvothermal method; (iii) Slow evaporation method. To grow single-crystals of molecular compounds, metal-organic cages and metal-organic higher dimensional compounds. Identification of single-crystals under polarizing optical microscope.	30

Suggested Readings:

1. J. Bassett, R. C. Denney, G. H. Jeffery and J. Mendham, Vogel's Textbook of Quantitative Analysis, revised, 5th Edition. *ELBS*, 1989.
2. Marr and Rocket, Practical Inorganic Chemistry. *Van Nostrand Reinhold*, 1972.
3. K. Nakamoto; Infrared and Raman Spectra of Inorganic and Coordination Compounds, Part A and B, 6th Edition. *Wiley*, 2008.
4. D. L. Pavia, G. M. Lampman, G. S. Kriz and J. R. Vyvyan; Introduction to Spectroscopy, 5thEdition. *Cengage India*, 2015.

Course No: CH-20	Course Name: Inorganic Chemistry Practical-IV				Course Code: SBS CH 010304 DSE 0063		
Batch: 2021 Onwards	**Programme:** M.Sc. Chemistry	**Semester:** III	**L** 0	**T** 0	**P** 6	**Credit** 3	**Contact Hrs. per Week: 06** **Total Hrs.: 90**
Total Evaluation Marks: 75 **CIE: 22.5** Marks **TEE: 52.5** Marks	**Examination Duration:** 8 Hrs. **Pre-requisite of course:** *Preliminary knowledge of electrochemistry, chromatography and quantitative analysis.*						
Course Objectives	*To gain knowledge about various techniques for the characterization of inorganic and coordination compounds through hands-on-practice.*						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1**: Basic understanding of chromatography **CO2**: Development of experimental skills to separate ions from mixtures **CO3**: Basic understanding of volumetric and gravimetric methods **CO4**: Characterization of compounds **CO5**: Estimation of metals from samples **CO6**: Interpretation of outcomes						

COURSE SYLLABUS

NOTE:
Three questions will be set, one from each of the UNIT. The candidates are required to attempt all the questions.

Unit No.	Contents	Contact Hrs.
I	**CHROMATOGRAPHY** Separation of binary mixtures in the given solution by paper chromatography, visualizing solution: concentrated ammonia, ascending chromatography.	30
II	**GRAVIMETRY** To prepare solutions of different metal ions and estimate the metal ions gravimetrically. Three component metal ion analysis (one volumetric and two gravimetric method).	30
III	**IODIMETRIC TITRATIONS** Estimation of Cu(II) and $K_2Cr_2O_7$ using sodium thiosulphate solution (Iodimetrically). Estimation of (i) arsenite and (ii) antimony iodimetrically Estimation of available chlorine in bleaching powder iodometrically	30

Suggested Readings:

1. J. A. I. Mendham, Vogel's Quantitative Chemical Analysis, 6thEdition. *Pearson*, 2009.
2. J. Bassett, R. C. Denney, G. H. Jeffery and J. Mendham, Vogel's Textbook of Quantitative Analysis, revised, 5thEdition. *ELBS*, 1989.
3. G. Svehla, Vogel's Textbook of Macro and Semimicro Qualitative Inorganic Analysis, revised, 5thEdition. *Longman*, 1979.
4. Marr and Rocket, Practical Inorganic Chemistry, *Van Nostrand Reinhold*, 1972.

Course No:	Course Name:				Course Code:		
CH-31	Inorganic Chemistry Practical-V				SBS CH 010415 DSE 0063		
Batch:	**Programme:**	**Semester:**	**L**	**T**	**P**	**Credit**	**Contact Hrs. per Week: 06**
2021 Onwards	M.Sc. Chemistry	**IV**	0	0	6	3	**Total Hrs.: 90**
Total Evaluation Marks: 75 **CIE: 22.5** Marks **TEE: 52.5** Marks		**Examination Duration:** 8 Hrs. **Pre-requisite of course:** Basic knowledge of preparation, estimation and characterization of inorganic compounds.					
Course Objectives	*To enable students analyse and characterize the given inorganic sample with knowledge of spectroscopy and titrations.*						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1: Determination of absorbance of an inorganic sample** **CO2: Determine the concentration of sample with the help of absorbance** **CO3: Knowledge of precipitation titrations** **CO4: Determination of chloride in neutral solution using precipitation titrations** **CO5: Knowledge of titrations** **CO6: Interpretation of electronic and magnetic properties of inorganic complexes**						

COURSE SYLLABUS

NOTE:
Three questions will be set, one from each of the UNIT. The candidates are required to attempt all the questions.

Unit No.	Contents	Contact Hrs.
I	**EXPERIMENTAL DETERMINATIONS WITH ULTRAVIOLET /VISIBLESPECTROPHOTOMETERS** (i) Determination of the absorption curve and concentration of a Substance (potassium nitrate) (ii) Simultaneous spectrophotometric determination (chromium and manganese)	30
II	**PRECIPITATION TITRATIONS** (i) Preparation of 0.1M silver nitrate and its standardization with Mohr's method using potassium chromate/adsorption indicator. (ii) Determination of chloride in neutral solution by titration with standard 0.1 M silver nitrate.	30
III	**PREPARATION, CHARACTERIZATION AND ESTIMATION (ANY TWO)** (i) Preparation of hexamminecobalt(III) chloride and determine the percentage of cobalt in the product iodimetrically. (ii) Preparation of chloropentaammine cobalt (III) chloride and interpretation of electronic spectrum and magnetic properties. (iii) Preparation of $[Co(acac)_3]$ and interpretation of electronic spectrum and magnetic properties.	30

Suggested Readings:

1. J. Bassett, R. C. Denney, G. H. Jeffery and J. Mendham,Vogel's Textbook of Quantitative Analysis, revised, 5th Edition. *ELBS*, 1989.
2. G. Svehla, Vogel's Textbook of Macro and Semimicro Qualitative Inorganic Analysis, revised, 5th Edition. *Longman*, 1979.
3. Marr and Rocket, Practical Inorganic Chemistry. *Van Nostrand Reinhold*, 1972.
4. Pass, G.; Sutcliffe Practical Inorganic Chemistry, 1st Edition.*Chapmann and Hall Ltd.*, 1968.
5. Jolly, W.L. Synthetic Inorganic Chemistry, 2nd Edition.*Prentice Hall, Inc.*, 1961.

Course No: CH-32	Course Name: Inorganic Chemistry Practical-VI				Course Code: SBS CH 010416 DSE 0063		
Batch: 2021 Onwards	**Programme:** M.Sc. Chemistry	**Semester:** **IV**	**L** 0	**T** 0	**P** 6	**Credit** 3	**Contact Hrs. per Week: 06** **Total Hrs.: 90**
Total Evaluation Marks: 75 **CIE:** **22.5** Marks **TEE:** **52.5** Marks	**Examination Duration:** 8 Hrs. **Pre-requisite of course:** Basic knowledge of ores, alloys and rare earth elements. Knowledge of qualitative and quantitative analysis.						
Course Objectives	*To train students to analyse ores and alloys and extract/separate rare earth elements. Also impart knowledge to analyse and estimate selected inorganic compounds.*						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1**: Knowledge of analysis of ores and alloys **CO2**: Practical analysis of samples of ores and alloys **CO3**: Analysis of selected inorganic complexes **CO4**: Knowledge of purification and structural elucidation **CO5**: Knowledge of rare earth samples **CO6**: Extraction and separation of rare earth from the given samples						

COURSE SYLLABUS

NOTE:
Three questions will be set, one from each of the UNIT. The candidates are required to attempt all the questions.

Unit No.	Contents	Contact Hrs.
I	**ANALYSIS OF ORES, ALLOYS BY QUALITATIVE AND QUANTITATIVE METHODS** Chemical methods for analysis of ores and alloys by qualitative and quantitative methods like gravimetric, radical analysis, titrimetric Ore Analysis (At least two of the following): • Determination of Silica and Manganese in pyrolusite • Determination of Copper and iron from chalcopyrite • Determination of iron from hematite Alloy Analysis (At least two of the following): • Determination of tin & lead from solder • Determination of iron & chromium from mild steel • Determination of copper and nickel from cupronickel	30
II	**ANALYSIS OF INORGANIC SUBSTANCES BY QUALITATIVE AND QUANTITATIVE METHODS** Preparation, purification and structural elucidation of some of the complexes from the following by available physicochemical and spectral methods: (i) $[Co(Py)_2Cl_2]$; (ii) $[Ni(NH_3)_6]Cl_2$; (iii) $Ni(dmg)_2$; (iv) $[Cu(NH_3)_4]SO_4.H_2O$; (v) Bis (cyclopentadienyl) iron (II); (vi) Ferrocene; (vii) Fe-Phenanthroline complex.	30
III	**DETERMINATION OF INDIVIDUAL CATIONS** Determination of aluminium, barium and bismuth by back titration. Determination of	30

	copper, iron(III) and nickel by direct titration.	

Suggested Readings:

1. G. Marr and B. W. Rockett, Practical Inorganic Chemistry.*Van Nostrand Reinhold*, 2019.
2. T.Dutta, K. H. Kim, M. Uchimiya, E. E. Kwon, B. H. Jeon, A. Deep and S. T. Yun, Global demand for rare earth resources and strategies for green mining. *Environ. Res.* 2016, 150, 182-190.
3. J. Derek Woolins, Inorganic Experiments. *Wiley VCH,* 2014.

ORGANIC CHEMISTRY COURSES

THEORY COURSES

Course No:	Course Name:				Course Code:		
CH-02	Organic Chemistry-I				SBS CH 010102 C 4004		
Batch:	**Programme:**	**Semester:**	**L**	**T**	**P**	**Credit**	**Contact Hrs. per Week: 04**
2021 Onwards	M.Sc. Chemistry	**I**	4	0	0	4	**Total Hrs.: 60**

Total Evaluation Marks: 100 **CIE:** 30 Marks **TEE:** 70 Marks	**Examination Duration:** 3 Hrs. **Pre-requisite of course**: Basic knowledge of chemical bonding, theories of bonding, stereochemistry, reaction mechanisms and reactive intermediates.
Course Objective	*To provide the basics in Organic Chemistry at the beginning of the semester. At the end of this course, students will gain the knowledge about the nature of bonding in organic molecules, delocalized chemical bonding, aromaticity, stereochemistry, such as conformation and configuration, RS and EZ notations and mechanistic aspects of aliphatic and aromatic nucleophilic substitution and electrophilic aromatic substitutions and elimination reactions.*
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1:** Advanced understanding of the concepts delocalisation, conjugation and aromaticity **CO2**: Advanced knowledge of supramolecular chemistry and non-covalent bonding **CO3**: Advanced knowledge of conformational analysis, dynamic stereochemistry and asymmetric synthesis **CO4**: In-depth understanding of all classes of nucleophilic substitution reactions **CO5**: Fundamental and advanced knowledge elimination reactions and its stereochemical aspects **CO6**: Detailed mechanistic knowledge of aromatic substitution reactions

COURSE SYLLABUS

NOTE:
i) Question no. 1 is compulsory and to be set from the entire syllabus. It will have seven sub-parts and students need to answer any four. Each part carries three and half marks.
ii) Question nos. 2 to 5 are to be set from all four units one from each. Every question will have three sub-parts and students need to answer any two sub-parts of each question. Each part carries seven marks.

Unit No.	Contents	Contact Hrs.
I	**NATURE OF BONDING IN ORGANIC MOLECULES** Delocalized chemical bonding-conjugation, cross conjugation, resonance, rules of resonance, effect on reactivity, hyperconjugation, tautomerism; Energy level of π–molecular orbitals, Aromaticity in benzenoid and non-benzenoid compounds, alternant and non-alternant hydrocarbons, Hückel's rule, annulenes, anti-aromaticity, homo-aromaticity; bonding in fullerenes. Fundamentals of Supramolecular Chemistry, Bonds weaker than covalent- addition compounds, crown ether complexes and cryptands, inclusion compounds, cyclodextrins, catenanes and rotaxanes.	15
II	**STEREOCHEMISTRY** ***Conformational analysis***: Simple alkanes, cycloalkanes, A values, decalins, conformational lock, ring strain, effect of conformation on reactivity.	15

	***Chirality*:** Basic principles, molecules with more than one chiral center, threo and erythroisomers, Optical activity in the absence of chiral carbon (biphenyls, allenes and spiranes); Stereochemistry of the compounds containing nitrogen, sulphur and phosphorus. Methods of resolution, optical purity, enantiotopic and diastereotopic atoms, groups and faces, stereospecific and stereoselective synthesis. Asymmetric synthesis: basic principles, chiral pool, auxiliary, substrate, reagent and catalyst controlled.	
III	**ALIPHATIC NUCLEOPHILIC SUBSTITUTION AND ELIMINATION REACTIONS** ***a) Aliphatic Nucleophilic Substitution Reactions:*** The S_N2, S_N1, mixed S_N1 and S_N2 and SET Mechanisms. The neighbouring group mechanism, neighbouring group participation by π and σ bonds. Classical and nonclassicalcarbocations, phenonium ions, norbornyl system, common carbocation rearrangements. The S_N^i mechanism. Nucleophilic substitution at an allylic, aliphatic trigonal and a vinylic carbon. Reactivity effects of substrate structure, attacking nucleophile, leaving group and reaction medium, phase transfer catalysis and ultrasound, ambident nucleophile, regioselectivity. ***b) Elimination Reactions:*** The E2, E1 and E1cB mechanisms. Orientation of the double bond. Reactivity – effects of substrate structures, attacking base, the leaving group and the medium.	15
IV	**AROMATIC SUBSTITUTION REACTIONS** ***a) Aromatic Electrophilic Substitution:*** The arenium ion mechanism, orientation and reactivity. The *ortho/para* ratio, *ipso* attack, orientation in other ring systems. Friedel-Crafts reaction, Diazonium coupling, Vilsmeir reaction, Gattermann-Koch reaction. ***b) Aromatic Nucleophilic Substitution:*** The S_N^{Ar}, diazonium salts and benzyne mechanisms. Reactivity–effect of substrate structure, leaving group and attacking nucleophile. The *von* Richter, Sommelet-Hauser and Smiles rearrangements.	15

Suggested Readings:

1. S. M. Mukherji and S. P. Singh, Reaction Mechanism in Organic Chemistry, Revised Edition. (Revised by S. P. Singh and Om Prakash). *TRINITY Press*, An Imprint of Laxmi Publications Pvt. Ltd., 2015.
2. R. N. Boyd, R. T. Morrison and S. K. Bhattcharjee, Organic Chemistry, 7thEdition. *Pearson*, 2014.
3. M. B. Smith, March's Advanced Organic Chemistry: Reactions, Mechanisms and Structure, 7thEdition. *Wiley*, 2013.
4. J. Clayden, N. Geeves and S. Warren, Organic Chemistry, *Oxford University Press*, 2012.
5. E. L. Eliel and S. H. Wilen, Stereochemistry of Organic Compounds, *Wiley India*, 2008.
6. F. A. Carey and R. J. Sundburg, Advanced Organic Chemistry PART A, *Springer* 2007.
7. P. Y. Bruice, Organic Chemistry, 7thEdition. *Pearson,* 2007.
8. D. Nasipuri, Stereochemistry of Organic Compounds, Second Edition. *New Age International*, 2005.
9. P. Sykes, A Guidebook to Mechanism in Organic Chemistry, *Longman*, 1985.

Course No: CH-08	Course Name: Organic Chemistry-II				Course Code: SBS CH 010208 C 4004		
Batch: 2021 Onwards	**Programme:** M.Sc. Chemistry	**Semester:** II	**L** 4	**T** 0	**P** 0	**Credits** 4	**Contact Hrs. per Week: 04** **Total Hrs.: 60**
Total Evaluation Marks: 100 **CIE:** 30 Marks **TEE:** 70 Marks		**Examination Duration:** **3 Hrs.** **Pre-requisite of course:** Basic knowledge about the structure and reactions of various alkenes and carbonyl compounds; formation, stability and reactions of free radicals; fundamentals of interaction of light with matter; basic knowledge of conjugation and molecular orbital diagrams.					

Course Objective	*To provide advance knowledge of organic chemistry reactions such as addition reactions, free radical, photochemistry and pericyclic reactions. At the end of this course, students will be trained in solving the problems related to addition reactions, free radical reactions, photochemistry and pericyclic reactions.*
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1**: In-depth understanding of electrophilic addition reaction of alkenes, alkynes and allenes **CO2**: Thorough knowledge of the addition, substitution and condensation reactions of carbonyl compounds **CO3**: Advanced knowledge of formation, stability and reactions of free radicals **CO4**: In-depth knowledge of various photochemical reactions in organic chemistry **CO5**: Ability to understand, explain and predict various aspects of pericyclic reactions such as electrocyclic reactions and cycloadditions. **CO6**: Theoretical treatments and applications of sigmatropic rearrangements and chelotropic reactions

COURSE SYLLABUS

NOTE:
i) Question no. 1 is compulsory and to be set from the entire syllabus. It will have seven sub-parts and students need to answer any four. Each part carries three and half marks.
ii) Question nos. 2 to 5 are to be set from all four units one from each. Every question will have three sub-parts and students need to answer any two sub-parts of each question. Each part carries seven marks.

Unit No.	Contents	Contact Hrs.
I	**ADDITION REACTIONS OF CARBON-CARBON AND CARBON-HETEROATOM MULTIPLE BONDS** ***a) Polar addition to Carbon-Carbon Multiple Bonds:*** Mechanistic and stereochemical aspects of following **electrophilic addition reactions**: hydrohalogenation, hydration, epoxidation, Woodward and Prevost dihydroxylations, halogenation, halocyclizations, oxymercuration, hydrogenation, hydroboration and carbene cyclopropanation. General aspects of addition reactions of alkynes and allenes. Addition of **nucleophiles** to alkenes, Michael reaction, nucleophilic epoxidation and cyclopropanation. ***b) Addition to Carbon-Heteroatom Multiple Bonds:*** Reactivity of various carbonyl compounds, Mechanistic and stereochemical aspects of	15

	following nucleophilic addition reactions to carbonyl compounds**:** hydration, acetalization, imine and enamine formation, Grignard, organozinc and organolithium reagents, Aldol, Knoevenagel, Claisen, Mannich, Benzoin, Perkin and Stobbe reactions, Addition of ylides (Wittig, Julia and Peterson reactions), hydride reductions of various carbonyl compounds. Hydrolysis of acetals, esters, amides and nitriles.	
II	**FREE RADICAL REACTIONS AND ORGANIC PHOTOCHEMISTRY** ***a) Free radicals:*** Generation of free radicals, structure and stability, persistent radicals, common initiators and uses (peroxides, UV light, AIBN-tin hydride), radical anions and cations (One electron redox reactions), radical chain reactions, radical scavengers, Types of free radical reactions: substitution (halogenation, Sandmeyer reaction), addition (to unsaturated systems, radical cyclization), fragmentation (Hunsdiecker reaction), intramolecular H-abstraction (Hofmann-Loeffler and Barton reactions), oxidation (auto-oxidation of aldehydes) and dimerization (Pinacol, McMurry, acyloin and Glaser reactions) ***b) Organic Photochemistry*****:** Fundamentals of organic photochemistry, Photochemical reactions of alkenes: photo-cycloaddition, Paterno-Buchi reaction, di-pi-methane rearrangement) Photochemical reactions of carbonyl compounds: Norrish type I and II reactions, di-pi methane and oxa-di-pi methane rearrangements. Basics of visible light photocatalysis.	15
III	**PERICYCLIC REACTIONS I- ELECTROCYCLIC AND CYCLOADDITION REACTIONS** Molecular orbital symmetry, Frontier orbitals of ethylene, 1,3-butadiene, 1,3,5-hexatriene, allyl and pentadienyl systems. Classification of pericyclic reactions. FMO approach. **Electrocyclic reactions**: conrotatory and disrotatory modes and effect on stereochemistry, 4n, 4n+2, allyl and pentadienyl systems, Nazarov cyclization. **Cycloaddition reactions:** antarafacial and suprafacial additions, 4n and 4n+2 systems, 2+2 addition of ketenes, Detailed treatment of Diels-Alder reactions (types of Diels-Alder reactions, common dienes and dienophiles, endo/exo selectivity, catalysis, synthetic applications, intramolecular and hetero Diels-Alder reactions), **1,3-dipolar cycloadditions**: structure, methods of preparation andsynthetic applications of nitrones, nitrile oxides and azides.	15
IV	**PERICYCLIC REACTIONS II- SIGMATROPIC, ENE AND CHELOTROPIC REACTIONS** **Sigmatropic rearrangements**: General considerations, suprafacial and antarafacial shifts of H and alkyl groups, 1,3, 1,5, 3,3 and 2,3-sigmatropic rearrangements. Valence tautomerism (divinylcyclopropane and bullvalene), Detailed treatment of Claisen (Eschenmoser, Johnson, Ireland and aromatic variants), Cope (oxy-Cope and anionic oxy-Cope) rearrangements. Wittig, aza-Wittig and Sommelet-Hauser rearrangements, concerted syn-eliminations. **Ene reactions**: General features, carbonyl and oxy-ene reactions, intramolecular ene reactions. **Chelotropic eliminations**: Definition, examples involving nitrogen, sulfur dioxide and carbon monoxide extrusions.	15

Suggested Readings:

1. S. Kumar, V. Kumar and S. P. Singh, Pericyclic Reactions, A Mechanistic and Problem-Solving Approach, Ist Edition. *Elsevier*, 2015.
2. S. M. Mukherji and S. P. Singh, Reaction Mechanism in Organic Chemistry, Revised Edition. (Revised by S. P. Singh and Om Prakash). *TRINITY Press*, An Imprint of Laxmi Publications Pvt. Ltd., 2015.
3. Michael B. Smith, March's Advanced Organic Chemistry: Reactions, Mechanisms, and Structure, 7th Edition. *Wiley*, 2013.
4. J. Clayden, N. Geeves and S. Warren, Organic Chemistry, *Oxford University Press*, 2012.
5. Morrison, Boyd and Bhattacharjee, Organic Chemistry, 7thEdition. *Pearson*, 2010.
6. F. A. Carey and R. J. Sundburg, Advanced Organic Chemistry PART A and PART B, *Springer* 2007.
7. S. Sankararaman, Pericyclic reactions-A Textbook, 1st Edition. *Wiley-VCH, Weinheim*, 2005.
8. R. Bruckner, Advanced Organic Chemistry: Reaction Mechanism, *Harcourt (India) Pvt. Ltd*., 2001.
9. P. Sykes, A Guidebook to Mechanism in Organic Chemistry, *Longman*, 1985.

Course No: CH-14	Course Name: Research Methodology and Software Applications				Course Code: SBS CH 010314 C 2002		
Batch: 2021 Onwards	**Programme:** M.Sc. Chemistry	**Semester:** III	**L** 2	**T** 0	**P** 0	**Credit** 2	**Contact Hrs. per Week: 02** **Total Hrs.: 30**
Total Evaluation Marks: 50 **CIE:** 15 Marks **TEE:** 35 Marks		**Examination Duration:** 2 Hrs. **Pre-requisite of course:** Basic knowledge of various methods used in research, literature review skills, finding and drafting research problems and various software used to conduct research smoothly.					
Course Objective	*Guiding philosophy of knowledge creation and dissemination will be discussed in this course. Features of various approaches to research, data collection, analysis and inference will be taught. Principles of formulating research problems, designing experiments and documentation will form a major part of the course. Specific objectives and techniques of chemical sciences research will also be presented.*						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1**: Basic understanding of various types of methodologies used during research. **CO2**: Basic idea of literature review and defining problems **CO3**: Basic knowledge of working hypothesis. **CO4**: Basic knowledge of various software used during research **CO5**: Skills for writing a research report **CO6**: Basic knowledge for writing dissertation						

COURSE SYLLABUS

NOTE:

i) Question no. 1 is compulsory and to be set from the entire syllabus. It will have four sub-parts and students need to answer any two. Each part carries three and half marks.

ii) Question nos. 2 to 5 are to be set from all four units one from each. Every question will have three sub-parts and students need to answer any two sub-parts of each question. Each part carries three and half marks.

Unit No.	Contents	Contact Hrs.
I	**METHODS AND TYPES OF RESEARCH** Research methods vs Methodology. Types of research, Descriptive vs. Analytical, Applied vs. Fundamental, Quantitative vs. Qualitative, Conceptual vs. Empirical. Research proposals- design and components.	7
II	**LITERATURE REVIEW** Importance of literature review in defining a problem, Primary and secondary sources, reviews, treatise, monographs-patents, Defining and formulating the research problem, Selecting the Problems, Development of working hypothesis.	8

III	**SCIENTIFIC SOFTWARES IN RESEARCH DESIGN** Data Analysis using Tools like MS Excel, ChemDraw and MATLAB, google scholar, chemspider, scifinder, scopus, reaxys, research gate; using advanced search techniques, web resources, e-journals, e-books, journal access, subscribing TOC alerts, hot articles, citation index, h-index and i-index, Impact factor	7
IV	**REPORTING, DOCUMENTATION AND PRESENTATION** Scientific Document; Organization and writing of research papers, short communications, review articles, monographs, peer reviewing, ethics in publishing, predatory journals and publishers, technical and survey reports, authored book and edited books and dissertation.	8

Suggested Readings:

1. A. Fink, Conducting Research Literature Reviews: From the Internet to Paper, *Sage Publications*, 2009.
2. M. Graziano, A.M. Anthony and M. L. Raulin, Research Methods: A Process of Inquiry, *Allyn and Bacon*., 2009.
3. W. M. K. Trochim, Research Methods: the concise knowledge base, *Atomic Dog Publishing*, 2005.
4. P. D. Leedy and J. E. Ormrod, Practical Research: Planning and Design, *Prentice Hall*, 2004.
5. B. L. Garg, R. Karadia, F. Agarwal and U. K. Agarwal, An introduction to Research Methodology, *RBSA Publishers*, 2002.
6. R. A. Day, How to Write and Publish a Scientific Paper, *Cambridge University Press*, 1992.
7. C. R. Kothari, Research Methodology: Methods and Techniques, *New Age International*, 1990.
8. S. M. Coley and C. A. Scheinberg, Proposal Writing, *Sage Publications*, 1990.

Course No: CH-21	Course Name: Organic Chemistry-III (Heterocycles and Natural Products)				Course Code: SBS CH 010305 DSE 4004		
Batch: 2021 Onwards	**Programme:** M.Sc. Chemistry	**Semester:** **III**	**L** 4	**T** 0	**P** 0	**Credit** 4	**Contact Hrs. per Week: 04** **Total Hrs.: 60**
Total Evaluation Marks: 100 **CIE:** 30 Marks **TEE:** 70 Marks		**Examination Duration:** 3 Hrs.					
		Pre-requisite of course: Basic and advanced knowledge of the chemistry of heterocycles and natural products.					
Course Objective	*This paper will provide a basic and advanced knowledge of the chemistry of heterocyclic and natural products including heterocycle reactivity, synthesis and chemical reactions of small to large member heterocycles and their importance in the field of medicine, natural product isolation and its structure determination, synthesis and biosynthesis and its uses during the drug discovery and development process.*						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1**: Basic and advance knowledge of understanding heterocylic chemistry: the synthesis, chemical transformation and reaction mechanism **CO2**: Basic and advance knowledge about different class of natural products **CO3**: Skills for analyzing and developing new sustainable methods **CO4**: Skills for developing industrially important methods **CO5**: Development of alternate and new eco-friendly synthetic pathways to chemicals **CO6**: Application and importance in drug discovery and development process.						

COURSE SYLLABUS

NOTE:
i) Question no. 1 is compulsory and to be set from the entire syllabus. It will have seven sub-parts and students need to answer any four. Each part carries three and half marks.
ii) Question nos. 2 to 5 are to be set from all four units one from each. Every question will have three sub-parts and students need to answer any two sub-parts of each question. Each part carries seven marks.

Unit No.	Contents	Contact Hrs.
I	**INTRODUCTION AND CHEMISTRY OF SMALL RING HETEROCYCLES** Introduction, nomenclature, spectral characteristics, reactivity of heterocyclic compounds. Synthesis and reactions of three, four and five membered heterocycles (aziridines, oxiranes, thiiranes, azetidines, oxetanes and thietanes, pyrrore, thiophene and furan).	15
II	**CHEMISTRY OF SIX MEMBERED AND BENZOFUSED HETEROCYCLES** Synthesis and reactions of six membered heterocycles, pyridine, pyrylium salts, pyridinium&thiopyrirylium salts. Chemistry of bicyclic compounds containing one or more heteroatom. Benzofused five and six membered rings: synthesis and reactions of indoles, benzofuran, benzothiophene, quinlolin, Isoquinoline, quinolones, isoquinolines, benzotriazoles, quinolinizium and benzopyrylium salts.	15

III	**CHEMISTRY OF NATURAL PRODUCTS: TERPENOIDS, CAROTENOIDS AND STEROIDS** ***Terpenoids and Carotenoids***: Classification, nomenclature, occurrence, isolation, general methods of structure determination, isoprene rule. Stereochemistry, Synthesis (chemical/biosynthesis) of the following representative molecules: Citral, α-Terpeneol, Farnesol, Santonin, Phytol and β-carotene. ***Steroids***: Occurrence, nomenclature, basic skeleton, Diel's hydrocarbon and stereochemistry. Isolation and biosynthesis of Cholesterol. Synthesis of Testorosterone, Progesterone, Oestrone.	15
IV	**CHEMISTRY OF NATURAL PRODUCTS: ALKANOIDS AND FLAFONOIDS** ***Alkaloids***: Definition, nomenclature, occurrence, isolation, general methods of structure elucidation, classification based on nitrogen heterocyclic ring. Stereochemistry, synthesis and biosynthesis of the following: Ephedrine, Nicotine, Atropine and Quinine. ***Flavonoids***: Introduction, isolation and purification of flavonoids, General methods of structural determination of flavonoids, Biosynthesis of flavonols and related polyphenols.	15

Suggested Readings:

1. J. Clayden, B. Greeves and S. Warren, Organic Chemistry, Second Edition, *Oxford University Press*, 2012.
2. B. A. Bohm, Introduction to Flavonoids, *Harwood Academic Publishers*, 2011.
3. I. L. Finar, Organic Chemistry, Vol. 2*, ELBS*., 2009
4. Atta-ur-Rahman and Choudhary, Chemistry, *Harwood Academic Publishers*, 2008.
5. E. S. Coffey, Rodd's Chemistry of Carbon Compounds, *Elsevier*, 2005
6. J. A. Joule, Heterocyclic Chemistry, *ELBS*, 2005
7. Mann, Davidson, Hobbs, Banthrope and Harborne, Natural products: Chemistry and Biological Significance, *Longman*, Essex., 2004.
8. T. Eicher and S. Hauptmann, The Chemistry of Heterocycles, *Thieme*, 2002.
9. G. R. Newkome and W. W. Paudler, Contemporary Heterocyclic Chemistry, *Wiley-Interscience*, 1995.
10. T. L. Gilchrist, Heterocyclic Chemistry*, Longman Scientific Technical*, 1990.
11. R. M. Acheson, An Introduction to Heterocyclic Chemistry, *John Wiley*, 1980
12. A. R. Katritzky and C. W. Rees, Comprehensive Heterocyclic Chemistry, *Pergamon Press*, 1970.

Course No: CH-22	Course Name: Organic Chemistry-IV (Reagents and Reactions)				Course Code: SBS CH 010306 DSE 4004		
Batch: 2021 Onwards	**Programme:** M.Sc. Chemistry	**Semester:** III	**L** 4	**T** 0	**P** 0	**Credit** 4	**Contact Hrs. per Week: 04** **Total Hrs.: 60**
Total Evaluation Marks: 100 **CIE:** 30 Marks **TEE:** 70 Marks		**Examination Duration:** 3 Hrs. Pre-requisite of course: Basic knowledge of the classical reagents and reactions used commonly in organic synthesis					
Course Objective	*To provide the advanced knowledge of organic synthesis in general and classical and modern reagents and methods in synthesis in particular. In-depth knowledge of metal-mediated reactions and common metal-based reagents, oxidation-reduction reactions and reagents and rearrangement reactions will be gained. At the end of the course students are expected to predict reagents and conditions needed for specific conversions.*						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1**: Advanced knowledge of modern methods of manipulations of carbonyl compounds, theoretical explanations of and reactivity including stereochemistry **CO2**: In-depth understanding of the use of various transition metal-based catalysts in coupling reactions **CO3**: Modern, classical and green methods of oxidation of various functional groups **CO4**: Common reduction methods in organic synthesis **CO5**: Environmentally friendly and stereoselective modern processes in organic synthesis **CO6**: Thorough understanding of various rearrangement reactions and their applications in synthesis						

COURSE SYLLABUS

NOTE:
i) Question no. 1 is compulsory and to be set from the entire syllabus. It will have seven sub-parts and students need to answer any four. Each part carries three and half marks.
ii) Question nos. 2 to 5 are to be set from all four units one from each. Every question will have three sub-parts and students need to answer any two sub-parts of each question. Each part carries seven marks.

Unit No.	Contents	Contact Hrs.
I	**USE OF METALS IN ORGANIC SYNTHESIS** Selective enolate generation using LDA, LHMDS, KHMDS; Modern aldol reactions (lithium, boron, and titanium enolates), Zimmerman-Traxler TS; McMurry and Tebbe olefinations; Gilman cuprates, Samarium Iodide, Palladium mediated reactions: Wacker process, Heck reaction, Stille coupling, Suzuki coupling, Negishi coupling, Sonagashira reaction and Buchwald-Hartwig amination.	15
II	**OXIDATION REACTIONS** Common oxidizing agents (transition metal oxidant, sulphur based, peroxide and peracid,	15

	modern catalytic oxidations using TEMPO) for oxidation of alcohols, ketones and aldehydes; Oxidation of C-C bonds [ozone, $KMnO_4$, $Pb(OAc)_4$, dimethyldioxirane, Ce(IV) andMn(III)] and saturated carbons, hypervalent iodine reagents, DDQ, Major methods for asymmetric epoxidations and dihydroxylations.	
III	**REDUCTION REACTIONS** Common reducing agents such as dissolving metal reductions (Birch reduction), various Aluminum and Boron derived hydrides, catalytic/transfer hydrogenations (Homogeneous and Heterogeneous), diimide, Bu_3SnH, low valent Ti species, and Wolf-Kishner reduction. Asymmetric reduction using Corey's oxazaborolidine (CBS catalyst) and Noyori's hydrogenation.	15
IV	**REARRANGEMENT REACTIONS** General mechanistic considerations, nature of migration, migratory aptitude and mechanistic study of the following rearrangements: Pinacol-pinacolone, Wagner-Meerwin, Benzil-Benzilic acid, Favorskii, Arndt-Ester synthesis, Demyanov, Beckmann, Hofmann, Curtius, Schmidt, Baeyer-Villiger, Shapiro reaction, Dienone-Phenol, Pummerer, Smiles, Sommelet-Hauser and Achmatowicz rearrangements.	15

Suggested Readings:

1. S. M. Mukherji and S. P. Singh, Reaction Mechanism in Organic Chemistry, Revised Edition. (Revised by S. P. Singh and Om Prakash). *TRINITY Press, An Imprint of Laxmi Publications Pvt. Ltd*., 2015.
2. F. A. Carey and R. J. Sundberg, Advanced Organic Chemistry, Part A and Part B: Reaction and Synthesis, 5thEdition. *Springer Verlag*, 2012.
3. V. K. Ahluwalia, Oxidation in Organic Synthesis, *CRC press*, 2012.
4. J. H. Hartwig, Organotransition Metal Chemistry: From Bonding to Catalysis, 1stEdition. *University Science Books*, 2009.
5. L. Kurti and B. Czako, Strategic Applications of Name Reactions in Organic Synthesis, *Elsevier Academic Press* , 2005.
6. R. H. Crabtree, The Organometallic chemistry of the transition metals, *John Wiley*, 2005.
7. W. Carruthers and Iain Coldham, Modern Methods of Organic Chemistry, 4thEdition. *Cambridge University Press,* 2004.
8. Warren, S.; Greeves, N.; J. Clayden and P. Wothers, Organic Chemistry, 2ndEdition. *Oxford University Press*, 2001.
9. Michael B. Smith, March's Advanced Organic Chemistry: Reactions, Mechanisms, and Structure, 7thEdition. *Wiley*, 2013.
10. S. Warren, Organic Synthesis, *Wiley*, 1982.
11. H. O. House, W. A. Benjamin, Modern Organic Synthesis, Inc., New York, 1965.

Course No: CH-15	Course Name: Applications of Spectroscopy				Course Code: SBS CH 010415 C 4004		
Batch: 2021 Onwards	**Programme:** M.Sc. Chemistry	**Semester:** IV	**L** 4	**T** 0	**P** 0	**Credit** 4	**Contact Hrs. per Week: 04** **Total Hrs.: 60**
Total Evaluation Marks: 100 **CIE:** 30 Marks **TEE:** 70 Marks		**Examination Duration:** 3 Hrs. **Pre-requisite of course**: An advanced knowledge of common and important reactions and reagents used in functional group transformations in organic synthesis. An ability to analyse complex chemical structures and find out key structural features.					
Course Objective	*To provide the advance knowledge and understanding of organic spectroscopy. At the end of this course, students will acquire both the theoretical and application aspect of various spectroscopic techniques (UV-Visible, IR, NMR spectroscopy and mass spectrometry) to the solve problems related to structure determination of organic compounds.*						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1**: An uptodate knowledge of modern reagents used in synthesis for FGIs and macrocycle formation **CO2**: Understanding of modern trends in synthesis such as multicomponent reactions, click chemistry, CH activation and organocatalysis **CO3**: Development of ability to consider and analyze the sustainability, economics, safety and toxicity aspects of organic synthesis **CO4**: Ability to analyse complex molecular structures to identify key structural features and devise ways of constructing them **CO5**: Understanding of strategies and tactics of organic synthesis such as protection, deprotection, umpolung, order of events etc. CO6: Ability to read and independently understand modern synthetic endeavours and appreciate various aspects such as efficiency and aesthetics of design. Ability to design synthetic routes						

COURSE SYLLABUS

NOTE:

i) Question no. 1 is compulsory and to be set from the entire syllabus. It will have seven sub-parts and students need to answer any four. Each part carries three and half marks.

ii) Question nos. 2 to 5 are to be set from all four units one from each. Every question will have three sub-parts and students need to answer any two sub-parts of each question. Each part carries seven marks.

Unit No.	Contents	Contact Hrs.
I	**ULTRAVIOLET AND VISIBLE SPECTROSCOPY AND MASS SPECTROMETRY** ***UV-Visible spectroscopy****:* Various electronic transitions, Beer-Lambert law, visible spectrum &colour, effect of solvent on electronic transitions, ultraviolet bands for carbonyl compounds, unsaturated carbonyl compounds, dienes, conjugatedpolyenes. Fieser-Woodward rules for conjugated dienes and carbonyl compounds, ultraviolet spectra of aromatic and heterocyclic compounds. ***Mass spectrometry****:* Introduction, ion production–EI, CI, FD and FAB, factors affecting fragmentation, ion analysis, ion abundance. Mass spectral fragmentation of organic	15

	compounds, common functional groups, molecular ion peak, metastable peak, McLafferty rearrangement. Nitrogen rule. High resolution mass spectrometry (HRMS).	
II	**INFRARED SPECTROSCOPY** Instrumentation and sample handling. Characteristic vibrational frequencies of alkanes, alkenes, alkynes, aromatic compounds, alcohols, ethers, phenols and amines. Detailed study of vibrational frequencies of carbonyl compounds (ketones, aldehydes, esters, amides, acids, anhydrides, lactones, lactams and conjugated carbonyl compounds). Effect of hydrogen bonding and solvent effect on vibrational frequencies, overtones, combination bands and Fermi resonance	15
III	**NUCLEAR MAGNETIC RESONANCE SPECTROSCOPY** General introduction and definition, theory of NMR, chemical shift, shielding and deshielding mechanism, magnetic anisotropy, chemical shift values and correlation for protons bonded to carbon (aliphatic, olefinic, aldehydic and aromatic) and other nuclei (alcohols, phenols, enols, carboxylic acids, amines, amides & mercapto), spin-spin interaction, Spin systems, Pople notation, complex spin-spin interaction between two, three and four nuclei (first order spectra), virtual coupling. chemical exchange, effect of deuteration, Stereochemistry, hindered rotation, Karplus curve-variation of coupling constant with dihedral angle. Simplification of complex spectra, nuclear magnetic double resonance, contact shift reagents. Fourier transform technique, nuclear Overhauser effect (nOe), COSY.	15
iV	**CARBON-13 NMR SPECTROSCOPY AND COMBINED APPLICATIONS** ***Carbon-13 NMR Spectroscopy*:** General considerations, chemical shift (aliphatic, olefinic, alkyne, aromatic, heteroarmatic and carbonyl carbon), coupling constants and DEPT ^{13}C NMR spectra. General introduction to two-dimensional NMR spectroscopy- HETCOR and NOESY. Resonance of other nuclei-F, P. ***Combined problems*:** Combined problems relating to structure elucidation by UV, IR, NMR Spectroscopy and Mass Spectrometry.	15

Suggested Readings:

1. D. L. Pavia, G. M. Lampman, G. S. Kriz and J. R. Vyvyan, Introduction to Spectroscopy, 5thEdition. *Cengage India*, 2015.
2. R. Kakkar, Atomic and Molecule Spectroscopy: Basic Concepts and Applications, *Cambridge University Press,* 2015.
3. W. Kemp, Organic Spectroscopy, 3rdEdition. *Mac publishers*, 2011.
4. D. H. Williams, I. Fleming, Spectroscopic Methods in Organic Chemistry, *Tata McGraw-Hill*, 2010.
5. J. R. Dyer, Application of Spectroscopy of Organic Compounds, *Prentice Hall*, 2009.
6. R. J. Abraham, J. Fisher and P. Loftus, Introduction to NMR Spectroscopy, *Wiley*, 2005.
7. J. Mohan, Organic Spectroscopy, *Narosa Publishers*, New Delhi, 2002.
8. R. M. Silverstein, G. C. Bassler and T. C. Morrill, Spectrometric Identification of Organic Compounds, *John Wiley*, 1995.
9. C. N. Banwell and E. M. McCash; Fundamentals of Molecular Spectroscopy, 4thEdition, *Tata McGraw Hill*, 1994.

Course No:	Course Name:				Course Code:		
CH-33	Organic Chemistry-V (Organic Synthesis)				SBS CH 010417 DSE 4004		
Batch:	**Programme:**	**Semester:**	**L**	**T**	**P**	**Credit**	**Contact Hrs. per Week: 04**
2021 Onwards	M.Sc. Chemistry	IV	4	0	0	4	**Total Hrs.: 60**

Total Evaluation Marks: 100 **CIE:** 30 Marks **TEE:** 70 Marks	**Examination Duration:** 3 Hrs. **Pre-requisite of course**: An advanced knowledge of common and important reactions and reagents used in functional group transformations in organic synthesis. An ability to analyse complex chemical structures and find out key structural features.
Course Objective	*To gain an in-depth understanding of various functional group transformations, classical and modern techniques in synthetic chemistry, synthetic planning and targeted synthesis of complex molecules. Detailed information and analysis of common synthetic techniques and methods will be gained. Using this knowledge, exercises on the planning of synthesis of complex scaffolds and targets will be carried out. Breakdown of complex molecules into simple building blocks for synthesis will be learned. A few case studies of total synthesis to understand the actual application of synthetic methods in real life problem solving will also be learned. Students are expected to design retrosynthesis and forward synthesis of complex targets at the end of the course.*
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1**: An uptodate knowledge of modern reagents used in synthesis for FGIs and macrocycle formation **CO2**: Understanding of modern trends in synthesis such as multicomponent reactions, click chemistry, CH activation and organocatalysis **CO3**: Development of ability to consider and analyze the sustainability, economics, safety and toxicity aspects of organic synthesis **CO4**: Ability to analyse complex molecular structures to identify key structural features and devise ways of constructing them **CO5**: Understanding of strategies and tactics of organic synthesis such as protection, deprotection, umpolung, order of events etc. **CO6**: Ability to read and independently understand modern synthetic endeavours and appreciate various aspects such as efficiency and aesthetics of design. Ability to design synthetic routes

COURSE SYLLABUS

NOTE:
i) Question no. 1 is compulsory and to be set from the entire syllabus. It will have seven sub-parts and students need to answer any four. Each part carries three and half marks.
ii) Question nos. 2 to 5 are to be set from all four units one from each. Every question will have three sub-parts and students need to answer any two sub-parts of each question. Each part carries seven marks.

Unit No.	Contents	Contact Hrs.
I	**FUNCTIONAL GROUP TRANSFORMATIONS USING MISCELLANEOUS REAGENTS AND REACTIONS** Amide coupling reagents (DCC, DIC, EDC, BOP, HOBt), macrolactonization, Mukiyama reagent; Mitsunobu reaction; Silyl and stannyl hydrides, Burgess reagent, Lawesson's	15

	reagent, CH_2N_2, $TMSCHN_2$, Finkelstein reaction, Eschenmoser-Tanabe, Ohira-Bestmann reagent.	
II	**CLASSICAL AND MODERN METHODS IN SYNTHESIS** Illustration of the following concepts with examples; Multicomponent reactions (Strecker, Mannich, Biginelli, Passerini and Ugi reactions), click chemistry, cascade and domino processes for multiple C-C bond forming reactions (radical cyclisations, electrocyclic cascades, polyenecyclizations), CH-activation and remote functionalisation, asymmetric organocatalysis (proline, NHCs), biocatalysis, Reusable reagents, biomimetic synthesis	15
III	**RETROSYNTHESIS AND DISCONNECTION APPROACH** Concept of retrosynthesis, disconnection approach, introduction to synthons and synthetic equivalents, linear and convergent synthesis, types of transforms, functional group inter-conversions, classification of disconnections, chemoselectivity, control of stereochemistry, reversal of polarity (umploung), common building blocks, the importance of the order of events in organic synthesis, applications of alkynes, aliphatic nitro compounds, bifunctional compounds, Protecting groups, representative examples for O, N, COOH and carbonyl protection/deprotections.	15
iV	**CASE STUDIES-TOTAL SYNTHESIS** Total synthesis, Semi synthesis, formal synthesis, overall yield, concept of ideal synthesis, Detailed case study of the following classical/modern total syntheses: Periplanone B (W. C. Still), Estrone (K. P. C. Vollhardt), Quinine (G. Stork).	15

Suggested Readings:

1. S. Caron, Practical Synthetic Organic Chemistry: reactions, Principles and Technique, 2nd Edition. *Wiley*, 2020.
2. S. Warren, Designing Organic Synthesis, *Wiley*, 2011.
3. F. A. Carey and R. J. Sandburg, Advanced Organic Chemistry Part B, *Plenum Press*, 2009.
4. T. Hudlický and J. W. Reed, The Way of Synthesis, *Wiley VCH-Weinheim* 2007.
5. G. S. Zweifel and M. H. Nantz, Modern Organic Synthesis- An Introduction, *W. H. Freeman & Co*., 2007.
6. J. March, Advanced Organic Chemistry, Reactions Mechanisms and Structure, *John Wiley*, 2005.
7. R. O. C. Norman and J. M. Coxon, Principles of Organic Synthesis, *Blackie Academic & Professional*, 2002.
8. K. C. Nicolaou and E. J. Sorensen, Classics in Total Synthesis, *Wiley VCH-Weinheim*, 1996.
9. W. Carruthers, Some Modern Methods of Organic Synthesis, *Foundation Books*, 1995.
10. Fieser and Fieser, Reagents in Organic Synthesis, *Wiley*, 1993.
11. H. O. House, W.A. Benjamin, Modern Synthetic Reactions, 1990.

Course No: CH-34	Course Name: Organic Chemistry-VI (Medicinal Chemistry)				Course Code: SBS CH 010418 DSE 4004		
Batch: 2021 Onwards	**Programme:** M.Sc. Chemistry	**Semester:** IV	**L** 4	**T** 0	**P** 0	**Credit** 4	**Contact Hrs. per Week: 04** **Total Hrs.: 60**
Total Evaluation Marks: 100 **CIE:** 30 Marks **TEE:** 70 Marks		**Examination Duration:** 3 Hrs. **Pre-requisite of course**: Basic understanding of non-covalent interactions, biomolecules and biochemical processes					
Course Objective	*This course will provide a basic understanding and fundamentals of Medicinal Chemistry. At the end of this course, students will learn about the various stages involved in drug discovery & development process and challenges encounter during the course of development of new drug which finally comes into the market, various biological drug targets, drug-target binding, mode of actions of anticancer, antibiotics, psychoactive drugs and its chemical synthesis.*						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1**: An appreciation of the history of medicinal chemistry, understanding of basic biochemical functioning of living organisms, structural and functional details of bio-macromolecules such as proteins, nucleic acids and lipids **CO2**: Advanced knowledge about structure and functions of enzymes, receptors, DNA and RNA **CO3**: Methods of inhibition of enzymes, importance of enzyme inhibition in drug development, receptors as drug targets, signal transduction, receptor theory and DNA active drugs **CO4**: Basic concepts such as hit, lead and structure activity relationships in drug developments; theories of drug activity; importance of physical properties of drugs **CO5**: Strategies and tactics of development of various anticancer agents. Examples with synthesis. **CO6**: Approaches for the development of antibiotics, their classification, synthesis, development of drugs acting on CNS						

COURSE SYLLABUS

NOTE:
i) Question no. 1 is compulsory and to be set from the entire syllabus. It will have seven sub-parts and students need to answer any four. Each part carries three and half marks.
ii) Question nos. 2 to 5 are to be set from all four units one from each. Every question will have three sub-parts and students need to answer any two sub-parts of each question. Each part carries seven marks.

Unit No.	Contents	Contact Hrs.
I	**DRUG TARGETS** Introduction to medicinal chemistry, intermolecular binding forces, Introduction to various drug targets; Proteins- primary, secondary and tertiary structure, protein function, proteomics; Enzymes- catalytic role, active site, allosteric binding, feedback control, binding interactions, isozymes, co-factors; Receptors- types of receptors, their roles, neurotransmitters, hormones, receptor activation and regulation; Nucleic acids- DNA, primary and secondary structure of DNA, function of DNA.	15
II	**DRUG-TARGET BINDING** Introduction to Pharmacodynamics and pharmacokinetics, Enzymes as drug targets- types of enzyme inhibitors, medicinal use of enzyme inhibitors with examples; Receptors as drug	15

	targets- agonists, antagonists, allosteric modulators, partial agonists, inverse agonists, desensitization, tolerance and dependence, affinity and efficacy; Nucleic acids as drug targets- Intercalating agents, topoisomerase poisons, alkylating/metallating agents, chain cutters, chain terminators, examples of medicinal use. Miscellaneous drug targets (tubulin)	
III	**DRUG DESIGN AND DEVELOPMENT** Development of new drugs, concept of lead compounds and lead modifications, structure-activity relationship (SAR), factors affecting bioactivity, resonance, inductive effect, isosterism, bioisosterism. Theories of drug activity, Quantitative structure activity relationship, Concepts of drugs receptor, Elementary treatment of drug receptor interactions, Physico-chemical parameters: lipophilicity, partition coefficient, electronic ionization constants, steric factors.	15
IV	**MODE OF ACTION AND SYNTHESIS** Anticancer Agents: Introductory Idea of antineoplastic agents, cancer chemotherapy, common targets in cancer chemotherapy, role of alkylating agents and antimetabolites in treatment of cancer. Antiinfective Drugs (antibiotics): Cell wall biosynthesis, inhibitors, β-lactam rings, antibiotics inhibiting protein synthesis, Synthesis of penicillin G, amoxicillin, Introductory idea of tetracycline and streptomycin. Psychoactive Drugs: Introductory idea of CNS depressants, general anaesthetics, hypnotics, sedatives, anti-anxiety drugs. Anti-fertility Drugs: Introductory idea of anti-fertility drugs and mode of action.	15

Suggested Readings:

1. R. B. Silverman, The Organic Chemistry of Drug Design and Drug Action, 3rd Edition. *Academic Press*, 2014.
2. G. L. Patrick, An Introduction to Medicinal Chemistry, 5th Edition. *Oxford University Press*, 2013.
3. D. Van Vranken and G. Weiss, Introduction to Bioorganic Chemistry and Chemical Biology, *Garland Science*, 2013.
4. D. Sriram and P. Yogeshwari, Medicinal Chemistry, 2nd Edition. Pearson, 2012.
5. Ed Robert F Dorge, Wilson and *Gisvold's TextBook* of Organic Medicinal and Pharmaceutical Chemistry, 12th Edition. 2010.
6. Ed. M E Wolff, Burger's Medicinal Chemistry and Drug Discovery, Vol. 1, 7th Edition. *John Wiley,* 2010
7. G. Thomas, Medicinal Chemistry, 2nd Edition, *John Wiley & Sons*, 2007.
8. S. Warren, N. Greeves, J. Clayden and P. Wothers, Organic Chemistry, 2nd Edition. *Oxford University Press*, 2001.
9. S. S. Pandeya and J. R. Dimmock, An Introduction to Drug Design, 1st Edition. *New Age International*, 1999.

PRACTICAL COURSES

Course No:	Course Name:				Course Code:		
CH-05	Organic Chemistry Practical-I				SBS CH 010105 C 0042		
Batch:	**Programme:**	**Semester:**	**L**	**T**	**P**	**Credit**	**Contact Hrs. per Week: 04**
2021 Onwards	M.Sc. Chemistry	**I**	0	0	4	2	**Total Hours: 60**

Total Evaluation Marks: 50 **CIE:** 15 Marks **TEE:** 35 Marks	**Examination Duration: 6 Hrs.** **Pre-requisite of course:** Basic idea of chemical laboratory safety and good practices; basic skills such as weighing, measuring, titrating, cleaning etc.
Course Objective	*To acquire experimental skills important for various separation and purification techniques, functional group identification and drying of organic solvents. At the end of this course, students will learn the various purification methods, chromatographic separation and identification of organic compounds, solvent drying and functional group detection in organic compounds. Students would be familiarized with quantitative analysis of organic compounds to estimate the percentage of given functional groups.*
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1:** Safe laboratory conduct and good practices **CO2:** Purification techniques for solids such as crystallisation, sublimation and chromatography **CO3:** Purification techniques for liquids such as distillation and chromatography **CO4:** Qualitative analysis of unknown samples to determine the functional groups **CO5:** Tests to determine the various elements present in an organic compound **CO6:** Quantitative analysis of compounds to estimate the percentage of functional groups

COURSE SYLLABUS

NOTE:
Two questions will be set, one from each of the UNIT. The candidates are required to attempt all the questions.

Unit No.	Contents	Contact Hrs.
I	**ISOLATION AND PURIFICATION TECHNIQUES** Laboratory Safety Crystallization, recrystallization and sublimation Distillation: Simple, Steam and Vacuum Solvent Extraction Drying of ethanol/ acetone/ diethylether/THF Paper Chromatography Thin Layer Chromatography	30
II	**ANALYSIS OF ORGANIC COMPOUNDS** QUALITATIVE ANALYSIS: Chemical Tests: Chemistry and Applications Extra elements detection (N, S, X = Cl, Br, I) Functional group detection (in mono functional compounds) QUANTITATIVE ANALYSIS:	30

	Estimation of alcoholic/phenolic/amino groups in the given organic compound	

Suggested Readings:

1. K. L. Williamson and K. M., Masters Macroscale and Microscale Organic Experiments, 7th Edition. *Cengage Learning*, 2017.
2. R. K. Bansal, Laboratory Manual in Organic Chemistry, *Wiley*, 2006.
3. B. S. Furniss and others, Vogel's Text Book of Practical Organic Chemistry, 5e Paperback, *Pearson*, 2003.
4. D. Pasto, C. Johnson and M. Miller, Experiments and Techniques in Organic Chemistry, *Prentice Hall*, Instructor's Edition, 1992.
5. H. T. Clarke revised by B. Haynee, A Hand book of Organic Analysis-Qualitative and Quantitative, *Edward Arnold, London*, 1975.
6. H. Middleton, Systematic Qualitative Organic Analysis, *Edward Arnold, London*, 1959.

Course No: CH-11	Course Name: Organic Chemistry Practical-II				Course Code: SBS CH 010211 C 0042		
Batch: 2021 Onwards	**Programme:** M.Sc. Chemistry	**Semester:** II	**L** 0	**T** 0	**P** 4	**Credit** 2	**Contact Hrs. per Week: 04** **Total Hours: 60**
Total Evaluation Marks: 50 **CIE:** 15 Marks **TEE:** 35 Marks		**Examination Duration: 6 Hrs.** **Pre-requisite of course:** Skills to handle solvent extractions, distillations, crystallisations simple chromatographic experiments independently. Ability to set up reaction assemblies which may require heating/cooling, set-up and execute filtration and drying processes.					

Course Objective	*To acquire the skills to plan and carry out separation of mixtures of organic compounds by means of solvent-solvent extraction, further purification and identification of isolated components and derivative preparation. To learn how to plan a synthetic operation from simple starting materials, set-up the reaction assembly, work-up, isolate and purify the product. Develop knowledge of proper and safe waste disposal in these operations.*
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1:** To analyse and separate binary mixtures of solids using solvent extraction, to purify and identify the isolated components via derivative preparation **CO2**: To analyse and separate binary mixtures of solid and liquid using solvent extraction, to purify and identify the isolated components via derivative preparation **CO3:** To analyse and separate binary mixtures of liquids using solvent extraction, to purify and identify the isolated components via derivative preparation **CO4:** To plan and carry out single-step preparation of organic compounds **CO5:** To work-up, isolate and purify, determine the purity of the prepared compound and safe treatment and disposal of chemical waste **CO6:** To develop an exposure to industrial chemical operations via a visit

COURSE SYLLABUS

NOTE:
Two questions will be set, one from each of the UNIT. The candidates are required to attempt all the questions.

Unit No.	Contents	Contact Hrs.
I	**QUALITATIVE ANALYSIS OF BINARY ORGANIC MIXTURES BY A SYSTEMATIC APPROACH** Chemical separation using H_2O, $NaHCO_3$, NaOH, HCl, Ether or any other reagent as per required conditions of solid-solid, solid-liquid and liquid-liquid mixtures Systematic identification of the components and preparation of at least one derivative of each.	30
II	**A. ORGANIC SYNTHESIS** Preparation of organic compound involving one-step reaction. (Prepare at least three compounds) [**Important *Note:*** *Greener protocols to be used wherever possible. Submit the recrystallised sample of the synthesized compound after checking its purity by TLC and melting points.*] **B. INDUSTRIAL VISIT**	30

	In order to get an exposure on how chemical industries function, department will arrange an industrial visit. Students to prepare a report on the industrial visit.	

Suggested Readings:

1. K. L. Williamson and K. M., Masters Macroscale and Microscale Organic Experiments, 7th Edition. *Cengage learning*, 2017.
2. H.A. Shally, Green Chemistry Laboratory Manual for General Chemistry, 1stEdition *CRC Press*, 2015.
3. R. K. Bansal, Laboratory Manual in Organic Chemistry, Wiley, 2006.
4. B. S. Furniss and others, Vogel's Text Book of Practical Organic Chemistry, 5th Edition Paperback, *Pearson*, 2003.
5. D. Pasto, C. Johnson and M. Miller, Experiments and Techniques in Organic Chemistry, *Prentice Hall, Instructor's Edition,* 1992.
6. H. T. Clarke revised by B. Haynee, A Hand book of Organic Analysis-Qualitative and Quantitative, *Edward Arnold, London*, 1975.
7. H. Middleton, Systematic Qualitative Organic Analysis, *Edward Arnold, London*, 1959.

Course No:	Course Name:				Course Code:		
CH-23	Organic Chemistry Practical-III				SBS CH 010307 DSE 0063		
Batch:	**Programme:**	**Semester:**	**L**	**T**	**P**	**Credit**	**Contact Hrs. per Week: 06**
2021 Onwards	M.Sc. Chemistry	**III**	0	0	6	3	**Total Hours: 90**

Total Evaluation Marks:75 **CIE:** 22.5 Marks **TEE:** 52.5 Marks	**Examination Duration: 8 Hrs.** **Pre-requisite of course:** Good skills for handling solvent extraction for isolation of samples, safe distillation of solvents and ability to purify samples by recrystallization from suitable solvents. Knowledge of various common reagents and the skill for their safe handling. Knowledge and concern about environmental impact of each operation.
Course Objective	*To gain the knowledge and skill for isolating and purifying important components from natural sources. To learn the methods to isolate and purify alkaloids, terpenoids, carotenoids and proteins from plant and animal sources. To learn the methods for synthesizing a target compound in a two-step procedure and isolating the purified product.*
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1:** General aspects of extraction of natural products from plant and animal sources **CO2:** Specific methods for the extraction and purification of alkaloids/phenols of plant origin **CO3:** Specific methods for the extraction of terpenoids, carotenoids and milk protein from the natural sources **CO4:** Planning of a two-step synthesis of a given target **CO5:** Execution of the planned synthesis by minimizing waste and environmental impact **CO6:** Isolation, purification and conformation of the structure of all the synthesized compounds

COURSE SYLLABUS

NOTE:
Three questions will be set, one from each of the UNIT. The candidates are required to attempt all the questions.

Unit No.	Contents	Contact Hrs.
I	**EXTRACTION OF NATURAL PRODUCTS (Alkaloids and natural phenols)** ● Caffeine from tea leaves ● Nicotine from tobacco ● Piperine from black pepper ● Curcumin from turmeric	**30**
II	**EXTRACTION OF NATURAL PRODUCTS (Terpenoids, Carotenoids and Protein)** ● Limonene from citrus rind ● Lycopene from tomatoes ● β-Carotene from carrot ● Casein from milk	**30**
III	**ORGANIC SYNTHESIS INVOLVING TWO-STEP PROCEDURE** Preparation of organic compound involving two-step reaction. (Prepare at least three compounds) [**Important *Note:*** *To use greener protocols wherever possible. Submit the recrystallised sample of the synthesized compound after checking its purity by TLC and melting*	**30**

	points.]	

Suggested Readings:

1. K. L. Williamson and K. M., Masters Macroscale and Microscale Organic Experiments, 7th Edition. *Cengage learning*, 2017.
2. H.A. Shally, Green Chemistry Laboratory Manual for General Chemistry, *CRC Press*, 1stEdition, 2015.
3. D. L. Pavia, G. M. Lampman, G. S. Kriz and J. R. Vyvyan, Introduction to Spectroscopy, 5thEdition. *Cengage India*, 2015.
4. R. M. Silverstein, G. C. Bassler and T. C. Morrill, Spectrometric Identification of Organic Compounds, 8th Edition, *Wiley India*, 2015.
5. William Kemp, Organic Spectroscopy, 3rd Edition. *Mac publishers*, 2011.
6. R. K. Bansal, Laboratory Manual in Organic Chemistry, *Wiley*, 2006.
7. Jag Mohan, Organic Spectroscopy, 2nd Edition. *CRC Press*, 2004.
8. B. S. Furniss and others, Vogel's Text Book of Practical Organic Chemistry, 5e Paperback, *Pearson*, 2003.
9. D. Pasto, C. Johnson and M. Miller, Experiments and Techniques in Organic Chemistry, *Prentice Hall*, Instructor's Edition, 1992.
10. H. T. Clarke revised by B. Haynee, A Hand book of Organic Analysis-Qualitative and Quantitative, *Edward Arnold,* London, 1975.
11. H. Middleton, Systematic Qualitative Organic Analysis, *Edward Arnold*, London, 1959.

Course No: CH-24	Course Name: Organic Chemistry Practical-IV				Course Code: SBS CH 010308 DSE 0063		
Batch: 2021 Onwards	**Programme:** M.Sc. Chemistry	**Semester:** **III**	**L** 0	**T** 0	**P** 6	**Credit** 3	**Contact Hrs. per Week: 06** **Total Hours: 90**
Total Evaluation Marks:75 **CIE:** 22.5 Marks **TEE:** 52.5 Marks		**Examination Duration: 8 Hrs.** **Pre-requisite of course:** General and basic skill set for setting up and carrying out quantitative estimations. Knowledge of the working principle of UV-visible spectrophotometer. General synthetic skills acquired in previous semesters.					

Course Objective	*To acquire hands-on experience in organic synthesis particularly involving multistep reactions and to gain knowledge about quantitative analysis of organic compounds by spectroscopic methods. At the end of this course, students will understand and acquire the knowledge of various important parameters used in multistep organic synthesis preferably in greener approaches. Further, they would be able to characterize the synthesized compounds on the basis of their spectral data. Students would also learn the spectrophotometric methods used for quantitative analysis of organic compounds.*
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1:** General principles and skill of quantitative analysis using spectroscopic methods **CO2:** Specific skills of estimating important molecules by UV-visible spectroscopy **CO3:** Methods to analyse the amount of carbohydrates, vitamin C, proteins, steroids, urea and drugs like aspirin in samples **CO4:** Synthetic skills to plan and execute multi step protocols **CO5:** Monitoring of reaction progress and purification and identification of intermediates **CO6:** Conformation of the target structure and estimation of its purity level

COURSE SYLLABUS

NOTE:
Three questions will be set, one from each of the UNIT. The candidates are required to attempt all the questions.

Unit No.	Contents	Contact Hrs.
I	**QUANTITATIVE ANALYSIS** UV-vis spectrophotometric estimations of the followings: ● Carbohydrates ● Ascorbic acid ● Amino acids	30
II	**QUANTITATIVE ANALYSIS** Estimations of the followings: ● Proteins ● Cholesterol ● Urea ● Aspirin	30

III	**MULTI-STEP ORGANIC SYNTHESIS** Prepare at least any two organic compounds by three or more step reaction. [**Important *Note:*** *Prefer to use* ***greener protocols*** *wherever possible. Monitor the progress of reaction by TLC and submit the recrystallised sample of the synthesized compound after checking its purity by TLC at each step*]	30

Suggested Readings:

1. K. L. Williamson and K. M., Masters Macroscale and Microscale Organic Experiments, 7th Edition. *Cengage learning*, 2017.
2. H.A. Shally, Green Chemistry Laboratory Manual for General Chemistry, 1stEdition. *CRC Press*, 2015.
3. D. L. Pavia, G. M. Lampman, G. S. Kriz and J. R. Vyvyan, Introduction to Spectroscopy, 5thEdition. *Cengage India*, 2015.
4. R. M. Silverstein, G. C. Bassler and T. C. Morrill, Spectrometric Identification of Organic Compounds, 8th Edition, *Wiley India*, 2015.
5. William Kemp, Organic Spectroscopy, 3rd Edition. *Mac publishers*, 2011.
6. R. K. Bansal, Laboratory Manual in Organic Chemistry, *Wiley*, 2006.
7. Jag Mohan, Organic Spectroscopy, 2nd Edition. CRC Press, 2004.
8. B. S. Furniss and others, Vogel's Text Book of Practical Organic Chemistry, 5e Paperback*, Pearson*, 2003.
9. D. Pasto, C. Johnson and M. Miller, Experiments and Techniques in Organic Chemistry, *Prentice Hall*, Instructor's Edition, 1992.
10. H. T. Clarke revised by B. Haynee, A Hand book of Organic Analysis-Qualitative and Quantitative, *Edward Arnold*, London, 1975.

Course No:	Course Name:				Course Code:		
CH-35	Organic Chemistry Practical-V				SBS CH 010419 DSE 0063		
Batch:	**Programme:**	**Semester:**	**L**	**T**	**P**	**Credit**	**Contact Hrs. per Week: 06**
2021 Onwards	M.Sc. Chemistry	**IV**	0	0	6	3	**Total Hours: 90**

Total Evaluation Marks:75 **CIE:** 22.5 Marks **TEE:** 52.5 Marks	**Examination Duration: 8 Hrs.** **Pre-requisite of course:** General and basic skill of the working principle of FTIR and NMR spectroscopy and mass spectrometry by analysing samples. General synthetic skills using microwave-mediated and mechanochemical organic synthesis.
Course Objective	To acquire knowledge and skill for the identification of samples of purified unknown organic compounds by measuring and analysing various spectra. Ability to handle spectroscopy equipment such as FTIR, UV-visible, NMR and MS. Ability to process and interpret the obtained spectral data and report it according to standard conventions. Collective use of the obtained information to arrive at a possible structure and molecular formula. Learn to execute modern green methods such as microwave and mechanochemical methods in targeted synthesis.
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1:** Theoretical and practical knowledge about various spectroscopic techniques **CO2:** Hands on skills with FTIR and UV-visible spectrophotometers **CO3:** Process, analyse and report IR and UV spectral data and use it in structure determination **CO4:** Skills to process, analyse and report NMR and MS data output and apply it for structure determination **CO5:** Plan and execute microwave mediated synthesis **CO6:** Plan and execute mechanochemical organic synthesis

COURSE SYLLABUS

NOTE:
Three questions will be set, one from each of the UNIT. The candidates are required to attempt all the questions.

Unit No.	Contents	Contact Hrs.
I	**SPECTROSCOPIC IDENTIFICATION OF FUNCTIONAL GROUPS OF ORGANIC COMPOUNDS** Determine the functional groups present in the compound by measuring and analysing the FTIR and UV-visible spectra. Report the spectral data in a standard format.	30
II	**SPECTROSCOPIC ANALYSIS OF ORGANIC COMPOUNDS ON BASIS OF NMR AND MS TECHNIQUES** Obtain and interpret the NMR spectra (H, C and F if necessary), process the spectra, report it based on conventions. Obtain the mass spectra and report it in a standard format. Analyse all the available data and arrive at a possible structure and molecular formula.	30

III	**MICROWAVE-MEDIATED AND MECHANOCHEMICAL ORGANIC SYNTHESIS** Synthesis of target compounds by using non-conventional energy sources such as microwave, grinding, ball milling or sonochemical methods. Identification and purity determination of the synthesized compounds.	30

Suggested Readings:

1. K. L. Williamson and K. M., Masters Macroscale and Microscale Organic Experiments, 7th Edition. *Cengage learning*, 2017.
2. H.A. Shally, Green Chemistry Laboratory Manual for General Chemistry, 1stEdition. *CRC Press*, 2015.
3. D. L. Pavia, G. M. Lampman, G. S. Kriz and J. R. Vyvyan, Introduction to Spectroscopy, 5thEdition. *Cengage India*, 2015.
4. R. M. Silverstein, G. C. Bassler and T. C. Morrill, Spectrometric Identification of Organic Compounds, 8th Edition, *Wiley India*, 2015.
5. William Kemp, Organic Spectroscopy, 3rd Edition. *Mac publishers*, 2011.
6. R. K. Bansal, Laboratory Manual in Organic Chemistry, *Wiley*, 2006.
7. Jag Mohan, Organic Spectroscopy, 2nd Edition. CRC Press, 2004.
8. B. S. Furniss and others, Vogel's Text Book of Practical Organic Chemistry, 5e Paperback*, Pearson*, 2003.
9. D. Pasto, C. Johnson and M. Miller, Experiments and Techniques in Organic Chemistry, *Prentice Hall*, Instructor's Edition, 1992.
10. H. T. Clarke revised by B. Haynee, A Hand book of Organic Analysis-Qualitative and Quantitative, *Edward Arnold*, London, 1975.

Course No: CH-36	Course Name: Organic Chemistry Practical-VI				Course Code: SBS CH 010420 DSE 0063		
Batch: 2021 Onwards	**Programme:** M.Sc. Chemistry	**Semester:** **IV**	**L** 0	**T** 0	**P** 6	**Credit** 3	**Contact Hrs. per Week: 6** **Total Hours: 90**
Total Evaluation Marks:75 **CIE:** 22.5 Marks **TEE:** 52.5 Marks	**Examination Duration: 8 Hrs.** **Pre-requisite of course:** This course will develop basic skills for designing and synthesizing multi-step organic synthesizing and their characterization of intermediates using spectroscopic techniques.						
Course Objective	*To analyse a complex synthetic problem in its entirety. Identify the key structural elements, stereochemical features and challenges in the given target molecule. Design the strategy, tactics and execute the synthesis in shortest possible way. Isolate, purify and identify each of the intermediates. Characterise any unknown compounds completely. Confirm the identity and purity of the final compound with all available techniques.*						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1:** Ability to analyse a given structure and establishing its key features **CO2:** Design the strategy and tactics of a possible synthesis **CO3:** Decide on the best possible approach by considering protecting group free, green and economically viable routes **CO4:** Execute the synthesis step by step, isolate and analyse each intermediate **CO5:** Troubleshoot and innovate when faced with roadblocks **CO6:** Isolate, purify and conform the structure of final target with all available means						

COURSE SYLLABUS

NOTE:
Three questions will be set, one from each of the UNIT. The candidates are required to attempt all the questions.

Unit No.	Contents	Contact Hrs.
I-III	**RETROSYNTHETIC ANALYSIS, SYNTHESIS, AND SPECTROSCOPIC CHARACTERISATION OF ALL INTERMEDIATES AND THE TARGET COMPOUND** [**Important *Note:*** *Prefer to use greener protocols wherever possible. Submit the recrystallised sample of the synthesized compound after checking its purity by TLC and m.pts.*]	90

Suggested Readings:

1. K. L. Williamson and K. M., Masters Macroscale and Microscale Organic Experiments, 7th Edition. *Cengage learning*, 2017.
2. H.A. Shally, Green Chemistry Laboratory Manual for General Chemistry, 1stEdition. *CRC Press*, 2015.
3. D. L. Pavia, G. M. Lampman, G. S. Kriz and J. R. Vyvyan, Introduction to Spectroscopy, 5thEdition. *Cengage India*, 2015.
4. R. M. Silverstein, G. C. Bassler and T. C. Morrill, Spectrometric Identification of Organic Compounds, 8th Edition, *Wiley India*, 2015.
5. William Kemp, Organic Spectroscopy, 3rd Edition. *Mac publishers*, 2011.
6. R. K. Bansal, Laboratory Manual in Organic Chemistry, *Wiley*, 2006.
7. Jag Mohan, Organic Spectroscopy, 2nd Edition. CRC Press, 2004.
8. B. S. Furniss and others, Vogel's Text Book of Practical Organic Chemistry, 5e Paperback*, Pearson*, 2003.

9. D. Pasto, C. Johnson and M. Miller, Experiments and Techniques in Organic Chemistry, *Prentice Hall*, Instructor's Edition, 1992.
10. H. T. Clarke revised by B. Haynee, A Hand book of Organic Analysis-Qualitative and Quantitative, *Edward Arnold*, London, 1975.

PHYSICAL CHEMISTRY COURSES

THEORY COURSES

Course No: CH-03	Course Name: Physical Chemistry-I						Course Code: SBS CH 010103 C 4004
Batch: 2021 Onwards	**Programme:** M.Sc. Chemistry	**Semester:** I	**L** 4	**T** 0	**P** 0	**Credit** 4	**Contact Hrs. per Week: 04** **Total Hrs.: 60**
Total Evaluation Marks: 100 **CIE: 30** Marks **TEE: 70** Marks		**Examination Duration:** **3** Hrs. **Pre-requisite of course:** Knowledge of basic chemistry up to UG level.					
Course Objectives	*To provide students with a basic understanding of thermodynamics, fugacity, phase rule, essentials of chemical kinetics and principle of quantum mechanics. This course will strengthen the fundamentals of Physical Chemistry, especially thermodynamics and quantum chemistry.*						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1**: Basic understanding of physical chemistry. **CO2**: Use of thermodynamics and chemical kinetics in daily life. **CO3**: Skills for analyzing and developing new sustainable methods. **CO4**: Skills for developing industrially important methods. **CO5**: Development of alternate and new theoretical methods. **CO6**: Use of advanced and recent technologies in physical chemistry.						

COURSE SYLLABUS

NOTE:

i) Question no. 1 is compulsory and to be set from the entire syllabus. It will have seven sub-parts. Each part carries 3.5 marks and students need to answer any four sub-parts.

ii) Question nos. 2 to 9 are to be set from all four units, two from each unit. Every question will have two sub-parts and students need to answer any one question from each unit. Each question carries 14 marks.

Unit No.	Contents	Contact Hrs.
I	**INTRODUCTION TO PHYSICAL CHEMISTRY AND CLASSICAL THERMODYNAMICS** Logarithmic relations, Curve sketching and linear graphs, calculation of slopes, terms of mean and median, Precision and accuracy in chemical analysis, types of error, standard deviation, Numerical Problems. ***Classical Thermodynamics:*** Its Laws, Maxwell's relations; spontaneity and equilibria; temperature and pressure dependence of thermodynamic quantities like entropy, enthalpy, free energy; Gibb`s-Duhem equation; Clausius-Clapeyron equation, Nernst heat theorem, Chemical potential and Work Function.	15
II	**ACTIVITY, FUGACITY, PHASE RULE** Concepts of fugacity, fugacity of gases and its determination. Activity and activity coefficient, choice of standard states, determination of activity coefficient for solute and solvent. ***Phase Rule:*** Phase Rule and its determination, application, Phase diagram for one component system, for two completely miscible components systems like Pb-Ag system, KI+ H_2O system, Bi-Cd system, Ferric	15

	chloride + water system, Sodium chloride + water system, Na_2SO_4-H_2O system.	
III	**CHEMICAL KINETICS-I** ***Introduction to Chemical Kinetics*:** Methods of determining rate laws, Arrhenius equation and its theory, Collision theory, and activated complex theory. ***Chain Reactions*:** Hydrogen-bromine reaction, Pyrolysis of acetaldehyde, Decompositions of ethane. Photochemical reactions (hydrogen-bromine and hydrogen-chlorine reactions). General treatment of chain reaction (hydrogen- bromine reactions), Apparent activation energy of chain reactions, Chain length, Rice-Herzfeld mechanism of organic molecules decomposition (acetaldehyde).	15
IV	**PRINCIPLES OF QUANTUM MECHANICS** Introduction to Quantum Mechanical Approach, Quantum Mechanical operators, Eigenvalues of Quantum Mechanical operators, Hermitian operator, Ladder operator, commutation relations, postulates of quantum mechanics and Uncertainty Principle. Dirac delta function, Uncertainty in position and momentum, Schrödinger equation for finding wave function of a particle, Energy of a particle in One-Dimension box, Extension to Schrödinger equation for finding wave function in a three-dimensional box, Energy of a particle in Three-Dimension box, Energy levels, Eigenvalue, concept of degeneracy and selection rules.	15

Suggested Readings:

1. J.P. Lowe, and K. Peterson, Quantum Chemistry, *Academic Press*, 2019.
2. H. K. Moudgil, Textbook of Physical Chemistry, *PHI Publication House*, New Delhi, 2015.
3. P. Atkins and J. Paula, Atkins' Physical Chemistry, 10th Edition. *Oxford University Press,* 2014
4. I. N. Levine, Quantum Chemistry, 7th Edition. *Pearson Education*, 2013.
5. I. N. Levine, Physical Chemistry, 6th Edition. *Tata Mcgraw-Hill Education*, 2011.
6. D. Mcquarie and J. Simon, Physical Chemistry-A molecular approach, 1stEdition.*Viva*, 2010.
7. R. K. Prasad, Quantum Chemistry, *New Age International*, 2010.
8. A. K. Chandra, Introductory Quantum Chemistry, *Tata McGraw-Hill*, 2008.
9. K. J. Laidler, Chemical Kinetics, 3rd Edition. *Pearson Education*, 2007.
10. E. Kreyszig, Advanced Engg. Mathematics, *John Wiley & Sons, Inc*. 2006.

Course No: CH-09	Course Name: Physical Chemistry-II (Quantum Chemistry & Group Theory)				Course Code: SBS CH 010209 C 4004		
Batch: 2021 Onwards	**Programme:** M.Sc. Chemistry	**Semester:** II	**L** 4	**T** 0	**P** 0	**Credit** 4	**Contact Hrs. per Week: 04** **Total Hrs.: 60**
Total Evaluation Marks: 100 **CIE: 30** Marks **TEE: 70** Marks		**Examination Duration:** **3** Hrs.					
		Pre-requisite of course: Knowledge of basic physical chemistry up to UG level.					
Course Objectives	*To provide students with an understanding of physical chemistry like quantum approach, enzyme kinetics, unimolecular reactions, principles of symmetry and group theory and non-equilibrium thermodynamics. This course will strengthen the essentials of Physical Chemistry, especially group theory and quantum chemistry.*						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1**: Basic understanding of physical chemistry. **CO2**: Use of symmetry and enzyme kinetics in daily life. **CO3**: Skills for analyzing and developing new sustainable methods. **CO4**: Skills for developing industrially important methods. **CO5**: Development of alternate and new theoretical methods. **CO6**: Use of advanced and recent technologies in Physical Chemistry.						

COURSE SYLLABUS

NOTE:

i) Question no. 1 is compulsory and to be set from the entire syllabus. It will have seven sub-parts. Each part carries 3.5 marks and students need to answer any four sub-parts.

ii) Question nos. 2 to 9 are to be set from all four units, two from each unit. Every question will have two sub-parts and students need to answer any one question from each unit. Each question carries 14 marks.

Unit No.	Contents	Contact Hrs.
I	**QUANTUM APPROACH AND APPROXIMATION METHODS** ***Harmonic oscillator*:** Application to diatomic molecules and Energy levels. Properties of Legendre polynomials, Rodrigues formula, Recursion formulae, Associated Legendre polynomials, Laguerre and associated Laguerre polynomials. ***Rigid rotator*:** Model for a rotating diatomic molecule and Energy level. Solution of spherical eigen-functions, Recursion formulae, Derivation of Legendre polynomial equation. ***The Hydrogen atom*:** Schrödinger equation for hydrogen atom. Solution of radial wave function. Radial distribution curves and shapes of atomic orbitals. ***Approximate Methods*:** The linear variation principle, First order time-independent Perturbation theory for non-degenerate states. Variation theorem and variation methods. Use of these methods illustrated with some examples like particle in a box with finite barrier, anharmonic oscillator, approximation functions for particle in a box and hydrogen atom.	15
II	**ENZYME KINETICS AND THEORY OF UNIMOLECULAR REACTIONS** ***Enzyme Kinetics*:** Kinetics of (one intermediate) enzymatic reaction: Michaelis-Menton treatment,	15

	Evaluation of Michaelis's constant for enzyme-substrate binding by line weaver-Burk plot by Dixon and by Eadie-Hofstee methods. Competitive and non-competitive inhibition. ***Unimolecular reactions*:** Dynamics of unimolecular reactions (Lindemann-Hinshelwood and Rice-Ramsperger-Kassel-Marcus [RRKM] theories of unimolecular reactions.	
III	**PRINCIPLES OF SYMMETRY AND GROUP THEORY** Symmetry elements and Symmetry operations; Definitions of groups, subgroups, and classes; Symmetry elements in Allene, H_2O_2, Benzene and Ferrocene; Determination of point groups of small molecules and Schönfliesand Hermann-Mauguin Notations; The Great Orthogonality theorem. Character table for point group C_n (C_2v and C_3v), D_n, (n=2 and 3), T_d and O_h.	15
IV	**NON EQUILIBRIUM THERMODYNAMICS** General theory of non-equilibrium processes, Entropy production and entropy flow; Thermodynamic criteria for non-equilibrium states, Entropy production in heat flow, Mass flow, Electric current, Chemical reactions, Saxen's relation, Onsager's reciprocity relation, Thermomolecular pressure difference, Electro kinetic phenomenon, Coupled reactions.	15

Suggested Readings:

1. F. A. Cotton, Chemical Application of Group Theory, 3rd Edition. *John Willey & Sons*, 2018.
2. H. K. Moudgil, Textbook of Physical Chemistry, *PHI Publication House*, New Delhi, 2015.
3. P. Atkins and J. Paula, Atkins' Physical Chemistry, 10th Edition. *Oxford University Press*, 2014.
4. I. N. Levine, Quantum Chemistry, 7th Edition. *Pearson Education*, 2013.
5. C. Kalidas and M. V. Sangaranarayanan, Non-Equilibrium Thermodynamics: Principles & Applications, *Macmillan India Ltd.*, 2012.
6. R. K. Prasad, Quantum Chemistry, *New Age International*, 2011.
7. A. K. Chandra, Introductory Quantum Chemistry, *Tata McGraw-Hill*, 2008.
8. K. J. Laidler, Chemical Kinetics, 3rd Edition. *Pearson Education*, 2007.
9. A. Katchalsky and P. F. Curren, Non-Equilibrium Thermodynamics in Biophysics, *Harvard University Press*, Cambridge, 1995.
10. G. Davidson, Group theory for Chemist, *Macmillan Physical Science*, 1991.

Course No: CH-13	Course Name: Molecular Spectroscopy						Course Code: SBS CH 010313 C 4004
Batch: 2021 Onwards	**Programme:** M.Sc. Chemistry	**Semester:** III	**L** 4	**T** 0	**P** 0	**Credit** 4	**Contact Hrs. per Week: 04** **Total Hrs.: 60**
Total Evaluation Marks: 100 **CIE: 30** Marks **TEE: 70** Marks		**Examination Duration:** **3** Hrs.					
		Pre-requisite of course: Knowledge of basic of molecular spectroscopy up to UG level.					
Course Objectives	*To provide students with an understanding of the basics of molecular spectroscopy like rotational, vibrational, Raman, electronic and solid state and surface spectroscopy. This course will strengthen the essentials of molecular spectroscopy, especially microwave and infrared spectroscopy*.						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1**: Basic understanding of molecular spectroscopy. **CO2**: Use of spectroscopy in daily life. **CO3**: Skills for analyzing and developing new sustainable methods. **CO4**: Skills for developing industrially important spectroscopic methods. **CO5**: Development of alternate and new spectroscopic characterization methods. **CO6**: Use of advanced and recent technologies in molecular spectroscopy.						

COURSE SYLLABUS

NOTE:

i) Question no. 1 is compulsory and to be set from the entire syllabus. It will have seven sub-parts. Each part carries 3.5 marks and students need to answer any four sub-parts.

ii) Question nos. 2 to 9 are to be set from all four units, two from each unit. Every question will have two sub-parts and students need to answer any one question from each unit. Each question carries 14 marks.

Unit No.	Contents	Contact Hrs.
I	**ROTATIONAL SPECTROSCOPY** ***Basics of Molecular Spectroscopy*** Electromagnetic radiation and its region, representation of spectra, signal to noise ratio, resolving power, width and intensity of spectral lines. ***Rotational (Microwave) Spectroscopy*** Rotational Spectroscopy-Rigid diatomic Rotator, Selection rule for rotational/microwave spectrum, determination of bond-length, intensity of spectral lines, effects of isotopes on rotational spectra, Non-rigid rotator, Stark effect, Rotational spectra of linear polyatomic molecules, Application of microwave spectroscopy.	15
II	**VIBRATIONAL AND RAMAN SPECTROSCOPY** ***Infrared (Vibrational) Spectroscopy*** Vibration in Diatomic molecules, Simple Harmonic Oscillator Model, Anharmonic Oscillator, Selection Rule, Population of Vibrational Energy level, Diatomic Vibrating Rotator, P-Q-R Branches of Spectra, Breakdown of Born Oppenheimer Approximation, Fundamental Vibration and their Symmetry, Overtone and Combination frequency, Applications of Infra-red spectroscopy. ***Raman Spectroscopy*** Stokes and anti-Stokes lines. Polarizability ellipsoids. Pure Rotational Raman spectra, pure vibrational	15

	Raman spectra. Selection rules. Rule of Mutual Exclusion. Polarization of light, Raman Effect, Application of Raman and Infra-red spectroscopy in structure determination	
III	**ELECTRONIC SPECTROSCOPY** Principle of electronic spectroscopy, Total electronic angular momentum, Term symbol. Vibrational Coarse Structure: Progressions, Franck-Condon Principle, Dissociation energy and dissociation products, Rotational fine structure of electronic-vibration transitions, Fortrat diagram, Pre-dissociation.	15
IV	**SOLID STATE AND SURFACE SPECTROSCOPY** Electronic Energy loss Spectroscopy (EELS), Reflection-Absorption Infrared Spectroscopy (RAIRS), Photoelectron spectroscopy (PES): X-ray PES and Ultra-violet PES, Auger Electron Spectroscopy (AES) and X-ray Fluorescence (XRF).	15

Suggested Readings:

1. C. N. Banwell and E. M. McCash, Fundamental of Molecular Spectroscopy, 4thEdition. *Tata McGraw-Hill Publishing Company Ltd.*, New Delhi, 2017.
2. D. N. Satyanarayana, Handbook of Molecular Spectroscopy: From radio waves to gamma rays, *I. K. International Publishing House*, New Delhi, 2015.
3. R. Kakkar, Atomic & Molecular Spectroscopy*, Cambridge University Press*, 2015.
4. J. M. Hollas, Modern Spectroscopy, 4th Edition. *John Wiley & Sons*, 2014.
5. G. E. Bacon, Fifty Years of Neutron Diffraction*, Hilger*, 2007.
6. B. E. Warren, X-Ray Diffraction*, Dover Publications*, 1999.
7. J. C. D. Brand and J. C. Speakman, Molecular Structure: The Physical Approach,2nd Edition. *Edward Arnold*, London, 1995.
8. W. J. Moore, Physical Chemistry, 4th Edition. *Prentice-Hall*, 1992.
9. R. Chang, Basic Principles of Spectroscopy, *McGraw-Hill*, New York, 1990.

Course No: CH-25	Course Name: Physical Chemistry-III (Statistical Mechanics, Surface and Interface Chemistry)						Course Code: SBS CH 010309 DSE 4004
Batch: 2021 Onwards	**Programme:** M.Sc. Chemistry	**Semester:** **III**	**L** 4	**T** 0	**P** 0	**Credit** 4	**Contact Hrs. per Week: 04** **Total Hrs.: 60**
Total Evaluation Marks: 100 **CIE: 30** Marks **TEE: 70** Marks		**Examination Duration:** **3** Hrs.					
		Pre-requisite of course: Knowledge of basic physical chemistry up to UG level.					
Course Objectives	*To provide students with an understanding of advanced physical chemistry like statistical mechanics and thermodynamics, photochemistry and electrified interface. This course will strengthen the essentials of Physical Chemistry, statistical mechanics and photochemistry.*						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1**: Basic understanding of advanced physical chemistry. **CO2**: Use of statistical mechanics and photochemistry in daily life. **CO3**: Skills for analyzing and developing new sustainable methods. **CO4**: Skills for developing industrially important methods. **CO5**: Development of alternate and new theoretical methods. **CO6**: Use of advanced and recent technologies in Physical Chemistry.						

COURSE SYLLABUS

NOTE:

i) Question no. 1 is compulsory and to be set from the entire syllabus. It will have seven sub-parts. Each part carries 3.5 marks and students need to answer any four sub-parts.

ii) Question nos. 2 to 9 are to be set from all four units, two from each unit. Every question will have two sub-parts and students need to answer any one question from each unit. Each question carries 14 marks.

Unit No.	Contents	Contact Hrs.
I	**STATISTICAL MECHANICS** Concept of distribution, Thermodynamic probability and most probable distribution, Canonical, grand canonical and micro canonical ensembles. Maxwell-Boltzmann statistics, Boltzmann distribution, Derivation of the Boltzmann distribution expression, Determination of the Boltzmann constant, Maxwell distribution law of velocity from Boltzmann distribution expression, The Bose-Einstein statistics, Statistics of a photon gas, Fermi-Dirac statistics and comparison of three statistics.	15
II	**STATISTICAL THERMODYNAMICS** Partition function and thermodynamic properties, Factorization of partition function, Relationship of partition function to thermodynamic properties, Translational partition function, Calculation of absolute entropy of an ideal monoatomic gas, Secure-Tetrode equation. Vibrational and rotational partition function of diatomic molecules. Calculation of contribution of vibrational, rotational partition functions towards various thermodynamic properties. Electronic partition function, Effect of change of zero-point energy on partition function. Chemical equilibrium and equilibrium constant in terms of partition functions.	15

III	**PHOTOCHEMISTRY** Transitions between states (Chemical, classical and quantum dynamics, vibronic states). Potential energy surfaces, transitions between potential energy surfaces. The Franck-Condon principle and radiative transitions. Spin-orbit coupling and spin forbidden radiative transitions, delayed fluorescence and phosphorescence. Triplet-triplet, triplet-singlet, singlet-triplet energy transfer. Multiphoton energy transfer processes. Photoelectric effect, Compton effect. Energy transfer: theory of radiation less energy transfer, energy transfer by electron exchange.	15
IV	**ELECTRIFIED INTERFACES** Thermodynamics of electrified interfaces, Electrocapillary thermodynamics, Non-polarizable interface and Thermodynamic equilibrium. Fundamental thermodynamic equation of polarizable interfaces. Determination of excess charge density on the electrode, electrical capacitance and surface excess of the interface, potential of zero charge, Helmholtz-Perrin model, Gouy-Chapman model, Stern and Devanathan model.	15

Suggested Readings:

1. B. Bagchi, Statistical Mechanics for Chemistry and Material Science, *CRC Press*, 2018.
2. T. L. Hill, An Introduction to Statistical Thermodynamics, *Dover Publication*, 2018.
3. R. K. Pathria and Paul D. Beal, Statistical Mechanics, 3rd Edition. *Elsevier*, 2016.
4. L. D. Landau and E. M. Lifshitz, Statistical Mechanics, Part I, Butterworth-Heinemann, 3rd ed., 2015.
5. P. Atkins and J. P. Atkins' Physical Chemistry, 10th Edition. *Oxford University Press*, 2014.
6. D. McQuarie and J. Simon, Physical Chemistry-A molecular approach, 1stEdition.*Viva*, 2010.
7. D. A. McQuarrie, Statistical Mechanics, *Viva Books Pvt. Ltd*., New Delhi, 2003.
8. A. Gilbert and J. Baggot, Essentials of Molecular Photochemistry, *Blackwell Scientific*, 1999.
9. N. J. Turro, Modern Molecular Photochemistry, *Univ. Science Books,* 1991.

Course No: CH-26	**Course Name:** Physical Chemistry-IV (Solid State & Electroanalytical methods)						**Course Code:** SBS CH 010310 DSE 4004
Batch: 2021 Onwards	**Programme:** M.Sc. Chemistry	**Semester:** **III**	**L** 4	**T** 0	**P** 0	**Credit** 4	**Contact Hrs. per Week: 04** **Total Hrs.: 60**
Total Evaluation Marks: 100 **CIE: 30** Marks **TEE: 70** Marks		**Examination Duration:** **3** Hrs.					
		Pre-requisite of course: Knowledge of basic physical chemistry up to UG level.					
Course Objectives	*To provide students with an understanding of advanced physical chemistry like electrochemistry, electroanalytical and potentiometric methods and solid-state chemistry. This course will strengthen the essentials of Physical Chemistry i.e., electrochemistry and solid-state chemistry.*						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1**: Basic understanding of advanced physical chemistry. **CO2**: Use of electroanalytical and potentiometric methods in daily life. **CO3**: Skills for analyzing and developing new sustainable methods. **CO4**: Skills for developing industrially important methods. **CO5**: Development of alternate analytical methods. **CO6**: Use of advanced and recent technologies in electrochemistry.						

COURSE SYLLABUS

NOTE:

i) Question no. 1 is compulsory and to be set from the entire syllabus. It will have seven sub-parts. Each part carries 3.5 marks and students need to answer any four sub-parts.

ii) Question nos. 2 to 9 are to be set from all four units, two from each unit. Every question will have two sub-parts and students need to answer any one question from each unit. Each question carries 14 marks.

Unit No.	Contents	Contact Hrs.
I	**ELECTROCHEMISTRY-II** Contact adsorption on the electrode, Free energy of contact adsorption, The degree of contact adsorption and the measurement of contact adsorption, The influence of the contact adsorption on the capacity of the interface, Capacity-potential curve, The position of the OHP and the constant capacity, The capacitance hump, Variation of the population of contact-adsorbed ions with electrode charge, The lateral-repulsion model and the water Flip-Flop model of contact adsorption, The contribution of adsorbed water dipoles to the capacity of the interface.	15
II	**ELECTRO-ANALYTICAL & POTENTIOMETRIC METHODS** Polarization phenomenon and its theories, Effect of concentration on cell potential. Concept of Liquid Junction potential. Reference electrodes (Calomel, Ag/AgCl, Tl/TlCl) Metallic Redox indicator electrode: Membrane and ion selective electrodes. Enzyme electrode. Constant current chronoamperometry, constant potential chronoamperometry, Pulse voltammetry. Electrocatalysis: Influence of various parameters on water splitting, HER and OER.	15
III	**SOLID STATE CHEMISTRY-I** Classification of solids, Lattice energy, Thermal decomposition reactions, Nucleation, Free energy of nucleation: Laws, Functions and growth of nuclei. Kinetic expressions for diffusion controlled,	15

	nucleation and growth-controlled reactions. Perfect and imperfect crystals, Point defects, Line and plane defects, Vacancies: Schottky and Frenkel defects, Thermodynamics of Schottky and Frenkel defect formation, Color center, non-stoichiometric defects.	
IV	**SOLID STATE CHEMISTRY-II** Evaluation of Madelung constant (NaCl), Calculation of repulsive potential exponent: Lattice heat capacity. Einstein and Debye model of lattice heat capacity, Debye T^3 law. ***X-ray diffraction:*** Bragg condition, Miller indices, Laue method, Debye-Scherrer method of X-ray structural analysis of crystals, index reflections, structure of simple lattices and X-ray intensities. JCPDS card file for corelating structure.	15

Suggested Readings:

1. H. K. Moudgil, Textbook of Physical Chemistry, *PHI Publication House*, New Delhi, 2015.
2. P. Atkins and J. Paula, Atkins Physical Chemistry, 10th Edition. *Oxford University Press*, 2014.
3. D. Mcquarie and J. Simon, Physical Chemistry-A Molecular Approach, 1stEdition.*Viva*, 2010.
4. J. M. Bockris and A. K. N. Reddy, Modern Electrochemistry-I (Ionics), *Springer*, 2006.
5. J. O. M. Bockris and A. K. N. Reddy, Modern Electrochemistry-II, *Springer*, 2006.
6. L. E. Smart, E. A. Moore, Solid State Chemistry-An Introduction, 3rd Edition. *CRC Press*, 2005.
7. A. R. West, Basic Solid-State Chemistry, 2nd Edition. *John Wiley & Sons*, 2005.

Course No: CH-37	Course Name: Physical Chemistry-V (Polymer & Surface Chemistry)						Course Code: SBS CH 010421 DSE 4004
Batch: 2021 Onwards	**Programme:** M.Sc. Chemistry	**Semester:** **IV**	**L** 4	**T** 0	**P** 0	**Credit** 4	**Contact Hrs. per Week: 04** **Total Hrs.: 60**
Total Evaluation Marks: 100 **CIE: 30** Marks **TEE: 70** Marks		**Examination Duration:** **3** Hrs. **Pre-requisite of course:** Knowledge of basic physical chemistry up to UG level.					
Course Objectives	*To provide students with an understanding of advanced physical chemistry like polymer chemistry, polymer characterization and chemistry of surfactants. This course will strengthen the fundamentals of Physical Chemistry, especially polymer chemistry and chemistry of surfactants.*						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1**: Basic understanding of advanced physical chemistry. **CO2**: Use of polymer chemistry and chemistry of surfactants in daily life. **CO3**: Skills for analyzing and developing new sustainable methods. **CO4**: Skills for developing industrially important methods. **CO5**: Development of alternate analytical methods. **CO6**: Use of advanced and recent technologies in polymer chemistry.						

COURSE SYLLABUS

NOTE:

i) Question no. 1 is compulsory and to be set from the entire syllabus. It will have seven sub-parts. Each part carries 3.5 marks and students need to answer any four sub-parts.

ii) Question nos. 2 to 9 are to be set from all four units, two from each unit. Every question will have two sub-parts and students need to answer any one question from each unit. Each question carries 14 marks.

Unit No.	Contents	Contact Hrs.
I	**POLYMER CHEMISTRY** Classification of polymers, Polymerization: Condensation, Addition, Radical chain, Ionic, Coordination and Co-polymerization. Polymerization conditions and polymer reactions. Polymerization in homogeneous and heterogeneous systems. Kinetics of polymerization. Polydispersion-average molecular weight concept. Number, weight and viscosity average molecular weights. Polydispersity and molecular weight distribution. Meaning of glass transition temperature, T_g, factors influencing the glass transition temperature and importance of glass transition temperature.	15
II	**CHARACTERIZATION AND CONDUCTING POLYEMRS** The practical significance of molecular weight. Measurement of molecular weights: End-group, Osmotic and Ultracentrifugation methods. Analysis and testing of polymers: Chemical analysis of polymers, Spectroscopic methods and Microscopy. Thermal analysis and physical testing: Tensile strength, fatigue, impact, tear resistance and hardness and abrasion resistance. ***Electrically conducting polymers:*** Factors affecting the conductivity of conducting polymers, nature of charge carriers in conducting polymers: Solitons, polarons and bipolarons. Mechanism of conduction in polymers. Organic solids, fullerenes, molecular devices: organic superconductors, doped fullerenes as	15

	superconductors and magnetism in organic materials.	
III	**CHEMISTRY OF SURFACTANTS-I** Adsorption of surface-active agents at Solid/Liquid, Liquid/Gas and Liquid/Liquid interfaces. Mechanism of adsorption, adsorption isotherm, effects of adsorption from aqueous solution on the surface properties of solid adsorbent, adsorption from non-aqueous solution. Determination of surface areas of solids. Gibb's and BET adsorption equation and its utilization to calculate surface concentration and surface area per molecule. ***Thin films and Langmuir-Blodgett films:*** Preparation techniques, evaporating/sputtering, chemical process, MOCVD, Sol-gel, Langmuir-Blodgett (LB) film, growth techniques, properties and applications of LB films.	15
IV	**CHEMISTRY OF SURFACTANTS-II** Surface active agents, classification, Critical micelle concentration (CMC), Methods of determining CMC, Factors affecting CMC, Micellar structure and shape, Micellar aggregation. CMC in non-aqueous media. hydrophobic interaction, Krafft temperature, Thermodynamic parameters of micellization. Counterion binding to micelles, solubilization, microemulsions, reverse micelles, surface films (electro kinetic phenomenon), catalytic activity at surfaces. Effectiveness of adsorption at Liquid/Gas and Liquid/Liquid interfaces, Szyszkiwski, Langmuir, Temkin, and Frumkin adsorption equations. Derivation of thermodynamics parameters of adsorption at the Liquid/Gas and Liquid/Liquid interfaces.	15

Suggested Readings:

1. V. R. Gowariker, N. V. Viswanathan and J. Sreedhar, Polymer Science, *New Age Internat. Pvt. Ltd*., 2015.
2. F. W. Billmeyer Jr., Textbook of Polymer Science, *Wiley India Pvt. Ltd*., 2014.
3. M. J. Rosen, Surfactants and Interfacial Phenomenon, 4thEdition. *Wiley*, 2012.
4. P. Becher, Emulsions: Theory and Practice, *American Chemical Society*, 2019.
5. H. R Alcock and F. W. Lamb, Contemporary Polymer Chemistry, *Prentice Hall*, 2017.
6. J. M. G. Cowie, Physics and Chemistry of Polymers, *Blackie Academic and Professional*, 2014.
7. F. Wold, Macromolecules: Structure and Function, *Prentice Hall of India*, 2001.
8. K. Takemoto, R. M. Ottanbrite and M. Kamachi, 2nd Edition. Functional Monomers and Polymers, *CRC press*, 1997.
9. P.C. Hiemenz, R. Rajagopalan, Principles of Colloid and Surface Chemistry, Revised and Expanded (Undergraduate Chemistry: A Series of Textbooks, 3rd Edition. *CRC Press*, 2007.
10. G. A. Somorjai, Y. Li, Introduction to Surface Chemistry and Catalysis, 2nd Edition. *Wiley*, 2010.

Course No: CH-38	Course Name: Physical Chemistry-VI (Frontiers in Electrochemistry)						Course Code: SBS CH 010422 DSE 4004	
Batch: 2021 Onwards	**Programme:** M.Sc. Chemistry	**Semester:** **IV**	**L** 4	**T** 0	**P** 0	**Credit** 4	**Contact Hrs. per Week:** **Total Hrs.:**	**04** **60**
Total Evaluation Marks: 100 **CIE:** **30** Marks **TEE:** **70** Marks		**Examination Duration:** **3** Hrs. **Pre-requisite of course:** Knowledge of basic physical chemistry up to UG level.						
Course Objectives	*To provide students with an understanding of applied physical chemistry like Electrodics, Fuel cell, Supercapacitors and rechargeable Batteries, current potential laws and Corrosion of metals and their alloys, Liquid crystals. This course will strengthen the applications of Physical Chemistry, especially Fuel cells and Batteries and Corrosion.*							
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1**: An understanding of advanced Physical Chemistry. **CO2**: Use of Fuel cells and Batteries and Corrosion in daily life. **CO3**: Skills for analyzing and developing new sustainable methods. **CO4**: Skills for developing industrially important methods. **CO5**: Development of alternate analytical methods. **CO6**: Use of advanced and recent technologies in Batteries and Corrosion.							

COURSE SYLLABUS

NOTE:

i) Question no. 1 is compulsory and to be set from the entire syllabus. It will have seven sub-parts. Each part carries 3.5 marks and students need to answer any four sub-parts.

ii) Question nos. 2 to 9 are to be set from all four units, two from each unit. Every question will have two sub-parts and students need to answer any one question from each unit. Each question carries 14 marks.

Unit No.	Contents	Contact Hrs.
I	**ELECTRODICS** Rate of charge transfer reactions under zero field, under the influence of an electric field. The equilibrium exchange current density, the non-equilibrium drift-current density (Butler-Volmer) equation. High-field and low-field approximations. Physical meaning of the symmetry factor (β), A simple picture of the symmetry factor and its dependence on over potential. Polarizable and nonpolarizable interfaces.	15
II	**FUEL CELLS, SUPERCAPACITORS AND BATTERIES** The maximum intrinsic efficiency, Actual efficiency and Current-Potential relation in an electrochemical energy converter. Factors influencing the electrochemical energy conversion, The power output of an electrochemical energy converter. Electrochemical electricity generators (fuel cells). Brief idea about H_2-O_2 fuel cell, Hydrocarbon-air fuel cells, and Natural gas, CO-air fuel cells, Supercapacitors, and Lithium ion batteries. Electricity storage: Some important quantities in electricity storage (like electricity storage density, energy density and power), Desirable conditions for an ideal storrer, Storage of electricity using the lead-acid battery, Dry cell, Silver-Zinc cell and	15

	Sodium-Sulfur cell.	
III	**CORROSION** Electrochemistry of corrosion of metals, Factors affecting corrosion, Electrochemical cell formation, Polarization of metal electrode *i.e*. Concentration, Resistance and Activation polarization. Anodic and cathodic polarization curves (Evan's diagram). Electrochemical measurement of corrosion current density, corrosion potential and mixed potential theory and Tafel slope. Impedance spectroscopy technique, Anodic passivation and passivation potential. Passivity theory. Methods of protecting metal and their alloys from corrosion (anodic protection, cathodic protection, sacrificial protection, barrier protection, use of chemical inhibitors, environment modifiers).	15
IV	**CURRENT POTENTIAL LAWS AND LIQUID CRYSTALS** Comparison of electrolytic interface to other type of charged interfaces *i.e.* semiconductors *p-n* junctions. The current across biological membranes, Hot and cold emission of electrons from a metal into vacuum. Dye sensitized solar cells. Liquid crystals: Mesomorphic behavior, thermotropic liquid crystals, positional order, bond orientational order, nematic and smetic mesophases, Smectic-nematic transition, twisted nematics, chiral nematics, optical properties of liquid crystals.	15

Suggested Readings:

1. M. G. Fontana, Corrosion Engineering, *McGraw Hill*, 2017.
2. H. K. Moudgil, Textbook of Physical Chemistry, *PHI Publication House*, New Delhi, 2015.
3. S. Glasstone, An introduction to Electrochemistry, *Est West Press Ltd*., 2016.
4. J. O. M. Bockris and A. K. N. Reddy, Modern Electrochemistry-I, *Springer*, 2009.
5. R. Narain, An Introduction to Metallic Corrosion, *Oxford and IBH Pub Co.*, 1993.
6. P. Atkins and J. Paula, Atkins' Physical Chemistry, *Oxford University Press*, 10th ed., 2014.
7. D. Mcquarie and J. Simon, Physical Chemistry-A Molecular Approach, 1stEdition. *Viva*, 2010.
8. J. O**.** M. Bockris and A. K. N. Reddy, Modern Electrochemistry-I (Ionics), *Springer*, 2006.
9. J. O. M. Bockris and A. K. N. Reddy, Modern Electrochemistry-II, *Springer*, 2016.

PRACTICAL COURSES

Course No: CH-06	Course Name: Physical Chemistry Practical-I						Course Code: SBS CH 010106 C 0042	
Batch: 2021 Onwards	**Programme:** M.Sc. Chemistry	**Semester:** I	**L** 0	**T** 0	**P** 4	**Credit** 2	**Contact Hrs. per Week:** 04	**Total Hrs.:** 60
Total Evaluation Marks: 50 **CIE:** **15** Marks **TEE:** **35** Marks	**Examination Duration:** 6 Hrs. **Pre-requisite of course:** Knowledge of solution preparation, safety measure in chemistry practical laboratory and basic practical knowledge up to UG level.							
Course Objectives	*To train students with introductory physical chemistry practical like adsorption, saponification value, molecular weight determination, surface tension, viscosity, distribution law and thermochemistry.*							
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1**: Basic understanding of practical physical chemistry. **CO2**: Use of surface tension, viscosity, adsorption in daily life. **CO3**: Skills for analyzing and developing new sustainable methods. **CO4**: Skills for developing industrially important practical methods. **CO5**: Development of alternate analytical methods. **CO6**: Use of advanced and recent techniques in experimental chemistry.							

COURSE SYLLABUS

NOTE:
Depending on availability of time and equipment some experiments may be added/deleted.

Unit No.	Contents	Contact Hrs.
I	**HANDS ON TRAINING IN PHYSICAL CHEMISTRY EXPERIMENTS** *Partial Molar Quantities* ● To determine the partial molar volume of urea and ethanol in aqueous solution from density measurements. *Adsorption* ● To determine the adsorption isotherms of acetic acid from aqueous solution and I_2 from alcoholic solution by charcoal. ● To investigate the adsorption of oxalic acid from aqueous solution by activated charcoal and to examine the validity of Freundlich & Langmuir's adsorption isotherms. *Acid and Saponification Value* ● To find out the acid value of a given sample. ● To find out the saponification value of given vegetable oil. *Molecular Weight of Polymer* To determine the molecular weight of a given polymeric solution by viscosity and Rast	30

	method.	
II	**BASICS PHYSICAL CHEMISTRY EXPERIMENTS** *Surface Tension/Interfacial Tension* ● To find surface tension/interfacial tension between two immiscible liquids. ● To determine the percentage composition of a given mixture of two liquids say CCl_4 and Toluene by surface tension method. Viscosity ● To find viscosity and coefficient of viscosity of unknown liquids by Ostwald's viscometer method. ● To determine the percentage composition of given unknown mixture by viscosity method. *Distribution Law* ● To study the distribution of benzoic acid, I_2, succinic acid between organic liquid and water at room temperature and show that whether BA, I_2, Succinic acid dimerizes in organic liquid or water. Thermochemistry ● To determine the heat of neutralization of sulphuric acid using Dewar's vacuum flask as the calorimeter. ● To determine the heat of ionization of a weak base i.e. NH_4OH using calorimeter.	30

Suggested Readings:

1. B. Viswanathan and P. S. Raghavan, Practical Physical Chemistry, *M V Learning*, 2017.
2. Shoemaker and Garland, Experiments in Physical Chemistry, *McGraw Hill*, 2015.
3. B. D. Khosla, V. C. Garg and Adarsh Gulati, Senior Practical Physical Chemistry, *R. Chand & Co.*, New Delhi, 2014.
4. Saroj Kumar Maity, Naba Kumar Ghosh, Physical Chemistry Practical, *New Central book Agency*, 2012.
5. G. P. Mathews, Experimental Physical Chemistry, 1st Edition. *Oxford University Press*, 1995.
6. A. M. James and F. E. Prichard, Practical Physical Chemistry, *Lomgman*, 1994.
7. B. P. Levitt, Findley's Practical Physical Chemistry, 9th Edition. *Longman Group Ltd.*, 1993.
8. J. B. Yadav, Advanced Practical Physical Chemistry, *Goel Publishing House*, 1991.
9. R. C. Das and B. Behara, Experimental Physical Chemistry, *Tata McGraw Hill*, 1984.

Course No: CH-12	Course Name: Physical Chemistry Practical-II					Course Code: SBS CH 010212 C 0042	
Batch: 2021 Onwards	**Programme:** M.Sc. Chemistry	**Semester:** II	**L** 0	**T** 0	**P** 4	**Credit** 2	**Contact Hrs. per Week: 04** **Total Hrs.: 60**
Total Evaluation Marks: 50 **CIE: 15** Marks **TEE: 35** Marks	**Examination Duration:** 6 Hrs. **Pre-requisite of course:** Knowledge of solution preparation, safety measure in chemistry practical laboratory and basic practical knowledge up to UG level.						
Course Objectives	*To provide students exposure of refractometry, chemical kinetics, solution chemistry, turbidity metry, and pH, potentio and conductometry experiments. Advanced experiments such as pH metry, potentiometry and conductometry will be carried out. First-hand experience of turbidity meter studies will be provided. At the end of this course students will be equipped to carry out instrumental analysis at the research level.*						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1**: Basic understanding of practical physical chemistry. **CO2**: Use of pH meter, potentiometer, conductivity meter in daily life. **CO3**: Skills for analyzing and developing new sustainable methods. **CO4**: Skills for developing industrially important practical methods. **CO5**: Development of alternate analytical methods. **CO6**: Use of advanced and recent techniques in experimental chemistry.						

COURSE SYLLABUS

NOTE:
Depending on availability of time and instruments in laboratory, few experiments may be added/deleted.

Unit No.	Contents	Contact Hrs.
I	**CHEMICAL KINETICS AND pH METRY EXPERIMENTS** *Chemical Kinetics* ● Determination of the effect of (a) change in temperature, (b) change in concentration of reactants and catalysts (c) ionic strength of the media on velocity constant of hydrolysis of an ester. ● Determine the velocity constant of hydrolysis of ethyl acetate catalyzed by an acid and NaOH solution. *Solution Chemistry* ● To determine the solubility of an inorganic salt like KCl, NaCl, KNO_3, $NaNO_3$, K_2SO_4 in water at different temperature and hence to obtain the solubility curve. ● To determine the heat of solution of given substance like oxalic acid and benzoic acid by solubility method. *pH metric* ● To determine the strength of strong acid versus strong base, weak acid versus strong base, mixture of strong and weak acids versus strong base, weak acid versus	30

	weak base, strong acid versus weak base using a pH meter. ● To determine the concentration of a reductant or an oxidant i.e. Ferrous ammonium sulphate, $K_2Cr_2O_7$and $KMnO_4$ by a pH metric titration method.	
II	**POTENTIOMETRY AND CONDUCTOMETRY EXPERIMENTS** *Potentiometry* ● To determine the strength of strong acid versus strong base, weak acid versus strong base, mixture of strong and weak acids versus strong base, weak acid versus weak base, strong acid versus weak base using a potentiometer. ● To prepare and test the standard reference electrode i.e., calomel electrode or silver- silver chloride electrode. ● Titrate Mohr's salt against $KMnO_4$potentiometrically and carry out the titration in reverse order. *Turbidimetry* ● To find the turbidity of given solution by using Nephthalo turbidity meter. *Conductometry* ● Study of conductometric titration of NH_4Cl versus NaOH solution, CH_3COONa versus HCl, $MgSO_4$ versus $Ba(OH)_2$, $BaCl_2$ and $K_2SO_4$and comment on the nature of graph. ● To study stepwise neutralization of polybasic acid like oxalic acid, citric acid, phosphoric acid by conductometric titration and explain the variation in the graph.	30

Suggested Readings:

1. B. Viswanathan and P. S. Raghavan, Practical Physical Chemistry, *M V Learning*, 2017.
2. Shoemaker and Garland, Experiments in Physical Chemistry, *McGraw Hill*, 2015.
3. B. D. Khosla, V. C. Garg and Adarsh Gulati, Senior Practical Physical Chemistry, *R. Chand & Co.*, New Delhi, 2014.
4. S. K. Maity and N. K. Ghosh, Physical Chemistry Practical, *New Central book Agency*, 2012.
5. G. P. Mathews, Experimental Physical Chemistry, 1stEdition. *Oxford University Press*, 1995.
6. A. M. James and F. E. Prichard, Practical Physical Chemistry, *Lomgman*, 1994.
7. B. P. Levitt, Findley's Practical Physical Chemistry, 9thEdition. *Longman Group Ltd.*, 1993.
8. J. B. Yadav, Advanced Practical Physical Chemistry, *Goel Publishing House*, 1991.
9. R. C. Das and B. Behara, Experimental Physical Chemistry, *Tata McGraw Hill*, 1984.

Course No: CH-27	Course Name: Physical Chemistry Practical-III						Course Code: SBS CH 010311 DSE 0063	
Batch: 2021 Onwards	**Programme:** M.Sc. Chemistry	**Semester:** **III**	**L** 0	**T** 0	**P** 6	**Credit** 3	**Contact Hrs. per Week:** **06** **Total Hrs.:** **90**	
Total Evaluation Marks: 75 **CIE:** **22.5** Marks **TEE:** **52.5** Marks	**Examination Duration:** 8 Hrs. **Pre-requisite of course:** Knowledge of solution preparation, safety measure in chemistry practical laboratory and basic practical knowledge up to UG level.							
Course Objectives	*To provide students exposure of solution chemistry, phase rule, spectrophotometry, polarimetry, ultrasonic interferometry and pH metry, potentiometry and conductometry experiments. Advanced experiments such as ultrasonic interferometer and spectrophotometer will be carried out. First-hand experience of polarimetric studies will be provided. At the end of this course students will be equipped to carry out instrumental analysis at the research level.*							
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1**: Basic understanding of practical physical chemistry. **CO2**: Use of pH meter, potentiometer, conductivity meter in daily life. **CO3**: Skills for analyzing and developing new sustainable methods. **CO4**: Skills for developing industrially important practical methods. **CO5**: Development of alternate analytical methods. **CO6**: Use of advanced and recent techniques in experimental chemistry.							

COURSE SYLLABUS

NOTE:
Depending on availability of time and instruments in laboratory, few experiments may be added/deleted.

Unit No.	Contents	Contact Hrs.
I	**CONDUCTOMETRY AND pH METRY** *Conductometry* ● Determination of the equivalent conductance of strong electrolytes such as HCl, KCl, KNO_3, $AgNO_3$ and NaCl and the validity of Onsager equation. ● Determination of the solubility of lead sulfate and silver halides. ● Conductometric titration of Strong acid *vs*. strong base, weak acid *vs*. strong base, Strong acid *vs*. weak base, weak acid *vs*. weak base using conductivity meter. *pH metric* ● Acid base titration of a non-aqueous media using pH meter. ● Determination of dissociation constant of acetic acid in DMSO, DMF, acetone and dioxane by titrating it with KOH. ● To determine the strength of strong acid versus weak base (NH_4OH), weak acid versus weak base, strong and weak acid mixture against a weak base	30

	using a pH meter. • To determine the degree of hydrolysis and hydrolysis constant of aniline, acetic acid by pH metrically.	
II	**SPECTROPHOTOMETRY AND POLARIMETERY** *Spectrophotometry* • Determine the concentration of Crystal violet and Aurine in mixture of (Crystal violet + Aurine) solution. • To determine the dissociation constant (K_a)of Methyl red using UV-visible absorption spectrophotometer. • Verification of Beer law using solutions such as I_2 in CCl_4, and $CuSO_4$ in water, $K_2Cr_2O_7$ and $KMnO_4$ in sulphuric acid medium.	30
III	*Polarimetry* • To determine the concentration of an optically active substance using polarimeter. • To determine the percentage of two optically active substances in a given mixture. *Solution Chemistry* • Determination of Solubility by evaporation and gravimetric method. • Determination of transition temperature by thermometric method.	30

Suggested Readings:

1. B. Viswanathan, P. S. Raghavan, Practical Physical Chemistry, *M V Learning*, 2017.
2. Shoemaker and Garland, Experiments in Physical Chemistry, *McGraw Hill*, 2015.
3. B. D. Khosla, V. C. Garg and Adarsh Gulati, Senior Practical Physical Chemistry, *R. Chand & Co.*, New Delhi, 2014.
4. S. K. Maity and N. K. Ghosh, Physical Chemistry Practical, *New Central book Agency*, 2012.
5. G. P. Mathews, Experimental Physical Chemistry, 1st Edition. *Oxford University Press*, 1995.
6. A. M. James and F. E. Prichard, Practical Physical Chemistry, *Lomgman*, 1994.
7. B. P. Levitt, Findley's Practical Physical Chemistry, 9th Edition. *Longman Group Ltd.*, 1993.
8. J. B. Yadav, Advanced Practical Physical Chemistry, *Goel Publishing House*, 1991.
9. R. C. Das and B. Behara, Experimental Physical Chemistry, *Tata McGraw Hill*, 1984.

Course No: CH-28	Course Name: Physical Chemistry Practical-IV						Course Code: SBS CH 010312 DSE 0063	
Batch: 2021 Onwards	**Programme:** M.Sc. Chemistry	**Semester:** **III**	**L** 0	**T** 0	**P** 6	**Credit** 3	**Contact Hrs. per Week:** **Total Hrs.:**	**06** **90**
Total Evaluation Marks: 75 **CIE:** **22.5** Marks **TEE:** **52.5** Marks		**Examination Duration:** 8 Hrs. **Pre-requisite of course:** Knowledge of solution preparation, safety measure in chemistry practical laboratory and basic practical knowledge up to UG level.						
Course Objectives	*To provide students exposure of phase rule, ultrasonic interferometry and pH metry, potentiometry and conductometry experiments. Advanced experiments such as ultrasonic interferometer and spectrophotometer will be carried out. First-hand experience of polarimetric studies will be provided. At the end of this course students will be equipped to carry out instrumental analysis at the research level.*							
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1**: Basic understanding of practical physical chemistry. **CO2**: Use of phase rule, ultrasonic interferometer, conductivity meter in daily life. **CO3**: Skills for analyzing and developing new sustainable methods. **CO4**: Skills for developing industrially important practical methods. **CO5**: Development of alternate analytical methods. **CO6**: Use of advanced and recent techniques in experimental chemistry.							

COURSE SYLLABUS

NOTE:
Depending on availability of time and instruments in laboratory, few experiments may be added/deleted.

Unit No.	Contents	Contact Hrs.
I	**PHASE RULE AND ULTRASONIC INTERFEROMETER** *Phase Rule* ● To verify the phase rule for a given two and three component Azeotropic mixtures. ● To determine the transition temperature of given salt hydrate like Sodium sulphate, Strontium sulphate or Sodium thiosulphate. *Ultrasonic Interferometer* ● To find ultrasonic speed of given organic binary liquid mixtures of different composition. ● To study the effect of temperature on ultrasonic speed of given organic mixture.	30
II	**POTENTIOMETRY-I EXPERIMENTS** *Potentiometry* ● To determine the thermodynamic parameters for a reaction from EMF measurement. ● To determine the pH of a series of buffer solutions by potentiometric method. ● To determine the solubility product of AgCl and to determine instability constant of $Ag(NH_3)_2^+$ complex. ● To determine the activity of hydrogen ion in acid medium using hydrogen electrode, hence to determine the ionic product of water and hydrolysis constant of sodium	30

	acetate. ● To determine the degree of hydrolysis and hydrolysis constant of weak acid by potentiometry.	
III	**MAGNETIC MOMENT AND MAGNETIC SUSCEPTIBILITY** ● Determine the magnetic susceptibility of a paramagnetic substance using Gouy's Balance. ● To study the change in weight of a substance after passing magnetic lines of force. **POTENTIOMETRY-II EXPERIMENTS** ● To determine the concentration of a reductant or an oxidant i.e. Ferrous ammonium sulphate and Ceric sulphate by a potentiometric redox titration. ● To determine the amount of KI and KCl present in a mixture by potentiometric titration.	30

Suggested Readings:

1. B. Viswanathan and P. S. Raghavan, Practical Physical Chemistry, *M V Learning*, 2017.
2. Shoemaker and Garland, Experiments in Physical Chemistry, *McGraw Hill*, 2015.
3. B. D. Khosla, V. C. Garg and Adarsh Gulati, Senior Practical Physical Chemistry, *R. Chand & Co.*, New Delhi, 2014.
4. S. K. Maity and N. K. Ghosh, Physical Chemistry Practical, *New Central book Agency*, 2012.
5. G. P. Mathews, Experimental Physical Chemistry, 1st Edition. *Oxford University Press*, 1995.
6. A. M. James and F. E. Prichard, Practical Physical Chemistry, *Lomgman*, 1994.
7. B. P. Levitt, Findley's Practical Physical Chemistry, 9th Edition. *Longman Group Ltd.*, 1993.
8. J. B. Yadav, Advanced Practical Physical Chemistry, *Goel Publishing House*, 1991.
9. R. C. Das and B. Behara, Experimental Physical Chemistry, *Tata McGraw Hill*, 1984.

Course No: CH-39	Course Name: Physical Chemistry Practical-V						Course Code: SBS CH 010423 DSE 0063	
Batch: 2021 Onwards	**Programme:** M.Sc. Chemistry	**Semester:** **IV**	**L** 0	**T** 0	**P** 6	**Credit** 3	**Contact Hrs. per Week:** **06** **Total Hrs.:** **90**	
Total Evaluation Marks: 75 **CIE:** **22.5** Marks **TEE:** **52.5** Marks	**Examination Duration:** 8 Hrs. **Pre-requisite of course:** Knowledge of solution preparation, safety measure in chemistry practical laboratory and basic practical knowledge up to UG level.							
Course Objectives	*To provide students exposure of Flame photometry, theoretical (computational) techniques, chronopotentiometry, chromatography, and conductometry experiments. Advanced experiments such as chronopotentiometry and computational will be carried out. First-hand experience of chronopotentiometry will be provided. At the end of this course students will be equipped to carry out instrumental analysis at the research level.*							
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1**: Basic understanding of practical physical chemistry. **CO2**: Use of flame photometer, computational techniques, chronopotentiometry in daily life. **CO3**: Skills for analyzing and developing new sustainable methods. **CO4**: Skills for developing industrially important practical methods. **CO5**: Development of alternate analytical methods. **CO6**: Use of advanced and recent techniques in experimental chemistry.							

COURSE SYLLABUS

NOTE:
Depending on availability of time and instruments available in laboratory, few experiments may be added/deleted.

Unit No.	Contents	Contact Hrs.
I	**FLAME PHOTOMETRY AND COMPUTATIONAL TECHNIQUES** • Determination of Na^+ and K^+ ions when present together. • Determination of Li/Ca/Ba/Sr ions present in any analyte. *Computational Techniques* • Elementary exercise in computer graphics an illustrative experiment solving the interactive equation. • Plotting a graph in origin. • Drawing a structure of molecules in Avogadro software and molecular modelling.	30
II	**CHROMATOGRAPHY AND CONDUCTOMETRY** • To prepare citric acid from sodium citrate and aniline from aniline hydrochloride using cationic and anionic exchangers. • To differentiate common sugars/amino acids by paper chromatography. *Conductometry* • Titrate a moderately strong acid (Salicylic/Mandelic acid) by the salt line and double alkali method.	30

	• Titrate a mixture of copper sulphate, acetic acid and sulphuric acid with sodium hydroxide. • Titrate magnesium sulphate against $BaCl_2$ and its reverse reaction.	
III	**CHRONOPOTENTIOMETRY TECHNIQUES** • Determine the extent of catalytic activity of Pt and Cu electrode by H_2 evolution reaction (HER). • Determine the extent of catalytic activity of Pt and Cu electrode by O_2 evolution reaction (OER). • Determine the area and roughness factor of the electrode by H-adsorption and H-desorption.	30

Suggested Readings:

1. B. Viswanathan and P. S. Raghavan, Practical Physical Chemistry, *M V Learning*, 2017.
2. Shoemaker and Garland, Experiments in Physical Chemistry, *McGraw Hill*, 2015.
3. B. D. Khosla, V. C. Garg and Adarsh Gulati, Senior Practical Physical Chemistry, *R. Chand & Co.*, New Delhi, 2014.
4. S. K. Maity and N. K. Ghosh, Physical Chemistry Practical, *New Central book Agency*, 2012.
5. G. P. Mathews, Experimental Physical Chemistry, 1stEdition. *Oxford University Press*, 1995.
6. A. M. James and F. E. Prichard, Practical Physical Chemistry, *Lomgman*, 1994.
7. B. P. Levitt, Findley's Practical Physical Chemistry, 9thEdition. *Longman Group Ltd.*, 1993.
8. J. B. Yadav, Advanced Practical Physical Chemistry, *Goel Publishing House*, 1991.
9. R. C. Das and B. Behara, Experimental Physical Chemistry, *Tata McGraw Hill*, 1984.

Course No: CH-40	Course Name: Physical Chemistry Practical-VI						Course Code: SBS CH 010424 DSE 0063
Batch: 2021 Onwards	**Programme:** M.Sc. Chemistry	**Semester:** **IV**	**L** 0	**T** 0	**P** 6	**Credit** 3	**Contact Hrs. per Week: 06** **Total Hrs.: 90**
Total Evaluation Marks: 75 **CIE: 22.5** Marks **TEE: 52.5** Marks	**Examination Duration:** 8 Hrs. **Pre-requisite of course:** Knowledge of solution preparation, safety measure in chemistry practical laboratory and basic practical knowledge up to UG level.						
Course Objectives	*To provide students exposure of nanotechnology experiments. Advanced experiments such as electrochemical methods and sol-gel, co-precipitation method will be carried out. First-hand experience of nanotechnology will be provided. At the end of this course students will be equipped to carry out instrumental analysis at the research level.*						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1**: Basic understanding of practical physical chemistry. **CO2**: Use of electrochemical, Sol-gel, Coprecipitation methods in daily life. **CO3**: Skills for analyzing and developing new sustainable methods. **CO4**: Skills for developing industrially important practical methods. **CO5**: Development of alternate analytical methods. **CO6**: Use of advanced and recent techniques in experimental chemistry.						

COURSE SYLLABUS

NOTE:
Depending on availability of time and instruments available in the laboratory, few experiments may be added/deleted.

Unit No.	Contents	Contact Hrs.
I	**SYNTHESIS OF NANOPARTICLES** • Synthesize metal nanoparticles by sol-gel method. • Synthesize metal nanoparticles by co-precipitation method. • Synthesize metal nanoparticles by reverse micelle technique. • Extract metal nanoparticles from plants and their products like Mg from chlorophyll.	30
II	**ELECTROCHEMICAL TECHNIQUES** • Record anodic and cathodic polarization of metal electrode in acidic medium. • Find corrosion rate from Tafel plots using Stern-Gerry equation. • Record Nyquist and Bode plots for MS electrode dipped in acidic medium. • Record cyclic Voltammogram and find anodic and cathodic oxidative peak. • Verify Cottrell equation using potential step chronoamperometry.	30
III	**CHARACTERIZATION TECHNIQUES** • Characterization of metal nanoparticles by UV-visible and FTIR spectroscopy techniques. • Estimate direct and indirect optical energy band gap of metal nanoparticles by UV-visible spectroscopy technique.	30

Suggested Readings:

1. B. Viswanathan and P. S. Raghavan, Practical Physical Chemistry, *M V Learning*, 2017.
2. Shoemaker and Garland, Experiments in Physical Chemistry, *McGraw Hill*, 2015.
3. B. D. Khosla, V. C. Garg and Adarsh Gulati, Senior Practical Physical Chemistry, *R. Chand & Co.*, New Delhi, 2014.
4. S. K. Maity and N. K. Ghosh, Physical Chemistry Practical, *New Central book Agency*, 2012.
5. G. P. Mathews, Experimental Physical Chemistry, 1st Edition. *Oxford University Press*, 1995.
6. A. M. James and F. E. Prichard, Practical Physical Chemistry, *Lomgman*, 1994.
7. B. P. Levitt, Findley's Practical Physical Chemistry, 9th Edition. *Longman Group Ltd.*, 1993.
8. J. B. Yadav, Advanced Practical Physical Chemistry, *Goel Publishing House*, 1991.
9. R. C. Das and B. Behara, Experimental Physical Chemistry, *Tata McGraw Hill*, 1984.

DISCIPLINE CENTRIC ELECTIVE COURSES (DCEC)

Course No: CH-43	Course Name: Reaction Mechanism: Structure and Reactivity				Course Code: SBS CH 010101 DCE 2002		
Batch: 2021 Onwards	**Programme:** M.Sc. Chemistry	**Semester:** I	**L** 2	**T** 0	**P** 0	**Credit** 2	**Contact Hrs. per Week: 02** **Total Hrs.: 30**
Total Evaluation Marks: 50 **CIE:** 15 Marks **TEE:** 35 Marks		**Examination Duration:** 2Hrs. **Pre-requisite of course:** Basic and advance knowledge of Physical Organic Chemistry.					
Course Objective	*To provide a basic and advanced knowledge of physical organic chemistry including a better understanding of a reaction mechanism, kinetic and non-kinetic methods, the different types of reactive intermediates involved during a chemical reaction, and kinetic and thermodynamically controlled reactions.*						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1**: Fundamental understanding of a reaction mechanism. **CO2**: Basic idea of a reactive intermediate involved during a chemical reaction. **CO3**: Basic knowledge of a kinetic and thermodynamic controlled product formation. **CO4**: Basic knowledge of kinetics and non-kinetics method to study a reaction mechanism. **CO5**: Idea about the correlation of stereochemistry and mechanism **CO6**: Advanced knowledge about general physical organic chemistry principles						

COURSE SYLLABUS

NOTE:
i) Question no. 1 is compulsory and to be set from the entire syllabus. It will have four sub-parts and students need to answer any two. Each part carries three and half marks.
ii) Question nos. 2 to 5 are to be set from all four units one from each. Every question will have three sub-parts and students need to answer any two sub-parts of each question. Each part carries three and half marks.

Unit No.	Contents	Contact Hrs.
I	**FUNDAMENTALS OF REACTION MECHANISMS** Fundamentals of stereoelectronic effects and reactivity, acids and bases, reaction types, intermediates and transition state, effect of temperature and catalysts.	7
II	**REACTIVE INTERMEDIATES** Introduction to structure, formation, stability and reactions of carbocations, carbanions, free radicals, radical anions, radical cations, arynes, carbenes and nitrenes.	8
III	**CHEMICAL EQUILIBRIA AND REACTIVITY** Thermodynamic and kinetic control of reactions, Correlation of reactivity with structure, linear free energy relationships, Hammond's postulate, Curtin-Hammett principle.	7
IV	**KINETICS AND NON-KINETIC METHODS TO STUDY MECHANISM** Kinetic methods: primary and secondary kinetic isotopic effects, isotopic labeling; non-kinetic methods: detection and interception of intermediates, systematic structural variation, stereochemical studies and cross-over experiments.	8

Suggested Readings:

1. F. A. Carey and R. J. Sundberg, Advanced Organic Chemistry, Part A, 5th Edition, Springer, 2012.
2. E. V. Anslyn and D. A. Dougherty, Modern Physical Organic Chemistry, University Science Books, 2005.
3. Warren, S.; Greeves, N.; J. Clayden and P. Wothers, Organic Chemistry, 2nd Edition, Oxford University Press, 2001.
4. J. March, Advanced Organic Chemistry, Reactions, Mechanisms and Structure, 4th Edition, John-wiley, 1999.
5. N. S. Isaacs, Physical Organic Chemistry, 2nd Edition, Longman Scientific & Technical, 1995.
6. P. Sykes, A guidebook to Mechanism in Organic Chemistry, 5th Edition, Longman Scientific Technical, 1985.
7. P. Deslongchamps, Stereoelectronic Effects in Organic Chemistry, Pergamon, 1983.

Course No: CH-44	Course Name: Nuclear Chemistry					Course Code: SBS CH 010102 DCE 2002	
Batch: 2021 Onwards	**Programme:** M.Sc. Chemistry	**Semester:** I	**L** 2	**T** 0	**P** 0	**Credit** 2	**Contact Hrs. per Week: 02** **Total Hrs.: 30**
Total Evaluation Marks:50 **CIE: 15** Marks **TEE: 35** Marks		**Examination Duration:** 2 Hrs.					
		Pre-requisite of *course:* To provide the basic knowledge of nuclear structures, radioactivity and applications.					
Course Objectives	*To provide the basics of nuclear structures, radiations, artificial radioactivity and applications of nuclear chemistry, radiopharmacy and chelation therapy.*						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1**: Basic understanding of nuclear structure **CO2**: To identify and understand various nuclear reactions **CO3**: Measurement of radioactivity **CO4**: Artificial radioactivity **CO5**: To understand chelation therapy **CO6**: Applications of nuclear chemistry						

COURSE SYLLABUS

NOTE:

i) Question no. 1 is compulsory and to be set from the entire syllabus. It will have four sub-parts and students need to answer any two. Each part carries three and half marks.

ii) Question nos. 2 to 5 are to be set from all four units one from each. Every question will have three sub-parts and students need to answer any two sub-parts of each question. Each part carries three and half marks.

Unit No.	Contents	Contact Hrs.
I	**NUCLEAR STRUCTURE** Composition of the nucleus, nuclear size, shape and density, theories of nuclear composition, magnetic and electric properties of nucleus, nuclear spin and parity, nuclear binding forces.	7
II	**NUCLEAR REACTIONS** Penetration potential, nuclear binding energy, nuclear emissions, nuclear transformations, bombardment of nuclei, nuclear fission, nuclear fusion, nuclear explosives, nuclear reactors in India, Szilard–Chalmer's effect, fuel cycle and waste management, reactor power control.	8
III	**RADIOACTIVITY** Radioactive decay and growth, naturally occurring and artificially produced radioactive substances, Measurement of radioactivity, group displacement law, radioactive disintegration series, rate of disintegration, half-life, average life of radioactive elements, unit of radioactivity, nuclear decay, determination of decay constants, decay rates, types of nuclear decay.	7

IV	**ARTIFICIAL RADIOACTIVITY AND APPLICATIONS OF NUCLEAR CHEMISTRY** Discovery of artificial radioactivity, isotopes used in medicines, radiocarbon dating, age determination, effects of radiation on life, applications of tracer element in medical, agriculture and analytical fields, biological effects of radiation, radiation protections, chelation therapy.	8

Suggested Readings:

1. G. Friedlander, J. W. Kennedy, E. S. Macias; Nuclear and Radiochemistry, 3rdEdition.*Willey*, 2013.
2. W. D. Loveland, D. Morrissey and G. T. Seaborg, Modern Nuclear Chemistry, *John Wiley & Sons*, 2006.
3. C. E. Housecroft and A. G. Sharpe; *Inorganic Chemistry*, 2ndEdition.*Pearson*, 2005.
4. H. J. Arnikar, Essentials of Nuclear Chemistry, *Wiley Eastern*, 1988.

Course No: CH-45	Course Name: Green Chemistry					Course Code: SBS CH 010303 DCE 2002	
Batch: 2021 Onwards	**Programme:** M.Sc. Chemistry	**Semester:** III	**L** 2	**T** 0	**P** 0	**Credit** 2	**Contact Hrs. per Week: 02** **Total Hrs.: 30**
Total Evaluation Marks:50 **CIE: 15** Marks **TEE: 35** Marks		**Examination Duration:** 2Hrs. **Pre-requisite of course:** Basic knowledge of writing balanced chemical reactions. Basic understanding of nature of solvents, catalysts, chromatography and electromagnetic spectrum.					
Course Objectives	*To provide the basic knowledge of Green Chemistry and its applications in the field of chemical sciences.*						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1**: Basic understanding of green chemistry **CO2**: Use of greener and renewable catalysts and their applications **CO3**: Skills for analyzing and developing new sustainable methods **CO4**: Skills for developing industrially important methods **CO5**: Development of alternate and new eco-friendly synthetic pathways to chemicals **CO6**: Use of advanced and recent green technologies in organic synthesis						

COURSE SYLLABUS

NOTE:

i)Question no. 1 is compulsory and to be set from the entire syllabus. It will have four sub-parts and students need to answer any two. Each part carries three and half marks.

ii) Question nos. 2 to 5 are to be set from all four units one from each. Every question will have three sub-parts and students need to answer any two sub-parts of each question. Each part carries three and half marks.

Unit No.	Contents	Contact Hrs.
I	**INTRODUCTION TO GREEN CHEMISTRY** Green chemistry history, needs and goals. Limitation/Obstacles in pursuit of the goals of green chemistry. Opportunities for next generation designer materials to create safer future. Twelve principles of Green Chemistry and their illustrations with examples.	7
II	**GREEN CATALYSIS AND RENEWABLE RAW MATERIALS** Heterogeneous catalysis: Use of zeolites, silica, alumina, clay, polymers, cyclodextrin and supported catalyst; Phase-transfer catalysis; Biocatalysis using enzymes; Biomass conversion to fine chemicals.	8
III	**GREENER SOLVENTS** Reactions under aqueous medium: Enhancement of selectivity, efficiency and industrial applicability. Ionic liquids; Supercritical fluids; Solvent free reactions in solid and liquid phase; Alternatives in extraction and chromatography.	7

IV	**GREEN TECHNOLOGY AND FUTURE TRENDS IN GREEN CHEMISTRY** Microwave and Ultrasound assisted reactions; photochemical reactions using sunlight; Flow techniques; combinatorial green chemistry. Green synthesis of ibuprofen and adipic acid (traditional vs green ones).	8

Suggested Readings:

10. G. Brahmachari, Catalyst-free Organic Synthesis. *Royal Society of Chemistry*, 2018.
11. M. Lancaster, Green Chemistry: An Introductory Text,3rd Edition. *Royal Society of Chemistry*, 2016.
12. F. M. Kerton, Alternative Solvents for Green Chemistry. *Royal Society of Chemistry*, 2013.
13. R. A. Sheldon, I. Arends and U. Hanefeld, Green Chemistry and Catalysis, 1stEdition. *Wiley-VCH*, 2007.
14. M. A. Ryan and M. Tinnes, Introduction to Green Chemistry. *American Chemical Society*, 2003.
15. P. T. Anastas and J. C. Warner, Green Chemistry: Theory and Practice. *Oxford University Press*, 1998.

Course No: CH-46	Course Name: Carbohydrate Chemistry and its Applications						Course Code: SBS CH 010304 DCE 2002
Batch: 2021 Onwards	**Programme:** M.Sc. Chemistry	**Semester:** III	**L** 2	**T** 0	**P** 0	**Credit** 2	**Contact Hrs. per Week:** 02 **Total Hrs.:** 30
Total Evaluation Marks: 50 **CIE:** **15** Marks **TEE:** **35** Marks		**Examination Duration:** 2 Hrs. **Pre-requisite of course:** Basic knowledge of writing chemical formulae, their interconversion and stereochemistry of substituted cyclohexane. Understanding of common reactions of aldehydic and ketonic functional groups.					
Course Objectives	*To provide the knowledge of chemistry of carbohydrates, their reactions and applications*						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1**: Basic understanding of carbohydrates **CO2**: In-depth understanding of carbohydrates and their reactions **CO3:** Important aspects of carbohydrates associated with human health **CO4**: Skills to design and create products and solutions to real life problems **CO5**: Understanding the role of carbohydrates in other allied fields **CO6**: Ability to analyse, design and solve problems based on carbohydrates						

COURSE SYLLABUS

NOTE:

i)Question no. 1 is compulsory and to be set from the entire syllabus. It will have four sub-parts and students need to answer any two. Each part carries three and half marks.

ii) Question nos. 2 to 5 are to be set from all four units one from each. Every question will have three sub-parts and students need to answer any two sub-parts of each question. Each part carries three and half marks.

Unit No.	Contents	Contact Hrs.
I	**CARBOHYDRATES-I** Introduction and biomedical Importance, Classification: Monosaccharides, oligosachharides and polysaccharides, Sugars and non-sugars, Reducing and non-reducing sugars. Monosaccharides: Nomenclature, Structural representation, Isomerism. Physical and chemical properties of some important monosaccharides including stereochemical aspects wherever needed.	7
II	**CARBOHYDRATES-II** Synthesis of glucose and fructose. Oligosaccharides: Nomenclature and important terminology, Structural representation, Isomerism, physical and chemical properties of some important disaccharides (lactose, maltose and sucrose).	8
III	**CARBOHYDRATES-III** Polysaccharides: Nomenclature and important terminology, Homo and heteroploysaccharides, Structural representation. Physical and chemical properties of some important polysaccharides (Cellulose, Starch, Chitin). Glycolysis: Metabolism of Glucose.	7

IV	**CARBOHYDRATES-IV** Applications: Importance of monosaccharides and their derivatives like deoxy sugars, glycosides, myoinositol, amino sugars, *N*-acetylmuramic acid, sialic acid in different fields. Importance of oligosaccharides and polysaccharides in different sectors. Artificial sweeteners: Synthesis and importance.	8

Suggested Readings:

1. P. Y. Bruice, Organic Chemistry, 5th Edition. *Pearson Education*, 2014.
2. M. Sinnott, Carbohydrate Chemistry and Biochemistry: Structure and Mechanism, 2nd Edition. *Royal Society of Chemistry*, 2013.
3. P. Y. Bruce and K. J. R. Prasad, Essential Organic Chemistry, *Pearson Education*, New Delhi, 2008.
4. T. K. Lindhorst, Essentials of Carbohydrate Chemistry and Biochemistry, 3rd Edition, *Wiley*, 2007.
5. A. L. Lehninger, D. L. Nelson and M. M. Cox, Lehninger Principles of Biochemistry, 4th Edition. *W. H. Freeman*, 2004.
6. M. Loudon, Organic Chemistry, *Oxford University Press*, New Delhi, 2002.

Course No: CH-47	Course Name: Asymmetric Catalysis: Fundamentals to Frontiers						Course Code: SBS CH 010305 DCE 2002	
Batch: 2021 Onwards	**Programme:** M.Sc. Chemistry	**Semester:** III	**L** 2	**T** 0	**P** 0	**Credit** 2	**Contact Hrs. per Week:** 02	**Total Hrs.:** 30
Total Evaluation Marks: 50 **CIE:** **15** Marks **TEE:** **35** Marks		**Examination Duration:** 2 Hrs. **Pre-requisite of course:** Basic knowledge of writing chemical formulae, their interconversion and stereochemistry. Basic understanding of homogenous and heterogeneous catalysis.						
Course Objectives	*To provide the advanced knowledge of asymmetric catalysis in organic synthesis.*							
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1**: Basic and in-depth understanding of asymmetric synthesis **CO2**: Use of catalysts and their applications in the field of asymmetric synthesis **CO3**: Understanding of advanced stereochemical synthetic methods **CO4**: Skills for developing pharmaceutically important methods for chiral compounds **CO5**: Understanding of new eco-friendly synthetic pathways to chiral chemical compounds **CO6**: Ability to analyse, design and solve problems based on asymmetric induction							

COURSE SYLLABUS

NOTE:

i)Question no. 1 is compulsory and to be set from the entire syllabus. It will have four sub-parts and students need to answer any two. Each part carries three and half marks.

ii) Question nos. 2 to 5 are to be set from all four units one from each. Every question will have three sub-parts and students need to answer any two sub-parts of each question. Each part carries three and half marks.

Unit No.	Contents	Contact Hrs.
I	**ASYMMETRIC INDUCTION AND CATALYSIS** Asymmetric induction, modes of asymmetric induction, asymmetric catalysis and basics of asymmetric catalysis including energetic of reactions, Important factors affecting asymmetric catalysis.	7
II	**LEWIS ACID -BASE CATALYSIS AND CHIRAL AUXILLIARIES** Lewis acid and Lewis base catalysis including examples. Chiral auxiliary: Basic requirements of chiral auxiliary; Chiral pool sources: selected examples of few most common chiral auxiliaries (Oppolzer, Evans oxazolidones, Myers amides, 8-phenylmenthol).	8
III	**KINETIC RESOLUTION, DESYMMETRIZATION AND MECHANISTIC STUDIES** Kinetic, dynamic kinetic and parallel kinetic resolution; Desymmetrization reactions. Mechanistic studies of asymmetric reactions	7
IV	**MULTIFUNCTIONAL AND MODERN ASPECTS OF ASYMMETRIC CATALYSIS** Non-liner effects and Chiral amplifications. Bifunctional, dual and multifunctional catalyst Modern aspects of asymmetric catalysis: Counteranion directed catalysis, cooperative catalysis, dual and merged catalysis, asymmetric photocatalysis.	8

Suggested Readings:

1. E. M. Carreira, L. Kvaerno, Classics in Stereoselective Synthesis, *Wiley-VCH: Weinheim*, Germany, 2009.
2. M. Nogrady, Stereoselective Synthesis: A Practical Approach, *Wiley*, 2008.
3. P. J. Walsh, M. C. Kozlowski, Fundamentals of Asymmetric Catalysis, *University Science Book*, 2009.
4. A. Berkessel, H. Groger, Asymmetric Organocatalysis: From Biomimetic Concepts to Applications in Asymmetric Synthesis, *Wiley-VCH*, 2005.
5. I. Ojima, Catalysis in Asymmetric Synthesis, *Wiley-VCH*, 2004.
6. Recent review and research articles relevant to above topics (reprints to be handed over to students).

Course No: CH-48	Course Name: Supramolecular Chemistry				Course Code: SBS CH 010306 DCE 2002		
Batch: 2021 Onwards	**Programme:** M.Sc. Chemistry	**Semester:** III	**L** 2	**T** 0	**P** 0	**Credit** 2	**Contact Hrs. per Week: 02** **Total Hrs.: 30**
Total Evaluation Marks: 50 **CIE:** **15** Marks **TEE:** **35** Marks		**Examination Duration:** 2 Hrs. **Pre-requisite of course:** Basic knowledge of non-covalent interactions, lock and key analogy and host-guest systems.					
Course Objectives	*To provide the basic knowledge of Supramolecular Chemistry, the terminologies, design and concepts and applications.*						
Course Outcomes:	After completing this course, studentsare expected to learn the following: **CO1**: Basic knowledge of supramolecular chemistry **CO2**: The concepts and various terminologies in supramolecular chemistry **CO3**: Nature of supramolecular interactions **CO4**: Understanding of supramolecular concepts and design **CO5**: Knowledge of various binding hosts such as crown ethers, cryptands, spherands **CO6**: Develop skills for designing new super/supramolecules						

COURSE SYLLABUS

NOTE:
i)Question no. 1 is compulsory and to be set from the entire syllabus. It will have four sub-parts and students need to answer any two. Each part carries three and half marks.
ii) Question nos. 2 to 5 are to be set from all four units one from each. Every question will have three sub-parts and students need to answer any two sub-parts of each question. Each part carries three and half marks.

Unit No.	Contents	Contact Hrs.
I	**INTRODUCTION TO SUPRAMOLECULAR CHEMISTRY** Definition and Development of Supramolecular Chemistry; What is Supramolecular Chemistry? Host–Guest Chemistry; Development; Classification of Supramolecular Host-Guest Compounds.	7
II	**TERMINOLOGIES AND CONCEPTS** Receptors, Coordination and the Lock and Key Analogy, Binding Constants; Definition and Use; Measurement of Binding Constants; Cooperativity and the Chelate Effect; Preorganisation and Complementarity; Thermodynamic and Kinetic Selectivity, and Discrimination.	8
III	**NATURE OF SUPRAMOLECULAR INTERACTIONS WITH EXAMPLES** Ion–ion Interactions; Ion–Dipole Interactions; Dipole–Dipole Interactions; Hydrogen Bonding; Cation–π Interactions; Anion-π Interactions; *π–π* Interactions; Van der Waals Forces and Crystal Close Packing; Closed Shell Interactions. Hydrophobic Effects, Solvation.	7
IV	**SUPRAMOLECULAR CONCEPTS AND DESIGN** Host Design; Informed and Emergent Complex Matter; Nanochemistry. Supramolecular Cation Coordination Chemistry; Concepts in Coordination Chemistry; EDTA – a Classical Supramolecular Host; Crown ethers; Cryptands; Spherands.	8

Suggested Readings:

1. J. W. Steed, J. L. Atwood, Supramolecular Chemistry, 2nd Edition. *Wiley*, 2009.
2. J. W. Steed, Supramolecular Chemistry: From Molecules to Nanomaterials, 8 Volume 7th Edition. *John Wiley & Sons*, 2012.
3. J.-M. Lehn, Supramolecular Chemistry: Concepts and Perspectives. *Wiley*, 2006.

Course No:	Course Name:						Course Code:
CH-49	Introduction to Nanomaterials						SBS CH 010307 DCE 2002
Batch:	**Programme:**	**Semester:**	**L**	**T**	**P**	**Credit**	**Contact Hrs. per Week: 02**
2021 Onwards	M.Sc. Chemistry	I	2	0	0	2	**Total Hrs.: 30**

Total Evaluation Marks:50 **CIE: 15** Marks **TEE: 35** Marks	**Examination Duration:** 2 Hrs. **Pre-requisite of course:** Basic understanding of materials, characterization techniques, surface area and dimensionality.
Course Objectives	*This course is designed to give exposure of nanomaterials and chemistry of it to the fresh postgraduate students. Many important nanomaterials such as graphene, carbon nanotubes, nanorods etc., their classification, synthesis, characterization and applications would be introduced to the students.*
Course Outcomes:	After completing this course, students are expected to learn the following: **CO1**: Basic knowledge of nanomaterials **CO2**: Classification of nanomaterials in terms of dimensionality **CO3**: Various synthetic process of nanomaterials with emphasis on gas phase synthesis **CO4**: Characterization methods of nanomaterials **CO5**: Preliminary knowledge of nanotubes, nanorods and nanoplates **CO6**: Exposure of wonder materials such as graphene and carbon nanotubes

COURSE SYLLABUS

NOTE:
i)Question no. 1 is compulsory and to be set from the entire syllabus. It will have four sub-parts and students need to answer any two. Each part carries three and half marks.
ii) Question nos. 2 to 5 are to be set from all four units one from each. Every question will have three sub-parts and students need to answer any two sub-parts of each question. Each part carries three and half marks.

Unit No.	Contents	Contact Hrs.
I	**INTRODUCTION** An Introduction to Nanomaterials with Historical Perspectives. Nanomaterials and Nanocomposites. Elementary Consequences of Small Particle Size - Surface of Nanoparticles. Classification of nanomaterials - zero dimensional (0D), one dimensional (1D) and two dimensional (2D) nanomaterials.	6
II	**SYNTHESIS OF NANOMATERIALS** Top-Down and Bottom-Up Approach of Synthesis of Nanomaterials. Gas-Phase Synthesis of Nanoparticles - Physical and Chemical Vapor Synthesis Processes. Radio- and Microwave Plasma Processes. Flame Aerosol Process. Synthesis of Coated Particles.	8
III	**CHARACTERIZATION OF NANOMATERIALS** Characterization of Nanomaterials: Global Methods for Characterization, X-Ray and Electron Diffraction, Electron Microscopy, Scanning Transmission Electron Microscopy.	8
IV	**NANOTUBES, NANORODS, AND NANOPLATES** Introduction of Nanotubes, Nanorods, and Nanoplates, One-Dimensional Crystals, Carbon Nanotubes and Graphene, Nanotubes and Nanorods from Materials other than Carbon, Synthesis of Nanotubes and Nanorods.	8

Suggested Readings:

1. D. Vollath, Nanomaterials: An Introduction to Synthesis, Properties and Applications, 2nd Edition. *Wiley-VCH*, 2013.
2. D. C. Agarwal, Introduction to Nanoscience and Nanomaterials. *World Scientific*, 2013.

Course No:	Course Name:				Course Code:		
CH-50	Molecular Magnetism				SBS CH 010308 DCE 2002		
Batch:	**Programme:**	**Semester:**	**L**	**T**	**P**	**Credit**	**Contact Hrs. per Week: 02**
2021 Onwards	M.Sc. Chemistry	III	2	0	0	2	**Total Hrs.: 30**
Total Evaluation Marks:50 **CIE: 15** Marks **TEE: 35** Marks		**Examination Duration:** 2 Hrs. **Pre-requisite of course:** To provide the basic knowledge of *molecular magnetism*.					
Course Objectives	*To provide the basic knowledge of origin of magnetism and molecular magnetism. At the end of this course, students will learn about the basic concept of magnetism, magnetic interaction, spin transition and magnetic exchange.*						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1**: Origin of magnetism **CO2**: Scope of molecular magnetism **CO3**: Effective magnetic moment **CO4**: Spin transition **CO5**: Quantum tunneling **CO6**: Single molecule magnets						

COURSE SYLLABUS

NOTE:
i)Question no. 1 is compulsory and to be set from the entire syllabus. It will have four sub-parts and students need to answer any two. Each part carries three and half marks.
ii) Question nos. 2 to 5 are to be set from all four units one from each. Every question will have three sub-parts and students need to answer any two sub-parts of each question. Each part carries three and half marks.

Unit No.	Contents	Contact Hrs.
I	**BASIC CONCEPTS OF MAGNETISATION** Origin of magnetism, magnetic susceptibility, measurement of magnetic susceptibility: Gouy method, induction method, superconducting quantum interference device magnetometer, Evans method, zero-field cooled measurements, field scan, reduced magnetization, hysteresis, AC susceptibility, classification of magnetic behaviour: diamagnetic, paramagnetic, ferromagnetic, ferromagnetic, antiferromagnetic compounds.	7
II	**MAGNETIC INTERACTION** Classical *vs*. quantum model, Curie Law, Curie-Weiss Law, spin-orbit coupling, magnetically non-equivalent sites in the unit cell, solute-solvent interaction, solute-solute interaction configurational equilibrium.	8
III	**SPIN TRANSITION** Van Vleck equation, magnetic anisotropy, low spin high spin transition, mechanism of spin transition, spin cooperativity, molecular electronics, intermediate spin and spin-admixed states.	7

IV	**MAGNETIC EXCHANGE** Magnetic exchange, Bleany-Bowers equation, mechanism of exchange coupling, spin hamiltonian, magnetic interaction in oligonuclear complexes, magneto-structural correlations, quantum tunneling of magnetization, single molecule magnets.	8

Suggested Readings:

1. J. M. D. Corey, Magnetism and Magnetic Materials. *Cambridge University Press*, UK, 2010.
2. J. E. Huheey, E. A. Keiter, R. L. Keiter, O. K. Medhi, Inorganic Chemistry: Principles of Structure and Reactivity, 4thEdition. *Pearson Education*, 2006.
3. D. Gatteschi, R. Sessoli and J. Villain, Molecular Nanomagnets. *Oxford University Press*, *Oxford,* 2006.
4. O. Kahn, Molecular Magnetism*, VCH Publishers, Inc*., *Orsay, France*, 1993.

DISCIPLINE CENTRIC SKILL-BASED COURSES (DCSC)

Course No: CH-51	Course Name: Computational Chemistry				Course Code: SBS CH 010201 DCS 2002		
Batch: 2021 Onwards	**Programme:** M.Sc. Chemistry	**Semester:** II	**L** 2	**T** 0	**P** 0	**Credit** 2	**Contact Hrs. per Week: 02** **Total Hrs.: 30**
Total Evaluation Marks: 50 **CIE: 15** Marks **TEE: 35** Marks		**Examination Duration:** 2 Hrs. **Pre-requisite of course:** To provide the basic knowledge of computational Chemistry. Basic understanding of ab-initio methods, DFT, basis sets and potential energy map.					
Course Objectives	*To provide the basic knowledge of various parameters and software involved in computational Chemistry and its application towards understanding the stability of molecules and proposing its reaction mechanism.*						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1**: Basic understanding of computational chemistry **CO2**: Scope of computational chemistry **CO3**: Computational methods **CO4**: Use of computational software and of polyatomic molecules **CO5**: Skills for analyzing stability of molecules and visualization of transition states **CO6**: Skills for proposing new molecules						

COURSE SYLLABUS

NOTE:

i)Question no. 1 is compulsory and to be set from the entire syllabus. It will have four sub-parts and students need to answer any two. Each part carries three and half marks.

ii) Question nos. 2 to 5 are to be set from all four units one from each. Every question will have three sub-parts and students need to answer any two sub-parts of each question. Each part carries three and half marks.

Unit No.	Contents	Contact Hrs.
I	**INTRODUCTION TO COMPUTATIONAL CHEMISTRY** Computational chemistry map, scope of computational chemistry, Born-Oppenheimer approximation, idea of self-consistency, Hartree-Fock theory, restricted HF calculations; open shell systems, ROHF and UHF calculations, HF limit and electron correlation, semi empirical methods.	7
II	**DENSITY FUNCTIONAL THEORY** Electron density, exchange-correlation functional, local Density approximation, generalized gradient approximation, hybrid density functional methods, self-Interaction corrections.	8
III	**BASIS SETS** Definition of basis sets, Slater and Gaussian type orbitals, minimal, double-zeta, split-valence, core-valence, Pople style basis Sets, polarization and diffuse functions, calculation of basis functions, pseudopotentials or effective core potentials, choice of basis bets.	7
IV	**BASIC CONCEPTS OF POTENTIAL ENERGY SURFACES** Z-matrix construction, Stationary Points, geometry optimization, local and global minima, and transition state theory. Computations of single point energy, optimizations and transition states of polyatomic molecules, intrinsic reaction coordinate analysis.	8

Suggested Readings:

1. J. B. Foresman and A. Frisch, Exploring Chemistry with Electronic Structure Methods, 2nd Edition. *Gaussian Inc.*, 2015.
2. F. Jensen, Introduction to Computational Chemistry, *John Wiley & Sons*, 2007
3. C. J. Cramer, Essentials of Computational Chemistry: Theories and Models, 2nd Edition. *John Wiley & Sons Ltd*, 2004.
4. C. J. Cramer, Essentials of Computational Chemistry: Theories and Models, 2nd Edition. *John Wiley & Sons Ltd*, 2002.
5. D. A. McQuarrie, Physical Chemistry: A molecular Approach, 1st Edition. *University Science Books*, 1997.

Course No: CH-52	Course Name: Analytical Techniques in Chemistry				Course Code: SBS CH 010202 DCS 2002		
Batch: 2021 Onwards	**Programme:** M.Sc. Chemistry	**Semester:** II	**L** 2	**T** 0	**P** 0	**Credit** 2	**Contact Hrs. per Week: 02** **Total Hrs.: 30**
Total Evaluation Marks: 50 **CIE: 15** Marks **TEE: 35** Marks		**Examination Duration:** 2 Hrs. **Pre-requisite of course:** Knowledge of solution preparation, safety measure in chemistry practical laboratory and basic practical knowledge up to UG level.					
Course Objectives	*To provide students with a basic understanding of analytical chemistry, classical and modern analytical techniques. This course will strengthen the fundamentals of analytical chemistry, especially thermogravimetric, imaging and impedance spectroscopy techniques.*						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1**: Basic understanding of analytical chemistry. **CO2**: Use of thermogravimetric, imaging and polarization techniques in daily life. **CO3**: Skills for analyzing and developing new sustainable methods. **CO4**: Skills for developing industrially important analytical methods. **CO5**: Development of alternate analytical methods. **CO6**: Use of advanced and recent techniques in analytical chemistry.						

COURSE SYLLABUS

NOTE:
i)Question no. 1 is compulsory and to be set from the entire syllabus. It will have four sub-parts and students need to answer any two. Each part carries three and half marks.
ii) Question nos. 2 to 5 are to be set from all four units one from each. Every question will have three sub-parts and students need to answer any two sub-parts of each question. Each part carries three and half marks.

Unit No.	Contents	Contact Hrs.
I	**THERMOGRAVIMETRIC ANALYSIS (TGA/DTA/DSC)** Principle, instrumentation of TGA, DTA, and DSC. Effect of heat on Materials, Chemical decomposition and T. G. Curves, Analysis of T.G. curve to show nature decomposition reactions, the product and qualities of compounds expelled, T.G. in controlled atmosphere, applications.	8
II	**ELECTROCHEMICAL ANALYSIS** Analysis of Metal, Alloys, Soil and Fertilizers by using electrochemical techniques like cyclic voltammetry, chronoamperometry, Pulse voltammetry. Theory, principle, working and application of cyclic voltammetry, chronoamperometry, Pulse voltammetry. Use of chemical and biosensors in environmental pollutant detection.	7
III	**IMAGING TECHNIQUES** An introduction to microscopy, the transmission and scanning electron microscope, electron optics, TEM specimen preparation and imaging system, dynamics of scattering, operating principle of SEM, penetration of electron in solids, SEM operating conditions and specimen preparation, electron beam lithography.	8
IV	**ELECTROCHEMICAL POLARIZATION AND IMPEDANCE SPECTROSCOPY** Anodic and cathodic polarization, Tafel plots, anodic and cathodic Tafel slopes, Corrosion rate from	7

	corrosion current density, Open circuit potential, Impedance spectroscopy, Nyquesi plots, Bode plots.	

Suggested Readings:

1. S. L. Chopra and J. S. Kanwar, Analytical Agriculture Chemistry, *Kalyani publishers,* 2008.
2. S. M. Khopkar, Concepts in Analytical Chemistry, 2nd Edition. New Age International Pub.2004.
3. H. H. Willard, L. L. Merritt, J. A. Dean and F. A. Settle, Instrumental methods of analysis, 7th Edition. *United States*, 1988.
4. D. A. Skoog and D. M. West, Principles of instrumental analysis, 2nd Edition. *Saunders College*, Philadelphia, 1980.
5. F. D. Snell and F. M. Biffen, Commercial Methods of Analysis, Tata McGraw Hill Book Company, New York, 1944.

Course No: CH-53	Course Name: Process Development of Active Pharmaceutical Ingredients				Course Code: SBS CH 010403 DCS 2002		
Batch: 2021 Onwards	**Programme:** M.Sc. Chemistry	**Semester:** **IV**	**L** 2	**T** 0	**P** 0	**Credit** 2	**Contact Hrs. per Week: 02** **Total Hrs.: 30**
Total Evaluation Marks:50 **CIE: 15** Marks **TEE: 35** Marks		**Examination Duration:** 2 Hrs. **Pre-requisite of course:** Understanding of general principles of chemistry and spectroscopic techniques.					
Course Objectives	*To provide the knowledge of Process Development of Active Pharmaceutical Ingredients to the students*						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1**: Basic understanding of active pharmaceutical ingredients **CO2**: Understand the process flow diagram and various process parameters **CO3:** Important features associated with process development of APIs **CO4**: Skills to develop technology for APIs and intermediates from lab scale to commercial batch **CO5**: understanding of GLP, GMP and safety in API industry **CO6**: Ability to understand various issues related to regulatory affairs						

COURSE SYLLABUS

NOTE:

i)Question no. 1 is compulsory and to be set from the entire syllabus. It will have four sub-parts and students need to answer any two. Each part carries three and half marks.

ii) Question nos. 2 to 5 are to be set from all four units one from each. Every question will have three sub-parts and students need to answer any two sub-parts of each question. Each part carries three and half marks.

Unit No.	Contents	Contact Hrs.
I	**PHARMACEUTICAL INDUSTRY AND ACTIVE PHARMACEUTICAL INGREDIENTS(APIS)** Pharmaceutical industries: Past and present; Introduction and Importance of active pharmaceutical ingredients, bulk drugs and their intermediates, Import and Export of APIs Scale-up approach of APIs: process research and development, optimization, maximization of percentage yield of the product, in-process control techniques.	8
II	**CHEMICAL TECHNOLOGY OF SELECTED APIS** Case studies with special emphasis on various factors for selection of routes: availability of raw materials and intermediates, process control parameters, pollution control procedures, polymorphs, safety issues, productivity etc.	7
III	**PROCESS TECHNOLOGY and REGULATORY PROFILE** Overview of plant layout, plant design, utilities and process flow sheets, Raw material consumption and costing, Overview of GLP, GMP and safety in API industry, Overview of Quality Assurance and Regulatory Affairs	8
IV	**STABILITY OF PRODUCTS** Drug substance – criteria, storage conditions, long term testing accelerated testing, frequency, evaluation, labeling; Drug product- selection of batches criteria, specification, conditions of storage and testing.	7

Suggested Readings:

1. N. G. Anderson, Practical Process Research and Development, 2nd Edition. *Academic Press, Elsevier*, 2012.
2. P. J. Harrington, Pharmaceutical Process Chemistry for Synthesis: Rethinking the Routes to Scale-Up, *Wiley*, 2011.
3. D. Lednicer, Strategies for Organic Drug Synthesis and Design, 2nd Edition, *Wiley*, 2008.
4. D. J. Pisano, D. S. Mantus, FDA Regulatory Affairs: A Guide for Prescription Drugs, Medical Devices, and Biologics 2nd Edition. *CRC Press*, 2008
5. K. Gadamasetti, Process Chemistry in Pharmaceutical Industry, Volume-I & II, *Taylor and Francis*, 1999.

Course No: CH-54	Course Name: Chemistry of Industrially Important Products						Course Code: SBS CH 010404 DCS 2002
Batch: 2021 Onwards	**Programme:** M.Sc. Chemistry	**Semester:** **IV**	**L** 2	**T** 0	**P** 0	**Credit** 2	**Contact Hrs. per Week: 02** **Total Hrs.: 30**
Total Evaluation Marks: 50 **CIE: 15** Marks **TEE: 35** Marks		**Examination Duration:** 2 Hrs. **Pre-requisite of course:** Understanding of general principles of chemistry and spectroscopic techniques in addition to synthetic aspects.					
Course Objectives	*To provide the knowledge of Chemistry of Industrially Important Products to the students*						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1**: Overview of industrially important products **CO2**: Various process parameters associated with dyes, pigments, petrochemicals, blends, additives and polymers **CO3:** Important features associated with process development of industrially important compounds **CO4**: Skills to develop technology for of industrially important compounds **CO5**: Understanding of agrochemicals and polymers used in textile industries **CO6**: Ability to understand various issues related to petrochemicals and dyes						

COURSE SYLLABUS

NOTE:

i)Question no. 1 is compulsory and to be set from the entire syllabus. It will have four sub-parts and students need to answer any two. Each part carries three and half marks.

ii) Question nos. 2 to 5 are to be set from all four units one from each. Every question will have three sub-parts and students need to answer any two sub-parts of each question. Each part carries three and half marks.

Unit No.	Contents	Contact Hrs.
I	**DYES AND PIGMENTS** Introduction and classification of dyes, color & constitution, different types of chromophores. Fluorescence and phosphorescence, dye intermediates, Developments of acid and basic dyes. Applications of different dyes and challenges associated with them. Chemistry and applications of optical brightening agents and pigments.	8
II	**PETROCHEMICALS** Crude oil and natural gas, refinery operations, energy consumption, lower olefins and acetylenes, cracking processes, synthesis gas, ammonia and methanol production, acetic acid and acetic anhydride production, C_1 products: Formic acid, hydrogen cyanide, chloromethanes, C_2 products: ethanol, acetaldehyde, ethylene oxide	7
III	**PROCESS TECHNOLOGY OF POLYMERS/FABRICS** Chemistry and Technology of chemical processing of polyester, nylon and acrylics. Dyeing machines for dyeing fiber, yarn and fabric. Mass coloration. Coloration of polypropylene	8

IV	**BLENDS, ADDITIVES AND AGROCHEMICALS** Blends, antioxidants, UV stabilizers, antistatic agents, peroxides, lubricants, fire retardants, heat stabilizers, plasticizers. Agricultural Chemicals: Fertilizers, insecticides, herbicides, fungicides.	7

Suggested Readings:

1. A. Heaton, An introduction to Industrial Chemistry, 3rdEdition, *Springer Science,* 2013.
2. K. Venkataraman, The Chemistry of Synthetic Dyes, *CBS*, 2010.
3. J. A. Tyrell, Fundamental of Industrial Chemistry, *Wiley*, 2005.
4. K. Hunger, Industrial Dyes: Chemistry, Properties, Applications, *Wiley*, 2002.
5. K. V. Datye and A. A. Vaidya, Chemical Processing of Synthetic Fibers and Blends, *Wiley*, 1984.

DISSERTATION
(Research Project)

Course No:	Course Name:					Course Code:	
CH-55A	Dissertation-I					SBS CH 010327 DCS 001408	
Batch:	**Programme:**	**Semester:**	**L**	**T**	**P**	**Credit**	**Contact Hrs. per Week: 14**
2021 Onwards	M.Sc. Chemistry	**III**	0	0	14	8	**Total Hrs.: 220**
Total Evaluation Marks: 200 **CIE: 66** Marks **TEE: 134** Marks		**Examination Duration:** External Viva-Voce **Pre-requisite of course:** None					
Course Objectives	The aim of the dissertation project work is to familiarize the students with advanced research.						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1**: Overview of handling research projects **CO2**: Develop skills in planning and setting-up experiments **CO3:** Handling of various instruments **CO4**: Research presentation skills **CO5**: Ability to understand various issues related to research **CO6**: Skills in writing research reports						

COURSE SYLLABUS

Unit No.	Contents	Contact Hrs.
I-IV	This course applies to students who opt to carry out their dissertation work in Central University of Haryana. The topic for the project work is to be decided by the supervisor/guide concerned. The project report is to be evaluated by a committee constituted by the Head, Department of Chemistry, School of Basic Sciences having at least one external member.	220

Course No:	Course Name:	Course Code:
CH-55B	Dissertation-II	SBS CH 010428 DCS 001408

Batch:	Programme:	Semester:	L	T	P	Credit	Contact Hrs. per Week: 14
2021 Onwards	M.Sc. Chemistry	IV	0	0	14	8	Total Hrs.: 220

Total Evaluation Marks: 200 **CIE:** **66** Marks **TEE:** **134** Marks	**Examination Duration:** External Viva-Voce **Pre-requisite of course:** None

Course Objectives	The aim of the dissertation project work is to familiarize the students with advanced research.
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1**: Overview of handling research projects **CO2**: Develop skills in planning and setting-up experiments **CO3:** Handling of various instruments **CO4**: Research presentation skills **CO5**: Ability to understand various issues related to research **CO6**: Skills in writing research reports

COURSE SYLLABUS

Unit No.	Contents	Contact Hrs.
I-IV	This course applies to students who opt to carry out their dissertation work in Central University of Haryana. The topic for the project work is to be decided by the supervisor/guide concerned. The project report is to be evaluated by a committee constituted by the Head, Department of Chemistry, School of Basic Sciences having at least one external member.	220

GENERIC ELECTIVE COURSES

ELECTIVE COURSE OFFERED BY THE DEPARTMENT TO STUDENTS OF OTHER DEPARTMENTS

Course No: CH-58	Course Name: Chemistry for Biologists						Course Code: SBS CH 010101 GE 4004
Batch: 2021 Onwards	**Programme:** P.G. (Generic Elective Course)	**Semester:** I	**L** 4	**T** 0	**P** 0	**Credit** 4	**Contact Hrs. per Week: 04** **Total Hrs.: 60**
Total Evaluation Marks:100 **CIE: 30** Marks **TEE: 70** Marks		**Examination Duration:** 3 Hrs. **Pre-requisite of course:** None					
Course Objectives	*To provide an opportunity to learn some basic concepts of chemistry important for biologists.* *To provide the knowledge of UV-vis., IR and ^{1}H-NMR spectroscopy*						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1**: Basic understanding of some important concepts of chemistry **CO2**: Understanding of formulae writing and stereochemistry of organic compounds **CO3:** Important aspects associated with other branches of science **CO4**: Skills to interpret data of organic compounds using advanced spectral techniques **CO5**: Ability to communicate about chemical sciences across the fields **CO6**: Ability to analyse, design and solve problems						

COURSE SYLLABUS

NOTE:

i)Question no. 1 is compulsory and to be set from the entire syllabus. It will have seven sub-parts and students need to answer any four. Each part carries three and half marks.

ii) Question nos. 2 to 5 are to be set from all four units one from each. Every question will have three sub-parts and students need to answer any two sub-parts of each question. Each part carries seven marks.

iii) P.G. Students from other departments may opt this course.

Unit No.	Contents	Contact Hrs.
I	**SOME BASIC TERMS AND CONCEPTS** Mole concept and Stoichiometry. Solution and different methods of expressing the concentration of a solution. Chemical bonds: Ionic, covalent, coordinate and metallic bonds. Shapes of the molecules, Polarized chemical bonds and polarity in the molecules. Intermolecular forces: Dispersion, dipole-dipole, hydrogen bonds, ion-dipole forces and their effect on the properties of the compounds. Biological implications of hydrogen bonding. Problems based on given topics.	15
II	**STEREOCHEMISTRY** Isomerism: Introduction, Formula writing, Structural and stereo isomerism, Conformations: analysis of ethane, *n*-butane, cyclohexane and its derivatives, Configurational isomerism, Geometrical and optical isomerism. Symmetry and chirality in the molecules having one or more than one chiral center, R & S, D & L, threo and erythro nomenclature, enantiotopic and diastereotopic atoms, groups and faces, stereospecific and stereoselective reactions. Problems based on given topics.	15

III	**CONCEPTS OF PHYSICAL CHEMISTRY** Thermodynamics: Change in Internal energy, enthalpy, free energy and entropy; Endothermic and exothermic processes, Exergonic and endergonic processes, Coupled biological processes, Chemical Kinetics: Reaction rate and rate constant, Catalysts and catalysis, Enzymes as catalysts, Enzyme inhibition. Chemical equilibrium: Equilibrium, equilibrium constant, Le Châtelier's principle and factors affecting the principle, Aqueous Equilibria: Introduction, importance in biology, pH and pH control, Buffers and their importance.	15
IV	**SPECTROSCOPIC TECHNIQUES** Ultraviolet and visible (UV-vis) spectroscopy: Introduction, Principle and selection rules of UV phenomenon, Various electronic transitions, Beer-Lambert law, presentation of spectrum, effect of solvents on electronic transitions, ultraviolet bands for carbonyl compounds and unsaturated carbonyl compounds. Fieser-Woodward rules for conjugated dienes. Infrared Spectroscopy: Introduction, Principle and selection rules of IR spectroscopy, Hookes law, Characteristic vibrational frequencies of organic compounds. Overtones, combination bands and Fermi resonance. Factors affecting the vibrational frequencies. ^{1}H NMR: Principle, nuclear spin states, nuclear magnetic moments, mechanism of resonance, chemical shifts, diamagnetic shielding, magnetic anisotropy, spin-spin splitting, coupling constant, ^{1}H NMR spectra of various simple organic compounds.	15

Suggested Readings:

1. B. R. Puri, L. R. Sharma and M. S. Pathania, Principles of Physical Chemistry,47th Edition. *Vishal Publishing Co.,* 2017.
2. B. R. Puri, L. R. Sharma, K. C. Kalia, Principles of Inorganic Chemistry, 33rd Edition. *Vishal Publishing Co.,* 2017.
3. D. L. Pavia, G. M. Lampman, G. S. Kriz and J. R. Vyvyan, Spectroscopy, 5th Edition. *Cengage Learning India Private Limited,* 2015.
4. P. S. Kalsi, Stereochemistry: Conformation and Mechanism, *New Age International Private Limited*, 2015.
5. S. M. Mukherji and S. P. Singh, Reaction Mechanism in Organic Chemistry, Revised Edition. (Revised by S. P. Singh and Om Prakash). *TRINITY Press, An Imprint of Laxmi Publications Pvt. Ltd*., 2015.
6. P. Atkins and J. Paula, Atkins' Physical Chemistry, 10th Edition. *Oxford University Press*, 2014.
7. J. Clayden, N. Geeves and S. Warren, Organic Chemistry, *Oxford University Press*, 2012.
8. Morrison, Boyd and Bhattcharjee, Organic Chemistry, 7th Edition, *Pearson*, 2010.
9. F. A. Carey and R. J. Sundburg, Advanced Organic Chemistry PART A., *Springer*, 2007.
10. D. Nasipuri, Stereochemistry of Organic Compounds, 2nd Edition, *New Age International*, 2005.
11. K. J. Laidler, Chemical Kinetics, 3rd Edition. *Pearson Education*, 1997.

Course No: CH-59	Course Name: Chemistry of Materials						Course Code: SBS CH 010102 GE 4004
Batch: 2021 Onwards	**Programme:** P.G. (Generic Elective Course)	**Semester:** I	**L** 3	**T** 1	**P** 0	**Credit** 4	**Contact Hrs. per Week: 04** **Total Hrs.: 60**
Total Evaluation Marks:100 **CIE: 30** Marks **TEE: 70** Marks		**Examination Duration:** 3 Hrs.					
		Pre-requisite of course: To provide basic nanomaterials and photophysical phenomena					

Course Objectives	*To give a very basic understanding of Chemistry of nanomaterials, porous materials and some photophysical phenomena with focus on energy and environment.*
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1**: Basic understanding of nanomaterials **CO2**: To understand the dramatic changes in properties that occurs by reducing the size **CO3**: Characterization of nanomaterials **CO4**: To impart knowledge on how to perform the synthesis of such small sizes and shapes of materials **CO5**: Knowledge of fundamental of photophysical phenomena **CO6**: Application of nanomaterials and photophysical phenomenon

COURSE SYLLABUS

NOTE:

i)Question no. 1 is compulsory and to be set from the entire syllabus. It will have seven sub-parts and students need to answer any four. Each part carries three and half marks.

ii) Question nos. 2 to 5 are to be set from all four units one from each. Every question will have three sub-parts and students need to answer any two sub-parts of each question. Each part carries seven marks.

Unit No.	Contents	Contact Hrs.
I	**NANOMATERIALS** An Introduction, Elementary Consequences of Small Particle Size - Surface of Nanoparticles. Classification of nanomaterials-zero dimensional (0D)-one dimensional (1D)-two dimensional (2D) nanomaterials. Gas-Phase Synthesis of Nanoparticles - Physical and Chemical Vapor Synthesis Processes. Radio- and Microwave Plasma Processes. Flame Aerosol Process. Synthesis of Coated Particles.	15
II	**CHARACTERIZATION OF NANOMATERIALS** Global Methods for Characterization, X-Ray and Electron Diffraction, Electron Microscopy, Scanning Transmission Electron Microscopy. Nanotubes, Nanorods, and Nanoplates, One-Dimensional Crystals, Graphene and Carbon Nanotubes. Nanotubes and Nanorods from Materials other than Carbon, Synthesis of Nanotubes and Nanorods.	15
III	**HYBRID MATERIALS** Coordination Polymers, Introduction, Classification of Coordination Polymers, Design Strategies of Coordination Polymers-Metal Nodes and Linkers, Secondary Building Unit Concept, Topology and Interpenetration, Synthesis of Coordination Polymers-Solvothermal/Hydrothermal, Sonochemical, Microwave, Mechanochemical. Charaterization: X-ray diffraction and Spectroscopic Methods.	15

	Applications of Coordination Polymers in Gas Storage, Gas Separation, Catalysis and Drug Delivery.	
IV	**PHOTOPHYSICAL PHENOMENA** Interaction of electromagnetic radiation with matter, Grotthus-Draper law, Stark-Einstein law of photochemical equivalence, quantum yield, electronically excited singlet states, life time of electronically excited state, construction of Jablonski diagram, electronic transitions and intensity of absorption bands, types of photophysical pathways, radiationless transitions, fluorescence emission, phosphorescence emission, Fluorescence quenching, chemiluminescence, photochemical reactions.	15

Suggested Readings:

1. D. Vollath, Nanomaterials: An Introduction to Synthesis, Properties and Applications, 2nd Edition. *Wiley-VCH*, 2013.
2. D. C. Agarwal, Introduction to Nanoscience and Nanomaterials. *World Scientific*, 2013.
3. S. R. Batten, S. M. Neville and D. R. Turner, Coordination Polymers: Design, Analysis and Application. *RSC Publishing*, 2009.
4. M.-C. Hong and L. Chen, design and Construction of Coordination Polymers. *Wiley*, 2009.
5. S. Kaskel, The Chemistry of Metal-Organic Frameworks, Vol. 1, *Wiley-VCH*, 2016.
6. L. R. Macgillivray, Metal-Organic Frameworks: Design and Applications, *Wiley*, 2010.
7. W. D. Jr. Callister and D. G. Rethwisch, Fundamentals of Materials Science and Engineering: An Integrated Approach, *John Wiley and Sons*, 2012.
8. K. K. Rohatgi and K. K. Mukherjee; Fundamentals of Photochemistry, 3rdEdition. *New Age International (P) Ltd.*, 2014.

Course No: CH-60	Course Name: Medicinal Chemistry						Course Code: SBS CH 010203 GE 4004
Batch: 2021 Onwards	**Programme:** P.G. (Generic Elective Course)	**Semester:** **II**	**L** 4	**T** 0	**P** 0	**Credit** 4	**Contact Hrs. per Week: 04** **Total Hrs.: 60**
Total Evaluation Marks:100 **CIE:** 30 Marks **TEE:** 70 Marks		**Examination Duration:** 3Hrs.					
		Pre-requisite of course: To provide basics of medicinal chemistry					
Course Objective	*This course will provide a basic understanding and fundamentals of Medicinal Chemistry, drug-target actions, process of development of new drugs and regulatory processes of drug approval, intellectual property and drug abuse and misuse.*						
Course Outcomes:	After completing this course, student is expected to learn the following. **CO1**: General overview about drugs and their function **CO2**: Idea of the various steps in drug discovery and development **CO3**: Fundamental understanding of how drug-target interactions happen **CO4**: Basic understanding of chemical principles involved in pharmacodynamics **CO5**: Classification and uses of various drugs **CO6**: A broad idea of drug manufacture, administration and drug abuse						

COURSE SYLLABUS

NOTE:
i)Question no. 1 is compulsory and to be set from the entire syllabus. It will have seven sub-parts and students need to answer any four. Each part carries three and half marks.
ii) Question nos. 2 to 5 are to be set from all four units one from each. Every question will have three sub-parts and students need to answer any two sub-parts of each question. Each part carries seven marks.
iii) P.G. Students from other departments may opt this course.

Unit No.	Contents	Contact Hrs.
I	**FUNDAMENTALS** Historical development of systems of medicine, Basic chemical and biochemical principles, Key definitions, drug, target, receptors, enzymes, common drugs and their classification, anti-inflammatory drugs, antihistamines, antacids, antibiotics, narcotics, antivirals, and antineoplastics.	15
II	**DRUG ACTION** Chemistry of drug-target interactions, bioavailability, drug absorption, distribution, metabolism, excretion (ADME), pharmacokinetics and pharmacodynamics, toxicity, side effects, lipophilicity and hydrophilicity, blood-brain barrier and its significance, routes of drug administration	15

III	**DRUG DESIGN AND SYNTHESIS** Development of new drugs, concept of lead compounds and lead modifications, structure-activity relationship (SAR), isosterism, bio-isosterism, important chemical principles behind design of drugs, natural products and their uses, chemical synthesis of drugs, drug formulation, drug delivery, photodynamic therapy.	15
IV	**DRUGS AND SOCIETY** Regulatory processes for drug approval, regulatory agencies, intellectual property, patents, drug misuse, drug abuse, abuse of antibiotics, fraud practices in treatment, historically important drugs and vaccines.	15

Suggested Readings:

1. R. B. Silverman, The Organic Chemistry of Drug Design and Drug Action, 3rdEdition. *Academic Press*, 2014.
2. G. L. Patrick, An Introduction to Medicinal Chemistry, 5th Edition. *Oxford University Press*, 2013.
3. D. Sriram and P. Yogeshwari, Medicinal Chemistry, 2ndEdition. *Pearson*, 2012.
4. Ed. Robert F. Dorge, Wilson and Gisvold'sTextBook of Organic Medicinal and Pharmaceutical Chemistry, 12thEdition, 2010.
5. Ed. M. E. Wolff, Burger's Medicinal Chemistry and Drug Discovery, Vol. 1, 7th Edition. *John Wiley*, 2010.
6. S. S. Pandeya and J. R. Dmmock, An Introduction to Drug Design, 1st Edition. *New Age International*, 1999.

Course No: CH-61	Course Name: Drug, Design and Discovery						Course Code: SBS CH 010304 GE 4004
Batch: 2021 Onwards	**Programme:** P.G. (Generic Elective Course)	**Semester:** **III**	**L** 4	**T** 0	**P** 0	**Credit** 4	**Contact Hrs. per Week: 04** **Total Hrs.: 60**
Total Evaluation Marks: 100 **CIE:** 30 Marks **TEE:** 70 Marks		**Examination Duration:** 3 Hrs. **Pre-requisite of course:** None					
Course Objective	This course will provide a basic understanding and fundamentals towards drug discovery and development process.						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1**: General idea about modern medicine and medicinal chemistry **CO2**: The process of drug discovery and development **CO3**: Fundamental understanding of how drug-target interactions happen **CO4**: Basic understanding of chemical principles involved in pharmacodynamics **CO5**: Classification and uses of various drugs **CO6**: A broad idea of drug manufacture, administration and drug abuse						

COURSE SYLLABUS

NOTE:

i)Question no. 1 is compulsory and to be set from the entire syllabus. It will have seven sub-parts and students need to answer any four. Each part carries three and half marks.

ii) Question nos. 2 to 5 are to be set from all four units one from each. Every question will have three sub-parts and students need to answer any two sub-parts of each question. Each part carries seven marks.

iii) P.G. Students from other departments may opt this course.

Unit No.	Contents	Contact Hrs.
I	**INTRODUCTION** ***History of drug discovery and targets*:** Introduction, Stages of drug discovery, lead discovery, Recent trends in drug discovery. Validation and diversity of drug targets ***Biological drug targets*:** Drug target identification, Receptors, types, binding and activation, theories of drug receptor interaction, drug receptor interactions, agonists vs antagonists, artificial enzymes, Biopharmaceutical therapies, , Hit to lead, Clinical biomarkers.	15
II	**DRUG DESIGN** ***Prodrug design:*** Basic concept, Carrier linked prodrugs/Bioprecursors, prodrugs of functional group, prodrugs to improve patient acceptability, Drug solubility, drug absorption and distribution, site specific drug delivery and sustained drug action. Rationale of prodrug design and practical consideration of prodrug design. ***Combating drug resistance*:** Causes for drug resistance, strategies to combat drug resistance in antibiotics and anticancer therapy, genetic principles of drug resistance. ***Analog Design***: Introduction, classical & non-classical, bioisosteric replacement strategies, rigid analogs, alteration of chain branching, changes in ring size, ring position isomers, design of stereo isomers and geometric isomers, fragments of a lead molecule, variation in inter atomic distance	15

III	**ANTIBIOTICS AND CARDIOVASCULAR DRUGS** Cell wall biosynthesis, inhibitors, β-lactam rings, antibiotics inhibiting protein synthesis, Synthesis of penicillin G, amoxycillin, cephalosporin, ciprofloxacin. Introductory idea of tetracycline and streptomycin. Introduction and general mode of action. Synthesis of ditiazem, verapamil, methyldopa and atenolol.	15
IV	**LOCAL ANTIINFECTIVE DRUGS AND PSYCHOACTIVE DRUGS** Introduction and general mode of action. Synthesis of furazolidone, naldixic acid, dapsone, isoniazid, ethambutol, gluconazole, chloroquin and primaquin. Introduction, neurotransmitters, CNS depressants, general anaesthgetics, mode of action of hypnotics,sedatives, anti-anxiety drugs, benzodiazopines, buspirone. Antipsychotic drugs–theneuroleptics, antidepressants, butyrophenones. Synthesis of diazepam, alprazolam,phenyltoin and glutethimide.	15

Suggested Readings:

1. R. B. Silverman, The Organic Chemistry of Drug Design and Drug Action, 3rd Edition. *Academic Press*, 2014.
2. D. M. Brahmankar and S. B. Jaiswal, Biopharmaceutics and Pharmacokinetics, 2ndEdition. *Vallabh Prakashan,* New Delhi, 2014.
3. G. L. Patrick, An Introduction to Medicinal Chemistry, 5th Edition. *Oxford University Press*, 2013.
4. D. Sriram and P. Yogeshwari, Medicinal Chemistry, 2ndEdition. *Pearson*, 2012.
5. Ed. Robert F. Dorge, Wilson and Gisvold's Text Book of Organic Medicinal and Pharmaceutical Chemistry, 12th Edition, 2010.
6. Ed. M. E. Wolff, Burger's Medicinal Chemistry and Drug Discovery, Volume 1, 7th Edition. *John Wiley*, 2010.
7. S. S. Pandeya and J. R. Dmmock, An Introduction to Drug Design, 1st Edition. *New Age International*, 1999.

Course No: CH-62	Course Name: Magneto Nuclear Chemistry						Course Code: SBS CH 010405 GE 4004
Batch: 2021 Onwards	**Programme:** P.G. (Generic Elective Course)	**Semester:** **IV**	**L** 2	**T** 0	**P** 0	**Credit** 2	**Contact Hrs. per Week: 02** **Total Hrs.: 30**
Total Evaluation Marks:50 **CIE: 15** Marks **TEE: 35** Marks		**Examination Duration:** 2 Hrs.					
		Pre-requisite of course: To provide the basic knowledge of magnetism and nuclear chemistry.					
Course Objectives	*To provide the basic knowledge of origin of magnetism and* nuclear chemistry. *At the end of this course, students will learn about the basic concept of magnetism, magnetic interaction, spin transition and magnetic exchange.*						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1**: Basic theory of magnetism **CO2**: Knowledge of exchange interaction **CO3**: To understand orbital contribution **CO4**: Basic understanding of nuclear structure **CO5**: To understand artificial radioactivity and chelation therapy **CO6**: Scope of magnetism and nuclear chemistry						

COURSE SYLLABUS

NOTE:

i)Question no. 1 is compulsory and to be set from the entire syllabus. It will have four sub-parts and students need to answer any two. Each part carries three and half marks.

ii) Question nos. 2 to 5 are to be set from all four units one from each. Every question will have three sub-parts and students need to answer any two sub-parts of each question. Each part carries three and half marks.

Unit No.	Contents	Contact Hrs.
I	**BASIC CONCEPTS OF MAGNETISM** Definition, Origin of magnetism, classification of magnetic behaviour; diamagnetic, paramagnetic, ferromagnetic, ferromagnetic, antiferromagnetic compounds, magnetic interactions, spin crossover, spin-orbit coupling, Curie law, Curie-Weiss law	7
II	**MAGNETIC INTERACTION** Mechanism of exchange interaction, reduced magnetization, magnetic hysteresis, calculation of magnetic moment, orbital contribution to the magnetic moment, anomalous magnetic moments, magnetic susceptibility.	8
III	**RADIOACTIVITY** Radioactive decay and growth, naturally occurring and artificially produced radioactive substances, Measurement of radioactivity, group displacement law, radioactive disintegration series, rate of disintegration, half-life, average life of radioactive elements, unit of radioactivity, nuclear decay, determination of decay constants, decay rates, types of nuclear decay.	7

IV	**ARTIFICIAL RADIOACTIVITY AND APPLICATIONS OF NUCLEAR CHEMISTRY** Discovery of artificial radioactivity, isotopes used in medicines, radiocarbon dating, age determination, effects of radiation on life, applications of tracer element in medical, agriculture and analytical fields, biological effects of radiation, radiation protections, chelation therapy.	8

Suggested Readings:

1. G. Friedlander, J. W. Kennedy, E. S. Macias; Nuclear and Radiochemistry, 3rdEdition.*Willey*, 2013.
2. J. M. D. Coey, Magnetism and Magnetic Materials, *Cambridge University Press*, UK, 2010.
3. J. E. Huheey, E. A. Keiter, R. L. Keiter, O. K. Medhi, Inorganic Chemistry: Principles of Structure and Reactivity, 4thEdition.*Pearson Education*, 2006.
4. W. D. Loveland, D. Morrissey and G. T. Seaborg, Modern Nuclear Chemistry, *John Wiley & Sons*, 2006.
5. D. Gatteschi, R. Sessoli and J. Villain, Molecular Nanomagnets, *Oxford University Press*, Oxford, 2006.
6. C. E. Housecroft and A. G. Sharpe; *Inorganic Chemistry*, 2ndEdition.*Pearson*, 2005.
7. O. Kahn, Molecular Magnetism, *VCH Publishers, Inc*., Orsay, France, 1993.
8. H. J. Arnikar, Essentials of Nuclear Chemistry, *Wiley Eastern*, 1988.

SWACHH BHARAT INTERNSHIP PROGRAMME

Course No:		Course Name:				Course Code:	
CH-56		Activities at Department and University Level				SBS CH 010105 DCS 0042	
Batch:	**Programme:**	**Semester:**	**L**	**T**	**A**	**Credit**	**Contact Hrs. per Week: 6**
2021 Onwards	M.Sc. Chemistry	I to IV	0	0	6	2	**Total Hrs.: 100**
Total Evaluation Marks:		**Examination Duration:** NA					
		Pre-requisite of course: None					

Course Objectives	*The main objective of this course is to make the students aware about the importance of cleanliness for social development.*
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1**: Learn about the importance of cleanliness **CO2**: Develop skills in finding and solving sanitation related problems **CO3:** Motivating others not to litter **CO4**: Motivating others not to use plastic bags **CO5**: To manage and implement campaigns and demonstrate sanitation advice in nearby villages. **CO6**: Skill to train others

COURSE SYLLABUS

Unit No.	Contents	Contact Hrs.
I-IV	This course is applicable to all students to carry out various activities associated with cleanliness and recycling of the waste materials at departmental and university level in line with Swachh Bharat Abhiyan that may include: • To conduct outreach programs for creating awareness on Swachh Bharat in association with NCC or NSS or women cell etc. • To produce energy and manure using bio-wastes. • Plantation drives to increase the green cover and conservation of old trees. • Self-sustainable units through energy production using solar panels. • Plastic free environment. • Development of Green Buildings concept in the society. • Effective Waste management and recycling. • Rain water harvesting. • Proper disposal of chemical waste. • Creating awareness in the community through short films. • Use of social media for broader community outreach. **Note**: Students will submit a brief report on the activities carried out to the department for the record purpose.	100

A = Activity

9. TEACHING-LEARNING PROCESS

- Lectures
- Discussions
- Simulations
- Role Playing
- Participative Learning
- Interactive Sessions
- Seminars
- Research-based Learning/Dissertation or Project Work
- Technology-embedded Learning
- Hands on training
- Self study analysis
- Report writing

10. IMPLEMENTATION OF BLENDED LEARNING

Blended Learning is a pedagogical approach that combines face to-face classroom methods with computer-mediated activities in the process of teaching and learning. It implies nice blend of face-to-face and online activities to make the learning processes more interesting and engaging. It focuses on integration of traditional classroom activities and innovative ICT-enabled strategies. It emphasizes student-centric learning environment where the teacher is the facilitator for productive and measurable learning outcomes. It optimizes and compliments the face to face learning, giving ample freedom and flexibility to the students and teachers to access and explore the wide range of open-access sources such as video lectures, podcasts, recordings and articles through digital platforms. It gives freedom and autonomy to the teachers in selection of appropriate digital platforms, resources and time-slots to complement and supplement face to face learning. The Blended Learning doesn't undermine the role of the teacher, rather it gives him/her an opportunity to explore the unexplored in accordance with the requirements of the curriculum.

Key features of Blended Learning

- **Student-Centric Pedagogical Approach** focusing on flexibility in timing, quality content, needs and interests of students and freedom to study through the mode of his/her choice;
- Freedom to Select variety of mediums and techniques;
- Increased student engagement in learning;
- Enhanced teacher and student interaction;

- Improved student learning outcomes;
- More flexible teaching and learning environment;
- More responsive for self and continuous learning;
- Better opportunities for experiential learning;
- Increased learning skills;
- Greater access to information, improved satisfaction and learning outcomes.

Note: It was resolved that Blended Learning with 40% component of online teaching and 60% face to face classes for each programme, may be adopted

11. ASSESSMENT AND EVALUATION

Overall assessment will be made as per CUH PG ordinances

- Continuous Comprehensive Evaluation at regular after achievement of each Course-level learning outcome
- Formative Assessment on the basis of activities of a learner throughout the programme instead of one-time assessment
- Oral Examinations to test presentation and communication skills
- Open Book Examination for better understanding and application of the knowledge acquired if required
- Group Examinations on Problem solving exercises
- Seminar Presentations
- Review of Literature
- Collaborative Assignments

12. KEYWORDS

- LOCF
- NEP-2020
- Blended Learning
- Face to face (F to F) Learning
- Programme Outcomes
- Programme Specific Outcomes
- Course-level Learning Outcomes

- Postgraduate Attributes
- Learning Outcome Index
- Formative Assessment and Evaluation
- Comprehensive and Continuous Evaluation

13. REFERENCES

- National Education Policy-2020. https://www.education.gov.in/sites/upload_files/mhrd/files/NEP_Final_English_0.pdf
- The draft subject specific LOCF templates available on UGC website. https://www.ugc.ac.in/ugc_notices.aspx?id=MjY5OQ==
- Draft Blended Mode of Teaching and Learning: Concept Note available on UGC website. https://www.ugc.ac.in/pdfnews/6100340_Concept-Note-Blended-Mode-of-Teaching-and-Learning.pdf

14. APPENDICES

Curricular Reforms — Extracts from National Education Policy-2020

8118809_UGC-Letter-reg-Swachcha-Bharat-Abhiyan-.pdf

3258851_swach-bharat-swashth-bharat--guidelines-2014.pdf

Annexure-XXV

CENTRAL UNIVERSITY OF HARYANA

(*Established under the Central Universities Act, 2009*)

(NAAC Accredited 'A' Grade)

Curriculum and Syllabi
Of
Integrated B.Sc.-M.Sc. Chemistry

(w.e.f. 2021)

DEPARTMENT OF CHEMISTRY
SCHOOL OF BASIC SCIENCES

Approved by :	**BOS**	**School Board**	**Academic Council**
Approval Status :	√	√	
Approval Date :	09-09-2021	20-09-2021	

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VISION AND MISSION

i) Vision and Mission of the University

Vision

To develop enlightened citizenship of a knowledge society for peace and prosperity of individuals, nation and the world, through promotion of innovation, creative endeavours, and scholarly inquiry.

Mission

To serve as a beacon of change, through multi-disciplinary learning, for creation of knowledge community, by building a strong character and nurturing a value-based transparent work ethics, promoting creative and critical thinking for holistic development and self-sustenance for the people of India. The University seeks to achieve this objective by cultivating an environment of excellence in teaching, research and innovation in pure and applied areas of learning.

ii) Vision and Mission of the Department

Vision

To establish a world-class teaching and research reputation of the department that contributes to society through its innovative, creative and scholarly approach.

Mission

To educate the students by adopting highest academic and professional standards to meet the global competency in the field of chemical sciences. To establish and maintain a high quality of support, research facilities, multidisciplinary and skill-based learning opportunities to our staff, students and researchers to orient them to world class creative and innovative minds.

1. BACKGROUND

i) NEP-2020 and LOCF an integrated Approach

Considering the curricular reforms as instrumental for desired learning outcomes, all the academic departments of Central University of Haryana made a rigorous attempt to revise the curriculum of undergraduate and postgraduate programmes in alignment with National Education Policy-2020 and UGC Quality Mandate for Higher Education Institutions-2021. The process of revising the curriculum could be prompted with the adoption of "Comprehensive Roadmap for Implementation of NEP-2020" in the 32nd meeting of the Academic Council of the University held on April 23, 2021. The Roadmap identified the key features of the Policy and elucidated the Action Plan with well-defined responsibilities and indicative timeline for major academic reforms.

The process of revamping the curriculum started with the series of webinars and discussions conducted by the University to orient the teachers about the key features of the Policy, enabling them to revise the curriculum in sync with the Policy. Proper orientation of the faculty about the vision and provisions of NEP-2020 made it easier for them to appreciate and incorporate the vital aspects of the Policy in the revised curriculum focused on 'creating holistic, thoughtful, creative and well-rounded individuals equipped with the key 21st century skills' for the 'development of an enlightened, socially conscious, knowledgeable, and skilled nation'.

With NEP-2020 in background, the revised curricula articulate the spirit of the policy by emphasising upon—integrated approach to learning; innovative pedagogies and assessment strategies; multidisciplinary and cross-disciplinary education; creative and critical thinking; ethical and Constitutional values through value-based courses; 21st century capabilities across the range of disciplines through life skills, entrepreneurial and

professional skills; community and constructive public engagement; social, moral and environmental awareness; Organic Living and Global Citizenship Education (GCED); holistic, inquiry-based, discovery-based, discussion-based, and analysis-based learning; exposure to Indian knowledge system, cultural traditions and classical literature through relevant courses offering 'Knowledge of India'; fine blend of modern pedagogies with indigenous and traditional ways of learning; flexibility in course choices; student-centric participatory learning; imaginative and flexible curricular structures to enable creative combination of disciplines for study; offering multiple entry and exit points initially in undergraduate programmes; alignment of Vocational courses with the International Standard Classification of Occupations maintained by the International Labour Organization; breaking the silos of disciplines; integration of extra-curricular and curricular aspects; exploring internships with local industry, businesses, artists and crafts persons; closer collaborations between industry and higher education institutions for technical , vocational and science programmes; and formative assessment tools to be aligned with the learning outcomes, capabilities, and dispositions as specified for each course. In case of UG programmes in Engineering and Vocational Studies, it was decided that the departments shall incorporate pertinent NEP recommendations while complying with AICTE, NBA, NSQF, International Standard Classification of Occupations, Sector Skill Council and other relevant agencies/sources. The University has also developed consensus on adoption of Blended Learning with 40% component of online teaching and 60% face to face classes for each programme.

The revised curricula of various programmes could be devised with concerted efforts of the faculty, Heads of the Departments and Deans of Schools of Study. The draft prepared by each department was discussed in series of discussion sessions conducted at Department, School and the University level. The leadership of the University has been a driving force behind the entire exercise of developing the uniform template and structure for the revised

curriculum. The Vice Chancellor of the University conducted series of meetings with Heads and Deans to deliberate upon the vital parameters of the revised curriculum to formulate a uniform template featuring Background, Programme Outcomes, Programme Specific Outcomes, Postgraduate Attributes, Structure of Masters Course, Learning Outcome Index, Semester-wise Courses and Credit Distribution, Course-level Learning Outcomes, Teaching-Learning Process, Blended Learning, Assessment and Evaluation, Keywords, References and Appendices. The experts of various Boards of Studies and School Boards contributed to a large extent in giving the final shape to the revised curriculum of each programme.

To ensure the implementation of curricular reforms envisioned in NEP-2020, the University has decided to implement various provisions in a phased manner. Accordingly, the curriculum may be reviewed annually.

ii) About Chemistry

Chemistry is the science of matter and its transformations. It addresses fundamental questions about the observable matter, ranging from its components, structure, properties and interconversions. As a system of knowledge, Chemistry not only explains the existence and behavior of matter around and within us, but also empowers us to manipulate the matter into new and improved forms for our use. From the ancient practices of rasayan vidya and alchemy, modern chemistry has grown over centuries into a formidable science that touches all aspects of human life. Humanity's progress in the last three centuries is pivoted on the contributions of chemistry, chemical industry and associated endeavors. The range of influence of chemistry in our life spans from essentials such as food (agrochemicals, preservatives), shelter (cement, metals, alloys, polymers) and health (drugs, cosmetics, soap, toothpaste), to advancements such as textiles (polymers, leather), beverages (flavoring and fermentation), crime fighting (forensics), weaponry (explosives), space travel (fuel) and cosmology (element detection). The list can go on endlessly. The

most visible contribution of chemistry to civilization is achieved by the advancements in modern medicine that was fuelled by organic chemistry. This led to significant improvements in the living standards, extension of human average life span and fighting of dangerous diseases such as cancer and microbial infections.

Chemistry is placed centrally between the other two major branches of science, namely physics and biology. Therefore, it is often called the *central science*. It influences the developments in these two broad realms of science as much as it is influenced by the discoveries in them. The fundamental importance of chemistry and chemical industry in sustaining human civilization demands for a steady supply of trained and skilled manpower. Thus, it is unsurprising that it is an essential and integral department in higher education institutions.

Education in chemistry not only imparts the technical know-how about structure, reactions and properties of matter, but also empowers the learner to raise fundamental questions about various natural phenomena, address local issues and come up with sustainable solutions, identify areas of life where intervention of chemistry can bring about progress and imbibe and spread the spirit of free enquiry and scientific temper.

iii) About the Programme (Nature, Extent and Aims)

The integrated B.Sc.-M.Sc. Programme in Chemistry will impart advanced knowledge of basic and applied chemical sciences to the graduates. It will prepare the students for taking up challenging assignments in academia and industry and also empower them with skill and knowledge for generating employment for their own and others. The Programme introduces the students to advanced developments in chemical sciences as well as in the field of other allied sciences, by providing them multidisciplinary and interdisciplinary courses. The design of choice-based curriculum can enrich students with analytical and problem-solving capabilities. It is designed to bring out the best of the abilities of each

student, allow them to sharpen the scientific temper and be abreast with the contemporary developments in the area.

The programme includes a balanced combination of *Core*, *Elective* and *Ability Enhancement* Courses. The courses are designed in such a way to cover the entire spectrum of chemical sciences from fundamentals (that will bring admitted students from various backgrounds to a common level) to most recent advancements in the field (that will make them ready to take up challenging assignments in the real world).

The integrated B.Sc.-M.Sc. Programme in Chemistry is of a five-year duration which is divided into ten semesters. The teaching and learning in the Programme will involve theory (lectures), practicals, tutorial and seminar-based classes. During the whole programme about 40 % syllabus of each course may be delivered via online mode and with a blended teaching-learning approach.

The curriculum will be taught through formal lectures with the aid of pre-made presentations, audio and video tools whenever necessary. Other teaching aids can also be used as and when required. The additional requirements like industrial visits, summer training and project work are also incorporated into the curriculum.

The Aims of the programme include

- To inculcate basic to advanced knowledge of chemical sciences among students.
- To provide higher education, disciplinary and inter/multi-disciplinary research-oriented knowledge to the students to make them lifelong learners.
- To provide a learned, skilled and creative pool of graduates who are ready to take up challenging assignments in different kinds of chemical industries, research institutions and academia.

- To mould responsible, proactive citizens who are equipped with scientific thinking and skills to address problems of their locality
- Adequate blend of theory, computation and hands-on experiments.
- Modernized lab courses – close to recent/current research.

iv) Qualification Descriptors (possible career pathways)

On successful completion of the Integrated B.Sc.-M.Sc. Chemistry Programme, students of the department are expected to be ready to take up opportunities all around the world in areas that demand skills in chemical and allied sciences. As the chemical industry is enormously vast and diverse, numerous opportunities and challenges await the graduates. The graduates are expected to satisfactorily address the professional expectations, maintain a work-life balance and lead productive and meaningful lives. Some of the possible career paths for the undergraduate and postgraduate students may be:

1. Teaching and Research in academia

2. Research scientists in pharmaceutical and other chemical and material industries

3. Research scientists in other allied sciences

4. Entrepreneurship in chemical science-based ventures

5. Administrative Assignments in various government and private agencies

6. Chemist/Scientist/Technician assignments in any of the following industries: pharmaceutical, polymers, petrochemicals, materials sciences, nanotechnology, fuels, non-conventional energy, renewable resources, agrochemicals, fermentation and processing, paints and pigments, metallurgy, packaging, cosmetics, cements, natural products, forensics, explosives, and any other various allied branches of chemistry.

2. STRUCTURE OF INTEGRATED B.Sc.-M.Sc. PROGRAMME

The Integrated B.Sc.-M.Sc. Chemistry Programme is of a *five-year* duration which is divided into ten semesters. The programme under Choice-Based Credit System (CBCS) includes a balanced combination of *Core*, *Elective* and *Ability Enhancement Courses* (Compulsory and Skill based). Distribution of the courses for undergraduate programme (for first three years) is given in **Table-1**.

The programme offers exit options to the students as per the relevant ordinances of CUH and guidelines of UGC and Ministry of Education.

After successful completion of five years (ten semesters) of the programme the candidate will be awarded with the Integrated Degree i.e. **Integrated B.Sc.-M.Sc. (Chemistry)**.

Table 1 (% age of courses for first three years of the Programme)

Sr. No.	Types of Courses	Nature	Total Credit	% of Courses
1	**Core Courses (CC)**	Compulsory Courses (CC)	84	56.75
2	**Elective Courses (EC)**	Discipline Specific Elective Courses (DSE)	24	16.21
		Generic Elective Courses (GE)	24	16.21
3	**Ability Enhancement Courses (AEC)**	Ability Enhancement Compulsory Courses (AECC)	8	5.40
		Ability Enhancement Elective (Skill Based) (SEC)	8	5.40
			148	**100**

Course Structure (Chemistry Major)

Details of courses for first three years

Courses	**Credits*** Theory+ Practical	**Credits*** Theory + Tutorial
I. Core Course **(14 Papers)**	14×4 = 56	14×5 = 70
Core Course Practical / Tutorial* **(14 Papers)**	14×2 = 28	14×1= 14
II. Elective Course **(8 Papers)**		
A.1. Discipline Specific Elective **(4 Papers)**	4×4 = 16	4×5 = 20
A.2. Discipline Specific Elective Practical/Tutorial* **(4 Papers)**	4×2 = 08	4×1 = 04
B.1. Generic Elective/Interdisciplinary **(4 Papers)**	4×4 = 16	4×5 = 20
B.2. Generic Elective Practical/ Tutorial* **(4 Papers)**	4×2 = 08	4×1 = 04
Optional Dissertation or project work in place of one Discipline Specific Elective paper (6 credits) in 6th Semester		
III. Ability Enhancement Courses **1. Ability Enhancement Compulsory**** **(2 Papers of 4 credit each)** Environmental Science/ English/ MIL Communication/Sanskrit	2×4 = 08	2×4 = 08
2. Ability Enhancement Elective (Skill Based) (Minimum 2) **(2 Papers of 4 credit each)**	2×4 = 08	2×4 = 08
Total credit	**148**	**148**

Institute should evolve a system/policy about ECA/ General Interest/ Hobby/ Sports/ NCC/ NSS/ related courses on its own.

*** wherever there is a practical there will be no tutorial and vice-versa., ** University/Department may add/ delete any course as per need**

3. SEMESTER-WISE COURSES AND CREDIT DISTRIBUTION (for first three years)

First Year

Sr. No	Course No	Course Name	Course Code	Course Type (Opted)	L	T	P	Credit
					Hrs.			
Semester I								
1		Inorganic Chemistry-I: Atomic Structure & Chemical Bonding-I		CC	4	0	0	4
2		Physical Chemistry-I: States of Matter & Ionic Equilibrium		CC	4	0	0	4
3		Inorganic Chemistry Practical-I		CC	0	0	4	2
4		Physical Chemistry Practical-I		CC	0	0	4	2
5		Physics-I: Mechanics		GE	4	0	0	4
6		Physics Practical-I		GE	0	0	4	2
7		English Communications / Sanskrit		AECC	4	0	0	4
					Total Credit 22			
Semester II								
1		Organic Chemistry-I: Basics & Hydrocarbons		CC	4	0	0	4
2		Physical Chemistry-II: Thermodynamics & its Applications		CC	4	0	0	4
3		Organic Chemistry Practical-I		CC	0	0	4	2
4		Physical Chemistry Practical-II		CC	0	0	4	2
5		Physics-II: Waves and Optics		GE	4	0	0	4
6		Physics Practical-II		GE	0	0	4	2
7		Environmental Science/ Sanskrit		AECC	4	0	0	4
					Total Credit 22			

CC = Core Course; GE = Generic Elective Course; AECC = Ability Enhancement Compulsory Course

Second Year

Sr. No	Course No	Course Name	Course Code	Course Type (Opted)	L	T	P	Credit
					Hrs.			
Semester III								
1		Inorganic Chemistry-II: s and p-Block Elements		CC	4	0	0	4
2		Organic Chemistry-II: Oxygen Containing Functional Groups		CC	4	0	0	4
3		Physical Chemistry-III: Phase Equilibria & Chemical Kinetics		CC	4	0	0	4
4		Inorganic Chemistry Practical-II		CC	0	0	4	2
5		Organic Chemistry Practical-II		CC	0	0	4	2
6		Physical Chemistry Practical-III		CC	0	0	4	2
7		Physics-III		GE	4	0	0	4
8		Physics Practical-III		GE	0	0	4	2
9		Pharmaceutical Chemistry/any other		SEC	4	0	0	4
					Total Credit 28			
Semester IV								
1		Inorganic Chemistry-III: Coordination Chemistry		CC	4	0	0	4
2		Organic Chemistry-III: Heterocyclic Chemistry		CC	4	0	0	4
3		Physical Chemistry-IV: Electrochemistry		CC	4	0	0	4
4		Inorganic Chemistry Practical-III		CC	0	0	4	2
5		Organic Chemistry Practical-III		CC	0	0	4	2
6		Physical Chemistry Practical-IV		CC	0	0	4	2
7		Physics-IV		GE	4	0	0	4
8		Physics Practical-IV		GE	0	0	4	2
9		Pesticide Chemistry/any other		SEC	4	0	0	4
					Total Credit 28			

CC = Core Course; GE = Generic Elective Course; SEC = Skill Enhancement Course (or students may choose any one from the given list)

Third Year

Sr. No	Course No	Course Name	Course Code	Course Type (Opted)	L	T	P	Credit
					Hrs.			
Semester V								
1		Organic Chemistry-IV: Biomolecules		CC	4	0	0	4
2		Physical Chemistry-V: Quantum Chemistry & Spectroscopy		CC	4	0	0	4
3		Organic Chemistry Practical-IV		CC	0	0	4	2
4		Physical Chemistry Practical-V		CC	0	0	4	2
5		Discipline Specific Elective -1		DSE	4	0	0	4
6		Discipline Specific Elective -2		DSE	4	0	0	4
7		Discipline Specific Elective Practical-1		DSE	0	0	4	2
8		Discipline Specific Elective Practical-2		DSE	0	0	4	2
					Total Credit 24			
Semester VI								
1		Inorganic Chemistry-IV:		CC	4	0	0	4
2		Organic Chemistry-V:		CC	4	0	0	4
3		Inorganic Chemistry Practical-IV:		CC	0	0	4	2
4		Organic Chemistry Practical-V:		CC	0	0	4	2
5		Discipline Specific Elective -3		DSE	4	0	0	4
6		Discipline Specific Elective -4		DSE	4	0	0	4
7		Discipline Specific Elective Practical-3		DSE	0	0	4	2
8		Discipline Specific Elective Practical-4		DSE	0	0	4	2
					Total Credit 24			

CC = Core Course; DSE = Discipline Specific Elective Course (Students may choose any one from the given list)

Total Credit (for 03 Years) = 148

NOTE: Scheme and Syllabi for Fourth and Fifth Year (M.Sc.) are yet to be finalized.

LIST of COURSES

Core Papers (C): (Credit: 06 each) (1 period/week for tutorials or 4 periods/week for practical)

1. Inorganic Chemistry I: Atomic Structure & Chemical Bonding (4 + 4)
2. Physical Chemistry I: States of Matter & Ionic Equilibrium (4 + 4)
3. Organic Chemistry I: Basics and Hydrocarbons (4 + 4)
4. Physical Chemistry II: Chemical Thermodynamics and its Applications (4 + 4)
5. Inorganic Chemistry II: s- and p-block Elements (4 + 4)
6. Organic Chemistry II: Oxygen Containing Functional Groups (4 + 4)
7. Physical Chemistry III: Phase Equilibria and Chemical Kinetics (4 + 4)
8. Inorganic Chemistry III: Coordination Chemistry (4 + 4)
9. Organic Chemistry III: Heterocyclic Chemistry (4 + 4)
10. Physical Chemistry IV: Electrochemistry (4 + 4)
11. Organic Chemistry IV: Biomolecules (4 + 4)
12. Physical Chemistry V: Quantum Chemistry & Spectroscopy (4 + 4)
13. Inorganic Chemistry IV: Organometallic Chemistry (4 + 4)
14. Organic Chemistry V: Spectroscopy (4 + 4)

Discipline Specific Elective Papers: (Credit: 06 each) (4 papers to be selected): DSE-1 to DSE-4

1. Applications of Computers in Chemistry (4) + Lab (4)
2. Analytical Methods in Chemistry (4) + Lab (4)
3. Molecular Modelling & Drug Design (4) + Lab (4)
4. Novel Inorganic Solids (4) + Lab (4)
5. Polymer Chemistry (4) + Lab (4)
6. Research Methodology for Chemistry (5) + Tutorials (1)
7. Green Chemistry (4) + Lab (4)
8. Industrial Chemicals & Environment (4) + Lab (4)
9. Inorganic Materials of Industrial Importance (4) + Lab (4)
10. Instrumental Methods of Analysis (4) + Lab (4)
11. Dissertation

Note: University/Department may include more options or delete some from this list

Other Discipline (Four papers of any one discipline, Credit: 06 each): GE-1 to GE-4

1. Mathematics (5) + Tut (1)
2. Physics (4) + Lab (4)
3. Economics (5) + Tut (1)
4. Computer Science (4) + Lab (4) Any other discipline of importance

Generic Elective Papers (GE) (Minor-Physics)

1. Mechanics
2. Waves and Optics
3. Electricity and Magnetism
4. Mathematical Physics I
5. Thermal Physics
6. Elements of modern Physics

Ability Enhancement Courses (AEC):

a) Ability Enhancement Compulsory Courses (Credit: 04 each):

1. English/MIL Communication/ Sanskrit
2. Environmental Science

b) Skill Enhancement Courses (02 to 04 papers) (Credit: 04 each): SEC-1 to SEC-4

1. IT Skills for Chemists
2. Basic Analytical Chemistry
3. Chemical Technology & Society
4. Chemoinformatics
5. Business Skills for Chemists
6. Intellectual Property Rights
7. Analytical Clinical Biochemistry
8. Green Methods in Chemistry
9. Pharmaceutical Chemistry
10. Chemistry of Cosmetics & Perfumes
11. Pesticide Chemistry
12. Fuel Chemistry
13. Youth & Social Responsibilities
14. SMART Youth of Young India

Note: University/Department may include more options or delete some from this list

Generic Elective Papers (GE) (Minor-Chemistry)

(any four) for other Departments/ Disciplines: (Credit: 06 each)

1. Atomic Structure, Bonding, General Organic Chemistry, Aliphatic Hydrocarbons (4 +4)
2. Chemical Energetics, Equilibria and Functional Organic Chemistry - I (4 + 4)
3. Solutions, Phase Equilibria, Conductance, Electrochemistry, & Functional Group Organic Chemistry - I (4 + 4)
4. Transition Metal & Coordination Chemistry, States of Matter & Chemical Kinetics (4 + 4)
5. Organometallics, Bio-inorganic Chemistry, Polynuclear Hydrocarbons & UV, IR Spectra (4 + 4)
6. Quantum Chemistry, Spectroscopy & Photochemistry (4 + 4)
7. Molecules of Life (4 + 4)
8. Chemistry of Main Group Elements, Theories of Acids & Bases (4 + 4)

Note: University/Department may include more options or delete some from this list.

8. COURSES

Course No:	Course Name: Inorganic Chemistry-I: Atomic Structure & Chemical Bonding-I				Course Code:		
Batch: 2021 Onwards	**Programme:** Integrated B.Sc.-M.Sc. Chemistry	**Semester:** I	**L**	**T**	**P**	**Credits**	**Contact Hrs. per Week: 04**
			4	0	0	4	**Total Hrs.: 60**
Total Evaluation Marks: 100 **CIE:** 30 Marks **TEE:** 70 Marks		**Examination Duration:** 3 Hrs. **Pre-requisite of course:** Basic knowledge about atomic structure, chemical bonding, periodic properties and redox reactions.					
Course Objective	*To provide basic knowledge about atomic structure, quantum mechanics, dual nature of particles, bonding aspect, electrode potential etc.*						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1**: Understanding about wave function **CO2**: Understand the periodicity in atomic and ionic radii, electronegativity, ionization energy, electron affinity of elements of the periodic table **CO3**: Understand the importance and application of chemical bonds, inter-molecular and intramolecular weak chemical forces and their effect. **CO4**: In-depth knowledge about standard electrode potential and volumetric analysis **CO5**: Ability to understand, explain predict various rules involve in chemical bonding **CO6**: Understanding of anomalous behaviour of elements						

COURSE SYLLABUS

NOTE:
i) Question no. 1 is compulsory and to be set from the entire syllabus. It will have seven sub-parts and students need to answer any four. Each part carries three and half marks.
ii) Question nos. 2 to 5 are to be set from all four units one from each. Every question will have three sub-parts and students need to answer any two sub-parts of each question. Each part carries seven marks.

Unit No.	Contents	Contact Hrs.
I	**ATOMIC STRUCTURE** Bohr's theory, its limitations and atomic spectrum of hydrogen atom. Wave mechanics: de Broglie equation, Heisenberg's Uncertainty Principle and its significance, Schrödinger's wave equation, significance of ψ and ψ^2. Quantum numbers and their significance. Normalized and orthogonal wave functions. Sign of wave functions. Radial and angular wave functions for hydrogen atom. Radial and angular distribution	15

	curves. Shapes of *s*, *p*, *d* and *f* orbitals. Contour boundary and probability diagrams. Pauli's Exclusion Principle, Hund's rule of maximum multiplicity, Aufbau's principle and its limitations, Variation of orbital energy with atomic number.	
II	**PERIODICITY OF ELEMENTS** *s*, *p*, *d*, *f* block elements, the long form of periodic table. Detailed discussion of the following properties of the elements, with reference to *s* and *p*-block. (a) Effective nuclear charge, shielding or screening effect, Slater rules, variation of effective nuclear charge in periodic table. (b) Atomic radii (van der Waals) (c) Ionic and crystal radii. (d) Covalent radii (octahedral and tetrahedral) (e) Ionization enthalpy, Successive ionization enthalpies and factors affecting ionization energy. Applications of ionization enthalpy. (f) Electron gain enthalpy, trends of electron gain enthalpy (g) Electronegativity, Pauling's/ Mulliken's/ Allred Rachow's/ and Mulliken-Jaffé's electronegativity scales. Variation of electronegativity with bond order, partial charge, hybridization, group electronegativity. Sanderson's electron density ratio	15
III	**CHEMICAL BONDING-I** (i) *Ionic bond:* General characteristics, types of ions, size effects, radius ratio rule and its limitations. Packing of ions in crystals. Born-Landé equation with derivation and importance of Kapustinskii expression for lattice energy. Madelung constant, Born-Haber cycle and its application, Solvation energy. (ii) *Metallic Bond:* Qualitative idea of valence bond and band theories. Semiconductors and insulators, defects in solids. (iii) *Weak Chemical Forces:* van der Waals forces, ion-dipole forces, dipole-dipole interactions, induced dipole interactions, Instantaneous dipole-induced dipole interactions. Repulsive forces, Hydrogen bonding (theories of hydrogen bonding, valence bond treatment) Effects of chemical force, melting and boiling points, solubility energetics of dissolution process.	15
IV	**CHEMICAL BONDING-II AND OXIDATION-REDUCTION** *Covalent bond:* Lewis structure, Valence Bond theory (Heitler-London approach). Energetics of hybridization, equivalent and non-equivalent hybrid orbitals. Bent's rule, Resonance and resonance energy, Molecular orbital theory. Molecular orbital diagrams of diatomic and simple polyatomic molecules N_2, O_2, C_2, B_2, F_2, CO, NO, and their ions; HCl, BeF_2, CO_2, (idea of s-p mixing and orbital interaction to be given). Formal charge, Valence shell electron pair repulsion theory (VSEPR), shapes of simple molecules and ions containing lone pairs and bond pairs of electrons, multiple bonding (σ and π bond	15

	approach) and bond lengths. Covalent character in ionic compounds, polarizing power and polarizability. Fajan's rules and consequences of polarization. Ionic character in covalent compounds: Bond moment and dipole moment. Percentage ionic character from dipole moment and electronegativity difference. Redox equations, Standard Electrode Potential and its application to inorganic reactions. Principles involved in volumetric analysis to be carried out in class	

Suggested Readings:

1. Atkins, P.W. & Paula, J. Physical Chemistry, 10th Edition, Oxford University Press, 2014.
2. Rodger, G.E. Inorganic and Solid State Chemistry, Cengage Learning India Edition, 2002.
3. Lee, J.D. Concise Inorganic Chemistry ELBS, 1991.
4. Douglas, B.E. and McDaniel, D.H. Concepts & Models of Inorganic Chemistry Oxford, 1970
5. Day, M.C. and Selbin, J. Theoretical Inorganic Chemistry, ACS Publications, 1962.

Course No:	Course Name: Inorganic Chemistry Practical-I				Course Code:		
Batch: 2021 Onwards	**Programme:** Integrated B.Sc.-M.Sc. Chemistry	**Semester:** **I**	**L** 0	**T** 0	**P** 4	**Credit** 2	**Contact Hrs. per Week: 04** **Total Hrs.: 60**
Total Evaluation Marks: 50 **CIE:** 15 Marks **TEE:** 35 Marks		**Examination Duration: 6 Hrs.**					
		Pre-requisite of course: Skill to handle preparation of various solutions, estimation of metal ions in the sample during performing experiments.					
Course Objective	*To acquire the skills to know about titrimetric analysis, acid-base titrations and oxidation-reduction titrimetry during the experiments. Also to carry out separation of mixtures of inorganic compounds by different methods.*						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1:** Basic knowledge of inorganic preparation **CO2:** Preparation of various solutions **CO3:** Separation of ions from the mixtures **CO4:** Estimation of ions from the mixtures **CO5:** Knowledge about indicators **CO6:** To work-up, isolate and purify, determine the purity of the prepared compound						

COURSE SYLLABUS

NOTE:
Two questions will be set, one from each of the UNIT. The candidates are required to attempt all the questions.

Unit No.	Contents	Contact Hrs.
I	**TITRIMETRIC ANALYSIS** (i) Calibration and use of apparatus (ii) Preparation of solutions of different Molarity/Normality of titrants **ACID-BASE TITRATIONS** (i) Estimation of carbonate and hydroxide present together in mixture. (ii) Estimation of carbonate and bicarbonate present together in a mixture. (iii) Estimation of free alkali present in different soaps/detergents	35
III	**OXIDATION-REDUCTION TITRIMETRY** (i) Estimation of Fe(II) and oxalic acid using standardized $KMnO_4$ solution. (ii) Estimation of oxalic acid and sodium oxalate in a given mixture. (iii) Estimation of Fe(II) with $K_2Cr_2O_7$ using internal (diphenylamine, anthranilic acid) and external indicator.	25

Suggested Readings:

1. J. Mendham, A. I. Vogel's *Quantitative Chemical Analysis 6th Edition,* Pearson, 2009.

Course No:	Course Name: Physical Chemistry-I				Course Code:		
Batch: 2021 onwards	**Programme:** Integrated B.Sc.-M.Sc.(Chemistry)	**Semester:** I	**L** 4	**T** 0	**P** 2	**Credit** 4	**Contact Hrs. per Week: 4** **Total Hrs.: 60**
Total Evaluation Marks: 100 **CIE:** **30** Marks **TEE:** **70** Marks		**Examination Duration:** **3** Hrs. **Pre-requisite of course:** Knowledge of basic physical chemistry course up to Sen. Sec. level.					
Course Objectives	*To provide students with a basic understanding of physical chemistry, gaseous, liquid and solid state and ionic equilibria. This course will strengthen the fundamentals of physical chemistry, especially gaseous state, liquid state and solid state.*						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1**: Basic understanding of physical chemistry. **CO2**: Use of gaseous, liquid and solid-state techniques in daily life. **CO3**: Skills for analyzing and developing new sustainable methods. **CO4**: Skills for developing industrially important methods. **CO5**: Development of alternate theoretical methods. **CO6**: Use of advanced and recent techniques in physical chemistry.						

COURSE SYLLABUS

NOTE:

i) Question no. 1 is compulsory and to be set from the entire syllabus. It will have seven sub-parts and students need to answer any four. Each part carries three and half marks.

ii) Question nos. 2 to 5 are to be set from all four units one from each. Every question will have three sub-parts and students need to answer any two sub-parts of each question. Each part carries seven marks.

Unit No.	Contents	Contact Hrs.
I	**GASEOUS STATE** Kinetic molecular model of a gas: postulates and derivation of the kinetic gas equation; collision frequency; collision diameter; mean free path and viscosity of gases, including their temperature and pressure dependence, relation between mean free path and coefficient of viscosity, calculation of σ from η; variation of viscosity with temperature and pressure. Maxwell distribution and its use in evaluating molecular velocities (average, root mean square and most probable) and average kinetic energy, law of equipartition of energy, degrees of freedom and molecular basis of heat capacities. Behavior of real gases: Deviations from ideal gas behavior, compressibility factor, *Z*, and its	15

	variation with pressure for different gases. Causes of deviation from ideal behavior. Van der Waals equation of state, its derivation and application in explaining real gas behavior, mention of other equations of state (Berthelot, dielectric or Dieterici); virial equation of state; van der Waals equation expressed in virial form and calculation of Boyle temperature. Isotherms of real gases and their comparison with van der Waals isotherms, continuity of states, critical state, relation between critical constants and van der Waals constants, law of corresponding states.	
II	**LIQUID STATE** Qualitative treatment of the structure of the liquid state; Radial distribution function; physical properties of liquids; vapour pressure, surface tension and coefficient of viscosity, and their determination. Effect of addition of various solutes on surface tension and viscosity. Explanation of cleansing action of detergents. Temperature variation of viscosity of liquids and comparison with that of gases. Qualitative discussion of structure of water. Different bonding present in solid and liquid state of water. Difference in structure of liquid and solid state of water.	15
III	**SOLID STATE** Nature of the solid state, law of constancy of interfacial angles, law of rational indices, Miller indices, elementary ideas of symmetry, symmetry elements and symmetry operations, qualitative idea of point and space groups, seven crystal systems and fourteen Bravais lattices; X-ray diffraction, Bragg's law, a simple account of rotating crystal method and powder pattern method. Analysis of powder diffraction patterns of NaCl, CsCl and KCl. Defects in crystals. Glasses and liquid crystals.	15
IV	**IONIC EQUILIBRIA** Strong, moderate and weak electrolytes, degree of ionization, factors affecting degree of ionization, ionization constant and ionic product of water. Ionization of weak acids and bases, pH scale, common ion effect; dissociation constants of mono-, di-and triprotic acids (exact treatment). Salt hydrolysis-calculation of hydrolysis constant, degree of hydrolysis and pH for different salts. Buffer solutions; derivation of Henderson equation and its applications; buffer capacity, buffer range, buffer action and applications of buffers in analytical chemistry and biochemical processes in the human body. Solubility and solubility product of sparingly soluble salts – applications of solubility product principle. Qualitative treatment of acid – base titration curves (calculation of pH at various stages). Theory of acid–base indicators; selection of indicators and their limitations.	15

	Multistage equilibria in polyelectrolyte systems; hydrolysis and hydrolysis constants.	

Suggested Readings:

1. P. W. Atkins, and J. D. Paula, Atkin's Physical Chemistry, 10th Edition, *Oxford University Press* (2014).
2. T. Engel, and P. Reid, Physical Chemistry 3rd Edition, *Pearson* (2013).
3. R. G. Mortimer, Physical Chemistry 3rd Edition, *Elsevier,* NOIDA, UP (2009).
4. D. W. Ball, Physical Chemistry, *Thomson Press*, India (2007).
5. G. W. Castellan, Physical Chemistry 4th Edition, *Narosa Publication House* (2004).

Course No:	Course Name: Physical Chemistry Practical-I				Course Code:		
Batch: 2021 onwards	**Programme:** Integrated B.Sc.-M.Sc.(Chemistry	**Semester:** I	**L** 0	**T** 0	**P** 4	**Credit** 2	**Contact Hrs. per Week:** **Total Hrs.:** **60**
Total Evaluation Marks: 50 **CIE:** **15** Marks **TEE:** **35** Marks		**Examination Duration:** **6** Hrs. **Pre-requisite of course:** Knowledge of solution preparation, safety measure in chemistry practical laboratory and basic practical knowledge up to Sen. Sec. level.					
Course Objectives	*To provide students with a basic understanding of laboratory techniques. This course will strengthen the fundamentals of analytical chemistry, and basics of physical chemistry practical techniques.*						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1**: Basic understanding of physical chemistry practical. **CO2**: Use of surface tension, viscosity and indexing techniques in daily life. **CO3**: Skills for analyzing and developing new sustainable methods. **CO4**: Skills for developing industrially important practical methods. **CO5**: Development of alternate testing methods. **CO6**: Use of advanced and recent techniques in experimental chemistry.						

COURSE SYLLABUS

NOTE: Depending on availability of time and equipment's, some experiments may be added/ deleted.

Unit No.	Contents	Contact Hrs.
I	**Surface tension and Viscosity Measurements.** a. Determine the surface tension by (i) drop number (ii) drop weight method. b. Study the variation of surface tension of detergent solutions with concentration. c. Determination of viscosity of aqueous solutions of (i) polymer (ii) ethanol and(iii) sugar at room temperature. d. Study the variation of viscosity of sucrose solution with the concentration of solute.	30
II	**Indexing by powder diffraction method of a cubic crystalline system.** a. Finding Miller indices of unknown XRD using JCPDS card file. b. Determination of average particle size using Scherrer equation. **pH metry** a. Study the effect on pH of addition of HCl/NaOH to solutions of acetic acid, sodium acetate and their mixtures. b. Preparation of buffer solutions of different pH	30

	i. Sodium acetate-acetic acid ii. Ammonium chloride-ammonium hydroxide c. pH metric titration of (i) strong acid vs. strong base, (ii) weak acid vs. strong base. d. Determination of dissociation constant of a weak acid.	

Suggested Readings:

1. R. Gupta, Practical Physical Chemistry, *New Age International Pub. House*, New Delhi (2017).
2. B. D. Khosla, V. C. Garg, and A . Gulati, Senior Practical Physical Chemistry, *R. Chand & Co.*, New Delhi (2011).
3. C. W. Garland, J. W. Nibler, and D. P. Shoemaker, Experiments in Physical Chemistry, 8th Edition; *McGraw-Hill,* New York (2003).
4. A. M. Halpern, and G. C. Mc. Bane, Experimental Physical Chemistry 3rd Edition, *W.H. Freeman & Co.,* New York (2003).

Course No:	Course Name: English Communications				Course Code:		
Batch: 2021 Onwards	**Programme:** Integrated B.Sc.-M.Sc.	**Semester:** I	**L** 4	**T** 0	**P** 0	**Credits** 4	**Contact Hrs. per Week: 04** **Total Hrs.: 60**
Total Evaluation Marks: 100 **CIE:** 30 Marks **TEE:** 70 Marks		**Examination Duration:** **3 Hrs.** **Pre-requisite of course:** None					
Course Objective	*The purpose of this course is to introduce students to the theory, fundamentals and tools of communication and to develop in the vital communication skills which should be integral to personal, social and professional interactions.*						
Course Outcomes:	After completing this course, student is expected to develop the following skills: **CO1**: Ability to share thoughts, emotions and ideas through various means of communication: both verbal and non-verbal. **CO2**: Enhancement in effective communication. **CO3**: Various dimensions of communication skills. **CO4:** Enhancement in writing skills such as report writing, note-taking etc.						

COURSE SYLLABUS

NOTE:

i i) Question no. 1 is compulsory and to be set from the entire syllabus. It will have four sub-parts and students need to answer any two. Each part carries three and half marks.

ii) Question nos. 2 to 5 are to be set from all four units one from each. Every question will have three sub-parts and students need to answer any two sub-parts of each question. Each part carries three and half marks.

Unit No.	Contents	Contact Hrs.
I	**INTRODUCTION AND COMMUNICATION** Introduction: Theory of Communication, Types and modes of Communication Language of Communication: Verbal and Non-verbal (Spoken and Written) Personal, Social and Business Barriers and Strategies Intra-personal, Inter-personal and Group communication.	15
II	**SPEAKINGSKILLS** Speaking Skills: Monologue, Dialogue, Group Discussion, Effective Communication/ Mis-Communication, Interview, Public Speech	15

III	**READINGANDUNDERSTANDING** Reading and Understanding, Close Reading, Comprehension, Summary Paraphrasing, Analysis and Interpretation, Translation (from Indian language to English and vice-versa), Literary/Knowledge Texts	15
IV	**WRITINGSKILLS** Writing Skills, Documenting, Report Writing, Making notes, Letter writing	15

Suggested Readings:

1. O. Blackswan, Language, Literature and Creativity, 2013.
2. Business English, Pearson, 2008.
3. Fluency in English-Part II, Oxford University Press, 2006.
4. Dr. G. Mishra, Dr. R. Kaul and Dr. B. Biswas, Language through Literature (forthcoming) Edition.

Course No:	Course Name: Sanskrit				Course Code:		
Batch: 2021 Onwards	**Programme:** Integrated B.Sc.-M.Sc.	**Semester:** I	**L** 4	**T** 0	**P** 0	**Credits** 4	**Contact Hrs. per Week: 04** **Total Hrs.: 60**
Total Evaluation Marks: 100 **CIE:** 30 Marks **TEE:** 70 Marks		**Examination Duration:** **3 Hrs.** **Pre-requisite of course:** None					

Course Objective/ उद्देश्यः	**1. संस्कृतेतर-विषयाणामध्येतृभ्यः संस्कृताध्ययनाय सौकर्योत्पादनम्; 2. भारतीयज्ञानसंपदाधारभूतानां वेदादि-शास्त्राणामुपनिषदां च रुचिरुत्पादनम्; 3. संस्कृतेनोपनिबद्धानां नीतिवाक्यानां गीतायां वर्णितस्य कर्मयोगस्य च तत्त्व-संधारणाय यत्नः; 4. सामान्य-भाषाविज्ञानस्य परिचयः।**
Course Outcomes/ पाठ्यक्रमाध्ययनस्य फलम्	After completing this course, student is expected to develop the following skills: **CO1**: अध्येतारः वेदादि-शास्त्राणामुपनिषदां च तत्त्वान् ज्ञात्वा स्वाध्याय प्रयत्नशीलाः भवेयुः। **CO2**: व्यावहारिकदृष्ट्या संस्कृतज्ञानेन अन्यविषयाणामध्येतारः तत्तद् स्वविषयानुगुणं संस्कृतभाषायामुपलभ्यमानानां ग्रन्थानां प्रति यत्नशीलाः स्युः। **CO3**: वेदोपनिषत्–गीता–नीतिशास्त्र–भाषाशास्त्रादीनां विषयाणां सम्यगध्ययनेनास्माकं पूर्वजानां वैदुष्येण परिचयः संजायेत। **CO4:** भारतीय-चिन्तनपरम्परायाः समृद्धिं ज्ञातुमयं पाठ्यक्रमः प्रकृष्टमाध्यमः संजायेत।

पाठ्यक्रमः

मन्त्राणां सन्दर्भानां श्लोकानां च व्याख्या सारसंक्षेपश्च –

NOTE:

i i) Question no. 1 is compulsory and to be set from the entire syllabus. It will have four sub-parts and students need to answer any two. Each part carries three and half marks.

ii) Question nos. 2 to 5 are to be set from all four units one from each. Every question will have three sub-parts and students need to answer any two sub-parts of each question. Each part carries three and half marks.

Unit No.	Contents	Contact Hrs.
I	**घटकम्-1**: **(क) यजुर्वेदः (34. 1-6)-शिवसंकल्पमन्त्राः; (ख) तैत्तिरीयोपनिषद् - शिक्षावल्ली (अनुशासनोपनिषद्)**	15
II	**घटकम्-2**: **भर्तृहरिः- नीतिशतकम्** : **1-50 श्लोकाः**	15

III	घटकम्-3: भगवद्गीता – तृतीयाध्यायः (कर्मयोगः)	15
IV	घटकम्-4: सामान्यभाषाविज्ञानम्- (क) वर्णमाला, वर्णानाम् उच्चारणस्थानानि प्रयत्नाश्च; (ख) भाषाविज्ञानस्य सामान्यः परिचयः, भाषापरिवर्तनस्य कारणानि, अर्थपरिवर्तनस्य कारणानि च	15

अनुशंसितग्रन्थाः -

1. उवव्ट-महीधर, शुक्लयजुर्वेदभाष्य, मोतीलाल बनारसीदास, दिल्ली, 2007
2. स्वामी दयानन्द सरस्वती, यजुर्वेदभाष्य, सम्पा० ब्रह्मदत्त जिज्ञासु, रामलाल कपूर ट्रस्ट, सोनीपत (हरियाणा)
3. तैत्तिरीयोपनिषद्, हिन्दी व्याख्याकार - स्वामी प्रखर प्रज्ञानन्द सरस्वती, काशी, 2013
4. भर्तृहरि, नीतिशतक, सम्पादक एवं हिन्दी व्याख्याकार - जनार्दन शास्त्री पाण्डेय, मोतीलाल बनारसीदास, दिल्ली, 2014
5. नीतिशतकम्, 'नीतिपथ' हिन्दी व्याख्याकार - राजेश्वर शास्त्री मुसलगाँवकर, चौखम्भा, वाराणसी
6. श्रीमद्भगवद्गीता (हिन्दी अनुवाद सहित), गीता प्रैस, गोरखपुर, 2015
7. श्रीकृष्ण त्रिपाठी, श्रीमद्भगवद्गीता (द्वितीय, तृतीय एवं चतुर्थ अध्याय), 2005
8. देवीदत्त शर्मा, भाषिकी और संस्कृत भाषा, हरियाणा साहित्य अकादमी, चण्डीगढ़, 1990
9. कपिलदेव द्विवेदी, भाषा-विज्ञान एवं भाषा-शास्त्र, विश्वविद्यालय प्रकाशन, चौक, वाराणसी, 2012
10. कर्णसिंह, भाषाविज्ञान, साहित्य भण्डार, मेरठ
11. Burrow, T., The Sanskrit Language, 2016
12. Gune, P.D., An Introduction to Comparative Philology, Oriental Book House, Poona, 1958
13. The Taittirīya Upaniṣad, Eng. Tr. and Commentary by Swami Muni Narayana Prasad, D.k. Print world (P), Ltd., New Delhi-2009
14. The Nīti and Vairāgya Śatakas of Bhartrihari, M.R. Kale, Motilal Banarsidass, Delhi, 2017

Course No:	Course Name: Organic Chemistry-I: Basics & Hydrocarbons				Course Code:		
Batch: 2021 Onwards	**Programme:** Integrated B.Sc.-M.Sc. (Chemistry)	**Semester:** II	**L**	**T**	**P**	**Credit**	**Contact Hrs. per Week: 04**
			4	0	0	4	**Total Hrs.: 60**
Total Evaluation Marks: 100 **CIE:** 30 Marks **TEE:** 70 Marks		**Examination Duration:** 3 Hrs. **Pre-requisite of course:** Basic knowledge of chemical structures of the simple organic compounds.					
Course Objective	*To provide basic knowledge of organic chemistry, reactions such as addition reactions, elimination and substitution reactions, stereochemistry and basic chemistry of alkanes, alkenes, alkynes and aromatic hydrocarbons , cycloalkanes and conformational analysis.*						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1**: Thorough knowledge of basics of organic chemistry **CO2**: Basic understanding of stereochemistry **CO3**: Basic chemistry of alkanes and alkenes **CO4**: Ability to understand, explain and predict various aspects of cycloalkanes and conformational analysis.						

COURSE SYLLABUS

NOTE:
i) Question no. 1 is compulsory and to be set from the entire syllabus. It will have seven sub-parts and students need to answer any four. Each part carries three and half marks.
ii) Question nos. 2 to 5 are to be set from all four units one from each. Every question will have three sub-parts and students need to answer any two sub-parts of each question. Each part carries seven marks.

Unit No.	Contents	Contact Hrs.
I	**BASICS OF ORGANIC CHEMISTRY** Organic Compounds: Classification, and Nomenclature, Hybridization, Shapes of molecules, Influence of hybridization on bond properties. Electronic Displacements: Inductive, electromeric, resonance and mesomeric effects, hyperconjugation and their applications; Dipole moment; Organic acids and bases; their relative strength. Homolytic and Heterolytic fission with suitable examples. Curly arrow rules, formal charges; Electrophiles and Nucleophiles; Nucleophlicity and basicity; Types, shape and their relative stability of Carbocations, Carbanions, Free radicals and Carbenes. Introduction to types of organic reactions and their mechanism: Addition, Elimination and Substitution reactions.	15

	Formulae representation: Fischer Projection, Newmann and Sawhorse Projection formulae and their interconversions;	
II	**STEREOCHEMISTRY** Isomerism: Types of isomerism, Geometrical isomerism: cis–trans and, syn-anti isomerism E/Z notations with C.I.P rules. Optical Isomerism: Optical Activity, Specific Rotation, Chirality/Asymmetry, Enantiomers, Molecules with two or more chiral-centres, Diastereoisomers, meso structures, Racemic mixture and resolution. Relative and absolute configuration: D/L and R/S designations. Cycloalkanes and Conformational Analysis: Types of cycloalkanes and their relative stability, Baeyer strain theory, Conformation analysis of alkanes: Relative stability: Energy diagrams of cyclohexane: Chair, Boat and Twist boat forms; Relative stability with energy diagrams.	15
III	**ALKANES AND ALKENES** Carbon-Carbon sigma bonds**:** Chemistry of alkanes: Formation of alkanes, Wurtz Reaction, Wurtz-Fittig Reactions, Free radical substitutions: Halogenation -relative reactivity and selectivity. Carbon-Carbon pi bonds**:** Formation of alkenes and alkynes by elimination reactions Mechanism of E1, E2, E1cb reactions. Saytzeff and Hofmann eliminations. Reactions of alkenes: Electrophilic additions their mechanisms (Markownikoff/ Anti Markownikoff addition), mechanism of oxymercuration-demercuration, hydroboration-oxidation, ozonolysis, reduction (catalytic and chemical), syn and anti-hydroxylation (oxidation). 1,2-and 1,4-addition reactions in conjugated dienes and, Diels-Alder reaction; Allylic and benzylic bromination and mechanism, e.g. propene, 1-butene, toluene, ethyl benzene.	15
IV	**ALKYNES AND AROMATIC HYDROCARBONS** Reactions of alkynes: Acidity, Electrophilic and Nucleophilic additions. Hydration to form carbonyl compounds, Alkylation of terminal alkynes. Aromaticity: Hückel's rule, aromatic character of arenes, cyclic carbocations/carbanions and heterocyclic compounds with suitable examples. Electrophilic aromatic substitution: halogenation, nitration, sulphonation and Friedel-Craft's alkylation/acylation with their mechanism. Directing effects of the groups.	15

Suggested Readings:

1. J. Singh, L.D.S. Yadav, Organic Chemistry (Volume I), 14th Edition, Pragati Prakashan, 2019.
2. S. M. Mukherji and S. P. Singh, Reaction Mechanism in Organic Chemistry, Revised Edition. (Revised by S. P. Singh and Om Prakash). TRINITY Press, An Imprint of Laxmi Publications Pvt. Ltd., 2015.
3. R. N. Boyd, R. T. Morrison and S. K. Bhattcharjee, Organic Chemistry, 7thEdition, Pearson, 2014.
4. S. M. Mukerji, S. P. Singh, K.P. Kapoor and R. Das, Organic Chemistry (Volume III), 2nd Edition, New Age International Publishers, 2014.
5. J. E. McMurry, Fundamentals of Organic Chemistry, 7thEdition, Cengage Learning India, 2013.
6. S. M. Mukerji, S. P. Singh, K.P. Kapoor and R. Das, Organic Chemistry (Volume II), 2nd Edition, New Age International Publishers, 2012.
7. S. M. Mukerji, S. P. Singh, K.P.Kapoor and R. Das, Organic Chemistry (Volume I), 2nd Edition, New Age International Publishers, 2010.
8. P. S. Kalsi, Stereochemistry Conformation and Mechanism, New Age International, 2005.
9. I. L. Finar, Organic Chemistry (Volume 1), 6th Edition, Pearson, 2002.
10. I. L. Finar, Organic Chemistry (Volume 2: Stereochemistry and the Chemistry of Natural Products), 5th Edition, Pearson, 2002.
11. E. L. Eliel & S. H. Wilen, Stereochemistry of Organic Compounds, Wiley: London, 1994.

Course No:	Course Name: Organic Chemistry Practical-I				Course Code		
Batch: 2021 Onwards	**Programme:** Integrated B.Sc.-M.Sc. Chemistry	**Semester:** II	**L** 0	**T** 0	**P** 4	**Credit** 2	**Contact Hrs. per Week: 02** **Total Hrs: 60**
Total Evaluation Marks: 50 **CIE:** 15 Marks **TEE:** 35 Marks		**Examination Duration: 6 Hrs.** **Pre-requisite of course:** Common understanding of chemicals.					
Course Objective	*To inculcate the common skills required for performing organic chemistry practicals like m.p. and b.p. determination, crystallization and separation of compounds by thin layer chromatography.*						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1:** About the calibration of thermometer and its uses **CO2**: Determination of b.p. and m.p. of the organic compounds purification of organic compounds **CO3:** About the use of thin layer chromatography						

COURSE SYLLABUS

NOTE:
Two questions will be set, one from each of the UNIT. The candidates are required to attempt both questions.

Unit No.	Contents	Contact Hrs.
I	1. Checking the calibration of the thermometer 2. Purification of organic compounds by crystallization using the following solvents: a) Water b) Alcohol c) Alcohol-Water 3. Determination of the melting points of above compounds and unknown organic compounds (Kjeldahl method and electrically heated melting point apparatus)	30
II	4.Effect of impurities on the melting point – mixed melting point of two unknown organic compounds 5.Determination of boiling point of liquid compounds. (boiling point lower than and more than 100 °C by distillation and capillary method) 6.Chromatography	30

	a. Separation of a mixture of two amino acids by ascending and horizontal paper chromatography b. Separation of a mixture of two sugars by ascending paper chromatography c. Separation of a mixture of *o*-and *p*-nitrophenol or *o*-and *p*-aminophenol by thin layer chromatography (TLC)	

Suggested Readings:

1. B.S. Furniss ; A. J. Hannaford ; P.W.G. Smith ; A. R. Tatchell, Practical Organic Chemistry, 5th Edition., Pearson, 2012.
2. F.G. Mann & B.C. Saunders, Practical Organic Chemistry, Pearson, 2009.

Course No:	Course Name: Physical Chemistry-II				Course Code:		
Batch: 2021 onwards	**Programme:** Integrated B.Sc.-M.Sc.(Chemistry)	**Semester:** II	**L** 4	**T** 0	**P** 0	**Credit** 4	**Contact Hrs. per Week: 4** **Total Hrs.: 60**
Total Evaluation Marks: 100 **CIE:** **30** Marks **TEE:** **70** Marks		**Examination Duration:** **3** Hrs. **Pre-requisite of course:** Knowledge of basic physical chemistry course up to Sen. Sec. level.					
Course Objectives	*To provide students with a basic understanding of chemical thermodynamics, and chemical equilibrium. This course will strengthen the fundamentals of thermodynamics, especially chemical thermodynamics, and chemical equilibrium.*						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1**: Basic understanding of chemical thermodynamics. **CO2**: Use of chemical thermodynamics in daily life. **CO3**: Skills for analyzing and developing new sustainable methods. **CO4**: Skills for developing industrially important chemical methods. **CO5**: Development of alternate physical chemistry methods. **CO6**: Use of advanced and recent chemical thermodynamic chemistry.						

COURSE SYLLABUS

NOTE:
i) Question no. 1 is compulsory and to be set from the entire syllabus. It will have seven sub-parts and students need to answer any four. Each part carries three and half marks.
ii) Question nos. 2 to 5 are to be set from all four units one from each. Every question will have three sub-parts and students need to answer any two sub-parts of each question. Each part carries seven marks.

Unit No.	Contents	Contact Hrs.
I	**CHEMICAL THERMODYNAMICS-I** Intensive and extensive variables; state and path functions; isolated, closed and open systems; zeroth law of thermodynamics. *First law:* Concept of heat, q, work, w, internal energy, U, and statement of first law; enthalpy, H, relation between heat capacities, calculations of q, w, U and H for reversible, irreversible and free expansion of gases (ideal and van der Waals) under isothermal and adiabatic conditions. *Second Law:* Concept of entropy; thermodynamic scale of temperature, statement of the second law of thermodynamics; molecular and statistical interpretation of entropy. Calculation of entropy change for reversible and irreversible processes. *Third Law:* Statement of third law, concept of residual entropy, calculation of absolute entropy of molecules.	15

II	**SYSTEMS OF VARIABLE COMPOSITION and CHEMICAL THERMODYNAMICS-II** Partial molar quantities, dependence of thermodynamic parameters on composition; Gibbs-Duhem equation, chemical potential of ideal mixtures, change in thermodynamic functions in mixing of ideal gases. **CHEMICAL THERMODYNAMICS-II** *Thermochemistry:* Heats of reactions: standard states; enthalpy of formation of molecules and ions and enthalpy of combustion and its applications; calculation of bond energy, bond dissociation energy and resonance energy from thermochemical data, effect of temperature (Kirchhoff's equations) and pressure on enthalpy of reactions. Adiabatic flame temperature, explosion temperature. *Free Energy Functions:* Gibbs and Helmholtz energy; variation of S, G, A with T, V, P; Free energy change and spontaneity. Relation between Joule-Thomson coefficient and other thermodynamic parameters; inversion temperature; Gibbs-Helmholtz equation; Maxwell relations; thermodynamic equation of state.	15
III	**CHEMICAL EQUILIBRIUM** Criteria of thermodynamic equilibrium, degree of advancement of reaction, chemical equilibria in ideal gases, concept of fugacity. Thermodynamic derivation of relation between Gibbs free energy of reaction and reaction quotient. Coupling of exoergic and endoergic reactions. Equilibrium constants and their quantitative dependence on temperature, pressure and concentration. Free energy of mixing and spontaneity; thermodynamic derivation of relations between the various equilibrium constants K_p, K_c and K_x. Le Chatelier principle (quantitative treatment); equilibrium between ideal gases and a pure condensed phase.	15
IV	**SOLUTIONS AND COLLIGATIVE PROPERTIES** Dilute solutions; lowering of vapour pressure, Raoult's and Henry's Laws and their applications. Excess thermodynamic functions. Thermodynamic derivation using chemical potential to derive relations between the four colligative properties [(i) relative lowering of vapour pressure, (ii) elevation of boiling point, (iii) Depression of freezing point, (iv) osmotic pressure] and amount of solute. Applications in calculating molar masses of normal, dissociated and associated solutes in solution.	15

Suggested Readings:

1. A. Peter, and J. Paula, Physical Chemistry 10th Edition, *Oxford University Press* (2014).
2. T. Engel, and P. Reid, Physical Chemistry 3rd Edition, *Prentice-Hall* (2012).
3. M. J. Assael, A. R. H. Goodwin, M. Stamatoudis, W. A. Wakeham, and S. Will, Commonly asked questions in thermodynamics. *CRC Press*, New York (2011).
4. I. N. Levine, Physical Chemistry 6th Edition, *Tata Mc Graw Hill* (2010).
5. C. R. Metz, 2000 solved problems in chemistry, *Schaum Series* (2006).
6. G. W. Castellan, Physical Chemistry 4th Edition, *Narosa* (2004).
7. D. A. McQuarrie, and J.D. Simon, Molecular Thermodynamics, *Viva Books Pvt. Ltd*., New Delhi (2004).

Course No:	Course Name: Physical Chemistry Practical-II				Course Code:		
Batch:	**Programme:**	**Semester:**	**L**	**T**	**P**	**Credit**	**Contact Hrs. per Week: 04**
2021-2023	M.Sc. Integrated Chemistry	II	0	0	4	2	**Total Hrs.: 60**
Total Evaluation Marks: 50 **CIE:** **15** Marks **TEE:** **35** Marks		**Examination Duration:** **6** Hrs. **Pre-requisite of course:** Knowledge of solution preparation, safety measure in chemistry practical laboratory and basic practical knowledge up to Sen. Sec. level.					
Course Objectives	*To provide students with a basic understanding of laboratory techniques. This course will strengthen the fundamentals of analytical chemistry, and basics of physical chemistry practical techniques.*						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1**: Basic understanding of physical chemistry practical. **CO2**: Use of surface tension, viscosity and indexing techniques in daily life. **CO3**: Skills for analyzing and developing new sustainable methods. **CO4**: Skills for developing industrially important practical methods. **CO5**: Development of alternate testing methods. **CO6**: Use of advanced and recent techniques in experimental chemistry.						

COURSE SYLLABUS

NOTE: Depending on availability of time and equipment's, some experiments may be added/ deleted.

Unit No.	Contents	Contact Hrs.
I	**THERMOCHEMISTRY-I** (a) Determination of heat capacity of a calorimeter for different volumes using change of enthalpy data of a known system (method of back calculation of heat capacity of calorimeter from known enthalpy of solution or enthalpy of neutralization). (b) Determination of heat capacity of the calorimeter and enthalpy of neutralization of hydrochloric acid with sodium hydroxide. (c) Calculation of the enthalpy of ionization of ethanoic acid. (d) Determination of heat capacity of the calorimeter and integral enthalpy (endothermic and exothermic) solution of salts.	**30**
II	**THERMOCHEMISTRY-II** (a) Determination of basicity/proticity of a polyprotic acid by the thermochemical method in	**30**

	terms of the changes of temperatures observed in the graph of temperature versus time for different additions of a base. Also calculate the enthalpy of neutralization of the first step. (b) Determination of enthalpy of hydration of copper sulphate. (c) Study of the solubility of benzoic acid in water and determination of ΔH.	

Suggested Readings:

1. R. Gupta, Practical Physical Chemistry, *New Age International Pub. House*, New Delhi (2017).
2. J. B. Yadav, Advanced Practical Physical Chemistry, *Krishana Prakashan Media, Pvt. Ltd*. (2015).
3. B.D. Khosla, V. C. Garg, and A. Gulati, Senior Practical Physical Chemistry, *R. Chand & Co*., New Delhi (2011).
4. V. D. Athawale, and P. Mathur, Experimental Physical Chemistry, *New Age International*, New Delhi (2001).
5. A. M. Halpern, and G.C. Mc Bane, Experimental Physical Chemistry 3rd Edition, *W.H. Freeman & Co.,* New York (2003).

Course No:	Course Name: Environmental Science				Course Code:		
Batch: 2021 Onwards	**Programme:** Integrated B.Sc.-M.Sc.	**Semester:** II	**L** 4	**T** 0	**P** 0	**Credits** 4	**Contact Hrs. per Week: 04** **Total Hrs.: 60**
Total Evaluation Marks: 100 **CIE:** 30 Marks **TEE:** 70 Marks		**Examination Duration:** 3 Hrs. **Pre-requisite of course:** None					
Course Objective	*To aware the students the need for sustainable development, problems of pollution, solid waste disposal, degradation of environment, issues like economic productivity and national security, Global warming, the depletion of ozone layer, loss of biodiversity and need of worldwide efforts in its conservation.*						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1**: The students will get the knowledge about trends of biological diversity and conservation strategies and thereafter be able to create awareness for its conservation and development. **CO2**: The understanding of issues concerning different natural resources will be helpful to find scientific solution based on participatory approach. **CO3**: To know about the local environmental issues, movements and an important role to minimize the impact of these aspects. **CO4**: Knowledge about the types of pollution and pollution control.						

COURSE SYLLABUS

NOTE:

i) Question no. 1 is compulsory and to be set from the entire syllabus. It will have four sub-parts and students need to answer any two. Each part carries three and half marks.

ii) Question nos. 2 to 5 are to be set from all four units one from each. Every question will have three sub-parts and students need to answer any two sub-parts of each question. Each part carries three and half marks.

Unit No.	Contents	Contact Hrs.
I	**INTRODUCTIONTO ENVIRONMENTAL SCIENCES** Definition, scope and importance of the environmental science, Natural Resources: Renewable and non-renewable resources: Natural resources and associated problems.	15
II	**ECOSYSTEM**	15

	Introduction, kinds of ecosystem, structure and functions, abiotic and biotic component, Ecological energetics, Energy flow models, Food chain and Food web, Ecological Pyramids-types, Ecological succession, Introduction, types, structure and function of the following ecosystem: a. Forest ecosystem b. Grassland ecosystem c. Desert ecosystem d. Aquatic ecosystems.	
III	**BIODIVERSITY AND ITS CONSERVATION** Introduction – Definition, value and types: genetic, species and ecosystem diversity. Bio-geographical classification and Hot-spots of India. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. Endangered and endemic species of India. Conservation of biodiversity: In-situ and Ex-situ conservation.	15
IV	**ENVIRONMENTAL ISSUES AND POLICIES** Definition, cause, effects and control measures of Air, Water, Soil, Marine and Noise pollution. Solid Waste Management: Causes, effects and control measures of wastes. Seventeen Sustainable Developmental Goals, Environment Protection Act, Air Act, Water Act, Wildlife Protection Act, Forest Conservation Act, Public awareness.	15

Suggested Readings:

1. D. Thangadurai, G. Ching, S. Jeyabalan, and S. Islam Biodiversity and Conservation: Characterization and Utilization of Plants, Microbes and Natural Resources for Sustainable Development and Ecosystem Management. United States: Apple Academic Press, 2019
2. I. Khan, Forest Governance and Sustainable Resource Management. SAGE Publications. India, 2019
3. P. D. Sharma, Ecology and Environment. 13th Edition, Rastogi Publications, 2017
4. G. Cao, R. Orru, Current Environmental Issues and Challenges. 14th Edition; Springer, 2014
5. D. Ginley, D. Cahen, Fundamentals of Materials for Energy and Environmental Sustainability. Cambridge University Press, 2011
6. R. K. Trivedi, Handbook of Environmental Laws, Rules Guidelines, Compliances and Standards, 3rd Edition. BS Publications, 2010
7. M. C. Dash, S. P. Dash, Fundamentals of Ecology. 3rd McGraw Hill Education, 2009
8. W. P. Cunningham, M. A. Cunningham, Principles of Environment Science. Enquiry and Applications. 5th Edition. Tata McGraw Hill, New Delhi, 2008
9. J. Gibbs, L. Malcolm, J. Sterling, Problem-Solving in Conservation Biology and Wildlife Management. 2nd Edition, Wiley-Blackwell,2008
10. M. Gilbert, An Introduction to Environmental Engineering and Science, Prentice Hall, New Delhi, 2007
11. E. P. Odum, W. Barrett, Fundamentals of Ecology. 5th Edition, Cengage Learning, 2005
12. E. Bharucha, The Biodiversity of India, Mapin Publishing, 2002

Course No:	Course Name: GE: Atomic Structure, Bonding, General Organic Chemistry & Aliphatic Hydrocarbons				Course Code:		
Batch: 2021 Onwards	**Programme:** Integrated B.Sc.-M.Sc.	**Semester:** I	**L**	**T**	**P**	**Credits**	**Contact Hrs. per Week: 04**
			4	0	0	4	**Total Hrs.: 60**
Total Evaluation Marks: 100 **CIE:** 30 Marks **TEE:** 70 Marks		**Examination Duration:** 3 Hrs. **Pre-requisite of course:** None					
Course Objective	*To provide basic knowledge of fundamentals of inorganic chemistry and organic chemistry to the students.*						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1**: The wave function **CO2**: Structures and geometries of molecules using Radius Ratio Rules, VSEPR theory and MO diagrams **CO3**: Importance and application of chemical bonds, inter-molecular and intramolecular weak chemical forces and their effect **CO4:** The nature and behavior of organic compounds **CO5:**Mechanisms of several organic reactions including free radical/electrophilic substitution/addition **CO6:** The fundamental concepts of stereochemistry						

COURSE SYLLABUS

NOTE:
i) Question no. 1 is compulsory and to be set from the entire syllabus. It will have seven sub-parts and students need to answer any four. Each part carries three and half marks.
ii) Question nos. 2 to 5 are to be set from all four units one from each. Every question will have three sub-parts and students need to answer any two sub-parts of each question. Each part carries seven marks.

Unit No.	Contents	Contact Hrs.
	INORGANIC CHEMISTRY-1	
I	**ATOMIC STRUCTURE** Review of Bohr's theory and its limitations, dual behaviour of matter and radiation, de Broglie's relation, Heisenberg Uncertainty principle. Hydrogen atom spectra. Need of a new approach to Atomic structure.	14

	What is Quantum mechanics? Time independent Schrodinger equation and meaning of various terms in it. Significance of ψ and ψ^2, Schrödinger equation for hydrogen atom. Radial and angular parts of the hydrogenic wavefunctions (atomic orbitals) and their variations for 1*s*, 2*s*, 2*p*, 3*s*, 3*p* and 3*d* orbitals (Only graphical representation). Radial and angular nodes and their significance. Radial distribution functions and the concept of the most probable distance with special reference to 1*s* and 2*s* atomic orbitals. Significance of quantum numbers, orbital angular momentum and quantum numbers m_l and m_s. Shapes of *s*, *p* and *d* atomic orbitals, nodal planes. Discovery of spin, spin quantum number(*s*) and magnetic spin quantum number (m_s). Rules for filling electrons in various orbitals, Electronic configurations of the atoms. Stability of half-filled and completely filled orbitals, concept of exchange energy. Relative energies of atomic orbitals, Anomalous electronic configurations.	
II	**CHEMICAL BONDING AND MOLECULAR STRUCTURE** **Ionic Bonding:** General characteristics of ionic bonding. Energy considerations in ionic bonding, lattice energy and solvation energy and their importance in the context of stability and solubility of ionic compounds. Statement of Born-Landé equation for calculation of lattice energy, Born-Haber cycle and its applications, polarizing power and polarizability. Fajan's rules, ionic character in covalent compounds, bond moment, dipole moment and percentage ionic character. **Covalent Bonding:** VB Approach: Shapes of some inorganic molecules and ions on the basis of VSEPR and hybridization with suitable examples of linear, trigonal planar, square planar, tetrahedral, trigonal bipyramidal and octahedral arrangements. Concept of resonance and resonating structures in various inorganic and organic compounds. **MO Approach:** Rules for the LCAO method, bonding and antibonding MOs and their characteristics for *s-s*, *s-p* and *p-p* combinations of atomic orbitals, nonbonding combination of orbitals, MO treatment of homonuclear diatomic molecules of 1st and 2nd periods (including idea of *s-p* mixing) and heteronuclear diatomic molecules such as CO, NO and NO^+. Comparison of VB and MO approaches.	16
	ORGANIC CHEMISTRY-1	
III	**FUNDAMENTALS OF ORGANIC CHEMISTRY** Physical Effects, Electronic Displacements: Inductive Effect, Electromeric Effect, Resonance and Hyperconjugation. Cleavage of Bonds: Homolysis and Heterolysis. Structure, shape and reactivity of organic molecules: Nucleophiles and electrophiles.	16

	Reactive Intermediates: Carbocations, Carbanions and free radicals. Strength of organic acids and bases: Comparative study with emphasis on factors affecting pK values. Aromaticity: Benzenoids and Hückel's rule. **Stereochemistry**: Conformations with respect to ethane, butane and cyclohexane. Interconversion of Wedge Formula, Newmann, Sawhorse and Fischer representations. Concept of chirality (upto two carbon atoms). Configuration: Geometrical and Optical isomerism; Enantiomerism, Diastereomerism and Meso compounds). Threo and erythro; D and L; *cis-trans* nomenclature; CIP Rules: R/S (for upto 2 chiral carbon atoms) and E / Z Nomenclature (for upto two C=C systems).	
IV	**ALIPHATIC HYDROCARBONS** Functional group approach for the following reactions (preparations & reactions) to be studied in context to their structure. **Alkanes:** (Upto 5 Carbons) Preparation: Catalytic hydrogenation, Wurtz reaction, Kolbe's synthesis, from Grignard reagent. Reactions: Free radical Substitution: Halogenation. **Alkenes:** (Upto 5 Carbons) Preparation: Elimination reactions: Dehydration of alkenes and dehydrohalogenation of alkyl halides (Saytzeff's rule); cis alkenes (Partial catalytic hydrogenation) and trans alkenes (Birch reduction). Reactions: cis addition (alk. $KMnO_4$) and trans-addition (bromine), Addition of HX (Markownikoff's and anti-Markownikoff's addition), Hydration, Ozonolysis, oxymecuration-demercuration, Hydroboration-oxidation. **Alkynes**: (Upto 5 Carbons) Preparation: Acetylene from CaC_2 and conversion into higher alkynes; by dehalogenation of tetra halides and dehydrohalogenation of vicinal-dihalides. Reactions: Formation of metal acetylides, addition of bromine and alkaline $KMnO_4$, ozonolysis and oxidation with hot alk. $KMnO_4$	14

Suggested Readings:

1. J. Singh, L.D.S. Yadav, Organic Chemistry (Volume I), 14th Edition, Pragati Prakashan, 2019.
2. T.W. Graham Solomon, C.B. Fryhle, & S.A. Dnyder, Organic Chemistry, John Wiley & Sons, 2014.
3. J.E. McMurry, Fundamentals of Organic Chemistry, 7th Ed. Cengage Learning Edition, 2013.
4. S. M. Mukerji, S. P. Singh, K.P.Kapoor and R. Das, Organic Chemistry (Volume I), 2nd Edition, New Age International Publishers, 2010.
5. R.T. Morrison & R.N. Boyd, Organic Chemistry, Pearson, 2010.
6. A. Bahl, & B.S. Bahl, S. Chand, Advanced Organic Chemistry, 2010.
7. J.E. Huheey, E.A. Keiter, R.L. Keiter, & O.K. Medhi, Inorganic Chemistry: Principles of Structure and Reactivity, Pearson Education India, 2006.
8. E.L. Eliel, Stereochemistry of Carbon Compounds, Tata McGraw Hill education, 2000.
9. F.A. Cotton, G. Wilkinson, & P.L. Gaus, Basic Inorganic Chemistry, 3rd Edition, Wiley, 1995.
10. J.D. Lee, Concise Inorganic Chemistry ELBS, 1991.
11. P. Sykes, A Guidebook to Mechanism in Organic Chemistry, Orient Longman, New Delhi 1988.
12. Cotton, F.A., Wilkinson, G. & Gaus, P.L., Basic Inorganic Chemistry, 3rd Edition, Wiley, 1995.
13. Finar, I.L. Organic Chemistry (Volume I & II), E.L.B.S.,1988.

Course No:	Course Name: GE-Lab: Atomic Structure, Bonding, General Organic Chemistry & Aliphatic Hydrocarbons				Course Code:		
Batch: 2021 Onwards	**Programme:** Integrated B.Sc.-M.Sc.	**Semester:** II	**L** 0	**T** 0	**P** 4	**Credit** 2	**Contact Hrs. per Week: 04** **Total Hours: 60**
Total Evaluation Marks: 50 **CIE:** 15 Marks **TEE:** 35 Marks		**Examination Duration: 6 Hrs.** **Pre-requisite of course:** None					
Course Objective	*To inculcate the common skills required for performing simple inorganic and organic chemistry practicals.*						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1:** The estimation techniques by volumetric analysis **CO2**: The handling skills of simple chemicals, glassware and small equipment. **CO3:** The qualitative analysis of simple organic compounds						

COURSE SYLLABUS

NOTE:
Two questions will be set, one from each of the UNIT. The candidates are required to attempt all the questions.

Unit No.	Contents	Contact Hrs.
I	***INORGANIC CHEMISTRY*** **VOLUMETRIC ANALYSIS** i. Estimation of sodium carbonate and sodium hydrogen carbonate present in a mixture. ii. Estimation of oxalic acid by titrating it with $KMnO_4$. iii. Estimation of water of crystallization in Mohr's salt by titrating with $KMnO_4$. iv. Estimation of Fe (II) ions by titrating it with $K_2Cr_2O_7$ using internal indicator. v. Estimation of Cu (II) ions iodometrically using $Na_2S_2O_3$.	30
II	***ORGANIC CHEMISTRY*** **QUAILITATIVE ANALYSIS OF ORGANIC COMPOUNDS** i. Detection of extra elements (N, S, Cl, Br, I) in organic compounds (containing	30

	upto two extra elements). ii. Separation of mixtures by Chromatography: Measure the Rf value in each case (combination of two compounds to be given) (a) Identify and separate the components of a given mixture of two amino acids (glycine, aspartic acid, glutamic acid, tyrosine or any other amino acid) by paper chromatography. (b) Identify and separate the sugars present in the given mixture by paper chromatography.	

Suggested Readings:

1. G. Svehla, Vogel's Qualitative Inorganic Analysis, Pearson Education, 2012.
2. J. Mendham, Vogel's Quantitative Chemical Analysis, Pearson, 2009.
3. A.I. Vogel, Tatchell, A.R., Furnis, B.S., Hannaford, A.J. & Smith, P.W.G., Textbook of Practical Organic Chemistry, Prentice-Hall, 5th Edition, 1996.
4. F.G. Mann, & B.C. Saunders, Practical Organic Chemistry Orient-Longman, 1960.

Course No:	Course Name: GE: Chemical Energetics, Equilibria & Functional Organic Chemistry-I				Course Code:		
Batch: 2021 Onwards	**Programme:** Integrated B.Sc.-M.Sc.	**Semester:** **II**	**L** 4	**T** 0	**P** 0	**Credits** 4	**Contact Hrs. per Week: 04** **Total Hrs.: 60**
Total Evaluation Marks: 100 **CIE:** 30 Marks **TEE:** 70 Marks		**Examination Duration:** **3 Hrs.**					
		Pre-requisite of course: None					
Course Objective	*To provide basic knowledge of chemistry of aromatic hydrocarbons, alky and aryl halides, alcohols, phenols, ethers and carbonyl compounds. To provide basic understanding of chemical energetics, chemical equilibrium and ionic equilibria.*						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1**: Basics of chemical energetics. **CO2**: Basics of chemical equilibrium and ionic equilibria. **CO3**: Chemistry of aromatic hydrocarbons, alky and aryl halides. **CO4**: Chemistry of alcohols, phenols, ethers and carbonyl compounds.						

COURSE SYLLABUS

NOTE:
i) Question no. 1 is compulsory and to be set from the entire syllabus. It will have seven sub-parts and students need to answer any four. Each part carries three and half marks.
ii) Question nos. 2 to 5 are to be set from all four units one from each. Every question will have three sub-parts and students need to answer any two sub-parts of each question. Each part carries seven marks.

Unit No.	Contents	Contact Hrs.
	PHYSICAL CHEMISTRY-1	
I	**CHEMICAL ENERGETICS** Review of thermodynamics and the Laws of Thermodynamics. Important principles and definitions of thermochemistry. Concept of standard state and standard enthalpies of formations, integral and differential enthalpies of solution and dilution. Calculation of bond energy, bond dissociation energy and resonance energy from thermochemical data. Variation of enthalpy of a reaction with temperature – Kirchhoff's equation. Statement of Third Law of thermodynamics and calculation of absolute entropies of substances.	15

II	**CHEMICAL EQUILIBRIUM AND IONIC EQUILIBRIA:** Chemical Equilibrium: Free energy change in a chemical reaction. Thermodynamic derivation of the law of chemical equilibrium. Distinction between ΔG and ΔG^{o}, Le Chatelier's principle. Relationships between K_p, K_c and K_x for reactions involving ideal gases. Ionic Equilibrium: Strong, moderate and weak electrolytes, degree of ionization, factors affecting degree of ionization, ionization constant and ionic product of water. Ionization of weak acids and bases, pH scale, common ion effect. Salt hydrolysis-calculation of hydrolysis constant, degree of hydrolysis and pH for different salts. Buffer solutions. Solubility and solubility product of sparingly soluble salts – applications of solubility product principle	15
	ORGANIC CHEMISTRY-2	
III	**AROMATIC HYDROCARBONS** *Preparation* (Case benzene): from phenol, by decarboxylation, from acetylene, from benzene sulphonic acid. *Reactions*: (Case benzene): Electrophilic substitution: nitration, halogenation and sulphonation. Friedel-Craft's reaction (alkylation and acylation) (upto 4 carbons on benzene). Side chain oxidation of alkyl benzenes (upto 4 carbons on benzene). **ALKYL AND ARYL HALIDES** Alkyl Halides (Upto 5 Carbons) Types of Nucleophilic Substitution (S_N1, S_N2 and S_Ni) reactions. *Preparation:* from alkenes *and* alcohols. *Reactions:* hydrolysis, nitrite & nitro formation, nitrile & isonitrile formation. Williamson's ether synthesis: Elimination vs substitution. Aryl Halides *Preparation:* (Chloro, bromo and iodo-benzene case): from phenol, Sandmeyer & Gattermann reactions. *Reactions (Chlorobenzene):* Aromatic nucleophilic substitution (replacement by –OH group) and effect of nitro substituent. Benzyne Mechanism: KNH_2/NH_3 (or $NaNH_2/NH_3$). Reactivity and Relative strength of C-Halogen bond in alkyl, allyl, benzyl, vinyl and aryl halides.	15
IV	**ALCOHOLS, PHENOLS AND ETHERS (UPTO 5 CARBONS)** Alcohols: *Preparation:* Preparation of 1^{o}, 2^{o} and 3^{o} alcohols: using Grignard reagent, Ester hydrolysis, Reduction of aldehydes, ketones, carboxylic acid and esters. *Reactions:* With sodium, HX (Lucas test), esterification, oxidation (with PCC, alk. $KMnO_4$, acidic dichromate, conc. HNO_3). Oppeneauer oxidation *Diols:* (Upto 6 Carbons) oxidation of diols. Pinacol-Pinacolone rearrangement. Phenols: (Phenol case) *Preparation:* Cumene hydroperoxide method, from diazonium salts.	15

	Reactions: Electrophilic substitution: Nitration, halogenation and sulphonation. Reimer-Tiemann Reaction, Gattermann-Koch Reaction, Houben–Hoesch Condensation, Schotten – Baumann Reaction. Ethers (aliphatic and aromatic): Cleavage of ethers with HI. Aldehydes and ketones (aliphatic and aromatic): (Formaldehye, acetaldehyde, acetone and benzaldehyde) *Preparation:* from acid chlorides and from nitriles. *Reactions* – Reaction with HCN, ROH, $NaHSO_3$, NH_2-G derivatives. Iodoform test. Aldol Condensation, Cannizzaro's reaction, Wittig reaction, Benzoin condensation. Clemensen reduction and Wolff Kishner reduction. Meerwein-Pondorff Verley reduction.	

Suggested Readings:

1. S. M. Mukherji and S. P. Singh, Reaction Mechanism in Organic Chemistry, Revised Edition. (Revised by S. P. Singh and Om Prakash). TRINITY Press, An Imprint of Laxmi Publications Pvt. Ltd., 2015.
2. T.W. Graham Solomon, C.B. Fryhle, & S.A. Dnyder, Organic Chemistry, John Wiley & Sons, 2014.
3. J.E. McMurry, Fundamentals of Organic Chemistry, 7th Ed. Cengage Learning India Edition, 2013.
4. S. M. Mukerji, S. P. Singh, K.P.Kapoor and R. Das, Organic Chemistry (Volume II), 2nd Edition, New Age International Publishers, 2010.
5. S. M. Mukerji, S. P. Singh, K.P.Kapoor and R. Das, Organic Chemistry (Volume I), 2nd Edition, New Age International Publishers, 2010.
6. I.L. Finar, Organic Chemistry (Volume I & II), E.L.B.S.
7. R.T. Morrison, & R.N. Boyd, Organic Chemistry, Pearson, 2010.
8. A. Bahl, & B.S Bahl, S. Chand, Advanced Organic Chemistry, 2010.
9. J.C. Kotz, P.M Treichel, & J.R. Townsend, General Chemistry Cengage Learning India Pvt. Ltd., New Delhi, 2009.
10. G.M. Barrow, Physical Chemistry, Tata McGraw-Hill, 2007.
11. G.W. Castellan, Physical Chemistry, 4th Edition, Narosa, 2004.
12. P. Sykes, A Guidebook to Mechanism in Organic Chemistry, Orient Longman, New Delhi, 1988.
13. B.H Mahan, University Chemistry, 3rd Edition, Narosa, 1998.
14. R.H. Petrucci, General Chemistry, 5th Edition, Macmillan Publishing Co.: New York, 1985.

Course No:	Course Name: GE Lab: Chemical Energetics, Equilibria & Functional Organic Chemistry-I				Course Code:		
Batch: 2021 Onwards	**Programme:** Integrated B.Sc.-M.Sc.	**Semester:** II	**L** 0	**T** 0	**P** 4	**Credit** 2	**Contact Hrs. per Week: 04** **Total Hrs: 60**
Total Evaluation Marks: 50 **CIE:** 15 Marks **TEE:** 35 Marks		**Examination Duration: 6 Hrs.** **Pre-requisite of course:** None					
Course Objective	*To acquire the skills for handling reactions to prepare simple organic compounds. To provide knowledge about the purification techniques for organic compounds and their m.pt determination to the students. To explain the importance and applications of thermochemistry and to calculate the pH of the different solutions.*						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1:** Thermochemistry and its applications in chemistry **CO2**: Ionic equilibria and measurement of pH of different solutions. **CO3:** Purification techniques and their importance **CO4:** Single-step organic preparations and purification of the obtained product						

COURSE SYLLABUS

NOTE:
Two questions will be set, one from each of the UNIT. The candidates are required to attempt all the questions.

Unit No.	Contents	Contact Hrs.
I	**PHYSICAL CHEMISTRY** **Thermochemistry** 1. Determination of heat capacity of calorimeter for different volumes. 2. Determination of enthalpy of neutralization of hydrochloric acid with sodium hydroxide. 3. Determination of enthalpy of ionization of acetic acid. 4. Determination of integral enthalpy of solution of salts (KNO_3, NH_4Cl). 5. Determination of enthalpy of hydration of copper sulphate. 6. Study of the solubility of benzoic acid in water and determination of ΔH. **Ionic equilibria** pH measurements Measurement of pH of different solutions like aerated drinks, fruit juices, shampoos and soaps (use dilute solutions of soaps and shampoos to prevent damage to the glass electrode) using pH-meter. a) Preparation of buffer solutions:	30

	(i) Sodium acetate-acetic acid (ii)Ammonium chloride-ammonium hydroxide Measurement of the pH of buffer solutions and comparison of the values with theoretical values.	
II	**ORGANIC CHEMISTRY** 1. Purification of organic compounds by crystallization (from water and alcohol) and distillation. 2. Criteria of Purity: Determination of melting and boiling points. 3. Preparations: Mechanism of various reactions involved to be discussed. Recrystallisation, determination of melting point and calculation of quantitative yields to be done. (a) Bromination of Phenol/Aniline (b) Benzoylation of amines/phenols (c) Oxime and 2,4-dinitrophenylhydrazone of aldehyde/ketone	30

Suggested Readings:

1. B.D. Khosla ; V . C . Garg & A. Gulati Senior Practical Physical Chemistry, R. Chand & Co.: New Delhi (2011).
2. A.L. Vogel, A.R. Tatchell, B.S. Furnis, A.J. Hannaford & P.W.G. Smith Textbook of Practical Organic Chemistry, Prentice-Hall, 5th edition, 1996.
3 F.G. Mann & B.C. Saunders Practical Organic Chemistry Orient-Longman, 1960.

9. TEACHING-LEARNING PROCESS

- Lectures
- Discussions
- Simulations
- Role Playing
- Participative Learning
- Interactive Sessions
- Seminars
- Research-based Learning/Dissertation or Project Work
- Technology-embedded Learning
- Hands on training
- Self study analysis
- Report writing

10. IMPLEMENTATION OF BLENDED LEARNING

Blended Learning is a pedagogical approach that combines face to-face classroom methods with computer-mediated activities in the process of teaching and learning. It implies nice blend of face-to-face and online activities to make the learning processes more interesting and engaging. It focuses on integration of traditional classroom activities and innovative ICT-enabled strategies. It emphasizes student-centric learning environment where the teacher is the facilitator for productive and measurable learning outcomes. It optimizes and compliments the face to face learning, giving ample freedom and flexibility to the students and teachers to access and explore the wide range of open-access sources such as video lectures, podcasts, recordings and articles through digital platforms. It gives freedom and autonomy to the teachers in selection of appropriate digital platforms, resources and time-slots to complement and supplement face to face learning. The Blended Learning doesn't undermine the role of the teacher, rather it gives him/her an opportunity to explore the unexplored in accordance with the requirements of the curriculum.

Key features of Blended Learning

- Student-Centric Pedagogical Approach focusing on flexibility in timing, quality content, needs and interests of students and freedom to study through the mode of his/her choice;
- Freedom to Select variety of mediums and techniques;
- Increased student engagement in learning;
- Enhanced teacher and student interaction;
- Improved student learning outcomes;
- More flexible teaching and learning environment;
- More responsive for self and continuous learning;
- Better opportunities for experiential learning;
- Increased learning skills;
- Greater access to information, improved satisfaction and learning outcomes.

Note: It was resolved that Blended Learning with 40% component of online teaching and 60% face to face classes for each programme, may be adopted

11. ASSESSMENT AND EVALUATION

Overall assessment will be made as per relevant ordinances of CUH.

- Continuous Comprehensive Evaluation at regular after achievement of each Course-level learning outcome
- Formative Assessment on the basis of activities of a learner throughout the programme instead of one-time assessment
- Oral Examinations to test presentation and communication skills
- Open Book Examination for better understanding and application of the knowledge acquired if required
- Group Examinations on Problem solving exercises

- Seminar Presentations
- Review of Literature

Collaborative Assignments

CENTRAL UNIVERSITY OF HARYANA

(*Established under the Central Universities Act, 2009*)

(NAAC Accredited 'A' Grade)

CBCS Based

Curriculum and Syllabi
Of
Ph.D. Chemistry Course Work

(w.e.f. 2021)

DEPARTMENT OF CHEMISTRY
SCHOOL OF BASIC SCIENCES

Approved by :	**BOS**	**School Board**	**Academic Council**
Approval Status :	√		
Approval Date :	09-09-2021		

CENTRAL UNIVERSITY OF HARYANA (CUH)
DEPARTMENT OF CHEMISTRY
SCHOOL OF BASIC SCIENCES

Ph.D. (Chemistry)

Course Structure of Course Work for Ph.D. Degree in Chemistry

Sr. No	Course No	Course Name	Course Code	Course Type	Credit
CORE COURSES (CC)					
1	**CHP-01**	Research Methodology and Computer Applications for Chemistry	SBS CH 030101 C 5016	**CC**	**06**
ANY ONE OF THE FOLLOWING ELECTIVE COURSES(EC)					
2	**CHP-02**	Solid State and Supramolecular Chemistry	SBS CH 030101 E 5016	**EC**	**06**
3	**CHP-03**	Advanced Computational Chemistry	SBS CH 030102 E 5016	**EC**	**06**
4	**CHP-04**	Advanced Organic Synthesis	SBS CH 030103 E 5016	**EC**	**06**
5	**CHP-05**	Medicinal Chemistry	SBS CH 030104 E 5016	**EC**	**06**
6	**CHP-06**	Spectroscopic Techniques for Chemists	SBS CH 030105 E 5016	**EC**	**06**
7	**CHP-07**	Electroanalytical Techniques for Chemists	SBS CH 030106 E 5016	**EC**	**06**
UGC APPROVED TWO-CREDIT COMPULSORY COURSE FOR Ph.D./ M.Phil. STUDENTS					
8	**Offered by Central Library, CUH**	Research and Publication Ethics	CPE-RPE		**02**
				Total Credit	**14**

Central University of Haryana
Department of Chemistry

Course Type	**:**	**Core**
Course Name	**:**	**Research Methodology and Computer Applications for Chemistry**
Course Code	**:**	**SBS CH 030101 C 5016**
Contact Hrs per week	**:**	**6**
Credit	**:**	**6**

Course Objective and Learning Outcomes:

Guiding philosophy of knowledge creation and dissemination will be discussed in this course. Idea about various approaches to research, data collection, analysis and inference will be taught. Principles of formulating research problems, designing experiments and documentation will form a major part of the course. Specific objectives and techniques of chemical sciences research will also be presented. At the end of the course the students are expected to identify, design and plan research problems, prepare research proposals and contemplate publications and reports when presented with data.

UNIT I: METHODS AND TYPES OF RESEARCH

Research methods vs Methodology. Types of research – Descriptive vs. Analytical, Applied vs. Fundamental, Quantitative vs. Qualitative, Conceptual vs. Empirical. Research proposals-design and components.

UNIT II: LITERATURE REVIEW

Defining and formulating the research problem - Selecting the problem - Necessity of defining the problem - Importance of literature review in defining a problem – Literature review – Primary and secondary sources – reviews, treatise, monographs-patents – web as a source – searching the web - Critical literature review – Identifying gap areas from literature review - Development of working hypothesis.

UNIT-III: SCIENTIFIC SOFTWARES IN RESAECRH DESIGN AND METHODS AS APPLIED

Data Analysis using Tools like MS Excel, ChemDraw and MATLAB

Digital Methods and Web Search: Internal basics, Internet protocols, pre-requisites, search engines – google scholar, chemspider, scifinder, scopus, reaxys, research gate; using

advanced search techniques, web resources, e-journals, e-books, journal access, subscribing TOC alerts, hot articles, citation index – h-index and i-index; Impact factor

Experiment design- monitoring- laboratory safety- Laboratory notebook keeping- data collection-coding of samples and experiments- storage of samples- Hypothesis-testing - Generalization and Interpretation.

UNIT-V: REPORTING, DOCUMENTATION AND PRESENTATION

Scientific Document; Organization and writing of research papers, short communications, review articles, monographs, technical and survey reports, authored book and edited books and dissertation.

Writing of Thesis: Format of a thesis: Review of literature, formulation, writing methods, results, preparation of tables, figures, writing discussion, summary and conclusion, synopsis, references citing and listing, bibliography, acknowledgement, avoiding plagiarism, Oral presentations-visual aids

Suggested Readings

1. A. Fink, Conducting Research Literature Reviews: From the Internet to Paper, Sage Publications, 2009.
2. M. Graziano, A.M. Anthony and M. L. Raulin, Research Methods: A Process of Inquiry, Allyn and Bacon., 2009.
3. W. M. K. Trochim, Research Methods: the concise knowledge base, Atomic Dog Publishing, 2005.
4. P. D. Leedy and J. E. Ormrod, Practical Research: Planning and Design, Prentice Hall, 2004.
5. B. L. Garg, R. Karadia, F. Agarwal and U. K. Agarwal, An introduction to Research Methodology, RBSA Publishers, 2002.
6. R. A. Day, How to Write and Publish a Scientific Paper, Cambridge University Press, 1992.
7. C. R. Kothari, Research Methodology: Methods and Techniques, New Age International, 1990.
8. S. M. Coley and C. A. Scheinberg, Proposal Writing, Sage Publications, 1990.

Central University of Haryana
Department of Chemistry

Course Type	**:**	**Elective**
Course Title	**:**	**Solid State and Supramolecular Chemistry**
Course Code	**:**	**SBS CH 030101 E 5016**
Contact Hrs per week	**:**	**6**
Credit	**:**	**6**

Course Objective and Learning Outcomes:

In-depth understanding of the elements of symmetry and their importance in solid state chemistry will be discussed. Symmetry as the founding principle of crystal growth and design will be pursued. X-ray techniques to study crystals and their properties, supramolecular interactions and their importance in crystal growth and design, molecular recognition and self-assembly will be analysed in depth. Students are expected to analyse and design crystal structures at the end of the course.

SYMMETRY AND STRUCTURE IN SOLID STATE

UNIT I

Crystal symmetry – (i) point group elements and (ii) space group elements; 32 crystal classes, HM notations, distribution in different systems and stereographic projections.

Space group – HM notation, space groups in triclinic and monoclinic systems.

Indexing of lattice planes; Miller indeces.

UNIT II

X-ray, Cu Kα and Mo Kα radiation; X-ray diffraction; Bragg equation; Reciprocal lattice and its relation to direct lattice; Bragg reflection in terms of reciprocal lattice – sphere of reflection and limiting sphere; relation between d_{hkl} and lattice parameters.

SUPRAMOLECULAR CHEMISTRY

UNIT III

Origin of supramolecular chemistry - "Chemistry beyond the molecules". Concepts and terminology of supramolecular chemistry.

Nature and types of supramolecular interactions (Hydrogen bonding, van der Waal interactions, π-stacking, C-H….π interactions etc.)

UNIT IV

Molecular recognition- Information and complementarity. Different types of receptors with special reference of Crown ethers, cryptates and Calix[4]arene. Anion recognition and anion coordination chemistry. Molecular self-assembly formation and examples.

Supramolecular chemistry of life, application of supramolecular chemistry in drug design. Application in material science-molecular machines.

Suggested Readings

1. C. Giacavazzo, Fundamentals of crystallography, 3rd Edition. 2011.
2. J. W. Steed and J. L. Atwood, SupramolecularChemistry, John Wiley, 2nd Edition. 2009.
3. J. P. Sauvage, Transition metals in supramolecular chemistry: John Wiley & sons: UK, 1st Edition. 1999.
4. J. D. Dunitz, X-ray analysis and the structure of organic molecules, 2nd Edition. 1995.
5. J. M. Lehn, Supramolecular Chemistry, VCH, Wienheim, 1995.
6. G. H. Stout and L. H. Jensen, X-ray structure determination: A practical guide, 2nd Edition. 1989.

Central University of Haryana
Department of Chemistry

Course Type	**:**	**Elective**
Course Title	**:**	**Advanced Computational Chemistry**
Course Code	**:**	**SBS CH 030102 E 5016**
Contact Hrs per week	**:**	**6**
Credit	**:**	**6**

Course Objective and Learning Outcomes:

The principles and applications of computational methods in chemistry will be covered in detail. Introduction of the theory of various mathematical approaches, approximation methods and basis sets will be discussed. Armed with this knowledge, further analysis of potential energy surfaces will be done. Hands on exercise on solving actual problems in computational chemistry will also be done. Students are expected to design, write and execute the calculations of various types by themselves at the end of this course.

UNIT-I: INTRODUCTION TO COMPUTATIONAL CHEMISTRY

Computational chemistry map, Scope of Computational Chemistry, Born-Oppenheimer approximation, Restricted and Unrestricted Hartree-Fock.

Density Functional Theory: Exchange-Correlation Functional, Local Density Approximation, Generalized Gradient Approximation, Hybrid Density Functional Methods.

UNIT-II: BASIS SETS

Definition, Slater and Gaussian Type Orbitals, Minimal, Double-zeta, Split-valence, Core-valence, Pople style basis sets, Polarization and Diffuse Functions, Calculation of Basis Functions for with suitable examples, Pseudopotentials or Effective Core Potentials.

UNIT-III: BASIC CONCEPTS OF POTENTIAL ENERGY SURFACES

Stationary Points, Geometry Optimization, Local and Global Minima, and Transition State Theory (TST).

UNIT-IV: HANDS ON EXERCISE

Computations of Single Point Energy, Formation Energy, Optimizations and Transition States of Polyatomic Molecules, Intrinsic Reaction Coordinate Analysis, Natural Bond Order, Electron Decomposition Analysis.

Suggested Readings

1. F. Jensen, Introduction to Computational Chemistry, John Wiley & Sons, 2007.
2. J. B. Foresman and A. Frisch, Exploring Chemistry with Electronic Structure Methods, 2nd Edition. Gaussian Inc., 2005.
3. C. J. Cramer, Essentials of Computational Chemistry: Theories and Models, 2nd Edition. John Wiley & Sons Ltd, 2004.
4. C. J. Cramer, Essentials of Computational Chemistry: Theories and Models, 2nd Edition. John Wiley & Sons Ltd, 2002.

Central University of Haryana
Department of Chemistry

Course Type	**:**	**Elective**
Course Title	**:**	**Advanced Organic Synthesis**
Course Code	**:**	**SBS CH 030103 E 5016**
Contact Hrs per week	**:**	**6**
Credit	**:**	**6**

Course Objective and Learning Outcomes:

To provide the advance knowledge of organic synthesis in general and classical and modern reagents and methods in synthesis in particular. In-depth knowledge of metal-mediated reactions and common metal-based reagents, oxidation-reduction reactions and reagents and rearrangement reactions will be gained. At the end of the course students are expected to predict reagents and conditions needed for specific conversions.

UNIT I: TRANSITION METAL CATALYSIS IN SYNTHESIS

Overview of modern catalytic methods in organic synthesis, transition metal catalysis, details of homogeneous catalysis by palladium, copper, silver, gold, rhodium and ruthenium complexes. Olefin and alkyne metathesis reactions.

UNIT II: ORGANOCATALYSIS AND BIOCATALYSIS

Asymmetric catalysis. Organocatalysis. Iminium and enamine catalysis. N-heterocyclic carbenes (NHC). Enzyme catalysis and biocatalysis. Light mediated reactions.

UNIT III: MODERN ORGANIC REACTIONS

Modern methods of carbonyl olefinations. Boron, Tin and Silicon based reagents. Modern oxidation reactions. Hypervalent iodine reagents. Sharpless asymmetric epoxidation and dihydroxylation reactions. New methods of reduction. Super hydride. Selectrides. Catalytic asymmetric hydrogenations and hydrogen transfer reductions. CH- and C-C activations.

UNIT IV: TOTAL SYNTHESIS

Strategies and tactics in total synthesis. Classical examples. Woodward synthesis of Strychnine. Stork synthesis of reserpine. Corey synthesis of longifolene. Overman synthesis of morphine. Vollhardt synthesis of estrone. Baran synthesis of vinigrol.

Suggested Readings

1. J. Clayden, N. Geeves, S. Warren, Organic Chemistry, 2nd Edition. Oxford University Press, 2012.
2. M. B. Smith, Organic Synthesis, Academic Press, 2009.

3. K. C. Nicolaou and E. J. Sorensen, Classics in Total Synthesis, Wiley, 2008,
4. Carey and Sundberg, Advanced Organic Chemistry; Parts A and B, Springer 2007.
5. E. J. Corey and X.-M. Cheng, The logic of Chemical Synthesis, Wiley, 2005.
6. R. O. C. Norman and J. M. Coxon, Principles of Organic Synthesis 3rd Edition, CRC Press, 2004.

Central University of Haryana
Department of Chemistry

Course Type	**:**	**Elective**
Course Title	**:**	**Medicinal Chemistry**
Course Code	**:**	**SBS CH 030104 E 5016**
Contact Hrs per week	**:**	**6**
Credit	**:**	**6**

Course Objective and Learning Outcomes:

This course will provide a basic understanding and fundamentals of Medicinal Chemistry. At the end of this course, students will learn about the various stages involved in drug discovery & development process and challenges encounter during the course of development of new drug which finally comes into the market, various biological drug targets, drug-target binding, mode of actions of anticancer, antibiotics, psychoactive drugs and its chemical synthesis.

UNIT I: DRUG DESIGN

Introduction, Development of new drugs, Concept of lead compounds and lead modifications, structure-activity relationship (SAR), factors affecting bioactivity, resonance, inductive effect, isosterism, bio-isosterism. Theories of drug activity: occupancy theory, rate theory, induced fit theory. Quantitative structure activity relationship, Concepts of drugs receptor, Elementary treatment of drug receptor interactions, Physico-chemical parameters: lipophilicity, partition coefficient, electronic ionization constants, steric factors.

UNIT II: ANTICANCER AGENTS

Introduction, cancer chemotherapy, role of alkylating agents and antimetabolites in treatment of cancer. Synthesis of 6-mercapto purine, melphalan, mechlorethamine, cyclophosphamide and uracil, Recent development in cancer chemotherapy.

UNIT III: ANTI-INFECTIVE DRUGS

Introduction and general mode of action of antibiotic and antibacterial-, antiviral-, antifungal- and antiprotozoan drugs. Cell wall biosynthesis, inhibitors, β-lactam rings, antibiotics inhibiting protein synthesis. Synthesis of penicillin G, amoxycillin, cephalosporin, ciprofloxacin, furazolidone, dapsone, gluconazole, chloroquine, primaquin, Introductory idea of tetracycline and streptomycin.

UNIT IV: CARDIOVASCULAR DRUGS

Introduction and general mode of action. Synthesis of ditiazem, verapamil, methyldopa and atenolol.

Suggested Readings

1. G. L. Patrick, An Introduction to Medicinal Chemistry, 5th Edition. Oxford University Press, 2013.
2. D. Sriram and P. Yogeshwari, Medicinal Chemistry, 2nd Edition. Pearson, 2012.
3. R. B. Silverman, The Organic Chemistry of Drug Design and Drug Action, Academic Press, 2009.
4. Ed. Robert F. Dorge. Wilson and Gisvold's Text Book of Organic Medicinal and Pharmaceutical Chemistry, 2008.
5. Ed. M. E Wolff, Burger's Medicinal Chemistry and Drug Discovery, Vol. 1, John Wiley, 2007.
6. S. S. Pandeya and J. R. Dmmock, An Introduction to Drug Design, New Age International, 2004.

Central University of Haryana
Department of Chemistry

Course Type	**:**	**Elective**
Course Title	**:**	**Spectroscopic Techniques for Chemists**
Course Code	**:**	**SBS CH 030105 E 5016**
Contact Hrs per week	**:**	**6**
Credit	**:**	**6**

Course Objective and Learning Outcomes:

To provide the advance knowledge and understanding of organic spectroscopy. At the end of this course, students will acquire both the theoretical and application aspect of various spectroscopic techniques (UV-Visible, IR, NMR spectroscopy and mass spectrometry) to the solve problems related to structure determination of organic compounds.

UNIT I: ULTRAVIOLET AND VISIBLE SPECTROSCOPY AND MASS SPECTROMETRY

UV-Visible spectroscopy: Various electronic transitions, Beer-Lambert law, visible spectrum & colour, effect of solvent on electronic transitions, ultraviolet bands for carbonyl compounds, unsaturated carbonyl compounds, dienes, conjugated polyenes. Fieser-Woodward rules for conjugated dienes and carbonyl compounds, ultraviolet spectra of aromatic and heterocyclic compounds.

Mass spectrometry: Introduction, ion production–EI, CI, FD and FAB, factors affecting fragmentation, ion analysis, ion abundance. Mass spectral fragmentation of organic compounds, common functional groups, molecular ion peak, metastable peak, McLafferty rearrangement. Nitrogen rule. High resolution mass spectrometry (HRMS).

UNIT II: INFRARED SPECTROSCOPY

Instrumentation and sample handling. Characteristic vibrational frequencies of alkanes, alkenes, alkynes, aromatic compounds, alcohols, ethers, phenols and amines. Detailed study of vibrational frequencies of carbonyl compounds (ketones, aldehydes, esters, amides, acids, anhydrides, lactones, lactams and conjugated carbonyl compounds). Effect of hydrogen bonding and solvent effect on vibrational frequencies, overtones, combination bands and Fermi resonance.

UNIT III: NUCLEAR MAGNETIC RESONANCE SPECTROSCOPY

General introduction and definition, theory of NMR, chemical shift, shielding and deshielding mechanism, magnetic anisotropy, chemical shift values and correlation for protons bonded to carbon (aliphatic, olefinic, aldehydic and aromatic) and other nuclei (alcohols, phenols, enols, carboxylic acids, amines, amides & mercapto), spin-spin interaction, Spin systems, Pople notation, complex spin-spin interaction between two, three and four nuclei (first order spectra), virtual coupling. chemical exchange, effect of deuteration, Stereochemistry, hindred rotation, Karplus curve-variation of coupling constant with dihedral angle.

Simplification of complex spectra, nuclear magnetic double resonance, contact shift reagents. Fourier transform technique, nuclear Overhauser effect (nOe), COSY, NOESY, ROESY, TOCSY, HSQC, HMBC

UNIT IV: CARBON-13 NMR SPECTROSCOPY AND COMBINED APPLICATIONS

***Carbon-13 NMR Spectroscopy*:** General considerations, chemical shift (aliphatic, olefinic, alkyne, aromatic, heteroaromatic and carbonyl carbon), coupling constants and DEPT ^{13}C NMR spectra. General introduction to two-dimensional NMR spectroscopy- HETCOR and NOESY. Resonance of other nuclei-F, P.

***Combined problems*:** Combined problems relating to structure elucidation by UV, IR, NMR Spectroscopy and Mass Spectrometry.

Suggested Readings

1. D. L. Pavia, G. M. Lampman, G. S. Kriz and J. R. Vyvyan, Introduction to Spectroscopy, 5th Edition. Cengage India, 2015.
2. R. Kakkar, Atomic and Molecule Spectroscopy: Basic Concepts and Applications, Cambridge University Press, 2015.
3. W. Kemp, Organic Spectroscopy, Mac publishers, 3rd Edition. 2011.
4. D. H. Williams, I. Fleming, Spectroscopic Methods in Organic Chemistry, Tata McGraw-Hill, 2010.
5. J. R. Dyer, Application of Spectroscopy of Organic Compounds, Prentice Hall, 2009.
6. R. J. Abraham, J. Fisher and P. Loftus, Introduction to NMR Spectroscopy, Wiley, 2005.
7. J. Mohan, Organic Spectroscopy, Narosa Publishers, New Delhi, 2002.
8. R. M. Silverstein, G. C. Bassler and T. C. TMorrill, Spectrometric Identification of Organic Compounds, John Wiley, 1995.
9. C. N. Banwell and E. M. McCash; Fundamentals of Molecular Spectroscopy, 4th Edition. Tata McGraw Hill, 1994.

Central University of Haryana
Department of Chemistry

Course Type	**:**	**Elective**
Course Title	**:**	**Electroanalytical Techniques for Chemists**
Course Code	**:**	**SBS CH 030106 E 5016**
Contact Hrs per week	**:**	**6**
Credit	**:**	**6**

Course Objective and Learning Outcomes:

To provide the knowledge and understanding of electroanalytical chemistry, modern electroanalytical techniques. At the end of this course, students will learn the fundamentals and uses of analytical chemistry, especially electrochemical polarization, impedance spectroscopy and Cyclic Voltammetry techniques.

UNIT I: ELECTROCHEMICAL POLARIZATION

Polarization of metal electrode, Anodic and cathodic polarization, Tafel plots, anodic and cathodic Tafel slopes, Mixed Potential Theory, Corrosion rate from corrosion current density, Corrosion inhibition efficiency, Galvanostatic and potentiostatic polarization, Importance of OCP in corrosion process, Equilibrium potential, Stern-Gerry equation, Open circuit potential. Impedance spectroscopy,

UNIT II: IMPEDANCE SPECTROSCOPY

AC impedance spectroscopy, Theory, principle and procedure of impedance spectroscopy, Nyquist plots, Bode plots, Bode phase angle plots, Applications of impedance spectroscopy in finding corrosion inhibition efficiency, double layer capacitance, charge transfer resistance, Equivalent circuit diagram. Structure of electrified interface from equivalent circuit diagram.

UNIT III: Cyclic Voltammetry and Chronoamperometry

Theory, principle, basics of Cyclic Voltammetry, Cyclic voltammogram, Application of cyclic voltammetry in qualitative and quantitative analysis, Pulse voltammetry.

Chronoamperometry, Potentiostatic and galvanostatic chronoamperometry, Charge-discharge cycle of rechargeable battery from chronoamperometry, Use of chemical and biosensors in environmental pollutant detection.

UNIT IV: SYNTHESIS, CHARACTERIZATION AND APPLICATIONS OF NANOPARTICLES

Introduction and properties (physical, electrical, mechanical, optical) of metal nanoparticles, Synthesis of metal nanoparticles by Sol-gel, coprecipitation, reverse micelle and hydrothermal methods. Characterization of metal nanoparticles by XRD, SEM, TEM, AFM, FTIR, TGA/DTA/DSC, and UV-visible techniques. Application study of metal nanoparticles. Merits and demerits of metal nanoparticles.

Books Suggested

1. S. L. Chopra and J. S. Kanwar, Analytical Agriculture Chemistry, *Kalyani Publishers,* 2008.
2. S. M. Khopkar, Concepts in Analytical Chemistry, 2nd Edition. New Age International Pub. 2004.
3. H. H. Willard, L. L. Merritt, J. A. Dean and F. A. Settle, Instrumental methods of analysis, 7th Edition. *United States*, 1988.
4. D. A. Skoog and D. M. West, Principles of instrumental analysis, 2nd Edition. *Saunders College*, Philadelphia, 1980.
5. F. D. Snell and F. M. Biffen, Commercial Methods of Analysis, Tata McGraw Hill Book Company, New York, 1944.

Central University of Haryana
Department of Chemistry

Course Type	**:**	**Core**
Course Name	**:**	**Research and Publication Ethics**
Course Code	**:**	**CPE-RPE**
Credits	**:**	**2**

Theory

RPE 01: Philosophy and Ethics (3 hrs.)

1. Introduction to philosophy: definition, nature and scope, concept, branches
2. Ethics: definition, moral philosophy, nature of moral judgement and reactions

RPE 02: Scientific Conduct (5 hrs.)

1. Ethics with respect to science and research
2. Intellectual honesty and research integrity
3. Scientific misconducts: Falsification, Fabrication, and Plagiarism (FFP)
4. Redundant publications: duplicate and overlapping publications, salami slicing
5. Selective reporting and misrepresentation of data

RPE 03: Publication Ethics (7 hrs.)

1. Publication ethics: definition, introduction and importance
2. Best practices / standards setting initiatives and guidance: COPE, WAME, etc.
3. Conflicts of interest
4. Publication misconduct: definition, concept, problems that lead to unethical behaviour and vice versa, types
5. Violation of publication ethics, authorship and contributorship
6. Identification of publication misconduct, complaints and appeals
7. Predatory publishers and journals

Practice

RPE 04: Open Access Publishing (4 hrs.)

1. Open access publications and initiatives
2. SHERPA/RoMEO online resource to check publisher copyright & self-archiving polices
3. Software tool to identify predatory publications developed by SPPU
4. Journal finder / journal suggestion tools viz. JANE, Elsevier Journal Finder, Springer Journal Suggester, etc.

RPE 05: Publication Misconduct (4 hrs.)

A. Group Discussion (2 hrs.)

1. Subject specific ethical issues, FFP, authorship
2. Conflicts of interest
3. Complaints and appeals: examples and fraud from India and abroad

B. Software tools (2 hrs.)

1. Use of plagiarism software like Turnitin, Urkund and other open source software tools

RPE 06: Databases and Research Metrics (7 hrs.)

A. Databases (4 hrs,)

1. Indexing databases Research Metrics
2. Citation databases: Web of Science, Scopus, etc.

B. Research Metrics (3 hrs.)

1. Impact Factor of journal as per Journal Citation Report, SNIP, SJR, IIP, Cite Score
2. Metrics: h index, g index, i10 index, almetrics

Suggested Readings:

1. Bird, A. (2006). *Philosophy of Science*. Routledge
2. MacIntyre, Alasdair (1967) *A Short History of Ethics*. London
3. P. Chaddah, (2018) Ethics in Competitive Research: Do not get scooped; do not get plagiarized, ISBN:978-9387480865
4. National Academy of Sciences, National Academy of Engineering and Institute of Medicine. (2009). On Being a Scientist: A Guide to Responsible Conduct in Research: Third Edition. National Academics Press.
5. Resnik, D. B. (2011). What is ethics in research and why is it important. National Institute of Environmental Health Sciences, 1-10. Retrived from https://www.neihs.nih.gov/research/resources/bioethics/whatis/index.cfm
6. Beall, J. (2012). Predatory publishers are corrupting open access. Nature, 489 (7415), 179-179. https://doi.org/10.1038/489179a
7. Indian National Science Academy (INSA), Ethics in Science Education, Research and Governance (2019), ISBN:978-81-939482-1-7. http://www.insaindia.res.in/pdf/Ethics_Book.pdf

Central University of Haryana
Department of Geography

Minutes of Board of Studies (BoS) Meeting held on 13.09.2021 at 11:00 AM

A meeting of the Board of Studies (BoS) of the Department of Geography was held on 13.09.2021 at 11:00 AM (Through online/offline mode) and the following members were present during the meeting:

1. Dr. Vinod Kumar, HOD Geography and Dean, School of Basic Sciences, Central University of Haryana, Mahendergarh **(Chaiperson)**.
2. Prof. Mehtab Singh, Department of Geography, Maharshi Dayanand University, Rohtak, Haryana. **(External Member attended offline)**
3. Prof. Simrit Kahlon, Department of Geography, Panjab University, Chandigarh. **(External Member attended online)**
4. Prof A. R. Siddiqui, HOD Geography, Allahabad University, Allahabad. **(Special Invitee attended online)**
5. Dr. Manish Kumar, Department of Geography, School of Basic Sciences, Central University of Haryana, Mahendergarh. **(Internal Member attended offline)**
6. Dr. Jitendra Kumar, Department of Geography, School of Basic Sciences, Central University of Haryana, Mahendergarh. **(Special Invitee attended offline)**

The following agenda were taken up and discussed in the meeting for consideration and approval of the Board of Studies (BoS) of the Department of Geography, Central University of Haryana:

Item No.	Descriptions
1	**To consider and approve the Learning Outcome-based Curriculum Framework (LOCF) Syllabus of M.Sc. Geography Programme *w.e.f.* Academic Session 2021-2022.**
	The Board of Studies (BoS) discussed and approved Learning Outcome-based Curriculum Framework (LOCF) Syllabus of M.Sc. Geography Programme *w.e.f.* Academic Session 2021-2022. **(Annexure-I; Page No. 1 to 88)**
2.	**To consider and approve the Minutes of DRC of the Department of Geography held on 28.11.2020 and 18.06.2021.**
	Board of Studies resolved the recommendation of DRC of the Department of Geography held on 28.11.2020 and 18.06.2021. **(Annexure-II; Page No. 1 to 4)**

Dr. Vinod Kumar

Prof. Mehtab Singh

(Approved Via Email)
Prof. Simrit Kahlon

(Approved Via Email)
Prof A. R. Siddiqui

Manish 13/09/2021
Dr. Manish Kumar

Kumar 13/9/21
Dr. Jitendra Kumar

Enclosure : Copy of Emails.

Minutes of Board of Studies (BoS) Meeting held on 13.09.2021 at 11:00 AM

3 messages

Geography Department <hodgeography@cuh.ac.in> Wed, Sep 15, 2021 at 2:52 PM
To: bonnie_kahlon@yahoo.com, mehtab singh <msrana241@gmail.com>, arsiddiqui1970@yahoo.com, aziz_rs@yahoo.com, "Dr. Jitendra Kumar" <jitendra@cuh.ac.in>
Cc: Dean School Of Basic Sciences <deansobs@cuh.ac.in>

Respected Sir/Madam

Minutes of Board of Studies (BoS) Meeting held on 13.09.2021 at 11:00 AM

A meeting of the Board of Studies (BoS) of the Department of Geography was held on 13.09.2021 at 11:00 AM (Through online/offline mode) and the following members were present during the meeting:

1. Dr. Vinod Kumar, HOD Geography and Dean, School of Basic Sciences, Central University of Haryana, Mahendergarh (Chaiperson).

2. Prof. Mehtab Singh, Department of Geography, Maharshi Dayanand University, Rohtak, Haryana. (External Member attended offline)

3. Prof. Simrit Kahlon, Department of Geography, Panjab University, Chandigarh. (External Member attended online)

4. Prof A. R. Siddiqui, HOD Geography, Allahabad University, Allahabad.
(Special Invitee attended online)

5. Dr. Manish Kumar, Department of Geography, School of Basic Sciences, Central University of Haryana, Mahendergarh. (Internal Member attended offline)

6. Dr. Jitendra Kumar, Department of Geography, School of Basic Sciences, Central University of Haryana, Mahendergarh. (Special Invitee attended offline)

The following agenda were taken up and discussed in the meeting for consideration and approval of the Board of Studies (BoS) of the Department of Geography, Central University of Haryana:

Item No.	Descriptions
1	**To consider and approve the Learning Outcome-based Curriculum Framework (LOCF) Syllabus of M.Sc. Geography Programme *w.e.f.* Academic Session 2021-2022.**
	The Board of Studies (BoS) discussed and approved Learning Outcome-based Curriculum Framework (LOCF) Syllabus of M.Sc. Geography Programme *w.e.f* **(Annexure-I; Page No. 1 to 88)**
2.	**To consider and approve the Minutes of DRC of the Department of Geography held on 28.11.2020 and 18.06.2021.**
	Board of Studies resolved the recommendation of DRC of the Department of Geography held on 28.11.2020 and 18.06.2021. **(Annexure-II; Page No. 1 to 4)**

You are kindly requested to consider and approve the items 1 & 2 of the agenda mentioned in the minutes of Board of Studies (BoS) meeting held on 13.09.2021 at 11:00 AM (Through online/offline mode).

With Regards,

--
Dr. Manish Kumar
(Teacher In-Charge)
Assistant Professor
Department of Geography
School of Basic Sciences
Central University of Haryana
Jant-Pali, Mahendergarh
Haryana – 123031, INDIA

Alternate E-mail: manish.ks@cuh.ac.in
Mobile/WhatsApp: +91-9555851874

Steering Member: International Geographical Union Commission on Modeling Geographical Systems

ORCID_ID: https://orcid.org/0000-0002-2588-6499
Scopus_ID: https://www.scopus.com/authid/detail.uri?authorId=56408923500
Web of Science Researcher_ID: https://publons.com/researcher/AAM-7581-2020/
Google Scholar ID: https://scholar.google.co.in/citations?user=BLV18cAAAAAJ

2 attachments

Annexure_I_After BoS Revision LOCF Syllabus_13_09_2021.pdf
881K

Annexure_II_DRC Minutes_28_11_2020 and 18_06_2021.pdf
8712K

Aziz Rahman <arsiddiqui1970@yahoo.com> Wed, Sep 15, 2021 at 3:15 PM
To: Geography Department <hodgeography@cuh.ac.in>

Dear Sir
Approved Item 1&2 of the agenda.
Regards
Prof. A.R.Siddiqui
HoD Geography, University of Allahabad
[Quoted text hidden]

Simrit Kahlon <bonnie_kahlon@yahoo.com> Wed, Sep 15, 2021 at 7:54 PM
Reply-To: Simrit Kahlon <bonnie_kahlon@yahoo.com>
To: hodgeography@cuh.ac.in

Approved Items 1 and 2 of the agenda of BOS Meeting held on 13 Sept 2021 of Dept of Geography

Regards
Simrit Kahlon

Sent from Yahoo Mail on Android

On Wed, Sep 15, 2021 at 14:53, Geography Department <hodgeography@cuh.ac.in> wrote:

> Respected Sir/Madam
>
> **Minutes of Board of Studies (BoS) Meeting held on 13.09.2021 at 11:00 AM**
>
> A meeting of the Board of Studies (BoS) of the Department of Geography was held on 13.09.2021 at 11:00 AM (Through online/offline mode) and the following members were present during the meeting:
> Jj
> [Quoted text hidden]

ANNEXURE-I

CENTRAL UNIVERSITY OF HARYANA

(*Established under the Central Universities Act, 2009*)
(NAAC Accredited 'A' Grade)

CBCS, LOCF and NEP-2020 Based
Curriculum and Syllabi
Of
M.Sc. Geography

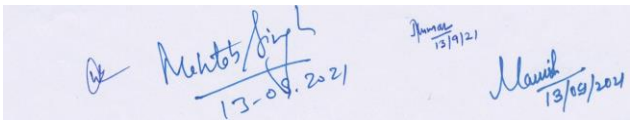
(w.e.f. 2021-22)

DEPARTMENT OF GEOGRAPHY
SCHOOL OF BASIC SCIENCES

Approved by:	**BOS**	**School Board**	**Academic Council**
Approval Status:	√		
Approval Date:	13/09/2021		

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VISION AND MISSION

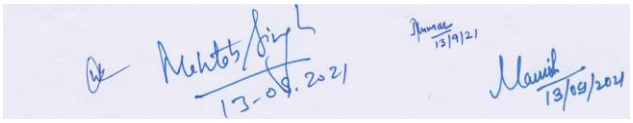
Vision and Mission of the University

Vision

To develop enlightened citizenship of a knowledge society for peace and prosperity of individuals, nation and the world, through promotion of innovation, creative endeavors, and scholarly inquiry.

Mission

To serve as a beacon of change, through multi-disciplinary learning, for creation of knowledge community, by building a strong character and nurturing a value-based transparent work ethics, promoting creative and critical thinking for holistic development and self-sustenance for the people of India. The University seeks to achieve this objective by cultivating an environment of excellence in teaching, research and innovation in pure and applied areas of learning.



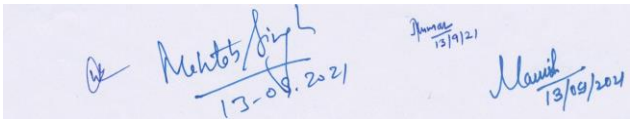
1. BACKGROUND

1.1. NEP-2020 and LOCF an integrated Approach

Considering the curricular reforms as instrumental for desired learning outcomes, all the academic departments of Central University of Haryana made a rigorous attempt to revise the curriculum of undergraduate and postgraduate programmes in alignment with National Education Policy-2020 and UGC Quality Mandate for Higher Education Institutions-2021. The process of revising the curriculum could be prompted with the adoption of "Comprehensive Roadmap for Implementation of NEP-2020" in 32nd meeting of the Academic Council of the University held on April 23, 2021. The Road map identified the key features of the Policy and elucidated the Action Plan with well-defined responsibilities and indicative timeline for major academic reforms.

The process of revamping the curriculum started with the series of webinars and discussions conducted by the University to orient the teachers about the key features of the Policy, enabling them to revise the curriculum in sync with the Policy. Proper orientation of the faculty about the vision and provisions of NEP-2020 made it easier for them to appreciate and incorporate the vital aspects of the Policy in the revised curriculum focused on 'creating holistic, thoughtful, creative and well-rounded individuals equipped with the key 21st century skills' for the 'development of an enlightened, socially conscious, knowledgeable, and skilled nation'.

With NEP-2020 in background, the revised curricula articulate the spirit of the policy by emphasising upon—integrated approach to learning; innovative pedagogies and assessment strategies; multidisciplinary and cross-disciplinary education; creative and critical thinking; ethical and Constitutional values through value-based courses; 21st century capabilities across the range of disciplines through life skills, entrepreneurial and professional skills; community and constructive public engagement; social, moral and environmental awareness; Organic Living and Global Citizenship Education (GCED); holistic, inquiry-based, discovery-based, discussion-based, and analysis-based learning; exposure to Indian knowledge system, cultural traditions and classical literature through relevant courses offering 'Knowledge of India'; fine blend of modern pedagogies with indigenous and traditional ways of learning; flexibility in course choices; student-centric participatory learning; imaginative and flexible curricular structures to enable creative combination of disciplines for study; offering multiple entry and exit points initially in undergraduate



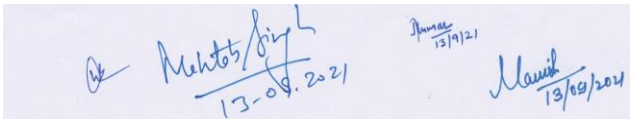
programmes; alignment of Vocational courses with the International Standard Classification of Occupations maintained by the International Labor Organization; breaking the silos of disciplines; integration of extra-curricular and curricular aspects; exploring internships with local industry, businesses, artists and crafts persons; closer collaborations between industry and higher education institutions for technical , vocational and science programmes; and formative assessment tools to be aligned with the learning outcomes, capabilities, and dispositions as specified for each course. In case of UG programmes in Engineering and Vocational Studies, it was decided that the departments shall incorporate pertinent NEP recommendations while complying with AICTE, NBA, NSQF, International Standard Classification of Occupations, Sector Skill Council and other relevant agencies/sources. The University has also developed consensus on adoption of Blended Learning with 40% component of online teaching and 60% face to face classes for each programme.

The revised curricula of various programmes could be devised with concerted efforts of the faculty, Heads of the Departments and Deans of Schools of Study. The draft prepared by each department was discussed in series of discussion sessions conducted at Department, School and the University level. The leadership of the University has been a driving force behind the entire exercise of developing the uniform template and structure for the revised curriculum. The Vice Chancellor of the University conducted series of meetings with Heads and Deans to deliberate upon the vital parameters of the revised curriculum to formulate a uniform template featuring Background, Programme Outcomes, Programme Specific Outcomes, Postgraduate Attributes, Structure of Masters Course, Learning Outcome Index, Semester-wise Courses and Credit Distribution, Course-level Learning Outcomes, Teaching-Learning Process, Blended Learning, Assessment and Evaluation, Keywords, References and Appendices. The experts of various Boards of Studies and School Boards contributed to a large extent in giving the final shape to the revised curriculum of each programme.

To ensure the implementation of curricular reforms envisioned in NEP-2020, the University has decided to implement various provisions in a phased manner. Accordingly, the curriculum may be reviewed annually.

1.2. About the Subject

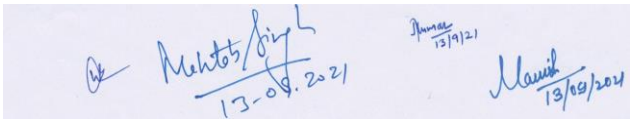
Geography is the study of the Earth (specifically, its surface) in relation to man, and it aims to analyze and comprehend various physical and human phenomena, from the spatial



perspective. It studies where objects are located, why they are there, and how they form and alter over time. It seeks to describe the variable character of the earth.

Geography, through its branches deals with a plethora of physical and human features, phenomena and processes taking place on the surface of the earth. Geomorphology studies landforms, geomorphic processes, landform genetics and evolution and stands crucial in the areas of regional planning, hazard management, urbanization, infrastructure development and mineral exploration. Climatology focuses upon the atmospheric constituents and their dynamics across the areas of distribution, and on the meteorological aspects of a place. This is highly useful in the context of environmental management and addressing the contemporary issues including climate change, global warming, sea-level changes, and human induced climatic phenomenon like urban heat island effects, urban flooding etc. Oceanography relates to the understanding of ocean water dynamics, studying the oceanic habitats and to sourcing of the mineral, energy and food resources from the oceans. Environment, flora and fauna are the main concern of the branch of biogeography. Various branches of human geography include economic geography, social geography, cultural geography, political geography, population geography, settlement geography, medical geography, anthropogeography and historical geography which analyze and explain the spatial aspects of their respective themes. Cartography, statistical analysis of geographical phenomena, and quantitative analysis of geographical phenomena are examples of traditional geographic techniques, while geoinformatics (remote sensing, GIS, and GNSS) is an example of a new geographic technique.

Application of the geographical knowledge and skill to the resolution of the real-world problems is recently gaining attention but not a new thing, *per se.* Geography is as old as man himself, but its academic age is limited to the last few centuries. In twentieth century, geography saw a transition from an exceptional, descriptive regional field of enquiry to an analytical discipline with wide interdisciplinary outlook; a multifaceted field of enquiry that encompasses not only a broad range of physical and life sciences, but also social sciences. For this integration geographers gain thorough knowledge of a broad range of subjects such as history, economics, politics, sociology, society, statistics, and so on. Geoinformatics has recently aided the transformation of geography into an applied discipline. As a result, geographers have evolved into problem-solvers that deal with social, fiscal, and environmental issues all around the world. They are the best planners and managers because of their ability to visualize structures and phenomena.



1.3. About the Programme (Nature, extent and aims)

1.3.1. Nature and extent of the Programme

The post-graduate Geography course, developed in accordance with the learning outcome-based curriculum system (LOCF), includes both fundamental and applied considerations. The course is designed in such a way that essential and foundational knowledge stands supplemented by lessons of applied interest, all while taking place in consideration with the modern geographical dynamics.

Instead of continuing the previous curriculum, LOCF suggests an alternative solution to enhancing higher education quality by identifying milestones in terms of outcomes (knowledge, understanding, skills, attitudes and values) and academic standards expected from students upon completion of their degrees. It also aims to materialize global competition and strengthen the applied facets of the disciplines.

1.3.2. Aims of the Programme

On completion of their Master's Degree Programme, students of geography will:

- Have a strong understanding of philosophy, methodology and subject matter of geography and its subfields.
- Have a thorough understanding of the earth's natural ecosystem, including landforms, oceans, weather, climate, seasons, soils, irrigation, and so on.
- Comprehend the evolution of human groups' relationships with their physical environment, as well as the growth of inter regional linkages as influenced by geographical circumstances.
- Know and apply the geographical research approaches along with geoinformatics, cartography and statistical analysis.
- Develop the ability to collect and analyze geographical data in such a way that it contributes to a better understanding of spatial phenomena and subsequent implementation of the analysis outcomes.
- Become the human resource, resolving the problems at hand, especially the ones related to disaster management, regional planning and environmental issues.
- Develop the ability to critically analyze seemingly universal models of thought, value orientations, and practices.

1.4 Qualification Descriptors (Possible Career Pathways)

The qualification descriptors for the M.Sc. programme in geography shall include learning attributes such as understanding, communication, expansion and application of subject knowledge with a clear understanding of one's location. This also involves awareness among the students' part of differences pertaining to class, caste, gender, community, region, etc. in order that they can transcend these differences with transparency of purpose and thought. The key qualification descriptor for M.Sc. Geography shall be clarity of concepts as well as critical thinking and their practical use. Each Post Graduate in geography should be able to:

(a) ***Demonstrate*** a coherent and systematic knowledge and understanding of the field of geography and theoretical developments in this field in the world context. This would also include the student's ability to identify, speak and write about genres, forms, periods, movements and conventions of geography as well as the ability to understand and engage with critical concepts and theories.

(b) ***Demonstrate*** the ability to understand the role of nature and its associating factors in a changing world from the disciplinary perspective as well as in relation to its professional and everyday use. While the aspect of disciplinary attribute is covered by the ability of the students to read data with close attention to themes, conventions, contexts and value systems, a key aspect of this attribute is to understand different parameters which directly or indirectly affecting dynamics of earth surface features.

(c) ***Demonstrate*** the ability to think and relate different processes which occurs on earth surface.

(d) ***Communicate*** ideas, opinions and values—both traditional values and values of life in all shades and shapes—in order to expand the knowledge of the subject as it moves from the classroom to real life world.

(e) ***Demonstrate*** the ability to share the results of academic and disciplinary learning through different forms of communication such as essays, dissertations, reports, findings, notes, etc., on different platforms of communication such as the classroom, conferences, seminars, workshops, the media and the internet.

(f) ***Recognize*** the scope of geography through geospatial techniques and values in terms of career opportunities, employment and lifelong engagement in teaching, publishing, translation, communication, media, soft skills and other allied fields.

(g) ***Apply*** subject-specific skills in society to foster a larger sense of ethical and moral

responsibility among fellow humans in order to see and respect differences in and among various species and life-forms and learn to transcend them.

(h) ***Communicate*** the results of studies undertaken in an academic field accurately in a range of different contexts using the main concept, constructs and techniques of the subjects of the study.

(i) ***Apply*** one's disciplinary knowledge and transferable skills to new/unfamiliar contexts and to identify and analyze problems and issues and seek solutions to real-life problems.

(j) ***Use*** knowledge, understanding and skills for critical assessment of a wide range of ideas and complex problems and issues relating to the chosen field of study.

(k) ***Demonstrate*** skills in identifying information needs, collection of relevant quantitative and/or qualitative data drawing on a wide range of sources, analysis and interpretation of data using methodologies as appropriate to the subject(s) for formulating evidence-based solutions and arguments.

(l) ***Address*** one's own learning needs relating to current and emerging areas of study, making use of research, development and professional materials as appropriate, including those related to new frontiers of knowledge.

The programme will strengthen the student's ability to draw on narratives that alert us to layers and levels of meaning and differences in situations and complexities of relations. Linguistic and Cultural competence should help the students identify, analyze and evaluate key issues in the text and around in the world—thematic, contextual, professional, processual and think of ways to find acceptable and sustainable solutions. Students will have the ability to understand and articulate with clarity and critical thinking one's position in the world.

Student has an option to pursue a Post Graduate degree in geography where the fundamentals of the subject and academic achievements are understood and conceived by him. Also, the teachers will be benefited as they shall have to keep abreast with latest developments, discoveries, research methodologies and application of various other disciplines in the subject.

1.4.1 Possible Career Pathways

The geography as a subject is concerned with the study of the earth, with its physical and cultural characteristics distributed and placed, the interrelationship between them and human life and the various phenomenon's of the earth. In this discipline, the

relationships between people and the environment are examined. A degree in geography from the Central University of Haryana opens many new doors in terms of your career choices. Our expertise in physical geography and other geospatial techniques will enable our students to pursue a career in much of this vast field. This section looks at some of the careers chosen by geographers and gives information about what the jobs can involve.

Some of the important career options are listed here –

- Teaching
- Research & Development
- Urban and Regional Planners
- Cartographers
- GIS Specialists
- Non-Governmental and Community based Startups
- Environmental Managers
- Disaster Management Experts
- Surveyors
- Draftsmen
- Climatologists
- Meteorologists
- Transport and Tourism Consultant
- Demographers

2. PROGRAMME OUTCOMES (POs)

Students enrolled in the Master's Programmes offered by the Departments under the School of Basic Sciences will have the opportunity to learn and master the following components in addition to attain important essential skills and abilities:

PO-NO.	COMPONENT	OUTCOMES
PO-1	Basic Knowledge	Capable of delivering basic disciplinary knowledge gained during the programme.
PO-2	In-depth Knowledge	Capable of describing advanced knowledge gained during the programme.
PO-3	Critical thinking and Problem-Solving abilities	Capable of analyzing the results critically and applying acquired knowledge to solve the problems.
PO-4	Creativity and innovation	Capable to identify, formulate, investigate and analyze the scientific problems and innovatively to design and create products and solutions to real life problems.
PO-5	Research aptitude and global competency	Ability to develop a research aptitude and apply knowledge to find the solution of burning research problems in the concerned and associated fields at global level.
PO-6	Holistic and multidisciplinary education	Ability to gain knowledge with the holistic and multidisciplinary approach across the fields.
PO-7	Skills enhancement	Learn specific sets of disciplinary or multidisciplinary skills and advanced techniques and apply them for betterment of mankind.
PO-8	Leadership and Teamwork abilities	Ability to learn and work in a group and capable of leading a team even.
PO-9	Environmental and human health awareness	Learn important aspects associated with environmental and human health. Ability to develop eco-friendly technologies.
PO-10	Ethical thinking and social awareness	Inculcate the professional and ethical attitude and ability to relate with social problems.
PO-11	Lifelong learning skills and Entrepreneurship	Ability to learn lifelong learning skills which are important to provide better opportunities and improve quality of life. Capable to establish independent startup/innovation center etc.

3. PROGRAMME SPECIFIC OUTCOMES (PSOs)

The post-graduate students shall be able to realise the following specific outcomes by the end of programmme:

NUMBER	PROGRAMME SPECIFIC OUTCOMES
PSO-1	The evolution of geography and its branches over time, as well as the relevance of geographical studies and central places in today's world.
PSO-2	Information and analysis of the earth's surface, its internal characteristics that change over time, and conceptual understanding of climate, including its spatial and temporal variation and impact on humans.
PSO-3	A deep knowledge of hydrology along with comprehensive understanding of important concept of the oceanic movements, waves, currents, tides, and other marine resources, as well as human-ocean interaction.
PSO-4	The patterns and consequences of rural-urban linkages will aid in understanding the process of rurbanisation as well as population attributes, and their spatio-temporal trends.
PSO-5	Developing a deep understanding of the concept of society its components and determinant to ensure balanced and sustainable regional development and planning in India.
PSO-6	Exploring the field and collecting data, as well as analyzing, computing, and presenting the data using a variety of statistical and geo-spatial tools and techniques. Using appropriate research methodology tools will make studies more detailed and comprehensive.
PSO-7	Concept of disaster and hazards, their impacts and mitigation strategies and development of Early Warning System by using geo spatial techniques will strengthen the understanding of Human Environmental Relationship.
PSO-8	Comprehensive understanding of environment, its components and developing an idea about climate change as a major driver of various contemporary environmental issues.
PSO-9	Detailed understanding of geology, physiography, climate, drainage, vegetation, soils, people and natural resource management of India.
PSO-10	Detailed understanding of the challenges that Indian agriculture faces in order to maintain sustainable productivity and ensure homogeneous rural development and human well-being.
PSO-11	Understanding the political and economic structures as a growth factor for both developing and developed countries.
PSO-12	After introducing various research paradigms, research attitude of the students will be developed through minor research project work.

4. POSTGRADUATE ATTRIBUTES

NUMBER	P.G. ATTRIBUTES
PGA-1	Disciplinary Knowledge: Broad understanding of historical development of various branches of geography
PGA-2	A detailed overview of some key concepts in climate, hydrology, oceanic movements and resources, and human-ocean interaction, as well as a study of its spatio-temporal impact on humans using various geospatial techniques.
PGA-3	Gain an understanding of the major theoretical perspectives and debates within evolution of geographical thought, how these have affected our views of the past, and how they may be applied in current world.
PGA-4	Understanding the concept of regional planning and rurbanisation during the phase of India's political evolution in order to overcome global geopolitical challenges.
PGA-5	The importance of central places in ensuring the region's homogeneous development and interdisciplinary human growth.
PGA-6	Understanding the major issues and barriers that the various sectors of economy face as well as the solutions that can be used to ensure long-term productivity and economic growth, which is a crucial element in national development.
PGA-7	Detailed understanding of Indian geography as a whole.
PGA-8	Students' research aptitude and analytical skills are developed by exploring the field for data collection, analysis, computation, and representation using various statistical techniques.

5. STRUCTURE OF MASTER'S COURSE

Nature of the Course	Choice Based Offered Programme Structure							%
	Structure -1 (Total Credit)	%	Structure -2 (Total Credit)	%	Structure -3 (Total Credit)	%	Structure -4 (Total Credit)	
CC	56	58.34	56	58.34	56	58.34	56	58.34
DCEC	32	33.33	24	25.00	16	16.66	10	10.42
GEC	8	8.33	8	8.33	8	8.33	8	8.33
SEC	0	0	8	8.33	16	16.66	22	22.91
TOTAL	96	100	96	100	96	100	96	100

LIST OF COURSES

Sr. No.	Course No	Course Code	Course Title	Course Type	Credit	Semester
CORE COURSES (CC)						
1	CC 1	SBS GEO 1 1 01 C 3104	Introduction to Geomorphology	CC	4	I
2	CC 2	SBS GEO 1 1 02 C 3104	Introduction to Climatology	CC	4	I
3	CC 3	SBS GEO 1 1 03 C 3104	Statistical Techniques in Geography	CC	4	I
4	CC 4	SBS GEO 1 1 04 C 3104	Urban Geography	CC	4	I
5	CC 5	SBS GEO 1 1 05 C 2024	Practical: Cartographic Methods	CC	4	I
6	CC 6	SBS GEO 1 2 06 C 3104	Evolution of Geographical Thought	CC	4	II
7	CC 7	SBS GEO 1 2 07 C 3104	Fundamentals of Photogrammetry and Remote Sensing	CC	4	II
8	CC 8	SBS GEO 1 2 08 C 3104	Hydrology and Oceanography	CC	4	II

9	CC 9	SBS GEO 1 2 09 C 3014	Research Methodology, Field Work and Report Writing (Socio-Economic Aspect)	CC	4	II
10	CC 10	SBS GEO 1 2 10 C 2024	Practical: Photogrammetry and Digital Image Processing	CC	4	II
11	CC 11	SBS GEO 1 3 11 C 3104	Fundamentals of GIS and GNSS	CC	4	III
12	CC 12	SBS GEO 1 3 12 C 3104	Regional Development and Planning	CC	4	III
13	CC 13	SBS GEO 1 3 13 C 3104	Population and Demographic Studies	CC	4	III
14	CC 14	SBS GEO 1 3 14 C 2024	Practical: GIS and GNSS	CC	4	III

Discipline Centric Elective Courses (DCEC)						
1	DCEC 1	SBS GEO 1 2 01 DCEC 3104	Economic Geography	DCEC	4	II
2	DCEC 2	SBS GEO 1 2 02 DCEC 3104	Social and Cultural Geography	DCEC	4	II
3	DCEC 3	SBS GEO 1 2 03 DCEC 3104	Geography of Health and Well Being	DCEC	4	II
4			MOOC 1		4	II
5	DCEC 4	SBS GEO 1 3 04 DCEC 3014	Field Work: Natural Hazards and Disaster Based Project Work	DCEC	4	III
6	DCEC 5	SBS GEO 1 3 05 DCEC3104	Research Methodology, Field Work and Report Writing (Physical Aspect)	DCEC	4	III
6	DCEC 6	SBS GEO 1 3 06 DCEC 3104	Environmental Geography	DCEC	4	III
7			MOOC 2		4	III
8	DCEC 7	SBS GEO 1 4 07 DCEC 3104	Geography of India	DCEC	4	IV
9	DCEC 8	SBS GEO 1 4 08 DCEC 3104	Agricultural Geography	DCEC	4	IV

10	DCEC 9	SBS GEO 1 4 09 DCEC 3104	Geography of Central Places	DCEC	4	IV
11	DCEC 10	SBS GEO 1 4 10 DCEC 3104	Political Geography	DCEC	4	IV
12	DCEC 11	SBS GEO 1 4 11 DCEC 3104	Rural Geography	DCEC	4	IV
13	DCEC 12	SBS GEO 1 4 12 DCEC 3104	Natural Hazards and Disaster Management	DCEC	4	IV
14	DCEC 13	SBS GEO 1 4 13 DCEC 3104	Practical: Advanced Spatial Information Technology	DCEC	4	IV
15			MOOC 3		4	IV
16			MOOC 4		4	IV
17			MOOC 5		4	IV
18			MOOC 6		2	IV

GENERIC ELECTIVE COURSES (GEC)						
1	GEC 1	SBS GEO 1 1 01 GE 3104	Climate Change Vulnerability and Adaptation	GEC	4	I
2	GEC 2	SBS GEO 1 1 02 GE 3104	Natural Hazards and Disaster Management	GEC	4	I
3	GEC3	SBS GEO 1 2 03 GE 3104	Contemporary Environmental Issues	GEC	4	II
4	GEC4	SBS GEO 1 2 04 GE 3104	Geography of India	GEC	4	II

SKILL ENHANCEMENT COURSE (SEC)						
Semester III						
1	SEC		Dissertation	SEC	8	III
Semester IV						
1.1	SEC		Dissertation	SEC	8	IV
		Or				
1.2	SEC		Dissertation	SEC	16	IV

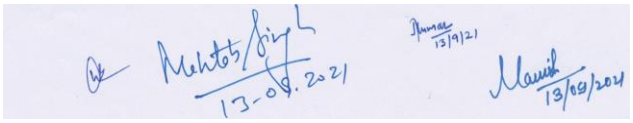
6. LEARNING OUTCOME INDEX

6.1 Core Courses (CC):

'PSOs Course No.	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8	PSO 9	PSO 10	PSO 11	PSO 12
CC 1		√		√	√	√	√	√	√			√
CC 2	√	√		√	√	√	√	√	√	√	√	√
CC 3	√	√	√	√	√		√	√	√		√	√
CC 4	√	√		√	√				√			√
CC 5	√	√	√	√	√		√	√	√	√	√	√
CC 6		√		√	√	√	√	√	√	√		√
CC 7		√		√	√	√	√	√	√			√
CC 8		√						√				√
CC 9		√		√	√	√	√	√	√			√
CC 10	√	√	√	√	√	√	√	√	√	√	√	√
CC 11	√	√	√	√	√	√	√	√	√	√	√	√
CC 12	√	√	√		√		√	√	√	√	√	√
CC 13	√	√	√		√		√	√	√	√	√	√
CC 14	√	√			√		√	√	√	√		√

6.2 Discipline Centric Elective Courses (DCEC):

PSOs Course No.	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8	PSO 9	PSO 10	PSO 11	PSO 12
DCEC 1	√	√	√		√			√	√	√	√	√
DCEC 2	√	√	√	√	√	√	√	√	√	√	√	√
DCEC 3		√	√		√			√	√		√	√
DCEC 4	√	√	√	√	√	√	√	√	√	√	√	√
DCEC 5	√		√		√	√	√	√	√		√	√
DCEC 6		√		√	√	√	√	√	√			√
DCEC 7		√	√	√	√	√	√	√	√	√		√
DCEC 8	√	√	√	√	√	√	√	√	√	√	√	√



DCEC 9	√	√	√	√	√	√	√	√	√	√	√	√
DCEC 10	√	√	√	√	√			√	√	√	√	√
DCEC 11		√	√		√		√		√			√
DCEC 12	√	√	√		√				√			√
DCEC 13	√	√		√		√	√	√	√			√

6.3 Generic Elective Course (GEC):

PSOs / Course No.	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8	PSO 9	PSO 10	PSO 11	PSO 12
GEC 1	√	√	√	√	√		√	√	√	√	√	√
GEC 2		√	√	√	√	√	√	√	√			√
GEC 3	√	√	√		√		√	√	√	√	√	√
GEC 4	√	√	√		√		√	√	√	√	√	√

6.4 Skill Enhancement Course (SEC):

PSOs / Course No.	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8	PSO 9	PSO 10	PSO 11	PSO 12
SEC	√	√		√	√	√	√	√		√	√	√

7. SEMESTER-WISE COURSES AND CREDIT DISTRIBUTION

SEMESTER-I (Total Credits = 24)

Sr. No.	Course No	Course Code	Course Title	L	T	P	Hrs/Week	Total Credit
Core Courses								
1	CC 1	SBS GEO 1 1 01 C 3104	Introduction to Geomorphology	3	1	0	4	4
2	CC 2	SBS GEO 1 1 02 C 3104	Introduction to Climatology	3	1	0	4	4
3	CC 3	SBS GEO 1 1 03 C 3104	Statistical Techniques in Geography	3	1	0	4	4
4	CC 4	SBS GEO 1 1 04 C 3104	Urban Geography	3	1	0	4	4
5	CC 5	SBS GEO 1 1 05 C 2024	Practical: Cartographic Methods	2	0	4	6	4
Generic Elective Courses (for students of other Departments)**								
6	GEC 1	SBS GEO 1 1 01 GE 3104	Climate Change Vulnerability and Adaptation	3	1	0	4	4
7	GEC 2	SBS GEO 1 1 02 GE 3104	Natural Hazards and Disaster Management	3	1	0	4	4
Total Credit Semester I							**24**	

SEMESTER-II (Total Credits =28)

Sr. No.	Course No	Course Code	Course Title	L	T	P	Hrs/Week	Total Credit
Core Courses								
1	CC 6	SBS GEO 1 2 06 C 3104	Evolution of Geographical Thought	3	1	0	4	4
2	CC 7	SBS GEO 1 2 07 C 3104	Fundamentals of Photogrammetry and Remote Sensing	3	1	0	4	4
3	CC 8	SBS GEO 1 2 08 C 3104	Hydrology and Oceanography	3	1	0	4	4

4	CC 9	SBS GEO 1 2 09 C 3014	Research Methodology, Field Work and Report Writing (Socio-Economic Aspect)	3	0	2	5	4
5	CC 10	SBS GEO 1 2 10 C 2024	Practical: Photogrammetry and Digital Image Processing	2	0	4	6	4
Discipline Centric Elective Courses (any one from the list)								
6	DCEC 1	SBS GEO 1 2 01 DCEC 3104	Economic Geography	3	1	0	4	4
7	DCEC 2	SBS GEO 1 2 02 DCEC 3104	Social and Cultural Geography	3	1	0	4	4
8	DCEC 3	SBS GEO 1 2 03 DCEC 3104	Geography of Health and Well Being	3	1	0	4	4
9		-	MOOC 1	-	-	-	-	4
Generic Elective Courses (for students of other Departments)								
10	GEC3	SBS GEO 1 2 03 GE 3104	Contemporary Environmental Issues	3	1	0	4	4
11	GEC4	SBS GEO 1 2 04 GE 3104	Geography of India	3	1	0	4	4
Total Credit Semester II							**28**	

SEMESTER-III (Total Credits =24)

Sr. No.	Course No	Course Code	Course Title	L	T	P	Hrs/Week	Total Credit
Core Courses								
1	CC 11	SBS GEO 1 3 11 C 3104	Fundamentals of GIS and GNSS	3	1	0	4	4
2	CC 12	SBS GEO 1 3 12 C 3104	Regional Development and Planning	3	1	0	4	4
3	CC 13	SBS GEO 1 3 13 C 3104	Population and Demographic Studies	3	1	0	4	4
4	CC 14	SBS GEO 1 3 14 C 2024	Practical: GIS and GNSS	2	0	4	6	4
Choose any one option from Option I and II								
Option I (Any two from the following Discipline Centric Elective Courses)								
6		SBS GEO 1 3 04 DCEC	Field Work: Natural	3	0	2	5	4

	DCEC 4	3014	Hazards and Disaster Based Project Work					
7	DCEC 5	SBS GEO 1 3 05 DCEC 3104	Research Methodology, Field Work and Report Writing (Physical Aspect)	3	0	2	5	4
8	DCEC 6	SBS GEO 1 3 06 DCEC 3104	Environmental Geography	3	1	0	4	4
9		-	MOOC 2	-	-	-	-	4
Option II Skill Enhancement Course (SEC)								
10	SEC		Dissertation					8
Total Credit Semester III							**24**	

SEMESTER-IV (Total Credits =20)

Sr. No.	Course No	Course Code	Course Title	L	T	P	Hrs/Week	Total Credit
	Option chosen in Sem III shall be continued in Sem IV							
Option I (Any five from the following Discipline Centric Elective Courses)								
1	DCEC 7	SBS GEO 1 4 07 DCEC 3104	Geography of India	3	1	0	4	4
2	DCEC 8	SBS GEO 1 4 08 DCEC 3104	Agricultural Geography	3	1	0	4	4
3	DCEC 9	SBS GEO 1 4 09 DCEC 3104	Geography of Central Places	3	1	0	4	4
4	DCEC 10	SBS GEO 1 4 10 DCEC 3104	Political Geography	3	1	0	4	4
5	DCEC 11	SBS GEO 1 4 11 DCEC 3104	Rural Geography	3	1	0	4	4
6	DCEC 12	SBS GEO 1 4 12 DCEC 3104	Natural Hazards and Disaster Management	3	1	0	4	4
7	DCEC 13	SBS GEO 1 4 13 DCEC 3104	Practical: Advanced Spatial Information Technology	2	0	4	6	4
8		-	MOOC 3	-	-	-	-	4
9		-	MOOC 4	-	-	-	-	4

Total Credit Semester IV							**20**	
Option II								
1	SEC		Dissertation					8
2		-	Any three from DCEC					12
Total Credit Semester IV							**20**	
Option III								
1	SEC		Dissertation					14
			MOOC 5					4
			MOOC 6					2
Total Credit Semester IV							**20**	

Note: Two credit courses on internship programme of four weeks (optional) will be available to interested students during the semester I to IV.

8. COURSE-LEVEL LEARNING OUTCOMES

Course Structure SEMESTER- I

<table>
<tr><td>Course No: CC 1</td><td colspan="3">Course Name: Introduction to Geomorphology</td><td colspan="4">Course Code: SBS GEO 1 1 01 C 3104</td></tr>
<tr><td rowspan="2">Batch:

2021-2023</td><td rowspan="2">Programme:

M.Sc. Geography</td><td rowspan="2">Semester:

I</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td>Contact Hrs per Week: 4</td></tr>
<tr><td>3</td><td>1</td><td>0</td><td>4</td><td>Total Hours: 60</td></tr>
<tr><td colspan="3" rowspan="2">Total Evaluation Marks: 100

CIE: 30 Marks

TEE: 70 Marks</td><td colspan="5">Examination Duration: 3 hours</td></tr>
<tr><td colspan="5">Pre-requisite of course: Basic knowledge of Plate Tectonic, Landform features, and natural hazards.</td></tr>
<tr><td>Course Objective</td><td colspan="7">Understanding the basics of geomorphology along with various important concepts and current relevance of geomorphology, knowledge about the geo-spatial genesis of various landscapes and learning the regional geomorphology and various geomorphic hazards case study from India.</td></tr>
<tr><td>Course Outcomes:</td><td colspan="7">After completing this course, student is expected:

CO1: To understand the concept of Geomorphology and morphogenetic regions along with the understanding of recent trends.
CO2: To know about the origin of continents and oceans, concept of plate tectonics.
CO3: To understand the concept of Isostasy, Mountain Building and Cycle of Erosion.
CO4: To understand about various theories of landform and process involved in landforms development.
CO5: To understand the applications of Geomorphic knowledge that may be of concern to society and wherever relevant, provide solutions to problems of geomorphic context.
CO6: To provide an idea about geomorphological regions with special reference to India and various geomorphic hazards and their mitigation.</td></tr>
<tr><td colspan="8">COURSE SYLLABUS</td></tr>
<tr><td colspan="8">NOTE: Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit IV will be taught via online mode.</td></tr>
<tr><td>Unit No.</td><td colspan="5">Content of Each Unit</td><td colspan="2">Hours of Each Unit</td></tr>
<tr><td>I</td><td colspan="5">CONCEPTS AND SCOPE OF GEOMORPHOLOGY, MODELS AND RECENT TRENDS IN GEOMORPHOLOGY
[Course Outcome (s) No.: 1]
Fundamental Concepts and Scope of Geomorphology; Concepts of Time: Cyclic, Graded and Steady State; Concept of Morphogenetic Regions; Concept of Dynamic Equilibrium; Approaches and Models in Geomorphology; System Concept in Geomorphology; Recent Trends in Geomorphological Studies.</td><td colspan="2">15</td></tr>
</table>

II	**TECTONIC MOVEMENTS** **[Course Outcome (s) No.: 2 & 3]** Origin of Continent and Ocean: Continental Drift Theory; Plate Tectonic Theory and Resultant Landforms; Concept of Isostasy; Mountain Building; Denudation process; Cycle of Erosion: Interruption, Rejuvenation and Polycyclic Reliefs.	15
III	**LANDFORMS & SLOPE DEVELOPMENT** **[Course Outcome (s) No.: 4]** Theories and Process of Slope Development; Landforms: Fluvial, Karst, Aeolian, Glacial (Process) in Geomorphology; Fluvial Morphology.	15
IV	**APPLIED GEOMORPHOLOGY AND GEOMORPHIC HAZARDS** **[Course Outcome (s) No.: 5 & 6]** Regional Geomorphology: Study of any two regions of India; Applied Geomorphology; Concept, Causes and Mitigation of Geomorphic Hazards: Earthquakes, Volcanoes, Landslides and Avalanches.	15

Suggested Readings:

1. Singh, S. (2020). **Bhooakriti Vigyan**. Pravalika Publication, Allahabad.
2. Singh, S. (2020). **Geomorphology**. Pravalika Publication, Allahabad.
3. Strahler, A.H. and Strahler, A.N. (2006). **Modern Physical Geography** (Fourth Edition). Willey-India, New Delhi.
4. Thornbury, W.D. (2005). **Principles of Geomorphology**. John Wiley and Sons, New York.
5. Kale, V. and Gupta, A. (2001). **Introduction to Geomorphology**. Orient Longman, Hyderabad.
6. Bloom, A. L. (1998/ 2001). **Geomorphology** (3rd edition). Prentice Hall of India, New Delhi.
7. Ahmed, E. (1999). **Geomorphology**. Kalyani Publishers, New Delhi.
8. Dayal, P. (1994). **A Text Book of Geomorphology**. Kalyani Publishers, New Delhi.
9. Sparks, B.W. (1986). **Geomorphology**. Longmans, London.
10. Chorley, R.J., Schumm, S. A. and Sugden, D. E. (1984). **Geomorphology**. Methuen & Company Ltd., London.
11. Gregory, K.J. and Walling, D.E. (1973). **Drainage Basin Form and Process**. Edward Arnold, London.
12. Goh Cheng, L. (1972). **Certificate Physical and Human Geography**. Oxford University press, Oxford.
13. Fairbridge, R.W. (ed.) (1968**). Encyclopaedia of Geomorphology**. Reinhold Book Corporation., New York.
14. King, C.A.M. (1966). **Techniques in Geomorphology**. Edward Arnold, London.
15. Wooldridge, S.W. and Morgan, R.S. (1959). **The Physical Basis of Geography- An Outline of Geomorphology**. Longman, London.

Course No: CC 2	**Course Name:** Introduction to Climatology				**Course Code:** SBS GEO 1 1 02 C 3104		
Batch: 2021-2023	**Programme:** M.Sc. Geography	**Semester:** I	**L**	**T**	**P**	**Credits**	**Contact Hrs per Week: 4**
			3	1	0	4	**Total Hours: 60**
Total Evaluation Marks: 100 **CIE:** 30 Marks **TEE:** 70 Marks		**Examination Duration:** 3 hours					
		Pre-requisite of course: Basic knowledge of Air Masses, World Climatic zones and Climate change.					
Course Objective	Developing the basic concept of climatology and understanding about atmosphere and various atmospheric processes with the help of generic theories and understanding climatic classification, its changes and disaster with a knowledge of climatic conventions and policies.						
Course Outcomes:	After completing this course, student is expected: **CO1:** To understand the concepts of climatology. **CO2:** To understand the concepts of radiation, temperature, stability and precipitation. **CO3:** To understand the concept of ENSO and its effect. **CO4:** To learn the world climatic classification. **CO5:** To comprehend recent trend and application of various themes of Climatology. **CO6:** To understand various climatic hazards along with the concept of climate change.						

COURSE SYLLABUS

NOTE:
Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit IV will be taught via online mode.

Unit No.	Content of Each Unit	Hours of Each Unit
I	**CONCEPT, SCOPE AND THEORIES** **[Course Outcome (s) No.: 1 & 2]** Meaning and Scope of Climatology; Composition and Structure of Atmosphere; Radiation Laws: Wave Nature, Particle Nature, Stefans-Boltzman & Weins Law; Solar Constant; Process of Precipitation; Adiabatic Temperature Change; Stability and Instability; Theories of Origin of Precipitation and Related Forms.	15
II	**CIRCULATION PROCESS** **[Course Outcome (s) No.: 3]** Tricellular Meridional Circulation and Jet Stream; Walker Circulation and El-Nino-Southern Oscillation (ENSO); Air Masses; Fronts; Cyclones: Tropical and Temperate; Anticyclones.	15

III	**WORLD CLIMATE CLASSIFICATION AND HEAT BUDGET** **[Course Outcome (s) No.: 4]** World Climatic Classifications: Koppen and Thornthwaite; Biomes; Insolation and Heat Budget; Weather Analysis, Forecasting and Modification.	15
IV	**APPLIED CLIMATOLOGY AND CLIMATE CHANGE** **[Course Outcome (s) No.: 5 & 6]** Climatic Change: Causes and Theories; Global Warming: Causes, Effects and its Evidences; Atmospheric Hazards and Disasters: Cloud-Bursts, Glacial Lake Outburst Flood (GLOF); Applied Climatology; International Programmes and Policies- Brundtland, Kyoto, Agenda-21, SDGs and Paris Agreement.	15

Suggested Readings:

1. Lal, D.S. (2020). **Climatology**. Sharda Pustak Bhawan, Allahabad.
2. Singh, S. (2020). **Climatology**. Pravalika Publication, Allahabad.
3. Singh, S. (2020). **Jalvayu Vigyan**. Pravalika Publication, Allahabad.
4. Oliver, J.E. and Hidore, J.J. (2003). **Climatology: An Atmospheric Science**. Pearson Education Private Ltd, Patparganj, Delhi.
5. Critchfield, H.J. (2002). **General Climatology**. Prentice-Hall of India, New Delhi.
6. Barry, R.G. and Carleton, M. (2001). **Synoptic and Dynamic Climatology**. Routledge, London.
7. Chorley, R.J. (2001). **Atmosphere, Weather and Climate**. Methuen, London.
8. Robinson, P. J. and Henderson, S. (1999). **Contemporary Climatology** (2nd edition). Pearson Education Ltd., Harlow, UK.
9. Singh, M.B. (1999). **Jalvayu Avam Jal Vigyan**. Tara Book Agency, Varanasi.
10. Kendrew, W.C. (1998). **Climatology (**5th edition). Edward Arnold, London.
11. Singh, M.B. (1998). **Jalvayu Avam Samudra Vigyan**. Tara Book Agency, Varanasi.
12. Das, P.K. (1987). ***Monsoons.*** National Book Trust, New Delhi.
13. Griffith, J.F. and Driscell, D.M. (1982), **Survey of Climatology**. Charles Merril, New York.
14. Trewartha, G.T. (1981). **An Introduction to Climate**. McGraw Hill, New York.
15. Finch, J. C. and Trewartha, G. T. (1937). **Elements of Weather and Climate**. Prentice-Hall, London.

Course No: CC 3	Course Name: Statistical Techniques in Geography				Course Code: SBS GEO 1 1 03 C 3104		
Batch:	**Programme:**	**Semester:**	**L**	**T**	**P**	**Credits**	**Contact Hrs per Week: 4**
2021-2023	M.Sc. Geography	I	3	1	0	4	**Total Hours: 60**
Total Evaluation Marks: 100 **CIE:** 30 Marks **TEE:** 70 Marks	**Examination Duration:** 3 hours						
	Pre-requisite of course: Basic knowledge of qualitative and quantitative data, Different sources and methods of data collection and Central tendency.						
Course Objective	Understanding the basic concept of quantitative information in general and geographical data in particular. Learning the ways to handle the collected data through classification, tabulation and stigmatization. To compute relations and impacts among the data series.						
Course Outcomes:	After completing this course, student is expected: **CO 1:** To differentiate between qualitative and quantitative information. **CO 2:** To differentiate primary and secondary data and various levels of data measurement. **CO 3:**To know about the nature of various data, different sources and methods of data collection. **CO 4:** To learn the measurement of central tendency. **CO 5:** To learn the measures of dispersion, concentration, correlation and regression. **CO 6:** To understand and apply the different forms of averages, their relevance.						

COURSE SYLLABUS

NOTE:
Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit IV will be taught via online mode.

Unit No.	Content of Each Unit	Hours of Each Unit
I	**BASICS OF STATISTICAL DATA:** **[Course Outcome (s) No.: 1, 2 & 3]** Introduction and Significance of Statistics in Geographical Studies; Primary and Secondary Data; Levels of Data Measurement: Nominal, Ordinal, Interval, and Ratio.	15
II	**MEASUREMENT OF CENTRAL TENDENCIES:** **[Course Outcome (s) No.: 4]** Measures of Central Tendency: Arithmetic Mean, Median, Mode and their Geographical Significance; Centrographic Techniques: Mean Centre, Median Centre and Standard Distance.	15
III	**DISPERSION AND CONCENTRATION MEASURES:** **[Course Outcome (s) No.: 5]** Measures of Dispersion and Concentration: Mean Deviation, Standard Deviation; Coefficient of Variation, Lorenz Curve and Gini's Coefficient;	15

	Location Quotient; Skewness.	
IV	**CORRELATION AND REGRESSION:** **[Course Outcome (s) No.: 5 & 6]** Correlation and Regression: Scatter Diagram, Correlation by Spearman's Rank Difference and Karl Pearson's Product Moment, Testing of Significance; Regression Analysis and Equations of Regression Line, Computation of Residuals and Mapping.	15

Suggested Readings:

1. Gupta, S.P., (2021). **Statistical Methods (46 Edition).** Sultan Chand and Sons.
2. Pal, S.K. (1998). **Statistics for Geoscientists; Techniques and Applications**. Concept Publishing Company, New Delhi.
3. Mathews, J.A. (1987). **Quantitative and Statistical Approaches to Geography, Practical Manual**. Pergmon, Oxford.
4. Ebdon, D (1983). **Statistics in Geography: A Pratical Approach**. Blackewell, London.
5. Gregory, S. (1978). **Statistical Methods and the Geographer (4th Edition).** Longman, London.
6. Peter, J. Taylor (1977). **Quantitative Methods in Geography**. Houngton Mifflin Company, Boston.
7. David M. Smith (1975). **Patterns in Human Geography**, Penguin, Harmonsworth.
8. Robert Hammond and Patrik Mc. Cullagh (1974). **Quantitative Methods in Geography**. Clarendon Press, Oxfords.
9. Yeates, Mauris (1974). **An Introduction to Quantitative Analysis in Human Geography**. McGraw Hill, NewYork
10. Cooley, W.W. and Lohnes, P. R. (1971). **Multivariate Data Analysis.** John Wiley and Sons, New York.
11. Morrison, D. F. (1967). **Multivariate Statistical Methods.** McGraw- Hills Inc, New York.
12. Rao, C. R. (1965). **Linear Statistical Inference and its Application.** John Wiley, New York.
13. Johnston, J. (1960). **Econometric Methods.** McGraw- Hills, New York.
14. Anderson, T.W. (1958). **Introduction to Multivariate Statistical Methods.** John Wiley & Sons, New York.
15. Kendall, M. G. (1957). **A Course in Multivariate Analysis.** Charles Griffin, London.

Course No: CC 4	**Course Name:** Urban Geography				**Course Code:** SBS GEO 1 1 04 C 3104		
Batch:	**Programme:**	**Semester:**	**L**	**T**	**P**	**Credits**	**Contact Hrs per Week: 4**
2021-2023	M.Sc. Geography	I	3	1	0	4	**Total Hours: 60**
Total Evaluation Marks: 100 **CIE:** 30 Marks **TEE:** 70 Marks		**Examination Duration:** 3 hours **Pre-requisite of course:** Basic knowledge of towns/cities, urbanization and urban planning concepts.					
Course Objective	*Understanding key concepts in urban geography and developing skills in critical analysis of urban theory, urbanisation, and urban problems, with the goal of applying this knowledge in urban planning and policy.*						
Course Outcomes:	After completing this course, student is expected: **CO1:** To understand the key concepts of urban geography. **CO2:** To know about modern cities and various aspects of urbanisation process and problems in developed and developing countries. **CO3:** To understand the origin and historic development of Indian urbanisation and metropolitan cities. **CO4:** To understand and analyze the internal structure and hierarchy of cities using appropriate techniques, models and theories. **CO5:** To learn about rural-urban linkages. **CO6:** To understand the geographical perspective of urbanisation and linkages with urban planning and policy issues.						

COURSE SYLLABUS

NOTE:
Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit IV and few topics from Unit II will be taught via online mode.

Unit No.	Content of Each Unit	Hours of Each Unit
I	**CONCEPTS AND SCOPE** **[Course Outcome (s) No.: 1]** Definition, Nature and Scope of Urban Geography; Classification of Urban Places in India; Aspects of Urban Places: Definition and Significance of Location, Site and Situation; Concepts of Megacities; Global Cities; Edge Cities, Satellite Towns and Rural-Urban Fringe.	15
II	**PROCESS OF URBANISATION** **[Course Outcome (s) No.: 2 & 3]** Characteristics, Processes and Problems of Urbanization in Developed and Developing Countries; Urbanisation Process in India: Colonial Legacy, The Post-Independence Characteristics and the Origin and Growth of Metropolitan Cities.	15

III	**URBAN MODELS AND THEORIES** **[Course Outcome (s) No.: 4 & 5]** The Law of the Primate City; Rank Size Rule; Central Place Theory of Christaller and Losch; Urban Land Use: Burgess, Harris & Ullman, and Hoyt.	15
IV	**URBAN PLANNING AND PROGRAMMES** **[Course Outcome (s) No.: 6]** Concept of Urban Planning; Urban E-Governance; Urban Development Programmes: Smart Cities, AMRUT and JNNURM.	15

Suggested Readings:

1. Grover, A. and Singh, R.B. (2020). **Urban Health and Wellbeing-Indian Case Studies**, Springer.
2. Bansal, S.C. (2019). **Urban Geography**. Meenakshi Publication, Meerut.
3. Schwanen, T. and Van Kempen, R. (Eds.) (2019). **Handbook of Urban geography**. Edward Elgar Publishing, Cheltenham.
4. Short, J. R. (2017). **An Introduction to Urban Geography**. Routledge.
5. Husain, M. (2015). **Models in Geography**. Rawat Publications, Jaipur.
6. Singh, R.B. (2015). **Urban Development Challenges, Risk and Resilience in Asian Mega Cities**-Sustainable Urban Future of Emerging Asian Mega Region, Springer, Tokyo.
7. Johnston, R. J. (2013). **City and society: An outline for Urban Geography**. Routledge.
8. Pacione, M. (2009). **Urban Geography: A Global Perspective**. Routledge, Oxford.
9. Mandal, R. B. (2008). **Urban Geography: A Textbook**. Concept Publishing Company, New Delhi.
10. Fyfe, N. and Kenny, J. (Eds.) (2005). **The Urban Geography Reader**. Routledge, London
11. Ramachandran, R. (2005). **Urbanization and Urban Systems in India**. Oxford University Press.
12. Kaplan, D. H., Wheeler, J. O., & Holloway, S. (2004). **Urban Geography**. John Wiley & Sons.
13. Kumar, B. and Singh, R.B. (2003). **Urban Development and Anthropogenic Climate Change-Experience in Indian Metropolitan Cities**, Manak Pub., New Delhi.
14. Singh, R.B. (2001). **Urban Sustainability in the Context of Global Change**, Science Pub., Inc., Enfield (NH), USA and Oxford & IBH Pub., New Delhi.
15. Carter, H. (1972). **The Study of Urban Geography**. Edward Arnold, London.

Course No: CC 5	Course Name: Practical: Cartographic Methods				Course Code: SBS GEO 1 1 05 C 2024		
Batch:	**Programme:**	**Semester:**	**L**	**T**	**P**	**Credits**	**Contact Hrs per Week: 6**
2021-2023	M.Sc. Geography	I	2	0	4	4	**Total Hours: 90**
Total Evaluation Marks: 100 **CIE:** 30 Marks **TEE:** 70 Marks		**Examination Duration:** 3 hours					
		Pre-requisite of course: Methods in Geographical Analysis, History of Map Making, Surveying Methods					

Course Objective	Introducing the basics of topographical sheet, the basis of interpretation of physical and cultural features on topographical sheet; learning the methods of map projections through the mathematical method; and familiarizing the students about the techniques of morphometric analysis of drainage basin, slope analysis and profile analysis, relief aspects and surveying methods in geography.
Course Outcomes:	After completing this course, student is expected: **CO1:** To know the basics of topographical sheet and its interpretation. **CO2:** To learn and interpret various physical and cultural features on Toposheets. **CO3:** To know the methods of developing various types of map projections through mathematical method. **CO4:** To know the techniques of morphometric analysis of drainage basin, slope analysis and profile analysis. **CO5:** To learn hands on experience on relief aspects including hypsometric analysis. **CO6:** To learn the surveying methods in geography.

COURSE SYLLABUS

NOTE: Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit I will be taught via online mode.

Unit No.	Content of Each Unit	Hours of Each Unit
I	**INTERPRETATION OF TOPOGRAPHICAL SHEETS** **[Course Outcome (s) No. :1]** Basic Information on Topographical Sheets, Conventional Signs, Interpretation of Relief, Drainage, Settlements, Land-Use, Vegetation and Transport Network on Toposheets.	22
II	**MAP PROJECTIONS** **[Course Outcome (s) No.: 2& 3]** Mathematical Methods: Mercator Projection, Conical Projection with Two Standards Parallel, Gnomonic	22

	Projection and Orthographic Projection.	
III	**MORPHOMETRIC ANALYSIS** **[Course Outcome (s) No. :4]** Linear Aspects- Stream Ordering and Bifurcation Ratio; Areal Aspects-Form Factor, Elongation Ratio and Circularity Ratio; Relief Aspects- Relative Relief and Dissection Index; Slope Analysis: Average Slope (Wentworth's Method); Profile Analysis: Longitudinal and Cross Profile.	22
IV	**RELIEF ASPECTS** **[Course Outcome (s) No. :5 & 6]** Hypsometric Analysis- Hypsometric Curve and Integral Hypsometric Curve, Clinographic Analysis, Altimetric Analysis; Surveying Methods with Instruments.	24

Suggested Readings:

1. Sharma, J.P. (2010). **Prayogic Bhugol**. Rastogi Publishers, Delhi.
2. Sarkar, A. (2008). **Practical Geography: A Systematic Approach**. Orient Blackswan, Kolkata.
3. Robinson, A.H. et al. (2004). **Elements of Cartography** (Sixth Edition). Wiley-India, New Delhi.
4. Singh, G. (2004). **Map Work and Practical Geography**. Vikas Publication House, Delhi.
5. Yadav, H.L. (2002). **Prayogatamak Bhoogol Ke Aadhar**. Radha Publications, New Delhi.
6. Khullar, D.R. (2001). **Essentials of Practical Geography** (Second Edition). New Academic Publishing, Jalandhar.
7. Singh, R.L. (1998). **Prayogic Bhoogol Rooprekha**. Kalyani Publications, New Delhi.
8. Doornkamp, J.C. and King, C.A.M. (1971). **Numerical Analysis in Geomorphology: An Introduction**. Arnold, London.
9. Khan, Md. Z.A. (1998). **Text Book of Practical Geography**. Concept, New Delhi.
10. Mayer, L. (1990). **Introduction to Quantitative Geomorphology**. Prentice Hall, New Jersey.
11. Ishtiaq, M. (1989). **Practical Geography**. Heritage Publishers, New Delhi.
12. Misra, R.P. and Ramesh, A. (1989). **Fundamentals of Cartography** (Revised and Enlarged Edition). Concept, New Delhi.
13. Monkhouse, F.J. and Wilkinson, H.R. (1980). **Maps and Diagrams**. B. I. Publications, Bombay.
14. Singh, R.L. (1979). **Elements of Practical Geography**. Kalyani Publishers, New Delhi.
15. Upton, W.B. (1970). **Landforms and Topographic Maps**. John Wiley, New York.

Course No: GEC 1	Course Name: Climate Change Vulnerability and Adaptation				Course Code: SBS GEO 1 1 01 GE 3104		
Batch:	**Programme:**	**Semester:**	**L**	**T**	**P**	**Credits**	**Contact Hrs per Week: 4**
2021-2023	M.Sc. Geography	I	3	1	0	4	**Total Hours: 60**

Total Evaluation Marks: 100 **CIE:** 30 Marks **TEE:** 70 Marks	**Examination Duration:** 3 hours **Pre-requisite of course:** Basic knowledge about Global warming, Concept of Biodiversity and Policies related to Environment.
Course Objective	Understanding various dimensions of climate change and adaptability. Learning the detailed analysis of vulnerability and its impacts. Understanding of the concept of mitigation and planning.
Course Outcomes:	After completing this course, student is expected: CO 1: To understand the concept of global warming, climate change and related issues. CO 2: To learn the concept of climochronology and climate change assessment. CO 3: To know the impact of climate change and adaptation strategies. CO 4: To understand the concept of ecosystem and biodiversity. CO 5: To know about the in-depth knowledge of vulnerability of flora and fauna. CO 6: To understand the role of policies and organizations in climate change mitigation.

COURSE SYLLABUS

NOTE:
Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit IV will be taught via online mode.

Unit No.	Content of Each Unit	Hours of Each Unit
I	**CONCEPTS OF CLIMATE CHANGE AND GLOBAL WARMING:** **[Course Outcome (s) No.: 1 & 2]** Climate Change: Understanding Climate Change; Evidences of Global Warming and Climate Change; Climochronology; Green House Gases and Global Warming; Global Climatic Assessment- IPCC.	15
II	**CLIMATE CHANGE VULNERABILITY:** **[Course Outcome (s) No.: 3 & 4]** Climate Change and Vulnerability: Physical Vulnerability, Economic Vulnerability, Social Vulnerability, Vulnerability of Natural Environment and Associated Services; Natural Ecosystems and Biodiversity; Agriculture, Fisheries and Forestry; Vulnerability of Water Resources.	15

III	**CLIMATE CHANGE: IMPACTS & ADAPTATION** **[Course Outcome (s) No.: 5]** Impact of Climate Change: Agriculture and Water, Flora and Fauna, Human Health; Adaptation and Mitigation to Climate Change; Global Initiatives with Particular Reference to South Asia; Adaptation Strategies with Special Reference to India.	15
IV	**CLIMATE CHANGE: POLICIES & ORGANIZATIONS** **[Course Outcome (s) No.: 6]** Climate Change Policy Framework: Important National and International Initiatives, Kyoto Protocol, Paris Agreement, UNFCCC, NAPCC, INDCS.	15

Suggested Readings:

1. Mishra, R.K, Singh, R.B. and Dubey, Anupama (2021). **Sustainable Climate Action and Water Management**, Springer.
2. Singh, R.B., Mal, Suraj, and Huggel, C. (2018). **Climate Change, Extreme Events and Disaster Risk Reduction**. Springer, pages 309, Switzerland.
3. IPCC. (2014). **Climate Change 2014: Impacts, Adaptation, and Vulnerability.** Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. NY, USA. Cambridge University Press, Cambridge, United Kingdom and New York
4. Singh, M., Singh, R.B., and Hassan, M.I., (Eds.) (2014). **Climate change and biodiversity**, Proceedings of IGU Rohtak Conference (Volume 1). Advances in Geographical and Environmental Studies, Springer
5. Singh, R.B. and Mal, Suraj (2009). **Environmental Change and Biodiversity**, Rawat Publication, Jaipur.
6. OECD. (2008). **Climate Change Mitigation: —What do we do?** (Organisation and Economic Co-operation and Development).
7. IPCC. (2007). **Climate Change 2007: Impacts, Adaptation and Vulnerability**. Contribution of Working Group II to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. NY, USA: Cambridge University Press, Cambridge, United Kingdom and New York.
8. UNEP. (2007). **Global Environment Outlook: GEO4: Environment for Development**. Nairobi, Kenya: United Nations Environment Programme.
9. Sen, Roy, S., and Singh, R.B., (2002). **Climate Variability, Extreme Events and Agricultural Productivity in Mountain Regions**. Oxford & IBH Pub, Delhi
10. Singh, Rana P.B. (ed.) (1993). **Environmental Ethics: Discourses and Cultural Traditions**: National Geographical Society of India, BHU, Varanasi.
11. Singh, S. N. (1993). **Elements of Environmental Geography and Ecology (in Hindi)**, Tara Book Agency, Varanasi
12. Singh, R. B. (ed.) (1990). **Environmental Geography**. Heritage Publication, New Delhi.
13. Singh, O., Kumra, V.K. and Singh, J. (1988). **India's Urban Environment. Pollution, Perception and Management**. Tara Book Agency, Varanasi.
14. Khoshoo, T. N. (1981). **Environmental Concerns and Strategies**. Ashish Publishing House, New Delhi.
15. Odum, E.P. (1975). **Ecology**. Rowman and Littlefield, Lanham USA.

Course No: GEC 2	Course Name: Natural Hazards and Disaster Management				Course Code: SBS GEO 1 1 02 GE 3104		
Batch:	**Programme:**	**Semester:**	**L**	**T**	**P**	**Credits**	**Contact Hrs per Week: 4**
2021-2023	M.Sc. Geography	I	3	1	0	4	**Total Hours: 60**
Total Evaluation Marks: 100 **CIE:** 30 Marks **TEE:** 70 Marks	**Examination Duration:** 3 hours						
	Pre-requisite of course: Basic knowledge of natural hazards and disaster management.						
Course Objective	*The course is intended to provide a general concept in the dimensions of disasters caused by nature beyond the human control as well as the disasters and environmental hazards induced by human activities with emphasis on disaster preparedness, response, recovery, planning and management.*						
Course Outcomes:	After completing this course, student is expected: **CO1:** To understand the basic concept of different types of natural hazards and disasters. **CO2:** To understand the disaster preparedness and response strategy and role of ICT in disaster management. **CO3:** To know the role of various stakeholders in planning policies. **CO4:** To learn the concept of recovery and rehabilitation. **CO5:** To understand the national disaster management policy. **CO6:** To know the role of geospatial technologies in disaster management.						

COURSE SYLLABUS

NOTE:
Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit IV and few topics from Unit II will be taught via online mode.

Unit No.	Content of Each Unit	Hours of Each Unit
I	**BASIC CONCEPTS** **[Course Outcome (s) No.: 1&2]** Concept of Hazards, Risk, Vulnerability, Disaster and Resilience; Types of disaster: Natural - Flood, Drought, Landslide, Earthquake, and Avalanche; Manmade Disaster – Nuclear, Chemical and Biological.	15
II	**DISASTER PLAN AND PROGRAMMES** **[Course Outcome (s) No.: 2 & 3]** Disaster Preparedness: Concept, Plan, Prediction, Early Warning System, Role of ICT, National and International Programmes and Policies, NGOs/Civil Societies; Disaster Responses: Role of Multiple Stockholders, Psychological and Medical Health Responses.	15

III	**POST DISASTER PLANNING** **[Course Outcome (s) No.: 4 & 5]** Reconstruction and Rehabilitation as a Means of Development**,** Damage Assessment, Long Term Recovery and Counter Disaster Planning.	15
IV	**DISASTER POLICY, MANAGEMENT AND GEOSPATIAL TECHNOLOGY** **[Course Outcome (s) No.: 6]** National Disaster Management Policy; Role of Remote Sensing, GIS and GNSS in Disaster Management.	15

Suggested Readings:

1. Kapur, A. (2010) **Vulnerable India: A Geographical Study of Disasters**, Sage Publication, New Delhi.
2. Modh, S. (2010) **Managing Natural Disaster: Hydrological, Marine and Geological Disasters**, Macmillan, Delhi.
3. Singh Jagbir (2007) "**Disaster Management Future Challenges and Oppurtunities"**, 2007. PublisherI.K. International Pvt. Ltd. S-25, Green Park Extension, Uphaar Cinema Market, New Delhi, India (www.ikbooks.com).
4. Srivastava, H. N. (2007). **Coastal Hazards, (Cyclone, Tsunami, and other Disasters).** National Book Trust of India, New Delhi.
5. Singh, R. B. (ed.), (2006) **Natural Hazards and Disaster Management: Vulnerability and Mitigation**, Rawat Publications, New Delhi.
6. Singh, R.B. (2005) **Risk Assessment and Vulnerability Analysis**, IGNOU, New Delhi. Chapter 1, 2 and 3
7. Stoltman, J.P. et al. (2004) **International Perspectives on Natural Disasters,** Kluwer Academic Publications. Dordrecht.
8. Sinha, A. (2001). **Disaster Management: Lessons Drawn and Strategies for Future,** New United Press, New Delhi.
9. Government of India. (1997) **Vulnerability Atlas of India**. New Delhi, Building Materials & Technology Promotion Council, Ministry of Urban Development, Government of India.
10. Hemmady, A. K.R. (1996). **Earthquake.** National Book Trust India, New Delhi.
11. Biswas, M.R. and Biswas, A.K. (1980). **Desertification Case Studies,** Pergamon, Oxford.
12. Sain, Kanwar. (1979). **The Flood Problem India.** Birla Institute of Scientific Research, New Delhi.
13. Zaruba, Q. and Menci, V. (1969). **Landslides and their Control.** Elsevier, Amsterdam.
14. Bhatia, B.M. (1967). **Famines in India,** Asia Publishing House, Delhi.
15. Mason, B.J. (1957). **The Physics of Clouds.** Clarendon Press, Oxford.

SEMESTER- II

Course No: CC 6	**Course Name:** Evolution of Geographical Thought				**Course Code:** SBS GEO 1 2 06 C 3104		
Batch:	**Programme:**	**Semester:**	**L**	**T**	**P**	**Credits**	**Contact Hrs per Week:4**
2021-2023	M.Sc. Geography	II	3	1	0	4	**Total Hours: 60**
Total Evaluation Marks: 100 **CIE:** 30 Marks **TEE:** 70 Marks	**Examination Duration:** 3 hours **Pre-requisite of course:** Foundation of Geography, Ancient Geography, Medieval Geography, Modern Geography						
Course Objective	*Introducing about geography as a field of study and the disciplinary developments of geography as science of synthesis; enabling to contextualize the approaches and concepts within geography; and understanding the emergence of modern geography, contemporary trends, relevance and future of geography.*						
Course Outcomes:	After completing this course, student is expected: **CO1:** To know about geography as a field of study and the evolution of geography as science of synthesis. **CO2:** To be acquainted with various schools of thoughts and their contributions along with the geographical concepts in Ancient India. **CO3:** To contextualize the approaches and concepts within geography. **CO4:** To know the emergence of modern geography and contemporary trends. **CO5:** To know the relevance of geography. **CO6:** To know the future of geography.						

COURSE SYLLABUS

NOTE:
Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit I will be taught via online mode.

Unit No.	Content of Each Unit	Hours of Each Unit
I	**GEOGRAPHY AS A FIELD OF STUDY** **[Course Outcome (s) No. :1]** Geography as a Field of Study; Place of Geography in the Classification of Knowledge; Relationship with Natural and Social Sciences; Geography as a Spatial Science; Geography as Science of Synthesis; Schools of Thoughts and their Contributions.	15
II	**APPROACHES AND CONCEPTS** **[Course Outcome (s) No.: 2& 3]** Human-Environment Interactions – Determinism, Possibilism and Neo-Determinism; Concepts and their	15

	Significance: Location, Space, Place and Region; Areal Differentiation and Spatial Organisation.	
III	**EMERGENCE OF MODERN GEOGRAPHY AND CONTEMPORARY TRENDS** **[Course Outcome (s) No. :4]** Positivism; Quantitative Revolution; Contemporary Trends: Behavioural Geography; Humanistic Geography; Marxist Geography; Gender Geography; Structuralism; Post-Structuralism and Post-Modernism.	15
IV	**RELEVANCE AND FUTURE OF GEOGRAPHY** **[Course Outcome (s) No. :5 & 6]** Relevance of Geography; Future of Geography - Changing Nature; Concepts, Approaches and Methodologies of Geography; Emerging Subfields; Geography and Public Policy; Evolution and Progress of Indian Geography.	15

Suggested Readings:

1. Cresswell, T. (2014). **Geographic Thought: A Critical Introduction**. Blackwell, New York.
2. Singh, Ravi S (ed.) 2009. **Indian Geography: Perspectives, Concerns and Issues**. Rawat Publications, Jaipur.
3. Johnston, R., Gregory D., Pratt G., Watts, M. and Whatmore, S. (2009). **The Dictionary of Human Geography**. Blackwell, New York.
4. Dikshit, R. D. (2008). **Bhaugolik Chintan Ka Vikas**. PHI Learning Pvt. Ltd.
5. Hussain, M. (2006). **Bhogolik Chintan Ka Itihas**. Rawat Publications.
6. Martin, G. (2005). **All Possible Worlds: A History of Geographical Ideas (**4th edition). Oxford University Press, New York.
7. Dikshit, R. D. (2004). **Geographical Thought. A Critical History of Ideas**. Prentice-Hall of India, New Delhi. (English and Hindi).
8. Clifford, N.J. (2002). T**he Future of Geography: when the whole is less than the sum of its parts**. Geoforum, Vol. 33, 431-436.
9. Kapur, A. (ed.) (2001). **Indian Geography – Voice of Concern**. Concept Publishing Company, New Delhi.
10. Holt-Jensen A. (1999). **Geography– History and Concepts**. Sage, London.
11. Peet, R. (1998). **Modern Geographical Thought.** Wiley-Blackwell, New York
12. Singh, R. L. and Singh, Rana P.B. (eds.) (1992). **The Roots of Indian Geography: Search and Research**. National Geographical Society of India, B.H.U. Publication number 39, Varanasi.
13. Buttimer, A. and Seamon, D. (ed.) (1980). **The Human Experience of Space and Place**. Croonhelm, London.
14. Harvey, D. (1969). **Explanation in Geography**. Arnold, London.
15. Hartshorne R. (1939). **The Nature of Geography**. AAG, New York.

Course No: CC 7	Course Name: Fundamentals of Photogrammetry and Remote Sensing				Course Code: SBS GEO 1 2 07 C 3104		
Batch:	**Programme:**	**Semester:**	**L**	**T**	**P**	**Credits**	**Contact Hrs per Week: 4**
2021-2023	M.Sc. Geography	II	3	1	0	4	**Total Hours: 60**
Total Evaluation Marks: 100 **CIE:** 30 Marks **TEE:** 70 Marks			**Examination Duration:** 3 hours				
			Pre-requisite of course: Basic knowledge of photogrammetry, EMR, satellite orbits and digital image concepts.				
Course Objective	*To understand the basics of photogrammetry and remote sensing technology and their potential applications and to develop basic skills to interpret aerial photographs and remote sensing images for various applications in geography.*						
Course Outcomes:	After completing this course, student is expected: **CO1:** To understand the basics of photogrammetry. **CO2:** To know the basic principles of remote sensing. **CO3:** To learn the basic principles of microwave and thermal remote sensing. **CO4:** To know the remote sensing platforms, sensors and resolution characteristics. **CO5:** To understand the various techniques of digital image classification. **CO6:** To understand the remote sensing data applications in various domains of geography.						

COURSE SYLLABUS

NOTE:
Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit IV and few topics from Unit III will be taught via online mode.

Unit No.	Content of Each Unit	Hours of Each Unit
I	**POHOTOGRAMMETRY** **[Course Outcome (s) No.: 1]** Photogrammetry: History and Development; Aerial Photographs: Types, Geometry, Methods of Determining Scale, Ground Coverage and Overlapping; Stereoscopes and Stereoscopic Vision.	15
II	**BASIC PRINCIPLES OF REMOTE SENSING** **[Course Outcome (s) No.: 2 & 3]** Remote Sensing: Meaning and Basic Principles/Concepts; Electromagnetic Radiations (EMR); Electromagnetic Spectrum; Interaction of EMR with Atmosphere and Earth's Surface Features; Basic Principles of Thermal and Microwave Remote Sensing.	15

III	**REMOTE SENSING PLATFORMS, SENSORS AND IMAGE CLASSIFICATION** **[Course Outcome (s) No.: 4]** Remote Sensing Platforms- Types and Characteristics; Satellite Orbits- Near Polar and Geostationary Orbits; Sensors- Types, Specifications and Resolutions (Landsat, LISS and Cartosat); Elements of Image Interpretation; Digital Image Processing: Supervised and Unsupervised Classification.	15
IV	**REMOTE SENSING PROGRAMS AND APPLICATIONS** **[Course Outcome (s) No.: 5 & 6]** Remote Sensing Set up and Programmes in India; Remote Sensing Data Applications.	15

Suggested Readings:

1. Kumar, D.; Singh, R.B. and Kaur, R. (2019). **Spatial Information Technology for Sustainable Development Goals**. Springer Nature, Switzerland.
2. Peter, J.G., Teunissen and Oliver, M. (Eds.) (2019). **Springer Handbook of Global Navigation Satellite Systems**. Springer Nature, Switzerland:
3. Gupta, R.P. (2018). **Remote Sensing Geology** (3rd Edition). Springer Nature, Switzerland.
4. Kron, G. (2017). **Global Navigation Satellite Systems: Signal, Theory & Applications**. Wilmington: Scitus Academics.
5. Chuveico, E. (2016). **Fundamentals of Satellite Remote Sensing — An Environmental Approach** (2 nd Edition). CRC Press, Roca Raton.
6. Chaunial, D.D. (2016). **Principles of Remote Sensing and Geographical Information System** (In Hindi), Sharda Pustak Bhawan, Allahabad.
7. Scott, M. (2015). **Global Navigation Satellite Systems and Their Applications**. Springer, New York.
8. Heywood, I.; Cornelius, S. and Carver, S. (2011). **An Introduction to Geographic Information Systems** (4 th Edition). Pearson Education, New Delhi.
9. Longley, P.A.; Goodchild, M.; Maguire, D.J. and Rhind, D.W. (2010). **Geographic Information Systems and Science** (3rd Edition). John Wiley, New Jersey:
10. DeMers, M. (2009). **Fundamentals of Geographic Information Systems** (4th Edition). John Wiley, New Jersey.
11. Sabins, F.F. (2007). **Remote Sensing: Principles and Interpretation** (3rd Edition). Waveland Press, Long Grove.
12. Chang, K-t. (2006). **Introduction to Geographic Information Systems**. Tata McGraw Hills, New Delhi.
13. Lillesand, T.M.; Kiefer, R.W. and Chipman, J.W. (2004). **Remote Sensing and Image Interpretation** (5th Edition). John Wiley India, New Delhi.
14. Joseph, George (2003). **Fundamental of Remote Sensing**, University's Press (India) Pvt. Ltd., Hyderabad.
15. Burrough, P.A. and McDonnell, R.A. (1998). **Principles of Geographic Information Systems**. Oxford University Press, Oxford.

Course No: CC 8	Course Name: Hydrology and Oceanography				Course Code: SBS GEO 1 2 08 C 3104		
Batch:	**Programme:**	**Semester:**	**L**	**T**	**P**	**Credits**	**Contact Hrs per Week: 4**
2021-2023	M.Sc. Geography	II	3	1	0	4	**Total Hours: 60**
Total Evaluation Marks: 100 **CIE:** 30 Marks **TEE:** 70 Marks			**Examination Duration:** 3 hours **Pre-requisite of course:** Concept of Hydrology, Ocean Reliefs, and Marine Ecosystem.				
Course Objective	Acquiring knowledge about meaning and various aspects of hydrology and oceanography. To understand the components of hydrological cycle and problems of water resources. Understanding the oceanic relief features, properties of water, oceanic circulation and resources.						
Course Outcomes:	After completing this course, student is expected: **CO 1:** To know the concepts of hydrology. **CO 2:** To know the concepts of oceanography. **CO 3:** To learn the mechanism and importance of different components of hydrological cycle. **CO 4:** To understand the concept of various oceanic properties and oceans dynamics. **CO 5:** To understand the nature and importance of oceanic ecosystem. **CO 6.** To recognize the mechanism of oceans and its linkages to atmosphere.						

COURSE SYLLABUS

NOTE:
Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit IV will be taught via online mode.

Unit No.	Content of Each Unit	Hours of Each Unit
I	**CONCEPTS OF HYDROLOGY:** **[Course Outcome (s) No.: 1 & 3]** Hydrology: Approach, Meaning and Scope; Precipitation and Interception; Evaporation; Evapotranspiration; Infiltration; Groundwater: Occurrence, Storage and Charge; Runoff: Sources, Components and Factors; River regimes; Hydrograph: Components and Separation; Water Resource Problems and Management.	15
II	**CONCEPTS OF OCEANOGRAPHY:** **[Course Outcome (s) No.: 2]** Definition and Scope of Oceanography; Historical Development of Oceanography; Distributional Patterns of Land and Oceans; Depth Zones and Hypsometric Curve; Bottom Relief of Oceans; Oceanic Deposits; Zonation of the Sea.	15

III	**OCEANIC PROPERTIES AND DYNAMICS:** **[Course Outcome (s) No.: 4]** Ocean Water Properties: Chemical Properties, Temperature, Salinity and Density; Sea Waves; Tides: Types and Origin; Oceanic Currents: Controlling Factors and General Circulation.	15
IV	**MARINE RESOURCES AND ECOSYSTEM:** **[Course Outcome (s) No.: 5 & 6]** Mangroves and Estuarine Ecology; Coral Reefs: Formation, Types and Distribution; Marine Pollution; Oceanic Resources: Mineral, Energy, Food Resource, Aquaculture; Oceanic Ecosystems: Marine Biota; Energy Flow: Food Chains and Food Webs; Marine Resources: Depletion, Conservation and Management.	15

Suggested Readings:

1. Singh, S. (2020). **Oceanography**. Pravalika Publication, Allahabad.
2. Singh, S. (2020). **Samudra Vigyan**. Pravalika Publication, Allahabad.
3. Novák, Viliam; Hlaváčiková, Hana (2019). **Applied Soil Hydrology**. Springer International Publishing, Switzerland.
4. Sharma, R.C. and Vatal, V. (2016). **Oceanography for Geographers**. Chatanaya Publishing, Allahabad.
5. Garrison, T. (2015). **Oceanography - An Introduction to Marine Science**. Cole Pacific Grove, USA.
6. Garrison, T. (2012). **Essentials of Oceanography**. Wards worth, London. (6th edition)
7. Davie, T. (2008). **Fundamentals of Hydrology**. Routledge, London.
8. Denny, M. (2008). **How the Ocean Works: An introduction to Oceanography**. Princeton University Press, New Jersey.
9. Brutsaert, W. (2005). **Hydrology: An Introduction**. Cambridge University Press.
10. Andrew. D.W. and Stanley, T. (2004). **Environmental Hydrology**. CRC Press, Allahabad.
11. Kerhsaw, S. (2004). **Oceanography: An Earth Science Perspective**. Routledge, London.
12. Ward, R.C. and Robinson, M. (2000). **Principles of Hydrology**. McGraw Hill, New York.
13. Duxbury, C.A and Duxbury, B. (1996). **An Introduction to the world's Oceans** (2nd Edition). C. Brown, Iowa.
14. Gross, M. Grant (1987). **Oceanography: A View of the Earth.** Prantice - Hall Inc, New Jersy.
15. Davis, R.J.A. (1986). **Oceanography - An Introduction to the Marine Environment**. C. Brown, Iowa.

Course No: CC 9	Course Name: Research Methodology, Field work and Report Writing (Socio-Economic Aspect)				Course Code: SBS GEO 1 2 09 C 3014		
Batch: 2021-2023	**Programme:** M.Sc. Geography	**Semester:** II	**L**	**T**	**P**	**Credits**	**Contact Hrs Per Week: 5**
			3	0	2	4	**Total Hours: 75**
Total Evaluation Marks: 100 **CIE:** **30** Marks **TEE:** **70** Marks		**Examination Duration:** 3 hours					
		Pre-requisite of course: Basic knowledge of computer, data and data analysis. Basic knowledge of field instruments.					
Course Objective	To introduce the students with research methodology. To expose the students to tools and techniques to do fieldwork and obtain data through practical experience in geographical field study. To make the students able to use software for data analysis and to learn the writing and preparation of field report.						
Course Outcomes:	After completing this course, student is expected: **CO1:** To understand the meaning and philosophy of research **CO2:** To know about the process of research. **CO3:** To understand the selection of research design, sampling, data collection methods. **CO4:** To collect and process data in the light of ethics in research. **CO5:** To handle tools and techniques including SPSS software. **CO6:** To develop the skills to conduct the socio-economic survey and report writing.						

COURSE SYLLABUS

NOTE:
Eight questions will be set, two from each of the unit. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit I will be taught via online mode.

Unit No.	Content of Each Unit	Hours of Each Unit
I	**INTRODUCTION TO RESEARCH AND RESEARCH PROBLEM** **[Course Outcome (s) No.: 1 & 2]** Meaning, Purpose, Types and Process of Research; Identification of Research Question; Research Problems and Literature Survey; Hypothesis.	15
II	**SELECTION OF RESEARCH DESIGN AND EHTICS** **[Course Outcome (s) No.: 3 & 4]** Selection of research design; Sampling design and determination of sample size; Methods of Data Collection; Qualitative Data Production: Interviews,	20

	Observation (Participant Observation and Ethnography); Process of Report Writing; Reference styles; Plagiarism and Ethics in Research.	
III	**USE OF SPSS SOFTWARE AND STATISTICS** **[Course Outcome (s) No.: 5]** SPSS (Statistical Package for Social Sciences): Introduction, managing Data, frequencies and cross tabulation, Graphs, Central Tendencies, Measures of Distribution, Measures of Asymmetry, Estimation and Hypothesis Testing, Correlation and Regression, Data Analysis and Interpretation.	20
IV	**CONDUCT A SOCIO-ECONOMIC SURVEY AND REPORT WRITING** **[Course Outcome (s) No.: 6]** Conduct a socio-economic survey using structured questionnaire/ schedule/Observation/Group Discussion/Field Diary; Prepare a Field Survey Report.	20

Suggested Readings:

1. Singh, J.P. (2021). **Samajik anusandhan ki vidhiyan**, Rawat Publication, Jaipur
2. Ahuja, R. (2019). **Research Methods**, Rawat Publication, New Delhi.
3. Ahuja, R. (2019). **Samajik Sarvekshan avam Anusandhan**. Rawat Publication, Jaipur
4. Kothari, C.R. (2019). **Research Methodology: Methods and Techniques**. New Age international Publishers, New Delhi
5. Healey, J.F. (2018). **Statistics: A Tool for Social Research**, Rawat Publication, Jaipur
6. Dikshit, R. D., (2003). **The Art and Science of Geography: Integrated Readings**, Prentice-Hall of India, New Delhi.
7. Mukherjee, Neela., (2002). **Participatory Learning and Action: with 100 Field Methods**. Concept Publs. Co., New Delhi
8. Kitchin, R. and Tate, N., (2001). **Conducting Research into Human Geography**. Theory, Methodology and Practice. Prentice-Hall, London.
9. Robinson, A., (1998). "**Thinking Straight and Writing That Way**", in Writing Empirical Research Reports: A Basic Guide for Students of the Social and Behavioural Sciences, eds. by F. Pryczak and R. Bruce Pryczak, Publishing: Los Angeles. Special Issue on "Doing Fieldwork" The Geographical Review 91:1-2 (2001).
10. Wolcott, H., (1995**). The Art of Fieldwork**, Alta Mira Press, Walnut Creek, CA.
11. Creswell, J., (1994). **Research Design: Qualitative and Quantitative Approaches**, Sage Publications.
12. Mukherjee, Neela., (1993). **Participatory Rural Appraisal: Methodology and Application**, Concept Publs. Co., New Delhi.
13. Mishra, R.P. (1989). **Research Methodology: A Handbook**, Concept Publishing House, New Delhi.
14. Evans, M., (1988). **"Participant Observation: The Researcher as Research Tool"** in Qualitative Methods in Human Geography, eds. J. Eylesand D. Smith, Polity.
15. Stoddard, R. H., (1982). **Field Techniques and Research Methods in Geography**, Kendall/Hunt.

Course No: CC 10	Course Name: Practical: Photogrammetry and Digital Image Processing				Course Code: SBS GEO 1 2 10 C 2024		
Batch:	**Programme:**	**Semester:**	**L**	**T**	**P**	**Credits**	**Contact Hrs per Week: 6**
2021-2023	M.Sc. Geography	II	2	0	4	4	**Total Hours: 90**
Total Evaluation Marks: 100 **CIE:** 30 Marks **TEE:** 70 Marks		**Examination Duration:** 3 hours **Pre-requisite of course:** Basic knowledge of aerial photographs, scale, satellite image and Bhuvan/USGS portal.					
Course Objective	*To make students acquainted with aerial photographs and standard digital image processing techniques through hands-on practical exercises and to develop basic skills to classify and interpret remote sensing images for various applications in geography.*						
Course Outcomes:	After completing this course, student is expected: **CO1:** To understand aerial photographs and elements of image interpretation. **CO2:** To known about various sources of remote sensing data acquisition. **CO3:** To understand the remote sensing data preparation methods. **CO4**: To learn the various techniques of image enhancement. **CO5:** To understand the image classification, accuracy and change detection techniques. **CO6:** To apply the knowledge of geospatial techniques in various domains of geography.						

COURSE SYLLABUS

NOTE:
Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit I and few topics from Unit II will be taught via online mode.

Unit No.	Content of Each Unit	Hours of Each Unit
I	**POHOTOGRAMMETRY AND IMAGE INTERPRETATION** **[Course Outcome (s) No.: 1]** Aerial Photograph: Stereo Vision Test; Orientation of Stereo Model under Mirror Stereoscope; Determination of Scale on Aerial Photograph; Annotation of Satellite Image; Visual Image Interpretation.	24
II	**DATA ACQUISITION AND PREPARATION:** **[Course Outcome (s) No.: 2 & 3]** Satellite Data Download from USGS and BHUVAN (ISRO) etc.; Layer Stack; Mosaic and Subset.	22
III	**IMAGE ENHANCEMENT** **[Course Outcome (s) No.: 4]** Image Enhancement: Linear Contrast Stretch and Non-Linear Contrast Stretch, Spatial Filtering.	22

IV	**DIGITAL IMAGE CLASSIFICATION** **[Course Outcome (s) No.: 5 & 6]** Digital Image Classification: Supervised and Unsupervised Classification; Accuracy Assessment; Digital Change Detection.	22

Suggested Readings:

1. Kumar, D.; Singh, R.B. and Kaur, R. (2019). **Spatial Information Technology for Sustainable Development Goals**. Springer Nature, Switzerland.
2. Peter, J.G., Teunissen and Oliver, M. (Eds.) (2019). **Springer Handbook of Global Navigation Satellite Systems**. Springer Nature, Switzerland:
3. Gupta, R.P. (2018). **Remote Sensing Geology** (3rd Edition). Springer Nature, Switzerland.
4. Kron, G. (2017). **Global Navigation Satellite Systems: Signal, Theory & Applications**. Wilmington: Scitus Academics.
5. Chuveico, E. (2016). **Fundamentals of Satellite Remote Sensing — An Environmental Approach** (2 nd Edition). CRC Press, Roca Raton.
6. Chaunial, D.D. (2016). **Principles of Remote Sensing and Geographical Information System** (In Hindi), Sharda Pustak Bhawan, Allahabad.
7. Scott, M. (2015). **Global Navigation Satellite Systems and Their Applications**. Springer, New York.
8. Heywood, I.; Cornelius, S. and Carver, S. (2011). **An Introduction to Geographic Information Systems** (4 th Edition). Pearson Education, New Delhi.
9. Longley, P.A.; Goodchild, M.; Maguire, D.J. and Rhind, D.W. (2010). **Geographic Information Systems and Science** (3rd Edition). John Wiley, New Jersey:
10. DeMers, M. (2009). **Fundamentals of Geographic Information Systems** (4th Edition). John Wiley, New Jersey.
11. Sabins, F.F. (2007). **Remote Sensing: Principles and Interpretation** (3rd Edition). Waveland Press, Long Grove.
12. Chang, K-t. (2006). **Introduction to Geographic Information Systems**. Tata McGraw Hills, New Delhi.
13. Lillesand, T.M.; Kiefer, R.W. and Chipman, J.W. (2004). **Remote Sensing and Image Interpretation** (5th Edition). John Wiley India, New Delhi.
14. Joseph, George (2003). **Fundamental of Remote Sensing**, University's Press (India) Pvt. Ltd., Hyderabad.
15. Burrough, P.A. and McDonnell, R.A. (1998). **Principles of Geographic Information Systems**. Oxford University Press, Oxford.

Course No: DCEC 1	**Course Name:** Economic Geography				**Course Code:** SBS GEO 1 2 01 DCEC 3104		
Batch:	**Programme:**	**Semester:**	**L**	**T**	**P**	**Credits**	**Contact Hrs per Week: 4**
2021-2023	M.Sc. Geography	II	3	1	0	4	**Total Hours: 60**
Total Evaluation Marks: 100 **CIE:** 30 Marks **TEE:** 70 Marks	**Examination Duration:** 3 hours **Pre-requisite of course:** Basic knowledge of economic activities, globalization, global trade and sectors of economy.						
Course Objective	*To introduce economic geography as a sub-discipline of geography, to comprehend key concepts, and to emphasise the importance of economic geography in analysing contemporary societies and their relationships with space.*						
Course Outcomes:	After completing this course, student is expected: **CO1:** To learn the key concepts and recent trends of economic geography. **CO2:** To know the classification of economic activities, Alfred Weber and Von Thunen's Theory. **CO3:** To know about the dynamics of world economy. **CO4:** To understand the concepts of old and new industrial space. **CO5:** To understand the concepts of feminism in economic geography. **CO6:** To develop the relationship between economic activities and geographical space.						

COURSE SYLLABUS

NOTE: Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit IV and few topics from Unit III will be taught via online mode.

Unit No.	Content of Each Unit	Hours of Each Unit
I	**KEY CONCEPTS AND RECENT TRENDS** **[Course Outcome (s) No.: 1]** Definition, Scope and Approaches of Economic Geography; Key Concepts of Economic Geography: Space, Place and Scale; Theoretical Perspectives in Economic Geography; Recent Trends in Economic Geography.	15
II	**ECONOMIC THEORIES AND ACTIVITIES** **[Course Outcome (s) No.: 2 & 3]** Economic Activities: Classification of Economic Activities; Sectors of Economy (Primary, Secondary and Tertiary); Classification of Industries; Resource Based and Footloose Industries, Alfred Weber's Theory of Least Cost Location; Von Thunen's Model and Its Modifications.	15
III	**ECONOMY AND DEVELOPMENT** **[Course Outcome (s) No.: 4]** The Changing World Economy: Studying the World Economy, Economic Organisation and Spatial Change, Technology and Economic Development, Spatial Division of Labour; Old Industrial Space; New Industrial Space.	15

IV	**GENDER, TRADE AND GLOBALISATION** **[Course Outcome (s) No.: 5 & 6]** Feminism and Economic Geography: The Emergence of Feminism in Economic Geography, Globalization of Gender and Work; The Economic Geography of Global Trade: Barriers and the Changing Sectoral Composition of Global Trade, High Technology Trade and E-Commerce.	15

Suggested Readings:

1. M. Neil, Kelly F. Philip and Yeung C.W. Henry (2019). **Economic Geography: A Contemporary Introduction**, Edition 3. John Wiley & Sons.
2. MacKinnon, D., & Cumbers, A. (2018). **An Introduction to Economic Geography**: **Globalisation, Uneven Development and Place**. Routledge.
3. Saxena, H.M. (2018). **Economic Geography** (2nd Edition). Rawat Publication, Jaipur.
4. Siddhartha, K. (2018). **Economic Geography**. Kitab Mahal, New Delhi.
5. Singh, J and Singh, K.N. (2018). **Elements of Economic Geography**. Radha Publications, Delhi.
6. Barnes J. Trevor and Christophers Brett (2017). **Economic Geography: A Critical Introduction**. John Wiley & Sons.
7. Knox, P., Agnew, J. A., & McCarthy, L. (2014). **The Geography of the World Economy**. Routledge.
8. Aoyama, Yuko et.al. (2011). **Key Concepts in Economic Geography.** Sage, London.
9. Leyshon, A., Lee, R., Mc Dowell, L and Sunley, P. (Eds.) (2011) The Sage Handbook of Economic Geography, London: Sage.
10. Polenske, K. (Ed.) (2007). **The Economic Geography of Innovation**, Cambridge University Press, Cambridge.
11. Bagchi-Sen, S., & Lawton-Smith, H. (2006). **Economic Geography**. Taylor & Francis.
12. Hudson, R. (2005). **Economic Geographies: Circuits, Flows and Spaces**, London: Sage.
13. Barnes, T., Peck, J., Sheppard, E. and Tickell, A. (Eds.) (2003). **Reading Economic Geography**, London: Wiley- Blackwell.
14. Clark, G., Gertler, M. and Feldman, M. (Eds.) (2003). **The Oxford Handbook of Economic Geography**, Oxford: Oxford University Press.
15. Sheppard, E. S., & Barnes, T. J. (Eds.). (2000). **A Companion to Economic Geography**. Oxford, Blackwell.

Course No: DCEC 2	**Course Name:** Social and Cultural Geography				**Course Code:** SBS GEO 1 2 02 DCEC 3104		
Batch: 2021-2023	**Programme:** M.Sc. Geography	**Semester:** II	**L**	**T**	**P**	**Credits**	**Contact Hrs per Week:4**
			3	1	0	4	**Total Hours: 60**
Total Evaluation Marks: 100 **CIE:** 30 Marks **TEE:** 70 Marks		**Examination Duration:** 3 hours					
		Pre-requisite of course: Emergence of Social and Cultural Geography, Indian Society					
Course Objective	*Introducing the basic concepts, and development of social geography and cultural geography; acquainting about the social identities and social issues in India; and familiarizing the processes in cultural geography.*						
Course Outcomes:	After completing this course, student is expected: **CO1:** To know about the basic concepts and development of Social Geography. **CO2:** To understand about the relationship of Social Geography with Social Sciences. **CO3:** To know about the Social Identities and Social Issues in India. **CO4:** To know about the evolution and development of Cultural Geography. **CO5:** To learn about the basic concepts in Cultural Geography. **CO6:** To understand the processes in Cultural Geography.						

COURSE SYLLABUS

NOTE:
Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit I will be taught via online mode.

Unit No.	Content of Each Unit	Hours of Each Unit
I	**NATURE AND SCOPE OF SOCIAL GEOGRAPHY** **[Course Outcome (s) No. :1&2]** Concepts, Nature and Scope; Development of Social Geography; Place of Social Geography in Social Sciences; Concepts of Social Space; Relevance of Social Geography	15
II	**SOCIAL IDENTITIES AND ISSUES IN INDIA** **[Course Outcome (s) No. :3]** Social Identities in India: Ethnicity, Tribes, Caste and Religion; Mother Tongues and Language Shifts in India; Social Issues in India: Gender and Space, Sex Ratio, Health and Education, Poverty.	15

III	**BASIC CONCEPTS IN CULTURAL GEOGRAPHY** **[Course Outcome (s) No. :4 & 5]** Definition, Evolution and Development of Cultural Geography; Place of Cultural Geography within Geography; Cultural Area; Cultural Region; Cultural Hearth; Cultural Realm; Landscape and Environment.	15
IV	**PROCESSES IN CULTURAL GEOGRAPHY** **[Course Outcome (s) No. :6]** Landscape Evolution; Cultural Diffusion; Adaptation; Acculturation; Assimilation; and Resistance/ Cultural Resilience.	15

Suggested Readings:

1. Ahmad, A. (2012). **Social Geography of India**. Concept Publishing Company, New Delhi.
2. Maurya, S. D. (2011). **Samajik Bhugol**. Sharda Pushtak Bhawan, Allahabad.
3. Anderson, Jon. (2010). **Understanding Cultural Geography Places and Traces.** Routledge, London.
4. Vincent J. Del Casino, (2009). **Social Geography- Critical Introduction to Geography.** Wiley-Blackwell.
5. Johnston, R. J., Gregory, D., et.al. (eds.). (2005). **The Dictionary of Human Geography**, Blackwell Publishing.
6. Anderson, K. Domosh, M., Pile, S. & Thrift, N. (eds.). (2003). **Handbook of Cultural Geography.** Sage Publications, London.
7. Ahmed, A. (1999). **Social Geography**. Rawat publications, Jaipur.
8. Massey, D. (1994). **Space, Place and Gender**. Polity Press, Cambridge.
9. Singh, K.S. (1993). **People of India Vol I to XI**. Oxford University Press, New Delhi.
10. Raza, M. and Ahmed, A. 1990. **An Atlas of Tribal India.** Concept Publishing Co, Delhi.
11. Sopher, D. (ed.). (1980). **An Exploration of India: Geographical Perspectives on Society and Culture**. Cornell Press, New York.
12. Jones, E. and Eyles, J. (1977). **Introduction to Social Geography.** Oxford University Press.
13. Knox, P.L. (1975). **Social Well –being: A Spatial Perspective**. Oxford, London.
14. Panikkar, K.M. (1959). **Geographical Factors in Indian History.** Bharatiya Vidya Bhavan, Bombay.
15. Subba Rao, B. (1958). **Personality of India**. MS University Press, Baroda.

Course No: DCEC 3	Course Name: Geography of Health and Well Being				Course Code: SBS GEO 1 2 03 DCEC 3104		
Batch: 2021-2023	**Programme:** M.Sc. Geography	**Semester:** II	**L**	**T**	**P**	**Credits**	**Contact Hrs Per Week: 4**
			3	1	0	4	**Total Hours: 60**
Total Evaluation Marks: 100 **CIE:** 30 Marks **TEE:** 70 Marks		**Examination Duration:** 3 hours					
		Pre-requisite of course: Basic knowledge of diseases.					

Course Objective	To acquaint the students with the role of geographical factors, viz., physical, demographic, social and economic, influencing the spatial distribution of diseases. To highlight the relation of health with nutrition, environmental degradation and urbanization; and also, to decipher the causes of the changing disease pattern. To make the students abreast of existing health-care facilities, so as to train them with better health care planning for the country.
Course Outcomes:	After completing this course, student is expected: **CO1:** To understand the concept of geography of health. **CO2: To k**now about the geographical factors which affect human health. **CO3:** To understand the classification of diseases. **CO4: To u**nderstand about pattern of diseases. **CO5:** To understand the transmission and diffusion of diseases. **CO6:** To develop the skills for health care planning and policies for future.

COURSE SYLLABUS

NOTE:
There is total five questions in this question paper and all are compulsory. Each Question carries Fourteen Marks. Question no.1 has seven sub parts and students need to answer any four parts. Question number Two to Five have three sub parts and students need to answer any two-sub part of each question. Each sub part carries seven marks. Unit III will be taught via online mode.

Unit No.	Content of Each Unit	Hours of Each Unit
I	**INTRODUCTION: GEOGRAPHY OF HEALTH** **[Course Outcome (s) No.: 1 & 2]** Nature, scope and concept of geography of health, Development of this area of specialization; its distinction from medical science. Geographical factors affecting human health and diseases arising from them, viz. physical, Social, Economic and Environmental.	15
II	**CLASSIFICATION AND PATTERN OF DISEASES** **[Course Outcome (s) No.: 3 & 4]** Classification of diseases: genetic, communicable and non-communicable; occupational and deficiency	15

	diseases. WHO classification of diseases, Pattern of World distribution of major diseases.	
III	**TRANSMISSION AND DIFFUSION OF DISEASES** **[Course Outcome (s) No.: 5]** Ecology, Etiology, Causes, Diffusion and transmission of major diseases: Cholera, Malaria, Tuberculosis, Hepatitis, Cardiovascular, Cancer, STDs and COVID-19; Deficiency disorders and problems of mal-nutrition in India.	15
IV	**HEALTH CARE PLANNING AND POLICIES** **[Course Outcome (s) No.: 6]** Health-care planning and policies: WHO, UNICEF, Red Cross; Healthcare Planning, Programme and Services in India; Inequalities in Healthcare Services in India; Family Welfare; Immunization.	15

Suggested Readings:

1. Elahi, E. (2020). **Insights in Global Health**. Routledge, London
2. Hazen, H., Anthamatten, P. (2019). **An Introduction to the Geography of Health**. Routledge, London
3. Rais, A. and Learmonth, A.T.A. (2018). **Geographical Aspects of Health and Diseases in India**. Concept Publishing, New Delhi
4. Kanaroglou, P., Delmelle, E. (2018). **Spatial analysis in Health Geography**. Routledge, LDN
5. Emch, M., Root, E.D., Carrel, M. (2017). **Health and Medical Geography**, Routledge, LDN
6. Eyles,J.,Woods, K.J.(2016). **The Social Geography of Medicine and Health**. Routledge
7. Hazra, J. (ed.) (1997). **Health Care Planning in Developing Countries**. Uni. of Calcutta, Calcutta
8. Narayan, K.V. (1997). **Health and Development- Inter-Sectoral Linkages in India**. Rawat Pub., Jaipur
9. Phillps, D.R. (1990). **Health and Health Care in the Third world**. Longman, London
10. Cliff, A. and Haggett, P. (1989). **Atlas of Disease Distribution**. Basil Blackwell. Oxford
11. Pyle, G. (1979). **Applied Medical Geography**. Winston H. Press, Silver Springs, U.S.A.
12. Learmonth A.T.A. (1978). **Patterns of Disease and Hunger- A Study in Medical Geography**. David & Charles, Victoria
13. Mc. Glashan, N.D. (1972). **Medical Geography**, Methuen, London
14. May, J.M. (1970). **The World Atlas of Diseases**. Nat. Book Trust, New Delhi
15. Stamp, L.D. (1964). **The Geography of Life and Death**. Cornell University, Ithaca.

Course No: GEC 3	Course Name: Contemporary Environmental Issues				Course Code: SBS GEO 1 2 03 GE 3104		
Batch: 2021-2023	**Programme:** M.Sc. Geography	**Semester:** II	**L**	**T**	**P**	**Credits**	**Contact Hrs per Week:4**
			3	1	0	4	**Total Hours: 60**
Total Evaluation Marks: 100 **CIE:** 30 Marks **TEE:** 70 Marks		**Examination Duration:** 3 hours					
		Pre-requisite of course: Environment, Ecosystems, Sustainable Development					
Course Objective	*Introducing the current environmental issues, the concerns and impact of climate change confronting our present-day world; acquainting the global initiatives and measures adopted relating to climate change; and familiarizing the current environmental issues in India.*						
Course Outcomes:	After completing this course, student is expected: **CO1:** To know about the current environmental issues in relation to human activities. **CO2:** To understand the concerns and impacts of climate change in the current global context. **CO3:** To learn about the global initiatives and the measures. **CO4:** To know the issues of major roadblocks to global initiatives. **CO5:**To gain knowledge about the current environmental issues relating to the Indian context. **CO6:** To know the environmental movements in India.						

COURSE SYLLABUS

NOTE:
Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit I will be taught via online mode.

Unit No.	Content of Each Unit	Hours of Each Unit
I	**CONTEMPORARY ENVIRONMENTAL ISSUES** **[Course Outcome (s) No. :1]** Urbanisation and Environment; Environment and Health; Agriculture, Industries, Transport and Environment; Energy and Environment; Resources and Environment; Global Warming; Soil Erosion; Droughts; Biodiversity Loss.	15
II	**ENVIRONMENTAL CONCERNS AND IMPACT ASSESSMENT** **[Course Outcome (s) No.: 2& 3]** Key Concerns in the Climate Change; Scientific and Political Conflicts Concerning their Impacts on Natural Resources; Food Production and the Techno-Economic Measures for Reducing Greenhouse Emissions;	15

III	**GLOBAL INITIATIVES AND MEASURES** **[Course Outcome (s) No. :4]** Major Conferences and Conventions on Environment; International Agencies; Roadblocks to Global Initiatives; Environmental Laws in India; Legislative Measures and Interventions.	15
IV	**ENVIRONMENTAL MOVEMENTS AND ISSUES IN INDIA** **[Course Outcome (s) No. :5 & 6]** Environmental Movements in India; Chipko and Apikko Movement; Multipurpose projects: Narmada Dam, Tehri Dam; River Linking and Cleaning Initiatives; Ecological Conservation and Restoration; Desertification and its Control.	15

Suggested Readings:

1. Singh, P., Singh, R. P., and Srivastava, V. (2020). **Contemporary Environmental Issues and Challenges in Era of Climate Change**. Springer, Singapore.
2. Singh, S. (2020). **Paryaavaran Boogol Ka Svaroop**. Pravalika Publication, Allahabad.
3. Chasek, P.S. (2018). **Global Environmental Politics**. Routledge.
4. Gunster, S. (2017). **This changes everything: Capitalism vs the climate**.
5. Harper, C., Harper, C.L. and Snowden, M. (2017). **Environment and Society: Human Perspectives on Environmental Issues**. Routledge.
6. Singh, R. B. (2015). **Environmental Geography of South Asia, Contributions toward a future earth Initiative**. Springer, Tokyo.
7. Rangarajan, M. (2009). **Environmental Issues in India: A Reader**. Pearson Education India.
8. Singh, R.B. and Mal, S. (2009). **Environmental Change and Biodiversity**, Rawat Publication, Jaipur.
9. Susskind, L. et. al. (eds). (2002). **Trans-boundary Environmental Negotiation: New Approaches to Global Cooperation**.
10. Toman, M. (ed). (2002). **Climate change, Economics and Policy**. Cambridge University Press.
11. Mukund, R. (1997). **Global Environmental Politics: India and the North-South Politics of Global Environmental Issues**. O.U.P, Delhi
12. Reddy, V. R. (1997). **Environmental Movements in India: Some Reflections**. FIA.
13. Makofske, W.J. and Karlin, E.F. (1995). **Technology and Global Environmental issues**. Addison Wesley, Longman, Toronto.
14. Smith, P. and Warr, K. (1991). **Global Environmental issues**. Hodder and Stoughton, London.
15. Kemp, D.D. (1990). **Global Environmental issues: A climatologized approach**. Taylor and Francis, London.

Course No: GEC 4	Course Name: Geography of India				Course Code: SBS GEO 1 2 04 GE 3104		
Batch: 2021-2023	**Programme:** M.Sc. Geography	**Semester:** II	**L**	**T**	**P**	**Credits**	**Contact Hrs per Week: 4**
			3	1	0	4	**Total Hours: 60**
Total Evaluation Marks: 100 **CIE:** 30 Marks **TEE:** 70 Marks		**Examination Duration:** 3 hours					
		Pre-requisite of course: Basic knowledge of Indian physiography, culture, demography, agriculture and transport.					
Course Objective	This course on the Geography of India assumes that the students are familiar with the basic landforms, climate, soil, vegetation and population characteristics of India. It is a course designed to enable students to broaden and deepen their understanding of India.						
Course Outcomes:	After completing this course, student is expected: **CO1:** To understand the basic concept of physiography of India. **CO2:** To know about natural vegetation and soil characteristics of India. **CO3:** To understand features of Indian agriculture. **CO4:** To learn about the new industrial policies and industrial regions. **CO5:** To know about demographic attributes and population policies. **CO6:** To learn about the development of transport network and foreign trade.						

COURSE SYLLABUS

NOTE:
Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit IV will be taught via online mode.

Unit No.	Content of Each Unit	Hours of Each Unit
I	**PHYSICAL SETUP** **[Course Outcome (s) No.: 1 & 2]** Introduction: Physiographic Regions; Drainage Systems; Indian Monsoon; Natural Vegetation and Soil.	15
II	**AGRICULTURE AND INDUSTRY** **[Course Outcome (s) No.: 3 & 4]** Agriculture: Salient Features, Problems and Solutions of Indian Agriculture; Green Revolution; Industries: New Industrial Policy and Industrial Regions.	15
III	**DEMOGRAPHY** **[Course Outcome (s) No.: 5]** Population Growth and Distribution; Sex-Ratio and Literacy Rate; Population Policy.	15

IV	**TRANSPORT AND TRADE** **[Course Outcome (s) No.: 6]** Development and Patterns of Transport Networks: Railways, Roadways and Waterways; Indian Foreign Trade.	15

Suggested Readings:

1. Bose Ashish. (2010). **India's Quest for Population Stabilisation,** National Book Trust, New Delhi.
2. Tiwari, R.C. (2010). **Geography of India**. Prayag Pustak Bhawan, Allahabad.
3. Gautam, A. (2009). **Advanced Geography of India (Second Edition)**. Sharada Pustak Bhawan, Allahabad.
4. Husain, M. (2008). **Geography of India**. Tata McGraw-Hill, New Delhi.
5. Bhalla, G. S. (2007). **Indian Agriculture Since Independence,** National Book Trust, New Delhi
6. Khullar, D.R. (2006**). India: A Comprehensive Geography**. Kalyani Pub., New Delhi.
7. Goh Cheng Leong and Gillian C. Morgan. (1999). **Human and Economic Geography.** Oxford University Press.
8. Dreze, J. & Sen A. (ed.) (1996). **India's Economic Development and Social Opportunity**. Oxford University Press, New Delhi.
9. Tirtha R., Krishan, G. (1996). **Emerging India**. Rawat, Jaipur.
10. Deshpande, C.D. (1992). **India: A Regional Interpretation, ICSSR.** Northern Book Centre, New Delhi.
11. Robinson, F. (1989). **The Cambridge Encyclopedia of India, Pakistan, Bangladesh, Sri Lanka, Nepal, Bhutan & Maldives**. Cambridge University Press, London.
12. Centre for Science & Environment (1988). **State of India's, Environment**. New Delhi.
13. Kundu A. and Raza, M. (1982). **Indian Economy: The Regional Dimension**. Spectrum Publishers, New Delhi.
14. Singh R.L. (ed.) (1971). **India-A Regional Geography, National Geographical Society of India.** Varanasi.
15. Spate, O.H.K., Learmonth, A.T.A. (1967). **India and Pakistan**. Methuen, London.

SEMESTER- III

Course No: CC 11	**Course Name:** Fundamentals of GIS and GNSS				**Course Code:** SBS GEO 1 3 11 C 3104		
Batch:	**Programme:**	**Semester:**	**L**	**T**	**P**	**Credits**	**Contact Hrs per Week: 4**
2021-2023	M.Sc. Geography	III	3	1	0	4	**Total Hours: 60**
Total Evaluation Marks: 100 **CIE:** 30 Marks **TEE:** 70 Marks		**Examination Duration:** 3 hours					
		Pre-requisite of course: Fundamentals of GIS and GNSS					
Course Objective	The course of GIS will make student understand basic data concept and its practical knowledge. The course will also aim to make students use GIS techniques effectively and efficiently.						
Course Outcomes:	After completing this course, student is expected: **CO1:** To understand the historical development of GIS **CO2:** To know the sources and data models of GIS **CO3:** To learn the database management system of GIS **CO4:** To understand the concept of GNSS **CO5:** To understand the principle, segment and error sources of GPS. **CO6:** To apply the knowledge of GIS and GPS in geographical studies.						

COURSE SYLLABUS

NOTE:
Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit IV will be taught via online mode.

Unit No.	Content of Each Unit	Hours of Each Unit
I	**BACKGROUND OF GIS** **[Course Outcome (s) No.: 1 & 2]** Definitions and Component of GIS: Historical Development of GIS; Sources of GIS Data: Spatial and Non-Spatial; GIS Data Models: Raster and Vector Data Model; Coordinate Systems: Datum and Map Projection.	15
II	**DATABASE MANAGEMENT SYSTEM** **[Course Outcome (s) No.: 3]** Attribute Data in GIS: Types of Attribute Tables, Database Management System; Database Model-Relational Model; Types and Methods of Overlay; Buffering.	15

III	**CONCEPT OF GNSS** **[Course Outcome (s) No.: 4 & 5]** Concept & Historical Background of Global Navigation Satellite System (GNSS); Principle; Operation; Segments; Sources of Errors.	15
IV	**APPLICATION OF GIS AND GNSS** **[Course Outcome (s) No.: 6]** Applications of GIS in Cadastral Mapping and *g*-Governance; Applications of GNSS in Aviation and Surveying	15

Suggested Readings:

1. Kumar, D., Singh, R.B. and Kaur, R. (2019). **Spatial Information Technology for Sustainable Development Goals**. Springer Nature, Switzerland.
2. Peter, J.G., Teunissen and Oliver, M. (Eds.) (2019). **Springer Handbook of Global Navigation Satellite Systems.** Springer Nature, Switzerland.
3. Gupta, R.P. (2018). **Remote Sensing Geology** (3rd Ed). Springer Nature, Switzerland.
4. Emery, W. and Camps, A. (2017). **Introduction to Satellite Remote Sensing**. Elsevier, Amsterdam.
5. Kron, G. (2017). **Global Navigation Satellite Systems: Signal, Theory & Applications**. Scitus Academics, Wilmington.
6. Chuveico, E. (2016). **Fundamentals of Satellite Remote Sensing — An Environmental Approach (2 nd Edition)**. CRC Press, Roca Raton.
7. Scott, M. (2015). **Global Navigation Satellite Systems and Their Applications.** Springe, New York.
8. Heywood, I.; Cornelius, S. and Carver, S. (2011). **An Introduction to Geographic Information Systems** (4 th Ed). Pearson Education, New Delhi.
9. Longley, P.A.; Goodchild, M.; Maguire, D.J. and Rhind, D.W. (2010). **Geographic Information Systems and Science** (3rd Edition)**.** John Wiley, New Jersey.
10. DeMers, M. (2009). **Fundamentals of Geographic Information Systems** (4th Edition). John Wiley, New Jersey
11. Sabins, F.F. (2007). **Remote Sensing: Principles and Interpretation** (3rd Edition). Waveland Press, Long Grove.
12. Chang, K-t. (2006). **Introduction to Geographic Information Systems**. Tata McGraw Hills, New Delhi.
13. Lillesand, T.M.; Kiefer, R.W. and Chipman, J.W. (2004). **Remote Sensing and Image Interpretation** (5th Edition). John Wiley India, New Delhi.
14. Joseph, George (2003). Fundamental of Remote Sensing, University's Press (India) Pvt. Ltd., Hyderabad.
15. Burrough, P.A. and McDonnell, R.A. (1998). **Principles of Geographic Information Systems**. Oxford University Press, Oxford.

Course No: CC 12	**Course Name:** Regional Development and Planning				**Course Code:** SBS GEO 1 3 12 C 3104		
Batch: 2021-2023	**Programme:** M.Sc. Geography	**Semester:** III	**L**	**T**	**P**	**Credits**	**Contact Hrs per Week:4**
			3	1	0	4	**Total Hours: 60**
Total Evaluation Marks: 100 **CIE:** 30 Marks **TEE:** 70 Marks		**Examination Duration:** 3 hours					
		Pre-requisite of course: Concept of Region, Growth and Development, Five-Year Plans in India					
Course Objective	*Understanding the concepts and theories of regional development; identifying the regional development strategies that have been taken up in planning processes in India; and acquainting about the region and regional issues of development involved in planning in Haryana.*						
Course Outcomes:	After completing this course, student is expected: **CO1:** To understand the regional development as a field of study and its association with geography. **CO2:** To understand the concepts of regional development. **CO3:** To understand the theories of regional development. **CO4:** To have the knowledge of planning agencies and their functions in India. **CO5:** To know the regional development strategies and planning in India. **CO6:** To know about the region and regional issues of development involved in planning in Haryana.						

COURSE SYLLABUS

NOTE:
Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit I will be taught via online mode.

Unit No.	Content of Each Unit	Hours of Each Unit
I	**BASIC CONCEPTS** **[Course Outcome (s) No. :1]** Concept and Types of Regions; Concept of Regional Development; Regional Planning as a Field of Study; Approaches and Techniques of Regional Planning.	15
II	**THEORIES OF REGIONAL DEVELOPMENT** **[Course Outcome (s) No.: 2& 3]** Growth Pole and Growth Centre, Core-Periphery, Cumulative Causation Theory, Trickle Down, Backwash Effect, Rostow's Theory, Convergence Divergence Theory, Theory of Balanced Regional Development, Spatial Integration (John Friedmann).	15

III	**REGIONAL DEVELOPMENT STRATEGIES IN INDIA** **[Course Outcome (s) No. :4]** Planning Agencies: NITI Aayog, State Planning Board; Evolution of Balanced Regional Development; Sectoral Planning; Target Area and Target Group Development Plans; Multi-Level Planning in India; Inclusive and Sustainable Development Planning.	15
IV	**REGIONAL DEVELOPMENT AND PLANNING IN HARYANA** **[Course Outcome (s) No. :5 & 6]** Regions and Regionalization – Agro-Climatic, Industrial and Urban-Metropolitan Regions; Plans and Strategies: Agricultural, Industrial and Urban Development.	15

Suggested Readings:

1. Singh, R.B., Chatterjee, Soumendu, Mishra, Mukund and Lucena, Andrews jose de. (2021). **Practices in Regional Science and Sustainable Regional Development**. Springer.
2. Nath, V. and Aggarwal, S.K. (2009). **Regional Development Planning in India.** Concept Publishing Company, New Delhi.
3. Planning Commission (2009). **Haryana Development Reports**. Government of India, New Delhi.
4. Mahapatra, A.C. and Pathak, C.R. (eds.) (2003). **Economic Liberalisation and Regional Disparities in India. Special Focus on the North Eastern Region.** Star Publishing House, Shillong.
5. Pathak, C.R. (2003). **Spatial Structure and Processes of Development in India.** Regional Science Association, Kolkata.
6. Chaudhuri, J.R. (2001). A**n Introduction to Development and Regional Planning with special reference to India.** Orient Longman, Hyderabad.
7. Chandna, R.C. (2000). **Regional Planning: A Comprehensive Text.** Kalyani Publishers, New Delhi.
8. Chandna, R.C. (2000). **Pradeshik Niyojan Tatha Vikas.** Kalyani Publication
9. Dreze, J. and Sen, A. (1996). **Indian Development: Select Regional Perspectives**, Oxford University Press.
10. Misra, R.P. (ed.) (1992). **Regional Planning: Concepts, Techniques, Policies and Case Studies** (2nd edition). Concept, New Delhi.
11. Chand, M. and Puri, V.K. (1985). **Regional Planning in India**. Allied Pub., New Delhi.
12. Gore, Charles (1984). **Regions in Question: Space, Development Theory and Regional Policy**. Methuen & Co. Ltd, London
13. Bhatt, L.S. et al. (ed.) (1982). **Regional Inequalities in India**. Society for the study of Regional Disparities, New Delhi.
14. Blunder. J. et al. (1973). **Regional Analysis and Development**. Harper & Row, London.
15. Friedmann, J. and Alonso, W. (ed.) (1973). **Regional Development and Planning.** MIT Press, Cambridge Massachesetts.

Course No: CC 13	Course Name: Population and Demographic Studies				Course Code: SBS GEO 1 3 13 C 3104		
Batch: 2021-2023	**Programme:** M.Sc. Geography	**Semester:** III	**L**	**T**	**P**	**Credits**	**Contact Hrs Per Week: 4**
			3	1	0	4	**Total Hours: 60**
Total Evaluation Marks: 100 **CIE:** 30 Marks **TEE:** 70 Marks	**Examination Duration:** 3 hours **Pre-requisite of course:** Basic knowledge of demography, population and policies.						

Course Objective	To introduce the students with the fundamental concepts of population geography and demography with its core subject data base, methodologies, theories and measurement. To enable the students to understand population geography in relation to the study of the population growth, distribution and related policies. To familiarize the students about population, change and its related problems and their solutions.
Course Outcomes:	After completing this course, student is expected: **CO1: T**o know the fundamental difference between demography and population geography. **CO2: T**o understand the theories, dynamics and measures of population. **CO3:** To understand population profile at the global and India level. **CO4: To know about the** population policies and human development. **CO5:** To understand the challenging issues of ageing, disability and women. **CO6:** To develop an idea about the population in relation to physical environment, health, education and their problems.

COURSE SYLLABUS

NOTE:
There is total five questions in this question paper and all are compulsory. Each Question carries Fourteen Marks. Question no.1 has seven sub parts and students need to answer any four parts. Question number Two to Five have three sub parts and students need to answer any two-sub part of each question. Each sub part carries seven marks. Unit I will be taught via online mode.

Unit No.	Content of Each Unit	Hours of Each Unit
I	**DEMOGRAPHY AND POPULATION, DATA SOURCES** **[Course Outcome (s) No.: 1]** Concepts, Scope and Methodology of Population Geography; Demography and Population Geography, Sources of Population Data with Particular Reference to India- United Nation, Census of India, Vital Registration System, SRS, NSS, NFHS.	15
II	**THEORIES, DYNAMICS AND MEASUREMENTS** **[Course Outcome (s) No.: 2]** Theories and Dynamics of Population: Pre-Malthus, Malthusian and Modern Theories; Demographic Transition Theory and Spatial Pattern in India; Theory,	15

	Measurement, Trend and Pattern of Fertility, Mortality, Migration and Nuptiality (special reference to India).	
III	**POPULATION PLANNING AND POLICIES** **[Course Outcome (s) No.: 3 & 4]** Population Planning: Population Distribution and Characteristic; Population Policy: Developed and Developing Countries, India's Population Policy; Demographic Dividends, Concept of Human Development.	15
IV	**POPULATION AND RELATED ISSUES** **[Course Outcome (s) No.: 5 & 6]** Population Issues- Ageing, Disability and Women; Population and Resource; Digital Divide and Inequality, Population, Health and Education; Urbanisation and Urban Issues; Globalisation, Population, Environment and Sustainability.	15

Suggested Readings:

1. Hassan, M.I. (2020). **Population Geography: A Systematic Exposition**. Routledge India, London.
2. Bhende, A. and Kanitkar, T. (2019). **Principles of Population Studies**. Himalaya Publishing House, Mumbai.
3. Chandna, R.C. (2015). **Geography of Population: Concepts, Determination and Patterns**. Kalyani Publishers, New Delhi.
4. Chandna, R.C. (2015). **Jansankhya Bhogol**. Kalyani Publishers. New Delhi
5. Dyson, Tim (2011). **Population and Development: Demographic transition**. Rawat Publication, Jaipur
6. Siegel, J.S., Swanson D.A. (2004). **The Methods and Materials of Demography**. Emerald Group Publishing Limited. (First edition by Siegel, J.S. and Shryock, H., 1976)
7. Daugherty, H.G., Kenneth C.W.K. (1998). **An Introduction to Population** (Second Edition). The Guilford Press, New York, London.
8. Crook, N. (1997). **Principles of Population and Development**. Pergamon, New York.
9. Srinivasan, K. (1997): **Basic demographic techniques and applications**, Sage Publications, New Delhi
10. Clarke, J.I. (1992). **Population Geography** (Second Edition). Pergamon Press, Oxford England.
11. Premi M.K. (1991). **India's Population: Heading Towards a Billion**. B.R. Publishing, New Delhi.
12. Mitra, A. (1978). **India's Population: Aspects of Quality and Control** (Vol. I & II). Abhinav Publications, New Delhi.
13. Bose, A. et al. (1974). **Population in India's Development (1947-2000).** Vikas Publishing House, New Delhi.
14. Garnier, B.J. (1970). **Geography of Population**, Longman, London.
15. Bogue, D.J. (1969). **Principles in Demography**. John Wiley, New York.

Course No: CC 14	Course Name: Practical: GIS and GNSS				Course Code: SBS GEO 1 3 14 C 2024		
Batch: 2021-2023	**Programme:** M.Sc. Geography	**Semester:** III	**L**	**T**	**P**	**Credits**	**Contact Hrs. per Week: 6**
			2	0	4	4	**Total Hours: 90**
Total Evaluation Marks: 100 **CIE:** 30 Marks **TEE:** 70 Marks		**Examination Duration:** 3 hours					
		Pre-requisite of course: Basic knowledge of GIS software and GNSS.					
Course Objective	*To Develop an understanding of GIS and GPS technologies and to develop basic skills to create the database in GIS environment for various applications in geography.*						
Course Outcomes:	After completing this course, student is expected: **CO1:** To familiarizes with GIS software. **CO2:** To learn to create GIS database in software. **CO3:** To perform query analysis in GIS software. **CO4**: To create map in GIS software. **CO5:** To know about the potential of GIS. **CO6:** To know the application of GIS and GNSS.						

COURSE SYLLABUS

NOTE:
Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit IV and few topics from Unit II will be taught via online mode.

Unit No.	Content of Each Unit	Hours of Each Unit
I	**INTRODUCTION TO GIS SOFTWARE** **[Course Outcome (s) No.: 1]** Familiarization with ArcGIS and QGIS; Data Input; Geo-Referencing; Database Creation: Digitisation of Point, Line and Polygon/Area; Spatial Data Editing.	22
II	**MAPPING AND QUERY ANALYSIS** **[Course Outcome (s) No.: 2 & 3]** Attribute Data Joining; Query Analysis; Thematic Mapping; Map Layout.	22
III	**SPATIAL ANALYSIS IN GIS** **[Course Outcome (s) No.: 4]** Spatial Analysis: Area/Length Calculation; Buffer/Proximity Analysis; Overlay Analysis.	22
IV	**GPS MAPPING** **[Course Outcome (s) No.: 5 & 6]** Collection of Waypoints, data import; Routes and Area Mapping with GNSS; Creation of Maps.	24

Suggested Readings:

1. Kumar, D.; Singh, R.B. and Kaur, R. (2019). **Spatial Information Technology for Sustainable Development Goals**. Springer Nature, Switzerland.
2. Peter, J.G., Teunissen and Oliver, M. (Eds.) (2019). **Springer Handbook of Global Navigation Satellite Systems**. Springer Nature, Switzerland:
3. Gupta, R.P. (2018). **Remote Sensing Geology** (3rd Edition). Springer Nature, Switzerland.
4. Kron, G. (2017). **Global Navigation Satellite Systems: Signal, Theory & Applications**. Wilmington: Scitus Academics.
5. Chuveico, E. (2016). **Fundamentals of Satellite Remote Sensing — An Environmental Approach** (2nd Edition). CRC Press, Roca Raton.
6. Chaunial, D.D. (2016). **Principles of Remote Sensing and Geographical Information System** (In Hindi), Sharda Pustak Bhawan, Allahabad.
7. Scott, M. (2015). **Global Navigation Satellite Systems and Their Applications**. Springer, New York.
8. Heywood, I.; Cornelius, S. and Carver, S. (2011). **An Introduction to Geographic Information Systems** (4th Edition). Pearson Education, New Delhi.
9. Longley, P.A.; Goodchild, M.; Maguire, D.J. and Rhind, D.W. (2010). **Geographic Information Systems and Science** (3rd Edition). John Wiley, New Jersey:
10. DeMers, M. (2009). **Fundamentals of Geographic Information Systems** (4th Edition). John Wiley, New Jersey.
11. Sabins, F.F. (2007). **Remote Sensing: Principles and Interpretation** (3rd Edition). Waveland Press, Long Grove.
12. Chang, K-t. (2006). **Introduction to Geographic Information Systems**. Tata McGraw Hills, New Delhi.
13. Lillesand, T.M.; Kiefer, R.W. and Chipman, J.W. (2004). **Remote Sensing and Image Interpretation** (5th Edition). John Wiley India, New Delhi.
14. Joseph, George (2003). **Fundamental of Remote Sensing**, University's Press (India) Pvt. Ltd., Hyderabad.
15. Burrough, P.A. and McDonnell, R.A. (1998). **Principles of Geographic Information Systems**. Oxford University Press, Oxford.

Course No: DCEC 4	Course Name: Field Work: Natural Hazards and Disaster Based Project Work				Course Code: SBS GEO 1 3 04 DCEC 3014		
Batch:	**Programme:**	**Semester:**	**L**	**T**	**P**	**Credits**	**Contact Hrs per Week: 5**
2021-2023	M.Sc. Geography	III	3	0	2	4	**Total Hours: 75**
Total Evaluation Marks: 100 **CIE:** 30 Marks **TEE:** 70 Marks	**Examination Duration:** 3 hours **Pre-requisite of course:** Basic Knowledge of Hazards and Disaster; Team work skill; Critical understanding of the surroundings.						

Course Objective	*To develop basic knowledge of disaster and hazards. Develop an approach to face such havoc situations. Thorough understanding of the causes, impacts distribution and mapping of various hazards in India. Comprehensive understanding of the management strategies to face Disaster. Develop the skill to understand the risk and vulnerabilities by visiting the field and report writing.*
Course Outcomes:	After completing this course, student is expected: **CO 1:** To understand the basic knowledge of natural hazards and disasters. **CO 2:** To understand the risk and vulnerability to disaster. **CO 3:** To understand the various hazards and their causes, impacts, distribution and mapping in India. **CO 4:** To learn the comprehensive disaster preparedness plan to reduce the adverse impacts of disasters and hazards. **CO 5:** To develop a team work approach and ethical thinking to understand the risks, vulnerabilities and mitigation during field excursion. **CO 6:** To learn report writing skills.

COURSE SYLLABUS

NOTE:
Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit IV will be taught via online mode.

Unit No.	Content of Each Unit	Hours of Each Unit
I	**CONCEPTS AND DEFINITIONS:** **[Course Outcome (s) No.: 1 and 2]** Definition and Concepts of Hazards and Disaster; Understanding of Risks and Vulnerabilities; Classification of Disasters.	15
II	**DISASTERS IN INDIA:** **[Course Outcome (s) No.: 3]** Causes, Impacts, Distribution and Mapping of Disasters in India: Floods, Droughts, Cyclone, Landslide, Earthquake, Tsunami and Human Induced Disasters: Fire Hazards, Chemical, Industrial accidents.	15

III	**RESPONSES AND MITIGATION:** **[Course Outcome (s) No.: 4]** Mitigation and Preparedness; NDMA and NIDM; Indigenous Knowledge and Community based Disaster Management; Do's and Don'ts during disaster.	15
IV	**FIELD EXCURSION AND PROJECT REPORT WRITING:** **[Course Outcome (s) No.: 5,6]** The Project Report will be based on any one of the following: 1. Flood 2. Drought 3. Cyclone 4. Earthquake 5. Landslides 6. Human Induced Disasters: Fire Hazards, Chemical, Industrial accidents	30

Suggested Readings:

16. Kapur, A. (2010) **Vulnerable India: A Geographical Study of Disasters**, Sage Publication, New Delhi.
17. Modh, S. (2010) **Managing Natural Disaster: Hydrological, Marine and Geological Disasters**, Macmillan, Delhi.
18. Singh Jagbir (2007) "**Disaster Management Future Challenges and Oppurtunities"**, 2007. PublisherI.K. International Pvt. Ltd. S-25, Green Park Extension, Uphaar Cinema Market, New Delhi, India (www.ikbooks.com).
19. Srivastava, H. N. (2007). **Coastal Hazards, (Cyclone, Tsunami, and other Disasters).** National Book Trust of India, New Delhi.
20. Singh, R. B. (ed.), (2006) **Natural Hazards and Disaster Management: Vulnerability and Mitigation**, Rawat Publications, New Delhi.
21. Singh, R.B. (2005) **Risk Assessment and Vulnerability Analysis**, IGNOU, New Delhi. Chapter 1, 2 and 3
22. Stoltman, J.P. et al. (2004) **International Perspectives on Natural Disasters,** Kluwer Academic Publications. Dordrecht.
23. Sinha, A. (2001). **Disaster Management: Lessons Drawn and Strategies for Future,** New United Press, New Delhi.
24. Government of India. (1997) **Vulnerability Atlas of India**. New Delhi, Building Materials & Technology Promotion Council, Ministry of Urban Development, Government of India.
25. Hemmady, A. K.R. (1996). **Earthquake.** National Book Trust India, New Delhi.
26. Biswas, M.R. and Biswas, A.K. (1980). **Desertification Case Studies,** Pergamon, Oxford.
27. Sain, Kanwar. (1979). **The Flood Problem India.** Birla Institute of Scientific Research, New Delhi.
28. Zaruba, Q. and Menci, V. (1969). **Landslides and their Control.** Elsevier, Amsterdam.
29. Bhatia, B.M. (1967). **Famines in India,** Asia Publishing House, Delhi.
30. Mason, B.J. (1957). **The Physics of Clouds.** Clarendon Press, Oxford.

Course No: DCEC 5	Course Name: Research Methodology, Field Work and Report Writing (Physical Aspect)				Course Code: SBS GEO 1 3 05 DCEC 3104		
Batch:	**Programme:**	**Semester:**	**L**	**T**	**P**	**Credits**	**Contact Hrs Per Week: 5**
2021-2023	M.Sc. Geography	III	3	0	2	4	**Total Hours: 75**
Total Evaluation Marks: 100 **CIE:** 30 Marks **TEE:** 70 Marks	**Examination Duration:** 3 hours **Pre-requisite of course:** Basic knowledge of computer, data and data analysis. Basic knowledge of field instruments.						
Course Objective	To understand the basic concept of geomorphology-form, material and process and their identification at field. To understand the scientific methods which open the way to understand the evolution of different feature of the field. To understand the process and relation of climatic and biological factors to the field features. To develop the skill in writing a research report.						
Course Outcomes:	After completing this course, student is expected: **CO1:** To understand the methods of geomorphological investigations. **CO2:** To know about the identification and interpretation of physical and chemical properties of materials. **CO3:** To understand practically the geomorphological processes. **CO4:** To learn the skills to identify landform. **CO5:** To understand the applications of Geomorphic, climatic and bio-geographical processes and their activities in relation to society. **CO6:** To learn report writing skills.						

COURSE SYLLABUS

NOTE:
Eight questions will be set, two from each of the unit. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Field report will be of 10 marks and Term End examination viva-voce will be of 10 marks. Unit I will be taught via online mode.

Unit No.	Content of Each Unit	Hours of Each Unit
I	**METHODS OF INVESTIGATION OF CLIMATE GENETIC LANDSCAPE** **[Course Outcome (s) No.: 1]** Methods of Geomorphology investigation; Models and Process determination in time and space; Form: Morphometry- Introduction, General problem, General and Specific Geomorphometry, Geochronology, Palaeoclimatic reconstruction	20
II	**IDENTIFICATION AND INTERPRETATION OF MATERIAL AND PROCESS** **[Course Outcome (s) No.: 2 & 3]**	20

	Identification and Interpretation of Material Property: Physical and Chemical; Identification and Interpretation of Process: Denudation, River, Glacial, Aeolian, Coastal, Slope, Biological and Neo tectonic.	
III	**RESEARCH METHODOLOGY AND INTERPRETATION OF PALAEOCLIMATIC LANDSCAPE** **[Course Outcome (s) No.: 4]** Radiocarbon and Uranium dating methods, Application of Isotopes, Tree-ring dating, Lichenometry, Peat and Lake sediment (stratigraphy)	15
IV	**SPATIO-TEMPORAL INTERACTION AMONG LANDSCAPE, CLIMATE AND BIOSPHERIC PROCESSES** **[Course Outcome (s) No.: 5 & 6]** Interpretation of interaction of wind, humidity, clouds and biodiversity; Observation of the relationship of various landforms, flora and fauna with land-use, settlement structure and life style of people; Prepare a field survey report.	20

Suggested Readings:

1. Kothari, C.R. (2019). **Research Methodology, Methods and Techniques**. New Age international publishers, New Delhi
2. Qian, Weihong (**2017**). **Temporal Climatology and Anomalous Weather Analysis**. Springer Singapore, Singapore
3. Gomez, B. and Jones, J. P. III (2010). **Research Methods in Geography: A Critical Introduction**. John Wiley, New York.
4. Strahler, A.H. and Strahler, A.N. (2006). **Modern Physical Geography**. Fourth Edition, Willey-India, New Delhi.
5. Thornbury, W.D. (2005). **Principles of Geomorphology**. John Wiley and Sons, New York.
6. Goudie, A. (ed.) (2004). **Encyclopedia of Geomorphology**. Routledge, London.
7. Morris, D., Freeland, J., Hinchliff, S., Smith, S. (ed.) (2003). **Changing Environments**. Pd. John Wiley and Sons Ltd., The Open University, U.K.
8. Limb, M. (2001). **Qualitative Methodologies for Geographers: Issue and Debates**. Edward Arnold, London.
9. Thompson, R.D. and Perry, A. (ed.) (1997). **Applied Climatology: Principles and Practice**. Routledge, London.
10. Blaxter, L., Hughes, C. and Tight, M. (1996). **How to Research**. Open University Press, Buckingham.
11. Stoddart, D.R. (ed.) (1996). ***Process and Form in Geomorphology***. Routledge, New York.
12. Critchfield, H.J. (1987). **Climatology**. Prentice Hall, New Delhi.
13. Griffith, J.F. and Driscell, D.M. (1982). **Survey of Climatology**. Charles Merril, New York.
14. Chorley, R.J. (1972). ***Spatial Analysis in Geomorphology***. Methuen, London.
15. King, C.A.M. (1966). **Techniques in Geomorphology**. Edward Arnold, London.

Course No: DCEC 6	Course Name: Environmental Geography				Course Code: SBS GEO 1 3 06 DCEC 3104		
Batch:	**Programme:**	**Semester:**	**L**	**T**	**P**	**Credits**	**Contact Hrs per Week: 4**
2021-2023	M.Sc. Geography	III	3	1	0	4	**Total Hours: 60**
Total Evaluation Marks: 100 **CIE:** 30 Marks **TEE:** 70 Marks	**Examination Duration:** 3 hours **Pre-requisite of course:** Basic knowledge about Environment, Man-Environment relationship and Environment Degradation.						
Course Objective	The main objectives of the course are to educate students about our climate and to understand its connections to man and other species that vary in various biomes. Learn about ecosystems and how energy is transferred, as well as the concept of productivity and stability of ecosystems. To understand various environmental problems and their management strategies.						
Course Outcomes:	After completing this course, student is expected: **CO 1:** To comprehend the fundamental concepts, structure and components of the environment. **CO 2:** To understand the value of ecosystems in ensuring the sustainability of life. **CO 3:** To establish the man-environment relationship. **CO 4:** To know about the environmental degradation and various environmental problems. **CO 5:** To know the role of important organizations to mitigate environmental issue. **CO 6:** To draw attention to the environmental issues and follow appropriate majors for environmental protection.						

COURSE SYLLABUS

NOTE:
Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit IV will be taught via online mode.

Unit No.	Content of Each Unit	Hours of Each Unit
I	**BASICS OF ENVIRONMENTAL GEOGRAPHY:** **[Course Outcome (s) No.: 1,3]** Meaning, Scope, Approaches and Methods of Environmental Geography; Composition and Types of Environments; Human-Environment Relationships; Environment and Ecology: Meaning, Structure and Type of Environment; Ecology - Meaning, Scope and Concepts.	15
II	**ECOSYSTEM AND BIOGEOCHEMICAL CYCLE:** **[Course Outcome (s) No.: 2]** Ecosystem: Meaning and Concepts of Ecosystem; Trophic Levels; Food Chains and Food Webs; Energy Flow in the Ecosystem; Circulation of Matter in the Ecosystem and Biogeochemical Cycle; Ecosystem	15

	Productivity; Ecosystem Stability.	
III	**ENVIRONMENTAL DEGRADATION AND PROBLEMS:** **[Course Outcome (s) No.: 4]** Environmental Degradation; Extreme Weather Events, Hazards and Disasters; Environmental Pollution (Air, Water, Solid Waste, Soil and Noise Pollution); Environmental Problems: Global Warming, Ozone Depletion, Urban Heat Island, Land Degradation, Reduction in Biodiversity.	15
IV	**ENVIRONMEMTAL MANAGEMENT AND MITIGATION:** **[Course Outcome (s) No.: 5 & 6]** Environmental Management: Concept and Approaches; Management of Soil, Forest and mineral Resources; Conservation of Natural Resources; Environmental Policies and Organizations	15

Suggested Readings:

1. Kumar, Dilip, Singh, R.B. and Kaur, Ranjeet (2019). **Spatial Information Technology for Sustainable Development Goals**, Springer.
2. Gautam, A. (2007). **Environmental Geography**. Sharda Pustak Bhawan, Allahabad.
3. Singh, S. (2007). **Paryavaran Bhugol**. Prayag Pustak Bhawan, Allahabad.
4. Singh, S. (2006). **Environmental Geography**. Prayag Pustak Bhawan, Allahabad.
5. Rajagopalan, R. (2005). **Environmental Studies: From Crisis to Cure**. Oxford University Press, New Delhi.
6. Anjuneyulu, Y. (2004). **Introduction to Environmental Science**. B. S. Publications, Hyderabad.
7. Blaikie, P., Cannon, T. and Davis, I. (eds.) (2004). **At Risk: Natural Hazards, Peoples Vulnerability and Disasters.** Routledge, London
8. Saxena, K.K. (2004). **Environmental Studies**. University Book House Private Ltd., Jaipur
9. Athavale, R. N. (2003). **Water Harvesting and Sustainable Supply in India**. Rawat Publications, Jaipur.
10. Mathur, H. S. (2003). **Essentials of Biogeography**. Pointer Publication, Jaipur.
11. Singh, D.N., Singh, J. and Raju, K.N.P. (eds.) (2003). **Water Crisis and Sustainable Management**, Tara Book Agency, Varanasi
12. Anjuneyulu, Y. (2002). **Environmental Impact Assessment Methodologies**. B. S. Publications, Hyderabad.
13. Singh, J. (2001). **Paryavaran Evam Samvikas**. Gyanodaya Prakashan, Gorakhpur.
14. Saxena, H. M. (2000). **Environmental Management**. Rawat Publications, Jaipur and New Delhi.
15. Singh, R. B. (ed.) (1995). **Studies in Environment and Development**. Rakesh Prakashan, Varanasi.

SEMESTER- IV

Course No: DCEC 7	Course Name: Geography of India						Course Code: SBS GEO 1 4 07 DCEC 3104
Batch:	**Programme:**	**Semester:**	**L**	**T**	**P**	**Credits**	**Contact Hrs per Week: 4**
2021-2023	M.Sc. Geography	IV	3	1	0	4	**Total Hours: 60**
Total Evaluation Marks: 100 **CIE:** 30 Marks **TEE:** 70 Marks	**Examination Duration:** 3 hours **Pre-requisite of course:** Basic knowledge of Indian physiography, culture, demography, agriculture and transport.						
Course Objective	This course on the Geography of India assumes that the students are familiar with the basic landforms, climate, soil, vegetation and population characteristics of India. It is a course designed to enable students to broaden and deepen their understanding of India.						
Course Outcomes:	After completing this course, student is expected: **CO1:** To understand the basic concept of physiography of India. **CO2:** To know about natural vegetation and soil characteristics of India. **CO3:** To understand features of Indian agriculture. **CO4:** To learn about the new industrial policies and industrial regions. **CO5:** To know about demographic attributes and population policies. **CO6:** To learn about the development of transport network and foreign trade.						

COURSE SYLLABUS

NOTE:
Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit IV and few topics from Unit III will be taught via online mode.

Unit No.	Content of Each Unit	Hours of Each Unit
I	**PHYSICAL SETUP** **[Course Outcome (s) No.: 1 & 2]** Physiography; Drainage Systems; Climate; Natural Vegetation and Soils.	15
II	**AGRICULTURE AND INDUSTRY** **[Course Outcome (s) No.: 3 & 4]** Agriculture: Salient Features, Problems and Solutions of Indian Agriculture; Green Revolution: Components, Impact, Problems and Ecological Implications of Green Revolution; Industries: Factors Influencing Location of Industries, New Industrial Policy and Industrial Regions.	15

III	**DEMOGRAPHY** **[Course Outcome (s) No.: 5]** Population Growth and Distribution; Demographic Attributes: Sex-Ratio, Literacy, Workforce and Migration; Population Policy.	15
IV	**TRANSPORT AND TRADE** **[Course Outcome (s) No.: 6]** Development and Patterns of Transport Networks: Railways, Roadways and Waterways; Indian and Foreign Trade with Special Reference to ASEAN and SAARC Countries.	15

Suggested Readings:

1. Tiwari, R.C. (2010). **Geography of India**. Prayag Pustak Bhawan, Allahabad.
2. Bose Ashish. (2010). **India's Quest for Population Stabilisation,** National Book Trust, New Delhi.
3. Gautam, A. (2009). **Advanced Geography of India (Second Edition)**. Sharada Pustak Bhawan, Allahabad.
4. Husain, M. (2008). **Geography of India**. Tata McGraw-Hill, New Delhi.
5. Bhalla, G. S. (2007). **Indian Agriculture Since Independence,** National Book Trust, New Delhi
6. Khullar, D.R. (2006**). India: A Comprehensive Geography**. Kalyani Pub., New Delhi.
7. Goh Cheng Leong and Gillian C. Morgan. (1999). **Human and Economic Geography.** Oxford University Press.
8. Dreze, J. & Sen A. (ed.) (1996). **India's Economic Development and Social Opportunity**. Oxford University Press, New Delhi.
9. Tirtha R., Krishan, G. (1996). **Emerging India**. Rawat, Jaipur.
10. Deshpande, C.D. (1992). **India: A Regional Interpretation, ICSSR.** Northern Book Centre, New Delhi.
11. Robinson, F. (1989). **The Cambridge Encyclopedia of India, Pakistan, Bangladesh, Sri Lanka, Nepal, Bhutan & Maldives**. Cambridge University Press, London.
12. Centre for Science & Environment (1988). **State of India's, Environment**. New Delhi.
13. Kundu A. and Raza, M. (1982). **Indian Economy: The Regional Dimension**. Spectrum Publishers, New Delhi.
14. Singh R.L. (ed.) (1971). **India-A Regional Geography, National Geographical Society of India.** Varanasi.
15. Spate, O.H.K., Learmonth, A.T.A. (1967). **India and Pakistan**. Methuen, London.

Course No: DCEC 8	Course Name: Agricultural Geography				Course Code: SBS GEO 1 4 08 DCEC 3104		
Batch:	**Programme:**	**Semester:**	**L**	**T**	**P**	**Credits**	**Contact Hrs per Week: 4**
2021-2023	M.Sc. Geography	IV	3	1	0	4	**Total Hours: 60**
Total Evaluation Marks: 100 **CIE:** 30 Marks **TEE:** 70 Marks	**Examination Duration:** 3 hours **Pre-requisite of course:** Basic knowledge of agriculture, problems facing by agriculture and policies.						
Course Objective	This course will introduce students to the nature and origins of agriculture, as well as the different regions in which it is practiced. Knowledge about the spatial distribution of crops, livestock and other agricultural activities. Understanding how we examines the environmental consequences, as well as new perspectives, methods and interventions for sustainable agricultural production in the long term.						
Course Outcomes:	After completing this course, student is expected: **CO 1:** To understand about the development of agricultural geography. **CO 2:** To highlight various agricultural determinant. **CO 3:**To analyse the development and productivity of agriculture and its impacts on different sectors. **CO 4:** To understand the appropriate place to locate agriculture to avail optimum production. **CO 5:** To know about the recent trends in agriculture. **CO 6:** To know about the problems and policies of Indian agriculture.						

COURSE SYLLABUS

NOTE:
Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit IV will be taught via online mode.

Unit No.	Content of Each Unit	Hours of Each Unit
I	**BASIC CONCEPTS:** **[Course Outcome (s) No.: 1]** Meaning, Scope and Development of Agricultural Geography; Approaches of Study: Commodity, Systematic, Regional and Systems; Origin and Dispersal of Agriculture: Major Agricultural Hearths; Diffusion of Agricultural Innovations.	15
II	**DETERMINANTS OF AGRICULTURE:** **[Course Outcome (s) No.: 2 & 3]** Determinants of Agriculture: Physical, Economic, Political, Technological, Socio-cultural; Land Reforms; Land Use Survey; Agricultural Concepts and their Measurements: Cropping Pattern, Crop Concentration, Cropping Intensity, Degree of	15

	Commercialisation, Diversification and Specialization, Efficiency and Productivity; Crop Combination Regions.	
III	**THEORIES OF AGRICULTURAL LOCATION AND DELINEATION:** **[Course Outcome (s) No.: 4]** Theories of Agricultural Location: Von Thunen's Model and its Modification – Sinclair's Approach; Concept of Agricultural Region: Whittlesey's Classification of Agricultural Regions; Agricultural Typology; Agro-Climatic Regions of India; Land use and Land Capability Classification.	15
IV	**POLICIES & RECENT TRENDS OF AGRICULTURE** **[Course Outcome (s) No.: 5 & 6]** Land Use and Shifting Cropping Pattern; New Trends in Indian Agriculture: Green Revolution, White Revolution; Food Deficit and Food Surplus Regions; Nutritional Index; Problems & Policies of Indian agriculture; Agriculture and Environmental Degradation.	15

Suggested Readings:

1. Mohammad, N. and Rai, S.C. (2014). **Agricultural Diversification and Food Security in the Mountain Ecosystem**, Concept Publishing Company, New Delhi.
2. Ferroni, Marco, 2013. **Transforming Indian agriculture- India 2040: Productivity, Markets and Institutions**, Sage Publications, New Delhi.
3. Cakmak, I. and Welch, R. M. (eds), 2009. **Impacts of agriculture on Human Health and Nutrition**, EOLSS Publications, UK.
4. Wright J. 2009. **Sustainable agriculture and food security in an era of oil scarcity**, Earthscan, London.
5. White P. 2007. **Emergence of agriculture: A global view, Routledge**, London.
6. Shafi, M. 2006. **Agricultural Geography**. Pearson Education, Delhi.
7. Singh, R. B. 2000. **Environmental Consequences of Agricultural Development: A Case Study from the Green Revolution state of Haryana, India**, Agriculture, Ecosystems and Environment 82, 97–103.
8. Burch, D., Gross, J. and Lawrence, G. (eds.), 1999. **Restructuring Global and Regional Agriculture**, Ashgate Publishing Company, Burlington.
9. Roling, N.G., and Wageruters, M.A.E. (eds.) 1998. **Facilitating Sustainable Agriculture**, Cambridge University Press, Cambridge.
10. Young, A. 1998. **Landuse Resources: Now and for the Future**, Cambridge University Press, Cambridge.
11. Singh, J., and Dhillon, S.S. 1994. **Agricultural Geography**, Tata McGraw Hill, New Delhi.
12. Tiwari, R. and Singh, B. 1994. **Krishi Bhoogol**, Prayag Pustak Bhandar, Allahabad. (Hindi).
13. Bryant, C.R., Johnston, T.R. 1992. **Agriculture in the City Countryside**, Belhaven Press, London.
14. Mohammad, N. 1992. **New Dimension in Agriculture Geography**, Vol. I to VIII, Concept Publishing Company, New Delhi.
15. Grigg, D.B. 1984. **Introduction to Agricultural Geography**, Hutchinson, London.

Course No: DCEC 9	Course Name: Geography of Central Places				Course Code: SBS GEO 1 4 09 DCEC 3104		
Batch:	**Programme:**	**Semester:**	**L**	**T**	**P**	**Credits**	**Contact Hrs Per Week: 4**
2021-2023	M.Sc. Geography	IV	3	1	0	4	**Total Hours: 60**
Total Evaluation Marks: 100 **CIE:** 30 Marks **TEE:** 70 Marks	**Examination Duration:** 3 hours **Pre-requisite of course:** Basic knowledge of central place theory and other location theories.						
Course Objective	To understand the genesis and geographical foundation of central places. To understand the nature of central place function and its pattern, hierarchy. To know the measurement of centrality and hierarchy central places along with its relation to region, periphery and other location and regional development theories to central places.						
Course Outcomes:	After completing this course, student is expected: **CO1:** To understand the genesis and geographical foundation of central places. **CO2:** To know about the behavioural and normative theory of settlement and nature of central function of a place. **CO3:** To understand the measurement of centrality and hierarchy. **CO4:** To learn the inter-linkages of central place and region. **CO5:** To understand the relation between central place theory and other locational theories. **CO6:** To develop the skills to use central place theory in development and planning for future.						

COURSE SYLLABUS

NOTE:
There is total five questions in this question paper and all are compulsory. Each Question carries Fourteen Marks. Question no.1 has seven sub parts and students need to answer any four parts. Question number Two to Five have three sub parts and students need to answer any two-sub part of each question. Each sub part carries seven marks. Unit I will be taught via online mode.

Unit No.	Content of Each Unit	Hours of Each Unit
I	**GENESIS AND FOUNDATION OF CENTRAL PLACES** **[Course Outcome (s) No.: 1]** Genesis: Concept of Central Places, attributes; and principles of central places, process of formation of central places. Geographical foundations of Central Places: Locational arrangement of nodes, spacing, dispersion and localisation, clustering and competition, Economies of agglomeration.	15
II	**THEORY AND FUNCTIONS** **[Course Outcome (s) No.: 2]** Behavioural and Normative Settlement theory; Nature	15

	of central functions, locational pattern of functions within a central place region; hierarchy of nodal centers based on functions and size.	
III	**CENTRALITY, HIERARCHY AND REGIONS** **[Course Outcome (s) No.: 3 & 4]** Methods of measurement of centrality and hierarchy (like central score, central tendency, population threshold and graph theory); hierarchy of settlements based on hierarchy of functions; Central Place and Region: Factors affecting delimitation of central place region (like commutation, communication, flow of goods and services etc.), forms of interaction and analysis of gradient; Centre-periphery contrast.	15
IV	**LOCATIONAL THEORIES AND DEVELOPMENT PERSPECTIVES** **[Course Outcome (s) No.: 5 & 6]** Central Place theory in relation to other locational theories and regional development and Planning; Central Place system in India; Case studies of metropolitan city; Rural service Centers and Market; Centrality, Perception and Future of Central Place.	15

Suggested Readings:

1. Sengar, B., Hovell, L., McMillin (2020). **Space and Places in Western India**. Routledge
2. Bansal, S.C. (2018). **Nagariya Bhugol.** Meenakshi Prakashan. Meerut
3. Bird, J. (2013). **Centrality and Cities**. Routledge, Oxford
4. Hough, M. (2004). **City Form and Natural Process**. Routledge, Oxford
5. Mishra, R.P. and K. Mishra (1998). **Million Cities of India; Growth Dynamics, Internal Structure, Quality of Life and Planning Perspectives**. Sustainable Development Foundation, India Vol I and II
6. Lefebvre, H. (1996). **Writings on Cities**. translated and edited by Eleonore Kofman and Elizabeth Lebas, Blackwell Publishers, U.K
7. Ramachandran, R. (1992). **Urbanisation and Urban Systems in India**. Oxford University Press, New Delhi
8. Dogan, M. and John D. K (ed.) (1988). **The Metropolis Era**. Vol 2 Mega Cities, Sage Publications, New Delhi
9. King, L. J. (1986). **Central Place Theory**. Saga Publications, New Delhi
10. Prakasa, Rao, V.L.S. (1983). **Urbanisation in India; Spatial Dimensions**. Concept Publishing Co., New Delhi
11. Mitra, A., Mukherjee S and Bose R. (1980). **Indian Cities**. Abhinav Publication's, New Delhi
12. Haggett, P, Andrew D. et.al. (eds) (1979). **Locational Models.** Arnold Heinemann
13. Nangia, S. (1976): **Delhi Metropolitan Region**, K.B. Publications, New Delhi
14. Baskin, C.W, (Translator) (1966). **Central Places in Southern Germany**. Prentice-Hall Inc. Englewood Cliffs New Jersey. (Originally written by C.W. Christaller in German with title Die Zentralen Orte Suddevtsch Land in 1933).
15. Qazi, Ahmad (1965). **Indian Cities, Characteristics and Correlates**. University of Chicago, U.S.A.

Course No: DCEC 10	Course Name: Political Geography				Course Code: SBS GEO 1 4 10 DCEC 3104		
Batch:	**Programme:**	**Semester:**	**L**	**T**	**P**	**Credits**	**Contact Hrs per Week: 4**
2021-2023	M.Sc. Geography	IV					
			3	1	0	4	**Total Hours: 60**
Total Evaluation Marks: 100 **CIE:** 30 Marks **TEE:** 70 Marks		**Examination Duration:** 3 hours					
		Pre-requisite of course: Basic knowledge of geopolitics, globalisation, nation, nation-state and political parties of India.					
Course Objective	*Understand the key concepts in contemporary political geography, such as the state, nation, nation-state, and nation-building. They also understand geopolitics and geostrategic views from a global perspective, as well as the current challenges of politics at various scales.*						
Course Outcomes:	After completing this course, student is expected: **CO1:** To understand the nature and scope of political geography, forms of governance and globalisation. **CO2:** To know the key concepts of state, nation, nation-state and nation building. **CO3:** To understand the challenges and changing nature of modern state and politics of differences. **CO4:** To know the concept of geopolitics and global geostrategic views. **CO5:** To understand the India as a regional power in South Asia. **CO6:** To learn the linkages of space and politics at local level.						

COURSE SYLLABUS

NOTE:
Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit IV and few topics from Unit II will be taught via online mode.

Unit No.	Content of Each Unit	Hours of Each Unit
I	**SCOPE AND DEVELOPMENT** **[Course Outcome (s) No.: 1]** Nature, Scope and Development of Political Geography; Perspective: World Systems, Place, and Globalisation; Forms of Governance: Unitary and Federal	15
II	**CONCEPT OF NATION, STATE AND NATION BUILDING** **[Course Outcome (s) No.: 2 & 3]** Frontiers and Boundaries: Concepts and Classification; Concepts of Nation, State, Nation-State and Nation Building; The politics of differences: Language, Religion, Ethnicity and Culture	15

III	**GEOPOLITICS AND GLOBAL STRATEGIC SCENARIOS** **[Course Outcome (s) No.: 4 & 5]** Rise and Demise of German Geopolitics; Global Strategic Views of Mackinder and Spykman; Regional organisation of Cooperation: SAARC, ASEAN, OPEC & EU	15
IV	**REGIONAL AND LOCAL LEVEL PERSPECTIVES IN INDIA** **[Course Outcome (s) No.: 6]** India as a regional power in South Asia; Geopolitical Significance of Indian Ocean; National and Regional political parties in India; Inter-state water disputes.	15

Suggested Readings:

1. S, Adhikari and R. Adhikari. (2020). **Rajnitik Bhugol.** Sharda Pustak Bhawan, Uttar Pradesh
2. Flint, Collin and Taylor, P.J. (2011). **Political Geography**. Pearson, New Delhi.
3. Gallaher, Carolyn et.al. (2009). **Key Concepts in Political Geography**. Sage, New Delhi.
4. Cox, Kevin R. (2008). **The Sage Handbook of Political Geograph**. Sage, New Delhi.
5. Dodds, Klaus (2007). **Geopolitics**. Oxford University Press, New York.
6. Blacksell, Mark (2003). **Political Geography**. Routledge, London.
7. Dicken, Peter (2003). **Global Shift**. Sage, New Delhi.
8. Jones, Martin, Rhys Jones and Michael Woods (2003). **An Introduction to Political Geography**. Routledge, London.
9. Khor, Martin (2001). **Rethinking Globalization**. Zed Books, London.
10. Dikshit, R.D. (2000). **Political Geography: The Spatiality of Politics**. Tata McGraw Hill, New Delhi.
11. Nash, Kate (2000). **Readings in Contemporary Political Sociology**. Blackwell, Oxford.
12. Agnew, J.A. (1998). **Geopolitics**. Routledge, London.
13. Painter, J. (1995). **Politics, Geography and Political Geography**. Arnold, London.
14. Agnew, J.A. (1987). **Place and Politics**. Allen and Unwin, Boston.
15. Short, J.R. (1982). **An Introduction to Political Geography**. Routledge and Kegan Paul, London.

Course No: DCEC 11	**Course Name:** Rural Geography				**Course Code:** SBS GEO 1 4 11 DCEC 3104		
Batch: 2021-2023	**Programme:** M.Sc. Geography	**Semester:** IV	**L**	**T**	**P**	**Credits**	**Contact Hrs per Week:4**
			3	1	0	4	**Total Hours: 60**
Total Evaluation Marks: 100 **CIE:** 30 Marks **TEE:** 70 Marks		**Examination Duration:** 3 hours					
		Pre-requisite of course: Rural Settlement, Rural factors of underdevelopment					

Course Objective	*Introducing the idea of rural development, historical perspective and philosophy of rural development; familiarizing about the rural society, social morphology, rural development plans and strategies in India; and learning about the rural development and sustainable environment in India.*
Course Outcomes:	After completing this course, student is expected: **CO1:** To understand the concepts, historical perspective and philosophy of rural development. **CO2:** To learn the aspects of rural society in India. **CO3:** To understand social morphology of rural India. **CO4:** To know the rural development plans and strategies in India. **CO5:** To review the different components of rural development. **CO6:**To develop an idea about rural development and sustainable environment in India.

COURSE SYLLABUS

NOTE:
Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit I will be taught via online mode.

Unit No.	**Content of Each Unit**	**Hours of Each Unit**
I	**CONCEPTS** **[Course Outcome (s) No. :1]** Idea of Rural Development; Historical Perspective of Gram Swarajya: Pre-Independence and Post-Independence; Gandhian Philosophy of Rural Development.	15
II	**RURAL SOCIETY AND SOCIAL MORPHOLOGY** **[Course Outcome (s) No.: 2& 3]** Aspects of Rural Society, Culture and Practices; Social Morphology of Rural India; Territoriality of Rural Society; Traditional Wisdom and Rural Development.	15

III	**RURAL DEVELOPMENT PLAN AND STRATEGIES IN INDIA** **[Course Outcome (s) No. :4]** Community Development, Target Area Development, Target Group Development, Integrated Development, Panchayati Raj Institutions and Bottom-Up Approach, Watershed Development Approach; Local Resource Based Development Strategies.	15
IV	**RURAL DEVELOPMENT AND SUSTAINABLE ENVIRONMENT** **[Course Outcome (s) No. :5 & 6]** Rural Health, Education, Employment, Infrastructure and Amenities; Food Security; SDGs; Well-Being and Happiness; Sustainable Environment.	15

Suggested Readings:

1. Anand, S. (2013). **Dynamics of Rural Development**. Research India Press, Delhi.
2. Singh, K. (2011). **Gramin Vikas**. Rawat Publications.
3. Nath, V. (2010). **Rural Development and Planning in India**. Concept, New Delhi
4. Madan, G.R. (2010). **Indian Rural Problems**. Radha Publications, New Delhi.
5. Singh, K. (2007). **Rural Development- Principles, Policies and Management**. Sage, New Delhi.
6. Krishnamurthy, J. (2000). **Rural Development - Problems and Prospects**. Rawat Publs, Jaipur.
7. Ramachandran, H. and Guimaraes, J.P.C. (1991). **Integrated Rural Development in Asia–Leaning from Recent Experience**. Concept Publishing, New Delhi, India
8. Desai, V. (1986). **Rural Development** (Vol-1-6). Himalayan Publishing, House New Delhi.
9. Rao R.N (1986). **Strategy for Integrated Rural Development**. B.R Publication, New Delhi.
10. UNAPDI. (1986). **Local Level Planning and Rural Development: Alternative Strategies**. Concept Publs. Co, New Delhi. (United Nations Asian & Pacific Development Institute, Bangkok)
11. Singh, R.B. (1985). **Geography of Rural Development**. Inter India, New Delhi.
12. Misra, R. P. (ed.) (1985). **Rural Development: Capitalist and Socialist Paths** (Vol. 1). Concept, New Delhi.
13. Hugh D. Clout (1972). **Rural Geography- An Introduction Survey**. Pergamon Press, New York.
14. Srinivas. M.N (1968). **Village India**. Asia Publication House, Bombay.
15. Sinha, R.N.P., **Geography and Rural Development**. Manohar Publishers and Distributors, New Delhi.

Course No: DCEC 12	Course Name: Natural Hazards and Disaster Management				Course Code: SBS GEO 1 4 12 DCEC 3104		
Batch:	**Programme:**	**Semester:**	**L**	**T**	**P**	**Credits**	**Contact Hrs per Week: 4**
2021-2023	M.Sc. Geography	IV	3	1	0	4	**Total Hours: 60**
Total Evaluation Marks: 100 **CIE:** 30 Marks **TEE:** 70 Marks		**Examination Duration:** 3 hours					
		Pre-requisite of course: Basic knowledge of hazards, disaster, and National Disaster Management Policy.					
Course Objective	*The course is intended to provide a general concept in the dimensions of disasters caused by nature beyond the human control as well as the disasters and environmental hazards induced by human activities with emphasis on disaster preparedness, response, recovery, planning and management.*						
Course Outcomes:	After completing this course, student is expected: **CO1:** To understand the basic concept of different types of natural hazards and disasters. **CO2:** To understand the disaster preparedness and response strategy and role of ICT in disaster management. **CO3:** To know the role of various stakeholders in planning policies. **CO4:** To learn the concept of recovery and rehabilitation. **CO5:** To understand the national disaster management policy. **CO6:** To know the role of geospatial technologies in disaster management.						

COURSE SYLLABUS

NOTE:
Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit IV and few topics from Unit II will be taught via online mode.

Unit No.	Content of Each Unit	Hours of Each Unit
I	**CONCEPTS OF HAZARDS AND DISASTER** **[Course Outcome (s) No.: 1&2]** Concept of Hazards, Risk, Vulnerability, Disaster and Resilience; Types of disaster: Natural - Flood, Drought, Landslide, Earthquake, and Avalanche; Manmade Disaster – Nuclear, Chemical and Biological.	15
II	**DISASTER PLAN AND PROGRAMMES** **[Course Outcome (s) No.: 2 & 3]** Disaster Preparedness: Concept, Plan, Prediction, Early Warning System, Role of ICT, National and International Programmes and Policies, NGOs/Civil Societies; Disaster Responses: Role of Multiple Stockholders, Psychological and Medical Health Responses.	15

III	**POST DISASTER PLANNING** **[Course Outcome (s) No.: 4 & 5]** Reconstruction and Rehabilitation as a Means of Development**,** Damage Assessment, Long Term Recovery and Counter Disaster Planning.	15
IV	**DISASTER POLICY, MANAGEMENT AND GEOSPATIAL TECHNOLOGY** **[Course Outcome (s) No.: 6]** National Disaster Management Policy; Role of Remote Sensing, GIS and GNSS in Disaster Management.	15

Suggested Readings:

1. Kapur, A. (2010) **Vulnerable India: A Geographical Study of Disasters**, Sage Publication, New Delhi.
2. Modh, S. (2010) **Managing Natural Disaster: Hydrological, Marine and Geological Disasters**, Macmillan, Delhi.
3. Singh Jagbir (2007) "**Disaster Management Future Challenges and Oppurtunities"**, 2007. PublisherI.K. International Pvt. Ltd. S-25, Green Park Extension, Uphaar Cinema Market, New Delhi, India (www.ikbooks.com).
4. Srivastava, H. N. (2007). **Coastal Hazards, (Cyclone, Tsunami, and other Disasters).** National Book Trust of India, New Delhi.
5. Singh, R. B. (ed.), (2006) **Natural Hazards and Disaster Management: Vulnerability and Mitigation**, Rawat Publications, New Delhi.
6. Singh, R.B. (2005) **Risk Assessment and Vulnerability Analysis**, IGNOU, New Delhi. Chapter 1, 2 and 3
7. Stoltman, J.P. et al. (2004) **International Perspectives on Natural Disasters,** Kluwer Academic Publications. Dordrecht.
8. Sinha, A. (2001). **Disaster Management: Lessons Drawn and Strategies for Future,** New United Press, New Delhi.
9. Government of India. (1997) **Vulnerability Atlas of India**. New Delhi, Building Materials & Technology Promotion Council, Ministry of Urban Development, Government of India.
10. Hemmady, A. K.R. (1996). **Earthquake.** National Book Trust India, New Delhi.
11. Biswas, M.R. and Biswas, A.K. (1980). **Desertification Case Studies,** Pergamon, Oxford.
12. Sain, Kanwar. (1979). **The Flood Problem India.** Birla Institute of Scientific Research, New Delhi.
13. Zaruba, Q. and Menci, V. (1969). **Landslides and their Control.** Elsevier, Amsterdam.
14. Bhatia, B.M. (1967). **Famines in India,** Asia Publishing House, Delhi.
15. Mason, B.J. (1957). **The Physics of Clouds.** Clarendon Press, Oxford.

Course No: DCEC 13	Course Name: Practical: Advanced Spatial Information Technology				Course Code: SBS GEO 1 4 13 DCEC 3104		
Batch: 2021-2023	**Programme:** M.Sc. Geography	**Semester:** IV	**L**	**T**	**P**	**Credits**	**Contact Hrs per Week: 6**
			2	0	4	4	**Total Hours: 90**
Total Evaluation Marks: 100 **CIE:** 30 Marks **TEE:** 70 Marks		**Examination Duration:** 3 hours					
		Pre-requisite of course: Basic understanding of Geospatial Technology					
Course Objective	*The course is intended to provide a concept of Spatial Information Technology such as Terrain Mapping, Digital Elevation Model, Spatial interpolation, Multicriteria Analysis, and Google Earth Applications.*						
Course Outcomes:	After completing this course, student is expected: **CO1:** To understand the basics concept of Spatial Information Technology. **CO2:** To learn about Digital Elevation Model (DEM). **CO3:** To understand the concept of spatial interpolation techniques. **CO4:** To understand the concept of Multicriteria Analysis. **CO5:** To learn the applications of Multicriteria Analysis. **CO6:** To learn the google earth different functions and applications.						

COURSE SYLLABUS

NOTE:
Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit I will be taught via online mode.

Unit No.	Content of Each Unit	Hours of Each Unit
I	**BASIC CONCEPTS AND TERRAIN ANALYSIS** **[Course Outcome (s) No.: 1&2]** Concept and Applications of Spatial Information Technology; Digital Elevation Model (DEM) ; Slope; Aspect; Watershed Delineation	22
II	**SPATIAL ANALYSIS – 1 : INTERPOLATION TECHNIQUE** **[Course Outcome (s) No.: 3]** Inverse Distance Weighted Interpolation (IDW); Kriging; Spline	22
III	**SPATIAL ANALYSIS – 2 : MULTICRITERIA ANALYSIS** **[Course Outcome (s) No.: 4 & 5]** Suitable site for Solid Waste Disposable Site; Suitable site for School: Suitable site for Hospital	22
IV	**WORKING WITH GOOGLE EARTH** **[Course Outcome (s) No.: 6]** Familiarize with Google Earth; Downloading and Mosacking Satellite Imagery; 3D Views; Online digitization on Google Earth; Conversion of kml/kmz file into	24

	Shapefile.	

Suggested Readings:

1. Kumar, D.; Singh, R.B. and Kaur, R. (2019). **Spatial Information Technology for Sustainable Development Goals**. Springer Nature, Switzerland.
2. Peter, J.G., Teunissen and Oliver, M. (Eds.) (2019). **Springer Handbook of Global Navigation Satellite Systems**. Springer Nature, Switzerland:
3. Gupta, R.P. (2018). **Remote Sensing Geology** (3rd Edition). Springer Nature, Switzerland.
4. Kron, G. (2017). **Global Navigation Satellite Systems: Signal, Theory & Applications**. Wilmington: Scitus Academics.
5. Chuveico, E. (2016). **Fundamentals of Satellite Remote Sensing — An Environmental Approach** (2 nd Edition). CRC Press, Roca Raton.
6. Chaunial, D.D. (2016). **Principles of Remote Sensing and Geographical Information System (In Hindi),** Sharda Pustak Bhawan, Allahabad.
7. Scott, M. (2015). **Global Navigation Satellite Systems and Their Applications**. Springer, New York.
8. Heywood, I.; Cornelius, S. and Carver, S. (2011). **An Introduction to Geographic Information Systems** (4 th Edition). Pearson Education, New Delhi.
9. Longley, P.A.; Goodchild, M.; Maguire, D.J. and Rhind, D.W. (2010). **Geographic Information Systems and Science** (3rd Edition). John Wiley, New Jersey:
10. DeMers, M. (2009). **Fundamentals of Geographic Information Systems** (4th Edition). John Wiley, New Jersey.
11. Sabins, F.F. (2007). **Remote Sensing: Principles and Interpretation** (3rd Edition). Waveland Press, Long Grove.
12. Chang, K-t. (2006). **Introduction to Geographic Information Systems**. Tata McGraw Hills, New Delhi.
13. Lillesand, T.M.; Kiefer, R.W. and Chipman, J.W. (2004). **Remote Sensing and Image Interpretation** (5th Edition). John Wiley India, New Delhi.
14. Joseph, George (2003). **Fundamental of Remote Sensing**, University's Press (India) Pvt. Ltd., Hyderabad.
15. Burrough, P.A. and McDonnell, R.A. (1998). **Principles of Geographic Information Systems**. Oxford University Press, Oxford.

9. TEACHING-LEARNING PROCESS

Teaching - learning process is aimed at capacitating learners to achieve the determined learning results corresponding to the courses of programmes. This may include lectures followed by Q&A session or group discussion, practical work, use of prescribed textbooks, electronic resources and other self-study materials, project work, which may be individual or team-based, activities devoted to subject-specific and interdisciplinary skills development, internship and visits to industrial or other research facilities etc.

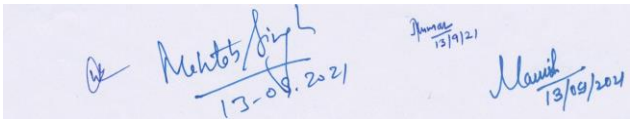
The result-based method, especially in the frame of Master's programme in geography, expects an important change from teacher-centric to learner-centric education and from passive to participatory instructions. Preparation for teaching comes to be crucial. Practical abilities, together with realization of interconnection between theory and experimentation, make up a significant phase of the teaching-learning method. Teaching plans, directed by such a framework, consist of lectures assisted by tutorials; field-based education; use of prescribed reading materials and other self-study materials; project work, some of which may be team-based; activities conceived to serve the development of subject related abilities; internship and visits to field sites, and other research means.

The faculty should promote learning on a proportionate scale of including lectures (listening/hearing), laboratory (scientific analysis and experiments) and field-based (collecting/participating). In order to achieve its objective of focused process based learning and holistic development, a variety of knowledge delivery methods will be used like:

- Lectures
- Discussions
- Simulations
- Role Playing
- Participative Learning
- Interactive Sessions
- Seminars
- Research-based Learning/Dissertation or Project Work
- Technology-embedded Learning

10. IMPLEMENTATION OF BLENDED LEARNING

Blended Learning is a pedagogical approach that combines face to-face classroom methods with computer-mediated activities in the process of teaching and learning. It implies nice



blend of face-to-face and online activities to make the learning processes more interesting and engaging. It focuses on integration of traditional classroom activities and innovative ICT-enabled strategies. It emphasises student-centric learning environment where the teacher is the facilitator for productive and measurable learning outcomes. It optimises and compliments the face-to-face learning, giving ample freedom and flexibility to the students and teachers to access and explore the wide range of open-access sources such as video lectures, podcasts, recordings and articles through digital platforms. It gives freedom and autonomy to the teachers in selection of appropriate digital platforms, resources and time-slots to complement and supplement face to face learning. The Blended Learning doesn't undermine the role of the teacher, rather it gives him/her an opportunity to explore the unexplored in accordance with the requirements of the curriculum.

Key features of Blended Learning

- **Student-Centric Pedagogical Approach** focusing on flexibility in timing, quality content, needs and interests of students and freedom to study through the mode of his/her choice;
- Freedom to Select variety of mediums and techniques;
- Increased student engagement in learning;
- Enhanced teacher and student interaction;
- Improved student learning outcomes;
- More flexible teaching and learning environment;
- More responsive for self and continuous learning;
- Better opportunities for experiential learning;
- Increased learning skills;
- Greater access to information, improved satisfaction and learning outcomes.

Note: Resolution no (c) as per minutes circulated by VC office**:** It was resolved that Blended Learning with 40% component of online teaching and 60% face to face classes for each programme, be adopted

11. ASSESSMENT AND EVALUATION

A variety of assessment methods that are appropriate within a given disciplinary area and a programme of study will be used. Priority will be accorded to formative assessment. Learning outcomes will be assessed using techniques such as the following: time-constrained examinations, closed-book and open-book tests, problem-based assignments, practical assignments, laboratory reports, observation of practical skills, individual project reports (case study reports), team project reports, oral presentations, seminar presentation, viva voce interviews, computerized adaptive testing, peer and self-assessment, etc. For Geography course the methods of assessment shall include the following:

- Continuous Comprehensive Evaluation at regular after achievement of each Course-level learning outcome
- Formative Assessment on the basis of activities of a learner throughout the programme instead of one-time assessment
- Oral Examinations to test presentation and communication skills
- Open Book Examination for better understanding and application of the knowledge acquired
- Group Examinations on Problem solving exercises
- Seminar Presentations
- Review of Literature
- Collaborative Assignments

12. KEYWORDS

- LOCF
- NEP-2020
- Blended Learning
- Face to face (F to F) Learning
- Programme Outcomes
- Programme Specific Outcomes
- Course-level Learning Outcomes
- Postgraduate Attributes
- Learning Outcome Index
- Formative Assessment and Evaluation
- Comprehensive and Continuous Evaluation

13. REFERENCES

- National Education Policy-2020. https://www.education.gov.in/sites/upload_files/mhrd/files/NEP_Final_English_0.pdf
- The draft subject specific LOCF templates available on UGC website. https://www.ugc.ac.in/ugc_notices.aspx?id=MjY5OQ==
- Draft Blended Mode of Teaching and Learning: Concept Note available on UGC website. https://www.ugc.ac.in/pdfnews/6100340_Concept-Note-Blended-Mode-of-Teaching-and-Learning.pdf
- https://www.du.ac.in/du/uploads/Revi_syll_19082019/19082019_Geography%20BA%20Hons%20&%20Prog%20_CBCS%20Str.pdf
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- http://www.bamu.nic.in/buoadmin/syllabus_pdf/geography.pdf
- https://mdu.ac.in/UpFiles/UpPdfFiles/2016/Jan/MA%20GEOG.,%20CBCS%20-.pdf
- http://www.cuh.ac.in/admin/uploads/pdf/0NEW%20SYLLABUS%20Geography.pdf
- https://cutn.ac.in/geography/

Annexure-XXVIII

Central University of Haryana
Department of Mathematics

Minutes of online BOS Meeting held on 04.09.2021

A meeting of the Board of Studies (BOS) of the Department of Mathematics was held on 04.09.2021 at Zoom platform (Meeting ID 488 802 3223) at 10.30 AM and the following members were present:

1. Prof. Ranjan Kumar Mohanty, (Department of Mathematics, South Asian University, Delhi) External Expert
2. Prof. N. R. Garg, (Department of Mathematics, MDU, Rohtak) External Expert
3. Dr. Rajesh Kumar Gupta(Department of Mathematics, CUH) Chairperson
4. Dr. Arun Kajla (Department of Mathematics, CUH) Member
5. Dr. Jagjeet (Department of Mathematics, CUH) Invitee

Following agenda items were considered and resolved accordingly:

1. The allocation of Research Supervisors for research scholars recommended by DRC, Mathematics Department.
2. Course work exemption permission for Mr. Shahid Ahmed, research scholar of Mathematics Department
3. Modify/update syllabi of some courses and to introduce some new courses for M.Sc. Mathematics programme.
4. Approval for Scheme and Syllabi of 5-years integrated B.Sc.-M.Sc. Mathematics
5. Panel of Paper setters/Examiners for the End term examinations (Dec. 2021) and (June 2022) of M.Sc. (Mathematics) and integrated B.Sc.-M.Sc. Mathematics.
6. Permission to Ms.Varsha (10909), student of M.Sc. Mathematics (2017-19) for another chance to appear for Numerical Analysis (II Semester) end term examination.
7. Any other matter with the permission of chair: Reporting item

1. The allocation of Research Supervisors for research scholars recommended by DRC Mathematics Department.

As recommended by DRC, Mathematics Department dated 16.06.2021, BOS approved the following research supervisors for the research scholars of the Mathematics Department:

Sr. No	Roll No.	Name of student	Research Supervisor
1	201334	Aditya Robin Singh	Dr. Phool Singh Associate Professor, Department of Mathematics, SoET, Central University of Haryana
2	201335	Amit Raj	Dr. Pawan Kumar Assistant Professor,

			Department of Mathematics, SoBS, Central University of Haryana
3	201336	Isha Sharma	Dr. Jagjeet Assistant Professor, Department of Mathematics, SoBS, Central University of Haryana
4	201337	Jyoti	Dr. Arun Kajla Assistant Professor, Department of Mathematics, SoBS, Central University of Haryana
5	201339	Lakhwinder Singh	Dr. Shah Jahan Assistant Professor, Department of Mathematics, SoBS, Central University of Haryana
6	201341	Parul Punia	Dr. Pawan Kumar Assistant Professor, Department of Mathematics, SoBS, Central University of Haryana
7	201342	Poonam Yadav	Dr. Rajesh Kumar Gupta Associate Professor, Department of Mathematics, SoBS, Central University of Haryana
8	201343	Raman Yadav	Dr. Phool Singh Associate Professor, Department of Mathematics, SoET, Central University of Haryana
9	201344	Shahid Ahmed	Dr. Shah Jahan Assistant Professor, Department of Mathematics, SoBS, Central University of Haryana

Consent forms (Annexure-I) duly signed by the research scholars, supervisors and HoD were attached. DRC minutes are also attached as Annexure-II.

2. Course work exemption permission of Mr. Shahid Ahmed, research scholar of Mathematics Department

Mr. Shahid Ahmed has completed M.Phil. degree with course work as per UGC guidelines from University of Delhi (Annexure - III) and secured first division. Moreover, Mr. Shahid Ahmed has done one mandatory course "Research and Publications Ethics, Course No CUHCL0101C2002" from Central University of Haryana and has qualified with required CGPA.

As recommended by DRC, Mathematics Department dated 16.06.2021, the BOS approved that Mr. Shahid Ahmed may be exempted from course work of Central University of Haryana.

3. Modify/update syllabi of some courses and to introduce some new courses for M.Sc. Mathematics programme.

The Board recommended the revised scheme & syllabus for M.Sc. Mathematics w.e.f. 2021-22. The Board recommended the changes in syllabi and scheme for M.Sc. Mathematics, which contain new courses, change in contents of some courses and change in course codes accordingly. This updated syllabus which will be effective from 2021-22 (Annexure-IV). The updated syllabus has been for forwarded to School Board for further approval.

4. **Scheme and Syllabi of 5-years integrated B.Sc.-M.Sc. Mathematics**

The BOS recommended the Scheme (6 semesters) and Syllabus (2 semesters) for the course of 5-years integrated B.Sc.-M.Sc. Mathematics with some minor modification, which have been incorporated (Annexure-V).

5. Panel of Paper-Setters and Examiners for Dec. 2021 and June 2022:

The Board approved the Panels of Paper-Setters/Examiners for M.Sc. Mathematics and integrated B.Sc.-M.Sc. Mathematics for both the Semesters of academic year 2021-22 for all regular and reappear students (Annexure-VI).

The approved panels are being sent to COE/AR (Exam) under sealed cover. Further, Head, Dept. of Mathematics is authorized to supply additional names, if required.

6. **Permission to Ms. Varsha (10909), student of M.Sc. Mathematics for the academic session 2017-19 for another chance to appear for Numerical Analysis (II Semester) end term examination.**

Ms. Varsha (10909), student of M.Sc. Mathematics for the academic session 2017-19 appeared for Numerical Analysis (II Semester) end term exam thrice and was not able to clear the passing criteria. However as per her representation (Annexure-VII), during the third attempt, which was conducted in online mode due to covid-19 pandemic, she was not able to complete her exam due to technical issue.

Due to covid-19, the Board recommended that she may be granted only one more chance in the current academic year to appear in the said examination and no further chances will be provided to her.

7. **Any other matter with the permission of chair**.

Reporting Item: The proposal for introduction of 5-years integrated BS-MS programme in mathematics department was approved in 28th meeting of the Academic Council (Central University of Haryana, Mahendergarh) (Annexure-VIII) on 26.06.2019, in principle. The programme with changed nomenclature 5-years integrated B.Sc.-M.Sc. (Mathematics) will commence in the academic session 2021-2022.

Prof. R. K. Mohanty

Prof. N. R. Garg

Dr. Rajesh Kumar Gupta

Dr. Arun Kajla

Dr. Jagjeet

CENTRAL UNIVERSITY OF HARYANA

(*Established under the Central Universities Act, 2009*)

(NAAC Accredited 'A' Grade)



CBCS, LOCF and NEP-2020 Based

Curriculum and Syllabi
of
M.Sc. Mathematics

(w.e.f. 2021-2022)

DEPARTMENT OF MATHEMATICS
SCHOOL OF BASIC SCIENCES

Approved by :	**BOS**	**School Board**	**Academic Council**
Approval Status :	√	√	x or √
Approval Date :	04.09.2021	20.09.2021	?

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VISION AND MISSION

Vision and Mission of the University

Vision

To develop enlightened citizenship of a knowledge society for peace and prosperity of individuals, nation and the world, through promotion of innovation, creative endeavours, and scholarly inquiry.

Mission

To serve as a beacon of change, through multi-disciplinary learning, for creation of knowledge community, by building a strong character and nurturing a value-based transparent work ethics, promoting creative and critical thinking for holistic development and self-sustenance for the people of India. The University seeks to achieve this objective by cultivating an environment of excellence in teaching, research and innovation in pure and applied areas of learning.

Vision and Mission of the Department

Vision

To be an internationally recognized centre for research and teaching in mathematics. To encourage excellence, innovation, integrity and values for society in the department. To produce global leaders for academic and industry by imparting multidisciplinary and contemporary mathematical knowledge to the students.

Mission

- To contribute towards building calibre of the students by providing quality education and research in Mathematics through updated curriculum, effective teaching learning process.
- To impart innovative skills, team-work, ethical practices to the students so as to meet societal expectations.
- To build a strong base in Mathematics for various academic programs across the institute.

1. BACKGROUND

i) NEP-2020 and LOCF an integrated Approach

Considering the curricular reforms as instrumental for desired learning outcomes, all the academic departments of Central University of Haryana made a rigorous attempt to revise the curriculum of undergraduate and postgraduate programmes in alignment with National Education Policy-2020 and UGC Quality Mandate for Higher Education Institutions-2021. The process of revising the curriculum could be prompted with the adoption of "Comprehensive Roadmap for Implementation of NEP-2020" in 32nd meeting of the Academic Council of the University held on April 23, 2021. The Roadmap identified the key features of the Policy and elucidated the Action Plan with well-defined responsibilities and indicative timeline for major academic reforms.

The process of revamping the curriculum started with the series of webinars and discussions conducted by the University to orient the teachers about the key features of the Policy, enabling them to revise the curriculum in sync with the Policy. Proper orientation of the faculty about the vision and provisions of NEP-2020 made it easier for them to appreciate and incorporate the vital aspects of the Policy in the revised curriculum focused on 'creating holistic, thoughtful, creative and well-rounded individuals equipped with the key 21st century skills' for the 'development of an enlightened, socially conscious, knowledgeable, and skilled nation'.

With NEP-2020 in background, the revised curricula articulate the spirit of the policy by emphasising upon—integrated approach to learning; innovative pedagogies and assessment strategies; multidisciplinary and cross-disciplinary education; creative and critical thinking; ethical and Constitutional values through value-based courses; 21st century capabilities across the range of disciplines through life skills, entrepreneurial and professional skills; community and constructive public engagement; social, moral and environmental awareness; Organic Living and Global Citizenship Education (GCED); holistic, inquiry-based, discovery-based, discussion-based, and analysis-based learning; exposure to Indian knowledge system, cultural traditions and classical literature through relevant courses offering 'Knowledge of India'; fine blend of modern pedagogies with indigenous and traditional ways of learning; flexibility in course choices; student-centric participatory learning; imaginative and flexible curricular structures to enable

creative combination of disciplines for study; offering multiple entry and exit points initially in undergraduate programmes; alignment of Vocational courses with the International Standard Classification of Occupations maintained by the International Labour Organization; breaking the silos of disciplines; integration of extra-curricular and curricular aspects; exploring internships with local industry, businesses, artists and crafts persons; closer collaborations between industry and higher education institutions for technical , vocational and science programmes; and formative assessment tools to be aligned with the learning outcomes, capabilities, and dispositions as specified for each course. In case of UG programmes in Engineering and Vocational Studies, it was decided that the departments shall incorporate pertinent NEP recommendations while complying with AICTE, NBA, NSQF, International Standard Classification of Occupations, Sector Skill Council and other relevant agencies/sources. The University has also developed consensus on adoption of Blended Learning with 40% component of online teaching and 60% face to face classes for each programme.

The revised curricula of various programmes could be devised with concerted efforts of the faculty, Heads of the Departments and Deans of Schools of Study. The draft prepared by each department was discussed in series of discussion sessions conducted at Department, School and the University level. The leadership of the University has been a driving force behind the entire exercise of developing the uniform template and structure for the revised curriculum. The Vice Chancellor of the University conducted series of meetings with Heads and Deans to deliberate upon the vital parameters of the revised curriculum to formulate a uniform template featuring Background, Programme Outcomes, Programme Specific Outcomes, Postgraduate Attributes, Structure of Masters Course, Learning Outcome Index, Semester-wise Courses and Credit Distribution, Course-level Learning Outcomes, Teaching-Learning Process, Blended Learning, Assessment and Evaluation, Keywords, References and Appendices. The experts of various Boards of Studies and School Boards contributed to a large extent in giving the final shape to the revised curriculum of each programme.

To ensure the implementation of curricular reforms envisioned in NEP-2020, the University has decided to implement various provisions in a phased manner. Accordingly, the curriculum may be reviewed annually.

ii) About the Mathematics

Mathematics is a powerful tool for global understanding and communication that organizes our lives and prevents chaos. Mathematics helps us understand the world and provides an effective way of building mental discipline. Mathematics encourages logical reasoning, critical thinking, creative thinking, abstract or spatial thinking, problem-solving ability, and even effective communication skills. Mathematics is necessary to understand the other branches of knowledge. All depend on mathematics in one way or another. There is no science, art, or specialty except mathematics was the key to it. The discipline and mastery of any other science or art are very much related to the size of mathematics.

iii) About the Programme (Nature, extent and aims)

A master's degree is a postgraduate degree for students who want to become more skilled or specialized in a particular discipline. While bachelor's and other undergraduate degrees typically give a relatively broad overview of a particular area of study, master's degrees tend to be more focused and allow students to develop the depth of their knowledge in a particular subject, putting them on the right course to become leaders in their fields.

The M.Sc. Mathematics programme, aims to build strong foundations in core areas of higher mathematics in both the pure and applied areas. It is meant for students who would typically take up careers involving mathematical research or mathematical skills – in academia or in industry. The training imparted to the students helps them master the art of problem solving, developing logical reasoning and computational capabilities which are essential traits in all walks of life. Additionally, the knowledge of mathematical modeling and computational training which the students acquire during the programme makes them highly sought after. In keeping with the demands of industry and academia, the syllabus is updated regularly, with inputs taken from various stakeholders including students, alumni and parents at different stages of the preparation of the syllabus.

Duration: M.Sc. Mathematics is a full-time postgraduate level program offered by the Department of Mathematics. This is a 2-years program, consisting of four semesters with two semesters per year.

Eligibility: For M.Sc. in Mathematics, the candidates with the following qualification are eligible:

B. A./B.Sc. (Hons.) in Mathematics from any recognized Indian or foreign university with 50% or above marks

OR

B.Sc./B. A. with Mathematics as one of the subject of study with 55% or above marks or equivalent grade in the aggregate

iv) Qualification Descriptors (possible career pathways)

Upon successful completion of the course, the students receive a master degree in the Mathematics. M.Sc. Mathematics post-graduates of this department are expected to demonstrate knowledge of major portion of pure and applied mathematics and the ability to provide an overview of scholarly debates relating to Mathematics. Also it is expected that after the completion of this course they will be in a position to pursue their research in Mathematics. Along with mathematical skills, it is also expected that they will learn life skills of argumentation, communication and general social values which are necessary to live rich, productive and meaningful lives. The list below provides a synoptic overview of possible career paths provided by a postgraduate training in Mathematics:

1. Teaching
2. Research
3. Engineering
4. Computer programming (In different MNC's)
5. Statistician

6. Defense Research and Development Organization (DRDO) and Indian Space Research Organization (ISRO).
7. Can go for UPSC/Civil services exam.
8. Finance
9. Science and business

2. PROGRAMME OUTCOMES (POs)

Students enrolled in the Master's Programmes offered by the Departments under the School of Basic Sciences will have the opportunity to learn and master the following components in addition to attain important essential skills and abilities:

PO-No.	Component	Outcomes
PO-1	Basic Knowledge	Capable of delivering basic disciplinary knowledge gained during the programme.
PO-2	In-depth Knowledge	Capable of describing advanced knowledge gained during the programme.
PO-3	Critical thinking and Problem Solving abilities	Capable of analyzing the results critically and applying acquired knowledge to solve the problems.
PO-4	Creativity and innovation	Capable to identify, formulate, investigate and analyze the scientific problems and innovatively to design and create products and solutions to real life problems.
PO-5	Research aptitude and global competency	Ability to develop a research aptitude and apply knowledge to find the solution of burning research problems in the concerned and associated fields at global level.
PO-6	Holistic and multidisciplinary education	Ability to gain knowledge with the holistic and multidisciplinary approach across the fields.
PO-7	Skills enhancement	Learn specific sets of disciplinary or multidisciplinary skills and advanced techniques and apply them for betterment of mankind.
PO-8	Leadership and Teamwork abilities	Ability to learn and work in a groups and capable of leading a team even.
PO-9	Environmental and human health awareness	Learn important aspects associated with environmental and human health. Ability to develop eco-friendly technologies.

PO-10	Ethical thinking and Social awareness	Inculcate the professional and ethical attitude and ability to relate with social problems.
PO-11	lifelong learning skills and Entrepreneurship	Ability to learn lifelong learning skills which are important to provide better opportunities and improve quality of life. Capable to establish independent startup/innovation center etc.

3. PROGRAMME SPECIFIC OUTCOMES (PSOs)

The post graduates shall be able to realise the following specific outcomes by the end of program studies:

On successful completion of the M.Sc. Mathematics programme a student

Number	Programme Specific Outcomes
PSO-1	Will have a strong foundation in both pure and applied mathematics.
PSO-2	Will be able to apply mathematical skills for solving problems and for preparing various competitive exams.
PSO-3	Will be able to communicate mathematical knowledge effectively, in writing as well as orally.
PSO-4	Will identify applications of mathematics in other disciplines, leading to enhancement of career prospects in different fields and research areas.
PSO-5	Will have basic knowledge of programming and computational techniques as required for employment.
PSO-6	Should have the knowledge of the fundamental axioms in mathematics and capability of developing ideas based on them and inculcate mathematical reasoning.
PSO-7	Will be able to locate and analyse the different mathematical texts with appropriate theoretical framework.
PSO-8	Have the knowledge of a wide range of mathematical techniques and application of mathematical methods/tools in science, social science, engineering and technology.
PSO-9	Should be able to develop analytical skills, critical thinking, creativity, communication and presentation skills through assignments, seminar, project

	work.
PSO-10	Should be able to apply their skills and knowledge that translate information presented verbally into mathematical form, select and use appropriate mathematical formulae or techniques in order to process the information and draw the relevant conclusion.

4. POSTGRADUATE ATTRIBUTES

No.	P.G. Attributes
PGA-1	Disciplinary Knowledge
PGA-2	Creative and Critical Thinking
PGA-3	Reflective Thinking
PGA-4	Problem Solving
PGA-5	Analytical Reasoning
PGA-6	Communication Skills
PGA-7	Research Skills
PGA-8	Life Skills
PGA-9	Life-long Learning
PGA-10	Global Competency

5. STRUCTURE OF MASTER'S COURSE

Types of Courses	**Nature**	**Total Credits**	**%**
Core Courses (CC)	Compulsory	65	67.01%
Elective Courses (EC)	Discipline Centric Elective Courses	24	24.74%
	Generic Elective Courses	08	8.25%
Skilled-based Courses/ Self-study based Courses	Skill Enhancement Elective Courses	00	

Note: The Scheme and Syllabus of the course are subject to change according to the UGC guidelines, NEP-2020 and University ordinance.

Course Type

Core Courses (CC)
Generic Elective Courses (GEC)
Discipline Centric Elective Courses (DCEC)
Skill Enhancement Elective Courses (SEEC)

Total Credit: 97, Semester-wise distribution of credits: 25+ 24 + 24 + 24

CORE COURSES (CC)

S.No.	Course Code	Course Title	L	T	P	Credit
1.	SBSMAT 01 01 01 C 3104	Real Analysis	3	1	0	4
2.	SBSMAT 01 01 02 C 3104	Algebra-I	3	1	0	4
3.	SBSMAT 01 01 03 C 3104	Complex Analysis	3	1	0	4
4.	SBSMAT 01 01 04 C 3104	Differential Equations	3	1	0	4
5.	SBSMAT 01 01 05 C 3104	Programming in C	3	1	0	4
6.	SBSMAT 01 01 06 C 0021	Lab Programming in C	0	0	2	1
7.	SBSMAT 01 02 01 C 3104	Linear Algebra	3	1	0	4
8.	SBSMAT 01 02 02 C 3104	Topology	3	1	0	4
9.	SBSMAT 01 02 03 C 3104	Numerical Analysis	3	1	0	4
10.	SBSMAT 01 02 04 C 0021	Lab for Numerical Analysis	0	0	2	1
11.	SBSMAT 01 02 05 C 2023	Typesetting in Latex	2	0	2	3
12.	SBSMAT 01 03 01 C 3104	Integral Equations and Calculus of Variation	3	1	0	4
13.	SBSMAT 01 03 02 C 3104	Functional Analysis	3	1	0	4
14.	SBSMAT 01 03 03 C 3104	Mathematical Statistics	3	1	0	4
15.	SBSMAT 01 03 04 C 0084	Seminar	0	0	8	4

16.	SBSMAT 01 04 01 C	Project/Dissertation	0	0	0	12

DISCIPLINE CENTRIC ELECTIVE COURSES (DCEC)

(Offered to the students of M.Sc. Mathematics by the Department)

S.No.	Course Code	Course Title	L	T	P	Credit
1.	SBSMAT 01 02 01 DCEC 3104	Wavelet Analysis	3	1	0	4
2.	SBSMAT 01 02 02 DCEC 2124	Object Oriented Programming with C++	2	1	2	4
3.	SBSMAT 01 02 03 DCEC 3104	Information Theory	3	1	0	4
4.	SBSMAT 01 02 04 DCEC 3104	Operations Research	3	1	0	4
5.	SBSMAT 01 03 01 DCEC 3104	Applied Discrete Mathematics	3	1	0	4
6.	SBSMAT 01 03 02 DCEC 3104	Theory of Elasticity	3	1	0	4
7.	SBSMAT 01 03 03 DCEC 3104	Algebra – II	3	1	0	4
8.	SBSMAT 01 03 04 DCEC 3104	Fluid Dynamics	3	1	0	4
9.	SBSMAT 01 03 05 DCEC 3104	Fuzzy Set Theory	3	1	0	4
10.	SBSMAT 01 04 01 DCEC 3104	Differential Geometry	3	1	0	4
11.	SBSMAT 01 04 02 DCEC 3104	Mathematical Modelling	3	1	0	4
12.	SBSMAT 01 04 03 DCEC 3104	Advanced Numerical Analysis	3	1	0	4
13.	SBSMAT 01 04 04 DCEC 3104	Finite Element Methods	3	1	0	4
14.	SBSMAT 01 04 05 DCEC 3104	Advanced Complex Analysis	3	1	0	4
15.	SBSMAT 01 04 06 DCEC 3104	Introduction to Cryptography	3	1	0	4

16.	SBSMAT 01 04 07 DCEC 3104	Advanced Abstract Algebra	3	1	0	4
17.	SBSMAT 01 04 08 DCEC 3104	Measure Theory and Integration	3	1	0	4
18.	SBSMAT 01 04 09 DCEC 3104	Mechanics	3	1	0	4
19.	SBSMAT 01 04 10 DCEC 3104	Number Theory	3	1	0	4
20.	SBSMAT 01 04 11 DCEC 3104	Mathematics for Finance and Insurance	3	1	0	4

GENERIC ELECTIVE COURSES (GEC)

(Offered to PG students of other departments only)

S. No.	Course code	Course title	L	T	P	Credit
1.	SBSMAT 01 01 01 GEC 3104	Introduction to Mathematical Analysis	3	1	0	4
2.	SBSMAT 01 01 02 GEC 3104	Mathematics for Chemists	3	1	0	4
3.	SBSMAT 01 01 03 GEC 3104	Basic Mathematics for Social Science	3	1	0	4
4.	SBSMAT 01 02 01 GEC 2124	Typesetting in Latex	2	1	2	4
5.	SBSMAT 01 02 02 GEC 2124	Numerical Methods	2	1	2	4
6.	SBSMAT 01 02 03 GEC 3104	Discrete Mathematics	3	1	0	4

Note: Any MOOCs course for PG students on SWAYAM can also be taken as DCEC or GEC course on the recommendations of the department.

Skill Enhancement Elective Courses (SEEC)

(Skill Enhancement Elective Course**,** non-credit, only qualifying in nature): This may include a course based on Theoretical/Experimental/Computational Techniques/Methods. The department may offer more than one courses depending on specialization and strength of faculty members, and the student has to opt one of them.

S. No	Course Code	Course Title	L	T	P	Credit
1.	SBSMAT 01 04 01 SEEC 0120	Programming in MATLAB	0	1	2	0
2.	SBSMAT 01 04 02 SEEC 0120	Automata Theory	0	1	2	0
3.	SBSMAT 01 04 03 SEEC 0120	Artificial Intelligence and Machine Learning	0	1	2	0

6. LEARNING OUTCOME INDEX

6.1A Mapping of Courses with PSOs (first year)

Semester	PSOs ⇨	PSO1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8	PSO 9	PSO 10
	Course No. ⇩										
I	1	√	√	√	√	x	√	√	√	√	√
	2	√	√	√	√	√	√	√	√	√	√
	3	√	√	√	√	√	√	√	√	√	√
	4	√	√	√	√	√	x	√	√	√	√
	5	√	√	√	√	√	√	x	√	√	√
	6	√	√	√	√	√	√	√	√	√	√
	7	√	√	√	√	x	√	√	√	√	√
	8	√	√	√	√	x	√	√	√	√	√
	9	√	√	√	√	√	√	√	√	√	√
II	10	√	√	√	√	√	√	√	√	√	√
	11	√	√	√	√	√	√	√	√	√	√
	12	√	√	√	√	√	√	√	√	√	√
	13	√	√	√	√	√	√	√	√	√	√
	14	√	√	√	√	√	√	√	x	x	√
	15	√	√	√	√	√	√	√	x	x	√
	16	√	√	√	√	√	√	√	√	√	√
	17	√	√	√	√	√	√	√	√	√	√
	18	√	√	√	√	√	√	√	√	x	√
	19	√	√	√	√	√	√	√	√	√	√
	20	√	√	√	√	√	√	√	√	√	√
	21	√	√	√	√	√	√	√	√	√	√

6.1B Mapping of Courses with PSOs (second year)

Semester	PSOs ⇨ / Course No. ⇩	PSO1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8	PSO 9	PSO 10
III	22	√	√	√	√	x	√	√	√	√	√
	23	√	√	√	√	√	√	√	x	√	√
	24	√	√	√	√	√	√	√	√	√	√
	25	√	√	√	√	√	√	√	√	√	√
	26	√	√	√	√	√	√	√	√	√	√
	27	√	√	√	√	x	√	√	√	√	√
	28	√	√	√	√	√	√	√	√	√	√
	29	√	√	√	√	√	x	√	√	√	√
	30	√	√	√	√	√	√	√	√	√	√
IV	31	√	√	√	√	√	√	√	√	√	√
	32	√	√	√	√	x	√	√	√	√	√
	33	√	√	√	√	√	√	√	√	√	√
	34	√	√	√	√	x	√	√	√	√	√
	35	√	√	√	√	√	√	√	√	√	x
	36	√	√	√	√	√	√	√	√	√	√
	37	√	√	√	√	√	√	√	√	√	√
	38	√	√	√	√	√	√	√	√	√	√
	39	√	√	√	√	√	√	√	√	√	√
	40	√	√	√	√	x	√	√	√	√	√
	41	√	√	√	√	√	√	√	√	√	√
	42	√	√	√	√	√	√	√	√	√	√
	43	√	√	√	√	√	√	√	√	√	√
	44	√	√	√	√	√	√	√	√	√	√
	45	√	√	√	√	√	√	√	√	√	√

7. SEMESTER-WISE COURSES AND CREDIT DISTRIBUTION

SEMESTER-I

Total Credits: 25 (C: 21, GEC: 4)

Sr. No.	Course No	Course Code	Course Title	L	T	P	Hrs/ Week	Total Credits
Core Courses								
1	1	SBSMAT 01 01 01 C 3104	Real Analysis	3	1	0	4	4
2	2	SBSMAT 01 01 02 C 3104	Algebra-I	3	1	0	4	4
3	3	SBSMAT 01 01 03 C 3104	Complex Analysis	3	1	0	4	4
4	4	SBSMAT 01 01 04 C 3104	Differential Equations	3	1	0	4	4
5	5	SBSMAT 01 01 05 C 3104	Programming in C	3	1	0	4	4
6	6	SBSMAT 01 01 06 C 0021	Lab Programming in C	0	0	2	2	1
Generic Elective Courses (any two of 2 credits each or any one of 4 credits from the list*)**								
7		MOOC/GEC (to be taken from other departments)		-	-	-	-	4

GEC courses offered to PG students of other departments only

Course No.	Course Code	Course Title	L	T	P	Hrs/ Week	Total Credits
7	SBSMAT 01 01 01 GEC 3104	Introduction to Mathematical Analysis	3	1	0	4	4
8	SBSMAT 01 01 02 GEC 3104	Mathematics for Chemists	3	1	0	4	4
9	SBSMAT 01 01 03 GEC 3104	Basic Mathematics for Social Science	3	1	0	4	4

Note: GEC courses will be offered only to those students who have studied mathematics only till 10^{th} standard.

SEMESTER-II

Total Credits: 24 (C: 16, DCEC: 4, GEC: 4)

Sr. No.	Course No	Course Code	Course Title	L	T	P	Hrs/ Week	Total Credits
Core Courses								
1	10	SBSMAT 01 02 01 C 3104	Linear Algebra	3	1	0	4	4
2	11	SBSMAT 01 02 02 C 3104	Topology	3	1	0	4	4
3	12	SBSMAT 01 02 03 C 3104	Numerical Analysis	3	1	0	4	4
4	13	SBSMAT 01 02 04 C 0021	Lab for Numerical Analysis	0	0	2	2	1
5	14	SBSMAT 01 02 05 C 2023	Typesetting in Latex	2	0	2	2	3
Discipline Centric Elective Courses								
6		MOOC/DCEC		-	-	-	-	4
Generic Elective Courses								
7		MOOC/GEC (to be taken from other departments)		-	-	-	-	4

GEC courses offered to PG students of other departments only

Course No	Course Code	Course Title	L	T	P	Hrs/ Week	Total Credits
15	SBSMAT 01 02 01 GEC 2124	Typesetting in LaTeX	2	1	2	4	4
16	SBSMAT 01 02 02 GEC 2124	Numerical Methods	2	1	2	4	4
17	SBSMAT 01 02 03 GEC 3104	Discrete Mathematics	3	1	0	4	4

Note: GEC courses will be offered only to those students who have studied mathematics upto 10+2 level.

DCEC courses for M.Sc. (Mathematics) students only

Course No	Course Code	Course Title	L	T	P	Hrs/ Week	Total Credits
18	SBSMAT 01 02 01 DCEC 3104	Wavelet Analysis	3	1	0	4	4
19	SBSMAT 01 02 02 DCEC 2124	Object Oriented Programming C++	2	1	2	4	4
20	SBSMAT 01 02 03 DCEC 3104	Information Theory	3	1	0	4	4
21	SBSMAT 01 02 04 DCEC 3104	Operations Research	3	1	0	4	4

SEMESTER-III

Total Credits: 24 (C:16, DCEC:8)

Sr. No.	Course No.	Course Code	Course Title	L	T	P	Hrs/ Week	Total Credits
Core Courses								
1	22	SBSMAT 01 03 01 C 3104	Integral Equations and Calculus of Variation	3	1	0	4	4
2	23	SBSMAT 01 03 02 C 3104	Functional Analysis	3	1	0	4	4
3	24	SBSMAT 01 03 03 C 3104	Mathematical Statistics	3	1	0	4	4
4	25	SBSMAT 01 03 04 C 0084	Seminar	0	0	8	8	4
Discipline Centric Elective Courses								
5		MOOC/DCEC		-	-	-	-	4
6		MOOC/DCEC		-	-	-	-	4

GEC courses may be selected from GEC courses of semester I, if he/she has not studied that paper in Ist semester.

DCEC courses for M.Sc. (Mathematics) students only

Course No	Course Code	Course Title	L	T	P	Hrs/ Week	Total Credits
26	SBSMAT 01 03 01 DCEC 3104	Applied Discrete Mathematics	3	1	0	4	4
27	SBSMAT 01 03 02 DCEC 3104	Theory of Elasticity	3	1	0	4	4
28	SBSMAT 01 03 03 DCEC 3104	Algebra – II	3	1	0	4	4
29	SBSMAT 01 03 04 DCEC 3104	Fluid Dynamics	3	1	0	4	4
30	SBSMAT 01 03 05 DCEC 3104	Fuzzy Set Theory	3	1	0	4	4

SEMESTER-IV

Total Credits: 24 (C:12, DCEC:8)

Sr. No.	Course No	Course Code	Course Title	L	T	P	Hrs/ Week	Total Credits
Core Courses								
1	31	SBSMAT 01 04 01 C	Project/Dissertation	-	-	-	12	12
Discipline Centric Elective Courses								
2		MOOC/DCEC		-	-	-	-	4
3		MOOC/DCEC		-	-	-	-	4
4		MOOC/DCEC		-	-	-	-	4
Discipline Centric Skill Based Courses								
5		SEEC		0	1	2	3	0

DCEC courses for M.Sc. (Mathematics) students only

Course No	Course Code	Course Title	L	T	P	Hrs/ Week	Total Credits
32	SBSMAT 01 04 01 DCEC 3104	Differential Geometry	3	1	0	4	4
33	SBSMAT 01 04 02 DCEC 3104	Mathematical Modelling	3	1	0	4	4
34	SBSMAT 01 04 03 DCEC 3104	Advanced Numerical Analysis	3	1	0	4	4
35	SBSMAT 01 04 04 DCEC 3104	Finite Element Methods	3	1	0	4	4
36	SBSMAT 01 04 05 DCEC 3104	Advanced Complex Analysis	3	1	0	4	4
37	SBSMAT 01 04 06 DCEC 3104	Introduction to Cryptography	3	1	0	4	4
38	SBSMAT 01 04 07 DCEC 3104	Advanced Abstract Algebra	3	1	0	4	4
39	SBSMAT 01 04 08 DCEC 3104	Measure Theory and Integration	3	1	0	4	4
40	SBSMAT 01 04 09 DCEC 3104	Mechanics	3	1	0	4	4
41	SBSMAT 01 04 10 DCEC 3104	Number Theory	3	1	0	4	4

42	SBSMAT 01 04 11 DCEC 3104	Mathematics for Finance and Insurance	3	1	0	4	4

OR

Total credits: 24 (C: 24)*

S. No.	Course	Course Code	L	T	P	Credits
1	Semester-long Project/Dissertation**	SBSMAT 01 04 02 C	-	-	-	24

***Allowed only on Departmental Committee Recommendations**

****** The date of final submission of Project/Dissertation report will be intimated to the students during third semester.**

SEEC (Skill Enhancement Elective Course**,** non-credit, only qualifying in nature): This may include a course based on Theoretical/Experimental/Computational Techniques/Methods. The department may offer more than one courses depending on specialization and strength of faculty members, and the student has to opt one of them. The course code may be given as: SBSMAT 01 04 0X SEEC 3100, X=1, 2, 3 ...etc.

Course No	Course Code	Course Title	L	T	P	Hrs/ Week	Total Credits
43	SBSMAT 01 04 01 SEEC 0120	Programming in MATLAB	0	1	2	3	0
44	SBSMAT 01 04 02 SEEC 0120	Automata Theory	0	1	2	3	0
45	SBSMAT 01 04 03 SEEC 0120	Artificial Intelligence and Machine Learning	0	1	2	3	0

8. COURSE-LEVEL LEARNING OUTCOMES

Course Structure

SEMESTER – I

<table>
<tr><td>Course No: 1</td><td colspan="3">Course Name: Real Analysis</td><td colspan="4">Course Code:
SBSMAT 01 01 01 C 3104</td></tr>
<tr><td rowspan="2">Batch:

2021-2023</td><td rowspan="2">Programme:

M.Sc.
Mathematics</td><td rowspan="2">Semester:

I</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td>Contact Hrs per Week: 4</td></tr>
<tr><td>3</td><td>1</td><td>0</td><td>4</td><td>Total Hours: 60</td></tr>
<tr><td colspan="3">Total Evaluation Marks:
100

CIE: 30 Marks

TEE: 70 Marks</td><td colspan="4">Examination Duration: 3 hours

Pre-requisite of course: Nil</td></tr>
<tr><td>Course Objective</td><td colspan="6">The course will develop a deep and rigorous understanding of real line $\mathbb{R}$ and of defining terms to prove the results about convergence and divergence of sequences and series of real numbers. The course will also develop the understanding of metric spaces and convergence, compactness, sequential compactness and connectedness in metric spaces. These concepts have wide range of applications in real life scenario.</td></tr>
</table>

Course Outcomes:	After completing this course, student is expected to learn the following: **CO1:** Understand many properties of the real line and learn to define sequence in terms of functions from $\mathbb{N}$ to a subset of $\mathbb{R}$. **CO2:** Recognize bounded, convergent, divergent, Cauchy and monotonic sequences. To calculate the limit superior, limit inferior of sequences and limit of a bounded sequence. **CO3**: Recognize bounded variation, total variation, directional derivatives, partial derivative and derivative as a linear transformation. **CO4:** Understand many properties of metric spaces and convergence, compactness, sequential compactness and connectedness in metric spaces.

COURSE SYLLABUS

NOTE:

Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit I will be taught via online mode.

OR

1. Question no. 1 has seven parts and students need to answer any four. Each part carries three and half Marks.

2. Question no. 2 to 5 have three parts and student need to answer any two parts of each question. Each part carries seven marks

Unit No.	Content of Each Unit	Hours of Each Unit
I	**[Course Outcome (s) No. : 1]** Real number system as complete ordered field, Archimedean property, supremum, infimum, Bolzano-Weierstrass property, sequence and series, convergence, limsup, liminf, continuity, uniform continuity.	15
II	**[Course Outcome (s) No. : 2]**	15

	Space of continuous functions, sequence and series of functions, uniform and pointwise convergence, Riemann sums and Riemann integral, Monotonic functions, types of discontinuity.	
III	**[Course Outcome (s) No. : 3]** Function of bounded variation, total variations, function of bounded variations expressed as difference of increasing functions, function of several variables, directional derivatives, partial derivative, derivative as a linear transformation, inverse and implicit function theorems.	15
IV	**[Course Outcome (s) No. : 4]** Metric space and examples, open sets, closed sets, sequences in metric spaces and convergence, compactness, sequential compactness, continuity and compactness, Heine-Borel theorem, connected and path connected spaces, components, Continuity and connectedness.	15

Suggested Readings:

1. Walter, R. *Principles of Mathematical Analysis*. 3rdedition, McGraw-Hill, 2017.
2. Simmons, G. F. *Introduction to Topology and Modern Analysis*. McGraw-Hill Pvt. Ltd. 2016.
3. Kumaresan, S. *Topology of Metric Spaces*. Narosa Publishing House, 2011.
4. Terence T. *Analysis II*. Hindustan Book Agency, 2009.
5. Malik, S. C. and Arora, S. *Mathematical Analysis*. 2nd edition reprint. New Age International Publishers 2005.
6. Apostol, T. M. *Mathematical Analysis*. 2nd edition. *Wesley Publishing Co.* 2002.
7. Somasundram, D. and Chaudhary, B. *A First Course in Mathematical Analysis*. Narosa Publishing House, 1996.
8. Royden, H. L. *Real Analysis,* Macmillan Pub. Co., Inc. 4th edition, New York, 1993.

Course No: 2	**Course Name:** Algebra-I				**Course Code:** SBSMAT 01 01 02 C 3104		
Batch: 2021-2023	**Programme:** M.Sc. Mathematics	**Semester:** I	**L**	**T**	**P**	**Credits**	**Contact Hrs per Week: 4**
			3	1	0	4	**Total Hours: 60**
Total Evaluation Marks: 100 **CIE:** 30 Marks **TEE:** 70 Marks			**Examination Duration:** 3 hours				
			Pre-requisite of course: Nil				

Course Objective	This course introduces the basic concepts of modern algebra such as groups and rings. The philosophy of this course is that modern algebraic notions play a fundamental role in mathematics itself and in applications to areas such as physics, computer science, economics and engineering.
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1:** Explain the fundamental concepts of advanced algebra such as groups and rings and their role in modern mathematics and applied contexts. **CO2:** Demonstrate accurate and efficient use of advanced algebraic techniques.

	CO3: Demonstrate capacity for mathematical reasoning through analyzing, proving and explaining concepts from advanced algebra. **CO4:** Apply problem-solving using advanced algebraic techniques applied to diverse situations in physics, engineering and other mathematical contexts.

COURSE SYLLABUS

NOTE:

Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit I will be taught via online mode.

OR

1. Question no. 1 has seven parts and students need to answer any four. Each part carries three and half Marks.
2. Question no. 2 to 5 have three parts and student need to answer any two parts of each question. Each part carries seven marks.

Unit No.	Content of Each Unit	Hours of Each Unit
I	**[Course Outcome (s) No. : 1]** Groups, subgroup, normal subgroup, quotient group, homomorphism and isomorphism, cyclic group, permutation group, Cayley's theorem, Lagrange theorem	15
II	**[Course Outcome (s) No. : 2]** Class equation, Cauchy's theorem, Sylow p-subgroups and its applications,Sylow theorems, Direct product of groups, Structure of finitely generated abelian groups, description of group of order $p^2$and pq, where p and q are distinct primes (In general survey of groups upto order 15).	15

III	**[Course Outcome (s) No. : 3]** Rings, examples (including polynomial rings, formal power series rings, matrix rings and group rings, integral domains, division rings, fields), ideals, prime and maximal ideals,homomorphism and isomorphism of rings.	15
IV	**[Course Outcome (s) No. : 4]** Factorization in domains, Euclidean domains, principal ideal domains and unique factorizations domains, polynomial rings over UFD, polynomial rings over field, irreducibility criteria.	15

Suggested Readings:

1. Gallian, J. *A. Contemporary Abstract Algebra*. 9th edition. Cengage Learning, 2015.
2. Lang, S. *Algebra*. 3rd edition, Springer 2012.
3. Herstein, I. N. *Topics in Algebra*. 2ndedition. John Wiley and Sons, 2006.
4. Bhattacharya, P. B. Jain, S. K. and Nagpaul, S. R. *Basic Abstract Algebra*. 2nd edition, Cambridge University Press, 2003.
5. Khanna, V. K. and Bhammbri, S. K. *A Course in Abstract Algebra*. Vikas Publishing house, 1999.
6. Cohn, P. M. *Algebra.* Vols. I & II, John Wiley & Sons, 1991.
7. Luther, S. and Passi, I. B. S. *Algebra.* Vol. I-Groups, Vol. II-Rings, Narosa Publishing House (Vol. I – 1996, Vol. II –1990).

<table>
<tr><td>Course No: 3</td><td colspan="3">Course Name: Complex Analysis</td><td colspan="4">Course Code:
SBSMAT 01 01 03 C 3104</td></tr>
<tr><td rowspan="2">Batch:

2021-2023</td><td rowspan="2">Programme:

M.Sc.
Mathematics</td><td rowspan="2">Semester:

I</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td>Contact Hrs per Week: 4</td></tr>
<tr><td>3</td><td>1</td><td>0</td><td>4</td><td>Total Hours: 60</td></tr>
<tr><td colspan="3" rowspan="2">Total Evaluation Marks:
100

CIE: 30 Marks

TEE: 70 Marks</td><td colspan="5">Examination Duration: 3 hours</td></tr>
<tr><td colspan="5">Pre-requisite of course: Nil</td></tr>
<tr><td>Course Objective</td><td colspan="7">In this course students will learn about the algebra and geometry of complex numbers, analyticity, contour integration and conformal mapping.</td></tr>
<tr><td>Course Outcomes:</td><td colspan="7">After completing this course, student is expected to learn the following:

CO1: Analyze the concept of differentiability, analyticity, Cauchy-Riemann equations and harmonic functions.

CO2: Compute complex contour integrals for their applications in Cauchy integral theorem.

CO3: Transform a functions into power series, categorize singularities and poles.

CO4: Understand the concept of bilinear transformation and conformal mapping.</td></tr>
<tr><td colspan="8">COURSE SYLLABUS</td></tr>
<tr><td colspan="8">NOTE:
Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five</td></tr>
</table>

questions in all selecting at least one question from each section. All questions carry equal marks. Unit I will be taught via online mode.

OR

1. Question no. 1 has seven parts and students need to answer any four. Each part carries three and half Marks.

2. Question no. 2 to 5 have three parts and student need to answer any two parts of each question. Each part carries seven marks

Unit No.	Content of Each Unit	Hours of Each Unit
I	**[Course Outcome (s) No. : 1]** Continuity and differentiability of complex function, Cauchy-Riemann equations, harmonic functions, analytic functions, analytic functions as mapping, the exponential function, trigonometric functions, hyperbolic functions, logarithmic functions, branch point, branch cut.	15
II	**[Course Outcome (s) No. : 2]** Power series representation of analytic functions, zeros of analytic functions, the index of a closed curve, Cauchy's theorem and integral formula, homotopic version of Cauchy's theorem and simple connectivity, counting zeros, Rouche's theorem, Liouville's Theorem, the open mapping theorem, Goursat theorem, Morera's theorem.	15
III	**[Course Outcome (s) No. : 3]** Taylor's series, Laurent's series, classification of singularities, residues, argument principle and their applications, contour integrals.	15
IV	**[Course Outcome (s) No. : 4]** Maximum modulus theorem, Schwarz's lemma and their applications. Mobius transformations, conformal mapping.	15

Suggested Readings:

1. Saff, E. B. and Snider, A. D. *Fundamentals of Complex Analysis with Applications to Engineering and Sciences*. Pearson Education, 2014.
2. Conway, J. B. Functions of One Complex Variable, Springer, 2012.
3. Mathews, J. H. and Howell, R. W. *Complex Analysis for Mathematics and Engineering.* Jones & Bartlett Publishers, 2012.
4. Brown, J. B. and Churchill, R. V. *Complex Variables and Applications*. 8th edition, Tata McGraw-Hill Education, 2009.
5. Ponnusamy, S. *Foundations of Complex Analysis.* Alpha Science International, 2005.
6. Copson, E. T. *Theory of Functions of Complex Variables*. Oxford University Press, 1970.

<table>
<tr><td>Course No: 4</td><td colspan="3">Course Name: Differential Equations</td><td colspan="3">Course Code:
SBSMAT 01 01 04 C 3104</td><td></td></tr>
<tr><td>Batch:

2021-2023</td><td>Programme:

M.Sc. Mathematics</td><td>Semester:

I</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td>Contact Hrs per Week: 4</td></tr>
<tr><td colspan="3"></td><td>3</td><td>1</td><td>0</td><td>4</td><td>Total Hours: 60</td></tr>
<tr><td colspan="2">Total Evaluation Marks: 100

CIE: 30 Marks

TEE: 70 Marks</td><td colspan="6">Examination Duration: 3 hours

Pre-requisite of course: Nil</td></tr>
<tr><td>Course Objective</td><td colspan="7">The objective of this course is to introduce ordinary differential equations, fundamental theorems for existence and uniqueness and partial differential equations (PDE's). This course further explains the analytic techniques in computing the solutions of various ordinary differential equations and partial differential equations.</td></tr>
<tr><td>Course Outcomes:</td><td colspan="7">After completing this course, student is expected to learn the following:

CO1: Understand ordinary differential equations of various types, their solutions and fundamental concepts about their existence.

CO2: Apply various power series methods to obtain series solutions of differential equations.

CO3: Solve the first-order linear and non-linear PDE's by using Lagrange's, Charpit's</td></tr>
</table>

	method and Jacobi's method respectively and understand Cauchy problem for first order PDE's. **CO4:** Determine the solutions of linear PDE's of second and higher order with constant coefficients, classify second order PDE's, solve standard PDE using separation of variable method and reduction to canonical form.

COURSE SYLLABUS

NOTE:

Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit I will be taught via online mode.

OR

1. Question no. 1 has seven parts and students need to answer any four. Each part carries three and half Marks.

2. Question no. 2 to 5 have three parts and student need to answer any two parts of each question. Each part carries seven marks

Unit No.	Content of Each Unit	Hours of Each Unit
I	**[Course Outcome (s) No.: 1]** Preliminaries of ODE and PDE, existence and uniqueness theorems, existence of independent solutions, Wronskian, Abel's formula, trajectories, orthogonality of functions, orthonormal set of functions, singular solutions of first order ODEs, system of first order ODEs, critical points (saddle, node, spiral etc).	15
II	**[Course Outcome (s) No.: 2]** General theory of homogeneous and non-homogeneous linear differential equations, Sturm Liouville's boundary value problems, Green's function, regular and singular points, power series solution of differential equation at regular and	15

	irregular singular points, Bessel's and Legendre's equations and their solutions.	
III	**[Course Outcome (s) No.: 3]** Curves and surfaces in three dimensions, origin of PDEs, Lagrange's method, orthogonal surfaces, Charpit's method and Jacobi method, special types of first order PDEs, Cauchy problem for first order PDEs.	15
IV	**[Course Outcome (s) No.: 4]** Solutions of higher order linear PDEs, method of separation of variables for Laplace, heat, wave and diffusion equations, Canonical form and reduction to canonical form.	15

Suggested Readings:

1. Simmons, G. F. *Differential Equations with Applications and Historical Notes*. 2nd edition, Tata McGraw Hill, New Delhi, 2016.
2. Evans, L. C. *Partial Differential Equations*. 2nd edition, The Orient Blackswan, 2014.
3. Lebedev, N. N. *Special Functions and Their Applications*. Revised, Courier Corporation, 2012.
4. Ross, S. L. *Differential Equations*. 3rd edition, Wiley India, 2007.
5. Sneddon, I. N. *Elements of Partial Differential Equations*. Dover Publications, 2006.
6. Bell, W. W. *Special Functions for Scientists and Engineers*. Courier Corporation, 2004.
7. Raisinghania, M. D. *Advanced Differential Equations*. S. Chand & Company Ltd., New Delhi, 2001.
8. Reid, W. T. *Ordinary Differential Equations*. John Wiley and Sons, New York, 1971.

<table>
<tr><td>Course No: 5</td><td colspan="3">Course Name: Programming in C</td><td colspan="4">Course Code:
SBSMAT 01 01 05 C 3104</td></tr>
<tr><td rowspan="2">Batch:

2021-2023</td><td rowspan="2">Programme:

M.Sc. Mathematics</td><td rowspan="2">Semester:

I</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td>Contact Hrs per Week: 4</td></tr>
<tr><td>3</td><td>1</td><td>0</td><td>4</td><td>Total Hours: 60</td></tr>
<tr><td colspan="2">Total Evaluation Marks:
100

CIE: 30 Marks

TEE: 70 Marks</td><td colspan="6">Examination Duration: 3 hours

Pre-requisite of course: Nil</td></tr>
<tr><td>Course Objective</td><td colspan="7">The course objective is to familiarize the students with problem solving through C-programming. The course aims to give exposure to basic concepts of the C-programming. The lab component of this course is designed to provide hands-on-training with the concepts.</td></tr>
<tr><td>Course Outcomes:</td><td colspan="7">After completing this course, student is expected to learn the following:

CO1: Classify and overview the programming languages and develop basic C programs, to defi data types and use them in simple data processing

CO2: Use various C-operators, expressions and input/output statements

CO3: Understand control flow using conditional branching and loop structures and the concept of array in problem solving</td></tr>
</table>

	CO4: Interprets the concepts of pointers, and classify functions and their usage

COURSE SYLLABUS

NOTE:

Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit I will be taught via online mode.

OR

1. Question no. 1 has seven parts and students need to answer any four. Each part carries three and half Marks.

2. Question no. 2 to 5 have three parts and student need to answer any two parts of each question. Each part carries seven marks

Unit No.	Content of Each Unit	Hours of Each Unit
I	**[Course Outcome (s) No. : 1]** An overview of programming, programming languages, classification, C essentials program development, anatomy of a C function, variables, constants, expressions, assignment statements, formatting source files, continuation character, the pre-processor, scalar data types-declarations, different types of integers, different kinds of integer constants, floating point types, initialization, mixing types, explicit conversions-casts, data types	15
II	**[Course Outcome (s) No. : 2]** Operators and expressions - precedence and associatively, unary plus and minus operators, binary arithmetic operators, arithmetic assignment operators, increment	15

	and decrement operators, comma operator, relational operators, logical operators, bit manipulation operators, bitwise assignment operators, cast operator, size of operators, conditional operator, memory operators, input/output functions.	
III	**[Course Outcome (s) No. : 3]** Control Flow - conditional branching, the switch statement, looping, nested loops, break and continue statements, goto statement, infinite loops, Arrays - declaring an array, arrays and memory, initializing arrays, encryption and decryption, multidimensional arrays, strings.	16
IV	**[Course Outcome (s) No. : 4]** Functions - passing arguments, declarations and calls, recursion, the main ( ) function, passing arrays as function arguments. Pointers - pointer arithmetic, accessing array elements through pointers, passing pointers as function arguments, arrays of pointers.	14

Suggested Readings:

1. Balagurusamy, E. *Programming in ANSI C*. 3rdedition. TATA McGraw Hill, 2016.
2. Brain W. K. and Ritchie D. M. *C Programme Language*. 2nd edition, Pearson, 2015.
3. Darnell, P. A. and Margolis, P. E. *C: A Software Engineering Approach*. Narosa Publishing, House (Springer International Student Edition), 2012.
4. Yashavant, P. K. *Let Us C*. BPB Publication, 2008.
5. Byrons, G. *Programming With C*. 2nd edition, Schaum's Series, 1996.

<table>
<tr><td>Course No: 6</td><td colspan="4">Course Name: Lab Programming in C</td><td colspan="3">Course Code:
SBSMAT 01 01 06 C 0021</td></tr>
<tr><td rowspan="2">Batch:

2021-2023</td><td rowspan="2">Programme :

M.Sc. Mathematics</td><td rowspan="2">Semester:

I</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td>Contact Hrs per Week: 2</td></tr>
<tr><td>0</td><td>0</td><td>2</td><td>1</td><td>Total Hours: 60</td></tr>
<tr><td colspan="3">Total Evaluation Marks: 100

CIE: 30 Marks

TEE: 70 Marks</td><td colspan="5">Examination Duration: 3 hours

Pre-requisite of course: Nil</td></tr>
<tr><td>Course Objective</td><td colspan="7">The lab component of this course is designed to provides hands-on-training to the concepts of C-programming covered in theory classes.</td></tr>
<tr><td>Course Outcomes:</td><td colspan="7">After completing this course, student is expected to learn the following:

CO1: Gain basic skills to write C-programs for simple mathematical problems

CO2: Able to write moderate C-programs for problem solving with the help of control flow statements, C-operators and functions.

CO3: Understand to implement various matrix operations with the help of Array and able to use string operation in C-programs

CO4: Develop the C-programs for some mathematical functions and real life problems</td></tr>
<tr><td colspan="8">COURSE SYLLABUS</td></tr>
<tr><td colspan="8">NOTE:</td></tr>
</table>

Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit I will be taught via online mode.

OR

1. Question no. 1 has seven parts and students need to answer any four. Each part carries three and half Marks.
2. Question no. 2 to 5 have three parts and student need to answer any two parts of each question. Each part carries seven marks

Unit No.	**Content of Each Unit**	**Hours of Each Unit**
I	**[Course Outcome (s) No. : 1, 2]** 1. Write a program (WAP) to understand concept of scanf and printf 2. WAP to swap two nos. using third variable 3. WAP to swap two nos. without using third variable. 4. WAP to convert temperature from Fahrenheit into Celsius. 5. WAP to find area and perimeter of rectangle. 6. WAP to find largest of two nos. 7. WAP to find largest of three nos. 8. WAP to find whether no. is even or odd 9. Using conditional operator find largest of two nos. 10. Using conditional operator find largest of three nos. 11. WAP that will take four digit no. and find sum of digits. 12. WAP to print 1 to 10 nos. 13. WAP to find roots of quadratic eq. 14. WAP to find sum of first n natural nos. 15. WAP to find average of n nos. 16. WAP to find reverse of no. 17. WAP for the function $f(x)$ using conditional operator	8

	$f(x) = \begin{cases} -1 & x < -5.0 \\ 0 & -5.0 \le x \le 5.0 \\ 1 & x > 5.0 \end{cases}$ 18. WAP to compute 1+1/2+1/3+1/4+--------+1/n 19. WAP to display nos. which are divisible by n b/w 1 & 1000. 20. WAP to convert lowercase text to uppercase	
II	**[Course Outcome (s) No. : 1, 2 , 4]** 21. WAP to generate Fibonacci series. 22. WAP to find nth term in Fibonacci series. 23. WAP to find factorial of no. using while, for, do-while loop. 24. WAP to check whether no. is prime or not 25. WAP to check whether no. is palindrome or not 26. WAP to display prime numbers in between two numbers *a* and *b*. 27. Print multiplication table of given no. using do while. 28. WAP to find whether given no. is Armstrong or not. 29. Write a menu driven program which has following option: factorial, prime, odd or even, exit 30. PRINT PATTERNs 1 1 * 23 12 *** 456 123 ***** 31. WAP to convert decimal no into binary and vice-versa. 32. WAP to print following pattern 1 232 34543 4567654	8

	33. WAP to print following pattern 1 101 10101 34. WAP to compute the following polynomial at any point $P(x) = x^3 – x^5 + x^7 – x^9 + ….n$ 35. $1/2(x\text{-}1/x) + 1/2(x\text{-}1/x)^2 + 1/2(x\text{-}1/x)^3 + …+n$ 36. $S= 1+x^2 + x^4 + x^6 + … +n$ 37. $S= x- x^3/3! + x^5/5! - x^7/7! + … n$ 38. Ackerman function:- $A(m,n) = n+1, m=0$ $A(m-1), m!=0, n=0$ $A(m-1, A(m,n-1)), m!=0, n!=0$ 39. WAP to find factorial of integer using recursion and without recursion 40. WAP to swap 2 nos. by call by reference	
III	**[Course Outcome (s) No. : 1, 2, 3]** 41. WAP to sort n numbers using array 42. To display nth no. stored in array 43. WAP to demonstrate what kind of operation can be performed on pointers. 44. WAP to pass 1-d array to function & using this function find 2 largest element 45. WAP to add two matrices. 46. WAP to multiply two matrices 47. WAP to find transpose of matrix 48. WAP to find greatest and smallest element in an array	8

	49. WAP to insert an element at a location in an array 50. WAP to delete an element from a location in an array 51. Linear and Binary search 52. Bubble sorting 53. WAP to find 2nd largest and 2nd smallest an element in an array 54. WAP to input string from terminal & display it 55. WAP to find reverse of string 56. Enter two strings & compare them using inbuilt function. 57. To convert string to lowercase to uppercase 58. String concatenation 59. Display ascii value of individual character of string 60. To find a character in string, display location & no. of occurrences.	
IV	**[Course Outcome (s) No. : 2, 3, 4]** 61. WAP C Program to Calculate the Simple Interest 62. WAP C Program to Find the GCD and LCM of Two Integers 63. WAP C Program to find HCF of a given Number using Recursion 64. WAP C Program to Calculate the Value of sin(x) 65. WAP C Program to Calculate the Value of cos(x) 66. WAP C Program to Calculate the Sum of cos(x) Series 67. WAP C Program to Find the Sum of First N Natural Numbers 68. WAP to find prime numbers in a given range 69. WAP C Program to Calculate the Mean, Variance & Standard Deviation 70. WAP C Program to Evaluate the given Polynomial Equation 71. WAP C program to Calculate the value of nCr 72. WAP C Program to Find & Display Multiplication Table 73. WAP to create, initialize, assign and access a pointer variable. 74. WAP to swap two numbers using pointers. 75. WAP to change the value of constant integer using pointers.	8

	76. WAP to print a string using pointer. 77. WAP to count vowels and consonants in a string using pointer. 78. WAP to read array elements and print with addresses. 79. WAP to print size of different types of pointer variables. 80. WAP to demonstrate example of array of pointers.	

Suggested Readings:

1. Balagurusamy, E. *Programming in ANSI C*. 3rd edition. TATA McGraw Hill, 2016.
2. Brain W. K. and Ritchie D. M. *C Programme Language*. 2nd edition, Pearson, 2015.
3. Darnell, P. A. and Margolis, P. E. *C: A Software Engineering Approach*. Narosa Publishing, House (Springer International Student Edition), 2012.
4. Yashavant, P. K. *Let Us C*. BPB Publication, 2008.
5. Byrons, G. *Programming With C*. 2nd edition, Schaum's Series, 1996.

Course No: 7	Course Name: Introduction to Mathematical Analysis						Course Code: SBSMAT 01 01 01 GEC 3104
Batch:	**Programme:**	**Semester:**	**L**	**T**	**P**	**Credits**	**Contact Hrs per Week:**
2021-2023	M.Sc. Mathematics	I					**4**
			3	1	0	4	**Total Hours: 60**

Total Evaluation Marks: 100 **CIE:** 30 Marks **TEE:** 70 Marks	**Examination Duration:** 3 hours **Pre-requisite of course:** Nil

Course Objective	The course will develop a deep and rigorous understanding of sets and functions, and defining terms to prove the results on convergence of sequences and series, defining limit, continuity, differentiability and their geometrical representation. These concepts have wide range of applications in real life.
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1:** Understand many properties of sets and their relations, including finite set and countable set. **CO2:** Define functions and their classifications, including algebraic and transcendental functions and their geometric representations.

	CO3: Define sequences in term of functions from N to R and their convergences. **CO4:** Recognize limit, continuity and differentiability and their geometrical interpretation.

COURSE SYLLABUS

NOTE:

Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit I will be taught via online mode.

OR

1. Question no. 1 has seven parts and students need to answer any four. Each part carries three and half Marks.

2. Question no. 2 to 5 have three parts and student need to answer any two parts of each question. Each part carries seven marks

Unit No.	Content of Each Unit	Hours of Each Unit
I	**[Course Outcome (s) No. : 1]** Sets, different kinds of sets, infinite and finite sets, countability, types of relations – void, universal, reflexive, symmetric, transitive and equivalence classes, complex numbers, graphic representation and properties, polar form of complex numbers, de Movier's theorem.	15
II	**[Course Outcome (s) No. : 2]** Functions, domain, co-domain, range, classification of real functions, algebraic and transcendental functions, even and odd functions, periodic functions, graphs of some important functions.	15

III	**[Course Outcome (s) No. : 3]** Definition of sequence and its convergence, series and convergence. Quadratic equations and roots, nature of roots.	15
IV	**[Course Outcome (s) No. : 4]** Limits, continuity and differentiability: Limit of a function, fundamental theorem on limits, methods of evaluating limits, existence of limit, left hand and right hand limit, continuity at a point, continuity in an interval, differentiability of a function at a point and in an interval, geometrical interpretation.	15

Suggested Readings:

1. Walter, R. *Principles of Mathematical Analysis*. 3rdedition, McGraw-Hill, 2017.
2. Ram, B. *Discrete Mathematics*. Pearson Education, 2012.
3. Malik, S. C. and Arora, S. *Mathematical Analysis*. 2ndedition. New Age International Publishers, 2005.
4. Somasundram, D. and Chaudhary, B. *A First Course in Mathematical Analysis*. Narosa Publishing House, 1996.
5. Royden, H. L. *Real Analysis,* Macmillan Pub. Co., Inc. 4thcomplex an Edition, New York, 1993.

<table>
<tr><td>Course No: 8</td><td colspan="3">Course Name: Mathematics for Chemists</td><td colspan="4">Course Code:
SBSMAT 01 01 02 GEC 3104</td></tr>
<tr><td rowspan="2">Batch:

2021-2023</td><td rowspan="2">Programme:

M.Sc.
Mathematics</td><td rowspan="2">Semester:

I</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td>Contact Hrs per Week: 4</td></tr>
<tr><td>3</td><td>1</td><td>0</td><td>4</td><td>Total Hours: 60</td></tr>
<tr><td colspan="2">Total Evaluation Marks:
100

CIE: 30 Marks

TEE: 70 Marks</td><td colspan="5">Examination Duration: 3 hours

Pre-requisite of course: Nil</td></tr>
<tr><td>Course Objective</td><td colspan="6">The main objective of this course is to introduce the students to the exciting world of numerical analysis, differential equations and statistics.</td></tr>
<tr><td>Course Outcomes:</td><td colspan="6">After completing this course, student is expected to learn the following:

CO1: Learn the basics of numerical analysis, to calculate the errors in approximations and their properties.

CO2: Understand the basics of differential equations to solve the first order linear differential equations and second order differential equations.

CO3: Analyze the singular points, power series solution of differential equation at regular and irregular singular points, Bessel’s and Legendre’s equations and their solutions.

CO4: Use the basics tools of statistics and by using these techniques to measures central</td></tr>
</table>

	tendency, learn Gaussian and Binomial distributions**.**

COURSE SYLLABUS

NOTE:

Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit I will be taught via online mode.

OR

1. Question no. 1 has seven parts and students need to answer any four. Each part carries three and half Marks.

2. Question no. 2 to 5 have three parts and student need to answer any two parts of each question. Each part carries seven marks

Unit No.	Content of Each Unit	Hours of Each Unit
I	**[Course Outcome (s) No. : 1]** Algebraic, transcendental functions, approximation, errors in approximation, absolute, relative and percentage errors, matrices and their properties, some special matrices, matrix algebra, the inverse matrix, linear transformations, orthogonal matrices and orthogonal transformations.	15
II	**[Course Outcome (s) No. : 2]** Solution of differential equations, first-order linear equations- separable equations, homogeneous linear equations, non-homogeneous linear equations, second-order differential equations with constant coefficients, general solution, particular solution, linear equations in chemical kinetics, harmonic oscillator and some other applications	15

III	**[Course Outcome (s) No. : 3]** Singular points, power series solution of differential equation at regular and irregular singular points, Bessel's and Legendre's equations and their solutions, partial differentiation, types of partial differential equations. Line integrals, double integrals, change of variables, polar coordinates, volume integrals, Laplacian operator, finite difference operators.	15
IV	**[Course Outcome (s) No. : 4]** Descriptive statistics, measures of central tendency, measures of dispersion, frequency and probability, permutations and combinations, binomial distribution, Gaussian distribution.	15

Suggested Readings:

1. Gupta, S. C. and Kapoor, V.K. *Fundamentals of Mathematical Statistics.* S. Chand & Sons, 2014.
2. Steiner, E. *The Chemistry Maths Book.* 2nd edition, Oxford University Press, 2008.
3. Lipschutz, S. and Lipson, M. *Linear Algebra*. 3rd edition, Tata McGraw-Hill, 2005.
4. Raisinghania, M. D. *Advanced Differential Equations*. S. Chand & Company Ltd. New Delhi, 2001.

<table>
<tr><td>Course No: 9</td><td colspan="5">Course Name: Basic Mathematics for Social Science</td><td colspan="2">Course Code:
SBSMAT 01 01 03 GEC 3104</td></tr>
<tr><td rowspan="2">Batch:

2021-2023</td><td rowspan="2">Programme:

M.Sc.
Mathematics</td><td rowspan="2">Semester:

I</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td>Contact Hrs per Week: 4</td></tr>
<tr><td>3</td><td>1</td><td>0</td><td>4</td><td>Total Hours: 60</td></tr>
<tr><td colspan="3" rowspan="2">Total Evaluation Marks:
100

CIE: 30 Marks

TEE: 70 Marks</td><td colspan="5">Examination Duration: 3 hours</td></tr>
<tr><td colspan="5">Pre-requisite of course: Nil</td></tr>
<tr><td>Course Objective</td><td colspan="7">The main objective of this course is to encourage students to develop a working knowledge of the basic Mathematics for social science and will present some of the ideas that form the foundation of quantitative work in the social sciences. In particular, topics from logarithm, set theory, matrix theory and calculus will be discussed with emphasis on the understanding of concepts and the development of intuition.</td></tr>
<tr><td>Course Outcomes:</td><td colspan="7">After completing this course, student is expected to learn the following:

CO1: Explain the fundamental concepts of indices, logarithm and antilogarithm and their role in basic Mathematics for social science.

CO2: Demonstrate accurate and efficient use of set theory and Venn diagram.

CO3: Understand and use the terms: function, relation, series arithmetic, geometric progression, Permutations and Combinations.</td></tr>
</table>

	CO4: Understand the concepts and properties of limits, continuity and differentiation of a function, logical reasoning, probability and descriptive statistics.

COURSE SYLLABUS

NOTE:

Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit I will be taught via online mode.

OR

1. Question no. 1 has seven parts and students need to answer any four. Each part carries three and half Marks.
2. Question no. 2 to 5 have three parts and student need to answer any two parts of each question. Each part carries seven marks

Unit No.	Content of Each Unit	Hours of Each Unit
I	**[Course Outcome (s) No. : 1]** Binary numbers, indices, logarithm and antilogarithm, laws and properties of logarithms, simple applications of logarithm and antilogarithm, numerical problems on averages, calendar, clock, time, work and distance, mensuration, seating arrangement, sets, types of sets, Venn diagram, De Morgan's laws, problem solving using Venn diagram, relations and types of relations.	15
II	**[Course Outcome (s) No. : 2]** Introduction of sequences, series arithmetic and geometric progression, relationship between AM and GM. Basic concepts of permutations and combinations, permutations, combinations with standard results. Introducing functions, domain and range of a function, types of functions (Polynomial function; Rational function; Logarithm function, Exponential function; Modulus	15

	function; Greatest Integer function, Signum function), Graphical representation of functions.	
III	**[Course Outcome (s) No. : 3]** Concept of limits and continuity of a function, instantaneous rates of change, differentiation as a process of finding derivative, derivatives of algebraic functions using Chain rule. Mathematically acceptable statements, connecting words/ phrases in Mathematical statement consolidating the understanding of "if and only if (necessary and sufficient) condition", "implies", "and/or", "implied by", "and", "or", "there exists" and their use through variety of examples related to real life and Mathematics problems based on logical reasoning (coding-decoding, odd man out, blood, relation, syllogism etc).	15
IV	**[Course Outcome (s) No. : 4]** Random experiment, sample space, events, mutually exclusive events. Independent and dependent Events, law of total probability, Bayes' Theorem. Data on various scales (nominal, ordinal, interval and ratio scale), data representation and visualization, data interpretation (dispersion, deviation, variance, skewness and kurtosis), percentile rank and quartile rank, correlation (Pearson and Spearman method of correlation), applications of descriptive statistics using real time data.	15

Suggested Readings:

1. Gill J. *Essential Mathematics for Political and Social Research*, Cambridge University Press, 2016.
2. Haeussler E., Paul R. and Wood R. *Introductory Mathematical Analysis for Business, Economics, and the Life and Social Sciences*, 15th edition. Prentice-Hall, 2015.
3. Goldstein L., Lay D., and Schneider D. *Calculus and Its Applications*, 14th Edition. Prentice Hall, 2014.
4. Hagle T. *Basic Math for Social Scientists*: Problems and Solutions, 1996.
5. Hagle T. *Basic Math for Social Scientists*: Concepts, 1996.
6. Kleppner D. and Ramsey N. *Quick Calculus*. Wiley, 1995.
7. Namboodiri K. *Matrix Algebra: An Introduction*. Sage Publications # 38, 1994.

SEMESTER – II

<table>
<tr><td>Course No: 10</td><td colspan="3">Course Name: Linear Algebra</td><td colspan="4">Course Code:
SBSMAT 01 02 01 C 3104</td></tr>
<tr><td rowspan="2">Batch:

2021-2023</td><td rowspan="2">Programme:

M.Sc.
Mathematics</td><td rowspan="2">Semester:

II</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td>Contact Hrs per Week: 4</td></tr>
<tr><td>3</td><td>1</td><td>0</td><td>4</td><td>Total Hours: 60</td></tr>
<tr><td colspan="2" rowspan="2">Total Evaluation Marks: 100

CIE: 30 Marks

TEE: 70 Marks</td><td colspan="6">Examination Duration: 3 hours</td></tr>
<tr><td colspan="6">Pre-requisite of course: Nil</td></tr>
<tr><td>Course Objective</td><td colspan="7">To give a brief introduction of vector spaces, linear transformation, matrix representation and various linear operators, which can be used by student for further applications in their respective fields of interest.</td></tr>
<tr><td>Course Outcomes:</td><td colspan="7">After completing this course, student is expected to learn the following:

CO1: Describe the concepts of the terms basis, dimension, and apply these concepts to various vector spaces and subspaces.

CO2: Use the concept of linear transformations, matrix representation and change of basis, including kernel, range.

CO3: Understand the notion of bilinear forms, triangularization and primary</td></tr>
</table>

	decomposition theorem **CO4:** Compute inner products and determine orthogonality on vector spaces, applying Gram-Schmidt orthogonalization process to find the orthonormal basis.

COURSE SYLLABUS

NOTE:

Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit I will be taught via online mode.

OR

1. Question no. 1 has seven parts and students need to answer any four. Each part carries three and half Marks.

2. Question no. 2 to 5 have three parts and student need to answer any two parts of each question. Each part carries seven marks

Unit No.	Content of Each Unit	Hours of Each Unit
I	**[Course Outcome (s) No. : 1]** System of linear equation, vector spaces: definition and examples, subspaces, linear dependence, basis and dimension, sum and direct sum, quotient spaces, linear transformations: kernel and image of a linear transformation, rank and nullity of a linear transformation, matrix mappings.	15
II	**[Course Outcome (s) No. : 2]** Linear mappings and matrices: matrix representation of linear transformation, change of basis, similarity, polynomial of matrices, characteristic polynomial, Cayley-Hamilton theorem, diagonalization,	15

	minimal polynomial, companion matrix.	
III	**[Course Outcome (s) No. : 3]** Canonical and bilinear forms: triangular form, invariance, primary decomposition, Jordon canonical form, rational canonical form, bilinear and quadratic forms, reduction and classification of quadratic forms.	15
IV	**[Course Outcome (s) No. : 4]** Inner product space, examples and properties, norms and distances, orthonormal basis, the Gram-Schmidt orthogonalization, orthogonal complements, the adjoint of a linear operator on an inner product space, normal and self-adjoint operators, unitary operators.	15

Suggested Readings:

1. Hoffman, K. and Kunze, R. *Linear Algebra*. 2nd edition, Pearson India, 2015.
2. Axler, S. *Linear Algebra Done Right*. 2nd edition, Springer-Verlag, 2014.
3. Lang, S. *Linear Algebra*. 3rd edition, Springer-Verlag, New York, 2013.
4. Lipschutz, S. and Lipson, M. *Linear Algebra*. 3rd edition, Tata McGraw-Hill, 2005.
5. Friedberg, S. H., Insel, A. J. and Spence, L. E. *Linear Algebra*. 4th edition, 2002

Course No: 11	**Course Name:** Topology				**Course Code:** SBSMAT 01 02 02 C 3104		
Batch: 2021-2023	**Programme:** M.Sc. Mathematics	**Semester:** II	**L**	**T**	**P**	**Credits**	**Contact Hrs per Week: 4**
			3	1	0	4	**Total Hours: 60**
Total Evaluation Marks: 100 **CIE:** 30 Marks **TEE:** 70 Marks		**Examination Duration:** 3 hours **Pre-requisite of course:** Nil					
Course Objective	This course aims to teach the fundamentals of point set topology and constitute an awareness of need for the topology in Mathematics. It is a central of modern analysis, and many further interesting generalizations of metric space have been developed.						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1:** Construct topological spaces from metric spaces and using general properties of neighbourhoods, open sets, close sets, basis and sub-basis **CO2:** Apply the properties of open sets, close sets, interior points, accumulation points and derived sets in deriving the proofs of various theorems **CO3:** Understand the concepts of countable spaces and separable spaces						

	CO4: Learn the concepts and properties of the compact and connected topological spaces

COURSE SYLLABUS

NOTE:

Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit I will be taught via online mode.

OR

1. Question no. 1 has seven parts and students need to answer any four. Each part carries three and half Marks.

2. Question no. 2 to 5 have three parts and student need to answer any two parts of each question. Each part carries seven marks

Unit No.	Content of Each Unit	Hours of Each Unit
I	**[Course Outcome (s) No. : 1]** Definition and examples of topological spaces, basis and sub-basis, open sets, closed sets, interior points, limit points, boundary points, exterior points of a set, closure of a set, derived set, Hausdorff spaces.	15
II	**[Course Outcome (s) No. : 2]** Subspace topology, continuous functions, metric topology, convergence of sequences, sequential continuity, open and closed mappings, homeomorphism, pasting lemma, product topology, Tychonoff theorem.	15

III	**[Course Outcome (s) No. : 3]** Connectedness, continuity and connectedness, connected subsets of the real line, components, path connectedness, locally connected, locally path connected. Compactness and its characterizations, compact subspace of the real line, continuity and compact sets, compactness and finite intersection property.	15
IV	**[Course Outcome (s) No. : 4]** Countability and separation axioms, T_0, T_1, T_2, Lindelof spaces, regular and normal spaces, Urysohn Lemma, metrization theorems (Urysohnmetrization, Nagata-Smirnov metrization theorem), Tietze extension theorem, compactification.	15

Suggested Readings:

1. Joshi, K. D. *Introduction to General Topology*. 2nd edition, New Age International Private Limited, 2017.
2. Munkres, J. R. *Toplogy*. Pearson Education, 2017.
3. Simmons, G. F. *Introduction to Topology and Modern Analysis*. Tata McGraw-Hill Education, 2016.
4. Pervin, W. J. *Foundations of General Topology*. Academic Press, 2014.
5. Singh, T. B. *Elements of Topology*. CRC Press, Taylor Francis, 2013.
6. Kelley, J. L. *General Topology*. 2nd edition, Springer, New York, 1991.

<table>
<tr><td>Course No: 12</td><td colspan="3">Course Name: Numerical Analysis</td><td colspan="4">Course Code:
SBSMAT 01 02 03 C 3104</td></tr>
<tr><td rowspan="2">Batch:

2021-2023</td><td rowspan="2">Programme:

M.Sc.
Mathematics</td><td rowspan="2">Semester:

II</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td>Contact Hrs per Week: 4</td></tr>
<tr><td>3</td><td>1</td><td>0</td><td>4</td><td>Total Hours: 60</td></tr>
<tr><td colspan="3">Total Evaluation Marks:
100

CIE: 30 Marks

TEE: 70 Marks</td><td colspan="5">Examination Duration: 3 hours

Pre-requisite of course: Nil</td></tr>
<tr><td>Course Objective</td><td colspan="7">The rapid growth of science and technology during last few decades has made a tremendous change in the nature of various mathematical problems. It is very difficult and almost impossible to get analytical solutions in case of many of these problems. These shortcomings of analytical solutions lead us to various numerical techniques developed for different types of mathematical problems seem to be an excellent option. The course objective is to acquaint the students with a wide range of numerical methods to solve algebraic and transcendental equations, linear system of equations, interpolation and curve fitting problems, numerical integration, initial and boundary value problems, etc.</td></tr>
</table>

Course Outcomes:	After completing this course, student is expected to learn the following: **CO1:** Overview the errors in computation and their measurements **CO2:** Apply numerical techniques to obtain approximate solutions to otherwise intractable mathematical problems **CO3:** Learn numerical technique to find the solutions of nonlinear equations, system of linear equations, interpolation problems, numerical differentiations and integration, Initial and boundary value problems **CO4:** Familiarized the students with convergence, advantages and limitations of these numerical techniques

COURSE SYLLABUS

NOTE:

Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit I will be taught via online mode.

OR

1. Question no. 1 has seven parts and students need to answer any four. Each part carries three and half Marks.

2. Question no. 2 to 5 have three parts and student need to answer any two parts of each question. Each part carries seven marks

Unit No.	Content of Each Unit	Hours of Each Unit
I	**[Course Outcome (s) No. : 1, 2, 3, 4]** Errors in approximation, absolute, relative and percentage errors, round-off error. Solution of algebraic and transcendental equations: bisection method, Regula Falsi method, Secant method, method of iteration, Newton Raphson method,	16

	order of convergence. Systems of simultaneous equations: Gauss elimination method, Gauss Jordon method, LU decomposition method, Iterative methods: Jacobi method and Gauss-Seidel method.	
II	**[Course Outcome (s) No. : 2, 3, 4]** Finite differences, Interpolation techniques for equal intervals-Newton forward and backward, Gauss forward, Gauss Backward, Stirling, Bessel formulae. Interpolation with unequal intervals-Newton's divided difference method, Lagrange method. Hermite interpolation, Power method for eigenvalue problem.	14
III	**[Course Outcome (s) No. : 2, 3, 4]** Numerical differentiation using Newton forward and backward formulae. Numerical integration: Newton-Cotes formulas, trapezoidal rule, Simpson rule, Gauss-Legendre, Gauss-Chebyshev formulas, Romberg's integration, Curve fitting: straight line fitting, parabolic curve fitting, fitting of exponential curve, fitting of other curves. Cubic splines	16
IV	**[Course Outcome (s) No. : 2, 3, 4]** Solution of ordinary differential equations: Taylor series method, Picard's method, Euler method, Euler modified method, Runge–Kutta methods, Milne's and Adam's predictor and corrector methods. Finite difference method for boundary value problems.	14

Suggested Readings:

1. Gupta, R. K. *Numerical Methods: Fundamentals and Applications.* 1st edition, Cambridge Universi Press, 2019.

2. Thangaraj, P. *Computer Oriented Numerical Methods*. PHI Learning Pvt. Ltd, 2013.

3. Jain, M. K., Iyengar, S. R. K. and Jain, R. K. *Numerical Methods for Scientific & Engineering Computation*. New Age International, 2012.

4. Burden R. L. and Faires J. D. *Numerical Analysis*. 9th Edition, Cengage Learning, 2011.

5. Chapra, S. C. and Canale, R. P. *Numerical Methods for Engineers*. McGraw Hill, International Edition, 1998.

6. Mathews, J. H. *Numerical Methods for Mathematics, Science and Engineering*. Prentice- Hall, International Editions, 1992.

<table>
<tr><td>Course No:
13</td><td colspan="4">Course Name: Lab For Numerical Analysis</td><td colspan="3">Course Code:
SBSMAT 01 02 04 C 0021</td></tr>
<tr><td rowspan="2">Batch:

2021-2023</td><td rowspan="2">Programme:

M.Sc.
Mathematics</td><td rowspan="2">Semester:

II</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td>Contact Hrs per Week:
2</td></tr>
<tr><td>0</td><td>0</td><td>2</td><td>1</td><td>Total Hours:
32</td></tr>
<tr><td colspan="2" rowspan="2">Total Evaluation Marks:
100

CIE: 30 Marks

TEE: 70 Marks</td><td colspan="6">Examination Duration: 3 hours</td></tr>
<tr><td colspan="6">Pre-requisite of course: Nil</td></tr>
<tr><td>Course Objective</td><td colspan="7">The lab component of this course is aim to design the programs on C/C++/MATLAB for various numerical methods covered in the course.</td></tr>
<tr><td>Course Outcomes:</td><td colspan="7">After completing this course, student is expected to learn the following:

CO1: Write efficient and well documented codes for various numerical methods and present outputs in an informative way

CO2: Able to solve problems covered in the theory paper (Numerical Analysis) with more accuracy using computer code.</td></tr>
<tr><td colspan="8">COURSE SYLLABUS</td></tr>
<tr><td colspan="8">NOTE:
Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit I</td></tr>
</table>

will be taught via online mode.

OR

1. Question no. 1 has seven parts and students need to answer any four. Each part carries three and half Marks.

2. Question no. 2 to 5 have three parts and student need to answer any two parts of each question. Each part carries seven marks

Unit No.	Content of Each Unit	Hours of Each Unit
I	**[Course Outcome (s) No. : 1, 2]** 1. To detect the interval(s) which contain(s) root of equation f(x)=0 and implement bisection method to find root of f(x)=0 in the detected interval. 2. To find the root of f(x)=0 using Regula Falsi and Secant methods 3. To find the root of f(x)=0 using Newton -Raphson and fixed point iteration methods. 4. To solve linear system of equations using Gauss elimination (without pivoting) method.	8
II	**[Course Outcome (s) No. : 1, 2]** 5. To solve linear system of equations using Gauss Jordan method. 6. To solve linear system of equations using Jacobi and Gauss-Seidel methods 7. To compute the intermediate value using the Newton's forward	8

	difference interpolation formula. **8.** To implement Lagrange interpolation formula	
III	**[Course Outcome (s) No. : 1, 2]** 9. To compute Newton divided difference (NDD) table and use it compute interpolating value with NDD formula. 10. To integrate a function numerically using trapezoidal and Simpson's rules. 11. To compute integration numerically from a data set using trapezoidal and Simpson's rules 12. To fit a straight line to a given data set	8
IV	**[Course Outcome (s) No. : 1, 2]** 13. To solve the initial value problem using Euler and modified Euler's methods. 14. To apply Milne's and Adam's predictor and corrector methods for solution of initial value problems 15. To solve the initial value problem using Runge-Kutta methods. 16. To apply finite difference method for boundary value problems	8

Suggested Readings:

1. Gupta, R. K. *Numerical Methods: Fundamentals and Applications.* 1st edition, Cambridge University Press, 2019.

   General Resources: C-Programs available online at https://www.cambridge.org/

2. Thangaraj, P. *Computer Oriented Numerical Methods*. PHI Learning Pvt. Ltd, 2013.

3. Burden R.L. and Faires J. D. *Numerical Analysis*. 9th Edition, Cengage Learning, 2011.

4. Chapra, S. C. and Canale, R. P. *Numerical Methods for Engineers*. McGraw Hill, International Edition, 1998.

5. Mathews, J. H. *Numerical Methods for Mathematics, Science and Engineering*. Prentice- Hall, International Editions, 1992.

Course No: 14	**Course Name:** Typesetting In Latex				**Course Code:** SBSMAT 01 02 05 C 2023		
Batch:	**Programme:**	**Semester:**	**L**	**T**	**P**	**Credits**	**Contact Hrs per Week:**
2021-2023	M.Sc. Mathematics	II					**4**
			2	0	2	3	**Total Hours: 60**
Total Evaluation Marks: 100		**Examination Duration:** 3 hours					
CIE: 30 Marks **TEE:** 70 Marks		**Pre-requisite of course:** Nil					
Course Objective	The purpose of this course is to acquaint students with the latest typesetting skills, which shall enable them to prepare high quality typesetting, beamer presentation and drawing graphs.						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1:** Typeset mathematical formulas, use nested list, tabular & array environments. **CO2:** Create or import graphics. **CO3:** Use alignment command and multiline formulas, bibliography and citation, making index and glossary. **CO4:** Use beamer to create presentation and typeset mathematical Projects, Dissertation, Thesis and Books.						

COURSE SYLLABUS

NOTE:

Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit I will be taught via online mode.

OR

1. Question no. 1 has seven parts and students need to answer any four. Each part carries three and half Marks.

2. Question no. 2 to 5 have three parts and student need to answer any two parts of each question. Each part carries seven marks

Unit No.	Content of Each Unit	Hours of Each Unit
I	**[Course Outcome (s) No. : 1, 3]** Preparing an input file, sentences and paragraphs, the document class, sectioning, display material, running Latex, changing the type style, producing mathematical symbols and mathematical formulae, arrays, delimiters, multiline formulae, putting one thing on other, spacing in math mode.	15
II	**[Course Outcome (s) No. : 2, 3]** Defining command and environments, producing and including graphics in a Latex file, figures and other floating bodies, lining it up in columns, table of content, cross-reference, bibliography and citation, making index and glossary, slides, overlays and notes, letters.	15

III	**[Course Outcome (s) No. :1, 3, 4]** Design it yourself: document class, page style, title page, customizing the style, line and page breaking, numbering, length, spaces and boxes, formatting with boxes, centring and flushing, list making environments, changing font type size and special symbols, picture, picture environments, picture objects, text, boxes, straight lines, arrow, stacks, circles, oval, framing, curve, grid, repeat patterns.	15
IV	**[Course Outcome (s) No. : 3, 4]** Making presentation slides in beamer class Latex, various styles in beamer presentation, dynamic slides. postscript macros for generic tex (pstrix): arguments, dimension, coordinates, angles, line styles, fill styles, custom styles, custom graphics, picture tools, text tricks, node and connection special tricks, basics of mathjax, mathjax configuration options.	15

Suggested Readings:

1. Kottwitz, S. *LaTeX Beginner's Guide*. Packt Publishing Ltd., UK, 2011.
2. Leslie L. *A Document Preparation System User's Guide and Reference Manual*, Addison-Wesley Publishing Company, 2001.
3. Tantau,T. *User Guide to the Beamer Class*, http://latex-beamer.sourceforge.net.
4. Oetiker,T. *The Not So Short Introduction to LATEX2E*, https://tobi.oetiker.ch/lshort/lshort.pdf.

Course No: 15	**Course Name:** Typesetting in Latex				**Course Code:** SBSMAT 01 02 01 GEC 2124		
Batch:	**Programme:**	**Semester:**	**L**	**T**	**P**	**Credits**	**Contact Hrs per Week:**
2021-2023	M.Sc. Mathematics	II					**4**
			2	0	2	3	**Total Hours: 60**
Total Evaluation Marks: 100 **CIE:** 30 Marks **TEE:** 70 Marks		**Examination Duration:** 3 hours **Pre-requisite of course:** Nil					
Course Objective	The purpose of this course is to acquaint students with the latest typesetting skills, which shall enable them to prepare high quality typesetting, beamer presentation and drawing graphs.						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1:** Typeset mathematical formulas, use nested list, tabular & array environments. **CO2:** Create or import graphics. **CO3:** Use alignment command and multiline formulas, bibliography and citation, making index and glossary. **CO4:** Use beamer to create presentation and typeset mathematical Projects, Dissertation, Thesis and Books.						
COURSE SYLLABUS							
NOTE: Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit I							

will be taught via online mode.

OR

1. Question no. 1 has seven parts and students need to answer any four. Each part carries three and half Marks.

2. Question no. 2 to 5 have three parts and student need to answer any two parts of each question. Each part carries seven marks

Unit No.	Content of Each Unit	Hours of Each Unit
I	**[Course Outcome (s) No. : 1, 3]** Preparing an input file, sentences and paragraphs, the document class, sectioning, display material, running Latex, changing the type style, producing mathematical symbols and mathematical formulae, arrays, delimiters, multiline formulae, putting one thing on other, spacing in math mode.	15
II	**[Course Outcome (s) No. : 2, 3]** Defining command and environments, producing and including graphics in a Latex file, figures and other floating bodies, lining it up in columns, table of content, cross-reference, bibliography and citation, making index and glossary, slides, overlays and notes, letters.	15
III	**[Course Outcome (s) No. :1, 3, 4]** Design it yourself: document class, page style, title page, customizing the style, line and page breaking, numbering, length, spaces and boxes, formatting with boxes, centring and flushing, list making environments, changing font type size and special symbols, picture, picture environments, picture objects, text, boxes, straight lines, arrow, stacks, circles, oval, framing, curve, grid, repeat patterns.	15
IV	**[Course Outcome (s) No. : 3, 4]** Making presentation slides in beamer class Latex, various styles in beamer presentation, dynamic slides. postscript macros for generic tex (pstrix): arguments, dimension, coordinates, angles, line styles, fill styles, custom styles, custom graphics, picture tools, text tricks, node and connection special tricks,	15

	basics of mathjax, mathjax configuration options.	

Suggested Readings:

5. Kottwitz, S. *LaTeX Beginner's Guide*. Packt Publishing Ltd., UK, 2011.
6. Leslie L. *A Document Preparation System User's Guide and Reference Manual*, Addison-Wesley Publishing Company, 2001.
7. Tantau,T. *User Guide to the Beamer Class*, http://latex-beamer.sourceforge.net.
8. Oetiker,T. *The Not So Short Introduction to LATEX2E*, https://tobi.oetiker.ch/lshort/lshort.pdf.

Course No: 16	**Course Name:** Numerical Methods				**Course Code:** SBSMAT 01 02 02 GEC 2124		
Batch:	**Programme:**	**Semester:**	**L**	**T**	**P**	**Credits**	**Contact Hrs per Week:**
2021-2023	M.Sc. Mathematics	II					**4**
			2	1	2	4	**Total Hours: 60**
Total Evaluation Marks: 100 **CIE:** 30 Marks **TEE:** 70 Marks		**Examination Duration:** 3 hours **Pre-requisite of course:** Nil					
Course Objective	The rapid growth of science and technology during last few decades has made a tremendous change in the nature of various mathematical problems. It is very difficult and almost impossible to get analytical solutions in case of many of these problems. These shortcomings of analytical solutions lead us to various numerical techniques developed for different types of mathematical problems seem to be an excellent option. The course objective is to acquaint the students with a wide range of numerical methods to solve algebraic and transcendental equations, linear system of equations, interpolation and curve fitting problems, numerical integration, initial and boundary value problems, etc.						

Course Outcomes:	After completing this course, student is expected to learn the following: **CO1:** Overview the errors in computation and their measurements **CO2:** Apply numerical techniques to obtain approximate solutions to otherwise intractable mathematical problems **CO3:** Learn numerical technique to find the solutions of nonlinear equations, system of linear equations, interpolation problems, numerical differentiations and integration, Initial and boundary value problems **CO4:** Familiarized the students with convergence, advantages and limitations of these numerical techniques

COURSE SYLLABUS

NOTE:

Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit I will be taught via online mode.

OR

1. Question no. 1 has seven parts and students need to answer any four. Each part carries three and half Marks.

2. Question no. 2 to 5 have three parts and student need to answer any two parts of each question. Each part carries seven marks

Unit No.	Content of Each Unit	Hours of Each Unit
I	**[Course Outcome (s) No. : 1, 2, 3, 4]** Errors in approximation, absolute, relative and percentage errors, round-off error. Solution of algebraic and transcendental equations: bisection method, Regula Falsi method, Secant method, method of iteration, Newton Raphson method, order of	16

	convergence. Systems of simultaneous equations: Gauss elimination method, Gauss Jordon method, LU decomposition method, Iterative methods: Jacobi method and Gauss-Seidel method.	
II	**[Course Outcome (s) No. : 2, 3, 4]** Finite differences, Interpolation techniques for equal intervals-Newton forward and backward, Gauss forward, Gauss Backward, Stirling, Bessel formulae. Interpolation with unequal intervals-Newton's divided difference method, Lagrange method. Hermite interpolation, Power method for eigenvalue problem.	14
III	**[Course Outcome (s) No. : 2, 3, 4]** Numerical differentiation using Newton forward and backward formulae. Numerical integration: Newton-Cotes formulas, trapezoidal rule, Simpson rule, Gauss-Legendre, Gauss-Chebyshev formulas, Romberg's integration, Curve fitting: straight line fitting, parabolic curve fitting, fitting of exponential curve, fitting of other curves. Cubic splines	16
IV	**[Course Outcome (s) No. : 2, 3, 4]** Solution of ordinary differential equations: Taylor series method, Picard's method, Euler method, Euler modified method, Runge–Kutta methods, Milne's and Adam's predictor and corrector methods. Finite difference method for boundary value problems.	14

***Suggested Readings*:**

1. Gupta, R. K. *Numerical Methods: Fundamentals and Applications.* 1st edition, Cambridge Universi Press, 2019.

2. Thangaraj, P. *Computer Oriented Numerical Methods*. PHI Learning Pvt. Ltd, 2013.

3. Jain, M. K., Iyengar, S. R. K. and Jain, R. K. *Numerical Methods for Scientific & Engineering Computation*. New Age International, 2012.

4. Burden R.L. and Faires J. D. *Numerical Analysis*. 9th Edition, Cengage Learning, 2011.

5. Chapra, S. C. and Canale, R. P. *Numerical Methods for Engineers*. McGraw Hill, International Edition, 1998.

6. Mathews, J. H. *Numerical Methods for Mathematics, Science and Engineering*. Prentice- Hall, International Editions, 1992.

<table>
<tr><td>Course No: 17</td><td colspan="3">Course Name: Discrete Mathematics</td><td colspan="4">Course Code:
SBSMAT 01 02 03 GEC 3104</td></tr>
<tr><td rowspan="2">Batch:

2021-2023</td><td rowspan="2">Programme:

M.Sc.
Mathematics</td><td rowspan="2">Semester:

II</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td>Contact Hrs per Week: 4</td></tr>
<tr><td>3</td><td>1</td><td>0</td><td>4</td><td>Total Hours: 60</td></tr>
<tr><td colspan="2">Total Evaluation Marks:
100

CIE: 30 Marks

TEE: 70 Marks</td><td colspan="5">Examination Duration: 3 hours

Pre-requisite of course: Nil</td></tr>
<tr><td>Course Objective</td><td colspan="6">The objective of the course is to introduce students with the fundamental concepts in Boolean algebra and graph theory, with a sense of some its modern applications. They will be able to use these methods in subsequent courses in the design and analysis of algorithms, computability theory, software engineering, and computer systems.</td></tr>
<tr><td>Course Outcomes:</td><td colspan="6">After completing this course, student is expected to learn the following:

CO1: Understand the concepts of Mathematical Logic: Statement and notations, proposition, Hasse diagram, function and Pigeon hole principle

CO2: Learn the basic concepts of Boolean algebra, lattice, logical gates and relations of Boolean function

CO3: Analyze the basic concepts of graphs, directed graphs, and weighted graphs and able to present a graph by matrices</td></tr>
</table>

	CO4: Use the properties of trees to find a minimal spanning tree for a given weighted graph and understand Eulerian and Hamiltonian graphs

COURSE SYLLABUS

NOTE:

Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit I will be taught via online mode.

OR

1. Question no. 1 has seven parts and students need to answer any four. Each part carries three and half Marks.

2. Question no. 2 to 5 have three parts and student need to answer any two parts of each question. Each part carries seven marks

Unit No.	Content of Each Unit	Hours of Each Unit
I	**[Course Outcome (s) No. : 1]** Mathematical Logic: Statement and notations, proposition and logic operations, connectives(conjunction, disjunction, negation), statement formulas and truth tables, propositions generated by set, equivalence of formulas and implication laws of logic, mathematical systems, propositions over a universe, principal of mathematical induction, variables, quantifiers.	15
II	**[Course Outcome (s) No. : 2]** Relation and Function: Binary relations, properties of binary relation in a set, equivalence relations, composition of binary relations, partial ordering and partial order set, Hasse diagram, function and Pigeon hole principle, recursion definition, many faces of recursion, recurrence relations, common recurrence	15

	relations, generating functions and their solutions.	
III	**[Course Outcome (s) No. : 3]** Boolean algebra: Posets, lattice and basic properties of Boolean algebraic, principle of duality, distributive and complemented lattices, uniqueness of finite Boolean algebra, Boolean functions and Boolean expressions, normal forms of Boolean expression and simplifications of Boolean expressions, basic circuits and theorems, logical gates and relations of Boolean function.	15
IV	**[Course Outcome (s) No. : 4]** Graph theory: Basic terminology of graph theory, paths, circuits, graph connectivity, Eulerian paths, multigraphs, weighted graphs. Trees, spanning trees, binary trees, rooted trees, planar graphs, Eulers theorem. The Konigsberg bridge problem and Eulerian graphs, Hamiltonian graphs.	15

***Suggested Readings*:**

1. Ram, B. Discrete Mathematics, Pearson Education, 2012.
2. Rosen, K. H. *Discrete Mathematics and Its Applications*. 7th edition, Tata McGraw Hill, 2011.
3. Khanna, V. K. *Lattices and Boolean Algebras*. PHI Publication, 2004.
4. Lipschutz, S., Lipson, M.L. and Patil, V.H. *Discrete Mathematics.* Schaum's Outline Series, Tata McGraw-Hill Education, 2006.
5. Liu, C. L. *Elements of Discrete Mathematics.* Tata McGraw Hill, 2000.
6. Trembley, J. P. and Manohar, R. *A First Course in Discrete Structure with applications to Computer Science*. Tata McGraw Hill, 1999.

<table>
<tr><td>Course No: 18</td><td colspan="3">Course Name: Wavelet Analysis</td><td colspan="4">Course Code:
SBSMAT 01 02 01 DCEC 3104</td></tr>
<tr><td>Batch:

2021-2023</td><td>Programme:

M.Sc.
Mathematics</td><td>Semester:

II</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td>Contact Hrs per Week: 4</td></tr>
<tr><td></td><td></td><td></td><td>3</td><td>1</td><td>0</td><td>4</td><td>Total Hours: 60</td></tr>
<tr><td colspan="2">Total Evaluation Marks:
100

CIE: 30 Marks

TEE: 70 Marks</td><td colspan="6">Examination Duration: 3 hours

Pre-requisite of course: Nil</td></tr>
<tr><td>Course Objective</td><td colspan="7">The course aim is to introduce a flexible system which provide stable reconstruction and analysis of functions (signals) and the construction of variety of orthonormal bases by applying operators on a single wavelet function.</td></tr>
<tr><td>Course Outcomes:</td><td colspan="7">After completing this course, student is expected to learn the following:

CO1: Understand the approximation of functions (signals) by frame theory.

CO2: Use the applications of frames in stable analysis and decompositions of functions.

CO3: Learn the applications of wavelets in the construction of orthonormal bases by wavelets.

CO4: Analyse different types of transforms in term of operators.</td></tr>
<tr><td colspan="8">COURSE SYLLABUS</td></tr>
<tr><td colspan="8">NOTE:</td></tr>
</table>

Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit I will be taught via online mode.

OR

1. Question no. 1 has seven parts and students need to answer any four. Each part carries three and half Marks.

2. Question no. 2 to 5 have three parts and student need to answer any two parts of each question. Each part carries seven marks

Unit No.	Content of Each Unit	Hours of Each Unit
I	**[Course Outcome (s) No. : 1]** Review of inner product spaces, orthonormal systems, frames in C^n, frames algorithms, frames and Bessel sequences in infinite dimensional Hilbert spaces, frame sequence, the Gram matrix associated with Bessel sequences.	15
II	**[Course Outcome (s) No. : 2]** Frames and operators, characterization of frames, dual frames, tight frames. Riesz bases, frames versus Riesz bases, conditions for a frame being a Riesz basis, frames containing a Riesz basis, perturbation of frames.	15
III	**[Course Outcome (s) No. : 3]** Wavelets, Haar wavelets, basic properties of the Haar scaling function, Haar decomposition and reconstruction algorithms, the Daubechies wavelets, wavelet bases, scaling function. multire solution analysis (MRA), construction of wavelets from MRA.	15
IV	**[Course Outcome (s) No. : 4]** Windowed Fourier transform (WFT), continuous Fourier transform (CFT), continuous wavelet transform (CWT), comparison between CFT and CWT, continuous wavelet transform as an operator, inversion formula for continuous wavelet transform.	15

***Suggested Readings*:**

1. Boggess, A. and Narcowich, F.J. *A First Course in Wavelets and Fourier Analysis*. John Wiley & amp; Sons, 2010.
2. Mallat, S. *A Wavelet Tour of Signal Processing*. Academic Press, 2009.
3. Han, D., Kornelson, K., Larson, D. and Weber, E. *Frames for Undergraduates*, Student Math. Lib (AMS) Vol. 40, 2007.
4. Christensen, O. *An Introduction to Frames and Riesz Bases*. Birkhauser, 2003.
5. Harnendez, E. and Weiss, G. *A First Course on Wavelets*, CRC Press, 1996.

<table>
<tr><td>Course No: 19</td><td colspan="4">Course Name: Object Oriented Programming With C++</td><td colspan="3">Course Code:
SBSMAT 01 02 02 DCEC 2124</td></tr>
<tr><td rowspan="2">Batch:

2021-2023</td><td rowspan="2">Programme:

M.Sc.
Mathematics</td><td rowspan="2">Semester:

II</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td>Contact Hrs per Week:
5</td></tr>
<tr><td>2</td><td>1</td><td>2</td><td>4</td><td>Total Hours:
75</td></tr>
<tr><td colspan="2" rowspan="2">Total Evaluation Marks:
100

CIE: 30 Marks

TEE: 70 Marks</td><td colspan="5">Examination Duration: 3 hours</td></tr>
<tr><td colspan="5">Pre-requisite of course: Programming in C</td></tr>
<tr><td>Course Objective</td><td colspan="7">After familiarizing the students with problem solving through C-programming, this course aims to give exposure to basic and advanced concepts of Object-Oriented Programming (OOP). The objective of course is to develop programming skills of students, using object oriented programming concepts, learn the concept of class and object using C++ and develop classes for simple applications.</td></tr>
<tr><td>Course Outcomes:</td><td colspan="7">After completing this course, student is expected to learn the following:

CO1: Identify importance of OOP and able to differentiate between structured oriented and OOP features

CO2: Develop simple C++ programs and compiling and executing in different environment</td></tr>
</table>

	CO3: Develop programs using functions, objects and classes **CO4:** Interprets the concept of constructors and destructors. Operator overloading and type conversions. Inheritance and polymorphism concepts of OOP **CO5:** Acquire knowledge of stream, i/o console, and file handling

COURSE SYLLABUS

NOTE:

Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit I will be taught via online mode.

OR

1. Question no. 1 has seven parts and students need to answer any four. Each part carries three and half Marks.
2. Question no. 2 to 5 have three parts and student need to answer any two parts of each question. Each part carries seven marks

Unit No.	Content of Each Unit	Hours of Each Unit
I	**[Course Outcome (s) No. : 1, 2]** Basic concepts of Object-Oriented Programming (OOP). Advantages and applications of OOP. Object-oriented languages. Introduction to C++. Structure of a C++ program. Creating the source files. Compiling and linking. C++ programming basics: input/output, data types, operators, expressions, control structures, library functions.	20
II	**[Course Outcome (s) No. : 1, 2, 3]** Functions in C++ : Passing arguments to and returning values from functions, inline functions, default arguments, function overloading. Classes and objects: Specifying and using class and object, arrays within a class, arrays of objects, object as a function arguments, friendly functions, pointers to members.	18

III	**[Course Outcome (s) No. : 1, 2, 4]** Constructors and destructors. Operator overloading and type conversions. Inheritance: Derived class and their constructs, Overriding member functions, class hierarchies, public and private inheritance levels. Polymorphism, pointers to objects, this pointer, pointers to derived classes, virtual functions.	19
IV	**[Course Outcome (s) No. : 1, 2, 5]** Streams, stream classes, unformatted i/o operations, formatted console i/o operations, managing output with manipulators. Classes for file stream operations, opening and closing a file. File pointers and their manipulations, random access. Error handling during file operations, command-line arguments. Exceptional handling.	18

***Suggested Readings*:**

1. Yashavant, P. K. *Let Us C++*. BPB Publication, 2020.
2. Balagrusamy, E. *Object Oriented Programming with C++*. 2nd edition, Tata McGraw Hill Pub. Co, 2013.
3. Lafore, R. *Object Oriented Programming in C++*. 4th edition, Pearson, 2008.
4. Gottfried, B. S. *Object Oriented Programming using C++*. Schaum's Outline Series, Tata McGraw Hill Pub. Co., 2000.
5. Barakaki, J. N. *Object Oriented Programming using C++*. Prentice Hall of India, 1996.

<table>
<tr><td>Course No: 20</td><td colspan="3">Course Name: Information Theory</td><td colspan="4">Course Code:
SBSMAT 01 02 03 DCEC 3104</td></tr>
<tr><td rowspan="2">Batch:

2021-2023</td><td rowspan="2">Programme:

M.Sc.
Mathematics</td><td rowspan="2">Semester:

II</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td>Contact Hrs per Week: 4</td></tr>
<tr><td>3</td><td>1</td><td>0</td><td>4</td><td>Total Hours: 60</td></tr>
<tr><td colspan="2" rowspan="2">Total Evaluation Marks:
100

CIE: 30 Marks

TEE: 70 Marks</td><td colspan="5">Examination Duration: 3 hours</td></tr>
<tr><td colspan="5">Pre-requisite of course: Nil</td></tr>
<tr><td>Course Objective</td><td colspan="6">The objective of this course is to introduce basic and advanced topics in information theory. This course further explains the different types of entropies, codes, discrete and continuous channels and their applications.</td></tr>
<tr><td>Course Outcomes:</td><td colspan="6">After completing this course, student is expected to learn the following:

CO1: Understand the basic concepts of information theory, different types of entropies with their properties and applications.

CO2: Analyse how different coding techniques will perform in different situations.

CO3: Understand about discrete channels and their properties with applications.

CO4: Understand about continuous channels and their properties with applications.</td></tr>
<tr><td colspan="7">COURSE SYLLABUS</td></tr>
</table>

NOTE:

Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit I will be taught via online mode.

OR

1. Question no. 1 has seven parts and students need to answer any four. Each part carries three and half Marks.

2. Question no. 2 to 5 have three parts and student need to answer any two parts of each question. Each part carries seven marks

Unit No.	Content of Each Unit	Hours of Each Unit
I	**[Course Outcome (s) No.: 1]** Measure of information – axioms for a measure of uncertainty, the Shannon entropy and its properties. joint and conditional entropies, transformation and its properties, axiomatic characterization of the Shannon entropy due to Shannon and Fadeev.	15
II	**[Course Outcome (s) No.: 2]** Noiseless coding - ingredients of noiseless coding problem, uniquely decipherable codes, necessary and sufficient condition for the existence of instantaneous codes, construction of optimal codes.	15
III	**[Course Outcome (s) No.: 3]** Discrete memory less channel - classification of channels, information processed by a channel, calculation of channel capacity, decoding schemes the ideal observer, the fundamental theorem of information theory and its strong and weak converses.	15

IV	**[Course Outcome (s) No.: 4]** Continuous channels - the time-discrete Gaussian channel, uncertainty of an absolutely continuous random variable, the converse to the coding theorem for time-discrete Gaussian channel, the time-continuous Gaussian channel, band-limited channels.	15

***Suggested Readings*:**

1. Ash, R. B. *Information Theory*. Courier Corporation, 2012.
2. Reza, F.M. *An Introduction to Information Theory*. Courier Corporation, 2012.
3. Hankerson, H. D., Harris, G. A. and Johnson, P. D. *Introduction to Information Theory and Data Compression*. Chapman and Hall/CRC, 2nd edition, 2003.
4. Aczel, J. and Daroczy, Z. *On Measures of Information and their Characterizations.* Academic Press, New York, 1975.

<table>
<tr><td>Course No: 21</td><td colspan="3">Course Name: Operations Research</td><td colspan="4">Course Code:
SBSMAT 01 02 04 DCEC 3104</td></tr>
<tr><td rowspan="2">Batch:

2021-2023</td><td rowspan="2">Programme:

M.Sc.
Mathematics</td><td rowspan="2">Semester:

II</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td>Contact Hrs per Week: 4</td></tr>
<tr><td>3</td><td>1</td><td>0</td><td>4</td><td>Total Hours: 60</td></tr>
<tr><td colspan="3">Total Evaluation Marks: 100

CIE: 30 Marks

TEE: 70 Marks</td><td colspan="5">Examination Duration: 3 hours

Pre-requisite of course: Nil</td></tr>
<tr><td>Course Objective</td><td colspan="7">This course is designed to introduce basic optimization techniques in order to get best results from a set of several possible solutions of different problems viz. linear programming problems, transportation problem, assignment problem and unconstrained and constrained problems etc.</td></tr>
<tr><td>Course Outcomes:</td><td colspan="7">After completing this course, student is expected to learn the following:

CO1: Understand linear programming problems and to find their solutions by using different method.

CO2: Find optimal solution of transportation problems and assignment problems

CO3: Understand and solve different queuing models.</td></tr>
</table>

	CO4: Find optimal solution of linear programming model using Game Theory. Also learn about sequencing problems.

COURSE SYLLABUS

NOTE:

Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit I will be taught via online mode.

OR

1. Question no. 1 has seven parts and students need to answer any four. Each part carries three and half Marks.

2. Question no. 2 to 5 have three parts and student need to answer any two parts of each question. Each part carries seven marks

Unit No.	Content of Each Unit	Hours of Each Unit
I	**[Course Outcome (s) No.: 1]** Operations research: origin, definition and scope. linear programming: formulation and solution of linear programming problems by graphical, simplex methods, Big-M and two phase methods, degeneracy, duality in linear programming, sensitivity analysis.	15
II	**[Course Outcome (s) No.: 2]** Transportation problems: basic feasible solutions, optimum solution by stepping stone and modified distribution methods, unbalanced and degenerate problems, transhipment problem. Assignment problems: solution by Hungarian method, unbalanced problem, case of maximization, travelling salesman and crew	15

	assignment problems.	
III	**[Course Outcome (s) No.: 3]** Queuing models: basic components of a queuing system, general birth-death equations, steady-state solution of Markovian queuing models with single and multiple servers (M/M/1. M/M/C, M/M/1/k, M/M/C/k)	15
IV	**[Course Outcome (s) No.: 4]** Game theory: two persons zero sum game, game with saddle points, rule of dominance; algebraic, graphical and linear programming, concept of mixed strategy. sequencing problems: processing of n jobs through 2 machines, n jobs through 3 machines, 2 jobs through m machines, n jobs through m machines.	15

***Suggested Readings*:**

1. Sharma, S. D. Operation Research, Kedar Nath Ram Nath Publications, 2012.
2. Swarup, K. and Gupta, P.K. Operations Research. S. Chand publisher, 2010.
3. Taha, H. A. Operation Research: An Introduction.9th edition, Pearson, 2010.
4. Gupta, P.K. and Hira, D.S. Introduction to Operations Research, S. Chand & Co. 2008.
5. Sharma, J. K., Mathematical Model in Operation Research, Tata McGraw Hill, 1989.

SEMESTER – III

Course No: 22	**Course Name:** Integral Equations and Calculus of Variation				**Course Code:** SBSMAT 01 03 01 C 3104		
Batch:	**Programme:**	**Semester:**	**L**	**T**	**P**	**Credits**	**Contact Hrs per Week: 4**
2021-2023	M.Sc. Mathematics	III					
			3	1	0	4	**Total Hours: 60**
Total Evaluation Marks: 100		**Examination Duration:** 3 hours					
CIE: 30 Marks **TEE:** 70 Marks		**Pre-requisite of course:** Nil					
Course Objective	In this course we study in detail about integral equations and calculus of variations. Integral equations find numerous applications in real life physical problems. The main objective of the course is to make the learner familiarize with resolvent kernel, successive approximation, solution of homogeneous Fredholm integral equation for solving integral equations and variational problems. Differential equations can be studied for their solutions by transforming them into integro-differential equations using Laplace transform.						

Course Outcomes :	After completing this course, student is expected to learn the following: **CO1:** Use the concept of different kernels and techniques for solving various kinds of integral equations. **CO2:** Find the solutions of Volterra integral equations using Neumann series method. **CO3:** Understand the relation between differential and integral equations. **CO4:** Learn about the formulation of variational problems, the variation of a functional and its properties, extremum of functional, sufficient condition for an extremum.

COURSE SYLLABUS

NOTE:

Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit I will be taught via online mode.

OR

1. Question no. 1 has seven parts and students need to answer any four. Each part carries three and half Marks.

2. Question no. 2 to 5 have three parts and student need to answer any two parts of each question. Each part carries seven marks

Unit No.	Content of Each Unit	Hours of Each Unit
I	**[Course Outcome (s) No. : 1]** Linear integral equations: Volterra integral equations, Fredholm integral equations, some basic identities, types of kernels: symmetric kernel, separable kernel, iterated kernel, resolvent kernel. Initial value problems reduced to Volterra integral equations, solution of Volterra integral equation using: resolvent kernel, successive approximation, neumann	15

	series method.	
II	**[Course Outcome (s) No. : 2]** Boundary value problems reduced to Fredholm integral equations, solution of Fredholm integral equations using separable kernel, resolvent kernel,methods of successive approximation and successive substitution to solve Fredholm equations of second kind, solution of homogeneous Fredholm integral equation, eigen values, eigen vectors.	15
III	**[Course Outcome (s) No. : 3]** Integral transforms for solving integral equations, basic properties of Laplace transforms, solution of Abel's equation using Laplace transform, application of Laplace transform to the solution of Volterra integral equations with convolution type kernels, solution of integro-differential equations using Laplace transform. Fourier Transform, Fourier sine and cosine transforms.	15
IV	**[Course Outcome (s) No. : 4]** Extrema of functionals: Euler's equation, sufficient conditions for the extremum of a functional, extension of the variational methods, Brachistochrone problem, geodesics.	15

***Suggested Readings*:**

1. Wazwaz, A. M. *A First Course in Integral Equations*. 2nd edition World Scientific Publishing Co. 2015.
2. Kanwal, R. P. *Linear Integral Equation. Theory and Techniques*. Academic Press, 2014.
3. Gelfand, I. M. and Fomin, S. V. *Calculus of Variations*. Courier Corporation, 2012.
4. Hildebrand, F. B. *Method of Applied Mathematics*, Courier Corporation, 2012.
5. Raisinghania M. D. *Integral Equation & Boundary Value Problem.* S. Chand Publishing, 2007.
6. Jerri, A. *Introduction to Integral Equations with Applications*, John Wiley & Sons, 1999.

<table>
<tr><td>Course No: 23</td><td colspan="3">Course Name: Functional Analysis</td><td colspan="4">Course Code:
SBSMAT 01 03 02 C 3104</td></tr>
<tr><td>Batch:

2021-2023</td><td>Programme:

M.Sc.
Mathematics</td><td>Semester:

III</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td>Contact Hrs per Week: 4</td></tr>
<tr><td></td><td></td><td></td><td>3</td><td>1</td><td>0</td><td>4</td><td>Total Hours: 60</td></tr>
<tr><td colspan="3">Total Evaluation Marks:
100

CIE: 30 Marks

TEE: 70 Marks</td><td colspan="5">Examination Duration: 3 hours

Pre-requisite of course: Nil</td></tr>
<tr><td>Course Objective</td><td colspan="7">To familiarize with the basic tools of Functional Analysis involving normed spaces, Banach spaces and Hilbert spaces, their properties dependent on the dimension and the bounded linear operators from one space to another.</td></tr>
<tr><td>Course Outcomes:</td><td colspan="7">After completing this course, student is expected to learn the following:

CO1: Verify the requirements of a norm, completeness with respect to a norm, relation between compactness and dimension of a space, check boundedness of a linear operator and relate to continuity, convergence of operators by using a suitable norm, compute the dual spaces.

CO2: Distinguish between Banach spaces and Hilbert spaces, decompose a Hilbert space in terms of orthogonal complements.</td></tr>
</table>

	CO3: Check totality of orthonormal sets and sequences, represent a bounded linear functional in terms of inner product, classify operators into self-adjoint, unitary and normal operators. **CO4:** Extend a linear functional under suitable conditions, compute adjoint of operators, check reflexivity of a space, ability to apply uniform boundedness theorem, open mapping theorem and closed graph theorem, check the convergence of operators and functional and weak and strong convergence of sequences.

COURSE SYLLABUS

NOTE:

Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit I will be taught via online mode.

OR

1. Question no. 1 has seven parts and students need to answer any four. Each part carries three and half Marks.

2. Question no. 2 to 5 have three parts and student need to answer any two parts of each question. Each part carries seven marks

Unit No.	Content of Each Unit	Hours of Each Unit
I	**[Course Outcome (s) No. : 1,2]** Metric Space, sequences, Cauchy sequences, complete metric spaces and examples, Baire's theorem. Cantor intersection theorem and Banach fixed point principle, normed linear spaces. Banach spaces, examples of Banach spaces and subspaces.	15
II	**[Course Outcome (s) No. : 2]** Continuity of linear maps, Equivalent norms, normed spaces of bounded linear maps, bounded linear functionals, dual spaces of l^p, $\mathbb{R}^n$and reflexivity, Hilbert spaces and examples, orthogonality, orthonormal sets, Bessel's	15

	inequality, Parsevals's theorem,the conjugate space of a Hilbert space.	
III	**[Course Outcome (s) No. :3]** Representation of bounded functional on Hilbert space, adjoint operators, self-adjoint operators, normal and unitary operators, weak and strong convergence, completely continuous operators.	15
IV	**[Course Outcome (s) No. :4]** Hahn-Banach theorem and its applications, uniform boundedness principle, open mapping theorem, projections on Banach spaces, closed graph theorem.	15

***Suggested Readings*:**

1. Simmons, G. F. *Introduction to Topology and Modern Analysis*. McGraw-Hill Pvt. Ltd. 2016.
2. Bachman, G. and Narici, L. *Functional Analysis*. Courier Corporation, 2012.
3. Conway, J. B. *A Course in Functional Analysis*. Springer, 2010.
4. Kreyszig, E. *Introductory Functional Analysis with Applications*. John Wiley, 2007.
5. Royden, H. L. *Real Analysis*. MacMillan Publishing Co., Inc., New York, 4th edition, 1993.

Course No: 24	**Course Name:** Mathematical Statistics			**Course Code:** SBSMAT 01 03 03 C 3104			
Batch:	**Programme:**	**Semester:**	**L**	**T**	**P**	**Credits**	**Contact Hrs per Week:**
2021-2023	M.Sc. Mathematics	III	3	1	0	4	**4**
							Total Hours: 60
Total Evaluation Marks: 100 **CIE:** 30 Marks **TEE:** 70 Marks		**Examination Duration:** 3 hours **Pre-requisite of course:** Nil					
Course Objective	The aim of the course is to enable the students with understanding of various types of measures, various types of probability distributions and testing of hypothesis problems. It aims to equip the students with standard concepts of statistical techniques and their utilization.						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1:** Explore the basic ideas about measures of central tendency, dispersion, skewness and kurtosis with their applications and basic idea about probability theory. **CO2:** Demonstrate the understanding of random variable, expectation, variance and some discrete distributions. **CO3:** Explain the different types of continuous distributions and their utilization. **CO4:** Deal with formulation of hypotheses as per situations and their testing.						
COURSE SYLLABUS							

NOTE:

Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit I will be taught via online mode.

OR

1. Question no. 1 has seven parts and students need to answer any four. Each part carries three and half Marks.
2. Question no. 2 to 5 have three parts and student need to answer any two parts of each question. Each part carries seven marks

Unit No.	Content of Each Unit	Hours of Each Unit
I	**[Course Outcome (s) No.: 1]** Measures of central tendency and dispersion, moments, measures of skewness and kurtosis, correlation and regression. axiomatic approach to the theory of probability, sample space, additive and multiplicative law of probability, conditional probability. Definition and properties of random variables, discrete and continuous random variables, probability mass and density functions, distribution function. Concepts of bivariate random variables.	15
II	**[Course Outcome (s) No.:2]** Mathematical expectation: Definition and its properties. variance, covariance, moment generating function- definitions and their properties. Discrete distributions: Binomial, Poisson and geometric distributions with their properties.	15
III	**[Course Outcome (s) No.: 3]** Continuous distributions: uniform, exponential, gamma and normal distributions with their properties, Central Limit Theorem (Only statement).	15

IV	**[Course Outcome (s) No.: 4]** Statistical estimation, Testing of hypothesis: Null and alternative hypotheses, simple and composite hypotheses, two types of errors, t, F and Chi-Square as sampling distribution and applications.	15

***Suggested Readings*:**

1. Meyer, P. L. Introductory Probability and Statistical Applications. 2nd edition, Addison-Wesley Publishing Company, 2017.
2. Gupta, S. C. and Kapoor, V. K. *Fundamentals of Mathematical Statistics*. Sultan Chand & Sons, 2014.
3. Mood, A. M., Graybill, F. A. and Boes, D. C. *Introduction to the Theory of Statistics*, Tata McGraw Hill, 2014.
4. Spiegel, M. R., Schiller, J. J. and Srinivasan, R. A. *Probability and Statistics*. Tata McGraw-Hill, 2014.
5. Baisnab, A. P. and Jas, M. *Element of Probability and Statistics*, Tata McGraw Hill, 1993.

<table>
<tr><td>Course No: 26</td><td colspan="4">Course Name: Applied Discrete Mathematics</td><td colspan="3">Course Code:
SBSMAT 01 03 01 DCEC 3104</td></tr>
<tr><td rowspan="2">Batch:

2021-2023</td><td rowspan="2">Programme:

M.Sc.
Mathematics</td><td rowspan="2">Semester:

III</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td>Contact Hrs per Week: 4</td></tr>
<tr><td>3</td><td>1</td><td>0</td><td>4</td><td>Total Hours: 60</td></tr>
<tr><td colspan="2" rowspan="2">Total Evaluation Marks:
100

CIE: 30 Marks

TEE: 70 Marks</td><td colspan="6">Examination Duration: 3 hours</td></tr>
<tr><td colspan="6">Pre-requisite of course: Nil</td></tr>
<tr><td>Course Objective</td><td colspan="7">The main objective of the course is to introduce concepts of mathematical logic, Lattice and graph theory and to give a brief introduction of Boolean algebra, bipartite graphs and trees and studying for their applications in real life.</td></tr>
<tr><td>Course Outcomes:</td><td colspan="7">After completing this course, student is expected to learn the following:

CO1: Analyze logical propositions using truth tables.

CO2: Understand the concept of lattice.

CO3: Learn about the applications of Boolean algebra in switching theory.

CO4: Use the concept of planar graphs, trees and study for their properties.</td></tr>
</table>

COURSE SYLLABUS		
NOTE: Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit I will be taught via online mode. **OR** 1. Question no. 1 has seven parts and students need to answer any four. Each part carries three and half Marks. 2. Question no. 2 to 5 have three parts and student need to answer any two parts of each question. Each part carries seven marks		
Unit No.	**Content of Each Unit**	**Hours of Each Unit**
I	**[Course Outcome (s) No. : 1]** Formal Logic: Statements, proposition, symbolic representation and tautologies, quantifiers, proposition logic.	15
II	**[Course Outcome (s) No. : 2]** Lattices: Lattices as partially ordered sets, their properties, lattices as algebraic systems, some special lattices, e.g., complete, complemented and distributive lattices, some special lattices e.g., bounded, complemented & distributive lattices.	15
III	**[Course Outcome (s) No. : 3]** Boolean Algebra: Boolean algebra as lattices, various Boolean identities, the switching algebra example, join - irreducible elements, atoms and minterms, Boolean Forms and their equivalence, minterm Boolean forms, sum of products canonical forms, minimization of Boolean functions, applications of Boolean algebra to switching theory (using AND, OR and NOT gates).	15

IV	**[Course Outcome (s) No. : 4]** Graph Theory: Definition of graphs, paths, circuits, cycles and subgraphs, induced subgraphs, degree of a vertex, connectivity, planar graphs and their properties, Euler's formula for connected planar graph, complete and complete bipartite graphs. Trees.	15

***Suggested Readings*:**

1. Tremblay, J.P. and Manohar, R. *Discrete Mathematical Structures with Applications to Computer Science*. Ist edition McGraw Hill Book Co., 2017.
2. Lepschutz, S. and Lipson, M. *Linear Algebra*. 5th edition, Tata McGraw Hill 2012.
3. Ram, B. *Discrete Mathematics*. Pearson Education, 2012.
4. Kenneth H. R. *Discrete Mathematics and Its Applications*, 7th edition, Tata McGraw Hill, 2011.
5. Liu, C. L. *Elements of Discrete Mathematics*. Tata McGraw Hill, 2000.

<table>
<tr><td>Course No: 27</td><td colspan="3">Course Name: Theory of Elasticity</td><td colspan="4">Course Code:
SBSMAT 01 03 02 DCEC 3104</td></tr>
<tr><td rowspan="2">Batch:

2021-2023</td><td rowspan="2">Programme:

M.Sc.
Mathematics</td><td rowspan="2">Semester:

III</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td>Contact Hrs per Week: 4</td></tr>
<tr><td>3</td><td>1</td><td>0</td><td>4</td><td>Total Hours: 60</td></tr>
<tr><td colspan="3" rowspan="2">Total Evaluation Marks:
100

CIE: 30 Marks

TEE: 70 Marks</td><td colspan="5">Examination Duration: 3 hours</td></tr>
<tr><td colspan="5">Pre-requisite of course: Nil</td></tr>
<tr><td>Course Objective</td><td colspan="7">This course aims to familiarize the students with tensors and the principles and basic equations of elasticity. The course will expose the students to two dimensional problems in Cartesian and polar coordinates.</td></tr>
<tr><td>Course Outcomes:</td><td colspan="7">After completing this course, student is expected to learn the following:

CO1: Use the indicial notation and knowledge of tensor

CO2: Analyse strain, stress and deformation

CO3: Understand the basic principles and field equations of linear elastic solids

CO4: Formulate the solution strategies of various two dimensional problems

CO5: Analyse the propagation of surface waves</td></tr>
<tr><td colspan="8">COURSE SYLLABUS</td></tr>
</table>

NOTE:

Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit I will be taught via online mode.

OR

1. Question no. 1 has seven parts and students need to answer any four. Each part carries three and half Marks.

2. Question no. 2 to 5 have three parts and student need to answer any two parts of each question. Each part carries seven marks

Unit No.	Content of Each Unit	Hours of Each Unit
I	**[Course Outcome (s) No. : 1, 2]** Cartesian tensor: Coordinate transformation, Cartesian tensor of different order, sum or difference and product of two tensors. contraction theorem, quotient law, symmetric & skew symmetric tensors, Kronecker tensor, alternate tensor and relation between them, scalar invariant of second order tensor, eigen values & vectors of a symmetric second order tensor, gradient, divergence & curl of a tensor field. Analysis of strain: affine transformations, infinitesimal affine transformation, geometrical interpretation of the components of strain.	15
II	**[Course Outcome (s) No. : 2]** Strain quadric of Cauchy, principal strains and invariants, general infinitesimal deformation. Saint- Venant's equations of compatibility. Analysis of stress: stress tensor, equations of equilibrium, transformation of co-ordinates, stress quadric of Cauchy, principal stress and invariants, maximum normal and shear stresses.	15

III	**[Course Outcome (s) No. : 3]** Equations of elasticity: Generalized Hooke's law, homogeneous isotropic media, elastic moduli for isotropic media, equilibrium and dynamic equations for an isotropic elastic solid, strain energy function and its connection with Hooke's law, Beltrami-Michell compatibility equations.	15
IV	**[Course Outcome (s) No. : 4, 5]** Two-dimensional problems: Plane strain, plane stress, generalized plane stress, Airy's stress function, general solution of bi-harmonic equation, stresses and displacements in terms of complex potentials, propagation of waves in an isotropic elastic solid medium, waves of dilation and distortion, elastic surface waves such as Rayleigh and Love waves.	15

***Suggested Readings*:**

1. Sadd, M. H. *Elasticity*: *Theory, Applications and Numerics*. Academic Press, 2014.
2. Love, A. E. H. *A Treatise on Mathematical Theory of Elasticity*. Cambridge [Eng.] University Press, 2013.
3. Timoshenko, S. P. and Goodier, J. N. *Theory of Elasticity.* New York McGraw-Hill, 2010.
4. Narayan, S. *Text Book of Cartesian Tensors*. S. Chand & Co., 1968.
5. Sokolnikoff, I. S. *Mathematical Theory of Elasticity*. McGraw-Hill Inc, 2nd edition, 1956.

<table>
<tr><td>Course No: 28</td><td colspan="4">Course Name: Algebra –II</td><td colspan="3">Course Code:
SBSMAT 01 03 03 DCEC 3104</td></tr>
<tr><td rowspan="2">Batch:

2021-2023</td><td rowspan="2">Programme:

M.Sc.
Mathematics</td><td rowspan="2">Semester:

III</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td>Contact Hrs per Week:
4</td></tr>
<tr><td>3</td><td>1</td><td>0</td><td>4</td><td>Total Hours: 60</td></tr>
<tr><td colspan="3">Total Evaluation Marks:
100

CIE: 30 Marks

TEE: 70 Marks</td><td colspan="5">Examination Duration: 3 hours

Pre-requisite of course: Nil</td></tr>
<tr><td>Course Objective</td><td colspan="7">The main objective of this course is to encourage students to develop a working knowledge of the central ideas of Linear Algebra like linear transformations, Vector space, Modules, canonical forms and Field Theory like field extensions, splitting field and Galois theory.</td></tr>
<tr><td>Course Outcomes:</td><td colspan="7">After completing this course, student is expected to learn the following:

CO1: Write abstract mathematical proofs in a clear and logical manner

CO2: Apply theorems to solve problems in number theory and theory of polynomials over a field

CO3: Demonstrate ability to think critically by interpreting theorems and relating results to problems in other mathematical disciplines

CO4: Think critically by recognizing patterns and principles of algebra and relating them</td></tr>
</table>

	to the number system

COURSE SYLLABUS

NOTE:

Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit I will be taught via online mode.

OR

1. Question no. 1 has seven parts and students need to answer any four. Each part carries three and half Marks.

2. Question no. 2 to 5 have three parts and student need to answer any two parts of each question. Each part carries seven marks

Unit No.	Content of Each Unit	Hours of Each Unit
I	**[Course Outcome (s) No. : 1]** Field, structure of finite fields, finite, algebraic, and transcendental extensions, splitting fields, simple and normal extensions, perfect fields, primitive elements, algebraically closed fields.	15
II	**[Course Outcome (s) No. : 2]** Automorphisms of extensions. Galois extensions, fundamental theorem of Galois theory, solution of polynomials by radicals, Galois group over the rationals.	15

III	**[Course Outcome (s) No. : 3]** Vector spaces, modules, direct products and direct sums, quotients and monomorphisms of modules, modules over PIDs and applications, various canonical forms.	15
IV	**[Course Outcome (s) No. : 4]** Simple and semisimple modules, semisimple rings, Wedderburn-Artin structure theory.	15

***Suggested Readings*:**

1. Lang, S. *Algebra*. Springer, 2012.
2. Herstein, I. N. *Topics in Algebra*. Wiley Eastern Ltd., New Delhi, 2006.
3. Dummit, D.S. and Foote, R.M.*Abstract Algebra (3rd revised edition).* Wiley, 2003.
4. Bhattacharya, P. B. Jain, S. K. and Nagpaul, S. R. *Basic Abstract Algebra, 2nd edition.* Cambridge University Press, 1997.
5. Anderson, F. W. and Fuller, K. R. *Rings and Categories of Modules*. Springer-Verlag New York, 1992.
6. Cohn, P. M. *Algebra*. John Wiley & Sons, Vols. I: 1982, Vols. II: 1989, Vols. III: 1991.

<table>
<tr><td>Course No: 29</td><td colspan="3">Course Name: Fluid Dynamics</td><td colspan="4">Course Code:
SBSMAT 01 03 04 DCEC 3104</td></tr>
<tr><td rowspan="2">Batch:

2021-2023</td><td rowspan="2">Programme:

M.Sc.
Mathematics</td><td rowspan="2">Semester:

III</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td>Contact Hrs per Week: 4</td></tr>
<tr><td>3</td><td>1</td><td>0</td><td>4</td><td>Total Hours: 60</td></tr>
<tr><td colspan="2" rowspan="2">Total Evaluation Marks:
100

CIE: 30 Marks

TEE: 70 Marks</td><td colspan="5">Examination Duration: 3 hours</td></tr>
<tr><td colspan="5">Pre-requisite of course: Nil</td></tr>
<tr><td>Course Objective</td><td colspan="7">The objective of this course is to provide a treatment of topics in fluid dynamics to a standard where the student will be able to apply the techniques used in deriving a range of important results and in research problems. The objective is to provide the student with knowledge of the fundamentals of fluid dynamics and an appreciation of their application to real world problems.</td></tr>
<tr><td>Course Outcomes:</td><td colspan="7">After completing this course, student is expected to learn the following:

CO1: Understand the basic principles of fluid dynamics, such as Lagrangian and Eulerian approach etc.

CO2: Use the concept of stress in fluids with applications.

CO3: Analyse Irrotational and rotational flows in fluids and some of their properties

CO4: Find analytical solution of Navier Stoke equation and solutions of some benchmark</td></tr>
</table>

	problems.

COURSE SYLLABUS

NOTE:

Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit I will be taught via online mode.

OR

1. Question no. 1 has seven parts and students need to answer any four. Each part carries three and half Marks.

2. Question no. 2 to 5 have three parts and student need to answer any two parts of each question. Each part carries seven marks

Unit No.	Content of Each Unit	Hours of Each Unit
I	**[Course Outcome (s) No.: 1]** Concept of fluids, physical properties of fluids, continuum hypothesis, density, specific weight, specific volume, kinematics of fluids, Eulerian and Lagrangian methods of description of flows, equivalence of Eulerian and Lagrangian method, general motion of fluid element, integrability and compatibility conditions, strain rate tensor, streamline, path line, streak lines, stream function¸ vortex lines, circulation.	15
II	**[Course Outcome (s) No.: 2]** Stresses in Fluids: stress tensor, symmetry of stress tensor, transformation of stress components from one co-ordinate system to another, principle axes and principle values of stress tensor conservation laws: equation of conservation of	15

	mass (continuity equation), equation of conservation of momentum, Navier Stokes equation, Euler's equation of motion, equation of moments of momentum, equation of energy.	
III	**[Course Outcome (s) No.: 3]** Irrotational and rotational flows: Bernoulli's equation, Bernoulli's equation for irrotational flows, two dimensional irrotational incompressible flows, circle theorem, sources and sinks, sources sink and doublets in two dimensional flows, methods of images.	15
IV	**[Course Outcome (s) No.: 4]** Approximate (analytical) solutions of Navier Stoke equation, order of magnitude analysis, use of similarity variables in analytical solution techniques, solutions of some benchmark problems like; Couette flow, axi-symmetric flows, creeping flows.	15

***Suggested Readings*:**

1. Besaint, W.H. and Ramsey, A.S. *A Treatise on Hydromechanics Part Ihydrostatics*, Andesite Press, 2017.
2. Kundu, P.K., Cohen, I. M. and Dowling, R. D. *Fluid Mechanics*, 6th edition, Academic Press, 2015.
3. O'Neil, M. E., and Chorlton, F. *Ideal and Incompressible Fluid Dynamics*. Ellis Horwood Ltd, 1986.
4. Yuan, S.W. *Foundations of Fluid Mechanics*. Prentice Hall of India Private Limited, New Delhi, 1976.
5. Curle, N. and Davies, H. J. *Modern Fluid Dynamics*.Vol1, D Van Nostrand Company Ltd, London, 1968.

<table>
<tr><td>Course No: 30</td><td colspan="3">Course Name: Fuzzy Set Theory</td><td colspan="4">Course Code:
SBSMAT 01 03 05 DCEC 3104</td></tr>
<tr><td rowspan="2">Batch:

2021-2023</td><td rowspan="2">Programme:

M.Sc.
Mathematics</td><td rowspan="2">Semester:

III</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td>Contact Hrs per Week: 4</td></tr>
<tr><td>3</td><td>1</td><td>0</td><td>4</td><td>Total Hours: 60</td></tr>
<tr><td colspan="3">Total Evaluation Marks:
100

CIE: 30 Marks

TEE: 70 Marks</td><td colspan="5">Examination Duration: 3 hours

Pre-requisite of course: Nil</td></tr>
<tr><td>Course Objective</td><td colspan="7">The course aims to introduce students to fundamental concepts in fuzzy sets, fuzzy relations, arithmetic operations on fuzzy sets, probability theory, fuzzy logic and its applications.</td></tr>
<tr><td>Course Outcomes:</td><td colspan="7">After completing this course, student is expected to learn the following:

CO1: Construct appropriate fuzzy numbers corresponding to uncertain and inconsistent collected data.

CO2: Understand the basic concepts of t- norms, t- conforms and operation of - cut interval.

CO3: Use the concepts of approximation of triangular fuzzy number, operations of trapezoidal fuzzy number, bell shape fuzzy number, crisp function and its applications.

CO4: Analyse the Integration and differentiation of fuzzy function product set, and

understand the basic concepts of composition of fuzzy relation, fuzzy graph, projection and</td></tr>
</table>

	cylindrical extension

COURSE SYLLABUS

NOTE:

Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit I will be taught via online mode.

OR

1. Question no. 1 has seven parts and students need to answer any four. Each part carries three and half Marks.

2. Question no. 2 to 5 have three parts and student need to answer any two parts of each question. Each part carries seven marks

Unit No.	Content of Each Unit	Hours of Each Unit
I	**[Course Outcome (s) No. : 1]** Concepts of fuzzy set, standard operations of fuzzy set, fuzzy complement, fuzzy union, fuzzy intersection, other operations in fuzzy set, t- norms and t-conorms. Interval, fuzzy number, operation of interval, operation of - cut interval, examples of fuzzy number operation.	15
II	**[Course Outcome (s) No. : 2]** Definition of triangular fuzzy number, operation of triangular fuzzy number, operation of general fuzzy numbers, approximation of triangular fuzzy number, operations of trapezoidal fuzzy number, bell shape fuzzy number, function with fuzzy constraint, propagation of fuzziness by crisp function, fuzzifying function of crisp variable, maximizing and minimizing set,	15

	maximum value of crisp function.	
III	**[Course Outcome (s) No. : 3]** Integration and differentiation of fuzzy function product set, definition of relation, characteristics of relation, representation methods of relations, operations on relations, path and connectivity in graph, fundamental properties, equivalence relation, compatibility relation, pre-order relation, order relation, definition and examples of fuzzy relation, fuzzy matrix, operations on fuzzy relation.	15
IV	**[Course Outcome (s) No. : 4]** Composition of fuzzy relation, - cut of fuzzy relation, projection and cylindrical extension, extension by relation, extension principle, extension by fuzzy relation, fuzzy distance between fuzzy sets, graph and fuzzy graph, fuzzy graph and fuzzy relation, - cut of fuzzy graph.	15

***Suggested Readings*:**

1. Mohan, C. *An Introduction to Fuzzy Set Theory and Fuzzy Logic*. Anshan Publishers, 2015.
2. Lee, K. H. *First Course on Fuzzy Theory and Applications*. Springer International Edition, 2005.
3. Yen, J., Langari, R. *Fuzzy Logic - Intelligence, Control and Information*. Pearson Education, 1999.
4. Zimmerman, H.J. *Fuzzy Set Theory and its Applications*. Allied Publishers Ltd., New Delhi, 1991.

SEMESTER – IV

<table>
<tr><td>Course No: 32</td><td colspan="4">Course Name: Differential Geometry</td><td colspan="3">Course Code:
SBSMAT 01 04 01 DCEC 3104</td></tr>
<tr><td rowspan="2">Batch:

2021-2023</td><td rowspan="2">Programme:

M.Sc.
Mathematics</td><td rowspan="2">Semester:

IV</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td>Contact Hrs per Week: 4</td></tr>
<tr><td>3</td><td>1</td><td>0</td><td>4</td><td>Total Hours: 60</td></tr>
<tr><td colspan="3">Total Evaluation Marks:
100

CIE: 30 Marks

TEE: 70 Marks</td><td colspan="5">Examination Duration: 3 hours

Pre-requisite of course: Nil</td></tr>
<tr><td>Course Objective</td><td colspan="7">In this course, students will be imparted knowledge to enable them to understand several concepts of Differential Geometry such as space curves, surfaces, curvatures, torsion, developables and geodesics.</td></tr>
<tr><td>Course Outcomes:</td><td colspan="7">After completing this course, student is expected to learn the following:
CO1: Learn about the concepts of curvature, torsion, involutes and evolutes.
CO2: Familiarize with several concepts of tangent plane, Helicoids, metric and direction coefficients.
CO3: Understand the concepts of developable surfaces.</td></tr>
</table>

	CO4: Use the several notions of curvatures such as geodesic curvature and Gaussian curvatures.

COURSE SYLLABUS

NOTE:

Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit I will be taught via online mode.

OR

1. Question no. 1 has seven parts and students need to answer any four. Each part carries three and half Marks.

2. Question no. 2 to 5 have three parts and student need to answer any two parts of each question. Each part carries seven marks

Unit No.	Content of Each Unit	Hours of Each Unit
I	**[Course Outcome (s) No. : 1]** Curves with torsion: tangent, principal normal, curvature, binormal, torsion, Serret-Frenet formulae, locus of centre of spherical curvature, helix, involutes and evolutes.	15
II	**[Course Outcome (s) No. : 2]** Envelopes: surfaces, tangent plane, envelope, characteristics, edge of regression, developable surfaces, osculating, polar and rectifying developable.	15
III	**[Course Outcome (s) No. : 3]** Curvilinear co-ordinates: first order magnitude, directions on a surface, second order magnitudes, derivative of unit normal, principal directions and curvatures.	15

IV	**[Course Outcome (s) No. : 4]** Geodesics: geodesic property, equations of geodesics, torsion of a geodesic. Bonnet's theorem, Joachimsthal's theorems, geodesic parallels, geodesic ellipses and hyperbolas, Liouville surfaces.	15

***Suggested Readings*:**

1. Weatherburn, C. E. *Differential Geometry of Three Dimensions*, Cambridge University Press, 2016.
2. Graustein, W. C. *Differential Geometry*. Courier Corporation, 2012.
3. Wilmore T. J. *An Introduction to Differential Geometry*, Dover Publications Inc., 2012.
4. Pressley, A. *Elementary Differential Geometry*. Springer, 2002.

<table>
<tr><td>Course No: 33</td><td colspan="5">Course Name: Mathematical Modelling</td><td colspan="2">Course Code:
SBSMAT 01 04 02 DCEC 3104</td></tr>
<tr><td rowspan="2">Batch:

2021-2023</td><td rowspan="2">Programme:

M.Sc.
Mathematics</td><td rowspan="2">Semester:

IV</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td>Contact Hrs per Week: 4</td></tr>
<tr><td>3</td><td>1</td><td>0</td><td>4</td><td>Total Hours: 60</td></tr>
<tr><td colspan="2">Total Evaluation Marks: 100

CIE: 30 Marks

TEE: 70 Marks</td><td colspan="6">Examination Duration: 3 hours

Pre-requisite of course: Nil</td></tr>
<tr><td>Course Objective</td><td colspan="7">The objectives of this course are to:
• Enable students understand how mathematical models are formulated, solved and interpreted.
• Make students appreciate the power and limitations of mathematics in solving practical real-life problems.
• Equip students with the basic mathematical modelling skills.</td></tr>
<tr><td>Course Outcomes:</td><td colspan="7">After completing this course, student is expected to learn the following:
CO1: Understand what a mathematical model is and explain the series of steps involved in a mathematical modeling process.
CO2: Use applications of mathematical modeling through difference equations.</td></tr>
</table>

	CO3: Understand and apply the concept of mathematical modeling through difference equations in population dynamics, genetics and probability theory. **CO4:** Apply the concept of mathematical modeling through graph theory.

COURSE SYLLABUS

NOTE:

Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit I will be taught via online mode.

OR

1. Question no. 1 has seven parts and students need to answer any four. Each part carries three and half Marks.
2. Question no. 2 to 5 have three parts and student need to answer any two parts of each question. Each part carries seven marks

Unit No.	Content of Each Unit	Hours of Each Unit
I	**[Course Outcome (s) No.: 1]** Simple situations requiring mathematical modelling, techniques of mathematical modelling, classifications, characteristics and limitations of mathematical models, some simple illustrations, mathematical modelling in population dynamics, mathematical modelling of epidemics through systems of ordinary differential equations of first order mathematical models in medicine, battles and international trade in terms of systems of ordinary differential equations.	15
II	**[Course Outcome (s) No.: 2]** The need for mathematical modelling through difference equations, linear growth and decay models, non-linear growth and decay models, basic theory of linear difference equations with constant coefficients, mathematical modelling through difference equations in economics and finance.	15

III	**[Course Outcome (s) No.: 3]** Mathematical modelling through difference equations in population dynamics and genetics, mathematical modelling through difference equations in probability theory, miscellaneous examples of mathematical modelling through difference equations.	15
IV	**[Course Outcome (s) No.: 4]** Situations that can be modelled through graphs, mathematical models in terms of directed graphs mathematical models in terms of signed graphs, mathematical models in terms of weighted graphs.	15

***Suggested Readings*:**

1. Kapur J. N. *Mathematical Modelling*, 2nd edition, New Age International, 2015.
2. Meerschaert, M. M. *Mathematical Modelling.* Academic Press, 2013.
3. Rutherford, A. *Mathematical Modelling Techniques.* Courier Corporation, 2012.
4. Clive,L. D. *Principles of Mathematical Modelling*. Elsevier, 2004.
5. Bender, E. A. *An Introduction to Mathematical Modelling.* Courier Corporation, 2000.

Course No: 34	Course Name: Advanced Numerical Analysis				Course Code: SBSMAT 01 04 03 DCEC 3104		
Batch:	**Programme:**	**Semester:**	**L**	**T**	**P**	**Credits**	**Contact Hrs per Week:**
2021-2023	M.Sc. Mathematics	IV	3	1	0	4	**4**
							Total Hours: 60

Total Evaluation Marks: 100 **CIE:** 30 Marks **TEE:** 70 Marks	**Examination Duration:** 3 hours **Pre-requisite of course:** Numerical Analysis

Course Objective	After familiarizing the students with basic numerical techniques in numerical analysis course, this course aims to give exposure to some advanced numerical methods. The course objective is to acquaint the students with a wide range of advanced numerical methods to solve systems of algebraic and transcendental equations, linear system of equations, difference equations, eigenvalue problems, and mainly some finite difference methods for solutions of partial differential equations.
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1:** Learn numerical technique to find the numerical solutions of system of linear and nonlinear equations and some curve fitting problems **CO2:** Solve bivariate interpolation problems, difference equations and eigen value problems.

	CO3: Understand finite difference methods for numerical solutions of partial differential equations especially heat, wave, Laplace and Poisson equations. **CO4:** Familiarize the students with advantages and limitations of numerical techniques

COURSE SYLLABUS

NOTE:

Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit I will be taught via online mode.

OR

1. Question no. 1 has seven parts and students need to answer any four. Each part carries three and half Marks.

2. Question no. 2 to 5 have three parts and student need to answer any two parts of each question. Each part carries seven marks

Unit No.	Content of Each Unit	Hours of Each Unit
I	**[Course Outcome (s) No. : 1, 2, 4]** General iterative method for the system: $x = g(x)$ and its sufficient condition for convergence. Chebyshev method, Newton-Raphson method. Successive over relaxation (SOR) method for system of linear equations. Bivariate interpolation, B-Spline interpolation and Bezier curves.	15
II	**[Course Outcome (s) No. : 2, 4]** Review of finite difference operators, difference equations, order of difference equation, degree of difference equation, solution of difference equations, use of generating function in the solution of difference equation. Jacobi, Givens and Householder methods real symmetric matrix	15

III	**[Course Outcome (s) No. : 3, 4]** Numerical solutions of parabolic equations of second order in one space variable –two and three levels explicit and implicit difference schemes, truncation errors and stability. Numerical solution of parabolic equations of second order in two space variable-improved explicit schemes, implicit methods, alternating direction implicit (ADI) methods.	14
IV	**[Course Outcome (s) No. : 3, 4]** Numerical solution of hyperbolic equations of second order in one and two space variables with constant and variable coefficients-explicit and implicit methods. ADI methods. Numerical solutions of elliptic equations-approximations of Laplace and biharmonic operators, solutions of Dirichlet, Neumann and mixed type problems with Laplace and Poisson equations in rectangular, circular and triangular regions. ADI methods.	16

***Suggested Readings*:**

1. Gupta, R. K. *Numerical Methods: Fundamentals and Applications.* 1st edition, Cambridge University Press, 2019.
2. Gupta. R. S., *Elements of Numerical Analysis*, 2nd Edition, Cambridge University Press, 2015.
3. Atkinson, K. and Han, W. *Theoretical Numerical Analysis*, Springer Science & Business Media, 2010.
4. Bradie, B. *A friendly introduction to Numerical Analysis.* Pearson Education, 2007.
5. Bazaraa, M.S., Sherali, H.D. and Shetty, C.M. *Nonlinear Programming Theory and Algorithms.* John Wiley and Sons, 2004.
6. Smith, G. D. *Numerical solution of Partial Differential Equations: Finite Difference Methods*.3rd edition. Oxford University Press, 1985.

Course No: 35	Course Name: Finite Element Methods				Course Code: SBSMAT 01 04 04 DCEC 3104		
Batch:	**Programme:**	**Semester:**	**L**	**T**	**P**	**Credits**	**Contact Hrs per Week:**
2021-2023	M.Sc. Mathematics	IV					**4**
			3	1	0	4	**Total Hours: 60**

Total Evaluation Marks: 100 **CIE:** 30 Marks **TEE:** 70 Marks	**Examination Duration:** 3 hours **Pre-requisite of course:** Nil

Course Objective	The course aims to provide the fundamental concepts of the element method mainly including shape functions and general linear and higher order elements up to 3 dimensions. The course objective is to acquaint the students about application of finite element methods for solving various boundary value problems.
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1:** Understand the general theory of Finite Element method and its difference with finite difference method **CO2:** Use the role and significance of shape functions in finite element formulations and use of linear, quadratic, and cubic shape functions for interpolation **CO3:** Formulate some important 1, 2 and 3 dimensional elements

	CO4: Apply the weighted residual and variational approaches in solving some boundary value problems

COURSE SYLLABUS

NOTE:

Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit I will be taught via online mode.

OR

1. Question no. 1 has seven parts and students need to answer any four. Each part carries three and half Marks.

2. Question no. 2 to 5 have three parts and student need to answer any two parts of each question. Each part carries seven marks

Unit No.	Content of Each Unit	Hours of Each Unit
I	**[Course Outcome (s) No. : 1, 2]** General theory of finite element methods, difference between finite element and finite difference methods, review of some integral formulae, concept of discretization, different coordinates, one dimensional finite elements, concept of shape functions, stiffness matrix, connectivity, boundary conditions, and equilibrium equation.	15
II	**[Course Outcome (s) No. : 2, 3]** Numerical integration, construction of shape functions: linear elements (one dimensional bar element, two dimensional-triangular and rectangular elements, three dimensional tetrahedron element).	15
III	**[Course Outcome (s) No. : 2, 3]** Higher order elements: one dimensional quadratic element, two dimensional triangular element, rectangular element, three dimensional tetrahedron element: quadratic element and higher order elements	14

IV	**[Course Outcome (s) No. : 4]** Weighted residual and variational approaches (Galerkin method, collocation method, Rayleigh Ritz method etc.), solving one-dimensional problems. Application of finite element methods for solving various boundary value problems, computer procedures for finite element analysis	16

***Suggested Readings*:**

1. Rao, S. S. *The Finite Element Method in Engineering*. 5th edition, Butterworth-Heinemann, 2017.
2. Hughes, T. J. R. *The Finite Element Method (Linear Static and Dynamic Finite Element Analysis)*. Courier Corporation, 2007.
3. Zienkiewicz, O. C. and Taylor, R. L. *The Finite Element Method: The Basis*. Butterworth-Heinemann, 2000.
4. Smith, G. D. *Numerical solution of Partial Differential Equations: Finite difference methods*. Oxford Applied Mathematics and Computing Science Series, 1985.

<table>
<tr><td>Course No: 36</td><td colspan="3">Course Name: Advanced Complex Analysis</td><td colspan="4">Course Code:
SBSMAT 01 04 05 DCEC 3104</td></tr>
<tr><td rowspan="2">Batch:

2021-2023</td><td rowspan="2">Programme:

M.Sc. Mathematics</td><td rowspan="2">Semester:

IV</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td>Contact Hrs per Week: 4</td></tr>
<tr><td>3</td><td>1</td><td>0</td><td>4</td><td>Total Hours: 60</td></tr>
<tr><td colspan="2" rowspan="2">Total Evaluation Marks:
100

CIE: 30 Marks

TEE: 70 Marks</td><td colspan="5">Examination Duration: 3 hours</td></tr>
<tr><td colspan="5">Pre-requisite of course: Nil</td></tr>
<tr><td>Course Objective</td><td colspan="7">The primary objective of this course is to understand the notion of logarithmically convex function and its fusion with maximum modulus theorem, the spaces of continuous, analytic and meromorphic functions, Runge's theorem and topics related with it, introduce harmonic function theory leading to Dirichlet's problem, theory of range of an entire function leading to Picard and related theorems.</td></tr>
<tr><td>Course Outcomes:</td><td colspan="7">After completing this course, student is expected to learn the following:

CO1: Understand the basics of logarithmically convex function that helps in extending maximum modulus theorem.

CO2: Be familiar with metric on spaces of analytic, meromorphic and analytic functions, equi-continuity and normal families leading to Arzela-Ascoli and related theorems.

CO3: Appreciate the richness of simply connected region which connects various fields</td></tr>
</table>

	topology, analysis and algebra. **CO4:** Know how big the range of an entire function is as well as Picard and related theorems.

COURSE SYLLABUS

NOTE:

Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit I will be taught via online mode.

OR

1. Question no. 1 has seven parts and students need to answer any four. Each part carries three and half Marks.

2. Question no. 2 to 5 have three parts and student need to answer any two parts of each question. Each part carries seven marks

Unit No.	Content of Each Unit	Hours of Each Unit
I	**[Course Outcome (s) No. : 1]** Maximum modulus principle, Schwarz's lemma, convex functions and Hadamard's three circles theorem, Phragmen-Lindelof theorem.	15
II	**[Course Outcome (s) No. : 2]** The space of continuous functions, spaces of analytic functions, The Riemann mapping theorem, Weierstrass factorization theorem. Gamma function, Reimann zeta function.	15
III	**[Course Outcome (s) No. : 3]** Analytic continuation, Runge's theorem, simple connectedness, Mittag-Leffier's theorem, Schwarz reflection principle, analytic continuation.	15

IV	**[Course Outcome (s) No. : 4]** Basic properties of harmonic functions, harmonic functions on a disk, Jensen's formula, Bloch's theorem, The Little Picard theorem, Schottky's theorem, The Great Picard theorem.	15

***Suggested Readings*:**

1. Ahlfors, L.V. Complex Analysis. 3rd edition, McGraw-Hill, 2017.
2. Alpay, D. *A Complex Analysis Problem Book.* Birkhäuser, 2016.
3. Churchill, R. V. and Brown, J. W. *Complex Variables and Applications. 9th edition*, McGraw Hill Education, 2014.
4. Edward,S. B. and Snider, Arthur D. *Fundamental of Complex Analysis with Applications to Engineering and Sciences*. Pearson Education, 2014.
5. Lang, S. *Complex Variable.* Springer, 2013.
6. Conway J. B. *Functions of One Complex Variable*. Springer, 2000.

Course No: 37	Course Name: Introduction to Cryptography				Course Code: SBSMAT 01 04 06 DCEC 3104		
Batch:	**Programme:**	**Semester:**	**L**	**T**	**P**	**Credits**	**Contact Hrs per Week:**
2021-2023	M.Sc. Mathematics	IV					**4**
			3	1	0	4	**Total Hours: 60**
Total Evaluation Marks: 100 **CIE:** 30 Marks **TEE:** 70 Marks		**Examination Duration:** 3 hours **Pre-requisite of course:** Nil					

Course Objective	The purpose of the course is to give a simple account of cryptography. Upon completion of the course, students will have a working knowledge of the fundamental definitions and theorems of elementary congruences, solve congruence equations and systems of equations with one and more variables. They will understand the language, notation of Caesar Cipher and explored to cryptography. We will also discussion on Diffie-Hellman RSA public key cryptosystem.
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1:** Understand the operations with congruence's, linear and non-linear congruence equations. **CO2:** Use the basics of RSA security and be able to break the simplest instances and analyze

	the basic concepts of remote coin flipping, elliptic curve based cryptography. **CO3:** Apply the theorems: Fermat's last theorem, prime number theorem and zeta function. **CO4:** Understand and use the numbers: Perfect numbers, Fermat numbers, Mersenne primes and amicable numbers, Fibonacci numbers.

COURSE SYLLABUS

NOTE:

Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit I will be taught via online mode.

OR

1. Question no. 1 has seven parts and students need to answer any four. Each part carries three and half Marks.

2. Question no. 2 to 5 have three parts and student need to answer any two parts of each question. Each part carries seven marks

Unit No.	Content of Each Unit	Hours of Each Unit
I	**[Course Outcome (s) No. : 1]** Modular arithmetic, congruence, primitive roots, cryptography introduction, Caesar Cipher, Diffie-Hellman RSA public key cryptosystem, Knapsack cryptosystem, application of primitive roots to cryptography.	15
II	**[Course Outcome (s) No. : 2]** Applications of cryptography in primality testing and factorization of large composite numbers, remote coin flipping. Elliptic curve based cryptography.	15

III	**[Course Outcome (s) No. : 3]** Perfect numbers, Fermat numbers, Mersenne primes and amicable numbers, Fibonacci numbers, representation of integers as sum of Squares.	15
IV	**[Course Outcome (s) No. : 4]** Linear and non-linear Diophantine equations, Fermat's last theorem, prime number theorem and zeta function.	15

***Suggested Readings*:**

1. Tilborg, H. C. A. *Fundamentals of Cryptology.* Springer, 2013.
2. Buchmann, J. A. *Introduction to Cryptology*.Springer Science & Business Media, 2012
3. Burton , D. M. *Elementary Number Theory*, Tata McGraw Hill Publishing House, 2006.
4. Menezes, A. J., V.,Oorschot, P. C. and Vanstone,S. A. *Handbook of Applied Cryptography*. CRC Press, 1996.
5. Koblitz, N. *A Course in Number Theory and Cryptography. 2nd edition* Springer, 1994**.**
6. Simmons, G. J. *Contemporary Cryptology*, *The Science of Information Integrity.*New York, IEEE Press, 1992

Course No: 38	**Course Name:** Advanced Abstract Algebra				**Course Code:** SBSMAT 01 04 07 DCEC 3104		
Batch:	**Programme:**	**Semester:**	**L**	**T**	**P**	**Credits**	**Contact Hrs per Week:**
2021-2023	M.Sc. Mathematics	IV					**4**
			3	1	0	4	**Total Hours: 60**

Total Evaluation Marks: 100 **CIE:** 30 Marks **TEE:** 70 Marks	**Examination Duration:** 3 hours **Pre-requisite of course:** Nil

Course Objective	The main objective of this course is to encourage students to develop a working knowledge of the central ideas of modules like cyclic modules, simple, semi-simple modules uniform modules, primary modules and theory of Noetherian and Artinian modules.
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1:** Explain the fundamental concepts of modules and their role in modern mathematics and applied contexts. **CO2:** Demonstrate accurate and efficient use of finitely generated Abelian groups. **CO3:** Apply the theorems: fundamental structure theorem of finitely generated modules over principal ideal domain, Noether- Lasker theorem, Hilbert basis theorem and Wedderburn - Artin theorem, Maschk's theorem.

	CO4: Solve the problem using Nilradical and Jacobson radicals, operations on ideals, extension and contractions applied to diverse situations in physics, engineering and other mathematical contexts.

COURSE SYLLABUS

NOTE:

Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit I will be taught via online mode.

OR

1. Question no. 1 has seven parts and students need to answer any four. Each part carries three and half Marks.

2. Question no. 2 to 5 have three parts and student need to answer any two parts of each question. Each part carries seven marks

Unit No.	Content of Each Unit	Hours of Each Unit
I	**[Course Outcome (s) No. : 1]** Cyclic modules, simple and semi-simple modules, Schur's lemma, free modules, fundamental structure theorem of finitely generated modules over principal ideal domain and its applications to finitely generated Abelian groups.	15
II	**[Course Outcome (s) No. : 2]** Uniform modules, primary modules and Noether- Lasker theorem, Noetherian and Artinian modules and rings with simple properties and examples.	15
III	**[Course Outcome (s) No. : 3]** Nilpotent ideals in Noetherian and Artinian rings, Hilbert basis theorem, Nakayama's lemma, Nilradical and Jacobson radicals, operations on ideals, extension and contraction.	15

IV	**[Course Outcome (s) No. : 4]** Hom(R,R), opposite rings, Wedderburn -Artin theorem, Maschk's theorem, equivalent statement for left Artinian rings having non-zero nilpotent ideals.	15

***Suggested Readings*:**

1. Rotman, J. J.*Advanced Modern Algebra*. *3rd edition*. American Mathematical Soc., 2015.
2. Atiyah, M. F. and Macdonald, I. G. *Introduction to Commutative Rings*. Sarat Book House, 2007.
3. Curtis, C. W. and Reiner, I. *Representation Theory of finite Groups and Associative Algebras*. American Mathematical Society, 2006.
4. Lam, T. Y. *Lectures on Modules and Rings*. GTM Vol. 189, Springer-Verlag, 1999.
5. Bhattacharya,P. B., Jain, S. K. and Nagpaul, S. R. *Basic Abstract Algebra*. 2nd edition, Cambridge University Press, Indian edition, 1997.
6. Anderson, F. W. and Fuller, K. R. *Rings and Categories of Modules.* Springer-Verlag New York, 1992.
7. Cohn, P. M. *Algebra, Vols. I, II & III*, John Wiley & Sons, (Vol. I-1982, Vol. II- 1989, Vol-III-1991.

.

Course No: 39	Course Name: Measure theory and Integration				Course Code: SBSMAT 01 04 08 DCEC 3104		
Batch:	**Programme:**	**Semester:**	**L**	**T**	**P**	**Credits**	**Contact Hrs per Week:**
2021-2023	M.Sc. Mathematics	IV					**4**
			3	1	0	4	**Total Hours: 60**

Total Evaluation Marks: 100	**Examination Duration:** 3 hours
CIE: 30 Marks **TEE:** 70 Marks	**Pre-requisite of course:** Nil

Course Objective	Measure theory provides a foundation for many branches of mathematics such as harmonic analysis, ergodic theory, theory of partial differential equations and probability theory. It is a central, extremely useful part of modern analysis, and many further interesting generalizations of measure theory have been developed.
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1:** Use the concepts of measurable set and measurable function **CO2:** State and explain the construction of the Lebesgue integral and use it **CO3:** Apply the theorems of monotone and dominated convergence and Fatou's lemma **CO4:** Describe the construction of product measure and to apply Fubini's theorem

COURSE SYLLABUS

NOTE:

Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit I will be taught via online mode.

OR

1. Question no. 1 has seven parts and students need to answer any four. Each part carries three and half Marks.

2. Question no. 2 to 5 have three parts and student need to answer any two parts of each question. Each part carries seven marks

Unit No.	Content of Each Unit	Hours of Each Unit
I	**[Course Outcome (s) No. : 1]** Length of an open set, concept of measure, Lebesgue outer measure and measurable sets, example of non-measurable set, Sigma algebra, Borel sets, G_δ and F_σ –sets, Outer and inner regularity of Lebesgue measure.	15
II	**[Course Outcome (s) No. : 2]** Set function, abstract measure spaces, properties of measures, some examples of measures, measurable spaces, measurable functions, combinations of measurable functions, and limits of measurable functions.	15
III	**[Course Outcome (s) No. : 3]** Review of Riemann integral, integrable simple functions, the Lebesgue integration of a measurable function, integration with respect to a measure.	15

IV	**[Course Outcome (s) No. : 4]** Almost everywhere convergence, convergence in measure, Fatou's Lemma, monotone and dominated convergence theorems.	15

***Suggested Readings*:**

1. Berberian, S. K. *Measure and Integration*. AMS Chelsea Publications, 2011.
2. Royden, H. L. and Fitzpatrick P. M. *Real Analysis*. 4th edition, Pearson India, 2010.
3. Barra, G. de. *Measure Theory and Integration*. New Age International (P) Ltd., 2009.
4. Rana, I. K. *An Introduction to Measure and Integration.*2nd edition, Narosa Publishing House, 2004.
5. Folland, G. B. *Real Analysis.* John Wiley & Sons, Inc., New York, 1999.
6. Hewitt, E. and Stromberg, K. *Real and Abstract Analysis*. Springer-Verlag, New York, 1975.

<table>
<tr><td>Course No: 40</td><td colspan="3">Course Name: Mechanics</td><td colspan="3">Course Code:
SBSMAT 01 04 09 DCEC 3104</td></tr>
<tr><td rowspan="2">Batch:

2021-2023</td><td rowspan="2">Programme:

M.Sc.
Mathematics</td><td rowspan="2">Semester:

IV</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td>Contact Hrs per Week: 4</td></tr>
<tr><td>3</td><td>1</td><td>0</td><td>4</td><td>Total Hours:60</td></tr>
<tr><td colspan="2" rowspan="2">Total Evaluation Marks:
100

CIE: 30 Marks

TEE: 70 Marks</td><td colspan="5">Examination Duration: 3 hours</td></tr>
<tr><td colspan="5">Pre-requisite of course: Nil</td></tr>
<tr><td>Course Objective</td><td colspan="6">This course aims to impart knowledge in mechanics used for the derivation of important results and problems related to rigid bodies. The objective is to give the students a mechanical approach for solving the problems related to the mechanics.</td></tr>
<tr><td>Course Outcomes:</td><td colspan="6">After completing this course, student is expected to learn the following:

CO1: Understand the notion of moment and product of inertia.

CO2: Recognize the dynamics involved in projectile motion, pendulum motion, simple harmonic motion and related problems.

CO3: Use the Lagrangian and Hamiltonian functions to formulate the equation of motion for mechanical systems.

CO4: Evaluate canonical equations by means of generating functions and eventually</td></tr>
</table>

	develop Hamilton-Jacobi method to solve equations of motion**.**

COURSE SYLLABUS

NOTE:

Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit I will be taught via online mode.

OR

1. Question no. 1 has seven parts and students need to answer any four. Each part carries three and half Marks.

2. Question no. 2 to 5 have three parts and student need to answer any two parts of each question. Each part carries seven marks

Unit No.	Content of Each Unit	Hours of Each Unit
I	**[Course Outcome (s) No. : 1]** Moments and products of inertia, theorems of parallel and perpendicular axes, principal axes, the momental ellipsoid, equimomental systems, coplanar distributions.	15
II	**[Course Outcome (s) No. : 2]** Two-dimensional motion of rigid bodies, Euler's dynamical equations for the motion of a rigid body about an axis, theory of small oscillations, generalized coordinates, holonomic and non-holonomic systems. scleronomic and rheonomic systems, Lagrange's equations for a holonomic system, Lagrange's equations for a conservative and impulsive forces, kinetic energy	15

	as quadratic function of velocities.	
III	**[Course Outcome (s) No. : 3]** Generalized potential, energy equation for conservative fields, Hamilton's variables. Donkin's theorem. Hamilton canonical equations, cyclic coordinates, Routh's equations. Poisson's bracket. Poisson's identity, Jacobi-Poisson theorem. Hamilton's principle, principle of least action.	15
IV	**[Course Outcome (s) No. : 4]** Poincare Cartan integral invariant. Whittaker's equations. Jacobi's equations. Statement of Lee Hwa Chung's theorem. Hamilton-Jacobi equation. Jacobi theorem. Method of separation of variables. Lagrange brackets, condition of canonical character of a transformation in terms of Lagrange brackets and Poisson brackets, invariance of Lagrange brackets and Poisson brackets under canonical transformations.	15

***Suggested Readings*:**

1. Spiegel, M.R. Theory & Problems of Theoretical Mechanics, Schaum Outline Series McGrawHill, 2017.
2. Rana, N. C. and Joag, P. C. *Classical Mechanics*. McGraw Hill, 2013.
3. Rao,S. K.*Classical Mechanics*. PHI Learning Pvt. Ltd., 2005.
4. Chorlton, F. *Textbook of Dynamics*. CBS Publishers & Dist. Pvt. Ltd., 2004.
5. Louis N. H. and Janet D. F. *Analytical Mechanics*. Cambridge University Press, 1998.
6. Gantmacher, F. *Lectures in Analytical Mechanics*. Mir Publishers, Moscow, 1975.

Course No: 41	**Course Name:** Number Theory				**Course Code:** SBSMAT 01 04 10 DCEC 3104		
Batch:	**Programme:**	**Semester:**	**L**	**T**	**P**	**Credits**	**Contact Hrs per Week:**
2021-2023	M.Sc. Mathematics	IV	3	1	0	4	**4** **Total Hours: 60**
Total Evaluation Marks: 100 **CIE:** 30 Marks **TEE:** 70 Marks		**Examination Duration:** 3 hours **Pre-requisite of course:** Nil					
Course Objective	The purpose of the course is to give a simple account of classical number theory, prepare students to graduate-level courses in number theory and algebra, and to demonstrate applications of number theory. In this course, students will have a working knowledge of the fundamental definitions and theorems of elementary number theory, be able to work with congruence's, solve congruence equations and systems of equations with one and more variables, and be literate in the language and notation of number theory.						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1**: Understand the properties of divisibility and prime numbers, compute the greatest common divisor and least common multiples and handle linear Diophantine equations **CO2:** Use the operations with congruence's, linear and non-linear congruence equations **CO3:** Apply the theorems: Chinese Remainder Theorem, Lagrange theorem, Fermat's						

	theorem, Wilson's theorem **CO4:** Analyse arithmetic functions in areas of mathematics

COURSE SYLLABUS

NOTE:

Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit I will be taught via online mode.

OR

1. Question no. 1 has seven parts and students need to answer any four. Each part carries three and half Marks.

2. Question no. 2 to 5 have three parts and student need to answer any two parts of each question. Each part carries seven marks

Unit No.	Content of Each Unit	Hours of Each Unit
I	**[Course Outcome (s) No. : 1]** Representation of the real numbers by decimals, divisibility, G.C.D and L.C.M., primes, Fermat numbers, congruences and residues, theorems of Euler, Fermat and Wilson, solutions of congruences, linear congruences, Chinese remainder theorem.	15
II	**[Course Outcome (s) No. : 2]** Arithmetical functions $\varphi(n)$, $\mu(n)$ and $d(n)$ and $\sigma(n)$, Mobius inversion formula, congruences of higher degree, congruences of prime power modulli and prime modulus, power residue.	15

III	**[Course Outcome (s) No. : 3]** Quadratic residue, Legendre symbols, lemma of Gauss and reciprocity law. Jacobi symbols, irrational numbers, irrationality of e and π. Finite continued fractions, simple continued fractions, infinite simple continued fractions.	15
IV	**[Course Outcome (s) No. : 4]** Periodic continued fractions, approximation of irrational numbers by convergent, best possible approximation, Farey series, rational approximation, Pell's equations, Hurwitz theorem, Lagrange four square theorem.	15

***Suggested Readings*:**

1. Apostol, T. M. *Introduction to Analytic Number Theory*. Springer 2014.
2. Niven, I. and Zuckerman, H. S. *Introduction to the Theory of Numbers*. John Wiley & Sons, 2008.
3. Burton, D. M. *Elementary Number Theory*. Tata McGraw Hill Publishing House, 2006.
4. Hardy, G. H. and Wright, E. M. *Theory of Numbers*. Oxford Science Publications, 2003.
5. Davenport, H. *Higher Arithmetic*. Cambridge University Press, 1999.

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Course No: 42	Course Name: Mathematics for Finance and Insurance				Course Code: SBSMAT 01 04 11 DCEC 3104		
Batch:	**Programme:**	**Semester:**	**L**	**T**	**P**	**Credits**	**Contact Hrs per Week:**
2021-2023	M.Sc. Mathematics	IV	3	1	0	4	**4** **Total Hours: 60**
Total Evaluation Marks: 100 **CIE:** 30 Marks **TEE:** 70 Marks		**Examination Duration:** 3 hours **Pre-requisite of course:** Nil					
Course Objective	This course introduces the basic concepts of Financial Management such as Insurance and Measurement of returns under uncertainty situations. The philosophy of this course is that Time value of Money - Interest rate and discount rate play a fundamental role in Life Insurance Mathematics – Construction of Morality Tables.						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1:** Demonstrate knowledge of the terminology related to nature, scope, goals, risks and decisions of financial management. **CO2:** Predict various types of returns and risks in investments and take necessary protective measures for minimizing the risk. **CO3:** Develop ability to understand, analyze and solve problems in bonds, finance and						

	insurance. **CO4:** Build skills for computation of premium of life insurance and claims for general insurance using probability distributions.

COURSE SYLLABUS

NOTE:

Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit I will be taught via online mode.

OR

1. Question no. 1 has seven parts and students need to answer any four. Each part carries three and half Marks.

2. Question no. 2 to 5 have three parts and student need to answer any two parts of each question. Each part carries seven marks

Unit No.	Content of Each Unit	Hours of Each Unit
I	**[Course Outcome (s) No. : 1]** Financial Management –overview. Nature and scope of financial management. Goals and main decisions of financial management. Difference between risk, Speculation and gambling. Time value of Money - Interest rate and discount rate. Present value and future value discrete case as well as continuous compounding case. Annuities and its kinds.	15
II	**[Course Outcome (s) No. : 2]** Meaning of return. Return as Internal Rate of Return (IRR). Numerical methods like Newton Raphson method to calculate IRR. Measurement of returns under uncertainty situations. Meaning of risk. Difference between risk	15

	and uncertainty. Types of risks. Measurements of risk. Calculation of security and Portfolio Risk and Return-Markowitz Model. Sharpe Single Index Model-Systematic Risk and Unsystematic Risk.	
III	**[Course Outcome (s) No. : 3]** Taylor series and Bond Valuation. Calculation of Duration and Convexity of bonds. Insurance Fundamentals – Insurance defined. Meaning of loss. Chances of loss, Peril, Hazard, proximate cause in insurance. Costs and benefits of insurance to the society and branches of insurance-life insurance and various types of general insurance. Insurable loss exposures- feature of a loss that is ideal for insurance.	15
IV	**[Course Outcome (s) No. : 4]** Life Insurance Mathematics – Construction of Morality Tables. Computation of Premium of Life Insurance for a fixed duration and for the whole life. Determination of claims for General Insurance – Using Poisson Distribution and Negative Binomial Distribution –the Polya Case. Determination of the amount of Claims of General Insurance – Compound Aggregate claim model and its properties, Claims of reinsurance. Calculation of a compound claim density function F, Recursive and approximate formulae for F.	15

***Suggested Readings*:**

1. Ross, S. M. *An Introduction to Mathematical Finance*. Cambridge University Press, 2019.
2. Elliott, R. J. and Kopp, P. E. *Mathematics of Financial Markets*. Sprigner Verlag, New York Inc, 2018.
3. Damodaran, A. *Corporate Finance - Theory and Practice*. John Wiley & Sons, Inc, 2012.
4. Hull, J. C. *Options, Futures, and Other Derivatives*. Prentice-Hall of India Private Ltd, 2010.
5. Daykin, C. D., Pentikainen, T. and Pesonen, M. *Practical Risk Theory for Actuaries*. Chapman & Hall, 2008.
6. Dorfman, M. S. *Introduction to Risk Management and Insurance*. Prentice Hall, Englwood Cliffs, New Jersey, 1999.
7. Neftci, S. N. *An Introduction to the Mathematics of Financial Derivatives*. Academic Press, Inc, 1991.

<table>
<tr><td>Course No: 43</td><td colspan="5">Course Name: Programming in MATLAB</td><td colspan="2">Course Code:
SBSMAT 01 04 01 SEEC 0120</td></tr>
<tr><td rowspan="2">Batch:

2021-2023</td><td rowspan="2">Programme:

M.Sc.
Mathematics</td><td rowspan="2">Semester:

IV</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td>Contact Hrs per Week: 3</td></tr>
<tr><td>0</td><td>1</td><td>2</td><td>0</td><td>Total Hours: 45</td></tr>
<tr><td colspan="3">Total Evaluation Marks: 100

CIE: 30 Marks

TEE: 70 Marks</td><td colspan="5">Examination Duration: 3 hours

Pre-requisite of course: Nil</td></tr>
<tr><td>Course Objective</td><td colspan="7">The course objective is to familiarize the students with problem solving through MATLAB. The course aims to give exposure to basic concepts of the MATLAB programming. The course aims to design the MATLAB programs for various numerical methods.</td></tr>
<tr><td>Course Outcomes:</td><td colspan="7">After completing this course, student is expected to learn the following:

CO1: Overview and display format of MATLAB programs

CO2: Acquire knowledge of various elementary built-in functions, data types and Matrix operations

CO3: Learn about control flow and loop structures

CO4: Write MATLAB programs for various numerical methods use to solve nonlinear equations, system of linear equations, interpolation, numerical differentiation and integrations,</td></tr>
</table>

	differential equations.

COURSE SYLLABUS

NOTE:

Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit I will be taught via online mode.

OR

1. Question no. 1 has seven parts and students need to answer any four. Each part carries three and half Marks.

2. Question no. 2 to 5 have three parts and student need to answer any two parts of each question. Each part carries seven marks

Unit No.	Content of Each Unit	Hours of Each Unit
I	**[Course Outcome (s) No. : 1, 2]** Overview of MATLAB, operators, display format, elementary built-in functions, working with variables, general commands, data types, data import, arrays, operations with arrays.	18
II	**[Course Outcome (s) No. : 2, 3]** Matrices: eigenvalues and eigenvectors, similarity transformation and diagonalization, functions, script files, operators, loops and conditional statements, programming in MATLAB, graphics- 2-D and 3-D plots, input and output.	20
III	**[Course Outcome (s) No. : 2, 3, 4]** Applications in numerical methods: bisection method, false position (Regula-Falsi) method, Newton–Raphson) method System of linear equations, LU decomposition, Gauss elimination method, Gauss Seidel method, Gauss Jordan method, interpolation, Lagrange and Newton	18

	polynomials.	
IV	**[Course Outcome (s) No. : 3, 4]** Applications to numerical differentiation and integrations: Trapezoidal method and Simpson method, Runge–Kutta method, introduction to working with modules in MATLAB.	19

***Suggested Readings*:**

1. Kumar, S. S. and Lenina, S. V. B. *Matlab: Easy Way of Learning*. PHI Learning Pvt. Ltd., 2016.
2. Pratap, R. *Getting Started with MATLAB: A Quick Introduction for Scientists and Engineers*. Oxford University Press, 2016.
3. Chapman, S. J. Matlab Programming for Engineers, 5th edition, Cengage Learning, 2015.
4. Otto, S.R. and Denier, J.P. *An Introduction to Programming and Numerical Methods in MATLAB*. Springer-Verlag, 2005.
5. Yang, W. Y., Cao, W., Chung, T. and Morris, J. *Applied Numerical Methods using MATLAB*. John Wiley Interscience, 2005.
6. *Getting Started with MATLAB,* Maths Works Inc. *www. in.mathsworks.com.*

<table>
<tr><td>Course No: 44</td><td colspan="3">Course Name: Automata Theory</td><td colspan="4">Course Code:
SBSMAT 01 04 02 SEEC 0120</td></tr>
<tr><td rowspan="2">Batch:

2021-2023</td><td rowspan="2">Programme:

M.Sc.
Mathematics</td><td rowspan="2">Semester:

IV</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td>Contact Hrs per Week: 3</td></tr>
<tr><td>0</td><td>1</td><td>2</td><td>0</td><td>Total Hours: 45</td></tr>
<tr><td colspan="2" rowspan="2">Total Evaluation Marks:
100

CIE: 30 Marks

TEE: 70 Marks</td><td colspan="6">Examination Duration: 3 hours</td></tr>
<tr><td colspan="6">Pre-requisite of course: Nil</td></tr>
<tr><td>Course Objective</td><td colspan="7">This course introduces the basic concepts of Computability Theory such as Moore and Mealy machines. The main objective of this course is to encourage students to develop a working knowledge of the central ideas of finite state machines, reduced machines, regular Languages, regular expressions and context free grammars.</td></tr>
<tr><td>Course Outcomes:</td><td colspan="7">After completing this course, student is expected to learn the following:

CO1: Apply a number of proof techniques to theorems in language design and develop a clear understanding of decidability and undecidability.

CO2: Understand the concepts of deterministic and non-deterministic finite state automata and their equivalence.

CO3: Demonstrate the equivalence between context-free grammars and pushdown</td></tr>
</table>

	automata. **CO4:** Appreciate the power of the Turing machine, as an abstract automaton, that describes computation, effectively and efficiently.

COURSE SYLLABUS

NOTE:

Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit I will be taught via online mode.

OR

1. Question no. 1 has seven parts and students need to answer any four. Each part carries three and half Marks.

2. Question no. 2 to 5 have three parts and student need to answer any two parts of each question. Each part carries seven marks

Unit No.	Content of Each Unit	Hours of Each Unit
I	**[Course Outcome (s) No. : 1]** Introductory Computability Theory - Finite state machines and their transition table diagrams, equivalence of finite state machines, reduced machines, homomorphism and finite automata acceptors.	12
II	**[Course Outcome (s) No. : 2]** Non-deterministic finite automata and equivalence of its power to that of deterministic finite automata, Moore and Mealy machines.	11
III	**[Course Outcome (s) No. : 3]** Regular Languages, Regular Expressions, Properties and uses of Regular	12

	expressions, Finite automata and Regular Expressions.	
IV	**[Course Outcome (s) No. : 4]** Context free Grammars and Context free Languages, Simplification of Context free Grammar, Pumping Lemma, Kleene's Theorems	10

***Suggested Readings*:**

1. Gersting,J. L. *Mathematical Structures for Computer Science*. 7th edition, Computer Science Press, New York, 2020.
2. Liu, C.L. *Elements of Discrete Mathematics*. McGraw-Hill Book Co. 2019.
3. Nasir S.F.B. and Srimani P. K.*A Textbook on Automata Theory*. Cambridge University Press India Pvt. Ltd., 2018.
4. Ram, B. *Discrete Mathematics*. Vinayak Publishers and Distributors, Delhi, 2010.
5. Lipschutz, S. and Schiller, J. *Finite Mathematics*. McGraw Hill, 1994.
6. Tremblay, J. P. and Manohar, R. *Discrete Mathematical Structures with Applications to Computer Science*. McGraw-Hill Book Co., 1997.

<table>
<tr><td>Course No: 45</td><td colspan="3">Course Name: Artificial Intelligence and Machine Learning</td><td colspan="4">Course Code:
SBSMAT 01 04 03 SEEC 0120</td></tr>
<tr><td>Batch:

2021-2023</td><td>Programme:

M.Sc. Mathematics</td><td>Semester:

IV</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td>Contact Hrs per Week: 3</td></tr>
<tr><td colspan="3"></td><td></td><td>1</td><td>2</td><td>0</td><td>Total Hours: 45</td></tr>
<tr><td colspan="3">Total Evaluation Marks:
100

CIE: 30 Marks

TEE: 70 Marks</td><td colspan="5">Examination Duration: 3 hours

Pre-requisite of course: Nil</td></tr>
<tr><td>Course Objective</td><td colspan="7">Theories and methods for automating and representing knowledge with an emphasis on learning from input/output data. The course covers a wide variety of approaches, including Supervised Learning, Neural Nets and Deep Learning, Reinforcement Learning, Expert Systems, Bayesian Learning, Fuzzy Rules, and Genetic Algorithms. Each student focuses on two of these approaches and creates a term project.</td></tr>
<tr><td>Course Outcomes:</td><td colspan="7">After completing this course, student is expected to learn the following:

CO1: Understand the concept of Artificial Intelligence.

CO2: Familiarize with Knowledge based AI systems and approaches

CO3: Apply the aspect of Probabilistic approach to AI and Identify the Neural Networks and NLP in designing AI models.</td></tr>
</table>

	CO4: Recognize the concepts of Machine Learning and its deterministic tools.

COURSE SYLLABUS

NOTE:

Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit I will be taught via online mode.

OR

1. Question no. 1 has seven parts and students need to answer any four. Each part carries three and half Marks.

2. Question no. 2 to 5 have three parts and student need to answer any two parts of each question. Each part carries seven marks

Unit No.	Content of Each Unit	Hours of Each Unit
I	**[Course Outcome (s) No. : 1]** History of artificial intelligence, The birth of artificial intelligence, AI Winters, Todays' AI, Historical milestones in the development of AI, Great contributors, People who have influenced AI , Differences between strong AI and weak AI, Artificial Intelligence definitions, Emergence of AI – Technological advances.	12
II	**[Course Outcome (s) No. : 2]** Machine Learning ---> Deep Learning --->AI, Functions of AI, Characteristics of artificial intelligence, Applications of AI, AI in health care, Industry 4.0, AI in manufacturing, AI in education sector, AI in business, AI in Finance Sector, AI in Law, AI in society, Cognitive science and AI, Cognition and process of Cognition, Disciplines in Cognitive science, Multidisciplinary subject,	11

	Linguistics, Artificial intelligence as Cognitive science, Methods in Cognitive science, Watson.	
III	**[Course Outcome (s) No. : 3]** Introduction to knowledge representation systems, Knowledge representation using logic, Propositional logic, Semantics of propositional logic, Properties of propositional logic statements, Tautologies and logical implication, Resolution, Conjunctive normal form, Resolution is valid, Resolution algorithm, Knowledgebase systems, Structure of a knowledge based system, Recap of artificial intelligence.	12
IV	**[Course Outcome (s) No. : 4]** Components of expert systems, Expert systems development, Wumpus world, Logic, A simple knowledge base, Exploring the Wumpus world, Semantic net, Inference in semantic networks, Semantic networks: Types and components, Types of relationships in semantic network, Frames, Frames: Some examples, Non-monotonic logic, Circumscription, Default logic, Artificial Neural Network, Natural language processing, Classical NLP, Feed-forward networks, Recurrent neural networks and recursive networks, Features for NLP problems, Framenet Vs. Wordnet, Features for text, Features for word relations, NGRAM features, Some terminologies.	10

***Suggested Readings*:**

1. Gersting, J. L. *Mathematical Structures for Computer Science*. 7th edition, Computer Science Press, New York, 2020.
2. Markiewicz, M. and Zheng, J. *Getting Started with Artificial Intelligence: A Practical Guide to Building Enterprise*. Ist edition, Shroff/O'Reilly, 2019.
3. Theobald, O. *Machine Learning: Make Your Own Recommender System*. Scatterplot Press, 2018.
4. Flasinski, M. *Introduction to Artificial Intelligence*. Springer, 2017.

9. TEACHING-LEARNING PROCESS

- Lectures
- Discussions
- Simulations
- Role Playing
- Participative Learning
- Interactive Sessions
- Seminars
- Research-based Learning/Dissertation or Project Work
- Technology-embedded Learning

10. IMPLEMENTATION OF BLENDED LEARNING

Blended Learning is a pedagogical approach that combines face to-face classroom methods with computer-mediated activities in the process of teaching and learning. It implies nice blend of face-to-face and online activities to make the learning processes more interesting and engaging. It focuses on integration of traditional classroom activities and innovative ICT-enabled strategies. It emphasises student-centric learning environment where the teacher is the facilitator for productive and measurable learning outcomes. It optimises and compliments the face to face learning, giving ample freedom and flexibility to the students and teachers to access and explore the wide range of open-access sources such as video lectures, podcasts, recordings and articles through digital platforms. It gives freedom and autonomy to the teachers in selection of appropriate digital platforms, resources and time-slots to complement and supplement face to face learning. The Blended Learning doesn't undermine the role of the teacher, rather it gives him/her an opportunity to explore the unexplored in accordance with the requirements of the curriculum.

Key features of Blended Learning

- Student-Centric Pedagogical Approach focusing on flexibility in timing, quality content, needs and interests of students and freedom to study through the mode of his/her choice;
- Freedom to Select variety of mediums and techniques;
- Increased student engagement in learning;
- Enhanced teacher and student interaction;
- Improved student learning outcomes;
- More flexible teaching and learning environment;
- More responsive for self and continuous learning;
- Better opportunities for experiential learning;
- Increased learning skills;
- Greater access to information, improved satisfaction and learning outcomes.

Note: Resolution no (c) as per minutes circulated by VC office**:** It was resolved that Blended Learning with 40% component of online teaching and 60% face to face classes for each programme, be adopted

11. ASSESSMENT AND EVALUATION

- Continuous Comprehensive Evaluation at regular after achievement of each Course-level learning outcome
- Formative Assessment on the basis of activities of a learner throughout the programme instead of one-time assessment
- Oral Examinations to test presentation and communication skills
- Open Book Examination for better understanding and application of the knowledge acquired
- Group Examinations on Problem solving exercises
- Seminar Presentations
- Review of Literature
- Collaborative Assignments

1. **Examination and Internal Assessment:** The internal assessment work and the End-Semester examination shall have the weightage of 30% and 70%, respectively.
2. **Internal Assessment:**
   (i) Internal Assessment shall be done on a continuous basis, taking into account the student's class performance, completion of assignments and performance at the two compulsory sessional tests to be conducted in a semester. For the sake of uniformity, particularly for interdepartmental transfer of credits, there shall be a uniform procedure of examination to be adopted by all faculty members.
   (ii) Internal Assessment Test 1 shall be held around the sixth week of the semester for the syllabi covered till then.
   (iii) Internal Assessment Test 2 shall be held around the twelfth week for the syllabi covered between seventh and twelfth week.
   (iv) For conducting Internal Assessment, one or more assessment tools, such as written tests, assignments, oral quizzes, paper presentation, laboratory work, etc., suitable to the course may be employed.
   (v) The Internal Assessment for theory shall consist of the following components with marks indicated against each:-
   (a) Attendance 5 marks

Below 75 %	Nil
75% to < 80 %	1 mark
80% to < 85 %	2 marks
85% to < 90%	3 marks
90% to < 95%	4 marks
95% to 100%	5 marks
(b) Assignments/Presentations and Class Participation	5 marks
(c) Internal Assessment Test-1	10 marks
(d) Internal Assessment Test-2	10 marks

This criteria shall be made known to the students at the commencement of each semester. For practical examination, 70 percent of the marks will be awarded through an end semester practical exam and remaining 30 percent of the marks will consist of internal assessment to be awarded by concerned faculty member(s) of the concerned department. Maximum 05 marks to be awarded for attendance of students (Same as mentioned in case of internal assessment for theory examination).

Assessment of Seminar paper: The seminar paper shall be assessed on the basis of the contents of the paper submitted and its presentation, equally. The assessment will be made by the concerned teacher/advisor/supervisor. A Seminar presentation paper will not exceed 4 credits per semester.

(vi) The Head/Incharge of the Department may allow a student to repeat one sessional test, if his/her application in this regard is considered as genuine on valid reasons.

(vii) A student is required to secure a minimum of 'P' grade in the Internal Assessment and in the End-Semester examinations in the aggregate. However, he/she shall have to pass the practical examination separately, with a minimum of 'P' grade.

3. End-Semester Examination:

(i) The End-semester Examinations covering the entire syllabus prescribed for the course and carrying 70% of weightage, shall be conducted by the Examination Branch of the University, in consultation with the Head of the Department.

(ii) The Examiners or Board of Examiners shall be appointed for each course by the Board of Studies of the Department concerned.

(iii) The distribution of weightage for the valuation of semester-long project work/ dissertation shall be:

(a) Periodic presentation : 30%

(b) Project Report : 40%

(c) Viva voce : 30%

Or

as decided by the Board of Studies of the Department concerned.

(iv) The hall ticket/admit card shall be issued to the student on the recommendation of the Head of the Department, subject to the following conditions:

(a) Having fulfilled the requirement of attendance as prescribed, and,

(b) Submission of a "No dues" certificate in the prescribed form.

4. Letter Grades and Grade Points:

An absolute grading system shall be adopted to grade the students.

(i) Under the absolute grading system, marks shall be converted to grades based on pre-determined class intervals.

(ii) In the End-semester theory or practical examinations, the examiner shall award the marks and these marks shall be further converted into Grades/Grade points by the examination branch in accordance with the provisions of the Ordinance.

(iii) Detail Marks Sheet issued at the end of the semester or the programme shall carry marks/percentage and equivalent grades both.

(iv) The University shall adopt the 10-point Grading System, with the Letter Grades as given under:

Letter Grade	**Grade Point (SGPA/CGPA)**	**Range of Grade Point (SGPA/CGPA)**	**Class Interval (in %)**
O (Outstanding)	10	Above 9 to 10	Above 90 and < 100
A+ (Excellent)	9	Above 8 to 9	Above 80 and < 90
A (Very Good)	8	Above 7 to 8	Above 70 and < 80
B+ (Good)	7	Above 6 to 7	Above 60 and < 70
B (Above Average)	6	Above 5 to 6	Above 50 and < 60
C (Average)	5	Above 4.5 to 5	Above 45 and < 50
P (Pass)	4	4 to 4.5	40 to 45
F (Fail)	0		< 40
Ab (Absent)	0		Absent

Note:

(i) F= Fail, and the students graded with 'F' in a programme or course shall be required to re-appear in the examination. However, students appearing in their final Semester Examination, may be permitted to appear in the reappear papers of the preceding odd Semesters.

(ii) The minimum qualifying marks for a course or programme shall be 40% (i.e., 'P' grade).

(iii) The students shall have to qualify at the Internal Assessment and the End-Semester examinations in the aggregate, and in the practical examinations, separately.

(iv) There shall be no rounding off of SGPA/CGPA.

(v) The SGPA/CGPA obtained by a student shall be out of a maximum of 10 points.

(vi) In order to be eligible for the award of the Master's degree of the University, a student must obtain CGPA of 4 at the end of the programme.

(vii) Provided that the student who is otherwise eligible for the award of the degree/diploma but has secured a CGPA of less than 4 at the end of the permissible period of semesters may be allowed by the Department concerned to repeat the same course(s) or other courses of the same type in lieu thereof in the extra semesters provided in Clause 7 on "Duration of Programme".

(viii) The Cumulative Grade Point Average (CGPA) obtained by a student shall be classified into the following division/Class:

CGPA	**Class/ Division**
Above 9	Outstanding
Above 8 to 9	First Class (With Distinction)
6 to 8	First Class
5.5 to < 6	High-Second Class
5 to < 5.5	Second Class

5. Setting of question papers and Evaluation

(i) The question papers for the End-Semester theory examination shall be set and evaluation of answer books shall be done by the examiners (Internal and/or External ordinarily in the ratio of 60:40) out of the Panel of Examiners recommended by the Board of Studies of the Department concerned on the basis of their expertise/ specialization.

In case of unavailability of external examiners, the Vice Chancellor may allow the evaluation to be performed by the internal examiners only so that the declaration of results is not delayed. The question papers shall be moderated by a Board of Moderators

to be appointed by the Controller of Examinations out of the panel drawn by Head/Incharge of the concerned department.

(ii) In the case of the practical examination of the courses, the assessment shall be jointly under taken by the internal and external examiners. For the assessment of practical component, half of the examiners in the team shall be invited from outside the University from amongst the panel of examiners (ordinarily not below the rank of Associate Professor) approved by the competent authority.

(iii) In case of the Project reports, Thesis and Dissertation, the assessment shall be jointly carried out by the internal and external examiners. External examiners shall be invited from amongst the panel of examiners (ordinarily not below the rank of Associate Professor) approved by the competent authority.

(iv) The result of the students shall be subject to moderation by a Board of Moderators appointed by the University for each programme/course.

(v) Pattern of Question Papers in End-Semester Exams. for assessment and evaluation of students:

(a) Question no. 1 shall consist of short answer type questions of specific word length from all the units with internal choice. The questions shall be set in such a manner that the students shall have to attempt at least one short-answer type question from each unit.

(b) Students shall have to attempt one question from each unit and the question paper shall provide internal choice for each question to be attempted from each unit.

6. Re-appear Examination/Improvement of Grades

Re-appear Examination: The students failing to score minimum grade required to qualify a course/programme may be allowed to re-appear in those papers where they couldn't score 'P' grade in the extra semesters provided in Clause 7 on "Duration of Programme" with the following provisions:

(i) student securing "F" Grade in a course shall be permitted to repeat/ reappear in the End-Semester Examination of the Course for a maximum number of three times i.e. a student with arrears on account of "F" Grade, shall be permitted to repeat / reappear in the End

Semester Examination for a maximum of three times (including the first appearance), along with the subsequent End Semester Examinations.

(ii) If a student secures "F" Grade in a Project Work / Project Report/ Dissertation / Field Work Report / Training Report etc, he/she shall be required to resubmit the revised Project Work / Project Report/ Dissertation / Field Work Report / Training Report etc. as required by the evaluator(s). Provided further that a student shall be permitted to re-submit the Project Work / Project Report / Dissertation / Field Work Report/ Training Report etc. for a maximum of three times (including the first submission).

(iii) Such students may avail the chance to re-appear only within the maximum duration of the programme.

(iv) Re-appear examination of even semesters shall be conducted with the end-semester examinations of even semesters and similarly examinations of odd semesters shall be conducted with the end-semester examinations of odd semesters. However a student in the final semester is allowed to re-appear in the courses of both odd and even semesters.

(v) A 'Re-appear' examination shall be based on the syllabi of the course/programme in force at the time of initial registration to the course/programme.

(vi) A student who has got the migration certificate issued from the university shall not be allowed to re-appear at any examination.

7. Re-evaluation/Re-checking:

A student may apply for revaluation/rechecking of his/her answer scripts within thirty days of the declaration of the result.

(i) For re-evaluation/re-checking of the answer scripts, a student shall have to apply on the prescribed form available on the University website or the Examination Branch of the University, along with the original Detail Marks Certificate or the copy of the result sheet and a Fee of Rs. 1000/- for each Course/Paper.

(ii) (a) If after the first revaluation, the difference of the original marks and re-evaluated marks is up to plus or minus 5% of the maximum marks of the paper, there shall be no change in the marks originally scored by the student.

(b) If after the first re-evaluation, the difference of the original marks and re-evaluated marks is more than 5% and less than 10%, the average of the two scores will be considered as final score and the result shall be revised accordingly.

(c) If after the first re-evaluation, the difference comes to more than plus or minus 10% of the maximum marks of the paper, the answer script shall be re-evaluated by a third examiner.

(d) After the second re-evaluation, the average of the nearest two awards/marks shall be taken as final and result shall be revised accordingly.

8. Minimum Credit requirements:

(i) For a one-year Post Graduate programme, the credit requirements for the award of the Post Graduate Diploma shall be 52 credits (±4 Credits), including a minimum of 9 credits from the elective courses (of which at least 4 credits shall be from elective course offered by another Department).

(ii) For a two-year Master's Degree programme, the credit requirements for the Master's degree shall be 100 credits (±4 Credits), including a minimum of 18 credits from elective courses (of which at least 8 credits shall be from elective courses offered by other Departments).

(iii) For a three-year Master's programme, the credit requirements for the Master's degree shall be 150 credits (±6 Credits), including a minimum of 27 credits from elective courses (of which 12 credits shall be from elective courses offered by other Departments).

9. Computation of SGPA and CGPA

The University shall follow the following procedure to compute the Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA):

(i) The SGPA is the ratio of sum of the product of the number of credits with the grade points scored by a student in all the courses taken by a student and sum of the number of credits of all the courses undergone by a student, i.e.

$$\text{SGPA (Si)} = \sum(Ci \times Gi) / \sum Ci$$

where Ci is the number of credits of the i^{th} course and Gi is the grade point scored by the student in the i^{th} course.

(ii) The CGPA is also calculated in the same manner taking into account all the courses undergone by a student over all the semesters of a programme, i.e.

$$\text{CGPA} = \sum(Ci \times Si) / \sum Ci$$

where Si is the SGPA of the i^{th} semester and Ci is the total no. of credits in that semester.

(iii) The SGPA and CGPA shall be rounded off to 2 decimal points.

10. Illustration of the Computation of SGPA and CGPA

(i) Illustration of Computation

Course	Credit	Grade Letter	Grade Point	Credit Point
Course I	3	A	8	3 x 8 = 24
Course II	4	B+	7	4 x 7 = 28
Course III	3	B	6	3 x 6 = 18
Course IV	3	O	10	3 x 10 =30

	Total credits for the semester=13			Total Credit points earned= 100

Thus, SGPA= 100/13= 7.69

(ii) Illustrations for computing CGPA:

Semester I	**Semester II**	**Semester III**	**Semester IV**	**Semester V**	**Semester VI**
Credit: 20	Credit: 22	Credit: 25	Credit: 26	Credit: 26	Credit: 25
SGPA: 6.9	SGPA: 7.8	SGPA: 5.6	SGPA: 6.0	SGPA: 6.3	SGPA= 8.0

Thus,

$$\text{CGPA} = \frac{((20 \times 6.9) + (22 \times 7.8) + (25 \times 5.6) + (26 \times 6.0) + (26 \times 6.3) + (25 \times 8.0))}{(20+22+25+26+26+25)}$$

= (969.4/144) =6.73

Note: Formula to calculate percentage from CGPA/SGPA= CGPA or SGPA x 10; and formula to calculate percentage to CGPA or SGPA = Percentage/10

e.g. In case of example mentioned in table 12.2, the percentage of CGPA = 6.73x10 =67.30.

(iii) **Transcript (Format):** Based on the above, letter grades, grade points, SGPA, and the CGPA, the Transcripts/Detail Marks Certificates (DMCs) shall be issued to the candidates for each semester and a consolidated transcript indicating the performance in all the semesters. The percentage of marks shall be reflected in the DMC of the final semester on the basis of the CGPA.

11. Removal of Student Name from the Programme:

(i) The name of a student falling under any one of the following categories shall automatically stand removed from the rolls of the University:

(a) A student who has failed to fulfil the minimum grade point requirements prescribed for the programme during the maximum duration of the programme.

(b) A student who has already exhausted the maximum duration allowed for completion of the Programme and has not fulfilled the requirements for the award of the degree /diploma.

(c) A student who is found to be involved in misconduct, forgery, indiscipline or any other objectionable conduct, upon recommendation of the Discipline Committee/ Proctorial Board, and

(d) A student who has failed to attend the classes as stipulated under Ordinance XV (II).

(ii) Promotion Rules

(a) A student will be promoted from an odd semester to the next even semester without any restrictions on the minimum number of credits earned. However for promotion from an even semester to the next odd semester, a student should have earned atleast 50% of the credits of the current and all previous semesters taken together. A student failing to earn atleast 50% of the credits from the prescribed courses of all present and all previous semesters taken together will be treated as an 'Ex-student' and will be allowed to repeat in the end semester examination of the previous semesters as applicable (for example for a student going from semester 4 to 5 who becomes an Ex. Student, he/ she shall be required to repeat all the papers of semester 3 and semester 4 in the next odd/even semester). However such student will not be allowed to repeat the internal assessment for the said paper/s of the respective semester/s as the case may be. After passing the said semesters, the student shall be promoted to the next odd semester and shall be treated as a 'Regular' student.

(b) A student shall be declared to have passed the programme of study and award of the degree if he/she has secured the required credits with at least 'P' grade.

12. KEYWORDS

- LOCF
- NEP-2020
- Blended Learning
- Face to face (F to F) Learning
- Programme Outcomes
- Programme Specific Outcomes
- Course-level Learning Outcomes
- Postgraduate Attributes
- Learning Outcome Index
- Formative Assessment and Evaluation
- Comprehensive and Continuous Evaluation

13. REFERENCES

- National Education Policy-2020. https://www.education.gov.in/sites/upload_files/mhrd/files/NEP_Final_English_0.pdf
- The draft subject specific LOCF templates available on UGC website. https://www.ugc.ac.in/ugc_notices.aspx?id=MjY5OQ
- Draft Blended Mode of Teaching and Learning: Concept Note available on UGC website. https://www.ugc.ac.in/pdfnews/6100340_Concept-Note-Blended-Mode-of-Teaching-and-Learning.pdf
- Ordinance-XV, Programmes leading to the award of Post Graduate degrees/Diplomas, Central University of Haryana.

14. APPENDICES

NIL

Annexure-XXIX

CENTRAL UNIVERSITY OF HARYANA

(*Established under the Central Universities Act, 2009*)

(NAAC Accredited 'A' Grade)

Curriculum and Syllabi

Integrated B.Sc.-M.Sc. (Mathematics)

(w.e.f. 2021-2022)

DEPARTMENT OF MATHEMATICS

SCHOOL OF BASIC SCIENCES

Approved by :	**BOS**	**School Board**	**Academic Council**
Approval Status :	√	√	x or √
Approval Date :	04/09/2021	20/09/2021	?

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VISION AND MISSION

Vision and Mission of the University

Vision

To develop enlightened citizenship of a knowledge society for peace and prosperity of individuals, nation and the world, through promotion of innovation, creative endeavor's and scholarly inquiry.

Mission

To serve as a beacon of change, through multi-disciplinary learning, for creation of knowledge community, by building a strong character and nurturing a value-based transparent work ethics, promoting creative and critical thinking for holistic development and self-sustenance for the people of India. The University seeks to achieve this objective by cultivating an environment of excellence in teaching, research and innovation in pure and applied areas of learning.

Vision and Mission of the Department

Vision

To be an internationally recognized centre for research and teaching in mathematics. To encourage excellence, innovation, integrity and values for society in the department. To produce global leaders for academic and industry by imparting multidisciplinary and contemporary mathematical knowledge to the students.

Mission

- To contribute towards building calibre of the students by providing quality education and research in Mathematics through updated curriculum, effective teaching learning process.
- To impart innovative skills, team-work, ethical practices to the students so as to meet societal expectations.
- To build a strong base in Mathematics for various academic programs across the institute.

1. Background

i) Preamble

Mathematics is a fundamental part of human thoughts and logic, and Integral to attempts at understanding the world and ourselves. Mathematics, as we all know, provide an effective way of building mental discipline and encourages logical reasoning. In addition, mathematical knowledge plays a vital role in understanding the contents of others subjects such as Basic Sciences, Social sciences and in Music and Art. This has been argued and established that there can't be a nation without mathematics. Today, more than ever before, the challenges of globalization and digitalization obligate mathematicians and researchers to go beyond the local, national, and even continental frontiers of their knowledge.

Considering the curricular reforms as instrumental for desired learning outcomes, all the academic departments of Central University of Haryana made a rigorous attempt to revise the curriculum of undergraduate and postgraduate programmes in alignment with National Education Policy-2020 and UGC Quality Mandate for Higher Education Institutions-2021. The process of revising the curriculum could be prompted with the adoption of "Comprehensive Roadmap for Implementation of NEP-2020" in 32nd meeting of the Academic Council of the University held on April 23, 2021. The Roadmap identified the key features of the Policy and elucidated the Action Plan with well-defined responsibilities and indicative timeline for major academic reforms. At the outset, it may well be stated that NEP 2020 document owes it origin to meet the fundamental challenges of ever changing academics scales at Global level. Thus, a high priority task in the context of future education development agenda in India is fostering quality higher education. The idea is to involve young minds in knowledge production and of greater participation of knowledge itself. Participation in knowledge, by young minds, is an important departure from the existing structure at undergraduate level. Implementation of new structure is based on guiding principles of Learning Outcome based Curriculum Framework (LoCF). The fundamental premise underlying the learning outcome based approach to curriculum planning and development is that higher education qualifications such as Bachelor-Master integrated degree programme are awarded on the basis of demonstrated achievement of outcomes (expressed in terms of knowledge, understanding, skills, attitudes and values) and academic standards expected of Graduate-Master of a programme of study. The LOCF approach is

envisioned to provide a focused, outcome-based syllabus at the Bachelor-Master integrated with an agenda to structure the teaching-learning experiences in a more student-centric manner. The LOCF approach has been adopted to strengthen student's experiences as they engage themselves in the programme of their choice. The Graduate-Master programme will prepare the students for academia and also prepare them to use this knowledge for employment. The given programme elaborates its nature and promises the outcomes that are to be accomplished by studying the courses. The programme also state the attributes that it offers to inculcate at the graduation level. The Bachelor-Master integrated attributes encompass values related to wellbeing, emotional stability, critical thinking, and also skills for employability. The programme prepares students for sustainability and lifelong learning. This also tries to change the perception towards studying mathematics. This course is designed to break the stereotypes of mathematics learning and create interest amongst students to do Mathematics. This programme is organized to provide the greatest flexibility to its students. There are Core Disciplinary papers that provide the fundamental knowledge in the discipline of mathematics. The programme is otherwise envisaged to provide a large amount of choice so that students can adapt their education on the basis of their interests. These provide not just mathematical knowledge and skills but also a vital skill in other disciplines as well.

Flexible learning is important to choose one's academic pathway leading to the award of certificate, diploma, and degree. The multiple entry exit will be according to the UGC guidelines and University ordinances.

ii) Introduction:

The objective of this programme is to prepare the students with a new vision. One of the significant reforms in integrated B.Sc.-M.Sc. (Mathematics) programme is to introduce the Learning Outcomes-based Curriculum Framework (LOCF) which makes it student-centric, interactive and outcome-oriented with well-defined aims, objectives and goals to achieve. Outcome based learning is the principal end of pedagogical transactions in higher education in today's world in the light of exponential changes brought about in science and technology, especially in mathematics. The learning outcomes will be attained by students through skills acquired during this programme of study. Programme learning outcomes will include subject-specific skills and generic skills, including transferable global skills and competencies. This

programme would also focus on knowledge and skills that will prepare students for employment, and for further studies.

The quality education in mathematics is very challenging task for higher education system in India. In designing this course we have taken appropriate measures to define the minimum levels of learning for students in integrated B.Sc.-M.Sc. (Mathematics) programme. The given programme elaborates its nature and promises the outcomes that are to be accomplished by studying the courses. The programme also state the attributes that it offers to inculcate at the different levels. It is designed to bring out the best intellect of the student and also allow the student to keep pace with the contemporary development.

The Integrated B.Sc.-M.Sc. (Mathematics) programme offers student's access to Core Courses, Ability Enhancement Compulsory Courses, Skill Enhancement Courses, Discipline Specific Electives and Generic Electives. The Programme-learning outcomes and course learning outcomes have been clearly specified to help prospective students, parents and employers understand the nature and extent of the degree programme; to maintain national and international standards, and to help in student mobility.

iii) Learning Outcomes Based Approach to Curriculum Planning:

The learning outcomes-based curriculum framework for Integrated B.Sc.-M.Sc. (Mathematics) programme is based on the expected learning outcomes and graduate-master attributes that a graduate-master in mathematics is expected to attain. The curriculum for Integrated B.Sc.-M.Sc. (Mathematics) programme is prepared keeping in mind the needs and aspirations of students in mathematics as well as the evolving nature of mathematics as a subject. The course learning outcomes and the programme learning outcomes specify the knowledge, understanding, skills, attitudes and values that a student completing this degree is expected to know. The qualification of Integrated B.Sc.-M.Sc. (Mathematics) programme is awarded to a student who can demonstrate the attainment of these outcomes.

iv) Nature and Extent of the Integrated B.Sc.-M.Sc. (Mathematics) Programme:

The Integrated B.Sc.-M.Sc. (Mathematics) is of five years duration. Each year is divided into two semesters. The total numbers of semester are ten and it is presumed that each semester will be of eighteen weeks duration. The teaching and learning in the Integrated B.Sc.-M.Sc. (Mathematics) will involve theory classes (lectures), practical classes and tutorial classes.

Mathematics is usually described as the abstract science of number, quantity and space along with their operations. The scope of Mathematics is very broad and it has a wide range of applications in natural sciences, engineering, economics, social sciences and in data science. Integrated B.Sc.-M.Sc. (Mathematics) programme aims at developing the ability to think critically, logically and analytically and hence use mathematical reasoning in everyday life. Pursuing a degree in mathematics will introduce the students to a number of interesting and useful ideas in preparations for a number of mathematics careers in education, research, government sector, business sector and industry. The Integrated B.Sc.-M.Sc. (Mathematics) programme covers the full range of mathematics, from classical Calculus to Modern Cryptography, Information Theory, and Network Security. The course lays a structured foundation of Calculus, Real & Complex analysis, Abstract Algebra, Differential Equations (including Mathematical Modelling), Number Theory, Graph Theory, and C++ Programming exclusively for Mathematics. An exceptionally broad range of topics covering Pure & Applied Mathematics: Linear Algebra, Metric Spaces, Statistics, Linear Programming, Numerical Analysis, Mathematical Finance, Coding Theory, Mechanics and Biomathematics cater to varied interests and ambitions. Also hand on sessions in Computer Lab using various Computer Algebra Systems (CAS) softwares such as Maple, Mathematica, MATLAB, Maxima and R to have a deep conceptual understanding of the above tools are carried out to widen the horizon of students' self experience. The courses like Biomathematics, Mathematical Finance etc. emphasize on the relation of mathematics to other subjects like Biology, Economics and Finance. To broaden the interest for interconnectedness between formerly separate disciplines one can choose from the list of Generic electives for example one can opt for economics as one of the GE papers. Skill enhancement Courses enable the student acquire the skill relevant to the main subject. Choices from Discipline Specific Electives provides the student with liberty of exploring his interests within the main subject. The key importance is the theme of integrating mathematical and professional skills. The well structured programme empowers the student with the skills and knowledge leading to enhanced career opportunities in industry, commerce, education, finance and research.

2. Aims of Integrated B.Sc.-M.Sc. (Mathematics) programme:

The overall aims of Integrated B.Sc.-M.Sc. (Mathematics) programme are follows:

i) Inculcate strong interest in learning mathematics and have balanced knowledge for understanding of definitions, key concepts, principles and theorems in mathematics.

ii) Enable students to apply the knowledge and skills acquired by them during the programme to solve problems in mathematics.

iii) Train students to communicate mathematical ideas in a lucid and effective manner, which will be helpful in wage employment, self-employment and entrepreneurship.

iv) Provide students with sufficient knowledge and skills that enable them to undertake research in different fields of mathematics and related disciplines.

v) To encourage the use of relevant software such as MATLAB, Maple, R and MATHEMATICA.

3. Programme Outcomes (POs) and Programme Specific Outcomes (PSOs)

Program Outcomes:

Students enrolled in the integrated B.Sc.-M.Sc. Programmes offered by the Departments under the School of Basic Sciences will have the opportunity to learn and master the following components in addition to attain important essential skills and abilities:

PO-No.	Component	Outcomes
PO-1	Basic Knowledge	Capable of delivering basic disciplinary knowledge gained during the programme.
PO-2	In-depth Knowledge	Capable of describing advanced knowledge gained during the programme.
PO-3	Critical thinking and Problem Solving abilities	Capable of analyzing the results critically and applying acquired knowledge to solve the problems.
PO-4	Creativity and innovation	Capable to identify, formulate, investigate and analyze the scientific problems and innovatively to design and create products and solutions to real life problems.
PO-5	Research aptitude and global competency	Ability to develop a research aptitude and apply knowledge to find the solution of burning research problems in the concerned and associated fields at global level.
PO-6	Holistic and multidisciplinary education	Ability to gain knowledge with the holistic and multidisciplinary approach across the fields.
PO-7	Skills enhancement	Learn specific sets of disciplinary or multidisciplinary

		skills and advanced techniques and apply them for betterment of mankind.
PO-8	Leadership and Teamwork abilities	Ability to learn and work in a groups and capable of leading a team even.
PO-9	Environmental and human health awareness	Learn important aspects associated with environmental and human health. Ability to develop eco-friendly technologies.
PO-10	Ethical thinking and Social awareness	Inculcate the professional and ethical attitude and ability to relate with social problems.
PO-11	lifelong learning skills and Entrepreneurship	Ability to learn lifelong learning skills which are important to provide better opportunities and improve quality of life. Capable to establish independent startup/innovation center etc.

Programme Specific Outcomes (PSOs):

On completion of Integrated B.Sc.-M.Sc. (Mathematics) Programme a student**:**

Number	**Programme Specific Outcomes**
PSO-1	Will have a strong foundation in both pure and applied mathematics.
PSO-2	Will be able to apply mathematical skills for solving problems and for preparing various competitive exams.
PSO-3	Will be able to communicate mathematical knowledge effectively, in writing as well as orally.
PSO-4	Will identify applications of mathematics in other disciplines, leading to enhancement of career prospects in different fields and research areas.
PSO-5	Will have basic knowledge of programming and computational techniques as required for employment.
PSO-6	Should have the knowledge of the fundamental axioms in mathematics and capability of developing ideas based on them and inculcate mathematical

	reasoning.
PSO-7	Will be able to locate and analyse the different mathematical texts with appropriate theoretical framework.
PSO-8	Have the knowledge of a wide range of mathematical techniques and application of mathematical methods/tools in science, social science, engineering and technology.
PSO-9	Should be able to develop analytical skills, critical thinking, creativity, communication and presentation skills through assignments, seminar and project work.
PSO-10	Should be able to apply their skills and knowledge that translate information presented verbally into mathematical form, select and use appropriate mathematical formulae or techniques in order to process the information and draw the relevant conclusion.

4. Integrated B.Sc.-M.Sc. (Mathematics) Attributes:

On completion of the course students are expected to have acquired the skills of multi dimensional thinking, analytical reasoning, rational enquiry, problems solving, effective communication, and exploring the different areas of pure and Applied mathematics. The attributes expected from the students of Integrated B.Sc.-M.Sc. (Mathematics) Programme are as:

a. **Disciplinary Knowledge**: Capability of demonstrating comprehensive knowledge of basic concepts and ideas in mathematics and its subfields, and its applications to other disciplines.

b. **Communications skills:** Ability to communicate various concepts of mathematics in effective and coherent manner both in writing and orally, ability to present the complex mathematical ideas in clear, precise and confident way.

c. **Multidimensional thinking and analytical reasoning:** Ability to apply multidimensional thinking in understanding the concepts in mathematics and allied areas; identify relevant assumptions, hypothesis, implications or

conclusions; formulate mathematically correct arguments; ability to analyse and generalise specific arguments or empirical data to get broader concepts.

d. **Problem solving**: Be able to apply mathematical skills and logical reasoning for solving different kinds of non-familiar problems. Capability to solve problems in computer graphics using concepts of linear algebra; linear programming, C, C++, Matlab, Maple and Mathematica. Capability to apply the knowledge gained from different areas of mathematics to solve specific problems or models in operations research, physics, chemistry, electronics, medicine, economics, finance etc.

e. **Research-related skills**: Capability to ask and inquire about relevant/appropriate questions, ability to define problems, formulate hypotheses, test hypotheses, formulate mathematical arguments and proofs, draw conclusions; ability to write clearly the results obtained.

f. **Self-directed learning**: Ability to work independently, ability to search relevant resources, capability to use ICT tools and e-content for self-learning and enhancing knowledge in mathematics.

g. **Moral and ethical awareness**: Ability to identify unethical behavior such as fabrication or misrepresentation of data, committing plagiarism, infringement of intellectual property rights.

h. **Employment**: Have sound knowledge of mathematical modelling, programming and computational techniques as required for employment in industry.

5. Qualification Descriptors for Integrated B.Sc.-M.Sc. (Mathematics) (Possible Career Pathways):

Students who choose Integrated B.Sc.-M.Sc. (Mathematics) programme, develop the ability to think critically, logically and analytically and hence use mathematical reasoning in everyday life. Pursuing a degree in mathematics will introduce the students to a number of interesting and useful ideas in preparations for a number of mathematics careers in education, research, government sector, business sector, entrepreneurship and industry. The key importance is the theme of integrating mathematical and professional skills. The well-structured programme empowers the student with the skills and knowledge leading to enhanced career opportunities in industry, commerce, education,

finance and research. The qualification descriptors for Integrated B.Sc.-M.Sc. (Mathematics) programme may include the following:

i. Demonstrate fundamental/systematic and coherent knowledge of the academic field of mathematics and its applications and links to engineering, science, technology, economics and finance; demonstrate procedural knowledge that create different professionals like teachers and researchers in mathematics, quantitative analysts, actuaries, risk managers, professionals in industry and public services.

ii. Demonstrate educational skills in areas of analysis, geometry, algebra, mechanics, differential equations etc.

iii. Demonstrate comprehensive knowledge about materials, including scholarly, and/or professional literature, relating to essential learning areas pertaining to the field of mathematics, and techniques and skills required for identifying mathematical problems.

iv. Apply the acquired knowledge in mathematics and transferable skills to new/unfamiliar contexts and real-life problems.

v. Demonstrate mathematics-related and transferable skills that are relevant to some of the job trades in education sector, entrepreneurship and employment opportunities.

6. Structure of integrated B.Sc.-M.Sc. (Mathematics) Programme:

The Integrated B.Sc.-M.Sc. (Mathematics) programme is a five year course divided into 10 semesters. A student is required to have complete the credit as per University ordinance and UGC guidelines. The scheme and syllabus of the course are subject to change according to the UGC guidelines, NEP 2020 and University ordinance.

Duration: Integrated B.Sc.-M.Sc. (Mathematics) program is a full-time integrated program offered by the Department of Mathematics. This is a 5-years program, consisting of ten semesters with two semesters per year.

Eligibility: 10+2 in Science Streams or equivalent of any recognized board in India with Mathematics as one of the optional subjects having minimum 50% marks or equivalent grade in aggregate for UR category and 45% or equivalent grade for SC/ST/OBC/PWD/EWS candidates.

7. Course Type

Core Courses (CC)

Generic Elective Courses (GEC)

Discipline Specific Elective Courses (DSEC)

Skill Enhancement Courses (SEC)

Ability Enhancement Compulsory Courses (AECC)

Total Credit: Semester-wise distribution of credits: 22+ 22+ 28 + 28+24+24

CORE COURSES (CC)

S.No.	Course code	Course title	L	T	P	Credit
1.	SBSMAT 03 01 01 C 4046	Calculus (P)	4	0	4	6
2.	SBSMAT 03 01 02 C 5106	Algebra	5	1	0	6
3.	SBSMAT 03 02 01 C 5106	Real Analysis	5	1	0	6
4.	SBSMAT 03 02 02 C 4046	Differential Equations (P)	4	0	4	6
5.	SBSMAT 03 03 01 C 5106	Theory of Real Functions	5	1	0	6
6.	SBSMAT 03 03 02 C 5106	Group Theory I	5	1	0	6
7.	SBSMAT 03 03 03 C 4046	Partial Differential Equations and System of ODE (P)	4	0	4	6
8.	SBSMAT 03 04 01 C 4046	Numerical Methods (P)	4	0	4	6
9.	SBSMAT 03 04 02 C 5106	Riemann Integration and Series of Functions	5	1	0	6
10.	SBSMAT 03 04 03 C 5106	Ring Theory and Linear Algebra I	5	1	0	6
11.	SBSMAT 03 05 01 C 5106	Multivariate Calculus	5	1	0	6
12.	SBSMAT 03 05 02 C 5106	Group Theory II	5	1	0	6
13.	SBSMAT 03 06 01 C 5106	Metric Spaces and Complex Analysis	5	1	0	6
14.	SBSMAT 03 06 02 C 5106	Ring Theory and Linear Algebra II	5	1	0	6

DISCIPLINE SPECIFIC ELECTIVE COURSES (DSE)

(Offered to the Students of Integrated B.Sc.-M.Sc. (Mathematics) by the Department)

S.No.	Course code	Course title	L	T	P	Credit
1.	SBSMAT 03 05 01 DSE 5106	Portfolio Optimization	5	1	0	6
2.	SBSMAT 03 05 02 DSE 5106	Theory of Equations	5	1	0	6
3.	SBSMAT 03 05 03 DSE 5106	Analytical Geometry	5	1	0	6
4.	SBSMAT 03 05 04 DSE 5106	Industrial Mathematics	5	1	0	6
5.	SBSMAT 03 05 05 DSE 5106	Boolean Algebra and Automata Theory	5	1	0	6
6.	SBSMAT 03 05 06 DSE 5106	Probability and Statistics	5	1	0	6
7.	SBSMAT 03 06 01 DSE 5106	Linear Programming	5	1	0	6
8.	SBSMAT 03 06 02 DSE 5106	Discrete Mathematics	5	1	0	6
9.	SBSMAT 03 06 03 DSE 5106	Bio-Mathematics	5	1	0	6
10.	SBSMAT 03 06 04 DSE 4046	Mathematical Modeling	5	1	0	6
11.	SBSMAT 03 06 05 DSE 5106	Mechanics	5	1	0	6
12.	SBSMAT 03 06 06 DSE 5106	Differential Geometry	5	1	0	6

GENERIC ELECTIVE COURSE (GEC)

(Offered to Integrated B.Sc.-M.Sc. Programme of others Departments only)

S. No.	Course code	Course title	L	T	P	Credit
1.	SBSMAT 03 01 01 GE 4046	Object Oriented Programming in C++(P)	4	0	4	6
2.	SBSMAT 03 01 02 GE 5106	Finite Element Methods	5	1	0	6
3.	SBSMAT 03 01 03 GE5106	Algebra	5	1	0	6
4.	SBSMAT 03 02 01 GE 5106	Econometrics	5	1	0	6
5.	SBSMAT 03 02 02 GE 5106	Mathematical Finance	5	1	0	6
6.	SBSMAT 03 02 03 GE 5106	Real Analysis	5	1	0	6
7.	SBSMAT 03 03 01 GE 5106	Cryptography and Network Security	5	1	0	6
8.	SBSMAT 03 03 02 GE 5106	Information Security	5	1	0	6
9.	SBSMAT 03 03 03 GE 5106	Theory of Real Function	5	1	0	6
10.	SBSMAT 03 04 01 GE 5106	Applications of Algebra	5	1	0	6
11.	SBSMAT 03 04 02 GE 5106	Combinatorial Mathematics	5	1	0	6
12.	SBSMAT 03 04 03 GE 4046	Numerical Method	4	0	4	6

Note: Any MOOCs course for PG students on SWAYAM can also be taken as DCEC or GEC course on the recommendations of the department.

Ability Enhancement Compulsory Courses (AECC)*:

S. No	Course Code	Course Title	L	T	P	Credit
1.	SBSMAT 03 01 01 AECC 3104	Environmental Sciences	3	1	0	4
2.	SBSMAT 03 01 02 AECC 3104	प्राचीनभारतीयसंस्कृतिः, दर्शनं भाषाविज्ञानं च (1)	3	1	0	4
3.	SBSMAT 03 02 01 AECC 3104	Hindi	3	1	0	4
4.	SBSMAT 03 02 02 AECC 3104	English	3	1	0	4

SKILL ENHANCEMENT ELECTIVE COURSES (SEEC)*:

The department may offer more than one courses depending on specialization and strength of faculty members, and the student has to opt one among the following.

S. No	Course Code	Course Title	L	T	P	Credit
1.	SBSMAT 03 03 01 SEC 3104	Logic, Sets and Graph Theory	3	1	0	4
2.	SBSMAT 03 03 02 SEC 3024	Computer fundamental and Programming in C	3	0	2	4
3.	SBSMAT 03 04 01 SEC 3024	Object Oriented Programming in C++(P)	3	0	2	4
4.	SBSMAT 03 04 02 SEC 3104	Operating System: Linux and Computer Graphic	3	1	0	4

*** 1. University/Department may add more choices for Ability Enhancement Compulsory and Skill Enhancement Elective Courses.**

2. Two AEEC courses (Environmental Sciences and English/MIL) will be taught in first two semesters according to the availability of the faculty members in respective departments.

SEMESTER-WISE COURSES AND CREDIT DISTRIBUTION

Scheme and Syllabus of Integrated B.Sc.-M.Sc. in Mathematics

(CHOICE BASED CREDIT SYSTEM)

Semester I

Total credits: 22

S. No.	Course Title	Course Code	L	T	P	Credits
1	Calculus (P)	SBSMAT 03 01 01 C 4046	4	0	4	6
2	Algebra	SBSMAT 03 01 02 C 5106	5	1	0	6
3	AECC1		3	1	0	4
4	GE -1		5	1	0	6

Semester II

Total credits: 22

S. No.	Course Title	Course Code	L	T	P	Credits
1	Real Analysis	SBSMAT 03 02 01 C 5106	5	1	0	6
2	Differential Equations (P)	SBSMAT 03 02 02 C 4046	4	0	4	6
3	AECC2		3	1	0	4
4	GE -2		5	1	0	6

Semester III

Total credits: 28

S. No.	Course Title	Course Code	L	T	P	Credits
1	Theory of Real Functions	SBSMAT 03 03 01 C 5106	5	1	0	6
2	Group Theory I	SBSMAT 03 03 02 C 5106	5	1	0	6
3	Partial Differential Equations and System of ODE (P)	SBSMAT 03 03 03 C 4046	4	0	4	6
4	SEC1		3	1	0	4
5	GE 3		5	1	0	6

Semester IV

Total credits: 28

S. No.	Course Title	Course Code	L	T	P	Credits
1	Numerical Methods (P)	SBSMAT 03 04 01 C 4046	4	0	4	6
2	Riemann Integration and Series of Functions	SBSMAT 03 04 02 C 5106	5	1	0	6
3	Ring Theory and Linear Algebra I	SBSMAT 03 04 03 C 5106	5	1	0	6
4	SEC2		3	1	0	4
5	GE 4		5	1	0	6

Semester V

Total credits: 24

S. No.	Course Title	Course Code	L	T	P	Credits
1	Multivariate Calculus	SBSMAT 03 05 01 C 5106	5	1	0	6
2	Group Theory II	SBSMAT 03 05 02 C 5106	5	1	0	6
3	DSE 1		5	1	0	6
4	DSE 1		5	1	0	6

Semester VI

Total credits: 24

S. No.	Course Title	Course Code	L	T	P	Credits
1	Metric Spaces and Complex Analysis	SBSMAT 03 06 01 C 5106	5	1	0	6
2	Ring Theory and Linear Algebra II	SBSMAT 03 06 02 C 5106	5	1	0	6
3	DSE 3		5	1	0	6
4	DSE 4		5	1	0	6

8. COURSE-LEVEL LEARNING OUTCOMES

Course Structure

SEMESTER – I

<table>
<tr><td>Course No: 1</td><td colspan="4">Course Name: Calculus (P)</td><td colspan="3">Course Code:
SBSMAT 03 01 01 C 4046</td></tr>
<tr><td rowspan="2">Batch:

2021-2026</td><td rowspan="2">Programme:

Integrated B.Sc.-M.Sc. (Mathematics)</td><td>Semester:</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td>Contact Hrs per Week: 6</td></tr>
<tr><td>I</td><td>4</td><td>0</td><td>4</td><td>6</td><td>Total Hours: 90</td></tr>
<tr><td colspan="2" rowspan="2">Total Evaluation Marks:
100

CIE:
TEE:</td><td colspan="6">Examination Duration: 3 hours</td></tr>
<tr><td colspan="6">Pre-requisite of course: Nil</td></tr>
<tr><td>Course Objective</td><td colspan="7">The course objective is to understand the axiomatic foundation of the real number system, in particular the notion of completeness and some of its consequences; understand the concepts of limits, continuity, compactness, differentiability, and integrability, rigorously defined;. Students should also have attained a basic level of competency in developing their own mathematical skill.</td></tr>
<tr><td>Course Outcomes:</td><td colspan="7">After going through this course the students will be able to
• Understand the method of successive differentiation and Taylor series expansions.
• Be familiar with concepts of asymptotes, curvature and singular points.
• Apply the concepts of calculus for tracing and rectification of the curves in</td></tr>
</table>

	Cartesian, parametric and polar coordinates. • Understand reduction formulae and be familiar with the method of finding volumes and surfaces of solids of revolution.

Unit No.	Content of Each Unit	Hours of Each Unit
I	Hyperbolic functions, higher order derivatives, Leibniz rule and its applications to problems of type $e^{ax+b}\sin x$, $e^{ax+b}\cos x$, $(ax+b)^n\sin x$, $(ax+b)^n\cos x$ concavity and inflection points, asymptotes L'Hospitals rule, applications of maxima and minima.	22
II	Curve tracing in Cartesian coordinates, tracing in polar coordinates of standard curves, Reduction formulae, derivations and illustrations of reduction formulae of the type $\int \sin nx\, dx$, $\int \cos nx\, dx$, $\int \tan nx\, dx$, $\int \sec nx\, dx$, $\int (\log x)^n dx$, $\int \sin^n x \cos^m x\, dx$ volume by slicing, disks and washer methods, volumes by cylindrical shells.	23
III	Parameterizing a curve, arc length, arc length of parametric curves and area of surface of revolution. Techniques of sketching conics, reflection properties of conics, rotation of axes and second degree equations, classification into conics using the discriminant, polar equations of conics.	23
IV	Triple product, introduction to vector functions, operations with vector-valued functions, limits and continuity of vector functions, differentiation and integration of vector functions, tangent and normal components of acceleration, connectedness.	22

Books Recommended:

1. G.B. Thomas and R.L. Finney, Calculus, 9th Ed., Pearson Education, Delhi, 2005
2. B. C. Das & B. N. Mukherjee, Differential Calculus, U. N. Dhur and Sons. Pvt. Ltd.
3. S. Narayan & P. K. Mittal, Integral Calculus, S. Chand Publishing.
4. S. Narayan & P. K. Narayan, A Text Book on Vector Calculus, S. Chand Publishing.
5. M.J. Strauss, G.L. Bradley and K. J. Smith, Calculus, 3rd Ed., Dorling Kindersley (India) P. Ltd. (Pearson Education), Delhi,2007.
6. H. Anton, I. Bivens and S. Davis, Calculus, 7th Ed., John Wiley and Sons (Asia) P. Ltd., Singapore, 2002.
7. R. Courant and F. John, Introduction to Calculus and Analysis (Volumes I & II), Springer-Verlag, New York, Inc., 1989.

List of Practical (using any software)

Plotting of graphs of function $e^{ax + b}$, log(ax + b), 1/(ax + b), sin(ax + b), cos(ax + b), |ax + b| and to illustrate the effect of a and b on the graph.

(i) Plotting the graphs of polynomials of degree 4 and 5, the derivative graph, the second derivative graph and comparing them.

(ii) Sketching parametric curves (E.g., Trochoid, cycloid, epicycloids and hypocycloid).

(iii) Obtaining surface of revolution of curves.

(iv) Tracing of conics in Cartesian coordinates/ polar coordinates.

(v) Sketching ellipsoid, hyperboloid of one and two sheets, elliptic cone, elliptic, paraboloid and hyperbolic paraboloid using Cartesian coordinates.

(vi) Matrix operations (addition, multiplication, inverse, transpose).

Course No: 2	**Course Name:** Algebra			**Course Code:** SBSMAT 03 01 02 C 5106			
Batch: 2021-2026	**Programme: Integrated B.Sc.-M.Sc. (Mathematics)**	**Semester:** I	**L**	**T**	**P**	**Credits**	**Contact Hrs per Week: 06**
			5	1	0	6	**Total Hours: 90**
Total Evaluation Marks: 100 **CIE:** **TEE:**		**Examination Duration:** 3 hours					
		Pre-requisite of course: N.A.					
Course Objective	The objective of the course is to introduce basic structures of algebra like matrices, system of linear equation and linear transformation which are the main pillars of modern mathematics. The course gives the student a good mathematical maturity and enables to build mathematical thinking and skill.						
Course Outcomes:	After going through this course the students will be able to • Work with the trigonometric form of complex numbers including De-Moivre's formula. • Be familiar with the Euler form $re^{i\theta}$ of complex numbers • Apply the elementary operations on the matrices. Compute the eigenvalues, eigen function, characteristic equation and minimal polynomial of a given matrix. • Obtain the solution of the systems of linear equations using the concept of rank of matrices						
Unit No.	**Content of Each Unit**						**Hours of Each Unit**
I	Polar representation of complex numbers, n^{th} roots of unity, De						23

	Moivre's theorem for rational indices and its applications. Equivalence relations, Functions, Composition of functions, Invertible functions, One to one correspondence and cardinality of a set.	
II	Well-ordering property of positive integers, Division algorithm, Divisibility and Euclidean algorithm, Congruence relation between integers, Principles of Mathematical Induction, statement of Fundamental Theorem of Arithmetic.	22
III	Systems of linear equations, row reduction and echelon forms, vector equations, the matrix equation Ax=b, solution sets of linear systems, applications of linear systems, linear independence.	23
IV	Introduction to linear transformations, matrix of a linear transformation, inverse of a matrix, Characterizations of invertible matrices. Subspaces of $\mathbf{R^n}$, dimension of subspaces $\mathbf{R^n}$ and rank of a matrix, Eigenvalues, Eigen Vectors and Characteristic Equation of a matrix.	22

Books Recommended:

1. Hall & Night, Higher Algebra, Arihant Publishers, 2013.
2. K. Hoffman, R.A. Kunze, Linerar Algebra 2nd Ed., Prentice-Hall of India Pvt. Ltd.,1971.
3. S. L. Loney, Plane Trigonometry, Arihant Publishers, 2016.
4. D. C. Lay, Linear Algebra and its Applications, 3rd Ed., Pearson Education Asia, Indian Reprint, 2007.
5. R.G. Bartle and D. R. Sherbert, Introduction to Real Ananlysis. Willy Std Edition, 2014.
6. B. Das & B N Mukherjee, Higher Trigonometry, U N Dhur & Sons, 2007.
7. T. Andreescu and D. Andrica, Complex Numbers from A to Z, Birkhauser,2006
8. E. G. Goodaire and M. M. Parmenter, Discrete Mathematics with Graph Theory, 3rd Ed., Pearson Education (Singapore) P. Ltd., Indian Reprint, 2005.

<table>
<tr><td>Course No: 03</td><td colspan="3">Course Name:
Environmental Sciences</td><td colspan="4">Course Code:
SBSMAT 03 01 01 AECC 3104</td></tr>
<tr><td rowspan="2">Batch:

2021-2026</td><td rowspan="2">Programme:

Integrated B.Sc.-M.Sc. (Mathematics)</td><td rowspan="2">Semester:
I</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td>Contact Hrs per Week: 2</td></tr>
<tr><td>3</td><td>1</td><td>0</td><td>4</td><td>Total Hours: 30</td></tr>
<tr><td colspan="3">Total Evaluation Marks:
100

CIE:

TEE:</td><td colspan="4">Examination Duration: 3 hours

Pre-requisite of course:</td></tr>
<tr><td>Course Objective</td><td colspan="6">To aware the students the need for sustainable development, problems of pollution, solid waste disposal, degradation of environment, issues like economic productivity and national security, Global warming, the depletion of ozone layer, loss of biodiversity and need of worldwide efforts in its conservation.</td></tr>
<tr><td></td><td colspan="6">After going through this course the students will be able to
• Get the knowledge about trends of biological diversity and conservation strategies and thereafter be able to create awareness for its conservation and development.
• Understanding of issues concerning different natural resources will be helpful to find scientific solution based on participatory approach.
• Know about the local environmental issues, movements and an important role to minimize the impact of these aspects.
• Knowledge about the types of pollution and pollution control</td></tr>
<tr><td>Unit No.</td><td colspan="5">Content of Each Unit</td><td>Hours of</td></tr>
</table>

		Each Unit
I	Definition, scope and importance of the environmental science, Natural Resources: Renewable and non-renewable resources: Natural resources and associated problems.	8
II	Introduction, kinds of ecosystem, structure and functions, abiotic and biotic component, Ecological energetics, Energy flow models, Food chain and Food web, Ecological Pyramids-types, Ecological succession, Introduction, types, structure and function of the following ecosystem :- a. Forest ecosystem b. Grassland ecosystem c. Desert ecosystem d. Aquatic ecosystems.	7
III	Introduction – Definition, value and types: genetic, species and ecosystem diversity. Bio- geographical classification and Hot-spots of India. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. Endangered and endemic species of India. Conservation of biodiversity: In-situ and Ex-situ conservation.	7
IV	Definition, cause, effects and control measures of Air, Water, Soil, Marine and Noise pollution. Solid Waste Management: Causes, effects and control measures of wastes. Seventeen Sustainable Developmental Goals, Environment Protection Act, Air Act, Water Act, Wildlife Protection Act, Forest Conservation Act, Public awareness.	8

Books Recommended:

1. Bharucha E, (2002) The Biodiversity of India, Mapin Publishing
2. Cao G, Orru R (2014) Current Environmental Issues and Challenges. 2014th edition; Springer
3. Cunningham W P, Cunningham M A (2008) Principles of Environment Science. Enquiry and Applications. 5th Edition. Tata McGraw Hill, New Delhi
4. Dash M C, Dash S P (2009) Fundamentals of Ecology. 3rd McGraw Hill Education
5. Gibbs J, Malcolm L, Sterling J (2008) Problem-Solving in Conservation Biology and Wildlife Management. 2nd ed. Wiley-Blackwell
6. Ginley D, Cahen, D (2011) Fundamentals of Materials for Energy and Environmental Sustainability. Cambridge University Press
7. Gilbert M (2007) An Introduction to Environmental Engineering and Science, Prentice Hall, New Delhi
8. Khan I (2019) Forest Governance and Sustainable Resource Management. SAGE Publications. India.
9. Odum E P, Barrett W, (2005) Fundamentals of Ecology. 5th ed. Cengage Learning.
10. Sharma P D (2017) Ecology and Environment. 13th ed. Rastogi Publications
11. Thangadurai D, Ching G, Jeyabalan S, Islam S (2019) Biodiversity and Conservation: Characterization and Utilization of Plants, Microbes and Natural Resources for Sustainable Development and Ecosystem Management. United States: Apple Academic Press

Course No: 04	Course Name: प्राचीनभारतीयसंस्कृतिः, दर्शनं भाषाविज्ञानं च (1)				Course Code: SBSMAT 03 01 02 AECC 3104		
Batch:	**Programme:**	**Semester :**	**L**	**T**	**P**	**Credits**	**Contact Hrs per Week: 2**
2021-2026	**Integrated B.Sc.-M.Sc. (Mathematics)**	**I**	3	1	0	4	**Total Hours: 30**
Total Evaluation Marks: 100 **CIE:** **TEE:**		**Examination Duration:** 3 hours **Pre-requisite of course:**					
Course Objective /उद्देश्यः	1. संस्कृतेतर-विषयाणामध्येतृभ्यः संस्कृताध्ययनाय सौकर्योत्पादनम्; 2. भारतीयज्ञानसंपदाधारभूतानां वेदादि-शास्त्राणामुपनिषदां च रुचिरुत्पादनम्; 3. संस्कृतेनोपनिबद्धानां नीतिवाक्यानां गीतायां वर्णितस्य कर्मयोगस्य च तत्त्व-संधारणाय यत्नः; 4. सामान्य-भाषाविज्ञानस्य परिचयः।						
	पाठ्यक्रमाध्ययनस्य फलम् / Course Level Learning Outcome: ●अध्येतारः वेदादि-शास्त्राणामुपनिषदां च तत्त्वान् ज्ञात्वा स्वाध्याय प्रयत्नशीलाः भवेयुः। ●व्यावहारिकदृष्ट्या संस्कृतज्ञानेन अन्यविषयाणामध्येतारः तत्तद् स्वविषयानुगुणं संस्कृतभाषायामुप- लभ्यमानानां ग्रन्थानां प्रति यत्नशीलाः स्युः। ●वेदोपनिषत्–गीता–नीतिशास्त्र–भाषाशास्त्रादीनां विषयाणां सम्यगध्ययनेनास्माकं पूर्वजानां वैदुष्येण परिचयः संजायेत। ●भारतीय-चिन्तनपरम्परायाः समृद्धिं ज्ञातुमयं पाठ्यक्रमः प्रकृष्टमाध्यमः संजायेत।						
Unit No.	**Content of Each Unit**						**Hours of Each Unit**

I	**घटकम्-1:** (क) यजुर्वेदः (34. 1-6)-शिवसंकल्पमन्त्राः; (ख) तैत्तिरीयोपनिषद् - शिक्षावल्ली (अनुशासनोपनिषद्)	8
II	**घटकम्-2:** भर्तृहरिः- नीतिशतकम् : 1-50 श्लोकाः	7
III	**घटकम्-3:** भगवद्गीता – तृतीयाध्यायः (कर्मयोगः)	7
IV	**घटकम्-4:** सामान्यभाषाविज्ञानम्- (क) वर्णमाला, वर्णानाम् उच्चारणस्थानानि प्रयत्नाश्च; (ख) भाषाविज्ञानस्य सामान्यः परिचयः, भाषापरिवर्तनस्य कारणानि, अर्थपरिवर्तनस्य कारणानि च	8

अनुशंसितग्रन्थाः -

1. उवव्ट-महीधर, शुक्लयजुर्वेदभाष्य, मोतीलाल बनारसीदास, दिल्ली, 2007

2. स्वामी दयानन्द सरस्वती, यजुर्वेदभाष्य, सम्पा० ब्रह्मदत्त जिज्ञासु, रामलाल कपूर ट्रस्ट, सोनीपत (हरियाणा)

3. तैत्तिरीयोपनिषद्, हिन्दी व्याख्याकार - स्वामी प्रखर प्रज्ञानन्द सरस्वती, काशी, 2013

4. भर्तृहरि, नीतिशतक, सम्पादक एवं हिन्दी व्याख्याकार - जनार्दन शास्त्री पाण्डेय, मोतीलाल बनारसीदास, दिल्ली, 2014

5. नीतिशतकम्, 'नीतिपथ' हिन्दी व्याख्याकार - राजेश्वर शास्त्री मुसलगाँवकर, चौखम्भा, वाराणसी

6. श्रीमद्भगवद्गीता (हिन्दी अनुवाद सहित), गीता प्रैस, गोरखपुर, 2015

7. श्रीकृष्ण त्रिपाठी, श्रीमद्भगवद्गीता (द्वितीय, तृतीय एवं चतुर्थ अध्याय), 2005

8. देवीदत्त शर्मा, भाषिकी और संस्कृत भाषा, हरियाणा साहित्य अकादमी, चण्डीगढ़, 1990

9. कपिलदेव द्विवेदी, भाषा-विज्ञान एवं भाषा-शास्त्र, विश्वविद्यालय प्रकाशन, चौक, वाराणसी, 2012

10. कर्णसिंह, भाषाविज्ञान, साहित्य भण्डार, मेरठ

11. Burrow, T., The Sanskrit Language, 2016

12. Gune, P.D., An Introduction to Comparative Philology, Oriental Book House, Poona, 1958

13. The Taittirīya Upaniṣad, Eng. Tr. and Commentary by Swami Muni Narayana Prasad, D.k. Print world (P), Ltd., New Delhi-2009

14. The NĪti and Vairāgya Śatakas of Bhartrihari, M.R. Kale, Motilal Banarsidass, Delhi, 2017

Course No: 05	**Course Name:** Object Oriented Programming in C++				**Course Code:** SBSMAT 03 01 01 GE 4046		
Batch: 2021-2026	**Programme: Integrated B.Sc.-M.Sc. (Mathematics)**	**Semester: I**	**L**	**T**	**P**	**Credits**	**Contact Hrs per Week: 06**
			4	0	4	6	**Total Hours: 90**
Total Evaluation Marks: 100 **CIE:** **TEE:**		**Examination Duration:** 3 hours **Pre-requisite of course:**					
Course Objective	The main objective of this course is to define and highlight the importance of object oriented programming. The students will see how to use concepts of object oriented programming in real-life using C++ programming language. The students will learn potential C++ features like overloading, type conversions, inheritance.						
	After going through this course the students will be able to • Write C-programmes to solve Mathematical problems. • Design algorithms to solve problems. • Understand the OOPS likes Encapsulation, Data Abstraction, Inheritance and Polymorphism. • Emphasize on the importance of use of Friend Functions for efficient C++ programming.						
Unit No.	**Content of Each Unit**						**Hours of**

		Each Unit
I	OOP Paradigm: Comparison of Programming paradigms, Characteristics of Object-Oriented Programming Languages, Object-based programming languages C++: Brief History of C++,Structure of a C++ program, Difference between C and C++ - cin, cout, new, delete operators, ANSI/ISO Standard C++, Comments, Working with Variables and const Qualifiers. Enumeration, Arrays and Pointer.	23
II	Implementing oops concepts in C++ Objects, Classes, Encapsulation, Data Abstraction, Inheritance, Polymorphism, Dynamic Binding, Message Passing, Default Parameter Value, Using Reference variables withFunctions.	22
III	Abstract data types, Class Component, Object & Class, Constructors Default and Copy Constructor, Assignment operator deep and shallow coping, Access modifiers – private, publicand protected. Implementing Class Functions within Class declaration or outside the Class declaration. instantiation of objects, Scope resolution operator, Working with Friend Functions, Using Static Class members.	22
IV	Understanding Compile Time Polymorphism function overloading Rules of Operator Overloading (Unary and Binary) as member function/friend function, Implementation of operator overloading of Arithmetic Operators, Overloading Output/Input,Prefix/ Postfix Increment and decrement Operators, Overloading comparison operators, Assignment, subscript and function call Operator, concepts of namespaces.	23
Practical to be performed in lab Marks: 20, Contact hrs:30		

Books Recommended:

1. R. Venugopal, Rajkumar, and T. Ravishanker, Mastering C++, TMH,1997.
2. B. Lippman and J. Lajoie, C++ Primer, 3rd Ed., Addison Wesley,2000.
3. Eckel, Thinking in C++, 2nd Ed., President, Mindview Inc., Prentice Hall.Parasons, Object Oriented Programming with C++, BPB Publication.
4. B. Stroustrup, The C++ Programming Language, 3rd Ed., Addison Welsley.

Course No: 6	**Course Name:** Finite Element Methods				**Course Code:** SBSMAT 03 01 02 GE 5106		
Batch: 2021-2026	**Programme: Integrated B.Sc.-M.Sc. (Mathematics)**	**Semester:** II	**L**	**T**	**P**	**Credits**	**Contact Hrs per Week: 06**
			5	1	0	6	**Total Hours: 90**
Total Evaluation Marks: 100 **CIE:** **TEE:**		**Examination Duration:** 3 hours					
Course Objective	The objective of the course includes an introduction about different finite element methods in one- two and three-dimensions. The course focuses on analyzing variety of finite elements as per the requirements of solutions of differential equations.						

Course Outcomes :	After going through this course the students will be able to • Describe finite element methods • Differential equations using finite element methods • Emphasize on the importance of use of Simplex elements in two and three dimensions. • Understand the Interpolation functions, numerical integration and modeling considerations.	
Unit No.	**Content of Each Unit**	**Hours of Each Unit**
I	Introduction to finite element methods, comparison with finite difference methods, Methods of weighted residuals, collocations, least squares and Galerkin's method. Variational formulation of boundary value problems equivalence of Galerkin and Ritz methods.	23
II	Applications to solving simple problems of ordinary differential equations. Linear, quadratic and higher order elements in one dimensional and assembly, solution of assembled system.	22
III	Simplex elements in two and three dimensions, quadratic triangular elements, rectangular elements, serendipity elements and isoperimetric elements and their assembly, discretization with curved boundaries.	23
IV	Interpolation functions, numerical integration, and modeling considerations**.** Solution of two dimensional partial differential equations under different Geometric conditions.	22

Books Recommended:

1. J.N. Reddy, Introduction to the Finite Element Methods, Tata McGraw-Hill,2003.
2. K.J. Bathe, Finite Element Procedures, Prentice-Hall,2001**.**
3. R.D. Cook, D.S. Malkus and M.E. Plesha, Concepts and Applications of Finite Element Analysis, John Wiley and Sons,2002.
4. T. J.R. Hughes, The Finite Element Method: Linear Static and Dynamic Finite Element Analysis, Dover Publication,2000.
5. G. R. Buchanan, Finite Element Analysis, McGraw Hill,1994.

Course No: 7	**Course Name:** Algebra			**Course Code:** SBSMAT 03 01 03 GE 5106			
Batch: 2021-2026	**Programme: Integrated B.Sc.-M.Sc. (Mathematics)**	**Semester:** I	**L**	**T**	**P**	**Credits**	**Contact Hrs per Week: 06**
			5	1	0	6	**Total Hours: 90**
Total Evaluation Marks: 100		**Examination Duration:** 3 hours					
		Pre-requisite of course: N.A.					

CIE: **TEE:**		
Course Objective	The objective of the course is to introduce basic structures of algebra like matrices, system of linear equation and linear transformation which are the main pillars of modern mathematics. The course gives the student a good mathematical maturity and enables to build mathematical thinking and skill.	
Course Outcomes:	After going through this course the students will be able to • Work with the trigonometric form of complex numbers including De-Moivre's formula. • Be familiar with the Euler form $re^{i\Theta}$ of complex numbers • Apply the elementary operations on the matrices. Compute the eigen values, eigen function, characteristic equation and minimal polynomial of a given matrix. • Obtain the solution of the systems of linear equations using the concept of rank of matrices	
Unit No.	**Content of Each Unit**	**Hours of Each Unit**
I	Polar representation of complex numbers, n^{th} roots of unity, De Moivre's theorem for rational indices and its applications. Equivalence relations, Functions, Composition of functions, Invertible functions, One to one correspondence and cardinality of a set.	23
II	Well-ordering property of positive integers, Division algorithm, Divisibility and Euclidean algorithm, Congruence relation between integers, Principles of Mathematical Induction, statement of Fundamental Theorem of Arithmetic.	23
III	Systems of linear equations, row reduction and echelon forms, vector equations, the matrix equation Ax=b, solution sets of linear systems, applications of linear systems, linear independence	22

IV	Introduction to linear transformations, matrix of a linear transformation, inverse of a matrix, Characterizations of invertible matrices. Subspaces of $\mathbf{R^n}$, dimension of subspaces $\mathbf{R^n}$ and rank of a matrix, Eigenvalues, Eigen Vectors and Characteristic Equation of a matrix.	22

Books Recommended:

1. Hall & Night, Higher Algebra, Arihant Publishers, 2013.
2. K. Hoffman, R.A. Kunze, Linerar Algebra 2nd Ed., Prentice-Hall of India Pvt. Ltd.,1971.
3. S. L. Loney, Plane Trigonometry, Arihant Publishers, 2016.
4. D. C. Lay, Linear Algebra and its Applications, 3rd Ed., Pearson Education Asia, Indian Reprint,2007.
5. R.G. Bartle and D. R. Sherbert, Introduction to Real Analysis. Willy Std Edition, 2014.
6. B Das & B N Mukherjee, Higher Trigonometry, U N Dhur & Sons, 2007.
7. T. Andreescu and D. Andrica, Complex Numbers from A to Z, Birkhauser,2006.
8. E. G. Goodaire and M. M. Parmenter, Discrete Mathematics with Graph Theory, 3rd Ed., Pearson Education (Singapore) P. Ltd., Indian Reprint, 2005**.**

<table>
<tr><td>Course No: 08</td><td colspan="3">Course Name: Real Analysis</td><td colspan="4">Course Code:
SBSMAT 03 02 01 C 5106</td></tr>
<tr><td rowspan="2">Batch:

2021-2026</td><td rowspan="2">Programme:

Integrated B.Sc.-M.Sc. (Mathematics)</td><td rowspan="2">Semester:

II</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td>Contact Hrs per Week: 06</td></tr>
<tr><td>5</td><td>1</td><td>0</td><td>6</td><td>Total Hours: 90</td></tr>
<tr><td colspan="3">Total Evaluation Marks:
100

CIE:
TEE:</td><td colspan="5">Examination Duration: 3 hours

Pre-requisite of course:</td></tr>
<tr><td>Course Objective</td><td colspan="7">This course presents a rigorous treatment of fundamental concepts in analysis. To introduce students to the fundamentals of mathematical analysis and reading and writing mathematical proofs. The course objective is to understand the axiomatic foundation of the real number system, in particular the notion of completeness and some of its consequences; understand the concepts neighborhood of a point, countable sets , sequence and series, rigorously defined;. Students should also have attained a basic level of competency in developing their own mathematical arguments and communicating them to others in writing</td></tr>
<tr><td>Course Outcomes:</td><td colspan="7">After going through this course the students will be able to
• Identify the properties of the number system and Describe various analytical properties of the real number system.
• Explain the concept of sequences and their types and Identify the convergence of sequences and series of positive terms.
• Apply various important convergence tests to the given series.
• Understand the difference between conditional and absolute convergence of alternating series.</td></tr>
</table>

Unit No.	Content of Each Unit	Hours of Each Unit
I	Review of Algebraic and Order Properties of *R*, neighborhood of a point in *R*, Idea of countable sets, uncountable sets and uncountability of *R*. Bounded above sets, Bounded below sets, Bounded Sets, Unbounded sets, Suprema and Infima, The Completeness Property of *R*, The Archimedean Property.	23
II	Density of Rational (and Irrational) numbers in *R*, Intervals. Limit points of a set, Isolated points, Illustrations of Bolzano-Weierstrass theorem for sets. Sequences, Bounded sequence, Convergent sequence, Limit of a sequence.	23
III	Limit Theorems, Monotone Sequences, Monotone Convergence Theorem. Subsequences, Divergence Criteria, Monotone Subsequence Theorem (statement only), Bolzano Weierstrass Theorem for Sequences. Cauchy sequence, Cauchy's Convergence Criterion.	22
IV	Infinite series, convergence and divergence of infinite series, Cauchy Criterion, Test for Convergence: Comparison test, Limit Comparison test, Ratio Test, Cauchy's n^{th} root test, Integral test, Alternating series, Leibniz test, Absolute and Conditional convergence.	22

Books Recommended:

1. R.G. Bartle and D. R. Sherbert, Introduction to Real Analysis, 3rd Ed., John Wiley and Sons (Asia) Pvt. Ltd., Singapore, 2002.
2. Kumar and S. Kumarasen, A Basic Course in Real Analysis, CRC Press, 2014.
3. G. B. Thomas and R. L. Finney, Calculus, Pearson, 9th Ed, 2005.
4. G. G. Bilodeau , P. R. Thie, G.E. Keough, An Introduction to Analysis, 2nd Ed., Jones & Bartlett,2010.
5. S. Thomson, A. M. Bruckner and J. B. Bruckner, Elementary Real Analysis, Prentice Hall, 2001.
6. S.K. Berberian, A First Course in Real Analysis, Springer Verlag, New York, 1994.

<table>
<tr><td>Course No: 9</td><td colspan="3">Course Name: Differential Equations</td><td colspan="4">Course Code:
SBSMAT 03 02 02 C 4046</td></tr>
<tr><td rowspan="2">Batch:

2021-2026</td><td rowspan="2">Programme: Integrated B.Sc.-M.Sc. (Mathematics)</td><td rowspan="2">Semester:

II</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td>Contact Hrs per Week: 06</td></tr>
<tr><td>4</td><td>0</td><td>4</td><td>6</td><td>Total Hours: 90</td></tr>
<tr><td colspan="2" rowspan="2">Total Evaluation Marks:
100

CIE:

TEE:</td><td colspan="6">Examination Duration: 3 hours</td></tr>
<tr><td colspan="6">Pre-requisite of course: N.A.</td></tr>
<tr><td>Course Objective</td><td colspan="7">The objective of this course is to introduce ordinary differential equations, general, particular, explicit, implicit and singular solutions of a differential equation. This course further explains the analytic techniques in computing the solutions of various ordinary differential equations.</td></tr>
<tr><td>Course Outcomes:</td><td colspan="7">After going through this course the students will be able to
• Use the techniques to solve differential equations and apply these techniques in various mathematical models used in real life problems.
• Be familiar with formation of differential equations and to solve exact differential equations by finding integrating factors.
• Find solution of Lagrange's equations, Clairauts equations and other standard equations of first order but not of first degree.
• Learn the concept of auxiliary equation, particular integral for linear differential equations with constant co-efficients and their solution</td></tr>
<tr><td>Unit No.</td><td colspan="6">Content of Each Unit</td><td>Hours of</td></tr>
</table>

		Each Unit
I	Differential equations and mathematical models. General, particular, explicit, implicit and singular solutions of a differential equation. Exact differential equations and integrating factors, separable equations and equations reducible to this form, linear equation and Bernoulli equations, special integrating factors and transformations.	22
II	Introduction to compartmental model, exponential decay model, lake pollution model (case study of Lake Burley Griffin), drug assimilation into the blood (case of a single cold pill, case of a course of cold pills), exponential growth of population, limited growth of population, limited growth with harvesting.	23
III	General solution of homogeneous equation of second order, principle of super position for homogeneous equation, Wronskian: its properties and applications, Linear homogeneous and non-homogeneous equations of higher order with constant coefficients.	23
IV	Euler's equation, method of undetermined coefficients, method of variation of parameters. Equilibrium points, Interpretation of the phase plane, predatory-prey model and its analysis, epidemic model of influenza and its analysis, battle model and its analysis.	22

List of Practical (using any software)

1. Plotting of second order solution family of differential equation.
2. Plotting of third order solution family of differential equation.
3. Growth model (exponential case only)
4. Decay model (exponential case only).
5. Lake pollution model (with constant/seasonal flow and pollution concentration).
6. Case of single cold pill and a course of cold pills.
7. Limited growth of population (with and without harvesting).
8. Predatory-prey model (basic Volterra model, with density

dependence, effect of DDT, two prey one predator).

9. Epidemic model of influenza (basic epidemic model, contagious for life, disease with carriers).
10. Battle model (basic battle model, jungle warfare, long range weapons).
11. Plotting of recursive sequences.
12. Study the convergence of sequences through plotting.

Books Recommended:

1. S.L. Ross, Differential Equations, 3rd Ed., John Wiley and Sons, India, 2004.
2. E. A. Coddington, An Introduction to Ordinary Differential Equation, Dover Publications, 1961.
3. G. R. Fulford, Mathematical Modeling with Case Studies, A Differential Equation Approach using Maple and Matlab, 2nd Ed., Taylor and Francis group, London and New York,2009.
4. C.H. Edwards and D.E. Penny, Differential Equations and Boundary Value problems Computing and Modeling, Pearson Education India,2005.
5. M. L. Abell, J. P. Braselton, Differential Equations with MATHEMATICA, 3rd Ed., Elsevier Academic Press,2004.

Course No: 10	Course Name: Syllabus will be provided by Hindi Department.				Course Code: SBSMAT 03 02 01 AECC 3104		
Batch:	**Programme:**	**Semester:**	**L**	**T**	**P**	**Credits**	**Contact Hrs per Week: 06**
2021-2026	**Integrated B.Sc.-M.Sc. (Mathematics)**	**II**	3	1	0	4	**Total Hours: 30**
Total Evaluation Marks: 100 **CIE:** **TEE:**		**Examination Duration:** 3 hours **Pre-requisite of course:**					
Course Objective							
Course Outcomes:							

Unit No.	Content of Each Unit	Hours of Each Unit
I		8
II		7
III		8
IV		7

Books Recommended :

1.

- Syllabus will be provided by Hindi Department

Course No: 11	Course Name: English				Course Code: SBSMAT 03 02 01 AECC 3104		
Batch:	**Programme:**	**Semester:**	**L**	**T**	**P**	**Credits**	**Contact Hrs per Week: 06**
2021-2026	**Integrated B.Sc.-M.Sc. (Mathematics)**	**II**	3	1	0	4	**Total Hours: 30**
Total Evaluation Marks: 100 **CIE:** **TEE:**		**Examination Duration:** 3 hours **Pre-requisite of course:**					
Course Objective	The purpose of this course is to introduce students to the theory, fundamentals and tools of communication and to develop in them vital communication skills which should be integral to personal, social and professional interactions. One of the critical links among human beings and an important thread that binds society together is the ability to share thoughts, emotions and ideas through various means of communication: both verbal and non-verbal. In the context of rapid globalization and increasing recognition of social and cultural pluralities, the significance of clear and effective communication has substantially enhanced.						
Course Outcomes:	The present course hopes to address some of these aspects through an interactive mode of teaching-learning process and by focusing on various dimensions of communication skills. Some of these are: Language of communication, various speaking skills such as personal communication, social interactions and communication in professional situations such as interviews, group discussions and office environments, important reading skills as well as writing skills such as report writing, notetaking etc. While, to an extent, the art of communication is natural to all living beings, in today's world of complexities, it has also acquired some elements of science. It is hoped						

	that after studying this course, students will find a difference in their personal and professional interactions.	
Unit No.	**Content of Each Unit**	**Hours of Each Unit**
I	Introduction: Theory of Communication, Types and modes of Communication. Language of Communication: Verbal and Non-verbal (Spoken and Written) Personal, Social and Business Barriers and Strategies Intra-personal, Inter-personal and Group communication	8
II	Speaking Skills: Monologue Dialogue, Group Discussion, Effective Communication/ Mis- Communication, Interview Public Speech	7
III	Reading and Understanding, Close Reading, Comprehension Summary, Paraphrasing, Analysis and Interpretation, Translation(from Indian language to English and vice-versa) ,Literary/Knowledge Texts	8
IV	Writing Skills, Documenting, Report Writing, Making notes, Letter writing	7

Books Recommended :

1. Fluency in English - Part II, Oxford University Press, 2006.
2. Business English, Pearson, 2008.
3. Language, Literature and Creativity, Orient Blackswan, 2013.
4. Language through Literature (forthcoming) ed. Dr. Gauri Mishra, Dr Ranjana Kaul, Dr Brati Biswas

<table>
<tr><td>Course No: 12</td><td colspan="3">Course Name:
Econometrics</td><td colspan="4">Course Code:
SBSMAT 03 02 01 GE 5106</td></tr>
<tr><td rowspan="2">Batch:

2021-2026</td><td rowspan="2">Programme:

Integrated B.Sc.-M.Sc. (Mathematics)</td><td rowspan="2">Semester:

II</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td>Contact Hrs per Week: 06</td></tr>
<tr><td>5</td><td>1</td><td>0</td><td>6</td><td>Total Hours: 90</td></tr>
<tr><td colspan="2">Total Evaluation Marks:
100

CIE:

TEE:</td><td colspan="6">Examination Duration: 3 hours

Pre-requisite of course:</td></tr>
<tr><td>Course Objective</td><td colspan="7">Econometrics is a set of research tools used to estimate and test economic relationships. The methods taught in this introductory course can also be employed in the business disciplines of accounting, finance, marketing and management and in many social science disciplines. The aim of this course is to provide you with the skills helpful in filling the gap between being “a student of economics” and being “a practicing economist.”</td></tr>
<tr><td>Course Outcomes</td><td colspan="7">After going through this course the students should be able to
• Design models and solve problems related to Economic issues.
• Describe the Statistical Concepts
• Understand the Detection, Remedies and Multicollinearity.
• Be familiars with the Type I and Type II errors.</td></tr>
<tr><td>Unit No.</td><td colspan="6">Content of Each Unit</td><td>Hours of Each Unit</td></tr>
</table>

I	Statistical Concepts Normal distribution; chi-square, t and F-distributions; estimation of parameters; properties of estimators; testing of hypotheses: defining statistical hypotheses; distributions of test statistics; testing hypotheses related to population parameters; Type I and Type II errors; power of a test; tests for comparing parameters from two samples.	22
II	Simple Linear Regression Model: Two Variable Case Estimation of model by method of ordinary least squares; properties of estimators; goodness of fit; tests of hypotheses; scaling and units of measurement; confidence intervals; Gauss-Markov theorem; forecasting.	23
III	Multiple Linear Regression Model Estimation of parameters; properties of OLS estimators; goodness of fit - R2 and adjusted R2 ; partial regression coefficients; testing hypotheses – individual and joint; functional forms of regression models; qualitative (dummy) independent variables.	23
IV	Violations of Classical Assumptions: Consequences, Detection and Remedies Multicollinearity; heteroscedasticity; serial correlation. Specification Analysis Omission of a relevant variable; inclusion of irrelevant variable; tests of specification errors.	22

Books Recommended:

1. J. L. Devore, Probability and Statistics for Engineers, Cengage Learning,2010.
2. J. E. Freund, Mathematical Statistics, Prentice Hall,1992.
3. R. J. Larsen and Morris L. Marx, An Introduction to Mathematical Statistics and its Applications, Prentice Hall,2011.
4. D. N. Gujarati and D.C. Porter, Essentials of Econometrics, McGraw Hill, 4th Ed., International Edition,2009.
5. C. Dougherty, Introduction to Econometrics, Oxford University Press, 3rd Ed., Indian edition,2007.

<table>
<tr><td>Course No: 13</td><td colspan="3">Course Name: Mathematical Finance</td><td colspan="3">Course Code:
SBSMAT 03 02 02 GE 5106</td><td></td></tr>
<tr><td rowspan="2">Batch:

2021-2026</td><td rowspan="2">Programme:

Integrated B.Sc.-M.Sc. (Mathematics)</td><td rowspan="2">Semester:

II</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td>Contact Hrs per Week: 06</td></tr>
<tr><td>5</td><td>1</td><td>0</td><td>6</td><td>Total Hours: 90</td></tr>
<tr><td colspan="3">Total Evaluation Marks: 100

CIE:
TEE:</td><td colspan="5">Examination Duration: 3 hours</td></tr>
<tr><td>Course Objective</td><td colspan="7">This course introduces the basic concepts of Financial Management such as Insurance and Measurement of returns under uncertainty situations. The philosophy of this course is that Time value of Money - Interest rate and discount rate play a fundamental role in Life Insurance Mathematics – Construction of Morality Tables.</td></tr>
<tr><td>Course Outcomes:</td><td colspan="7">After going through this course the students will be able to
• Build quantitative models of financial mathematics/industries
• Apply models to obtain information of practical value in the financial mathematics
• Understand the terms random returns, portfolio mean return and variance.
• Design models and solve problems related to financial issues</td></tr>
<tr><td>Unit No.</td><td colspan="6">Content of Each Unit</td><td>Hours of Each Unit</td></tr>
<tr><td>I</td><td colspan="6">Basic principles: Comparison, arbitrage and risk aversion, Interest (simple and compound, discrete and continuous), time value of money,</td><td>20</td></tr>
</table>

	inflation, net present value, internal rate of return (calculation by bisection and Newton-Raphson methods), comparison of NPV and IRR.	
II	Bonds, bond prices and yields, Macaulay and modified duration, term structure of interest rates: spot and forward rates, explanations of term structure, running present value, floating-rate bonds, immunization, convexity, putable and callable bonds.	24
III	Asset return, short selling, portfolio return, (brief introduction to expectation, variance, covariance and correlation), random returns, portfolio mean return and variance, diversification, portfolio diagram, feasible set, Markowitz model (review of Lagrange multipliers for 1 and 2 constraints), Two fund theorem, risk free assets, One fund theorem, capital market line, Sharpe index.	23
IV	Capital Asset Pricing Model (CAPM), betas of stocks and portfolios, security market line, use of CAPM in investment analysis and as a pricing formula, Jensen's index.	23

Books Recommended:

1. D. G. Luenberger, Investment Science, Oxford University Press, Delhi,1998.
2. J. C. Hull, Options, Futures and Other Derivatives, 6th Ed., Prentice-Hall India, Indian reprint,2006.
3. S. Ross, An Elementary Introduction to Mathematical Finance, 2nd Ed., Cambridge University Press, USA,2003.

<table>
<tr><td>Course No: 14</td><td colspan="3">Course Name: Real Analysis</td><td colspan="4">Course Code:
SBSMAT 03 02 03 GE 5106</td></tr>
<tr><td rowspan="2">Batch:

2021-2026</td><td rowspan="2">Programme:

Integrated B.Sc.-M.Sc. (Mathematics)</td><td rowspan="2">Semester:

II</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td>Contact Hrs per Week: 06</td></tr>
<tr><td>5</td><td>1</td><td>0</td><td>6</td><td>Total Hours: 90</td></tr>
<tr><td colspan="3">Total Evaluation Marks:
100

CIE:
TEE:</td><td colspan="4">Examination Duration: 3 hours

Pre-requisite of course:</td></tr>
<tr><td>Course Objective</td><td colspan="6">This course presents a rigorous treatment of fundamental concepts in analysis. To introduce students to the fundamentals of mathematical analysis and reading and writing mathematical proofs. The course objective is to understand the axiomatic foundation of the real number system, in particular the notion of completeness and some of its consequences; understand the concepts neighborhood of a point, countable sets , sequence and series, rigorously defined;. Students should also have attained a basic level of competency in developing their own mathematical arguments and communicating them to others in writing</td></tr>
<tr><td>Course Outcomes:</td><td colspan="6">After going through this course the students will be able to
• Identify the properties of the number system and Describe various analytical properties of the real number system.
• Explain the concept of sequences and their types and Identify the convergence of sequences and series of positive terms.
• Apply various important convergence tests to the given series.
• Understand the difference between conditional and absolute convergence of alternating series.</td></tr>
</table>

Unit No.	Content of Each Unit	Hours of Each Unit
I	Review of Algebraic and Order Properties of *R*, neighborhood of a point in *R*, Idea of countable sets, uncountable sets and uncountability of *R*. Bounded above sets, Bounded below sets, Bounded Sets, Unbounded sets, Suprema and Infima, The Completeness Property of *R*, The Archimedean Property.	23
II	Density of Rational (and Irrational) numbers in *R*, Intervals. Limit points of a set, Isolated points, Illustrations of Bolzano-Weierstrass theorem for sets. Sequences, Bounded sequence, Convergent sequence, Limit of a sequence.	23
III	Limit Theorems, Monotone Sequences, Monotone Convergence Theorem. Subsequences, Divergence Criteria, Monotone Subsequence Theorem (statement only), Bolzano Weierstrass Theorem for Sequences. Cauchy sequence, Cauchy's Convergence Criterion.	22
IV	Infinite series, convergence and divergence of infinite series, Cauchy Criterion, Test for Convergence: Comparison test, Limit Comparison test, Ratio Test, Cauchy's n^{th} root test, Integral test, Alternating series, Leibniz test, Absolute and Conditional convergence.	22

Books Recommended:

1. R.G. Bartle and D. R. Sherbert, Introduction to Real Analysis, 3rd Ed., John Wiley and Sons (Asia) Pvt. Ltd., Singapore, 2002.
2. Kumar and S. Kumarasen, A Basic Course in Real Analysis, CRC Press, 2014.
3. G. B. Thomas and R. L. Finney, Calculus, Pearson, 9th Ed, 2005.
4. G. G. Bilodeau , P. R. Thie, G.E. Keough, An Introduction to Analysis, 2nd Ed., Jones & Bartlett,2010.
5. S. Thomson, A. M. Bruckner and J. B. Bruckner, Elementary Real Analysis, Prentice Hall, 2001.
6. S.K. Berberian, A First Course in Real Analysis, Springer Verlag, New York, 1994.

9. Teaching-Learning Process

- Lectures
- Discussions
- Simulations
- Role Playing
- Participative Learning
- Interactive Sessions
- Seminars
- Research-based Learning/Dissertation or Project Work
- Technology-embedded Learning

10. Implementation of Blended Learning

Blended Learning is a pedagogical approach that combines face to-face classroom methods with computer-mediated activities in the process of teaching and learning. It implies nice blend of face-to-face and online activities to make the learning processes more interesting and engaging. It focuses on integration of traditional classroom activities and innovative ICT-enabled strategies. It emphasises student-centric learning environment where the teacher is the facilitator for productive and measurable learning outcomes. It optimises and compliments the face to face learning, giving ample freedom and flexibility to the students and teachers to access and explore the wide range of open-access sources such as video lectures, podcasts, recordings and articles through digital platforms. It gives freedom and autonomy to the teachers in selection of appropriate digital platforms, resources and time-slots to complement and supplement face to face learning. The Blended Learning doesn't undermine the role of the teacher, rather it gives him/her an opportunity to explore the unexplored in accordance with the requirements of the curriculum.

Key features of Blended Learning

- **Student-Centric Pedagogical Approach** focusing on flexibility in timing, quality content, needs and interests of students and freedom to study through the mode of his/her choice;
- Freedom to Select variety of mediums and techniques;
- Increased student engagement in learning;

- Enhanced teacher and student interaction;
- Improved student learning outcomes;
- More flexible teaching and learning environment;
- More responsive for self and continuous learning;
- Better opportunities for experiential learning;
- Increased learning skills;
- Greater access to information, improved satisfaction and learning outcomes.

Note: Resolution no (c) as per minutes circulated by VC office**:** It was resolved that Blended Learning with 40% component of online teaching and 60% face to face classes for each programme, be adopted

11. Assessment and Evaluation

- Continuous Comprehensive Evaluation at regular after achievement of each Course-level learning outcome
- Formative Assessment on the basis of activities of a learner throughout the programme instead of one-time assessment
- Oral Examinations to test presentation and communication skills
- Open Book Examination for better understanding and application of the knowledge acquired
- Group Examinations on Problem solving exercises
- Seminar Presentations
- Review of Literature
- Collaborative Assignments

12. Keywords

- LOCF
- NEP-2020
- Blended Learning
- Face to face (F to F) Learning
- Programme Outcomes
- Programme Specific Outcomes
- Course-level Learning Outcomes
- Postgraduate Attributes
- Learning Outcome Index

- Formative Assessment and Evaluation
- Comprehensive and Continuous Evaluation
- Multiple Entry
- Multiple Exit

13. References

- Draft Blended Mode of Teaching and Learning: Concept Note available on UGC website, https://www.ugc.ac.in/pdfnews/6100340_Concept-Note-Blended-Mode-of-Teaching-and-Learning.pdf

- Guidelines for Multiple Entry and Exit in Academic Programmes offered in Higher Education Institutions, https://www.education.gov.in/sites/upload_files/mhrd/files/upload_document/abc_doc.pdf
- National Education Policy-2020, https://www.education.gov.in/sites/upload_files/mhrd/files/NEP_Final_English_0.pdf
- Quality Mandate for Higher Education in India, https://www.ugc.ac.in/e-book/Quality%20Mandate%20E-BOOK/mobile/index.html

- The draft subject specific LOCF templates available on UGC website, https://www.ugc.ac.in/ugc_notices.aspx?id=MjY5OQ==

13. Appendices

Nil

Annexure-XXX

HOD Physics <hodphysics@cuh.ac.in>

BOS Approval for minutes of Meeting on 08-09-2021 at 10 AM online

8 messages

HOD Physics <hodphysics@cuh.ac.in> Thu, Sep 9, 2021 at 9:27 PM
To: Sevi Murugavel <murug@physics.du.ac.in>, ku singh <kusingh@thapar.edu>, "Dr. Rakesh Kumar" <rks@cuh.ac.in>, "Dean School Of Basic S..." <deansobs@cuh.ac.in>
Cc: "Dr. Jaswant Kumar" <jaswantkyadav@cuh.ac.in>, "Dr. Meenu Thakur" <meenuthakur@cuh.ac.in>, "Dr. Ramovatar" <ramovatar@cuh.ac.in>, "Dr. ANSHU" <anshuphysics@cuh.ac.in>, Manoj Kumar Singh <manojksingh@cuh.ac.in>

Dear BOS Members,
Please find the minutes of the BOS meeting held on 08-09-2021 at 10 AM via online mode.

Kindly give the approval for the minutes via email.

With regards

On Thu, Sep 2, 2021 at 12:21 PM HOD Physics <hodphysics@cuh.ac.in> wrote:

Prof. Sevi Murugavel

Department of Physics and Astrophysics

University of Delhi

Prof. Kulvir Singh

School of Physics and Materials Science

Thapar Institute of Engineering and Technology

Patiala

Dr. Rakesh Kumar

Department of Physics and Astrophysics

Central University of Haryana, Mahendergarh

Dear BOS Members

This is for your kind information that Department of Physics and Astrophysics has revised the scheme and syllabi of M.Sc. Physics (Two Year course) as per New Education Policy (NEP 2020). Also Department is also going to start Integrated BSc-MSc Physics Program from the session 2021-2022.

For this purpose a meeting of Board of Studies (BOS) is scheduled on 08-09-2021 at 10 AM in online mode. Updated scheme and syllabi of both Programs has been attached with this email.

The link for online meeting is

https://meet.google.com/dyq-kbrc-bfu

You are requested to kindly make it convenient to attend the meeting.

--
With Best Regards

Dr. Suneel Kumar
Associate Professor
Head, Department of Physics & Astrophysics
Central University of Haryana
Jant-Pali
Mahendergarh-123029
Haryana
Email: hodphysics@cuh.ac.in

--
With Best Regards

Dr. Suneel Kumar
Associate Professor
Head, Department of Physics & Astrophysics
Central University of Haryana
Jant-Pali
Mahendergarh-123029
Haryana
Email: hodphysics@cuh.ac.in

BOS_Minutes_8.9.2021 (3).pdf
296K

HOD Physics <hodphysics@cuh.ac.in> Fri, Sep 10, 2021 at 12:46 PM
To: Sevi Murugavel <murug@physics.du.ac.in>, ku singh <kusingh@thapar.edu>, "Dr. Rakesh Kumar" <rks@cuh.ac.in>, "Dean School Of Basic S..." <deansobs@cuh.ac.in>, "Dr. Suneel Kumar" <suneelkumar@cuh.ac.in>

Dear Sir,
Please find the revised minutes of BOS meeting held on 10-09-2021. I

DEPARTMENT OF PHYSICS & ASTROPHYSICS
Central University of Haryana
Minutes of the meeting of the BOS held on 8.9.2021 at 10:00 AM

A Board of Studies Meeting of the Department of Physics & Astrophysics was held on **September 8, 2021 (Wednesday)** at **10 AM** in the through online mode using Google Meet (https://meet.google.com/dyq-kbrc-bfu). The meeting was attended by the following members:

	Name	Designation

1.	Dr. Suneel Kumar (Chairman)	HOD, Department of Physics & Astrophysics, Central University of Haryana
2.	Prof. Sevi Murugavel (External member)	Professor, Department of Physics and Astrophysics, University of Delhi
3.	Prof. Kulvir Singh (External member)	Professor, School of Physics and Materials Science, Thapar Institute of Engineering and Technology, Patiala
4.	Dr. Rakesh Kumar (Member)	Assistant Professor, Department of Physics & Astrophysics, Central University of Haryana

At the outset, the Chairman welcomed the members for attending the meeting of **Board of Studies**. The Chairman further expressed special thanks to **Prof. Sevi Murugavel** and **Prof. Kulvir Singh** for sparing the time from their busy schedule to attend the meeting. He informed the members about the academic activities and newly introduced course in the Department. The BOS members expressed their highly appreciation and satisfaction about the courses and activities of the Department.

After that the BOS discussed and resolved the following items:

Item No. 1: To consider and approve the revised scheme and syllabi of M.Sc. Physics (Two Year course) as per New Education Policy (NEP 2020)

The BOS discussed the item and the following modifications were been recommended for the approval:

i) To include a 2-credits course related to “Research and Publication Ethics” in Semester-III.

ii) To change the name of course “Characterization Techniques for Materials” (in Semester-III) to “Characterization and Testing Techniques”.

iii) To include a 4-credits elective course based on “Introduction to Hydrogen Energy Systems” in the Semester-IV.

iv) To reduce the total no. of credits for M.Sc. (Physics) program from 96 credits to 80 credits

.**Item No. 2: To consider and approve the Scheme and syllabi for newly started Integrated B.Sc.-M.Sc. (Physics) Program**

Under this agenda item the BOS discussed and approved program scheme for 1st Year, and approved its syllabi for Semester-I and Semester-II.

The meeting ended with a vote of thanks by the Chair.

Dr. Suneel Kumar Prof. Sevi Murugavel Prof. Kulvir Singh

Dr. Rakesh Kumar

-

-

-

Distribution:

All BOS members (by email)

Cc: BOS File

[Quoted text hidden]

2 attachments

Introduction of Hydrogen Energy Systems.doc
28K

BOS_Minutes_8.9.2021 (3).pdf
296K

KULVIR SINGH <kusingh@thapar.edu> Fri, Sep 10, 2021 at 2:20 PM
To: HOD Physics <hodphysics@cuh.ac.in>
Cc: Sevi Murugavel <murug@physics.du.ac.in>, "Dr. Rakesh Kumar" <rks@cuh.ac.in>, "Dean School Of Basic S..." <deansobs@cuh.ac.in>, "Dr. Jaswant Kumar" <jaswantkyadav@cuh.ac.in>, "Dr. Meenu Thakur" <meenuthakur@cuh.ac.in>, "Dr. Ramovatar" <ramovatar@cuh.ac.in>, "Dr. ANSHU" <anshuphysics@cuh.ac.in>, Manoj Kumar Singh <manojksingh@cuh.ac.in>

Dear Dr Suneel Kumar,
I have gone through the minutes. They are in line as discussed in the meeting. The corrections and suggestions are also incorporated in the minutes.
So, it is approved from my side.
Thanking you.
With best regards
Kulvir Singh
[Quoted text hidden]

Sevi Murugavel <murug@physics.du.ac.in> Fri, Sep 10, 2021 at 2:46 PM
To: KULVIR SINGH <kusingh@thapar.edu>
Cc: HOD Physics <hodphysics@cuh.ac.in>, "Dr. Rakesh Kumar" <rks@cuh.ac.in>, "Dean School Of Basic S..." <deansobs@cuh.ac.in>, "Dr. Jaswant Kumar" <jaswantkyadav@cuh.ac.in>, "Dr. Meenu Thakur" <meenuthakur@cuh.ac.in>, "Dr. Ramovatar" <ramovatar@cuh.ac.in>, "Dr. ANSHU" <anshuphysics@cuh.ac.in>, Manoj Kumar Singh <manojksingh@cuh.ac.in>

Dear Dr Suneel Kumar,

Thanks for sharing the minutes of the last meeting. It looks fine.
In addition, I have the following suggestion under item #1.
To include a 2-credits course related to “Research and Publication Ethics” in Semester-III –
under **Discipline Centric Skill based courses**

With regards,
Murugavel
[Quoted text hidden]

HOD Physics <hodphysics@cuh.ac.in> Fri, Sep 10, 2021 at 3:22 PM
To: Sevi Murugavel <murug@physics.du.ac.in>
Cc: KULVIR SINGH <kusingh@thapar.edu>, "Dr. Rakesh Kumar" <rks@cuh.ac.in>, "Dean School Of Basic S..." <deansobs@cuh.ac.in>, "Dr. Jaswant Kumar" <jaswantkyadav@cuh.ac.in>, "Dr. Meenu Thakur" <meenuthakur@cuh.ac.in>, "Dr. Ramovatar" <ramovatar@cuh.ac.in>, "Dr. ANSHU" <anshuphysics@cuh.ac.in>, Manoj Kumar Singh <manojksingh@cuh.ac.in>

Thanks a lot. Sir
[Quoted text hidden]

HOD Physics <hodphysics@cuh.ac.in> Fri, Sep 10, 2021 at 3:23 PM
To: KULVIR SINGH <kusingh@thapar.edu>
Cc: Sevi Murugavel <murug@physics.du.ac.in>, "Dr. Rakesh Kumar" <rks@cuh.ac.in>, "Dean School Of Basic S..." <deansobs@cuh.ac.in>, "Dr. Jaswant Kumar" <jaswantkyadav@cuh.ac.in>, "Dr. Meenu Thakur" <meenuthakur@cuh.ac.in>, "Dr. Ramovatar" <ramovatar@cuh.ac.in>, "Dr. ANSHU" <anshuphysics@cuh.ac.in>, Manoj Kumar Singh <manojksingh@cuh.ac.in>

Thank you sir
[Quoted text hidden]

Dr. Rakesh Kumar <rks@cuh.ac.in> Fri, Sep 10, 2021 at 5:10 PM
To: HOD Physics <hodphysics@cuh.ac.in>
Cc: Sevi Murugavel <murug@physics.du.ac.in>, ku singh <kusingh@thapar.edu>, "Dean School Of Basic S..." <deansobs@cuh.ac.in>, "Dr. Suneel Kumar" <suneelkumar@cuh.ac.in>

Dear Sir,
I hereby approve the BOS minutes.
Thanking you

Regards,
Dr. Rakesh Kumar,
Assistant Professor,
Department of Physics & Astrophysics,
Central University of Haryana,
Jant-Pali, Mahendergarh
Haryana Pin: 123031
Email ID (official): rks@cuh.ac.in
Email ID (personal): nanorks@gmail.com
Mob. No. 9811514070

[Quoted text hidden]

HOD Physics <hodphysics@cuh.ac.in> Sat, Sep 11, 2021 at 11:57 AM
To: "Dr. Rakesh Kumar" <rks@cuh.ac.in>
Cc: Sevi Murugavel <murug@physics.du.ac.in>, ku singh <kusingh@thapar.edu>, "Dean School Of Basic S..." <deansobs@cuh.ac.in>, "Dr. Suneel Kumar" <suneelkumar@cuh.ac.in>

Thank you.
[Quoted text hidden]

CENTRAL UNIVERSITY OF HARYANA

(*Established under the Central Universities Act, 2009*)

(NAAC Accredited 'A' Grade)

CBCS, LOCF and NEP-2020 Based

Curriculum and Syllabi
Of
M.Sc. Physics

(w.e.f. September 2021)

DEPARTMENT OF PHYSICS & ASTROPHYSICS
SCHOOL OF BASIC SCIENCES

Approved by :	**BOS**	**School Board**	**Academic Council**
Approval Status :	Approved	Approved	x or √
Approval Date :	08-09-2021	20-09-2021	?

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VISION AND MISSION

i) Vision and Mission of the University

Vision

To develop enlightened citizenship of a knowledge society for peace and prosperity of individuals, nation and the world, through promotion of innovation, creative endeavours, and scholarly inquiry.

Mission

To serve as a beacon of change, through multi-disciplinary learning, for creation of knowledge community, by building a strong character and nurturing a value-based transparent work ethics, promoting creative and critical thinking for holistic development and self-sustenance for the people of India. The University seeks to achieve this objective by cultivating an environment of excellence in teaching, research and innovation in pure and applied areas of learning.

ii) Vision and Mission of the Department

Vision

To establish a platform for the dissemination and creation of knowledge through teaching and research in Physics and Astrophysics at various levels. To help create a scientific society which encourages logical thinking.

Mission

- To offer a state of art Academic Programs in Physics and interdisciplinary areas.
- To create intellectual property through innovations, quality research publications and patents
- To create state of art research laboratories which will facilitate the research of Central University of Haryana as well as other academic institutions.

1. BACKGROUND

i) NEP-2020 and LOCF an integrated Approach

Considering the curricular reforms as instrumental for desired learning outcomes, all the academic departments of Central University of Haryana made a rigorous attempt to revise the curriculum of undergraduate and postgraduate programmes in alignment with National Education Policy-2020 and UGC Quality Mandate for Higher Education Institutions-2021. The process of revising the curriculum could be prompted with the adoption of "Comprehensive Roadmap for Implementation of NEP-2020" in 32nd meeting of the Academic Council of the University held on April 23, 2021. The Roadmap identified the key features of the Policy and elucidated the Action Plan with well-defined responsibilities and indicative timeline for major academic reforms.

The process of revamping the curriculum started with the series of webinars and discussions conducted by the University to orient the teachers about the key features of the Policy, enabling them to revise the curriculum in sync with the Policy. Proper orientation of the faculty about the vision and provisions of NEP-2020 made it easier for them to appreciate and incorporate the vital aspects of the Policy in the revised curriculum focused on 'creating holistic, thoughtful, creative and well-rounded individuals equipped with the key 21st century skills' for the 'development of an enlightened, socially conscious, knowledgeable, and skilled nation'.

With NEP-2020 in background, the revised curricula articulate the spirit of the policy by emphasising upon—integrated approach to learning; innovative pedagogies and assessment strategies; multidisciplinary and cross-disciplinary education; creative and critical thinking; ethical and Constitutional values through value-based courses; 21st century capabilities across the range of disciplines through life skills, entrepreneurial and professional skills; community and constructive public engagement; social, moral and environmental awareness; Organic Living and Global Citizenship Education (GCED);

holistic, inquiry-based, discovery-based, discussion-based, and analysis-based learning; exposure to Indian knowledge system, cultural traditions and classical literature through relevant courses offering 'Knowledge of India'; fine blend of modern pedagogies with indigenous and traditional ways of learning; flexibility in course choices; student-centric participatory learning; imaginative and flexible curricular structures to enable creative combination of disciplines for study; offering multiple entry and exit points initially in undergraduate programmes; alignment of Vocational courses with the International Standard Classification of Occupations maintained by the International Labour Organization; breaking the silos of disciplines; integration of extra-curricular and curricular aspects; exploring internships with local industry, businesses, artists and crafts persons; closer collaborations between industry and higher education institutions for technical , vocational and science programmes; and formative assessment tools to be aligned with the learning outcomes, capabilities, and dispositions as specified for each course. In case of UG programmes in Engineering and Vocational Studies, it was decided that the departments shall incorporate pertinent NEP recommendations while complying with AICTE, NBA, NSQF, International Standard Classification of Occupations, Sector Skill Council and other relevant agencies/sources. The University has also developed consensus on adoption of Blended Learning with 40% component of online teaching and 60% face to face classes for each programme.

The revised curricula of various programmes could be devised with concerted efforts of the faculty, Heads of the Departments and Deans of Schools of Study. The draft prepared by each department was discussed in series of discussion sessions conducted at Department, School and the University level. The leadership of the University has been a driving force behind the entire exercise of developing the uniform template and structure for the revised curriculum. The Vice Chancellor of the University conducted series of meetings with Heads and Deans to deliberate upon the vital parameters of the revised curriculum to formulate a uniform template featuring Background, Programme Outcomes, Programme Specific Outcomes, Postgraduate Attributes, Structure of Masters Course, Learning Outcome Index, Semester-wise Courses and Credit Distribution, Course-level Learning Outcomes, Teaching-

Learning Process, Blended Learning, Assessment and Evaluation, Keywords, References and Appendices. The experts of various Boards of Studies and School Boards contributed to a large extent in giving the final shape to the revised curriculum of each programme.

To ensure the implementation of curricular reforms envisioned in NEP-2020, the University has decided to implement various provisions in a phased manner. Accordingly, the curriculum may be reviewed annually.

ii) About the Subject

Physics is the natural science that studies the matter, its motion and behavior through space and time, and the related entities of energy and force. Physics is one of the most fundamental scientific disciplines and its main goal is to understand the behavior of universe and its characteristics.

Physics uses the scientific method to help uncover the basic principles governing light and matter, and to discover the implications of those laws. It assumes that there are rules by which the universe functions, and that those laws can be at least partially understood by humans. It is also commonly believed that those laws could be used to predict everything about the universe's future if complete information was available about the present state of all light and matter.

On inclusion of Astronomy, the Physics became one of the oldest academic disciplines. Physics intersects with many interdisciplinary areas of research. New ideas in Physics often explain the fundamental mechanisms studied by other branches of science and suggest new avenues of research in academic disciplines such mathematics etc. Advancement in Physics often leads to new technologies.

iii)About the Programme (Nature, extent and aims)

M.Sc. Physics is a two year regular programme. There four semesters in this programme. Each semester is of sixteen weeks duration. Teaching and learning process of M.Sc. Physics involves theory and practical classes along with seminar presentation and research project work.

The curriculum will be taught through formal lectures with the aid of power-point presentations, audio and video tools and other teaching aids can be used as and when required. Emphasis will be given to laboratory work and visit to National laboratories to give hands on experience to students. Students will be encourage to do semester long project in their own institutes as well as in reputed institutes of National level. Aims of the Programme are as follows

- Understand the underlying Physics in respective specializations, and, be able to teach and guide successfully
- Introduce advanced ideas and techniques that are applicable in respective fields.
- Provide the students with a broad spectrum of Physics Courses
- Emphasize the role of Physics in other disciplines such as (Chemical Sciences, Mathematical Sciences, Life Sciences and their applied areas)
- Develop the ability of the students to observe, perform, analyse and report an experiment
- Develop the ability of the students to deal with physical models and formulas mathematically
- Equip the students with different practical, intellectual and transferable skills.
- Strengthen the student knowledge of Physics and its applications in real world.
- Provide the student with mathematical and computational tools and models to be used in solving professional problems
- Improve the student's inter disciplinary skills.
- To develop human resources with a solid foundation in theoretical and experimental aspects of respective specializations as a preparation for career in academia and industry.

iv) Qualification Descriptors (possible career pathways)

Upon successful completion of the course, the students receive a M.Sc. Degree in the Physics. The postgraduate of Department of Physics and Astrophysics are expected to opt different paths seeking sphere of knowledge and domain of professional work that can fulfill their dreams. Students will be able to demonstrate their knowledge in advance branches of Physics. This will establish a platform over which students can pursue higher studies. The possible career paths for postgraduate in M.Sc. Physics are

1. Teaching Assignments
2. Scientific Assignments

3. Instruments development
4. Research and Development in Industries
5. Simulation Techniques Development in Science
6. Role in Renewable Energy Resources
7. University/Institute Administrative Assignments
8. Technician in Lasers, Accelerators, Detectors and Electronics
9. Astronomer
10. Medical Device Designer
11. Radiologist

2. PROGRAMME OUTCOMES (POs)

Students enrolled in the Master's Programmes offered by the Departments under the School of Basic Sciences will have the opportunity to learn and master the following components in addition to attain important essential skills and abilities:

PO-No.	Component	Outcomes
PO-1	Basic Knowledge	Capable of delivering basic disciplinary knowledge gained during the programme.
PO-2	In-depth Knowledge	Capable of describing advanced knowledge gained during the programme.
PO-3	Critical thinking and Problem Solving abilities	Capable of analyzing the results critically and applying acquired knowledge to solve the problems.
PO-4	Creativity and innovation	Capable to identify, formulate, investigate and analyze the scientific problems and innovatively to design and create products and solutions to real life problems.
PO-5	Research aptitude and global competency	Ability to develop a research aptitude and apply knowledge to find the solution of burning research problems in the concerned and associated fields at global level.
PO-6	Holistic and multidisciplinary	Ability to gain knowledge with the holistic and multidisciplinary approach across the fields.

	education	
PO-7	Skills enhancement	Learn specific sets of disciplinary or multidisciplinary skills and advanced techniques and apply them for betterment of mankind.
PO-8	Leadership and Teamwork abilities	Ability to learn and work in a groups and capable of leading a team even.
PO-9	Environmental and human health awareness	Learn important aspects associated with environmental and human health. Ability to develop eco-friendly technologies.
PO-10	Ethical thinking and Social awareness	Inculcate the professional and ethical attitude and ability to relate with social problems.
PO-11	lifelong learning skills and Entrepreneurship	Ability to learn lifelong learning skills which are important to provide better opportunities and improve quality of life. Capable to establish independent startup/innovation center etc.

3. PROGRAMME SPECIFIC OUTCOMES (PSOs)

The post graduates shall be able to realise the following specific outcomes by the end of program studies:

Number	Programme Specific Outcomes
PSO-1	Identify, formulate, and solve Physics problems
PSO-2	Design and conduct experiments, as well as to analyse and interpret data
PSO-3	Apply knowledge of Physics in a different stream of science and to communicate effectively.
PSO-4	Ability to use the techniques, skills, and modern physical tools in real world application.
PSO-5	Engage in life-long learning and will have recognition.

4. Postgraduate Attributes

No.	P.G. Attributes
PGA-1	have the ability to demonstrate advanced independent critical enquiry, analysis and reflection
PGA-2	In-depth knowledge of their specialist discipline(s)
PGA-3	be critical and creative thinkers, with an aptitude for continued self-directed learning
PGA-4	be able to examine critically, synthesize and evaluate knowledge across a broad range of disciplines.
PGA-5	Reach a high level of achievement in writing, research or project activities, problem solving and communication.
PGA-6	have a set of flexible and transferable skills for different types of employment
PGA-7	have a strong sence of intellectual integrity and ethics of scholarship.
PGA-8	be able to initiate and implement constructive change in their communities, including professions and workplaces.

5. STRUCTURE OF MASTER'S COURSE

Total Credits of M.Sc. Physics : 96

Types of Courses	Nature	Total Credits	%
Core Courses(CC)	Compulsory	60	**62.5**
Elective Courses (EC)	Discipline Centric Elective Courses	0	**0**
	Discipline Specialized Elective Courses	16	**16.6**
	Generic Elective Courses	8	**8.3**
Skilled-based courses/ Self-study based courses	Skill Enhancement Courses	12	**12.5**

List of Courses (*, **, *, ****)**

6. LEARNING OUTCOME INDEX

6.1A Mapping of Core Courses with PSOs

POs ⇨	PSO1	PSO2	PSO3	PSO4	PSO5
Course No. ⇩					
1	√		√		√
2	√		√		√
3	√		√		√
4	√	√		√	
5	√	√			√
6	√		√		√
7	√		√		√
8	√		√		√

9	√	√	√		
10	√	√		√	
11	√		√	√	
12	√		√	√	
13	√	√			√
14	√		√	√	

6.1B Mapping of Discipline Centric Courses with PSOs

POs ⇨	**PSO1**	**PSO2**	**PSO3**	**PSO4**	**PSO5**
Course No. ⇩					
1	√				√
2	√	√		√	√
3		√		√	√
4		√		√	√
5	√		√		√
6		√	√	√	
7	√	√			√
8		√	√	√	
9	√	√	√		
10	√		√		√
11	√		√		
12	√		√		√
13		√	√	√	
14		√	√	√	

15	√		√		
16	√		√		√
17	√		√		√
18	√		√		√
19	√		√		√
20	√	√			
21	√	√		√	
22	√		√	√	
23	√			√	√
24		√		√	
25		√		√	
26	√			√	√
27	√	√			

7. SEMESTER-WISE COURSES AND CREDIT √DISTRIBUTION

SEMESTER-I (26-Credits)

Sr. No.	Course No	Course Code	Course Title	L	T	P	Hrs/ Week	Total Credits
Core Courses								
1	1	SBS PHY 01 101 CC 3104	Mathematical Methods in Physics – I	3	1	0	4	4
2	2	SBS PHY 01 102 CC 3104	Classical Mechanics	3	1	0	4	4
3	3	SBS PHY 01 103 CC 3104	Quantum Mechanics - I	3	1	0	4	4

4	4	SBS PHY 01 104 CC 3104	Semiconductor Devices	3	1	0	4	4
5	5	SBS PHY 01 105 CC 00126	Laboratory I	0	0	12	12	6

Generic Elective Courses (for students of other Departments)

6	1	SBS PHY 01 101 GEC 2124	Numerical Methods and Programming	2	1	2	7	4
7	2	SBS PHY 01 102 GEC 3104	Modern Optics	3	1	0	4	4
8	3	SBS PHY 01 103 GEC 3104	Physics of Digital Photography	3	1	0	4	4
9	4	SBS PHY 01 104 GEC 2002	Renewable Energy Resources	2	0	0	2	2

SEMESTER-II (26-Credits)

Sr. No.	Course No	Course Code	Course Title	L	T	P	Hrs/ Week	Total Credits
Core Courses								
1	6	SBS PHY 01 201 CC 3104	Statistical Mechanics	3	1	0	4	4
2	7	SBS PHY 01 202 CC 3104	Classical Electrodynamics	3	1	0	4	4
3	8	SBS PHY 01 203 CC 3104	Mathematical Methods in Physics- II	3	1	0	4	4
4	9	SBS PHY 01 202 CC 3104	Quantum Mechanics – II	3	1	0	4	4
4	10	SBS PHY 01 204 CC 3104	Laboratory II	0	0	12	12	6

Discipline Centric Elective Courses								
5	1	SBS PHY 01 204 DCEC 3104	Introduction to Astronomy and Astrophysics	3	1	0	4	4
6	2	SBS PHY 01 205 DCEC 3104	Solar Energy and Physics of Photovoltaic	3	1	0	4	4
7	3	SBS PHY 01 206 DCEC 3104	Accelerator Physics	3	1	0	4	4
8	4	SBS PHY 01 207 DCEC 3104	Radiation Physics	3	1	0	4	4
Discipline Centric Skill based courses								
9	5	SBS PHY 01 201 DCEC 3024	Computational Physics	3	0	2	5	4
10	6	SBS PHY 01 203 DCEC 3104	Analog Electronics	3	1	0	4	4
Generic Elective Courses (for students of other Departments)								
13	5	SBS PHY 01 202 GEC 3104	Environmental Physics	3	1	0	4	4
12	6	SBS PHY 01 201 GEC 2002	Latex for Humans	1	0	2	3	2

SEMESTER-III (28-Credits)

Sr. No.	Course No	Course Code	Course Title	L	T	P	Hrs / Week	Total Credits
Core Courses								
1	11	SBS PHY 01 301 CC 3104	Atomic, Molecular Physics and Lasers	3	1	0	4	4
2	12	SBS PHY 01 302 CC 3104	Nuclear and Particle Physics	3	1	0	4	4
3	13	SBS PHY 01 303 CC 3104	Solid State Physics	3	1	0	4	4
4	14	SBS PHY 01 304 CC 3104	Laboratory III	0	0	12	12	6

Discipline Centric Elective Courses								
5	7	SBS PHY 01 301 DCEC 3104	Physics of Electronic Materials and Devices	3	1	0	4	4
6	8	SBS PHY 01 302 DCEC 3104	Nuclear Reactor Physics	3	1	0	4	4
7	9	SBS PHY 01 303 DCEC 3104	Plasma Physics and Fusion Reactor	3	1	0	4	4
8	10	SBS PHY 01 304 DCEC 3104	Physics of Nanomaterials	3	1	0	4	4
9	11	SBS PHY 01 306 DCEC 3104	General Theory of Relativity	3	1	0	4	4
10	12	SBS PHY 01 309 DCEC 3104	Astrophysics of Stars	3	1	0	4	4
Discipline Centric Skill based courses								
11	13	SBS PHY 01 305 DCEC 3024	Characterization Techniques for Materials	3	0	2	5	4
12	14	SBS PHY 01 307 DCEC 3104	Digital Electronics and Microprocessor	3	1	0	4	4
13	15	SBS PHY 01 308 DCEC 3104	Programming with Python	3	1	0	4	4
14	16	SBS PHY 01 309 CC 0202	Seminar Presentation	0	2	0	2	2
15	17	SBS PHY 01 310 CC 2002	Research and Publication Ethics	2	0	0	2	2

SEMESTER-IV (16-Credits)

Sr. No.	Course No	Course Code	Course Title	L	T	P	Hrs/ Week	Total Credits
Major Research Project								
1	1	SBS PHY 01 401 PROJ 000	Dissertation	0	0	0	16	16
Discipline Centric Elective Courses								
2	18	SBS PHY 01 401 DCEC 3104	Advanced Nuclear Physics	3	1	0	4	4
3	19	SBS PHY 01 402 DCEC 3104	Particle Physics	3	1	0	4	4
4	20	SBS PHY 01 404 DCEC 3104	Cosmology	3	1	0	4	4
5	21	SBS PHY 01 406 DCEC 3104	Ferroelectricity and Magnetism	3	1	0	4	4
6	22	SBS PHY 01 408 DCEC 3104	Advanced Carbon Materials	3	1	0	4	4
Discipline Centric Skill based courses								
7	23	SBS PHY 01 403 DCEC 3104	Experimental Techniques in	3	1	0	4	4

			Nuclear and Particle Physics					
8	**24**	**SBS PHY 01 405 DCEC 3104**	**Astronomy Laboratory**	**3**	**1**	**0**	**4**	**4**
9	**25**	**SBS PHY 01 407 DCEC 3104**	**Vacuum Science and Thin Film Technology**	**3**	**1**	**0**	**4**	**4**
10	**26**	**SBS PHY 01 409 DCEC 3104**	**Minor Project**	**3**	**1**	**0**	**4**	**4**
11	**27**	**SBS PHY 01 410 DCEC 3104**	**Introduction to Hydrogen Energy Systems**	**3**	**1**	**0**	**4**	**4**

Note:

- This GEC* courses offered by the Department can only be taken by the students of other Departments. The students of the Physics Department will take GEC from other Departments.

- The Department may offer more than one discipline centric elective courses (DCECs) depending on specialization and strength of faculty members, and the number of students have to opt one of them for semester II. If class strength is less than 10, then that particular subject will not be offered.

- In semester III, students are required to opt two DCEC (courses) out of more than two courses offered by the Department, depending on the specialization and strength of the faculty.

- In semester IV, the students have to opt four DCEC (courses) out of options offered by the Department or Students may opt for full semester major research project.

8. COURSE-LEVEL LEARNING OUTCOMES

Course Structure

Mathematical Methods in Physics I

Scheme Version: 2021-22	**Name of the subject: Mathematical Methods in Physics I**	**L**	**T**	**P**	**C**	**Semester:** I (1^{st} Year)	**Contact Hours per Week:** 4
		3	1	0	4		**Total Hours:**

							60
Subject Code: SBS PHY 01 101 CC 3104	**Applicable to Programs:** M.Sc. Physics	**Evaluation (Total Marks: 100)**	**CIE**	30 Marks	**Examination Duration:** 3 hours		
			TEE	70 Marks	**Prerequisite of Course:** B.Sc.		
Course Description	This course has been developed to introduce students to some topics of mathematical Physics which are directly relevant in different papers of Physics course. It includes elements of matrices and group theory, introduction to tensor algebra, function of a complex variable and calculus along with an introduction to computational techniques and statistical measures used in physics Course.						
Course Objectives	• Learning about matrices and groups • Understanding basics of Tensors. • Getting to know the significance of Complex algebra • Understanding Numerical methods in Physics						
Course Outcomes	**After successful completion of the course the student will be able to do the following :** **CO101C.1 :** To use matrices for solving linear algebraic equations and to use group theory for understanding of crystallography. **CO101C.2 :** To use tensor transformation and related algebra in physics. **CO101C.3 :** To solve real definite integrals in theoretical Physics. **CO101C.4 :** To find roots of a given polynomial and understand the properties of a statistical distribution of point particles						

COURSE SYLLABUS

Unit No.	Content of Each Unit	Hours of Each Unit
1	**Matrices and Group Theory : [Course Outcome(s): CO101C.1]** Linear vector spaces, matrix spaces, linear operators, eigenvectors and eigenvalues, matrix diagonalization, special matrices. Symmetries and groups, multiplication table and representations, permutation group, translation and rotation groups, O(N) and U(N) groups.	15
2	**Tensors Analysis : [Course Outcome(s): CO101C.2]** Coordinate transformations, scalars, contravariant and covariant vectors, mixed and covariant tensor of second	15

	rank, addition, subtraction and contraction of tensors, quotient rule. Christoffel symbols, transformation of Christoffel symbols, Covariant differentiation, Ricci's theorem, divergence, Curl and Laplacian tensor form, Stress and strain tensors, Hook's law in tensor form.	
3	**Complex Variables :[Course Outcome(s): CO101C.3]** Functions of complex variable, Limits and continuity, differentiation, Analytical functions, Cauchy-Riemannn conditions, Cauchy Integral theorem, Cauchy integral formula, Derivatives of analytical functions, Liouville's theorem. Power series Taylor's theorem, Laurent's theorem. Calculus of residues–poles, essential singularities and branch points, residue theorem, Jordan's lemma, singularities on contours of integration, evaluation of definite integrals.	15
4	**Computational Techniques and Probability Theory : [Course Outcome(s): CO101C.4]** Root of functions, interpolation, extrapolation, Integration by trapezoid and Simpson's rule,solution of first order differential equation : using Runge-Kutta method and Finite difference methods. , Preliminary Concepts : mean values, standard deviation, various moments; Random walk problem, Binomial distribution, Poisson distribution, Gaussian distributions, Lorentz distribution, Central Limit Theorem.	15

TEXT BOOKS

1. **Fredrick W. Byron and Robert W. Fuller**, Mathematics of Classical and Quantum Physics, Dover Publications, Mineola, New York, Vol 1&2, 1970.
2. **Merle C. Potter and Jack Goldberg**, Mathematical Methods, S.CHAND (Prentice Hall of India), New Delhi, 2nd Edition, 1987.
3. **George Arfken and Hans J Weber**, Mathematical Methods for Physicists, Elsevier Academic Press. Cambridge, Massachusetts, 7th Edition 2012
4. **L. A. Pipe**, Applied Mathematics for Engineers and Physicists, Dover Publication Inc., Mineola, New York 3rd Edition 2014.
5. **E. Kreyszig**, Advanced Engineering Mathematics, John Wiley & Sons. Hoboken, New Jersey (United States), 10th Edition, 2015.
6. **K. F. Riley, M.P. Hobson, and S. J. Bence,** Mathematical methods for Physicists and Engineers, S. CHAND (Cambridge University Press), New Delhi, 3rd edition, 2018.
7. **V. BALAKRISHNAN,** Mathematical Physics with Applications, Problems and

Solutions, Ane Books, New Delhi, 1st Edition, 2018

Classical Mechanics

Scheme Version:	Name of the subject: Classical Mechanics	L	T	P	C	Semester:	Contact Hours per Week: 4
							Total

<table>
<tr><td>2021-22</td><td></td><td>3</td><td>1</td><td>0</td><td>4</td><td>I
(1st Year)</td><td>Hours: 60</td></tr>
<tr><td rowspan="2">Subject Code:
SBS PHY 01
102 CC 3104</td><td rowspan="2">Applicable to Programs:M.Sc. Physics</td><td rowspan="2">Evaluation
(Total Marks: 100)</td><td>CIE</td><td>30 Marks</td><td colspan="3">Examination Duration:3 hours</td></tr>
<tr><td>TEE</td><td>70 Marks</td><td colspan="3">Prerequisite of Course: None</td></tr>
<tr><td>Course Description</td><td colspan="7">This course aims at providing knowledge of Classical Mechanics to the students so that they are able to understand the Lagrangian & Hamiltonian mechanics of systems of particles interacting with various forces and also their applications in various branches of Physics.</td></tr>
<tr><td>Course Objectives</td><td colspan="7">• To understand the fundamentals of classical mechanics
• To get familiar with various classical mechanical problems related to Lagrangian & Hamiltonian formulations
• To aware the students about applications of classical mechanics in various science branches</td></tr>
<tr><td>Course Outcomes</td><td colspan="7">After completion of this course, students would be able to:
CO102C.1. Understand the mechanics of system of particles, D'Alembert's principle, Lagrangian mechanics, & Euler's equation of motion.
CO102C.2. Learn about Hamiltonian formulation, Hamilton's Equations of Motion and Principle of least action.
CO102C.3. Learn Canonical Transformations & Hamilton-Jacobi theory.
CO102C.4. Learn about Rigid body dynamics including problems.
CO102C.5. Understand the two body central force problem and its related aspects.</td></tr>
<tr><td colspan="8">COURSE SYLLABUS</td></tr>
</table>

Unit No.	Content of Each Unit	Hours of Each Unit
1	**Lagrangian Formulation and Central Force Problem: [Course Outcome(s): CO102C.1]** Newtonian mechanics of one and many particle systems, Virtual work, Constraints: holonomic and non-holonomic, D'Alembert's Principle and Euler-Lagrange Equations of motion, velocity dependent potentials, simple applications of Lagrangian formulation. Hamilton's Principle, Calculus of Variations, Derivation of Lagrange's equation from Hamilton's principle. Conservation theorems and Symmetry Properties, Noether's theorem.	15
2	**Hamilton's Equations of Motion: [Course Outcome(s): CO102C.2]** Generalized momentum, Legendre transformation and the Hamilton's Equations of Motion, simple applications of Hamiltonian formulation, cyclic coordinates, Routh's procedure, Hamiltonian Formulation of Relativistic Mechanics, Derivation of Hamilton's canonical equation from Hamilton's variational principle. The principle of least action.	15
3	**Canonical Transformation and Hamilton-Jacobi Theory: [Course Outcome(s): CO102C.3]** Canonical transformation, integral invariant of Poincare, Lagrange's and Poisson brackets as canonical invariants, equation of motion in Poisson bracket formulation. Infinitesimal contact transformation and generators of symmetry, Liouville's theorem. Hamilton-Jacobi equation and its application. Action angle variable: adiabatic invariance of action variable,the Kepler problem in action angle variables.	15
4	**Small Oscillations and Rigid Body Motion: [Course Outcome(s): CO102C.4 & CO102C.5]** Stable and unstable equilibria; Theory of small oscillations in Lagrangian formulation, normal coordinates and its applications, Free vibrations of linear triatomic oscillator. Orthogonal transformation, Eigenvalues of the inertia tensor, Euler equations, Eulerian angles, moment of Inertia.	15

	Two body central force problem: Reduction to equivalent one body problem, equation of motion and first integrals, Equivalent one-dimension problem and classification of orbits. Coriolis force.	

TEXT BOOKS

1. **A.Sommerfeld,** Mechanics, Academic Press,United States, 1st Edition, 1952.
2. **I. Percival and D. Richards**, Introduction to Dynamics, Cambridge University Press, 1st Edition1982.
3. **Ronald L. Greene,** Classical Mechanics with Maple, Springer,Germany, 2nd Edition, 2000.
4. **Herbert Goldstein, Charles Poole, John Safko,** Classical Mechanics, Pearson Education,UK, 3rd Edition, 2011.
5. **L.D. Landau and E.M. Lifshitz,** Mechanics, Butterworth-Heinemann, UK, 2nd Edition, 2012.
6. **N.C. Rana and P.S. Joag,** Classical Mechanics, Tata McGraw Hill, New Delhi, 1st Edition, 2015.

QUANTUM MECHANICS - I

<table>
<tr><td rowspan="2">Scheme Version:

2021-22</td><td rowspan="2">Name of the subject:

Quantum Mechanics – I</td><td>L</td><td>T</td><td>P</td><td>C</td><td rowspan="2">Semester:

I

(1st Year)</td><td>Contact Hours per Week: 4</td></tr>
<tr><td>3</td><td>1</td><td>0</td><td>4</td><td>Total Hours: 60</td></tr>
<tr><td rowspan="2">Subject Code:
SBS PHY 01
103 CC 3104</td><td rowspan="2">Applicable to Programs: M.Sc. Physics</td><td rowspan="2">Evaluation

(Total Marks: 100)</td><td>CIE</td><td>30 Marks</td><td colspan="3">Examination Duration: 3 hours</td></tr>
<tr><td>TEE</td><td>70 Marks</td><td colspan="3">Prerequisite of Course:
Graduation Level Quantum Mechanics</td></tr>
<tr><td>Course Description</td><td colspan="7">This course is designed for fundamental knowledge of quantum mechanics, which has comprehensive and rich applicability in condensed matter physics, atomic and molecular physics, nuclear physics, space science, and chemistry.</td></tr>
<tr><td>Course Objectives</td><td colspan="7">• To understand the fundamentals of quantum mechanics
• To make familiar with various quantum mechanical problems related to vector space, eigenvalue, Schrödinger equation, free particle, harmonic oscillator, potential barrier and well, angular momenta etc.
• To aware the students about applications of quantum mechanics in various science branches</td></tr>
<tr><td>Course Outcomes</td><td colspan="7">After completetion of this course, students will be able to

CO103C.1. explain the theories and phenomena of vector space, operators, Dirac's notations, matrices, and commutators which are very helpful in solving the various quantum mechanics problems</td></tr>
</table>

	CO103C.2. understand the uncertainty relation between two arbitrary operators **CO103C.3.** distinguish the actual meaning of time independent and time dependent Schrodinger's equations **CO103C.4.** illustrate Ehrenfest theorem, Poisson Brackets, wave packets and wave functions in position and momentum space **CO103C.5.** analyze the energy eigenvalues and wave functions of harmonic oscillator, infinite and finite square wells, free particle, and hydrogen atom **CO103C.6.** determine the transmission and reflection coefficients of potential barrier and well, potential step, and delta function well **CO103C.7.** recognize the importance of angular momentum and its applications in quantum mechanics **CO103C.8.** explain the physics behind the addition of angular momenta

COURSE SYLLABUS

Unit No.	Content of Each Unit	Hours of Each Unit
1	**Mathematical Tools of Quantum Mechanics [Course Outcome(s): CO103C.1 & CO103C.2]** Vector Spaces, Linear Independence, Bases, Dimensionality, Linear Transformations, Similarity Transformations, Eigen Values and Eigen Vectors, Inner Product, Orthogonality and Completeness, Hilbert Space, Hermitian and Unitary Operators, Orthonormality, Completeness and Closure, Dirac's Bra and Ket Notation, Matrix Representation and Change of Basis, Operators and Observables, Commutation Relations, Uncertainty principle for two arbitrary Operators.	15
2	**Quantum Dynamics [Course Outcome(s): CO103C.3, CO103C.4 & CO103C.5]** Time Evolution Operator, Stationary States, Schrodinger	15

	Equation, The Schrodinger versus the Heisenberg Picture, The Infinite Square Well and the Simple Harmonic Oscillator: Energy Eigenvalues and Energy Eigenstates, Connecting Quantum to Classical Mechanics: The Ehrenfest Theorem; Poisson Brackets and Commutators, Wave Packets, Wave Functions in Position and Momentum Space.	
3	**Quantum Mechanics in One and Three Dimensions [Course Outcome(s): CO103C.5 & CO103C.6]** Properties of One Dimensional Motion: Bound States and Scattering States, The Free Particle, The Potential Step, The Potential Barrier and Well, The Finite Square Well, The Delta-Function Well, Three Dimension Problems: Hydrogen Atom.	15
4	**Angular Momenta and Approximate Analysis [Course Outcome(s): CO103C.7 & CO103C.8]** Orbital angular momentum, General Formalism of Angular Momentum, Eigenfunctions and Eigenvalues of Orbital Angular Momentum, Addition of Angular Momenta, Spin Angular Momentum: Stern-Gerlach Experiment; Pauli Matrices and Spinors, Clebsch-Gordan Coefficients.	15

TEXT BOOKS

1. **L. D. Landau and E.M. Lifshitz**, Quantum Mechanics, Butterworth Heinemann, The Netherlands, 3rd Edition, 1981.
2. **P. A. M. Dirac**, The Principles of Quantum Mechanics, Oxford University Press, UK, 4th Edition, 1988.
3. **R. Shankar**, Principles of Quantum Mechanics, Springer, Germany, 2nd Edition, 1994.
4. **N. Zettili**, Quantum Mechanics: Concepts and Applications, Wiley, USA, 2nd Edition, 2009.
5. **J. J. Sakurai**, Modern Quantum Mechanics, Pearson, India, 2nd Edition, 2013.
6. **L. I. Schiff**, Quantum Mechanics, McGraw Hill Education, USA, 4th Edition, 2017.
7. **D. J. Griffiths**, Introduction to Quantum Mechanics, Cambridge University Press, UK, 3rd Edition, 2018.
8. **C. Cohen-Tannoudji, B. Diu, and F. Laloe**, Quantum Mechanics, Volume 1: Basic Concepts, Tools, and Applications, Wiley, USA, 2nd Edition, 2019.

Semiconductor Devices

<table>
<tr><td rowspan="2">Scheme Version:

2021-22</td><td rowspan="2">Name of the subject:

Semiconductor Devices</td><td>L</td><td>T</td><td>P</td><td>C</td><td rowspan="2">Semester:

I

(1st Year)</td><td>Contact Hours per Week: 4</td></tr>
<tr><td>3</td><td>1</td><td>0</td><td>4</td><td>Total Hours: 60</td></tr>
<tr><td rowspan="2">Subject Code:
SBS PHY 01
104 CC 3104</td><td rowspan="2">Applicable to Programs: M.Sc. Physics</td><td rowspan="2">Evaluation

(Total Marks: 100)</td><td>CIE</td><td>30 Marks</td><td colspan="3">Examination Duration: 3 hours</td></tr>
<tr><td>TEE</td><td>70 Marks</td><td colspan="3">Prerequisite of Course: None</td></tr>
<tr><td>Course Description</td><td colspan="7">The objective of the course on Semiconductor Devices is to introduce semiconductor physics, physical principle of devices and their basic applications.</td></tr>
<tr><td>Course Objective</td><td colspan="7">• An understanding of basic semiconductor device physics
• An understanding of the application of Field-Effect Transistors.
• An understanding of the application of Bipolar Junction Transistors.</td></tr>
<tr><td>Course Outcomes</td><td colspan="7">On completion of the course, student would be able:

CO104C.1. To understand the basic properties of semiconductors including the band gap, charge carrier concentration, doping and charge carrier injection/excitation.

CO104C.2. To understand how to find the Fermi energy level and carrier density in n-type and p-type semiconductors.

CO104C.3. To understand basic properties of PN junctions and Metal-Semiconductor junction.

CO104C.4. To understand the working, design and applications of various semiconducting devices like rectifiers, clippers, LED, Solar cells.</td></tr>
</table>

	CO104C.5. To understand the working, design, and applications of BJTs and FETs. **CO104C.6.** To understand the working, design and applications of Operational amplifier

COURSE SYLLABUS

Unit No.	Content of Each Unit	Hours of Each Unit
1	**Semiconductors [Course Outcome(s): CO104C.1 & CO104C.2]** Energy Band and Charge Carriers: Energy bands in semiconductors, Types of semiconductors: Intrinsic and extrinsic materials. Carrier concentration: Fermi Level, Electron and hole concentration in equilibrium, Temperature dependence of carrier concentration, Compensation and charge neutrality. Conductivity and mobility: Effect of temperature, Doping and high electric field, Hall Effect.	**15**
2	**Junctions [Course Outcome(s): CO104C.3 & CO104C.4]** p-n junction and contact potential, Fermi levels, Space charge, Reverse and Forward bias, Zener and Avalanche breakdown. Capacitance of p-n junction, Diode Applications: Load-Line Analysis, Series Diode Configurations, Parallel and Series-Parallel Configurations (AND/OR Gates), Half-Wave Rectification, Full-Wave Rectification, Clippers, Clampers. Network with a DC and AC Source, LED, Solar cell and photodetectors, Metal-Semiconductor contact: Rectifying contact and Ohmic contact.	**15**
3	**Bipolar Junction Transistors (BJT) [Course Outcome(s): CO104C.5]** Fundamentals of BJT, BJT Operation: Common-Base Configuration, Common-Emitter Configuration, Common-Collector Configuration, Limits of Operation, Minority carrier distribution, BJT DC Biasing: Operating Point, Fixed-Bias Configuration, Emitter-Bias Configuration, Voltage-Divider Bias Configuration, Collector Feedback Configuration, Emitter-Follower Configuration, **Field Effect Transistors:** JEFT: Construction and Characteristics of JFETS, Transfer Characteristics, MOSFET: Depletion-Type MOSFET, Enhancement-Type MOSFET, Transfer Characteristics.	**15**

4	**Operational Amplifiers [Course Outcome(s): CO104C.6]** Differential amplifier (DA)- Basic circuit of differential amplifier Operation of differential amplifier: Common-mode rejection ratio (CMRR), DC analysis of differential, Applications of OP-amp: Inverting amplifier-Input and impedance of inverting amplifier, Noninverting amplifier-Voltage follower, Effect of negative feedback on OP-amp in feedback circuits, Summing amplifiers-Applications of summing amp, OP-amp as integrators and differentiators.	

TEXT BOOKS

1. **J.J. Cathey**, Schaum's Outline of Electronic Devices and Circuits, McGraw Hill, New York, 2nd Edition 2002.
2. **B. Streetman and S. Banerjee**, Solid State Electronics, Prentice Hall India, New Delhi, 6th Edition, 2006.
3. **Millman and Halkias**, Integrated Electronics, McGraw Hill, New York, 2nd Edition 2009.
4. **A.P. Malvino**, Electronic Principles, McGraw, New Delhi, New York 7th, Edition, 2009.
5. **J.H. Moore, C.C. Davis and M.A. Coplan**, Building Scientific Apparatus, Addison Wesley, United States, 4th Edition 2009.
6. **R.L. Boylestad and L. Nashelsky**, Electronics Devices and Circuit Theory, Prentice Hall of India, New Delhi, 11th Edition, 2013.
7. **P. Horowitz and W. Hill**, The Art of Electronics, Cambridge University Press, 3rd Edition, 2015.

LABORATORY I

<table>
<tr><td rowspan="2">Scheme Version:

2021-22</td><td rowspan="2">Name of the subject:
Laboratory I</td><td>L</td><td>T</td><td>P</td><td>C</td><td rowspan="2">Semester:

I (1st Year)</td><td>Contact Hours per Week: 12</td></tr>
<tr><td>0</td><td>0</td><td>12</td><td>6</td><td>Total Hours: 180</td></tr>
<tr><td rowspan="2">Subject Code:
SBS PHY 01 105
CC 00126</td><td rowspan="2">Applicable to Programs:

M.Sc. Physics</td><td rowspan="2">Evaluation

(Total Marks: 100)</td><td>CIE</td><td>30 Marks</td><td colspan="3">Examination Duration: 3 hours</td></tr>
<tr><td>TEE</td><td>70 Marks</td><td colspan="3">Prerequisite of Course: None</td></tr>
<tr><td>Course Description</td><td colspan="7">The objective of the lab 1 is to train students to perform various experiments associated with Electronics, Quantum physics, Waves mechanics and Spectroscopy. Students assigned the general laboratory work will perform at least ten (10) experiments of the above mentioned list of Physics experiments and further 8 experiments from the C programming section.. Experiments of equal standard may be added. Workshop soldering and designing of experiments should be included</td></tr>
<tr><td>Course Objectives</td><td colspan="7">• To give hands on experience to students for generating magnetic field and measurement of various parameters.
• To teach how temperature controlled oven works
• To take measurements of current and voltage using various equipment</td></tr>
<tr><td>Course</td><td colspan="7">After completition of this course, the students will be able to</td></tr>
</table>

Outcomes	**CO105C.1.** learn various Physics aspects by performing the experiments related to electronic devices, atomic and molecular physics, light wave, sound waves etc. **CO105C.2.** Learn Error analysis **CO105C.3.** Use excel for plotting graphs **CO105C.4.** to do C programming	
COURSE SYLLABUS		
Unit No.	**Content of Each Unit**	**Hours of Each Unit**
1	1. Hall Effect 2. Four Probe Method to find band gap of semiconductor 3. Electron Spin Resonance 4. Frank-Hertz experiment 5. PN Junction characteristics 6. Solar cell characteristics 7. Velocity of ultrasonic wave in liquids 8. Characteristics of MOSFET 9. Diode as voltage regulator 10. Ionization potential of mercury 11. Planck's constant using LED 12. Law of Malus 13. Zener diode characteristics	150
2	Introduction to C Programming: 1. Write a Program to calculate and display the volume of a CUBE having its height, width and depth. 2. Write a C program to perform addition, subtraction, division and multiplication of two numbers 3. Write a program to input two numbers and display the maximum number. 4. Write a program to find the largest and smallest among three entered numbers and also display whether the identified largest/smallest number is even or odd. 5. Write a program to find the roots of quadratic equation. 6. Write a program to check whether the entered year is leap year or not (a year is leap if it is divisible by 4 and divisible by	30

	100 or 400.) 7. Write a program to find the factorial of a number. 8. Write a program to check number is Armstrong or not. 9. Write a program to find GCD (greatest common divisor or HCF) and LCM (least common multiple) of two numbers 10. Write a program to generate Fibonacci series.	

TEXT BOOKS

1. **Worsnop and Flint,** Experimental Physics, Little hampton Book Services Ltd, United Kingdom, 9th Edition, 1951.
2. **A. C. Melissinos, J. Napolitano,** Experiments in Modern Physics, Academic Press, Cambridge, Massachusetts, 2nd Edition, 2003.
3. Lab manuals, prepared by faculty of the Department of Physics, 2018.

Numerical Methods and Programming

<table>
<tr><td rowspan="2">Scheme Version:

2021-22</td><td rowspan="2">Name of the subject: Numerical Methods and Programming</td><td>L</td><td>T</td><td>P</td><td>C</td><td rowspan="2">Semester:

I (1st Year)</td><td>Contact Hours per Week: 4</td></tr>
<tr><td>1</td><td>1</td><td>2</td><td>4</td><td>Total Hours: 60</td></tr>
<tr><td rowspan="2">Subject Code: SBS PHY 01 101 GEC 2124</td><td rowspan="2">Applicable to Programs: M.Sc.</td><td rowspan="2">Evaluation (Total Marks: 100)</td><td>CIE</td><td>30 Marks</td><td colspan="3">Examination Duration: 3 hours</td></tr>
<tr><td>TEE</td><td>70 Marks</td><td colspan="3">Prerequisite of Course: B.Sc. With Mathematics.</td></tr>
<tr><td>Course Description</td><td colspan="7">This course teaches the students to solve basic problems of mathematics and sciences with the help of an approximation and a computer.</td></tr>
<tr><td>Course Objectives</td><td colspan="7">To make the student
• 1) Understand basics of a Programming Language
• 2) Aware of various Numerical methods.
• 3) Able to create hypothetical data sets for Physical Systems.
4) familiar with random sampling of large data sets.</td></tr>
<tr><td>Course Outcomes</td><td colspan="7">Students will be able to learn :
CO101G.1 : to write a computer program in C.

CO101G.2 : the solutions of linear and non-linear equations along with solutions of simultaneous linear equations.

CO101G.3 : Numerical differentiation and integration.

CO101G.4 : Monte Carlo methods and its application to problems of physical world.</td></tr>
<tr><td colspan="8">COURSE SYLLABUS</td></tr>
<tr><td>Unit No.</td><td colspan="5">Content of Each Unit</td><td colspan="2">Hours of Each Unit</td></tr>
<tr><td>1</td><td colspan="5">C/C++: [Course Outcome(s): CO101G.1]
Flow charts, Algorithms, Input and output statements, Control statements, Arrays, Repetitive and logical structures, Subroutines and functions.</td><td colspan="2">15</td></tr>
<tr><td>2</td><td colspan="5">Numerical Methods of Analysis: [Course Outcome(s): CO101G.2, CO101G.3]</td><td colspan="2">35</td></tr>
</table>

	Roots of a function, Solution of simulteneous linear equation, Interpolation and curve fitting, Numerical differentiation and integration, Solution of ordinary differential equations	
3	Simulations I: **[Course Outcome(s): CO101G.3, CO101G.4]** Generation of random numbers, Statistical tests of randomness,, Monte-Carlo evaluation of integrals and Error Analysis.	35
4	Simulations II : **[Course Outcome(s): CO101G.4]** Inhomogeneous distribution and Importance of data sampling, Metropolis algorithm, Brownian motion as random walk problem and its Monte-Carlo simulation.	20

TEXT BOOKS

1. **S. S. M. Wong,** Computational Methods in Physics and Engineering, World Scientific, Singapore, 2nd Edition, 1997.
2. **C. F. Gerald,** Applied Numerical Analysis, Pearson/Addison Wesley, UK, 7th Edition, 2003.
3. **Teukolsky, Vetterling and Flannery,** Numerical Recipes: The Art of Scientific Computing, Cambridge University Press, 3rd Edition 2007.
4. **Landau and Binder,** A Guide to Monte Carlo Simulations in Statistical Physics, Cambridge University Press, 3rd Edition, 2013.
5. **V. Rajaraman,** Computer Oriented Numerical Methods, Prentice Hall of India, New Delhi, 4th Edition, 2015.
6. **V. Rajaraman,** Computer Programming in FORTRAN 90/95, Prentice Hall of India, New Delhi, 1st Edition, 2015.

Modern Optics

<table>
<tr><td rowspan="2">Scheme Version:

2021-22</td><td rowspan="2">Name of the subject:

Modern Optics</td><td>L</td><td>T</td><td>P</td><td>C</td><td rowspan="2">Semester:

I

(1st Year)</td><td>Contact Hours per Week: 4</td></tr>
<tr><td>3</td><td>1</td><td>0</td><td>4</td><td>Total Hours: 60</td></tr>
<tr><td rowspan="2">Subject Code:
SBS PHY 01
102 GEC 3104</td><td rowspan="2">Applicable to Programs: M.Sc. Physics</td><td rowspan="2">Evaluation

(Total Marks: 100)</td><td>CIE</td><td>30 Marks</td><td colspan="3">Examination Duration: 3 hours</td></tr>
<tr><td>TEE</td><td>70 Marks</td><td colspan="3">Prerequisite of Course: B.Sc. with Physics</td></tr>
<tr><td>Course Description</td><td colspan="7">The course has focus on the Geometrical and wave optics, thin films, Holography, optical fiber, liquid crystals, LED and Photonic band gap crystals.</td></tr>
<tr><td>Course Objectives</td><td colspan="7">• To understand the fundamentals of optics.
• To impart knowledge about different physical phenomena.
• To update the students with the latest technologies.</td></tr>
<tr><td>Course Outcomes</td><td colspan="7">After completetion of this course, students would be able to:
CO102G.1. Understand the various physical phenomena & their real life applications.
CO102G.2. Learn about the wave optics and holography.
CO102G.3. Get knowledge about the basics of Lasers.
CO102G.4. Learn about the fiber optics & LED.</td></tr>
<tr><td colspan="8"></td></tr>
</table>

COURSE SYLLABUS		
Unit No.	**Content of Each Unit**	**Hours of Each Unit**
1	**An overview of Geometrical and Wave Optics: [Course Outcome(s): CO102G.1]** Laws of Reflection, Refraction, Total Internal Reflection; Ideas of Interference, Diffraction, Polarization, Dispersion.	15
2	**Fresnel Relations: [Course Outcome(s): CO102G.2]** Conductors, Thin Films: Reflection Model, Matrix Formalism, Coating Design, Fourier Optics: Wave Propagation, Fraunhofer Diffraction, Fresnel Diffraction, Spatial Filtering, Holography and Holograms.	15
3	**Coherence, Interference and Visibility, Laser Physics: [Course Outcome(s): CO102G.3]** Overview, Gain Saturation, Light-Atom Interactions, Optical Gain and Pumping Schemes, Output Characteristics, Light Shifts and Optical Forces, Atom-Photon interactions.	15
4	**Fiber Optics: [Course Outcome(s): CO102G.4]** Mode Analysis, Single mode and multimode optical fiber, Loss and Dispersion, Photonics Band-gap Crystals, Liquid crystals, Introduction of LED.	15

TEXT BOOKS

1. 1. **A. E. Siegman,** Lasers, University Science Book, USA,Revised Edition, 1986.
2. **G. R. Fowles,** Introduction to Modern Optics, Dover Publication, USA, 2nd Edition, 1989.
3. **J. T. Verdeyen,** Laser Electronics, Prentice-Hall, India,New Delhi, 3rd Edition, 1995.
4. **E. Hecht,** Optics, Addison Wesley, USA, 4th Edition, 2001.
5. **Pedrotti,**Introduction to Optics, Pearson UK, 3rd Edition, 2006.
6. **B. E. A. Saleh and M. C. Teich,** Fundamentals of Photonics, Wiley,United States, 2nd Edition, 2012.
7. **A. Ghatak,** Optics, Tata McGraw-Hill, New Delhi, 6th Edition, 2017.

Physics of Digital Photography

Scheme Version: 2021-22	**Name of the subject:** Physics of Digital Photography	**L**	**T**	**P**	**C**	**Semester:** I (1st Year)	**Contact Hours per Week:** 4
		3	1	0	4		**Total Hours:** 60
Subject Code: SBS PHY 01 103 GEC 3104	**Applicable to Programs:** M.Sc. Physics	**Evaluation (Total Marks: 100)**	**CIE**	30 Marks	**Examination Duration:** 3 hours		
			TEE	70 Marks	**Prerequisite of Course:** B.Sc. with Physics		
Course Description	The aim of this course is to provide a theoretical overview of the photographic imaging chain. The course is intended to serve as a link between imaging science and photographic practice.						
Course Objective	• To become proficient at the technical aspect of photographing with a digital camera. • To develop and practice skills using digital photography tools and the Internet including emailing and posting to a web site • To develop the habit of looking closely at the visible world around you in order to represent it in terms of aesthetics, beauty and truth. – To look at what you are seeing and to see what you are looking at.						
Course Outcomes	On completion of the course, student would be able: **CO103G.1.** To understand the photographic optics & methods						

	CO103G.2. To understand the basic principle of photography **CO103G.3.** To understand the theory of exposure **CO103G.4.** To understand about the image quality

COURSE SYLLABUS

Unit No.	Content of Each Unit	Hours of Each Unit
1	**Fundamental optical formulae [Course Outcome(s): CO103G.1]** Image formation: Refraction, Gaussian optics, Lens refractive power, Magnification, Focal length, Lens focusing movement Field of view: Entrance and exit pupils, Chief and marginal rays, Angular field of view, Field of view area, Focal-length multiplier, Depth of field: Circle of confusion, Depth of field equations, Hyperfocal distance, Focus and recompose limits, distortion, Exposure: Photometry, Flux emitted into a cone, Relative aperture, f-number, Working f-number, f-stop, Natural vignetting, Photometric exposure, Exposure value, f-number for aplanatic lenses	**15**
2	**History of photography [Course Outcome(s): CO103G.2]** Pinhole Camera, Camera Obscura, Normal Human Eye and Process of Seeing-Human eye and camera, Camera principles: Compact cameras and SLR's - Working of SLR camera- Different image sensors-CCD and CMOS. Angle of view- Different types of lenses-normal lens, wide angle lens, fish eye lens, prime lens, telephoto lens. Depth of Field-Shallow depth of field, large depth of field, Depth of focus - circles of confusion	**15**
3	**Exposure strategy [Course Outcome(s): CO103G.3]** Digital output, Sensor response, Colour, Digital output levels, Dynamic range, Tonal range, Tone reproduction, Gamma, Tone curves, Histograms, verage photometry, Reflected-light metering, Average scene luminance, Exposure index, ISO speed, Standard output sensitivity, Exposure modes: Metering modes, Exposure compensation, Aperture priority (A or Av), Shutter priority (S or Tv), Program mode (P), Manual mode (M)	**15**

4	**Image quality [Course Outcome(s): CO103G.4]** Colour temperature, White balance, Color space, Lens MTF, sharpness, Signal-to-noise ratio, Different Image capturing formats: RAW, TIFF, JPEG, Storage Devices- SD card CF card, Principles of Composition: Perspective - Space (Negative and Positive), Directional lines-Golden Section and Rule of the Third, Colour Theory	**15**

TEXT BOOKS

1. **Steven Heller**, A History of Photography: From 1839 to the Present
2. **Tom Ang,** Photography: The Definitive Visual History
3. **Todd Gustavson** and **George Eastman House**, Camera: A History of Photography from Daguerreotype to Digital by Understanding Exposure, Fourth Edition by BRYAN PETERSON.
4. **DK**, Digital Photography Complete Course Hardcover
5. **Fil Hunter, Steven Biver and Paul Fuqua**, Light Science & Magic: An Introduction to Photographic Lighting by Understanding Color in Photography by Bryan Peterson.
6. **Andy Rowland**, Physics of Digital Photography by (IOP Publishing).

INTRODUCTION TO RENEWABLE ENERGY RESOURCES

<table>
<tr><td rowspan="2">Scheme Version:

2021-2022</td><td rowspan="2">Name of the Subject:
Introduction to Renewable Energy Resources</td><td>L</td><td>T</td><td>P</td><td>C</td><td>Semester:</td><td>Contact hours per week: 2</td></tr>
<tr><td>3</td><td>1</td><td>0</td><td>4</td><td>I (1st Year)</td><td>Total Hours: 30</td></tr>
<tr><td rowspan="2">Subject Code:
SBS PHY 01 104
GEC 2002</td><td rowspan="2">Applicable to Programs:
M.Sc. Physics</td><td rowspan="2">Evaluation (Total Marks): 100</td><td>CIE</td><td>30 Marks</td><td colspan="3">Examination Duration: 3 hours</td></tr>
<tr><td>TEE</td><td>70 Marks</td><td colspan="3">Pre-requisite of course: 10+2 with Non-Medical</td></tr>
<tr><td>Course Description</td><td colspan="7">To introduce the pattern of fuel consumption, energy demand, various renewable sources of energy and modern applications.</td></tr>
<tr><td>Course Objectives</td><td colspan="7">• The course treats the basics of various renewable energy resources and energy generation using different methods; it is suitable for students from interdisciplinary background.</td></tr>
<tr><td>Course Outcomes:</td><td colspan="7">On completion of this course, student will learn:

CO104G.1 The Course will create awareness among students about Non-Conventional sources of energy technologies and provide adequate inputs on a variety of issues.
CO104G.2 The Course will be introducing the students to all the aspects of PV technology. This will enable them to understand the requirements for PV materials and PV systems for different applications.
CO104G.3 It creates awareness among students about wind and geothermal energy technologies and provide adequate inputs on a variety of issues.
CO104G.4 To teach fundamentals of hydrogen energy as energy systems, production processes, storage, utilization, and safety that is necessary for taking some important elective subjects.
CO104G.5 It increases the potential for job opportunities in automotive industries and hydrogen production & its infrastructure development related sectors as about 40% energy is being consumed by automotive sectors.
CO104G.6 To give an idea about different biomass and nuclear as energy source and their processing and utilization for recovery of energy and other valuable products. A comprehensive knowledge of how wastes are utilized for recovery of value would be immensely useful for the students from all fields.</td></tr>
<tr><td></td><td colspan="7">COURSE SYLLABUS</td></tr>
<tr><td>Unit No.</td><td colspan="5">Content of Each Unit</td><td colspan="2">Hours of Each Unit</td></tr>
<tr><td>1.</td><td colspan="5">Energy Scenario and Solar Energy: [Course Outcome (s): CO104G.1 & CO104G.2]
Global and Indian Energy Scenario and Energy Policy, Commercial and Noncommercial Forms of Energy, Fossil Fuels, Renewable Sources, Impact of Energy Systems on Environment, Need for use of New and Renewable Energy Sources, Solar Thermal and Solar Photovoltaic Energy.</td><td colspan="2">15</td></tr>
</table>

2.	**Wind and Geothermal Energy: [Course Outcome (s): CO104G.3]** Wind Energy Basics- Global circulation, Forces influencing Wind - Pressure gradient force and Coriolis force, Local and Regional Wind systems, Geothermal Tidal and Wave Energy, Geothermal regions, geothermal sources, Geothermal energy conversion technologies.	15
3.	**Hydrogen Energy and Fuel cells: [Course Outcome (s): CO104G.4 & CO104G.5]** Hydrogen Energy-production and storage, Production Processes: Thermo chemical Water Splitting, Gasification, Pyrolysis methods. Electrochemical, Electrolysis, Photo electro chemical. General storage methods, compressed storage, Zeolites, Metal hydride storage, chemical hydride storage and cryogenic storage. Fuel cells- Thermodynamics and performance of Fuel Cells, Its working, construction, classifications and applications.	15
4.	**Biomass and Nuclear Energy**: **[Course Outcome (s): CO104G.6]** Biomass Energy and application, Techniques for biomass assessment, Thermochemical conversion of biomass, Mini/micro hydro power: classification of hydropower schemes, Nuclear Energy: Fission, Fusion, Different type of nuclear reactors, Nuclear waste disposal and environment measures.	15

REFERENCE BOOKS

1. Solar Energy: S. P. Sukhatme, (Tata McGraw Hill).
2. Garg .H.P,Prakash .J, "Solar energy fundamentals and applications", Tata McGraw Hill publishing Co. Ltd, 2006.
3. Xianguo Li, Principles of Fuel Cells, Taylor and Francis, 2005.
4. Fundamentals of Renewable Energy Processes, Aldo Vieira da Rosa, Elsevier Academic Press.
5. J Twidell and T Weir, Renewable Energy Resources, Taylor and Francis (Ed), New York, USA, 2006.
6. KC Khandelwal, SS Mahdi, Biogas Technology - A Practical Handbook, Tata McGraw Hill, 1986.
7. EH Lysen, Introduction to Wind Energy, CWD Report 82-1, Consultancy Services Wind Energy Developing Countries, May 1983.
8. JG Collier and GF Hewitt, Introduction to Nuclear Power, Hemisphere Publishing, New York, 1987.

STATISTICAL MECHANICS

<table>
<tr><td rowspan="2">Scheme Version:

2021-22</td><td rowspan="2">Name of the subject:
Statistical Mechanics</td><td>L</td><td>T</td><td>P</td><td>C</td><td rowspan="2">Semester:

II (1st Year)</td><td>Contact Hours per Week: 4</td></tr>
<tr><td>3</td><td>1</td><td>0</td><td>4</td><td>Total Hours: 60</td></tr>
<tr><td rowspan="2">Subject Code:
SBS PHY 01
201 CC 3104</td><td rowspan="2">Applicable to Programs:
M.Sc. Physics</td><td rowspan="2">Evaluation

(Total Marks: 100)</td><td>CIE</td><td>30 Marks</td><td colspan="3">Examination Duration: 3 hours</td></tr>
<tr><td>TEE</td><td>70 Marks</td><td colspan="3">Prerequisite of Course:
Graduation Level Quantum Mechanics and Mathematical Physics</td></tr>
<tr><td>Course Description</td><td colspan="7">This course is developed for understanding of thermodynamics and statistical mechanics, which have broad and rich applicability in quantum mechanics, condensed matter physics, classical mechanics and electrodynamics.</td></tr>
<tr><td>Course Objectives</td><td colspan="7">• To understand the fundamentals of thermodynamics and statistical mechanics
• To make familiar with various thermodynamical and statistical mechanics terms such as entropy, free energy, phase space, statistical ensembles, Bose-Einstein statistics, Fermi-Dirac statistics etc.
• To able the students for solve the problems related to thermodynamics and statistical physics</td></tr>
<tr><td>Course Outcomes</td><td colspan="7">At the end of this course, the students will be able to
CO201C.1. explain the various thermodynamical quantities and Maxwell’s relations
CO201C.2 apply the thermodynamics in ideal gas, magnetic and dielectric materials</td></tr>
</table>

	CO201C.3. describe various statistical approaches which describe systems of particles **CO201C.4.** evaluate the formulae of random walk and diffusion equation **CO201C.5.** compare microstates, macrostates, and statistical ensembles **CO201C.6.**understand the theories and mathematical approaches of statistical ensembles, equipartition theorem and Maxwell-Boltzmann statistics **CO201C.7.** illustatre the fundamental concepts of Bose-Einstein and Fermi-Dirac Statistics **CO201C.8.** calculate the problems related to Bosons and Fermions	
COURSE SYLLABUS		
Unit No.	**Content of Each Unit**	**Hours of Each Unit**
1	**Review of Thermodynamics [Course Outcome(s): CO201C.1 & CO201C.2]** Extensive and intensive variables, laws of thermodynamics, Entropy for Different Systems, Gibbs Paradox, Boltzmann Relation for Entropy, Legendre Transformations and Thermodynamic Potentials, Chemical Potential, Free Energy and Its Connection with Thermodynamic Quantities, Maxwell Relations, Applications of Thermodynamics to (a) Ideal Gas, (b) Magnetic Material, and (c) Dielectric Material.	15
2	**Statistical Methods and Description of Systems of Particles [Course Outcome(s): CO201C.3, CO201C.4, & CO201C.5]** Binomial distribution, Poisson distribution, Gaussian distributions, Central Limit Theorem, Random Walk and Brownian Motion, Diffusion Equation, Phase Space, Liouville's Theorem, Phase Equilibrium, Microstates and Macrostates, Statistical Ensembles, Irreversibility and the Attainment of Equilibrium	15
3	**Classical Statistical Mechanics [Course Outcome(s): CO201C.6]** Micro-Canonical Ensemble, Canonical Ensemble: Derivation of Partition Function and Thermodynamic Quantities; Mean Values and Fluctuations, Grand Canonical Ensemble: Gibbs Factor; Gibbs Distribution; Derivation of Partition Function and Thermodynamic	15

	Quantities; Fluctuations in the Number of Particles, Applications of Canonical and Grand Canonical Ensembles, Equipartition Theorem and It's Applications, Maxwell-Boltzmann Statistics.	
4	**Quantum Statistical Mechanics [Course Outcome(s): CO201C.7 & CO201C.8]** Bosons: Occupation Number; Bose-Einstein Statistics; Debye Theory of Specific Heat; Grand partition function For Ideal Bose Gas; Black-Body Radiation; Bose-Einstein Condensation, Fermions: Occupation Number; Fermi-Dirac Statistics; Ideal Fermi gas, Pauli Paramagnetism, First and Second Order Phase Transitions, Ising Model, Phase Equilibria: Equilibrium Conditions; Simple Phase Diagrams; Clausius-Clapeyron Equation.	15

TEXT BOOKS

1. **F. Reif**, Fundamental of Statistical and Thermal Physics, McGraw-Hill, USA, 1965.
2. **L. D. Landau and E. M. Lifshitz**, Statistical Physics, UK, 3rd Edition, 1980.
3. **D. V. Schroeder**, An Introduction to Thermal Physics, Addison Wesley Longman, UK, 2000.
4. **J. P. Sethna**, Statistical Mechanics: Entropy, Order Parameters and Complexity, Oxford University Press, UK, 2006.
5. **M. Kardar**, Statistical Physics of Particles, Cambridge University Press, UK, 2007.
6. **H. Gould and J. Tobochnik**, Statistical and Thermal Physics: With Computer Applications, Princeton University Press, USA, 2010.
7. **K. Huang**, Statistical Mechanics, Wiley, India, 2nd Edition, 2011.
8. **R. K. Pathria and P. D. Beale**, Statistical Mechanics, Academic Press, USA, 2011.

Classical Electrodynamics

<table>
<tr><td rowspan="2">Scheme Version:

2021-22</td><td rowspan="2">Name of the subject:

Classical Electrodynamics</td><td>L</td><td>T</td><td>P</td><td>C</td><td rowspan="2">Semester:

II

(1st Year)</td><td>Contact Hours per Week: 4</td></tr>
<tr><td>3</td><td>1</td><td>0</td><td>4</td><td>Total Hours: 60</td></tr>
<tr><td rowspan="2">Subject Code:
SBS PHY 01
202 CC 3104</td><td rowspan="2">Applicable to Programs: M.Sc. Physics</td><td rowspan="2">Evaluation

(Total Marks: 100)</td><td>CIE</td><td>30 Marks</td><td colspan="3">Examination Duration: 3 hours</td></tr>
<tr><td>TEE</td><td>70 Marks</td><td colspan="3">Prerequisite of Course: None</td></tr>
<tr><td>Course Description</td><td colspan="7">This course is designed for fundamental knowledge of basic electrodynamics and it’s applications to various phenomena.</td></tr>
<tr><td>Course Objective</td><td colspan="7">• To evaluate fields and forces in Electrodynamics and Magneto dynamics using basic scientific method.

• To provide concepts of relativistic electrodynamics and its applications in branches of Physical Sciences.</td></tr>
<tr><td>Course Outcomes</td><td colspan="7">On completion of the course, student would be able:

CO202C.1. To understand the basics of electrostatics

CO202C.2. To use of Maxwell equations in analysing the electromagnetic field due to time varying charge and current distribution.

CO202C.3. To describe the nature of electromagnetic wave and its propagation through different media and interfaces.</td></tr>
</table>

	CO202C.4. The students will be able to analyze s radiation systems in which the electric dipole, magnetic dipole or electric quadruple dominate. **CO202C.5.** The students will have an understanding of the covariant formulation of electrodynamics and the concept of retarded time for charges undergoing acceleration. **CO202C.6.** To explain charged particle dynamics and radiation from localized time varying electromagnetic sources.

COURSE SYLLABUS

Unit No.	Content of Each Unit	Hours of Each Unit
1	**Electrostatics [Course Outcome(s): CO202.1]** Coulomb's law, Guass's law, Poisson's equation, Laplace equation. Simple boundary value problems illustrating various techniques such as method of images, separation of variables, Green's functions, Multipole expansion. Electrostatics of dielectric media, multipole expansion. Boundary value problems in dielectrics; molecular polarisability, electrostatic energy in dielectric media.	**15**
2	**Magnetostatics & Maxwell's Equations [Course Outcome(s): CO202.2]** Review of Magnetostatics: Biot-Savart law, Ampere's theorem, Electromagnetic induction, examples of magnetostatic problems, , Scalar and vector potentials, Gauge symmetry, Coulomb and Lorentz gauges Gauge invariance, Displacement current, Time varying fields, Maxwell's equations in free space and linear isotropic media (non conducting) boundary conditions on the fields at interfaces. Poynting theorem, conservation laws for a system of charged particles and electromagnetic field,	**15**
3	**Electromagnetic Waves [Course Outcome(s): CO202.3]** Electromagnetic waves in free space, dielectrics and conductors. Reflection and refraction, polarization, Fresnel's law, interference, coherence, and diffraction, frequency dispersion in dielectrics and metals, dielectric constant and anomalous dispersion, wave propagation in one dimension, group velocity, metallic wave guides, boundary conditions at metallic surfaces, propagation	**15**

	modes in wave guides.	
4	**Radiation and Relativistic Electrodynamics [Course Outcome(s): CO202.4CO202.5 CO202.6]** Lorentz Transformation, Lorentz invariance of Maxwell's equation. Dynamics of charged particles in static and uniform electromagnetic fields. Radiation- from moving charges and dipoles and retarded potentials Field of a localized oscillating source, fields and radiation in dipole and quadrupole approximations, Lienard-Wiechert potentials, Total power radiated by an accelerated charge, Lorentz formula. Four-vectors relevant to electrodynamics, electromagnetic field tensor and Maxwell's equations, transformation of fields, fields of uniformly moving particles.	**15**

TEXT BOOKS

1. **L.D. Landau** and E.M. Lifshitz, Classical Theory of Electrodynamics, Butterworth-Heinemann. Germany, 4th Edition, 1987.
2. **Melvin Schwartz**, Principles of Electrodynamics, Dover Publications, UK, 1st Edition, 1987.
3. **Walter Greiner**, Classical Electrodynamics, Springer, Germany, 1st Edition, 1998.
4. **J. Schwinger**, L.L. Deraad Jr, K.A. Milton, W-Y. Tsai and J. Norton, Classical Electrodynamics, Westview Press, UK, 1998.
5. **David J. Griffiths**, Introduction to Electrodynamics, Benjamin Cummings, USA, 3rd Edition, 1999.
6. **J.D. Jackson**, Classical Electrodynamics, John Wiley & Sons, United States, 2nd Edition, 2003.
7. **Charles A. Brau**, Modern Problems in Classical Electrodynamics, Oxford University Press, 1st Edition, 2003.
8. **L. D. Landau** and E. M. Lifshitz & L. P. Pitaevskii, Electrodynamics of Continuous Media Oxford, 1st Edition, 2005.
9. **Wolfgang K. H. Panofsky** and Melba Phillips, Classical Electricity and Magnetism, Dover Publications, UK, 2nd Edition, 2012.
10. **Joseph Edminister**, Schaum's outline of electromagnetics, New Delhi, 2nd Edition, 2017.

Mathematical Methods in Physics II

Scheme Version: 2021-22	**Name of the subject: Mathematical Methods in Physics II**	**L**	**T**	**P**	**C**	**Semester:** II (1st Year)	**Contact Hours per Week:** 4
		3	1	0	4		**Total Hours:** 60
Subject Code: SBS PHY 01 203 CC 3104	**Applicable to Programs:** M.Sc. Physics	**Evaluation (Total Marks: 100)**	**CIE**	30 Marks	**Examination Duration:** 3 hours		
			TEE	70 Marks	**Prerequisite of Course: Mathematical Methods in Physics I**		

Course Description	This course has been developed to introduce students to some topics of mathematical Physics which are directly relevant in different subjects of M.Sc. Physics. It includes Ordinary differential equation, special functions and different transformation methods to solve differential equation.
Course Objectives	**To Make the students familiar with** • **Partial and Ordinary differential equations in Physics.** • **Power series method of their solution and different polynomials** • **Fourier Transfor and Laplace Transform as a tool to solve differential equation.**
Course Outcomes	**On completion of the course, student would be able to:** **CO203C.1 :** to solve second order differential equation. **CO203C.2 :** to use the special function in Quantum mechanics and electrodynamics **CO203C.3 :** to perform Fourier transform on a given data set. **CO203C.4 : to perform Laplace transform on a given data set.**

COURSE SYLLABUS

Unit No.	**Content of Each Unit**	**Hours of Each Unit**
1	**Second Order Differential Equations : [Course Outcomes : CO203C.1]** Separation of variables-ordinary differential equations, singular points, series solutions leading to Legendre, Bessel, Hermite, Laguerre functions as solutions. Orthogonal properties and recurrence relations of these functions.	15
2	**Special functions : [Course Outcomes : CO203C.2]** Spherical harmonics and associated Legendre polynomials. Sturm -Liouville systems and orthogonal polynomials.	15

	Wronskian linear independence and/ linear dependence.	
3	**Fourier Transforms : [Course Outcomes : CO203C.3]** Fourier Transforms: Development of the Fourier integral from the Fourier Series, Fourier and inverse Fourier transform, Convolution theorem. Simple Applications: FTIR, Telecommunication systems, Solution of partial differential equation wave equation	15
4	**Laplace Transforms : [Course Outcomes : CO203C.4]** Laplace transforms and their properties, Convolution theorem, Application of Laplace transform in solving linear, differential equations with constant coefficient, with variable coefficient and linear partial differential equation.	15

TEXT BOOKS

1. **Merle C. Potter and Jack Goldberg**, Mathematical Methods, S. CHAND (Prentice Hall of India), New Delhi, 2nd Edition, 1987.
2. **Fredrick W. Byron and Robert W. Fuller**, Mathematics of Classical and Quantum Physics, Dover Publications, UK, Vol 1 &2, 1970.
3. **George Arfken and Hans J Weber**, Mathematical Methods for Physicists, Elsevier Academic Press, Cambridge, 7th Edition, 2012.
4. **L. A. Pipe**, Applied Mathematics for Engineers and Physicists, Dover Publication Inc. 2014.
5. **E. Kreyszig**, Advanced Engineering Mathematics, John Wiley & Sons, United States, 10th Edition, 2015,
6. **K.F.Riley, M.P. Hobson, and S.J.Bence,** Mathematical methods for Physicists and Engineers, S. CHAND (Cambridge University Press), New Delhi, 3rd Edition, 2018.
7. **V Balakrishnan:** Mathematical Physics with Applications, Problems and Solutions; Ane Books, 1st Edition, 2018.

LABORATORY II

<table>
<tr><td rowspan="2">Scheme Version:

2021-22</td><td rowspan="2">Name of the subject:
Laboratory II</td><td>L</td><td>T</td><td>P</td><td>C</td><td rowspan="2">Semester:

II (1st Year)</td><td>Contact Hours per Week: 12</td></tr>
<tr><td>0</td><td>0</td><td>12</td><td>6</td><td>Total Hours: 180</td></tr>
<tr><td rowspan="2">Subject Code:
SBS PHY 01 204
CC 00126</td><td rowspan="2">Applicable to Programs:

M.Sc. Physics</td><td rowspan="2">Evaluation

(Total Marks: 100)</td><td>CIE</td><td>30 Marks</td><td colspan="3">Examination Duration: 3 hours</td></tr>
<tr><td>TEE</td><td>70 Marks</td><td colspan="3">Prerequisite of Course: None</td></tr>
<tr><td>Course Description</td><td colspan="7">The aim & objective of the course is to impart the practical training on various electronics devices such as; Op-Amp, Vibrators, Amplifiers, Michelson interferometer etc. Students assigned the general laboratory work will perform at least twelve (12) experiments from the above mentioned. More experiments of similar nature may be added.</td></tr>
<tr><td>Course Objectives</td><td colspan="7">• To train students for various electronics experiments and take measurements
• To train students on various optical instruments like Spectrometer, Michelson Interferometer
• To have hand on experiment for measurement of magnetoresistance and dielectric constant.</td></tr>
<tr><td>Course Outcomes</td><td colspan="7">After completion of this course, the students will be able to
CO204C.1. Understand spectral lines, grating spectra, and interference fringes
CO204C.2. Learn the characteristics of Op-Amp, vibrators, clipper, clampers, and DA/</td></tr>
</table>

	AD **CO204C.3.** Use excel for plotting graphs **CO204C.4.** Understand motion of temperature and magnetic field dependence of Hall coefficient.

COURSE SYLLABUS

Unit No.	Content of Each Unit	Hours of Each Unit
1	1. Study of Balmer series and Rydberg constant 2. Op-Amp as inverting and non-inverting amplifier 3. Op-Amp as differentiator, Integrator and Adder 4. e/m by Thomson method 5. Single stage RC coupled amplifier 6. Frequency response of common emitter amplifier 7. Bistable/Monostable/Astable vibrators 8. Grating spectra 9. Refractive index of water and oil using prism 10. Magneto resistance 11. Temperature dependence of Hall coefficient 12. Digital to Analog converter, Analog to Digital converter 13. Michelson Interferometer 14. Faraday Effect 15. Clipper and clampers	150
2	1. Root finding of a polynomial equation using numerical methods 2. Solving first and second order differential equation numerical methods 3. Numerical integration 4. Generating finite and infinite series	30

TEXT BOOKS

2. **Worsnop and Flint,** Experimental Physics, Little hampton Book Services Ltd, United Kingdom, 9th Edition, 1951.
3. **A. C. Melissinos, J. Napolitano,** Experiments in Modern Physics, Academic Press, Cambridge, Massachusetts, 2nd Edition, 2003.
3. Lab manuals, prepared by faculty of the Department of Physics, 2018.

Latex for Humans

<table>
<tr><td rowspan="2">Scheme Version:

2021-22</td><td rowspan="2">Name of the subject: Latex for Humans</td><td>L</td><td>T</td><td>P</td><td>C</td><td rowspan="2">Semester:

II (1st Year)</td><td>Contact Hours per Week: 2</td></tr>
<tr><td>1</td><td>0</td><td>2</td><td>2</td><td>Total Hours: 30</td></tr>
<tr><td rowspan="2">Subject Code: SBS PHY 01 201 GEC 1022</td><td rowspan="2">Applicable to Programs: All Masters/ Bachelors Program</td><td rowspan="2">Evaluation (Total Marks: 50)</td><td>CIE</td><td>15 Marks</td><td colspan="3">Examination Duration: 2 hours</td></tr>
<tr><td>TEE</td><td>35 Marks</td><td colspan="3">Prerequisite: 10+2 with Non-Medical</td></tr>
<tr><td>Course Description</td><td colspan="7">To impart knowledge to student about different tools used in writing scientific/non-scientific literature.</td></tr>
<tr><td>Course Objectives</td><td colspan="7">Write beautifully presentable documents using Latex.</td></tr>
<tr><td>Course Outcomes</td><td colspan="7">On completion of the course, student would be able to:
CO201G.1 :Write CV, documents, books and reports.
CO201G.2 : Write mathematical formulae using simple commands.
CO201G.3 : Produce fonts in different languages like Roman and Greek.
CO201G.4 : Write Thesis and seminar presentations using latex
CO201G.5 : Tell the advantages of LaTeX over other more traditional softwares.
CO201G.6 : install and use MikTeX.
CO201G.7 : List LaTeX compatible operating systems.
CO201G.8 : Explain how to obtain LaTeX</td></tr>
<tr><td colspan="8">COURSE SYLLABUS</td></tr>
<tr><td>Unit No.</td><td colspan="5">Content of Each Unit</td><td colspan="2">Hours of Each Unit</td></tr>
<tr><td>1</td><td colspan="5">[Course Outcomes : CO201G.5 , CO201G.6 , CO201G.7, CO201G.8]
Software installation, Markup Languages</td><td colspan="2">5</td></tr>
<tr><td>2</td><td colspan="5">[Course Outcomes : CO201G.2 , CO201G.3]
LATEX typesetting basics, LATEX math typesetting</td><td colspan="2">10</td></tr>
<tr><td>3</td><td colspan="5">[Course Outcomes : CO201G.2 , CO201G.4]
Tables and matrices, Graphics, Packages, User definable packages</td><td colspan="2">7</td></tr>
</table>

4	[Course Outcomes : **CO201G.1**] Document classes, text bibTEX, beamer, flash cards / CV, Creating your own package, Project.	8

Text Books

1. **Helmut Kopka & Patrick W. Daly,**Guide to LATEX, Addison-Wesley, New Delhi, 4th Edition 2003.
2. **Stefan Kottwitz** , LaTeX Beginner's Guide, Packt Publishing, UK. 1st Edition, 2011
3. Resources from websites:

The not so short introduction to LaTeX - Tobi Oetiker
https://tobi.oetiker.ch/lshort/lshort.pdf

Environmental Physics

<table>
<tr><td rowspan="2">Scheme Version:

2021-22</td><td rowspan="2">Name of the subject:

Environmental Physics</td><td>L</td><td>T</td><td>P</td><td>C</td><td rowspan="2">Semester:

II (1st Year)</td><td>Contact Hours per Week: 4</td></tr>
<tr><td>3</td><td>1</td><td>0</td><td>4</td><td>Total Hours: 60</td></tr>
<tr><td rowspan="2">Subject Code:
SBS PHY 01
202 GEC 3104</td><td rowspan="2">Applicable to Programs: M.Sc. Physics</td><td rowspan="2">Evaluation

(Total Marks: 100)</td><td>CIE</td><td>30 Marks</td><td colspan="3">Examination Duration: 3 hours</td></tr>
<tr><td>TEE</td><td>70 Marks</td><td colspan="3">Prerequisite of Course: 10+2 with Science</td></tr>
<tr><td>Course Description</td><td colspan="7">This course aims to introduce students to the application of core physical concepts of the Earth system, with special focus on: atmospheric radiation, greenhouse gases, pollution, and climate change. This course will demonstrate how physics is fundamental to understand natural and human influences on climate and atmospheric composition.</td></tr>
<tr><td>Course Objective</td><td colspan="7">• To understand the broad scope of problems to which the principles of environmental physics can be applied and to appreciate the commonalities that exist among widely varying systems;

• To develop problem solving abilities and a critical, practical awareness of global environmental change.</td></tr>
<tr><td>Course Outcomes</td><td colspan="7">On completion of the course, student would be able:

CO202G.1. To understand the concepts like energy transformations and various forms of energy, climate change and its effect on living beings

CO202G.2. To understand the concepts like thermodynamics and its applications to various energy transformation processes:

CO202G.3. To develop an awareness of climate change and its effects</td></tr>
</table>

	CO202G.4. To develop an awareness of different fossil fuels and their alternatives

COURSE SYLLABUS

Unit No.	Content of Each Unit	Hours of Each Unit
1	**Introduction to Energy [Course Outcome(s): CO202G.1]** Importance of energy in science and society. Types of energy (mechanical, heat, chemical, nuclear, electrical). Law of conservation of energy. Energy transformations. Mechanical energy: force, work, kinetic and potential energy, PE diagrams, conservation of mechanical energy, bound systems. Electricity Basics.	**15**
2	**Heat Energy and Kinetic Theory [Course Outcome(s): CO202G.2]** Heat and Temperature. Internal Energy, Specific Heat. Ideal gas equation. Kinetic theory interpretation of pressure and temperature. Work, heat, and the first law of thermodynamics. Adiabatic lapse rate. Radiant energy. Blackbody radiation. Heat engines and the second law of thermodynamics. The Carnot cycle. Applications of the second law to various energy transformation processes: heat pumps and refrigerators; different engine cycles. Entropy and disorder.	**15**
3	**Energy and Climate Change [Course Outcome(s): CO202G.3]** Energy balance of the Earth. Greenhouse effect. Climate feedbacks (water, clouds, ice albedo). Global Climate Models. Evidence for climate change. Paleo-climate. Climate change impacts. Climate change mitigation. Target CO_2 levels.	**15**
4	**Energy Source [Course Outcome(s): CO202G.4]** Chemical energy. Energy in biology, photosynthesis, respiration. Energy use in the human body, energy content of food. Fossil fuels and their origin (coal, oil, natural gas). Problems with fossil fuels, greenhouse pollution, peak oil. Alternatives to fossil fuels. Alternative energy resource: Wind energy, energy from water on land, ocean energy. Biomass and other sources.	

TEXT BOOKS

1. **Sol Wieder**, An Introduction of Solar Energy for scientists and Engineers, John Wiley, United States, 1st Edition, 1982.
2. **J.T. Widell** and **J. Weir**, Renewable Energy Resources, Elbs, 1st Edition, 1988.
3. **R.N. Keshavamurthy** and **M. Shankar Rao**, The Physics of Monsoons, Allied Publishers, New Delhi, 1st Edition, 1992.

4. **Landau** & **Lifshitz**, Fluid Mechanics, Pergamon Press, UK, 2nd Edition, 2000.
5. **Egbert Boeker** & **Rienk Van Groundelle**, Environmental Physics, John Wiley, United States, 2nd Edition, 2000.
6. **J.T. Hougtyion**, The Physics of Atmosphere, Cambridge University Press, 3rd Edition, 2002.
7. **C. W. Rose**, An Introduction to the Environmental Physics of Soil, Water and Watersheds, Cambridge University Press, 1st Edition, 2004.
8. **R. A. Hinrichs** and **M. Kleinbach**, Energy, Its Use and the Environment, Brooks Cole, Stanford University Press, 4th Edition, 2005.
9. **P. Hughes**, **N. J. Mason**, Introduction to Environmental Physics: Planet Earth, Life and Climate, Taylor & Francis, France, 1st Edition, 2005.
10. **J. Monteith** and **M. Unsworth**, Principles of Environmental Physics: Plants, Animals and the Atmosphere, Elsevier, 4th Edition, Europe, 2013.
11. **K.L. Kumar**, Engineering Fluid Mechanics, S. Chand, New Delhi, 4th Edition, 2016.

Computational Physics

<table>
<tr><td rowspan="2">Scheme Version:

2021-22</td><td rowspan="2">Name of the subject:

Computational Physics</td><td>L</td><td>T</td><td>P</td><td>C</td><td rowspan="2">Semester:

II (1st Year)</td><td>Contact Hours per Week: 4</td></tr>
<tr><td>3</td><td>1</td><td>0</td><td>4</td><td>Total Hours: 60</td></tr>
<tr><td rowspan="2">Subject Code:
SBS PHY 01
201 DCEC
3104</td><td rowspan="2">Applicable to Programs: M.Sc. Physics</td><td rowspan="2">Evaluation

(Total Marks: 100)</td><td>CIE</td><td>30 Marks</td><td colspan="3">Examination Duration: 3 hours</td></tr>
<tr><td>TEE</td><td>70 Marks</td><td colspan="3">Prerequisite of Course: None</td></tr>
<tr><td>Course Description</td><td colspan="7">The objective of the course is to train the students for various computational techniques to solve integration, differentiation and molecular dynamics simulation techniques.</td></tr>
<tr><td>Course Objective</td><td colspan="7">• To train students for computer programming
• To make students familiar with simulation techniques
• To train students for executing many body problems related computer programs</td></tr>
<tr><td>Course Outcomes</td><td colspan="7">On completion of the course, student would be able:

• computations techniques to solve various differential equations
• the computational integration
• the molecular simulations and optimization techniques.</td></tr>
<tr><td colspan="8">COURSE SYLLABUS</td></tr>
</table>

Unit No.	Content of Each Unit	Hours of Each Unit
1	**Stochastic Processes:** Theory of random walks and simulation of random walks in one, two and three dimensions. Elementary ideas and simulations of self-avoiding walks, additive and multiplicative stochastic processes, Brownian motion and fractional Brownian motion.	**15**
2	**Numerical Integration and Stochastic Differential Equations:** Dynamical equations, Finite Difference Method, Langevin dynamics, TDGL equation, Cahn-Hilliard equation, Burgers' equation, KPZ model, Traffic Flow Dynamics.	**15**
3	**Molecular Dynamics (MD) and Monte Carlo (MC) Simulations:** Elementary ideas of molecular dynamics simulation, Physical potentials, Verlet algorithm. Time average and Ensemble average, Monte Carlo methods, Metropolis algorithm. Application of Monte-carlo simulations: (a) Ising model in magnetism (b) Glauber and Kawasaki dynamics.	**15**
4	**Combinatorial Optimization Problems:** Classification of problems; examples of optimization problems: traveling salesman problem (TSP) and satisfiability (k-SAT) problem; heuristic methods of solutions and simulated annealing technique. **Computational experiments using computer programming** 1. Finite and infinite series 2. Root finding: (bisection, Secant and Newton-Raphson methods), 3. Solving first and second order ordinary differential equations including simultaneous, equations (Euler and Runge-Kutta methods) 4. Numerical integration (trapezoidal, Simpson, Gauss quadrature, methods) 5. Matrices (arrays of variable sizes, addition, multiplication, eigenvalues, eigenvectors, inversion, solutions of simultaneous equations) 6. To determine Wien's constant using bisection method and	**15**

	false position method. 7. To solve Kepler's equation by Newton-Raphson method. 8. To solve van der Waals gas equation for volume of a real gas by the method of successive approximation. 9. To interpolate a real data set from an experiment using the Lagrange's method, and Newton's method of forward differences and cubic splines. 10. To fit the Einstein's photoelectric equation to a realistic data set and hence calculate Planck's constant. To estimate the value of π by rectangular method, Simpson rule and Gauss quadrature by numerically evaluating suitable integral. 11. To find the area of a unit circle by Monte Carlo integration. 12. To simulate Buffen's needle experiment. 13. To simulate the random walk. 14. To study the motion of an artificial satellite by solving Newton's equation for its orbit using Euler method. 15. To study the growth and decay of current in RL circuit containing (a) DC source and (b) AC using Runge Kutta method, and to draw graphs between current and time in each case. 16. To study the motion of two coupled harmonic oscillators.	

TEXT BOOKS

1. V. Rajaraman, Computer Oriented Numerical Methods, Prentice Hall of India, 3rd Edition, 1993.

2. V. Rajaraman, Computer Programming in FORTRAN 90/95, Prentice Hall of India, 1st Edition,1997.

3. D. Frenkel & B. Smit, Understanding Molecular Simulation, Academic Press,2nd Edition,2001.

4. **M. Plischke & B. Bergersen,** Equilibrium Statistical Physics, World Scientific, 3rd Edition, 2006.

1. **W.H. Press, B.P. Flannery, S.A. Teukolsky and W.T. Vetterling,** Numerical Recipes in C/C++: The Art of Scientific Computing, Cambridge University Press, 3rd Edition, 2007.
2. **M. P. Allen,** Computer Simulation of Liquids, Oxford University Press,2nd Edition , 2017**.**

3. **Kurt Binder and Heerman,** Monte Carlo Simulation in Statistical Physics,Springer,6th Edition,2019.

QUANTUM MECHANICS - II

<table>
<tr><td rowspan="2">Scheme Version:

2021-22</td><td rowspan="2">Name of the subject:
Quantum Mechanics – II</td><td>L</td><td>T</td><td>P</td><td>C</td><td rowspan="2">Semester:

II (1st Year)</td><td>Contact Hours per Week: 4</td></tr>
<tr><td>3</td><td>1</td><td>0</td><td>4</td><td>Total Hours: 60</td></tr>
<tr><td rowspan="2">Subject Code:
SBS PHY 01 202
DCEC 3104</td><td rowspan="2">Applicable to Programs:
M.Sc. Physics</td><td rowspan="2">Evaluation

(Total Marks: 100)</td><td>CIE</td><td>30 Marks</td><td colspan="3">Examination Duration: 3 hours</td></tr>
<tr><td>TEE</td><td>70 Marks</td><td colspan="3">Prerequisite of Course: Quantum Mechanics-I</td></tr>
<tr><td>Course Description</td><td colspan="7">This course is designed to understand some advanced topics such as symmetries, identical particles, approximation methods and relativity in quantum mechanics, which has broad and rich applicability in condensed matter physics, atomic and molecular physics, nuclear physics, space science, and chemistry.</td></tr>
<tr><td>Course Objectives</td><td colspan="7">• To make familiar with various advanced topics of quantum mechanics such as symmetries and conservation laws, fermions and bosons, time independent and time dependent perturbation theories, variational and WKB methods, scattering theory, delta function and relativistic theory

• To aware the students about applications of advanced phenomena of quantum</td></tr>
</table>

	mechanics in physical, mathematical and chemical sciences
Course Outcomes	After completetion of this course, students will be able to **CO202D.1.** understand the concepts of symmetries, conservation laws, bosons and fermions in quantum mechanics **CO202D.2.** apply symmetries and conservation laws in various quantum mechanical problems **CO202D.3.** illustatre the time independent and time dependent perturbation theories, the variational and WKB methods **CO202D.4.** describe the fine structure and Zeeman effect phenomena **CO202D.5.** explain the basics of scattering theory **CO202D.6.** apply the delta function's properties in various quantum mechanical problems **CO202D.7.** understand the basics of relativistic quantum mechanics **CO202D.8.** recognize the importance and applications of relativistic quantum mechanics

COURSE SYLLABUS

Unit No.	Content of Each Unit	Hours of Each Unit
1	**Symmetries, Conservation Laws & Identical Particles [Course Outcome(s): CO202D.1 & CO202D.2]** Transformation in space, The Translation Operator, Translation Symmetry, Conservation Laws, Parity: Parity in One & Three Dimensions; Parity Selection Rules, Rotational Symmetry, Degeneracy, Rotational Selection Rules, Many Particle Systems, Systems of Identical Particles, The Helium Atom, The Pauli Exclusion Principle.	15
2	**Approximation Methods [Course Outcome(s): CO202D.3 &**	15

	CO202D.4] Time Independent Perturbation Theory: Nondegenerate Perturbation Theory; Degenerate Perturbation Theory; Fine Structure; The Zeeman Effect, The Variational Method, The WKB method, Time Dependent Perturbation Theory, Adiabatic & Sudden Approximations.	
3	**Scattering Theory & The Delta Function [Course Outcome(s): CO202D.5 & CO202D.6]** Differential cross-section, scattering of a wave packet, integral equation for the scattering amplitude, Born approximation, method of partial waves, low energy scattering and bound states, resonance scattering, The Delta Function: One Dimensional Delta Function and Three Dimensional Delta Function.	15
4	**Relativistic Quantum Mechanics [Course Outcome(s): CO202D.7 & CO202D.8]** Klein-Gordon equation, Dirac equation, Probability and Current Density, Plane Wave Solutions, Symmetries of the Dirac equation, Dirac's Equation for a Central Potential, Covariance of Dirac's Equation, Relativistic Hydrogen Atom Problem, The Hole Theory and Positrons.	15

TEXT BOOKS

1. **L. D. Landau and E.M. Lifshitz**, Quantum Mechanics, Butterworth Heinemann, The Netherlands, 3rd Edition, 1981.
2. **P. A. M. Dirac**, The Principles of Quantum Mechanics, Oxford University Press, UK, 4th Edition, 1988.
3. **R. Shankar**, Principles of Quantum Mechanics, Springer, Germany, 2nd Edition, 1994.
4. **N. Zettili**, Quantum Mechanics: Concepts and Applications, Wiley, USA, 2nd Edition, 2009.
5. **J. J. Sakurai**, Modern Quantum Mechanics, Pearson, India, 2nd Edition, 2013.
6. **L. I. Schiff**, Quantum Mechanics, McGraw Hill Education, USA, 4th Edition, 2017.
7. **D. J. Griffiths**, Introduction to Quantum Mechanics, Cambridge University Press, UK, 3rd Edition, 2018.
8. **C. Cohen-Tannoudji, B. Diu, and F. Laloe**, Quantum Mechanics, Volume 1: Basic Concepts, Tools, and Applications, Wiley, USA, 2nd Edition, 2019.

Analog Electronics

<table>
<tr><td rowspan="2">Scheme Version:

2021-22</td><td rowspan="2">Name of the subject:

Analog Electronics</td><td>L</td><td>T</td><td>P</td><td>C</td><td rowspan="2">Semester:

II (1st Year)</td><td>Contact Hours per Week: 4</td></tr>
<tr><td>3</td><td>1</td><td>0</td><td>4</td><td>Total Hours: 60</td></tr>
<tr><td rowspan="2">Subject Code:
SBS PHY 01 203 DCEC 3104</td><td rowspan="2">Applicable to Programs: M.Sc. Physics</td><td rowspan="2">Evaluation

(Total Marks: 100)</td><td>CIE</td><td>30 Marks</td><td colspan="3">Examination Duration: 3 hours</td></tr>
<tr><td>TEE</td><td>70 Marks</td><td colspan="3">Prerequisite of Course: None</td></tr>
<tr><td>Course Description</td><td colspan="7">This course covers the design, construction, and operation of analog electronic circuits. The main contents are: the basic principles of operation, terminal characteristics, and equivalent circuit models for diodes, transistors, and op-amps. Frequency response of cascaded amplifiers and gain-bandwidth considerations. Concepts of feedback, stability</td></tr>
</table>

	and frequency compensation.
Course Objective	• To introduce students to entire circuit designs • To provide in-depth theoretical base of Digital Electronics
Course Outcomes	On completion of the course, student would be able: **CO203D.1.** To understand the techniques to shape of signals. **CO203D.2** To understand the principle of multivibrators **CO203D.3** To understand basic properties of analog systems **CO203D.4** To understand the fundamental designing concepts of different types of Logic Gates, Minimization techniques etc.

COURSE SYLLABUS

Unit No.	Content of Each Unit	Hours of Each Unit
1	**Linear Wave Shaping [Course Outcome(s): CO203D.1]** High Pass RC circuits: Its response to step, Pulse, Square wave, Ramp, exponential waveforms, Low pass RC Circuit: Its response to step, pulse, Square wave, Ramp, Exponential wave forms, Its application as an integrator. Attenuators, Time base Signal in a CRO. Operation of Clamping Circuits, Clamping Circuit theorem, Practical Clamping Circuit theorem, Operation of Transistor as a switch. **Clipping and Switching Circuits:** Diode Clippers, Combinational and Biased clippers Transistor Clippers, Comparators, Applications of Voltage Comparators.	**15**
2	**Multivibrators [Course Outcome(s): CO203D.2]** A bistable multivibrator-basic concepts of its operation. Symmetrical and Unsymmetrical triggering, Application (brief). Monostable Multivibrator, Basic concepts of its operation, quantitative discussion of Quasi stable state, Application, Astable multivibrator - basic concepts of operation. Quantitative discussion of the period of oscillation, Application.	**15**
3	**Analog Systems [Course Outcome(s): CO203D.3]**	**15**

	Operational Amplifier, Differential Amplifier, Transfer Characteristics, Frequency Characteristics, IC Operational Amplifier, Compensation in Operational Amplifiers, Application of OP-AMP as adder, Multiplier, Differentiator, Integrator, Log and Antilog Amplifier, Application of Operational Amplifier to analogue computation.	
4	**Logic Systems [Course Outcome(s): CO203D.4]** Basic Concepts of dc positive and negative logic systems, Dynamic logic systems, OR gate and AND gate, NOT gate, NAND gate, EX-OR gate, NOR gate & their applications, Response to input pulse operation. TTL (transistor transistor logic) and DTL (diode transistor logic) logics Binary Adders, Half adders and full adders, Multiplexing and demultiplexing.	**15**

TEXT BOOKS

12. **P. Horowitz and W. Hill,** The Art of Electronics, Cambridge University Press, 2nd Edition, 1989.
13. **J.J. Cathey,** Schaum's Outline of Electronic Devices and Circuits, McGraw Hill Education, New York, 2nd Edition, 2002.
14. **R.L. Boylestad and L. Nashelsky**, Electronics Devices and Circuit Theory, Prentice Hall of India, New Delhi, 8th Edition 2003.
15. **A.P. Malvino**, Electronic Principles, Tata McGraw, New Delhi, 7th Edition, 2009.
16. **J.H. Moore, C.C. Davis and M.A. Coplan**, Building Scientific Apparatus, Cambridge University Press, 4th Edition 2009.
17. **W. Kleitz**, Digital Electronics, A Practical Approach, Pearson, UK, 9th Edition 2011.
18. **R. J. Tocci**, Digital Systems-Principles and Applications, Prentice Hall of India, New Delhi, 10th Edition 2013.
19. **Millman and Halkias**, Integrated Electronics, McGraw Hill, New York, 2nd Edition, 2017.

Introduction to Astronomy and Astrophysics

<table>
<tr><td rowspan="2">Scheme Version:

2021-22</td><td rowspan="2">Name of the subject: Introduction to Astronomy and Astrophysics</td><td>L</td><td>T</td><td>P</td><td>C</td><td rowspan="2">Semester:

II (1st Year)</td><td>Contact Hours per Week: 4</td></tr>
<tr><td>3</td><td>1</td><td>0</td><td>4</td><td>Total Hours: 60</td></tr>
<tr><td rowspan="2">Subject Code: SBS PHY 01 204 DCEC 3104</td><td rowspan="2">Applicable to Programs: M.Sc. Physics</td><td rowspan="2">Evaluation (Total Marks: 100)</td><td>CIE</td><td>30 Marks</td><td colspan="3">Examination Duration: 3 hours</td></tr>
<tr><td>TEE</td><td>70 Marks</td><td colspan="3">Prerequisite: General Mathematics</td></tr>
<tr><td>Course Description</td><td colspan="7">To make the students aware about different theoretical and observational technique adopted in understanding astrophysics and astronomy</td></tr>
<tr><td>Course Objectives</td><td colspan="7">The objective of this course is to make the students
• Understand coordinate systems in Astronomy
• Understand the Sun
• Understand Binary stars.
• Understand stellar distances</td></tr>
<tr><td>Course Outcomes</td><td colspan="7">On completion of the course, student would be able to :
CO204D.1 : differentiate between various coordinate systems
CO204D.2 : know about the characteristics of Sun
CO204D.3 : Know about Binary stars and their motions
CO204D.4 : Know about stellar distances and other properties</td></tr>
<tr><td colspan="8">COURSE SYLLABUS</td></tr>
<tr><td>Unit No.</td><td colspan="5">Content of Each Unit</td><td colspan="2">Hours of Each Unit</td></tr>
<tr><td>1</td><td colspan="5">Observational Data: [Course Outcomes : CO204D.1]
Astronomical Coordinates- Celestial Sphere, Horizon, Equatorial, Ecliptic and galactic system of coordinates, Conversion from one coordinate system to another. Aspects of sky from different places on the earth. Twilight, Seasons, Sidereal. Apparent and Mean solar time and their relations. Calendar. Julian date and heliocentric correction. Determination of Mass, luminosity, radius, temperature and distance of a star, H-R Diagram, Empirical mass-luminosity relation.</td><td colspan="2">15</td></tr>
</table>

2	**Stellar Distances and Magnitudes : [Course Outcomes : CO204D.4]** Distances of stars from the trigonometric, secular and moving cluster parallaxes. Stellar motions. Magnitude scale and magnitude systems. Atmospheric extinction. Absolute magnitudes and distance modulus. Colour index. Black-body approximation to the continuous radiation and temperatures of stars. Variable stars as distance indicators.	15
3	**Binaries and Variable Stars : [Course Outcomes : CO204D.2]** Visual, spectroscopic and eclipsing binaries. Importance of binary stars as source of basic astrophysical data. Classification and properties of various types of intrinsic and eruptive variable stars. Astrophysical importance of the study of variable stars. Novae and Supernovae.	15
4	**Sun** : [Course Outcomes : **CO204D.3**] Physical Characteristic of Sun – Basic data, solar rotation, solar magnetic fields, Photosphere- granulation, sun-spots, Babcock model of sunspot formation, solar atmosphere-chromospheres and corona, Solar activity – flares, prominences, Solar wind, activity cycle, Helioseismology	15

TEXT BOOKS

1. **W.M.Smart**: Text book of Spherical Astronomy, Cambridge University Press; 6th edition, 1977

2. **M. Zeilik,** Astronomy, The evolving Universe, Cambridge University Press , 1st Edition, 2002.

3. **P.V. Foukal,** Solar Astrophysics , Wiley-VCH, United States, 1st Edition, 2004.

4. **I. Morrison,** Introduction to Astronomy and Cosmology, Wiley, United States, 1st Edition, 2008

SOLAR ENERGY AND PHYSICS OF PHOTOVOLTAICS

<table>
<tr><td>Scheme Version:

2021-2022</td><td>Name of the Subject:

Solar Energy and Physics of Photovoltaics</td><td>L

3</td><td>T

1</td><td>P

0</td><td>C

4</td><td>Semester:

II (1st Year)</td><td>Contact hours per week: 4

Total Hours: 60</td></tr>
<tr><td rowspan="2">Subject Code:

SBS PHY 01 205
DCEC 3104</td><td rowspan="2">Applicable to Programs:

M.Sc. Physics</td><td rowspan="2">Evaluation (Total Marks): 100</td><td>CIE</td><td>30 Marks</td><td colspan="3">Examination Duration: 3 hours</td></tr>
<tr><td>TEE</td><td>70 Marks</td><td colspan="3">Pre-requisite of course: There is no prerequisite or co-requisite for this course. But students are expected to know basic semiconductor physics.</td></tr>
<tr><td>Course Description</td><td colspan="7">The course is intended for students who have interest in alternate energy sources as a contributor to sustainability. It provides a comprehensive treatise on the science and technology of solar energy, its collection and the design principles that need to be understood for its effective use in a variety of installations and uses.</td></tr>
<tr><td>Course Objectives</td><td colspan="7">• The Course will be introducing the students to all the aspects of PV technology.
• To develop basic understanding related to fabrication ad characterization of different types of solar cells.
• To know state of art in the field of solar cells materials and solar cells.</td></tr>
<tr><td>Course Outcomes:</td><td colspan="7">On completion of this course, student will learn:

CO204.1 The available solar energy and the current solar energy conversion and utilization processes, solar spectrum.

CO204.2 The factors that influence the use of solar radiation as an energy source.

CO204.3 The various active and passive technologies that are available for collecting solar energy; have the ability to apply design principles to selection of an appropriate solar energy installation to meet requirements.</td></tr>
</table>

	CO204.4 How solar cells convert light into electricity, how solar cells are manufactured, how solar cells are evaluated. **CO204.5** What technologies are currently on the market, and how to evaluate the risk and potential of existing and emerging solar cell technologies. **CO204.6** To examine the potential & drawbacks of currently manufactured technologies, as well as pre-commercial technologies. How to enhance solar cell performance and reduce cost, and the major hurdles-technological and economic, towards widespread adoption.	
	COURSE SYLLABUS	
Unit No.	**Content of Each Unit**	**Hours of Each Unit**
1.	**Solar Radiation: [Course Outcome (s): CO204.1 & CO204.2]** origin, solar constant, spectral distribution of solar radiation, absorption of solar radiation in the atmosphere, global and diffused radiation, seasonal and daily variation of solar radiation, measurement of solar radiation, sun tracking systems, photo thermal conversion, solar energy collectors, collector efficiency and its dependence on various parameters.	15
2.	**Solar energy: [Course Outcome (s): CO204.3]** storage of solar energy, solar pond, solar water heater, solar distillation, solar cooker, solar green houses, solar dryers, absorption air conditioning. solar fuels: electrolysis of water, photoelectrochemical splitting of water.	15
3.	**Fundamentals of solar cells: [Course Outcome (s): CO204.4 & CO204.5]** Photo voltaic effect, semiconductor properties, energy levels, basic equations, p-n junction its characteristics, fabrication steps, thermal equilibrium condition, depletion capacitance, junction breakdown, heterojunction. Silicon based solar cells: single crystal, polycrystalline and amorphous silicon solar cells.	15

4.	**Device physics**: **[Course Outcome (s): CO204.6]** Solar cell device structures, construction, output power, efficiency, fill factor and optimization for maximum power, surface structures for maximum light absorption, current voltage characteristics in dark and light, operating temperature vs conversion efficiency, charge carrier generation, recombination and other losses. Cadmium telluride solar cells, copper indium gallium selenide solar cells, organic solar cells, perovskite solar cells, Advanced concepts in photovoltaic research.	15

REFERENCE BOOKS

9. S P Sukhatme, Solar Energy: Principles of Thermal Collection and Storage, Tata McGraw Hill, 1996.

10. Solid State Electronic Devices, Ben. G. Streetman, S. K. Banerjee, PHI Leaning Pvt. Ltd, 2000.

11. D. Yogi Goswami, Frank Kreith, Jan F. Kreider, Principles of Solar Engineering, Taylor and Francis, 2000.

12. Jasprit Singh, Semiconductor Devices, Basic Principles, Wiley, 2001

13. Stephen J.Fonash, Solar Cell Device Physics, 2nd edition, Academic Press, 2003.

14. H P Garg, J Prakash, Solar energy fundamentals and applications, Tata McGraw Hill publishing Co. Ltd, 2006.

Accelerator Physics

<table>
<tr><td rowspan="2">Scheme Version:

2021-22</td><td rowspan="2">Name of the subject:

Accelerator Physics</td><td>L</td><td>T</td><td>P</td><td>C</td><td rowspan="2">Semester:

II (1st Year)</td><td>Contact Hours per Week: 4</td></tr>
<tr><td>3</td><td>1</td><td>0</td><td>4</td><td>Total Hours: 60</td></tr>
<tr><td rowspan="2">Subject Code:
SBS PHY 01
206 DCEC
3104</td><td rowspan="2">Applicable to Programs: M.Sc. Physics</td><td rowspan="2">Evaluation

(Total Marks: 100)</td><td>CIE</td><td>30 Marks</td><td colspan="3">Examination Duration:3 hours</td></tr>
<tr><td>TEE</td><td>70 Marks</td><td colspan="3">Prerequisite of Course: Nuclear Physics, Electrodynamics, Quantum mechanics</td></tr>
<tr><td>Course Description</td><td colspan="7">This course is intended to expose the students to theoretical design and usage of various particle accelerators.</td></tr>
<tr><td>Course Objectives</td><td colspan="7">• To understand the beam optics.
• Get knowledge about different types of accelerators
• To understand the main features of superconducting cyclotron, linear accelerators and high energy accelerators.</td></tr>
<tr><td>Course Outcomes</td><td colspan="7">After completetion of this course, students would be able to:
CO206D.1. Understand the beam optics & beam transport system.
CO206D.2. About various theoretical techniques to accelerate particles and technical details of electrostatic accelerators.
CO206D.3. Get knowledge about latest accelerator technology based on Rf cavities.
CO206D.4. About Synchrotron Radiations & production of radioactive ion beams.</td></tr>
</table>

COURSE SYLLABUS		
Unit No.	**Content of Each Unit**	**Hours of Each Unit**
1	**Charged Particle Dynamics: [Course Outcome(s): CO206D.1]** Particle motion in electric and magnetic fields, Beam transport system, Beam pulsing and bunching techniques, microbeams, Particle and ion sources, secondary beams, Measurement of beam parameters.	15
2	**Electrostatic and Heavy Ion Accelerators: [Course Outcome(s): CO206D.2]** Van de Graaff voltage generator, Cockcroft-Walton voltage generator, insulating column, voltage measurement, Acceleration of heavy ions, Tandem electrostatic accelerator, Production of heavy negative ions, Pelletron and Tandetron, Cluster beams.	15
3	**Radiofrequency Accelerators: [Course Outcome(s): CO206D.3]** Linear accelerators - Resonance acceleration and phase stability, electron and proton Linacs, Superconducting Heavy Ion Linear Accelerators. Circular accelerators- Cyclotron, Frequency Modulated Synchrocyclotron, AVF Cyclotron, Alternating-gradient accelerators.	15
4	**Synchrotron Radiation Sources: [Course Outcome(s): CO206D.4]** Electromagnetic radiation from relativistic electron beams, Electron synchrotron, Characteristics of synchrotron radiation. Production of Radioactive ion beams, Polarized beams, Proton synchrotron, Colliding accelerators.	15

TEXT BOOKS
1. **M.S. Livingston and J.P. Blewel**, Particle Accelerators, McGraw-Hill Book Press, 1962. 2. **Ed. J. Cerny**, Nuclear Spectroscopy and Reactions Part-A, Academic Press, 1974. 3. **H.J. Wiedman**, Particle Accelerator Physics, Vol I and II, Springer Verlag, 1998. 4. **S. Y. Lee**, Accelerator Physics, World Scientific, Singapore, 2004

Radiation Physics

<table>
<tr><td rowspan="2">Scheme Version:

2021-22</td><td rowspan="2">Name of the subject:

Radiation Physics</td><td>L</td><td>T</td><td>P</td><td>C</td><td rowspan="2">Semester:

II (1st Year)</td><td>Contact Hours per Week: 4</td></tr>
<tr><td>3</td><td>1</td><td>0</td><td>4</td><td>Total Hours: 60</td></tr>
<tr><td rowspan="2">Subject Code:
SBS PHY 01 207 DCEC 3104</td><td rowspan="2">Applicable to Programs: M.Sc. Physics</td><td rowspan="2">Evaluation

(Total Marks: 100)</td><td>CIE</td><td>30 Marks</td><td colspan="3">Examination Duration:3 hours</td></tr>
<tr><td>TEE</td><td>70 Marks</td><td colspan="3">Prerequisite of Course: Nuclear Physics, Electrodynamics, Quantum mechanics</td></tr>
<tr><td>Course Description</td><td colspan="7">To impart knowledge in depth about nuclear radiation, its detection, nuclear spectrometry and related aspects</td></tr>
<tr><td>Course Objectives</td><td colspan="7">• To aware the students about the various type of nuclear radiations and their interaction with matter
• To learn various techniques for detection of radiations
• To study the nuclear spectrometry</td></tr>
<tr><td>Course Outcomes</td><td colspan="7">After completion of this course, students would be able to:
CO207D.1. Understand nuclear radiation and its detection procedure, nuclear spectrometry.
CO207D.2. Know applications of nuclear spectrometry</td></tr>
</table>

	CO207D.3. Know how to solve problems related to safety aspect of nuclear radiation CO207D.4 Understand the nuclear spectroscopy and basics of nuclear medicine.

COURSE SYLLABUS

Unit No.	Content of Each Unit	Hours of Each Unit
1	**Interaction of Nuclear Radiations: [Course Outcome(s): CO207D.1]** Origin and energy spectra, Brief discussion of interactions of gamma rays, Electron and heavy charged particles with matter, Different types of neutron sources, Interaction of neutron with matter, Neutron detectors.	15
2	**Nuclear Radiation Detector: [Course Outcome(s): CO207D.2]** Gas filled detectors; Ionization chamber, Proportional counter and GM counter, Scintillation detector, semiconductor detector for X-rays, gamma rays and charged particle detection, Radiation exposure, Biological effects of radiation, radiation monitoring	15
3	**Nuclear Spectrometry and Applications[Course Outcome(s):CO207D.3]** Analysis of nuclear spectrometric data, measurement of nuclear energy levels, spins, parities, moments, internal conversion coefficients, Angular correlation, Perturbed angular correlation, measurement of g-factor and hyperfine fields.	15
4	**Mossbauer Effect: [Course Outcome(s): CO207D.4]** Positron annihilation, particle and photon induced x-ray emission, Elemental concentration analysis by charged particles and neutron activation analysis, Diagnostic nuclear medicine, Therapeutic nuclear medicine.	15

TEXT BOOKS
1. Knoll G. F., Radiation Detection and Measurement, John Wiley & Sons, 1989. 2. Singuru R. M., Introduction to experimental nuclear physics, Wiley Eastern Publications, 1987. 3. Muraleedhara V. Nuclear radiation Detection, measurement and Analysis, Narosa Publishing House, 2009.

Atomic, Molecular Physics and Lasers

<table>
<tr><td rowspan="2">Scheme Version:

2021-22</td><td rowspan="2">Name of the subject: Atomic, Molecular Physics and Lasers</td><td>L</td><td>T</td><td>P</td><td>C</td><td rowspan="2">Semester:

III
(2nd Year)</td><td>Contact Hours per Week: 4</td></tr>
<tr><td>3</td><td>1</td><td>0</td><td>4</td><td>Total Hours: 60</td></tr>
<tr><td rowspan="2">Subject Code: SBS PHY 01 301 CC 3104</td><td rowspan="2">Applicable to Programs:
M.Sc. Physics</td><td rowspan="2">Evaluation (Total Marks: 100)</td><td>CIE</td><td>30 Marks</td><td colspan="3">Examination Duration: 3 hours</td></tr>
<tr><td>TEE</td><td>70 Marks</td><td colspan="3">Prerequisite: Mathematical Methods in Physics I, Quantum Mechanics I, Statistical Mechanics</td></tr>
<tr><td>Course Description</td><td colspan="7">Aim of the course is to aware students about various atomic and molecular spectra and to understand the working of LASERs.</td></tr>
<tr><td>Course Objectives</td><td colspan="7">The students will be exposed to
. Rotation and Vibration spectroscopy
. Raman Effect and Raman spectroscopy of molecules.
. Working of Lasers</td></tr>
<tr><td>Course Outcomes</td><td colspan="7">On completion of the course, student would be able to :
CO301C.1 : Understand different models of an Atom
CO301C.2 : derive the energy distribution corresponding to different levels of an atom
CO301C.3 : Understand rotation spectroscopy and Understand Raman Effect and Raman spectroscopy of molecules.
CO301C.4 : understand the working of He-Ne Laser and Ruby Laser.</td></tr>
<tr><td colspan="8">COURSE SYLLABUS</td></tr>
<tr><td>Unit No.</td><td colspan="5">Content of Each Unit</td><td colspan="2">Hours of Each Unit</td></tr>
<tr><td>1</td><td colspan="5">Atomic Spectra I: [Course Outcomes : CO301C.1]
Review of Atomic Models: Rutherford’s Model, Bohr’s model, Sommerfeld’s model, Stern-Gerlach experiment for electron spin. Revision of quantum numbers, exclusion principle, electronic configuration. Relativistic correction to energy levels of an atom, atom in a weak uniform external electric field – first and second order Stark effect.</td><td colspan="2">15</td></tr>
</table>

2	**Atomic Spectra II: [Course Outcomes : CO301C.2]** Spin-orbit interaction and fine structure, LS and JJ coupling, Relativistic correction to spectra of hydrogen atom, Lamb shift, effect of magnetic field on the hydrogen atom spectra, Zeeman and Paschen-Back effect. Hyperfine structure and isotope shift, Auger Effect and Frank Condon Principle. Born-Oppenheimer approximation.	15
3	**Molecular spectra: [Course Outcomes : CO301C.3]** Rotational levels in diatomic and polyatomic molecules, vibrational levels in diatomic and polyatomic molecules, diatomic vibrating rotator, Born-Oppenheimer approximation, Vi vibrational levels, experimental aspects of vibrational and rotational spectroscopy of molecules, polarization of light and Raman effect, Raman Spectroscopy (Brief Introduction).	15
4	**Lasers: [Course Outcomes : CO301C.4]** Spontaneous and stimulated emission, Spatial and temporal Coherence, Einstein A and B coefficients, Optical Pumping, Population Inversion, Modes of resonator, Q-switching and Mode Locking, Ultra short pulse generation, He-Ne Laser and Ruby Laser- Principle, Construction and working, Application of lasers in the field of medicine and Industry.	15

Text Books

1. **H. E. White,** Introduction to Atomic Spectra, McGraw Hill, New York, 1st Edition, 1934.
2. **H. G. Kuhn,** Introduction to Atomic Spectra, Green and Co., Harlow, 2nd Edition, 1969.
3. **K. Thyagarajan and A.K. Ghatak,** Lasers - Theory and Applications, Plenum Press, New York, 1st Edition, 1981.
4. **B. H.Bransden and C. J Joachain,** Physics of Atoms and Molecules, Pearson, UK, 2nd Edition, 2003.
5. **R. Eisberg and R. Resnick,** Quantum Physics of Atoms, Molecules, Solids, Nuclei and Particles, Wiley, United States, 2nd Edition, 2006.
6. **Arthur Beiser,** Perspectives of Modern Physics, McGraw Hill, New York, 6th Edition, 2006.
7. **C. N. Banwell,** Fundamentals of Molecular Spectroscopy, McGraw Hill, New York, 4th Edition, 2017.

NULEAR PHYSICS

<table>
<tr><td rowspan="2">Scheme Version:

2021-22</td><td rowspan="2">Name of the subject:
Nuclear and Particle Physics</td><td>L</td><td>T</td><td>P</td><td>C</td><td rowspan="2">Semester:

III (2nd Year)</td><td>Contact Hours per Week: 4</td></tr>
<tr><td>3</td><td>1</td><td>0</td><td>4</td><td>Total Hours: 60</td></tr>
<tr><td rowspan="2">Subject Code:
SBS PHY 01 302
CC 3104</td><td rowspan="2">Applicable to Programs:
M.Sc. Physics</td><td rowspan="2">Evaluation
(Total Marks: 100)</td><td>CIE</td><td>30 Marks</td><td colspan="3">Examination Duration: 3 hours</td></tr>
<tr><td>TEE</td><td>70 Marks</td><td colspan="3">Prerequisite of Course:
Mathematical Physics and Quantum Mechanics</td></tr>
<tr><td>Course Description</td><td colspan="7">This course will enable the M.Sc. students to understand the basic concepts of static properties of nuclei, radioactive decays, nuclear forces, nuclear reactions. They will also learn about the elementary particle physics.</td></tr>
<tr><td>Course Objectives</td><td colspan="7">Students will be exposed to
• General properties of nuclei
• Interactions among the nucleons
• Different models developed to explain the nuclear structure
• Elementary classification of particles and their properties</td></tr>
<tr><td>Course Outcomes</td><td colspan="7">After completetion of this course, the students will be able to
CO302C.1. Understand basic properties of nuclei
CO302C.2. Understand interactions between nucleons, meson theory and spin dependence of nuclear forces
CO302C.3. Get knowledge about Nuclear models, Magic numbers, and Collective nuclear model. Elementary knowledge about classification of particles.
CO302C.4. Classify the particles and will be able to understand their properties.</td></tr>
</table>

COURSE SYLLABUS		
Unit No.	**Content of Each Unit**	**Hours of Each Unit**
1	**Introductory Concept of Nuclei: [Course outcomes:CO302C.1]** Scattering and electromagnetic methods for determining the nuclear radius, Nuclear angular momentum, Nuclear magnetic dipole moment and Electric quadruple moment, Parity quantum number, Statistics of nuclear particles, Nuclear Disintegration: Simple theories of decay, Properties of neutrino, Non conservation of parity and Wu's experiment in beta decay, Electron capture, Internal conversion.	15
2	**Inter Nucleon Forces: [Course outcomes: CO302C.2]** Properties and simple theory of the deuteron ground state, Spin dependence and tensor component of nuclear forces, Nucleon-nucleon scattering at low energy, Charge-independence of nuclear forces, Many–nucleon systems and saturation of nuclear forces, Exchange forces, Elements of meson theory.	15
3	**Nuclear Structure and Models: [Course outcomes: CO302C.3]** Fermi gas model, Experimental evidence for shell structure in nuclei, Basic assumption for shell model, Single- particle energy levels in central potential, Spin-orbit potential and prediction of magic numbers, Extreme single- particle model, Prediction of angular moment, Parities and magnetic moment of nuclear ground states, Liquid drop model, Semi-empirical mass formula, Nuclear fission, The unified model.	15
4	**Particle Physics: [Course outcomes: CO302C.4]** Properties and origin, Elementary particles, Properties, classification, type of interactions and conservation laws, Properties of mesons, Resonance particles, Strange particles and Strangeness quantum number, Simple ideas of group theory, Symmetry and conservation laws, CP and CPT invariance, Special symmetry groups SU (2) and SU (3) classification of hadrons, Quarks, Gell-Mann-Okubu mass formula.	15

TEXT BOOKS

1. **Roy & Nigam,**Nuclear Physics, John Wiley & Sons, USA, 1st Edition, 1967.
2. **H. Enge,**Introduction to nuclear Physics, Addison Wesley, USA, 1st Edition 1969.
3. **J.M. Blatt and V.F. Weisskopf,** Theoretical Nuclear Physics, Springer, Germany, 1st Edition, 1969.
4. **M.Leon,**Particle Physics:An introduction, Elsevier, Netherlands, 1st Edition, 1973.
5. **S. N. Ghoshal**, Nuclear Physics, S. Chand, India, 1st Edition, 1994.
6. **F.I. Stancu,** Group Theory in Subnuclear Physics, Clarendon Press, UK, 1st Edition, 1997.
7. **J.D. Walecka,**Theoretical Nuclear and Subnuclear Physics, World Scientific, Singapore, 2nd Edition, 2004.
8. **B. R. Martin and G. Shaw,**Particle Physics, John Wiley & Sons, USA, 3rd Edition, 2008.

SOLID STATE PHYSICS

<table>
<tr><td rowspan="2">Scheme Version:

2021-22</td><td rowspan="2">Name of the subject: Solid State Physics</td><td>L</td><td>T</td><td>P</td><td>C</td><td rowspan="2">Semester:

III (2nd Year)</td><td>Contact Hours per Week: 4</td></tr>
<tr><td>3</td><td>1</td><td>0</td><td>4</td><td>Total Hours: 60</td></tr>
<tr><td rowspan="2">Subject Code:
SBS PHY 01
303 CC 3104</td><td rowspan="2">Applicable to Programs:

M.Sc. Physics</td><td rowspan="2">Evaluation

(Total Marks: 100)</td><td>CIE</td><td>30 Marks</td><td colspan="3">Examination Duration: 3 hours</td></tr>
<tr><td>TEE</td><td>70 Marks</td><td colspan="3">Prerequisite of Course:
Graduation Level Solid State Physics and Quantum Mechanics</td></tr>
<tr><td>Course Description</td><td colspan="7">The solid state physics is the branch of physics dealing with physical properties of solids particularly crystals, including the behavior of electrons in these solids. The course solid state physics is basically designed for fundamental understanding of several breakthrough phenomena such as crystal structure, lattice dynamics, various crystal bonding, free electrons theory, band theory and superconductivity in solids.</td></tr>
<tr><td>Course Objectives</td><td colspan="7">• To understand the fundamentals of intriguing phenomena such as direct lattice, reciprocal lattice, lattice vibration in solids, specific heat of metals, band formation in solids, effective mass, and superconductivity.
• To develop the scientific and positive attitudes in students related to the materials science which is a part of solid state physics
• To able the students for solve the problems related to solid state physics</td></tr>
<tr><td>Course Outcomes</td><td colspan="7">At the end of this course, the students will be able to</td></tr>
</table>

	CO303C.1. identify various crystal structures and their symmetries in solids **CO303C.2.** determine the crystal structure through X-ray diffraction, rotating crystal, and Laue methods **CO303C.3.** explain the theories and phenomena of lattice dynamics, various bonding, and thermal properties (specifically specific heat) in solids **CO303C.4.** calculate the specific heat and density of states of various solids **CO303C.5.** interpret the electrical conductivity and resistivity, mean free path, relaxation time, Fermi energy, electronic specific heat, and band formation in solids **CO303C.6.** recognize the importance of effective mass, nearly free-electron model and tight binding approximation **CO303C.7.** identify the basic differences between conductors and superconductors **CO303C.8.** illustrate the some exciting phenomena such as Meissner effect, Isotope effect, London's equations, BCS theory, and Josephson effect of superconductors **CO303C.9.** understand the basics of high temperature superconductors and commercial applications of superconductors

COURSE SYLLABUS

Unit No.	Content of Each Unit	Hours of Each Unit
1	**Crystal Structure [Course Outcome(s): CO303C.1 & CO303C.2]** Crystal Structures and Lattices with Basis, Miller Indices, Common Crystal Structures, Reciprocal Lattice, Brillouin Zones, X-ray Diffraction by a Crystal and Their Equivalence, Laue Equations, Ewald Construction, Brillouin Interpretation, Intensity of X-ray Reflections: Atomic Scattering Factor; Geometrical Structure Factor, Structure Factors, Structure Factor; Experimental Methods of Structure Analysis: Laue's Method; Rotating Crystal	15

	Method; Powder Method, Diffraction from Non-Crystalline Systems.	
2	**Lattice Dynamics, Crystal Binding and Thermal Properties [Course Outcome(s): CO303C.3 & CO303C.4]** Classical Theory of Lattice Dynamics: Vibrations of Crystals with Monatomic Basis and Two Atomic Basis; Dispersion Relation; Group Velocity; Acoustical and Optical modes, Bonding in Solids, Elastic Constants and Properties, Phonons: Quantization of Lattice Vibration; Phonon Momentum; Inelastic Scattering of Neutrons by Phonons, Thermal Properties: Heat Capacity; Density of States; Normal Modes; Debye and Einstein Models.	15
3	**Free Electrons and Energy Band in Solids [Course Outcome(s): CO303C.5 & CO303C.6]** Free Electron Gas Model and Its Limitations, Electrons Moving in One and Three Dimensional Potential Well, The Density of States, Fermi Energy, Effect of Temperature on Fermi Distribution Function, The Electronic Specific Heat, The Electrical Conductivity of Metals, Relaxation Time and Mean Free Path, The Electrical Resistivity, Band Theory:Bloch Theorem; The Kronig-Penny Model; Symmetry Properties of the Energy Function; Effective Mass of an Electron; The Nearly Free Electron Model and Tight Binding Approximation; Metals; Insulators and Semiconductors.	15
4	**Superconductivity [Course Outcome(s): CO303C.7, CO303C.8 & CO303C.9]** Introduction to Superconductivity, Effect of Magnetic Field, The Meissner Effect, Type I and Type II Superconductors, Entropy, Free Energy, Heat Capacity, Energy gap, Isotope Effect, Thermodynamics of the Superconducting Transition, London Equation and Penetration Depth, Coherence Length, BCS Theory of Superconductivity, Cooper Pair, Flux Quantization, DC and AC Josephson Effects: SQUIDs, High Temperature Superconductivity, Applications of Superconductors.	15
TEXT BOOKS		
1. **J. M. Ziman**, Principles of the Theory of Solids, Cambridge University Press, UK, 2nd Edition, 1979. 2. **J. F. Annett**, Superconductivity Super fluids and Condensates, Oxford University Press, UK, 1st Edition, 2004.		

3. **J. P. Srivastava**, Elements of Solid State Physics, Prentice-Hall of India, 2nd Edition, 2006.
4. **H. Ibach and H. Luth**, Solid State Physics: An Introduction to Theory and Experiment, Springer, Germany, 4th Edition, 2009.
5. **M. A. Wahab**, Solid State Physics: Structure and Properties of Materials, Narosa Publications, India, 2nd Edition, 2009.
6. **C. Kittel**, Introduction to Solid State Physics, John Wiley and Sons, USA, 8th Edition, 2012.
7. **N. W. Ashcroft and N. D. Mermin**, Solid State Physics, Holt, Rinehart and Winston, USA, Revised Edition, 2016.
8. **S. O. Pillai,** Solid State Physics, New Age International Publishers, 8th Edition, 2018.

LABORATORY III

<table>
<tr><td>Scheme Version:

2021-22</td><td>Name of the subject:
Laboratory III</td><td>L</td><td>T</td><td>P</td><td>C</td><td rowspan="2">Semester:

III (2nd Year)</td><td>Contact Hours per Week: 12</td></tr>
<tr><td>0</td><td>0</td><td>12</td><td>6</td><td>Total Hours: 180</td></tr>
<tr><td rowspan="2">Subject Code:
SBS PHY 01 304
CC 00126</td><td rowspan="2">Applicable to Programs:

M.Sc. Physics</td><td rowspan="2">Evaluation

(Total Marks: 100)</td><td>CIE</td><td>30 Marks</td><td colspan="3">Examination Duration: 3 hours</td></tr>
<tr><td>TEE</td><td>70 Marks</td><td colspan="3">Prerequisite of Course: None</td></tr>
<tr><td>Course Description</td><td colspan="7">Aim of Lab III is to train students for advanced practical related to solid state physics, nuclear physics, electronics, numerical techniques and material science.

Each student is required to perform at least five experiments from Section A and at least three experiments from any one of the optional subtopics of Section B: (i) Electronics (ii) Thin Film and Nano-Material (iii) Numerical Techniques; depending upon the courses opted under discipline centric elective course</td></tr>
<tr><td>Course Objectives</td><td colspan="7">• To train students on advanced experiments
• To give training on advance instruments
• To introduce students to latest numerical techniques</td></tr>
</table>

Course Outcomes	After completion of this course, the students will be able to **CO304C.1.** Apart from some experiments based on nuclear physics, electronics, computation and solid state physics. **CO304C.2.** To understand the basic synthesis and characterization techniques for different materials such as thin films and nanoparticles. **CO304C.3.** students will also perform the advance experiments like DTA, TGA, UV-VIS, Microwave furnace and thin film coating techniques. **CO204C.4. Students will advance techniques of numerical analysis**	
COURSE SYLLABUS		
Unit No.	**Content of Each Unit**	**Hours of Each Unit**
1	1. Kerr Effect 2. Curie Temperature 3. B-H curve 4. Dielectric constant 5. Solid State Nuclear Track Detector (SSNTD) 6. G.M. Counters: characteristics, dead time and counting statistics 7. Scintillation detector-energy calibration, resolution and determination of gamma ray energy 8. Quinks tube method to find susceptibility of a material 9. Nuclear Magnetic Resonance 10. Zeeman Effect 11. To study Lattice Dynamics	100
2	**(i) Electronics** 1. PCM/delta modulation and demodulation 2. Fiber optic communication 3. Modulation/Demodulation 4. 4-bit ripple counter **(ii) Thin Film and Nano-Material** 1. Data Analysis of XRD, SEM and TEM 2. Chemical Deposition (for CNT growth) 3. ZnO wire by thermal oxidation 4. Band gap estimation by Tauc-plot method 5. Thin film deposition technique 6. DTA/TGA analysis **(iii) Numerical Techniques**	80

	1. Solution of Linear algebraic equation: Gauss Jordon elimination, Singular Value Decomposition, Sparse linear system. 2. Evaluation of Functions: special functions, evaluation of functions by path integration, incomplete gamma, beta function. 3. Random Numbers: Uniform random numbers generators, statistical distributions and their properties, Rejection Methods, transformation method, simple Monte Carlo integration, Adaptive and recursive Monte Carlo methods, Test of randomness. 4. Signal Processing: FFT, IFFT, Filtering with FFT, convolution and correlation functions, application to real time series data. 5. Eigen systems: Solving eigenvalues and finding eigen functions of Schrodinger equation for analytically unsolvable potentials using variational principle.	

TEXT BOOKS

1. Albert Malvino, Digital Principles and Applications, McGraw Hill, New York, 4th Edition, 1986.

2. **A. C. Melissinos, J. Napolitano,** Experiments in Modern Physics, Academic Press, Cambridge, Massachusetts, 2nd Edition, 2003.

3.**W.H. Press, B.P. Flannery, S.A. Teukolsky and W.T. Vetterling,** Numerical Recipes in C/C++: The Art of Scientific Computing, Cambridge University Press, 3rd Edition, 2007.

4. J. P. Sethna, Statistical Mechanics: Entropy, Order Parameters, and Complexity, Oxford University Press, 2nd Edition, 2007.

5. E. Balagurusamy, Numerical Methods, Tata McGraw Hill, New Delhi, 1st Edition, 2017.

Physics of Electronic Material and Devices

<table>
<tr><td rowspan="2">Scheme Version:

2021-22</td><td rowspan="2">Name of the subject:

Physics of Electronic Material and Devices</td><td>L</td><td>T</td><td>P</td><td>C</td><td rowspan="2">Semester:

II (2nd Year)</td><td>Contact Hours per Week: 4</td></tr>
<tr><td>3</td><td>1</td><td>0</td><td>4</td><td>Total Hours: 60</td></tr>
<tr><td rowspan="2">Subject Code:
SBS PHY 01 301 DCEC 3104</td><td rowspan="2">Applicable to Programs: M.Sc. Physics</td><td rowspan="2">Evaluation
(Total Marks: 100)</td><td>CIE</td><td>30 Marks</td><td colspan="3">Examination Duration: 3 hours</td></tr>
<tr><td>TEE</td><td>70 Marks</td><td colspan="3">Prerequisite of Course: None</td></tr>
<tr><td>Course Description</td><td colspan="7">This course intends to provide knowledge about band structure and electronic properties of semiconducting materials. In addition, this course aims to provide a detailed theory and design of electronic, microwave and photonics devices.</td></tr>
<tr><td>Course Objective</td><td colspan="7">• To acquire the fundamental knowledge and expose to the field of semiconductor theory and devices and their applications.</td></tr>
<tr><td>Course Outcomes</td><td colspan="7">On completion of the course, student would be able:

CO301D.1. To describe the properties of materials and application of semiconductor</td></tr>
</table>

	electronics **CO301D.2.** To understand the oncepts of recombination and generations of charge carriers **CO301D.3.** To understand basic properties of Metal-Semiconductor junction. **CO301D.4.** To understand the working, design and applications of various semiconducting devices like rectifiers, clippers, LED, Solar cells.

COURSE SYLLABUS

Unit No.	Content of Each Unit	Hours of Each Unit
1	**Fundamentals of Semiconductors [Course Outcome(s): CO301D.1]** Carrier concentration of semiconductor, Transport Equations, Fundamentals of Compound Semiconductors: Introduction of Compound Semiconductors, Properties of Compound semiconductors, Synthesis of Compound Semiconductors. Crystal structures of Elemental and III-IV	**15**
2	**Carrier mobility in semiconductors [Course Outcome(s): CO301D.2]** Electron and Hole conductivity in semiconductors, Shallow impurities in semiconductors (Ionization Energies), Deep Impurity states in semiconductors, Carrier Trapping and recombination/generation in semiconductors, Shockley read theory of recombination, Switching in electronic devices.	**15**
3	**Metal-semiconductor, Metal-Insulator-Semiconductor and MOS devices [Course Outcome(s): CO301D.3]** Native oxides of Compound semiconductors for MOS devices and the interface state density related issues. Metal semiconductor contacts, Schottky barrier diode, Metal semiconductor Field Effect Transistors (MESFETs): Pinch off voltage and threshold voltage of MESFETs. D.C. characteristics and analysis of drain current. Velocity overshoot effects and the related advantages of GaAs, InP and GaN based devices for high speed operation. Sub threshold characteristics, short channel effects and the performance of scaled down devices.	**15**
4	**High Frequency Devices [Course Outcome(s): CO301D.4]** Essential Condition of High frequency device and compound semiconductor,Tunnel diode, MIS Tunnel diode, Degenerate and Non-degenerate semiconductor, MIS switch diode, MIM Tunnel diode. IMPATT diode. Characteristics, breakdown Voltage, Avalanche Region and Drift Region, Transferred electron devices.	**15**

	Photonic devices: LED and LASER, Photo detectors, Solar-cells.	

TEXT BOOKS

1. **A.S. Grove**, Physics and Technology of Semiconductor Devices, WILEY, United States, 1st Edition , 1967.
2. **B.L. Sharma,Metal**, Semiconductor Schottky Barrier Junction and their Applications, Springer, USA, 1st Edition, 1984.
3. **E. H.Rhoderick**, Metal/Semicond uctor Contacts, Clarendon Press, UK, 1st Edition , 1988.
4. **Jasprit Singh**, Semiconductor Devices Basic Principles, John Wiley & Sons, United States, 1st Edition, 2000.
5. **S.M. Sze**, Physics of Semiconductor Devices, John Wiley & Sons, United States, 2nd Edition, 2003.

Nuclear Reactor Physics

Scheme Version: 2021-22	**Name of the subject:** Nuclear Reactor Physics	**L**	**T**	**P**	**C**	**Semester:** III (2nd Year)	**Contact Hours per Week:** 4
		3	1	0	4		**Total Hours:** 60
Subject Code: SBS PHY 01 302 DCEC 3104	**Applicable to Programs:** M.Sc. Physics	**Evaluation (Total Marks: 100)**	**CIE**	30 Marks	**Examination Duration:** 3 hours		
			TEE	70 Marks	**Prerequisite of Course:** None		
Course Description	This course is intended to impart primary but wide theoretical knowledge about nuclear reactor and related topics.						
Course Objectives	• To understand the theoretical and experimental knowledge about nuclear reactors. • To know about the basic designs of nuclear reactors. • To understand the need of nuclear fuel and waste management.						

Course Outcomes	After completetion of this course, students would be able to: **CO302D.1.** Understand the nuclear fission reactions. **CO302D.2.** Learn about neutron sources and moderators. **CO302D.3.** Get knowledge about working of nuclear reactors. **CO302D.4.** Get knowledge about different types of power reactors **CO302D.5.** Learn how to manage the nuclear fuel and waste.

COURSE SYLLABUS

Unit No.	Content of Each Unit	Hours of Each Unit
1	**Nuclear Reactions: [Course Outcome(s): CO302D.1]** Characteristics of atomic nucleus, Binding energy, Nuclear fission, Cross section, Interaction of neutrons with nuclei.	15
2	**Neutron moderation**: **[Course Outcome(s): CO302D.2]** Inelastic scattering, Elastic collisions, Moderating ratio, Slowing down Density, Resonance escape, Moderators, Neutron sources, Prompt neutrons, Fast fission, Fission energy, Thermal utilization, Fission products, Chain reaction, Multiplication factor, Leakage of neutrons, Critical size, Diffusion and slowing down theory, Homogenous and heterogeneous reactors.	15
3	**Nuclear Reactors: [Course Outcome(s): CO302D.3]** Fuel materials, Moderator materials, Cladding materials, Coolant materials and control materials, Control requirement calculations, Means of control, Reactor kinematics: Neutron lifetime, Generation time, Point kinetic equation and solution of the equations for step input reactivity.	15
4	**Types of Power reactors & Fuel and waste management: [Course Outcome(s): CO302D.4 & CO302D.5]** Boiling water reactors, Pressurized water reactors,	15

	Pressurized heavy water reactors, Light water cooled graphite moderated reactors, Gas cooled reactors, Advanced gas cooled reactors, High temperature gas cooled reactors and liquid metal cooled reactors and Fast breeder reactors, Fuel management schemes, Fuel composition, Fuel cycle cost and waste management.	

Laboratory Assignments:

Visits to fission reactor sites and related case studies for generation of nuclear energy.

TEXT BOOKS

1. **Lamarshs, J.R.**, Introduction to Nuclear Reactor Theory, Addison-Wesley Publishing Co., 1966.
2. **Glasstons**, Sammuel and Sesonske, Alexander, Nuclear reactor Engineer, CBS Publishers & Distributors, 1986.

PLASMA PHYSICS AND FUSION REACTOR

Scheme Version: 2021-22	**Name of the subject:** Plasma Physics and Fusion Reactor	**L**	**T**	**P**	**C**	**Semester:** III (2nd Year)	**Contact Hours per Week:** 4 / **Total Hours:** 60
		3	1	0	4		
Subject Code: SBS PHY 01 303 DCEC 3104	**Applicable to Programs:** M.Sc. Physics	**Evaluation (Total Marks: 100)**	**CIE**	30 Marks	**Examination Duration:** 3 hours		
			TEE	70 Marks	**Prerequisite of Course:** Mathematical Physics and Quantum Mechanics		
Course Description	Students will be exposed to theory related to motion of charge particle in inhomogeneous field, production of plasma and usage of plasma.						

Course Objectives	• To make students familiar with fourth state of matter • To aware students about plasma creation in laboratory • To make students familiar with production of energy in fusion reactor
Course Outcomes	After completion of this course, the students will have understanding of **CO303D.1.** what are theoretical method to study the charge particle motion **CO303D.2** Idea behind the magnetic confinement **CO303D.3.** how to generate plasma in the laboratory **CO303D.4.** how plasma production is helpful to make fusion reactors

COURSE SYLLABUS

Unit No.	Content of Each Unit	Hours of Each Unit
1	**Introduction**: **[Course outcomes: CO303D.1]** Plasma state, plasma parameters, applications of plasmas. **Single particle orbit theory:** Drift of charge particle under different combinations of electric and magnetic field, crossed electric and magnetic fields, homogenous electric and magnetic fields, spatially and time varying electric and magnetic fields,	15
2	**The Boltzmann Equation: [Course outcomes: CO303D.2]** Simplified magneto-hydrodynamic equations - Electron plasma oscillations Debye shielding phenomenon and criteria for plasma, motion of charged particles in electromagnetic field, Electric field drift, parallel acceleration, curvature drift, adiabatic invariants; fundamental equations of magneto-hydrodynamics(MHD), magnetic confinement.	15
3	**Production of Plasma in laboratory: [Course outcomes: CO303D.3]** Physics of glow discharge, electron emission, ionization breakdown of gases, Paschen's law and different regimes of E/ρ in a discharge. **Plasma diagnostic:** Probes, energy analysers, magnetic probes and optical diagnostics, preliminary concepts.	15

4	**Fusion Reactor**: **[Course outcomes: CO303D.4]** Potential of fusion energy, controlled thermonuclear reactions, fusion reactions, fusion cross-sections, fusion power generation, energy balance for fusion systems, ignition criterion, gain factor, plasma heating, ohmic heating, neutral beam injection, radio frequency heating, inertial confinement fusion, tokamaks, stability, operating limits and transport.	15
TEXT BOOKS		
1. Nicholson, D. R., Introduction to Plasma theory, Wiley, 1983 2. Chen, F.F., Introduction to Plasma Physics, Springer, 1984 3. Sturrock, P.A., Plasma Astrophysics, Cambridge University Press, 1994 4. Choudhuri, A.R., The Physics of Fluids and Plasmas, Cambridge University Press, 1998		

PHYSICS OF NANOMATERIALS

Scheme Version: 2021-2022	**Name of the Subject:** Physics of Nanomaterials	**L** **3**	**T** **1**	**P** **0**	**C** **4**	**Semester:** **III**(2^{nd}Year)	**Contact hours per week:** 4 **Total Hours: 60**
Subject Code: SBS PHY 01 304 DCEC 3104	**Applicable to Programs:** M.Sc. Physics	**Evaluation (Total Marks):** 100	**CIE**	**30 Marks**	**Examination Duration: 3 hours**		
			TEE	**70 Marks**	**Pre-requisite of course:** Solid State Physics		
Course Description	To introduce knowledge on basics of nanoscience and the fundamental concepts behind size reduction in various physical properties. More specifically, the student will be able to understand the different properties of materials being used in various length scales.						

Course Objectives	• The objective of this course is to provide the knowledge on the Physics of nanostructure materials, materials growth aspects important for size control and size selection and application of nanoscale materials. • The course lays foundation for advanced courses in engineering aspects of materials and their applications.	
Course Outcomes:	On completion of this course, student will learn: **CO304.1** Correlate properties of nanostructures with their size, shape and surface characteristics. **CO304.2** Qualitatively describe how the nanoparticle size can affect the morphology, crystal structure, reactivity, and mechanical properties. **CO304.3** Understand the effects of quantum confinement on the electronic structure and corresponding physical and chemical properties of materials at nanoscale. **CO304.4** Describe several synthesis methods for fabrication of inorganic nanoparticles, one-dimensional nanostructures (nanotubes, nanorods, nanowires), thin films, nonporous materials, and nanostructured bulk materials, and also could describe how different lithography methods can be used for making nanostructures. **CO304.5** Understand some specific materials like graphene and carbon nanotubes for various applications. **CO304.6** To comprehend basic knowledge on the characterization of nanomaterials by different methods.	
	COURSE SYLLABUS	
Unit No.	**Content of Each Unit**	**Hours of Each Unit**
1.	**Introduction to Nanostructure Materials: [Course Outcome (s): CO304.1 & CO304.2]** Nanoscience & nanotechnology, size dependence of properties, Chemical- reactivity, Mechanical properties at nanoscale, Moor's law, Surface energy and Melting point (quasi melting) of nanoparticles, Excitons, Density of states, Variation of density of states with energy and size of crystal. Population of conduction and valance band for 0D, 1D, 2D & 3D material.	15

2.	**Quantum Size Effect: [Course Outcome (s): CO304.3]** Quantum confinement and its consequences, quantum wells, quantum wires and quantum dots and artificial atoms. Electronic structure from bulk to quantum dot. Electron states in direct and indirect gap semiconductors nanocrystals. Confinement in disordered and amorphous systems.	15
3.	**Synthesis of Nanomaterials: [Course Outcome (s): CO304.4 & CO304.5]** Key issue in the synthesis of Nanomaterials, Different approaches of synthesis, Top down and Bottom up approaches, Thermal and e-beam evaporation, Gas phase synthesis of nanopowders, chemical and colloidal methods, sol gel method, functionalization of nanoparticles. Ball Milling, Specific materials like graphene and carbon nanotubes (CNTs).	15
4.	**Characterization techniques: [Course Outcome (s): CO304.6]** XRD (Scherrer's formula), Electron Microscopy: Scanning Electron Microscopy (SEM), Transmission Electron Microscopy (TEM), Scanning Probe Microscopy (SPM), Atomic Force Microscopy (AFM), Raman Spectroscopy and XPS, Estimation of band gap using UV-Vis-NIR spectroscopy, Thermogravimetric analysis.	15

REFERENCE BOOKS

1. D. Bimberg, M. Grundmann, N.N. Ledenstov, Quantum Dot Hetrostructures, John Wiley & Sons, United States, 1st Edition, 1999.
2. Charles P. Poole, Jr. Frank J. Owens, Introduction to Nanotechnology, John Wiley & Sons, United States, 1st Edition, 2003.
3. Guozhong Cao, Nanostructures & Nanomaterials, Synthesis, Properties & Applications, Imperial College Press, UK, 1st Edition, 2004
4. Liming Dai, Carbon Nanotechnology, Elsevier, Netherland, 1st Edition, 2006.
5. Michael J. O'Connell, Carbon Nanotubes: Properties and Applications, CRC Press, USA, 1st Edition, 2006.
6. T. Pradeep, Nano: The Essentials, McGraw Hill Companies, New York, 1st Edition, 2007.
7. Hornyak G.L., Tibbals H.F., Dutta J.,Moore J.J., Introduction to Nanoscience and Nanotechnology, CRC Press, USA, 1st Edition, 2008.

Characterization Techniques for Materials

Scheme Version: 2021-22	**Name of the subject:** Characterization Techniques for Materials	**L**	**T**	**P**	**C**	**Semester:** I (1st Year)	**Contact Hours per Week:** 4
		3	1	0	4		**Total Hours:** 60
Subject Code: SBS PHY 01 305 DCEC 3104	**Applicable to Programs:** M.Sc. Physics	**Evaluation (Total Marks:**	**CIE**	30 Marks	**Examination Duration:** 3 hours		
				70	**Prerequisite of Course:** None		

		100)	**TEE**	Marks	
Course Description	This course covers the fundamental principles and practical applications of different classes of materials and characterization techniques. The course discusses characterization techniques used for chemical and structural analysis of materials, including metals, ceramics, polymers, composites, and semiconductors. The topics include important spectroscopic, microscopic and thermal methods for materials characterization.				
Course Objective	• To introduce the materials characterization techniques to the students • Help the students to understand the instrumentation aspects • To provide a detailed understanding of data interpretation • To provide hands on experience of the characterization techniques				
Course Outcomes	On completion of the course, student would be able: **CO305D.1.** To determine crystal structure of specimen and estimate its crystallite size and stress **CO305D.2.** To choose an appropriate microscopy techniques to investigate microstructure of materials at high resolution **CO305D.3.** To use appropriate spectroscopic technique to measure vibrational/electronic transitions to estimate parameters like energy band gap, elemental concentration, etc. **CO305D.4.** To apply thermal analysis techniques to determine thermal stability of and thermodynamic transitions of the specimen.				

COURSE SYLLABUS

Unit No.	Content of Each Unit	Hours of Each Unit
1	**Structure analysis [Course Outcome(s): CO305D.1]** X-ray diffraction. Diffraction under non-ideal conditions. Atomic scattering and Geometrical structure factors. Factors influencing the intensities of diffracted beams. Phase identification, indexing and lattice parameter determination, Powder X-ray diffractometer. Applications of XRD in bulk and nano-materials.	**15**
2	**Microscopy techniques [Course Outcome(s): CO305D.2]**	**15**

	Introduction to Microscopes, Optical microscopy, Transmission Electron Microscopy (TEM); Basic Electron scattering, Concepts of resolution, TEM instruments, Various imaging modes, Analysis of micrographs, Electron Energy Loss Spectroscopy, Scanning Electron Microscopy (SEM), Scanning Probe Microscopy (AFM and STM)	
3	**Spectrophotometric analysis of materials [Course Outcome(s): CO305D.3]** UV-VIS spectroscopy, Fourier transform infrared spectroscopy, Raman spectroscopy, X-ray photoelectron Spectroscopy (XPS).	**15**
4	**Thermal analysis techniques [Course Outcome(s): CO305D.4]** Differential thermal analysis (DTA), Differential Scanning Calorimetry (DSC), Thermo-gravimetric analysis (TGA), **Electrical characterization techniques:** Electrical resistivity in bulk and thin films, Hall effect, Magnetoresistance	**15**

TEXT BOOKS

6. **Wendlandt, W.W.,** Thermal Analysis, John Wiley & Sons, 1986.
7. **Wachtman, J.B.,** Kalman, Z.H., Characterization of Materials, Butterworth Heinemann, 1993.
8. **Murphy, Douglas B,** Fundamentals of Light Microscopy and Electronic Imaging, Wiley-Liss, Inc. USA, 2000.
9. **Cullity, B.D.,** and Stock, R.S., "Elements of X-Ray Diffraction", Prentice-Hall, 2001.
10. **B. Raj**, **T. Jayakumar**, **M. Thavasimuthu**, Practical Non-Destructive Testing, 2nd ed., Narosa Publishing House, 2002.
11. **D. A. Skoog**, **F.J. Holler**, **S. R. Crouch**, Instrumental Analysis, Cengage Learning, 2007.
12. **Li Lin**, **Ashok Kumar**, Materials Characterization Techniques Sam Zhang; CRC Press, 2008.
13. **Y. Leng**, Materials Characterisation: Introduction to Microscopic and Spectroscopic Methods, John Wiley & Sons (Asia), 2008.
14. **J. C. Vickerman**, **I. Gilmore**, Surface Analysis: The Principal Techniques, 2 nd ed., John Wiley & Sons, Inc.2009.

General Theory of Relativity

Scheme Version: 2021-22	Name of the subject: General Theory of Relativity	L	T	P	C	Semester: III(2nd Year)	Contact Hours per Week: 4
		3	1	0	4		Total Hours: 60
Subject Code: SBS PHY 01 306 DCEC 3104	Applicable to Programs: M.Sc. Physics	Evaluation (Total Marks: 100)	CIE	30 Marks	Examination Duration: 3 hours		
			TEE	70 Marks	Prerequisite: Classical Electrodynamics, Mathematical Methods in Physics I & II		
Course Description	Aim of the course is to familiarize students with different aspects of theory of gravitation.						
Course Objectives	The student will come to understand . Special Theory of Relativity . General Theory of Relativity . Few applications of Geeral Theory of Relativity.						
Course Outcomes	On completion of the course, student would be able to **CO306D.1 :** understand the mathematical rigour that goes behind the theory of relativity and also be able to **CO306D.2 :** Understand few applications of general theory of relativity. **CO306D.3 :** Understand the Special theory of relativity **CO306D.4 :** Understand the origin of gravitational waves						

COURSE SYLLABUS

Unit No.	Content of Each Unit	Hours of Each Unit
1	**Historical Background [Course Outcomes : CO306D.3]** Review of Newtonian Mechanics. Special theory of relativity. Prelude to General relativity, historical developments, 4-Vectors and 4-tensors, examples from physics	15
2	**Tensors in GTR [Course Outcomes : CO306D.1]** Principle of Equivalence, Equations of motion, Gravitational force, Tensor Analysis in Riemannian space, Effects of Gravitation, Riemann-Christoffel curvature tensor, Ricci Tensor, Curvature Scalar	15
3	**Applications of GTR [Course Outcomes : CO306D.2]** Einstein Field Equations, Experimental tests of General Theory of Relativity, Scwartzchild Solution, Gravitational	15

	lensing	
4	**Gravitational Radiation [Course Outcomes : CO306D.4]** Gravitational waves: generation and detection, Energy, momentum and angular momentum in Gravitation	15

Text Books

1. **S. Weinberg,** Cosmology, Oxford University, 1 st Edition, 2008.
2. **Ray D'Inverno**, Introducing Einstein's General Relativity, Oxford University, 1 st Edition, 1992.
3. **M. Berry,** Principle of Cosmology and Gravitation, Taylor & Francis; 1 st Edition, 1989.
4. **Tai L. Chow**, Introduction to General theory of Relativity and Cosmology, Springer, 1 st Edition, 2008.
5. **P.A.M. Dirac**, General theory of Relativity, Wiley-Blackwell, 1 st Edition, 1975.
6. L.D. Landau and E.M. Lifshitz, The Classical Theory of Fields, Publishere, Shroff, 2 nd Edition, 2010

Digital Electronics and Microprocessor

<table>
<tr><td rowspan="2">Scheme Version:

2021-22</td><td rowspan="2">Name of the subject:

Digital Electronics and Microprocessor</td><td>L</td><td>T</td><td>P</td><td>C</td><td rowspan="2">Semester:

III (2nd Year)</td><td>Contact Hours per Week: 4</td></tr>
<tr><td>3</td><td>0</td><td>2</td><td>4</td><td>Total Hours: 60</td></tr>
<tr><td rowspan="2">Subject Code:
SBS PHY 01 307 DCEC 3024</td><td rowspan="2">Applicable to Programs:M.Sc. Physics</td><td rowspan="2">Evaluation

(Total Marks: 100)</td><td>CIE</td><td>30 Marks</td><td colspan="3">Examination Duration:3 hours</td></tr>
<tr><td>TEE</td><td>70 Marks</td><td colspan="3">Prerequisite of Course: Physics of Semiconductor Devices, Analog Electronics</td></tr>
<tr><td>Course Description</td><td colspan="7">This course is intended to train the M.Sc students for digital systems, their implementation and application of microprocessor.</td></tr>
<tr><td>Course Objectives</td><td colspan="7">• To understand the fundamentals of digital systems.
• To make familiar with various logic families and their implementation in logic circuits.
• To understand the design of microprocessors and their applications.</td></tr>
<tr><td>Course Outcomes</td><td colspan="7">After completion of this course, students will be able to learn about:

CO307D.1. The basics of digital systems and Boolean algebra.
CO307D.2. Digital arithmetic operations and combinational & sequential circuits.
CO307D.3. Various memory devices & their applications.
CO307D.4. Microprocessor and its various operations.</td></tr>
<tr><td colspan="8">COURSE SYLLABUS</td></tr>
<tr><td>Unit No.</td><td colspan="5">Content of Each Unit</td><td colspan="2">Hours of Each Unit</td></tr>
</table>

1	**Digital Systems: [Course Outcome(s): CO307D.1]** Digital signals, binary number system, conversions, Boolean algebra, logic gates, standard gate assemblies, implementing circuits from boolean expressions, SOP, POS, Simplifying logic circuits: algebraic method, K-mapping, Error detection: Parity method, checksum method.	15
2	**Digital Circuits**: **[Course Outcome(s): CO307D.2]** Combinational Circuits: Half Adder, Full Adder, Decoder, Encoder, Multiplexer, Demultiplexer and their applications. Sequential Circuits: Flip flops; SR, T, D and J-K, Shift Register, Parallel and Serial data transfer, Timming Waveforms. Counters: Synchronous and Asynchronous Up, Down, and Bidirectional Counters, Timing Wave forms. Digital to Analog Converters and their properties, weighted resistor and R-2R Ladder type, Analog to digital Converters: Flash, Successive approximation, Sigma- Delta ADC.	15
3	**Applications: [Course Outcome(s): CO307D.3]** Memory: Read Only Memory (ROM): PROM, EPROM, EEPROM, Applications, Programming a ROM, Random Access Memory(RAM): SRAM, DRAM, Applications, Memory Storage cell, Read and Write operations, Programmable Logic Devices (PLD) Digital Display, Seven segment display.	15
4	**8085 Microprocessor: [Course Outcome(s): CO307D.4]** Basics of Microprocessor-8085, PIN description, Microprocessor initiated operations. Internal data operations. Introduction to 8085 assembly language programming. 8085 instruction, Microprocessor Applications, Recent trends in Microprocessor Technology.	15

Laboratory Assignments:

To construct logic gates OR, AND, NOT, NOR, NAND gates using discrete components and verify their truth tables
To construct logic gates AND, NOT, EX-NOR and EX-OR using NAND gates and verify their truth tables.
To perform 4 bit DAC and ADC operations
To arrange a data set in ascending order using 8080 microprocessor.
Use the IC555 chip as astable, bistable and monostable multivibrator.

To study various operations of Arithmetic logic Unit (ALU).
To perform the addition and subtraction of n 8 bit numbers using 8085 microprocessor
To perform the multiplication and division of two 8 bit number using 8085 microprocessor
To write a program to arrange an array of data in ascending order using 8085 microprocessor
To design and construct multiplexer and demultiplexer and verify their truth tables.
To study the encoders and decoders
To perform BCD to Binary operation using 8085 microprocessor.

TEXT BOOKS

1. **Malvino A.P**. and **Brown A**., Digital Computer Electronics, Prentice-Hall, India, New Delhi, 3rd Edition, 1999.

2. **Gaonkar R. S**., Microprocessor Architecture, Programming and Applications, Prentice-Hall, India,New Delhi, 2nd Edition, 2014.

3. **Tocci R. J**., Digital Systems-Principles and Applications, Prentice Hall of India, New Delhi, 8th Edition, 2015.

Programming with Python

<table>
<tr><td rowspan="2">Scheme Version:

2021-22</td><td rowspan="2">Name of the subject:
Programming with Python</td><td></td><td>L</td><td>T</td><td>P</td><td>C</td><td rowspan="2">Semester:

III (2nd Year)</td><td>Contact Hours per Week: 4</td></tr>
<tr><td></td><td>3</td><td>0</td><td>2</td><td>4</td><td>Total Hours: 60</td></tr>
<tr><td rowspan="2">Subject Code:
SBS PHY 01 308 DCEC 3024</td><td rowspan="2">Applicable to Programs:
M.Sc. Physics</td><td></td><td rowspan="2">Evaluation
(Total Marks: 100)</td><td>CIE</td><td>30 Marks</td><td colspan="3">Examination Duration: 3 hours</td></tr>
<tr><td></td><td>TEE</td><td>70 Marks</td><td colspan="3">Prerequisite of Course: Basic knowledge of computer</td></tr>
<tr><td>Course Description</td><td></td><td colspan="7">The objective of the course on Computational Methods is to familiarize the students about various computational techniques by using Python.</td></tr>
<tr><td>Course Objectives</td><td></td><td colspan="7">• To train student in scientific language Python
• To make students comfortable with code writing techniques
• To apply numerical methods using Python language</td></tr>
<tr><td>Course Outcomes</td><td></td><td colspan="7">After completion of this course, students will be able to learn about:

CO308D.1. Learn the basics of programming using Python as a scientific programming language.
CO308D.2. Understand the basics of input and output formatting and display techniques along with graphical user interface
CO308D.3. Design algorithms for various numerical methods using Python and
CO308D.4. Solve selected problems using Python algorithms and programming.</td></tr>
<tr><td></td><td colspan="8"></td></tr>
</table>

	COURSE SYLLABUS		
Unit No.		**Content of Each Unit**	**Hours of Each Unit**
1		**Basic of Python: [Course Outcome(s): CO308D.1]** Computational modeling, python programming for a Physicist, structure of a python program, running python program in console and in editor. constant and variables, numbers-integers, long integer, floating point number, complex number, sequences-string, list, tuples, dictionaries, operators – arithmetic operators, relational operators.	15
2		**Logical Statements**: **[Course Outcome(s): CO308D.2]** logical operators, assignment operators, conditional operator. Control statements if, if else, if-elif-else, while, for loop, nested if and nested for loops, break and continue.	15
3		**Functions in Python: [Course Outcome(s): CO308D.3]** user made, library, inbuilt. Functions definition and declaration, passing arguments, return values, default values and optional parameters. Importing modules, File handling operation with files, opening and closing a file. Formatting inputs and outputs, visualizing data, 2D, 3D, scatter graphs, animating graphs, statistical analysis of data- mean, median, mode, variance**.**	15
4		**Selected Problem using Python: [Course Outcome(s): CO308D.4]** Optimization: designing an algorithm for accuracy, designing an algorithm for speed, Errors in computation and Numerical stability , numerical integration, differentiation. Curve fitting, least squares method principle, Fourier Transform, symbolic computation, numerical computation.	15

	TEXT BOOKS		
	2. Patil P. B. &Verma U. P., Numerical Computational Methods, Revised Edition (Reprint 2013), Narosa Publication. 3. Fangohr H., Introduction to Python for Computational Science and Engineering (A beginner's guide), (2015), Faculty of Engineering and the Environment, University of Southampton. 4. Rajaraman V., Computer Oriented Numerical methods, 3rd Edition (2015), Prentice Hall India Ltd.		

Research and Publication Ethics

<table>
<tr><td rowspan="2">Scheme Version:

2021-22</td><td rowspan="2">Name of the subject:

Research and Publication Ethics</td><td></td><td>L</td><td>T</td><td>P</td><td>C</td><td rowspan="2">Semester:

III (2nd Year)</td><td>Contact Hours per Week: 2</td></tr>
<tr><td></td><td>2</td><td>0</td><td>0</td><td>2</td><td>Total Hours: 30</td></tr>
<tr><td rowspan="2">Subject Code:
SBS PHY 01
310 DCEC
2002</td><td rowspan="2">Applicable to Programs:

M.Sc. Physics</td><td rowspan="2"></td><td rowspan="2">Evaluation

(Total Marks: 100)</td><td>CIE</td><td>15

Marks</td><td colspan="3">Examination Duration: 1.5 Hours</td></tr>
<tr><td>TEE</td><td>35

Marks</td><td colspan="3">Prerequisite of Course: None</td></tr>
<tr><td>Course Description</td><td></td><td colspan="7">The objective of the course is to familiarize the students with ethics of research and how to make publications</td></tr>
<tr><td>Course Objectives</td><td></td><td colspan="7">• To train student for research
• To make students aware of IPR policy</td></tr>
<tr><td>Course Outcomes</td><td></td><td colspan="7">On completion of the course, the student should be able to:

CO310D.1: Understand the basic ethics of research.
CO310D.2: Maintain the research integrity and intellectual honesty.
CO310D.3: Understand the scientific misconduct and proper citations.
CO310D.4: Acquire knowledge of databases and software’s.</td></tr>
</table>

	COURSE SYLLABUS		
Unit No.		**Content of Each Unit**	**Hours of Each Unit**
1		**Theory: [Course Outcome(s): CO310D.1, CO310D.2]** RPE 01: Philosophy and Ethics (3 hrs.) 1. Introduction to philosophy: definition, concept, branches, nature and scope, 2. Ethics: definition, moral philosophy, nature of moral judgements and reactions RPE 02: Scientific Conduct (5 hrs.) 1. Ethics with respect to science and research 2. Intellectual honesty and research integrity 3. Scientific misconducts: Falsification, Fabrication, and Plagiarism (FFP) 4. Redundant publications: duplicate and overlapping publications, salami slicing 5. Selective reporting and misrepresentation of data RPE 03: Publication Ethics (7 hrs.) 1. Publication ethics: definition, introduction and importance 2. Best practices/standards setting initiatives and guidance: COPE, WAME, etc. 3. Conflicts of interest 4. Publication misconduct: definition, concept, problems that lead to unethical behavior and vice versa, types 5. Violation of publication ethics, authorship and contribution-ship 6. Identification of publication misconduct, complaints and appeals 7. Predatory publishers and journals	15
2		Practice: [Course Outcome(s): CO310D.3, CO310D.4] RPE 04: Open Access Publishing (4 hrs.) 1. Open access publications and initiatives 2. SHERPA/RoMEO online resource to check publisher copyright & self-archiving polices	15

		3. Software tool to identify predatory publications developed by SPPU 4. Journal finder / journal suggestion tools viz. JANE, Elsevier Journal Finder, Springer Journal Suggester, etc. RPE 05: Publication Misconduct (4 hrs.) *A. Group Discussion (2 hrs.)* 1. Subject specific ethical issues, FFP, authorship 2. Conflicts of interest 3. Complaints and appeals: examples and fraud from India and abroad *B. Software tools (2 hrs.)* 1. Use of plagiarism software like Turnitin, Urkund and other open source software tools RPE 06: Databases and Research Metrics (7 hrs.) *A. Databases (4 hrs.)* 1. Indexing databases Research Metrics 2. Citation databases: Web of Science, Scopus, etc. *B. Research Metrics (3 hrs.)* 1. Impact Factor of journal as per Journal Citation Report, SNIP, SJR, IIP, Cite Score 2. Metrics: h index, g index, i10 index, almetrics	

	TEXT BOOKS
	1. Indian National Science Academy (INSA), Ethics in Science Education, Research and Governance, 2019, ISBN:978-81-939482-1-7. http://www.insaindia.res.in/pdf/Ethics_Book.pdf 2. Chaddah, P., Ethics in Competitive Research: Do not get scooped; do not get plagiarized 2018, ISBN:978-9387480865. 3. Beall, J. Predatory publishers are corrupting open access, Nature, 489 (7415), 179-179, 2012. https://doi.org/10.1038/489179a 4. Resnik, D. B., What is ethics in research and why is it important, National Institute of Environmental Health Sciences, 1-10. Retrived from https://www.neihs.nih.gov/research/resources/bioethics/whatis/index.cfm

	2011. 5. National Academy of Sciences, National Academy of Engineering and Institute of Medicine, On Being a Scientist: A Guide to Responsible Conduct in Research: 3rd edition , National Academics Press 2009. Bird, A., Philosophy of Science, Routledge 2006. 6. MacIntyre, A., A Short History of Ethics, London 1967.

Astrophysics of Stars

Scheme Version: 2021-22	Name of the subject: Astrophysics of Stars	L	T	P	C	Semester: III(2nd Year)	Contact Hours per Week: 4
		3	1	0	4		Total Hours: 60
Subject Code: SBS PHY 01 309 DCEC 3104	Applicable to Programs: M.Sc. Physics	Evaluation (Total Marks: 100)	CIE	30 Marks	Examination Duration: 3 hours		
			TEE	70 Marks	Prerequisite: Introduction to Astronomy and Astrophysics		

Course Description	Aim of the Course : Stars are the fundamental building blocks of the Universe. By injecting vast amounts of energy and momentum into their surround-ings, they act as drivers for the evolution of their host galaxies..
Course Objectives	Aim of this course is to understand in detail what goes on deep inside an object that, to us, is a mere pinprick of light in the sky.
Course Outcomes	On completion of the course, student would be able to **CO307D.1 :** quantify the basic parameters of stars. **CO307D.2 :** understand how radiation interacts with matter at the surfaces of stars **CO307D.3 :** Understand how to produce the spectra that we observe **CO307D.4 :** know about the processes that determine the interior structure, composition and evolution of stars.

COURSE SYLLABUS

Unit No.	Content of Each Unit	Hours of Each Unit
1	Stellar Observations : [Course Outcomes : **CO307D.1**] **Introduction, Distance & magnitude, Blackbody radiation, Colors & line spectra, Binary systems : visual binaries, Eclipsing & spectroscopic binaries, The Hertzsprung-Russel diagram, Spectral classification**	15
2	Stellar Atmospheres : [Course Outcomes : **CO307D.2**] **Stellar atmospheres, Describing radiation, Radiation & matter , Radiative transfer, The Eddington approximation, The grey atmosphere, Realistic model atmospheres, Opacity sources, Spectral features, Profile**	15

	shapes, Line strengths	
3	Stellar Interiors : [Course Outcomes : **CO307D.4**] **Mechanical structure, The virial theorem, Polytropes, Equation of state, Energy conservation; diffusive transport, Mass-luminosity relation; main sequences, Convective transport, Energy generation, Nuclear fusion networks, Fusion rates, Rotation, Stellar model building**	15
4	Stellar Evolution : [Course Outcomes : **CO307D.3]** **The main sequence, The Sun, Massive stars, Star formation, Pre-main-sequence evolution, Evolution off the main sequence, Helium burning & beyond, Stellar death, Stellar pulsation, White dwarfs, Neutron stars**	15

Text Books

1. "An Introduction to Modern Stellar Astrophysics" ,
Bradley W Carroll and Dale A Ostlie (ISBN: 978-08053034830), Cambridge University Press (2017)
2. "Stellar Structure and Evolution", R. Kippenhahn & A. Weiger, (2012) Springer-Verlag Berlin Heidelberg
3. Structure and Evolution of the Stars, by M. Schwarzschild. (ISBN : 9780691652832), 2016, Princton University Press
4. Stellar Atmospheres, by Ivan Hubeny , Springer Verlag
5. Radiative Processes in Astrophysics : G. Rybiki and A. Lightmann, 2004 WILEY-VCH Verlag GmbH & Co.

Major Research Project

<table>
<tr><td rowspan="2">Scheme Version:

2021-22</td><td rowspan="2">Name of the subject:

Major Research Project</td><td></td><td>L</td><td>T</td><td>P</td><td>C</td><td rowspan="2">Semester:

IV (2nd Year)</td><td>Contact Hours per Week:</td></tr>
<tr><td></td><td>0</td><td>0</td><td></td><td>16</td><td>Total Hours:</td></tr>
<tr><td rowspan="2">Subject Code:
SBS PHY 01 401 DCEC 00016</td><td rowspan="2">Applicable to Programs:

M.Sc. Physics</td><td></td><td rowspan="2">Evaluation

(Total Marks: 100)</td><td>CIE</td><td>00</td><td colspan="3">Examination Duration:3 hours</td></tr>
<tr><td></td><td>TEE</td><td>100 Marks</td><td colspan="3">Prerequisite of Course: None</td></tr>
<tr><td>Course Description</td><td colspan="8">The dissertation topics will be based on special papers or elective papers and topics of current interest. A departmental committee will distribute the topics according to the skill and merit of the students.</td></tr>
<tr><td>Course Objectives</td><td colspan="8">• To make students familiar with approach to do literature survey
• To make student capable of independent thinking
• Students will learn basic techniques for carrying out research</td></tr>
<tr><td>Course Outcomes</td><td colspan="8">After completion of this project, students will be able to learn about:

CO401.1. Basic of literature review
CO401.2. Techniques used for performing research
CO401.3. Analyze the results and tabulate them in a proper manner
CO401.4. How to write and dissertation, making presentation and viva etc.</td></tr>
</table>

Evaluation: The evaluation will be done by an external examiner. External examiner will award the grades based on quality of research work done recorded in dissertation and presentation made by student.

ADVANCED NULEAR PHYSICS

<table>
<tr><td rowspan="2">Scheme Version:

2021-22</td><td rowspan="2">Name of the subject:
Advanced Nuclear Physics</td><td>L</td><td>T</td><td>P</td><td>C</td><td rowspan="2">Semester:

IV (2nd Year)</td><td>Contact Hours per Week: 4</td></tr>
<tr><td>3</td><td>1</td><td>0</td><td>4</td><td>Total Hours: 60</td></tr>
<tr><td rowspan="2">Subject Code:
SBS PHY 01 401
DCEC 3104</td><td rowspan="2">Applicable to Programs:
M.Sc. Physics</td><td rowspan="2">Evaluation
(Total Marks: 100)</td><td>CIE</td><td>30 Marks</td><td colspan="3">Examination Duration: 3 hours</td></tr>
<tr><td>TEE</td><td>70 Marks</td><td colspan="3">Prerequisite of Course:
Mathematical Physics and Nuclear Physics</td></tr>
<tr><td>Course Description</td><td colspan="7">To impart knowledge about nuclear deformations, properties and nuclear models for understanding of related reaction dynamics. Beside this students will be exposed to heavy ion physics and nuclear astrophysics.</td></tr>
<tr><td>Course Objectives</td><td colspan="7">• Students will understand about the stability of nuclei away from the drip line and deformed nuclei
• Students will know the different theoretical approaches to explain the structure of nuclei
• Student will understand the basics of heavy ion nuclear physics and its correlation to Astrophysics</td></tr>
<tr><td>Course Outcomes</td><td colspan="7">After competitions of this course, the students will be able to

CO401D.1. Know the basic properties of deformed shapes of nuclei
CO401D.2. Understand the nuclear models to study the nuclear structure properties
CO401D.3. Understand the various aspects of heavy ion collisions nuclear</td></tr>
</table>

	astrophysics **CO401D.4.** Understand the nuclear astrophysics and related applications.	
COURSE SYLLABUS		
Unit No.	**Content of Each Unit**	**Hours of Each Unit**
1	**Nuclear deformations: [Course outcomes: CO401D.1:]** Effect of quadrupole deformations and higher multipole deformations, Nuclear orientation effect, static and dynamic deformations, deformed magic shells and related nuclear aspects, Importance of Exotic nuclear systems, halo shapes and bubble effect.	15
2	**Collective Model of Nucleus: [Course outcomes: CO401D.2:]** Collective motion, parameterization of nuclear surface, Rotation of deformed nuclei, Collective model Hamiltonian, nuclear wave function for even-even nuclei and odd-A nuclei, Rotation-vibrational coupling, Nilsson model, Cranking shell model.	15
3	**Heavy-Ion Physics: [Course outcomes: CO401D.3:]** Total Hamiltonian function, Scattering of deformed nuclei, Fusion fission dynamics, Radioactive ion beams, tightly and loosely bound interactions, Nuclear isomers, Nuclear Molecules, Nuclear Dynamics at Intermediate and high energies, Relativistic heavy ion collisions	15
4	**Nuclear Astrophysics: [Course outcomes: CO401D.4:]** Hot big bang cosmology, Primordial nucleosynthesis, Stellar nucleosynthesis, energy production in stars, pp chain, CNO cycle, production of elements. **Nuclear Applications**: Recent trends in nuclear structure physics and related important applications	15
TEXT BOOKS		
1. Pal, M.K., Theory of Nuclear Structure, East-West Press Delhi, 1983. 2. Preston M. A. and Bhaduri R. K., Structure of Nucleus Addison-Wesley, 2000. 3. Lilley J.S., Nuclear physics principles and applications John Wiley & sons Ltd., 2007. 4. Krane K.S. Nuclear Physics, Wiley India Pvt. Ltd., 2008.		

PARTICLE PHYSICS

<table>
<tr><td rowspan="2">Scheme Version:

2021-22</td><td rowspan="2">Name of the subject:
Particle Physics</td><td>L</td><td>T</td><td>P</td><td>C</td><td rowspan="2">Semester:

IV (2nd Year)</td><td>Contact Hours per Week: 4</td></tr>
<tr><td>3</td><td>1</td><td>0</td><td>4</td><td>Total Hours: 60</td></tr>
<tr><td rowspan="2">Subject Code:
SBS PHY 01 402
DCEC 3104</td><td rowspan="2">Applicable to Programs:

M.Sc. Physics</td><td rowspan="2">Evaluation

(Total Marks: 100)</td><td>CIE</td><td>30 Marks</td><td colspan="3">Examination Duration: 3 hours</td></tr>
<tr><td>TEE</td><td>70 Marks</td><td colspan="3">Prerequisite of Course:
Mathematical Physics and Quantum Mechanics, Nuclear Physics</td></tr>
<tr><td>Course Description</td><td colspan="7">To impart the knowledge of fundamental particles, fundamental interaction and the range and strength of these interactions with the concept of particle antiparticle or matter antimatter.</td></tr>
<tr><td>Course Objectives</td><td colspan="7">• Students will understand the different type of particles and interactions among them
• Students will be able to understand the conservation laws in particle physics
• Students will get to know the production cross section for particles
• Students will understand the quark model.</td></tr>
<tr><td>Course Outcomes</td><td colspan="7">After completion of this course, the students will be able to

CO402D.1. Need of standard model and its limitations and the properties of QCD.</td></tr>
</table>

	CO402D.2. Basic rules of Feynman diagrams and the quark model for hadrons **CO402D.3.** Properties of neutrons and protons in terms of a simple quark model **CO402D.4.** . Weak interaction between quarks and how that this is responsible for β decay. **CO402D.5** Leptons and how the(electron) neutrinos and (electron) antineutrinos are produced during β+ and β- decays respectively	
COURSE SYLLABUS		
Unit No.	**Content of Each Unit**	**Hours of Each Unit**
1	**Introduction: [Course outcomes: CO402D.1:]** Fermions and bosons, Particles and antiparticles, Quarks and leptons, Interactions and fields in particle physics, Classical and quantum pictures, Yukawa picture, Types of interactions - electromagnetic, weak, strong and gravitational, units.	15
2	**Invariance Principles and Conservation Laws: [Course outcomes: CO401D.2:]** Invariance in classical mechanics and in quantum mechanics, Parity, Pion parity, Charge conjugation, Positronium decay, Time reversal invariance, CPT theorem.	15
3	**Hadron-Hadron Interactions: [Course outcomes: CO401D.3:]** Cross section and decay rates, Pion spin, Isospin, Two-nucleon system, Pion-nucleon system, Strangeness and Isospin, G-parity, Total and Elastic cross section, Particle production at high energy.	15
4	**Static Quark model of Hadrons: [Course outcomes: CO401D.4, CO402D.5:]** The Eightfold way, Meson nonet, Baryon octet, Baryon Decuplet, hypothesis of quarks, SU (3) symmetry, Quark spin and color, Quark-antiquark combinations. **Weak Interactions:** Classification of weak interactions, Fermi theory, Weinberg-Salam model, Parity non-conservation in β-decay, Helicity of neutrino, Experimental verification of parity violation, K-decay.	15
TEXT BOOKS		
1. Perkins, D.H., Introduction to High Energy Physics, Cambridge University Press, 2000, 3rd ed. 2. Hughes, I.S., Elementary Particles, Cambridge University Press, 1991.		

3. Close, F.E., Introduction to Quarks and Partons, Academic Press, 1979.
4. Segre, E., Nuclei and Particles, Benjamin-Cummings, 1977.
5. Khanna, M.P., Introduction to Particle Physics, Prentice-Hall of India, 2004.

Experimental Techniques in Nuclear and Particle Physics

<table>
<tr><td rowspan="2">Scheme Version:

2021-22</td><td rowspan="2">Name of the subject:

Experimental Techniques in Nuclear and Particle Physics</td><td>L</td><td>T</td><td>P</td><td>C</td><td rowspan="2">Semester:

IV (2nd Year)</td><td>Contact Hours per Week: 4</td></tr>
<tr><td>3</td><td>1</td><td>0</td><td>4</td><td>Total Hours: 60</td></tr>
<tr><td rowspan="2">Subject Code:
SBS PHY 01 403 DCEC 3104</td><td rowspan="2">Applicable to Programs: M.Sc. Physics</td><td rowspan="2">Evaluation

(Total Marks: 100)</td><td>CIE</td><td>30 Marks</td><td colspan="3">Examination Duration:3 hours</td></tr>
<tr><td>TEE</td><td>70 Marks</td><td colspan="3">Prerequisite of Course: Basics of Nuclear and Particle Physics</td></tr>
<tr><td>Course Description</td><td colspan="7">This course is intended to familiarize the M.Sc. students to the experimental techniques used in the fields of nuclear physics and particle physics. Various detection techniques will be introduced followed by a description of on-detector and off-detector electronics.</td></tr>
<tr><td>Course Objectives</td><td colspan="7">• Get knowledge about various experimental techniques used in the fields of nuclear physics and particle physics.

• To get familiar with various detector systems and related electronics.</td></tr>
</table>

Course Outcomes	After completetion of this course, students would be able to: **CO403D.1.** Get knowledge about different types of radiations & their interaction with matter. **CO403D.2.** Understand the radiation exposure and its effects on biological system. **CO403D.3.** Learn about how to detect radiations. **CO403D.4.** Get knowledge about the various electronic components of radiation detectors and pulse signal processing. **CO403D.5.** Understand Learn about different existing detector facilities all around the world.

COURSE SYLLABUS

Unit No.	Content of Each Unit	Hours of Each Unit
1	**Radiation interactions: [Course Outcome(s): CO403D.1 & CO403D.2]** Nuclear processes in radioactive sources: types of radiations & radiation sources; Interaction of gamma-rays, electrons, heavy charged particles, neutrons, neutrinos and other particles with matter. Radiation protection, Biological effects of radiation, radiation monitoring.	15
2	**Detection of radiations: [Course Outcome(s): CO403D.3]** General properties of Radiation detectors, energy resolution, detection efficiency and dead time. Gas-filled detectors: Ionization chamber, Proportional counters, position-sensitive proportional counters, Multiwire proportional chambers, Drift chamber, Time projection chamber. Scintillation detector, Phoswich detectors, Cherenkov detector. Semiconductor detectors. Detection of fast and slow neutrons - nuclear reactions for neutron detection. General Background and detector shielding.	15
3	**Detector electronics: [Course Outcome(s): CO403D.4]** Electronics for pulse signal processing, CR-$(RC)^n$ and delay-line pulse shaping, pole-zero cancellation, baseline shift and restoration, preamplifiers, overload recovery and pileup, Linear	15

	amplifiers, single-channel analyser, analog-to-digital converters, multichannel analyzer. Basic considerations in time measurements; Walk and jitter, Time pickoff methods, time-to-amplitude converters, Systems for fast timing, fast-slow coincidence, and particle identification, NIM and CAMAC instrumentation standards and data acquisition system.	
4	**Experimental Facilities: [Course Outcome(s): CO403D.5]** Detector systems for heavy-ion reactions: Large neutron detector array, gamma and charge particle detector arrays, electron spectrometer, heavy-ion reaction analysers, nuclear lifetime measurements (DSAM and RDM techniques), production of radioactive ion beams. Detector systems for high energy experiments**:** basics of Collider physics, Modern Hybrid experiments- CMS and ALICE.	15

TEXT BOOKS

1. **W.R. Leo,** Techniques for Nuclear and Particle Physics Experiments, Springer, Berlin Heidelberg, 2nd Edition, 1994.
2. **Konrad Kleinknecht**, Detectors for particle radiation, Cambridge University Press, 1999.
3. **Richard Fernow**, Introduction to Experimental Particle Physics, Cambridge University Press, 2001.
4. Glenn F. Knoll**,** Radiation Detection and Measurement, John Wiley & Sons, 4th Edition, 2010.

Cosmology

Scheme Version: 2021-22	Name of the subject: Cosmology	L	T	P	C	Semester: IV(2nd Year)	Contact Hours per Week: 4
		3	1	0	4		Total Hours: 60
Subject Code: SBS PHY 01 404 DCEC 3104	Applicable to Programs: M.Sc. Physics	Evaluation (Total Marks: 100)	CIE	30 Marks	Examination Duration: 3 hours		
			TEE	70 Marks	Prerequisite: Introduction to Astronomy and Astrophysics		

Course Description	**Cosmology** is a branch of astronomy that involves the origin and evolution of the universe, from the Big Bang to today and on into the future.
Course Objectives	The aim of this course is to introduce the model of the universe on large scales
Course Outcomes	On completion of the course, student would be able to **CO404D.1 :** Understand the concepts of STR and GTR **CO404D.2 :** Apply the concepts of GTR to cosmology **CO404D.3 :** Understand the model of expanding universe **CO404D.4 :** Explain the model of early universe and its thermal history.

COURSE SYLLABUS

Unit No.	Content of Each Unit	Hours of Each Unit
1	**Principles of Relativity: [Course Outcomes : CO404D.1]** Overview of Special Relativity - spacetime interval and Lorentz metric- four vectors - Introduction to general relativity (GR) - equivalence principle - notions of curvature	15
2	**Gravitation as a manifestation of the curvature of spacetime : [Course Outcomes : CO404D.2]** gravitational redshift and clock corrections - orbits in strong gravity, light bending and gravitational lensing - concept of horizon and ergosphere, hydrostatic equilibrium in GR - gravitational radiation.	15
3	**Cosmological Models: [Course Outcomes : CO404D.3]** Universe at large scales – Homogeneity and isotropy – distance ladder –Newtonian cosmology - expansion and redshift - Cosmological Principle - Hubble's law -	15

	Robertson-Walker metric - Observable quantities – luminosity and angular diameter distances - Horizon distance- Dynamics of Friedman- Robertson-Walker models: Friedmann equations for sources with p=wu and w =−1, 0, 1/3, discussion of closed, open and flat Universes.	
4	**Physical Cosmology and Early Universe: [Course Outcomes** : **CO404D.4**] Thermal History of the Universe - distribution functions in the early Universe – relativistic and nonrelativistic limits - Decoupling of neutrinos and the relic neutrino background - Nucleosynthesis - Decoupling of matter and radiation – Cosmic microwave background radiation (CMB)- Anisotropies in CMB - Inflation – Origin and growth of Density Perturbations - Formation of galaxies and large scale structures - Accelerating universe and type-Ia supernovae - The Intergalactic medium and reionization.	15

Text Books

1. Cosmological Physics, Cambridge University Press, J . A. Peacock

2. An Introduction to Relativity, J. V. Narlikar, Cambridge University Press, 2010

3. Theoretical Astrophysics, Volume III: Galaxies and Cosmology,
T. Padmanabhan,Cambridge University Press, 2002 (for lectures on Cosmology)

4. Classical Theory of Fields, Vol. 2, L. D. Landau and E. M. Lifshitz, Oxford : Pergamon Press, 1994 (For more material on General Relativity).

5. Introduction to Cosmology, J. V. Narlikar, Cambridge University Press, 1993 (For the lectures on Cosmology).

6. First course in general relativity, B. F. Schutz, Cambridge university press, 1985 (For material on General Relativity).

7. Structure Formation in the Universe. T. Padmanabhan, Cambridge University Press, 1995 (for material on Cosmology and Structure formation).

Astronomy Laboratory

Scheme Version: 2021-22	**Name of the subject: Astronomy Laboratory**	**L**	**T**	**P**	**C**	**Semester:** IV(2nd Year)	**Contact Hours per Week:** 4
		0	0	8	4		**Total Hours:** 60
Subject Code: SBS **PHY 01 405 DCEC 0084**	**Applicable to Programs:** M.Sc. Physics	**Evaluation (Total Marks: 100)**	**CIE**	30 Marks	**Examination Duration:** 3 hours		
			TEE	70 Marks	**Prerequisite: Introduction to Astronomy and Astrophysics**		

Course Description	This course shall be providing the tools and know-how to apply the principles of *astronomy* first-hand.
Course Objectives	The aim of this course to make students aware about different softwares (e.g. stellarium etc.) available to simulate night sky and observe astronomical phenomenon.
Course Outcomes	On completion of the course, student would be able to **CO307D.1 :** become familiar with astronomical coordinate system **CO307D.2 :** Study the spectrum of celestial objects **CO307D.3 :** observe the distance of planets **CO307D.4 :** observe the proper motion of stars

COURSE SYLLABUS

Unit No.	**Content of Each Unit**	**Hours of Each Unit**
1	Getting to know : [**Course Outcomes : CO307D.1**] Experiment 1 : To become familiar with night sky Experiment 2: Becoming Familiar with Constellations Experiment 3: Retrograde motion of Planets	15
2	Spectral Analysis : [**Course Outcomes : CO307D.2**] Experiment 4: Study of solar spectrum	15

	Experiment 5: Spectral classification of stars Experiment 6: Extracting position of a star	
3	Stellar Motions : [**Course Outcomes : CO307D.4**] Experiment 7: Cepheid Variables Experiment 8: To measure the Proper Motion of Barnard's Star Experiment 9: Circumpolar Star	15
4	Stellar Distances : [**Course Outcomes : CO307D.3**] Experiment 10: Colour Magnitude Diagram Experiment 11:Orbital Inclination Experiment 12: Planetary Distances Experiment 13: Distance to the Moon	15

References

1. http://www3.gettysburg.edu/~marschal/clea/Vireo.html
2. https://astro.unl.edu/vlabs/
3. http://va-iitk.vlabs.ac.in/
4. https://www.astro.indiana.edu/catyp/minilabs.html
5. https://depts.washington.edu/naivpl/content/welcome-virtual-planetary-laboratory

FERROELECTRICITY AND MAGNETISM

<table>
<tr><td rowspan="2">Scheme Version:

2021-22</td><td rowspan="2">Name of the subject:
Ferroelectricity and Magnetism</td><td>L</td><td>T</td><td>P</td><td>C</td><td rowspan="2">Semester:

IV (2nd Year)</td><td>Contact Hours per Week: 4</td></tr>
<tr><td>3</td><td>1</td><td>0</td><td>4</td><td>Total Hours: 60</td></tr>
<tr><td rowspan="2">Subject Code:
SBS PHY 01 406
DCEC 3104</td><td rowspan="2">Applicable to Programs:
M.Sc. Physics</td><td rowspan="2">Evaluation
(Total Marks: 100)</td><td>CIE</td><td>30 Marks</td><td colspan="3">Examination Duration: 3 hours</td></tr>
<tr><td>TEE</td><td>70 Marks</td><td colspan="3">Prerequisite of Course:
Graduation Level Solid-State Physics</td></tr>
<tr><td>Course Description</td><td colspan="7">This course is designed to convey the understanding about dielectric, ferroelectric, and magnetic materials, which possess several breakthrough applications in actuators, sensors, energy storage devices, data storage devices etc.</td></tr>
<tr><td>Course Objectives</td><td colspan="7">• To understand the fundamentals of dielectric, ferroelectric and magnetism phenomenon in solids
• To make acquainted with several types of electric and magnetic materials and their exciting properties
• To aware the students about industrial applications of ferroelectric and magnetic materials
• To develop the positive and scientific attitudes and analytical thinking in the students related to materials science</td></tr>
<tr><td>Course Outcomes</td><td colspan="7">After competitions of this course, the students will be able to
CO406D.1. explain the dielectric phenomenon in crystals with their exciting</td></tr>
</table>

	properties **CO406D.2.** interpret the theory of polarization and components of polarizability of polar dielectrics **CO406D.3.** learn the basics of ferroelectric and piezoelectric crystals **CO406D.4.** understand the applications of ferroelectric and piezoelectric materials in various electronic devices **CO406D.5.** describe the diamagnetism and paramagnetism phenomenon in solids, specifically the magnetic susceptibility behavior with temperature **CO406D.6.** evaluate the paramagnetic susceptibility of iron group ions, rare earth ions,and conduction electrons **CO406D.7.** compare the general mechanism of ferro, ferri, and anti-ferro magnetic materials **CO406D.8.** recognize some new ferromagnetic materials which possess intriguing applications in data storage devices

COURSE SYLLABUS

Unit No.	Content of Each Unit	Hours of Each Unit
1	**Theory of Dielectrics [Course Outcome(s): CO406D.1 & CO406D.2]** Introduction, The Microscopic Concept of Polarization, Langevin's Theory of Polarization in Polar Dielectrics, Internal-Field or Local Field, Clausius-Mossotti Relation, Components of Polarizability: Electronic Polarizability; Ionic Polarizability; Orientational Polarizability; Total Polarizability, Measurement of Dielectric Constant, Dielectric Losses, Optical Phenomena.	15
2	**Ferroelectric Crystals [Course Outcome(s): CO406D.3 & CO406D.4]** Representative Crystal Types of Ferroelectrics: Properties of Rochelle Salt and Barium Titanate, Ferroelectric Displacive Transitions, Landau Theory of Phase Transition: Second-Order Transitions; First-Order Transitions, Antiferroelectricity, Ferroelectric Domains,	15

	Piezoelectricity, Electrostriction, Applications of Ferroelectric Crystals.	
3	**Diamagnetism and Paramagnetism [Course Outcome(s): CO406D.5 & CO406D.6]** Langevin's Theory of Diamagnetism, Quantum Theory of Diamagnetism: Mononuclear Systems, Langevin's Theory of Paramagnetism, Quantum Theory of Paramagnetism: Rare Earth Ions; Hund Rule; Iron Group Ions; Crystal Field Splitting, Van Vleck Paramagnetism, Nuclear Paramagnetism, Cooling by Adiabatic Demagnetization, Paramagnetic Susceptibility of Conduction Electrons.	15
4	**Ferromagnetism and Antiferromagnetism [Course Outcome(s): CO406D.7 & CO406D.8]** Ferromagnetic Order: Weiss Theory of Ferromagnetism; The Exchange Interaction; The Heisenberg Model, Ferrimagnetic Order: Curie Temperature and Susceptibility of Ferrimagnets, Antiferromagnetic Order, Ferroelectric Domains: Anisotropy Energy; The Bloch Wall; Origin of Domains; Coercivity and Hysteresis, Spin Waves: Magnons in Ferromagnets; The Bloch $T^{3/2}$ Law, Determination of Magnetically Ordered Structures, Some New Magnetic Materials: GMR-CMR Effects.	15

TEXT BOOKS

1. **S. Blundell**, Magnetism in Condensed Matter, Oxford, UK, 1st Edition, 2001.
2. **M.E. Lines and A. M. Glass**, Principles and Applications of Ferroelectrics and Related Materials, Oxford University Press, UK, 2001.
3. **M. A. Omar**, Elementary Solid State Physics, Pearson, India, 1st Edition, 2002.
4. **B. D. Culity and C. D. Grahim**, Introduction to Magnetic Materials, Wiley, USA, 2nd Edition, 2008.
5. **K. Uchino**, Ferroelectric Devices, CRC Press publication, Taylor and Francis Group, 2nd Edition, 2010.
6. **C. Kittel**, Introduction to Solid State Physics, John Wiley and Sons, USA, 8th Edition, 2012.
7. **M. P. Marder**, Condensed Matter Physics, Wiley, USA, 2nd Edition, 2015.

VACUUM SCIENCE AND THIN FILM TECHNOLOGY

<table>
<tr><td rowspan="2">Scheme Version:

2021-2022</td><td rowspan="2">Name of the Subject:

Vacuum Science and Thin Film Technology</td><td>L</td><td>T</td><td>P</td><td>C</td><td rowspan="2">Semester:

IV (2nd Year)</td><td>Contact hours per week: 4</td></tr>
<tr><td>3</td><td>1</td><td>0</td><td>4</td><td>Total Hours: 60</td></tr>
<tr><td rowspan="2">Subject Code:

SBS PHY 01 407
DCEC 3104</td><td rowspan="2">Applicable to Programs:

M.Sc. Physics</td><td rowspan="2">Evaluation (Total Marks): 100</td><td>CIE</td><td>30 Marks</td><td colspan="3">Examination Duration: 3 hours</td></tr>
<tr><td>TEE</td><td>70 Marks</td><td colspan="3">Pre-requisite of course:</td></tr>
<tr><td>Course Description</td><td colspan="7">The central objective of the course is to provide basic understanding of physics and technology behind thin film growth. Possible applications demonstrating novel material designs and case studies in technological areas of current interest will be discussed.</td></tr>
<tr><td>Course Objectives</td><td colspan="7">• Understand vacuum fundamentals essential to operating, maintaining, designing, or using vacuum systems.
• Know the working principles and limitations of pumps, gauges, and other vacuum system components.
• Learn the design concepts involved in matching equipment and instrumentation to applications.</td></tr>
<tr><td>Course Outcomes:</td><td colspan="7">On completion of this course, student will learn:

CO407.1 Understand the Kinetic Theory of Gases, mean free path and the physical concepts behind the thin film depositions.

CO407.2 Understand the kinetic theory of nucleation, growth and diffusion phenomenon

CO407.3 Understand the basics of vacuum science and technology, Vacuum pumps and gauges and use of various vacuum based techniques for development of thin film-based</td></tr>
</table>

	materials, structures, and plasma devices and systems. **CO407.4** Familiarize with the physical concepts of lithography behind the solid-state electronics devices design patterns. **CO407.5** Understand certain experimental techniques for characterization of thin films for their structural, morphological, surface topology, electrical, mechanical and optical properties. **CO407.6** Design protocols for thin film deposition, characterization and various applications.	
	COURSE SYLLABUS	
Unit No.	**Content of Each Unit**	**Hours of Each Unit**
1.	**The physics of gases and vacuum systems: [Course Outcome (s): CO407.1 & CO407.2]** Gas kinetics, Maxwell-Boltzmann distribution, molecular impingement flux, Knudsen equation, mean free path, transport properties, Evaporation: thermodynamics of evaporation, evaporation rate, alloys, compounds, sources, deposition monitoring techniques, Deposition: adsorption, surface diffusion, nucleation, structure development, interfaces, stress, adhesion.	15
2.	**Vacuum Science and deposition techniques: [Course Outcome (s): CO407.3]** Basics of vacuum science, creation of vacuum using different pumps, vacuum gauges, vacuum leak detection, helium leak detector, residual gas analyzer. Thermal evaporation and electron beam evaporation system, idea of DC and R.F. sputtering system, Methods of producing thin films using Physical vapour deposition, Chemicals Vapour Deposition and spray pyrolysis methods, Molecular Beam Epitaxy and Laser Ablation methods for thin film deposition.	15

3.	**Lithography: [Course Outcome (s): CO407.4 & CO407.5]** Importance of lithography, Basic steps of lithography, Substrate preparation methods, Positive photoresist, Negative photoresist, photoresist Processing, photoresist coating methods, Resist Exposure (single, bi-layer and multi-level photoresist exposure) and Resist Development, soft backing and hard baking, Etching, Types of lithography, Photolithography, Idea of electron beam lithography, Idea of an X-ray lithography, Interference Lithography, Step Growth, Nano imprint, Self-Assembly, Nano templates.	15
4.	**Thin Film Analysis and Applications: [Course Outcome (s): CO407.6]** Film analysis: structure-thickness, topography, inhomogeneity, crystallography, bonding, point defects, composition, optical, electrical and mechanical behavior of thin films. Thin film technology applications: optical windows, integrated circuits, micro-electro-optomechanical systems and photovoltaics.	15

REFERENCE BOOKS

1. Chopra, K.L., Thin Film Phenomena, Robert E. Krieger publishing, 1969.
2. Smith, D.L., Thin-Film Deposition: Principles and Practice, McGraw-Hill, 1995.
3. Hummel, R. E. and Guenther, K.H., Handbook of Optical Properties: Thin Films for Optical Coatings, Volume 1, CRC Press, 1995.
4. Ohring, M., The Materials Science of Thin Films, 2nd Edition, Academic press, 2002.
5. Soriaga, M.P., Stickney, J., Bottomley, L.A., and Kim Y.G, Thin Films: Preparation, Characterization, Applications, Springer Science 2011.

Advanced Carbon Materials

<table>
<tr><td rowspan="2">Scheme Version:

2021-22</td><td rowspan="2">Name of the subject:

Advanced Carbon Materials</td><td>L</td><td>T</td><td>P</td><td>C</td><td rowspan="2">Semester:

I (1st Year)</td><td>Contact Hours per Week: 4</td></tr>
<tr><td>3</td><td>1</td><td>0</td><td>4</td><td>Total Hours: 60</td></tr>
<tr><td rowspan="2">Subject Code:
SBS PHY 01 408 DCEC 3104</td><td rowspan="2">Applicable to Programs: M.Sc. Physics</td><td rowspan="2">Evaluation

(Total Marks: 100)</td><td>CIE</td><td>30 Marks</td><td colspan="3">Examination Duration: 3 hours</td></tr>
<tr><td>TEE</td><td>70 Marks</td><td colspan="3">Prerequisite of Course: None</td></tr>
<tr><td>Course Description</td><td colspan="7">This course aims to introduce students to the advanced carbon material that includes graphene, fullerenes, hierarchical carbon, and CNTs are referred to as strength of revolution and advancement in the era of material science and technology. In general, 20th century corresponds to plastic meanwhile 21st century will be named as “Century of Graphene” owing to its exceptional physical properties.</td></tr>
<tr><td>Course Objective</td><td colspan="7">On completion of the course, student would be able:</td></tr>
</table>

	• To understand various properties of Graphene, CNTs and Fullerenes
Course Outcomes	On completion of the course, student would be able: **CO408D.1.** To understand the basic properties of carbon **CO408D.2.**To understand the various properties and applications of graphene **CO408D.3.**To understand the various properties and applications of CNT **CO408D.4.**To understand the various properties and applications of fullerenes

COURSE SYLLABUS

Unit No.	Content of Each Unit	Hours of Each Unit
1	**INTRODUCTION [Course Outcome(s): CO408D.1.]** Carbon atomic structure and hybridization, carbon on the Earth and in outer space, carbon in technology and economy, carbon isotopes: classification of carbon allotropes, conversion of one allotropic form into another, phase diagram of carbon, new carbon structures: discovery of C_{60}, Graphene and Nanotubes	**15**
2	**GRAPHENE [Course Outcome(s): CO408D.2.]** Structure of graphene; Preparation of graphene – synthesis of graphene by various physical and chemical methods and Purification; Electronic Properties – Band Structure of Graphene - Mobility and Density of Carriers - Quantum Hall Effect – Characterization of graphene: Raman Spectroscopy, Infrared Spectroscopy, Absorption and Photoluminescence Spectroscopy, Atomic Force Microscopy, Application of graphene	**15**
3	**CARBON NANOTUBES [Course Outcome(s): CO408D.3.]** The Structure of Carbon Nanotubes- Nomenclature, Structure of Single-Walled Carbon Nanotubes and Structure of Multiwalled Carbon Nanotubes; Synthesis of CNT by various physical and chemical methods and Purification, Characterization of Carbon Nanotubes: Raman and Infrared Spectroscopy of Carbon Nanotubes, Absorption and Emission Spectroscopy of Carbon Nanotubes, ESR-Spectroscopic Properties of Carbon Nanotubes.	**15**

	Application of CNTs	
4	**FULLERENES [Course Outcome(s): CO408D.4.]** Structure and Bonding- Nomenclature, The Structure of C60, Structure of Higher Fullerenes - Growth Mechanisms; Production and Purification- Fullerene Preparation by Pyrolysis of Hydrocarbons, Partial Combustion of Hydrocarbons, Arc Discharge Methods, Production by Resistive Heating, Rational Syntheses; Physical Properties-, Spectroscopic Properties, Thermodynamic Properties; Chemical Properties- Hydrogenation and Halogenation, Nucleophilic Addition to Fullerenes. Application of Fullerenes	**15**

TEXT BOOKS

1. **M.S. Dresselhaus, G. Dresselhaus and P.C. Eklund,** Science of Fullerenes and Carbon Nanotubes, Elsevier, 1996.
2. **Yury Gogotsi**, Carbon Nanomaterials, Taylor and Francis, 2006.
3. **Francois Leonard,** The Physics of Carbon Nanotube Devices, Elsevier, 2008.
4. **Anke Krueger**, Carbon Materials and Nanotechnology, Wiley-VCH, 2010.
5. **D.R. Askeland**, **P.P. Phule**, **W.J. Wright**, The Science and Engineering of Materials, 6th ed., Cengage Learning, 2010.
6. **Jamie H. Warner, Franziska Schäffel, Mark H. Rümmeli,** Graphene: Fundamentals and emergent applications, Elsevier, 2013.
7. **T. Pradeep**, NANO: The Essentials- Understanding Nanoscience and Nanotechnology, McGraw Hill Education, 2017.
8. **Deborah D L Chung**, Carbon Materials: Science and Applications, World Scientific, 2019.

Minor Research Project

<table>
<tr><td rowspan="2">Scheme Version:

2021-22</td><td rowspan="2">Name of the subject:

Minor Project</td><td></td><td>L</td><td>T</td><td>P</td><td>C</td><td rowspan="2">Semester:

IV (2nd Year)</td><td>Contact Hours per Week: 4</td></tr>
<tr><td></td><td>0</td><td>0</td><td></td><td>4</td><td>Total Hours: 60</td></tr>
<tr><td rowspan="2">Subject Code:
SBS PHY 01
409 DCEC
00016</td><td rowspan="2">Applicable to Programs:

M.Sc. Physics</td><td></td><td rowspan="2">Evaluation

(Total Marks: 100)</td><td>CIE</td><td>00</td><td colspan="3">Examination Duration:3 hours</td></tr>
<tr><td></td><td>TEE</td><td>100 Marks</td><td colspan="3">Prerequisite of Course: None</td></tr>
<tr><td>Course Description</td><td colspan="8">The minor project topic will be decided on the basis of student skill and interest.

On mentor will be allocated to student for discussion and direction.</td></tr>
</table>

Course Objectives		• Student will have idea about the literature survey and how to write an overview.
Course Outcomes		After completion of this project, students will be able to learn about: **CO401.1.** Basic of literature review **CO401.2.** Learn how to do research **CO401.3.** How to write a report. **CO401.4.** Present the work done in minor project.

Evaluation: The evaluation will be done by a Departmental committee constituted by Head of the Department. Committee will award the grades based on quality of project work done and presentation made by student.

INTRODUCTION TO HYDROGEN ENERGY SYSTEMS

Scheme Version: 2021-2022	**Name of the Subject:** Introduction to Hydrogen Energy Systems	**L**	**T**	**P**	**C**	**Semester:**	**Contact hours per week: 4**
		3	**1**	**0**	**4**	**IV** (2nd Year)	**Total Hours: 60**
Subject Code: SBS PHY 01 410 DCEC 3104	**Applicable to Programs:** M.Sc. Physics	**Evaluation (Total Marks):** 100	**CIE**	**30 Marks**	**Examination Duration: 3 hours**		
			TEE	**70 Marks**	**Pre-requisite of course:** None		
Course Description	To introduce the concept of energy generation from Hydrogen as future fuel. To enlighten the knowledge of production, storage and transportation.						
Course Objectives	This course aim is to give insight of hydrogen production, storage and their application, as a future source of energy.						

Course Outcomes:	On completion of this course, student will learn: **CO410.1** The Course will create awareness among students about Non-Conventional sources of energy technologies and provide adequate inputs on a variety of issues. **CO410.2** There is very good scope for saving energy, by using it judiciously. During these days of saving the environment, energy conservation plays a vital role. The government of India has passed Energy Conservation Act-2003 and Energy Conservation Building Code (ECBC-2007), in this regard. By observing energy efficient measures there is tremendous scope of saving energy in industry, built environment, transport etc. **CO410.3** To teach fundamentals of hydrogen energy as energy systems, production processes, separation and utilization that is necessary for taking some important elective subjects as well as to increase the potential for job opportunities in automotive industries and hydrogen production & its infrastructure development related sectors as about 40% energy is being consumed by automotive sectors. **CO410.4** This course has objectives to elaborate PG students regarding current trends in hydrogen energy architecture and following key concepts such as hydrogen storage and hydrogen sensing. **CO410.5**. To Provide adequate inputs on a variety of issues relating to safety guidelines, codes and standards in hydrogen energy systems.	
	COURSE SYLLABUS	
Unit No.	**Content of Each Unit**	**Hours of Each Unit**
5.	**Hydrogen energy pathways:[Course Outcome (s): CO410.1 & CO410.2]** **Hydrogen Energy Pathways-** Properties of hydrogen, Global and Indian hydrogen energy scenario, need for hydrogen, current uses, environmentally sustainable hydrogen, hydrogen as part of Climate Neutral Strategy. Hydrogen for mobility applications & vehicles, Overview of Hydrogen utilization: I.C. Engines, gas turbines, hydrogen burners, power plant, refineries, domestic and marine applications.	15
6.	**Hydrogen production and separation: [Course Outcome (s): CO410.3]** **Hydrogen Production**-Production of hydrogen from hydrocarbons-oxidative and nonoxidative processes, coal. Hydrogen production using nuclear energy and renewables- wind, biomass, solar. **Hydrogen separation and purification**-Pressure swing adsorption, Solvent based absorption, membrane separation, cryogenic separation etc.	15
7.	**Hydrogen storage: [Course Outcome (s): CO410.4]** **Hydrogen Storage** -Types of hydrogen storage (Gaseous, Liquid, Solid hosts), Gibbs Phase Rule, Pressure-Composition-Temperature plots; Van't Hoff plots for absorption desorption enthalpies, Gravimetric capacities, Hysteresis in cycling, Joule-Thomson Effect, Non-ideal treatment of hydrogen gas Kinetics: Hydrogen absorption/desorption phenomena (chemisorption, nucleation and growth and diffusion), Kinetic models, Kissinger analysis for activation energy estimation, Hydrogen adsorption	15

	isotherms-BET, design and applications of storage systems, materials for hydrogen storage, Hydrogen storage for automobiles.	
8.	**Hydrogen sensing and safety**: **[Course Outcome (s): CO410.4& CO410.5]** **Hydrogen sensing-**Traditional methods of hydrogen sensing using thermal conductivity measurements or Gas Chromatography, Mass Spectroscopy or laser gas analysis; Solid state sensors- their working principle and applications at industrial scale. **Hydrogen Safety-**Physiological, physical and chemical hazards, hydrogen properties associated with hazards, Hazard spotting, evaluation and safety guidelines, Hydrogen safety codes and standards. Hydrogen safety barrier diagram, risk analysis, safety in handling and refueling station, safety in vehicular and stationary applications, fire detecting system, safety management.	15

REFERENCE BOOKS

15. F. Peter, Fuels and Fuel Technology, A.Wheatan & Co. Ltd., 1st edition, 1965.
16. JOM Bockris, Energy options: Real Economics and the Solar Hydrogen System, Halsted Press and London publisher, 1980.
17. S. Sarkar, Fuels and Combustion, Orient Longman, 2nd edition, 1990.
18. J Twidell and T Weir, Renewable Energy Resources, Taylor and Francis (Ed), New York, USA, 2006.
19. J. G. Speight, The chemisty & Technology of Petroleum, 4th edition, CRC Press, 2006.
20. M. Ball and M. Wietschel, The Hydrogen Economy Opportunities and Challenges, Cambridge University Press, 2009.
21. J.G. Speight and B. Ozum, Petroleum Refining Process, CRC Press, 2009.
22. W. Lyons, Working Guide to Petroleum and Natural Gas Production Engineering, Elsevier Inc, 2009.
23. Ke Liu, C. Song and V. Subramani, Hydrogen and Syngas Production and Purification Technologies, John Wiley & Sons, 2010.
24. M.K.G. Babu, K.A. Subramanian, Alternative Transportation Fuels: Utilization in Combustion Engines, CRC Press, 2013.
25. J. G. Speight, The Chemistry and Technology of Coal, CRC Press, 2013.

9. TEACHING-LEARNING PROCESS

- Lectures
- Discussions
- Simulations
- Role Playing
- Participative Learning
- Interactive Sessions
- Seminars
- Research-based Learning/Dissertation or Project Work
- Technology-embedded Learning

10. IMPLEMENTATION OF BLENDED LEARNING

Blended Learning is a pedagogical approach that combines face to-face classroom methods with computer-mediated activities in the process of teaching and learning. It implies nice blend of face-to-face and online activities to make the learning processes more interesting and engaging. It focuses on integration of traditional classroom activities and innovative ICT-enabled strategies. It emphasises student-centric learning environment where the teacher is the facilitator for productive and measurable learning outcomes. It optimises and compliments the face to face learning, giving ample freedom and flexibility to the students and teachers to access and explore the wide range of open-access sources such as video lectures, podcasts, recordings and articles through digital platforms. It gives freedom and autonomy to the teachers in selection of appropriate digital platforms, resources and time-slots to complement and supplement face to face learning. The Blended Learning doesn't undermine the role of the teacher, rather it gives him/her an opportunity to explore the unexplored in accordance with the requirements of the curriculum.

Key features of Blended Learning

- **Student-Centric Pedagogical Approach** focusing on flexibility in timing, quality content, needs and interests of students and freedom to study through the mode of his/her choice;
- Freedom to Select variety of mediums and techniques;
- Increased student engagement in learning;
- Enhanced teacher and student interaction;
- Improved student learning outcomes;

- More flexible teaching and learning environment;
- More responsive for self and continuous learning;
- Better opportunities for experiential learning;
- Increased learning skills;
- Greater access to information, improved satisfaction and learning outcomes.

Note: Resolution no (c) as per minutes circulated by VC office**:** It was resolved that Blended Learning with 40% component of online teaching and 60% face to face classes for each programme, be adopted

11. ASSESSMENT AND EVALUATION

- Continuous Comprehensive Evaluation at regular after achievement of each Course-level learning outcome
- Formative Assessment on the basis of activities of a learner throughout the programme instead of one-time assessment
- Oral Examinations to test presentation and communication skills
- Open Book Examination for better understanding and application of the knowledge acquired
- Group Examinations on Problem solving exercises
- Seminar Presentations
- Review of Literature
- Collaborative Assignments

12. KEYWORDS

- LOCF
- NEP-2020
- Blended Learning
- Face to face (F to F) Learning
- Programme Outcomes
- Programme Specific Outcomes
- Course-level Learning Outcomes
- Postgraduate Attributes
- Learning Outcome Index
- Formative Assessment and Evaluation
- Comprehensive and Continuous Evaluation

13. REFERENCES

- National Education Policy-2020. https://www.education.gov.in/sites/upload_files/mhrd/files/NEP_Final_English_0.pdf
- The draft subject specific LOCF templates available on UGC website. https://www.ugc.ac.in/ugc_notices.aspx?id=MjY5OQ==
- Draft Blended Mode of Teaching and Learning: Concept Note available on UGC website. https://www.ugc.ac.in/pdfnews/6100340_Concept-Note-Blended-Mode-of-Teaching-and-Learning.pdf

14. APPENDICES

Annexure-XXXI

CENTRAL UNIVERSITY OF HARYANA

(*Established under the Central Universities Act, 2009*)

(NAAC Accredited 'A' Grade)

Curriculum and Syllabi
Of
Integrated B.Sc.-M.Sc. (Physics)

(w.e.f. September 2021)

DEPARTMENT OF PHYSICS & ASTROPHYSICS
SCHOOL OF BASIC SCIENCES

Approved by :	**BOS**	**School Board**	**Academic Council**
Approval Status :	Approved	Approved	x or √
Approval Date :	08-09-2021	20-09-2021	?

STRUCTURE OF Integrated BSc-MSc Programme

Course Structure (Physics-Major)

Details of courses under B.Sc. (Honors)

Course	*Credits	
	Theory+ Practical	Theory + Tutorial
I. Core Course		
(14 Papers)	14X4= 56	14X5=70
Core Course Practical / Tutorial*		
(14 Papers)	14X2=28	14X1=14
II. Elective Course		
(8 Papers)		
A.1. Discipline Specific Elective	4X4=16	4X5=20
(4 Papers)		
A.2. Discipline Specific Elective		
Practical/Tutorial*	4 X 2=8	4X1=4
(4 Papers)		
B.1. Generic Elective/		
Interdisciplinary	4X4=16	4X5=20
(4 Papers)		
B.2. Generic Elective		
Practical/ Tutorial*	4 X 2=8	4X1=4
(4 Papers)		

- **Optional Dissertation or project work in place of one Discipline Specific Elective paper (6 credits) in 6th Semester**

III. Ability Enhancement Courses		
1. Ability Enhancement Compulsory		
(2 Papers of 4 credit each)	2 X 4=8	2 X 4=8
Environmental Science		
English/MIL Communication		
2. **Ability Enhancement Elective** (Skill Based)		
(Minimum 2)	2 X 4=8	2 X 4=8
(2 Papers of 2 credit each)		
Total credit	**148**	**148**

Institute should evolve a system/policy about ECA/ General

Interest/Hobby/Sports/NCC/NSS/related courses on its own.
*** wherever there is a practical there will be no tutorial and vice-versa**

**** University may add more choices for Ability Enhancement compulsory and Ability Enhancement Elective (Skill Based) courses.**

SEMESTER-WISE COURSES AND CREDIT DISTRIBUTION

Scheme and Syllabus of Integrated BSc-MSc in Physics
(CHOICE BASED CREDIT SYSTEM)

……

Semester I

Total credits: 22

S. No.	Course Title	Course Code	L	T	P	Credits
1	Mathematical Physics-I		4	0	0	4
2	Mechanics		4	0	0	4
3	Ability Enhancement Compulsory course-1		4	0	0	4
4	Generic Elective-1		4	0	0	4
5	Mathematical Physics-1 Lab		2	0	0	2
6	Mechanics Lab		2	0	0	2
7	Generic Elective-1 Practical		0	0	4	2

Semester II

Total credits: 22

S. No.	Course Title	Course Code	L	T	P	Credits
1	Electricity and Magnetism		4	0	0	4
2	Waves and Optics		4	0	0	4
3	Ability Enhancement Compulsory course-2		4	0	0	4
4	Generic Elective-2		5	0	0	5
5	Electricity and Magnetism lab		0	0	4	2
6	Waves and Optics Lab		0	0	4	2
7	Generic Elective-2 Practical/Tutorial		0	0	1	1

Exit Options: Exit plan will be as per relevant ordinance.

Generic Elective Papers (GE) (Minor Physics) (any four) for other Departments/Disciplines:

(Credit: 06 Each)

1. **Mechanics**
2. **Electricity and Magnetism**
3. **Waves and Optics**
4. **Mathematical Physics**

CORE COURSE (HONOURS IN PHYSICS)

SEMESTR - I

PHYSICS-C I: MATHEMATICAL PHYSICS-I

(Credits: Theory-04, Practicals-02)
Theory: 60 Lectures

The emphasis of course is on applications in solving problems of interest to physicists. The students are to be examined entirely on the basis of problems, seen and unseen.

Calculus:
Recapitulation: Limits, continuity, average and instantaneous quantities, differentiation. Plotting functions. Intuitive ideas of continuous, differentiable, etc. functions and plotting of curves. Approximation: Taylor and binomial series (statements only).
(2 Lectures)

First Order and Second Order Differential equations: First Order Differential Equations and Integrating Factor. Homogeneous Equations with constant coefficients. Wronskian and general solution. Statement of existence and Uniqueness Theorem for Initial Value Problems. Particular Integral. **(13 Lectures)**

Calculus of functions of more than one variable: Partial derivatives, exact and inexact differentials. Integrating factor, with simple illustration. Constrained Maximization using Lagrange Multipliers. **(6 Lectures)**

Vector Calculus:
Recapitulation of vectors: Properties of vectors under rotations. Scalar product and its invariance under rotations. Vector product, Scalar triple product and their interpretation in terms of area and volume respectively. Scalar and Vector fields. **(5 Lectures)**

Vector Differentiation: Directional derivatives and normal derivative. Gradient of a scalar field and its geometrical interpretation. Divergence and curl of a vector field. Del and Laplacian operators. Vector identities. **(8 Lectures)**

Vector Integration: Ordinary Integrals of Vectors. Multiple integrals, Jacobian. Notion of infinitesimal line, surface and volume elements. Line, surface and volume integrals of Vector fields. Flux of a vector field. Gauss' divergence theorem, Green's and Stokes Theorems and their applications (no rigorous proofs). **(14 Lectures)**

Orthogonal Curvilinear Coordinates:
Orthogonal Curvilinear Coordinates. Derivation of Gradient, Divergence, Curl and Laplacian in Cartesian, Spherical and Cylindrical Coordinate Systems. **(6 Lectures)**

Introduction to probability:
Independent random variables: Probability distribution functions; binomial, Gaussian, and Poisson, with examples. Mean and variance.

Dependent events: Conditional Probability. Bayes' Theorem and the idea of hypothesis testing. **(4 Lectures)**

Dirac Delta function and its properties:
Definition of Dirac delta function. Representation as limit of a Gaussian function and rectangular function. Properties of Dirac delta function. **(2 Lectures)**

Reference Books:

- Mathematical Methods for Physicists, G.B. Arfken, H.J. Weber, F.E. Harris, 2013, 7th Edn., Elsevier.
- An introduction to ordinary differential equations, E.A. Coddington, 2009, PHI learning
- Differential Equations, George F. Simmons, 2007, McGraw Hill.
- Mathematical Tools for Physics, James Nearing, 2010, Dover Publications.
- Mathematical methods for Scientists and Engineers, D.A. McQuarrie, 2003, Viva Book
- Advanced Engineering Mathematics, D.G. Zill and W.S. Wright, 5 Ed., 2012, Jones and Bartlett Learning
- Mathematical Physics, Goswami, 1st edition, Cengage Learning
- Engineering Mathematics, S.Pal and S.C. Bhunia, 2015, Oxford University Press
- Advanced Engineering Mathematics, Erwin Kreyszig, 2008, Wiley India.
- Essential Mathematical Methods, K.F.Riley & M.P.Hobson, 2011, Cambridge Univ. Press

PHYSICS LAB- C I LAB:

60 Lectures

The aim of this Lab is not just to teach computer programming and numerical analysis but to emphasize its role in solving problems in Physics.

- *Highlights the use of computational methods to solve physical problems*
- *The course will consist of lectures (both theory and practical) in the Lab*
- *Evaluation done not on the programming but on the basis of formulating the problem*
- *Aim at teaching students to construct the computational problem to be solved*
- *Students can use any one operating system Linux or Microsoft Windows*

Topics	Description with Applications
Introduction and Overview	Computer architecture and organization, memory and Input/output devices

Basics of scientific computing	Binary and decimal arithmetic, Floating point numbers, algorithms, Sequence, Selection and Repetition, single and double precision arithmetic, underflow &overflow-emphasize the importance of making equations in terms of dimensionless variables, Iterative methods
Errors and error Analysis	Truncation and round off errors, Absolute and relative errors, Floating point computations.
Review of C & C++ Programming fundamentals	Introduction to Programming, constants, variables and data types, operators and Expressions, I/O statements, scanf and printf, c in and c out, Manipulators for data formatting, Control statements (decision making and looping statements) (*If-statement. If-else Statement. Nested if Structure. Else-if Statement. Ternary Operator. Goto Statement. Switch Statement. Unconditional and Conditional Looping. While Loop. Do-While Loop. FOR Loop. Break and Continue Statements. Nested Loops*), Arrays (*1D & 2D*) and strings, user defined functions, Structures and Unions, Idea of classes and objects
Programs:	Sum & average of a list of numbers, largest of a given list of numbers and its location in the list, sorting of numbers in ascending descending order, Binary search
Random number generation	Area of circle, area of square, volume of sphere, value of pi (**π**)
Solution of Algebraic and Transcendental equations by Bisection, Newton Raphson and Secant methods	Solution of linear and quadratic equation, solving $\alpha = \tan\alpha$; $I = I_0 \left(\frac{\sin\alpha}{\alpha} \right)^2$ in optics
Interpolation by Newton Gregory Forward and Backward difference formula, Error estimation of linear interpolation	Evaluation of trigonometric functions e.g. *sin θ, cos θ, tan θ, etc.*
Numerical differentiation (Forward and Backward difference formula) and Integration (Trapezoidal and Simpson rules), Monte Carlo method	Given Position with equidistant time data to calculate velocity and acceleration and vice versa. Find the area of B-H Hysteresis loop

Solution of Ordinary Differential Equations (ODE) First order Differential equation Euler, modified Euler and Runge-Kutta (RK) second and fourth order methods	First order differential equation • Radioactive decay • Current in RC, LC circuits with DC source • Newton's law of cooling • Classical equations of motion Attempt following problems using RK 4 order method: • Solve the coupled differential equations $\frac{dx}{dt} = y + x - \frac{x^3}{3}$; $\frac{dy}{dx} = -x$ for four initial conditions x(0) = 0, y(0) = -1, -2, -3, -4. Plot x vs y for each of the four initial conditions on the same screen for $0 \le t \le 15$ The differential equation describing the motion of a pendulum is $\frac{d^2P}{dt^2} = -\sin(P)$. The pendulum is released from rest at an angular displacement α, i. e. $P(0) = \alpha$ and $P'(0) = 0$. Solve the equation for $\alpha = 0.1, 0.5$ and 1.0 and plot P as a function of time in the range $0 \le t \le 8\pi$. Also plot the analytic solution valid for small P ($\sin(P) = P$

Referred Books:

- Introduction to Numerical Analysis, S.S. Sastry, 5th Edn. , 2012, PHI Learning Pvt. Ltd.
- Schaum's Outline of Programming with C++. J. Hubbard, 2000, McGraw-Hill Pub.
- Numerical Recipes in C: The Art of Scientific Computing, W.H. Pressetal, 3rd Edn. , 2007, Cambridge University Press.
- A first course in Numerical Methods, U.M. Ascher & C. Greif, 2012, PHI Learning.
- Elementary Numerical Analysis, K.E. Atkinson, 3rd Edn. , 2007, Wiley India Edition.
- Numerical Methods for Scientists & Engineers, R.W. Hamming, 1973, Courier Dover Pub.
- An Introduction to computational Physics, T.Pang, 2nd Edn. , 2006,Cambridge Univ. Press
- Computational Physics, Darren Walker, 1st Edn., 2015, Scientific International Pvt. Ltd.

PHYSICS-C II: MECHANICS

(Credits: Theory-04, Practicals-02)

Theory: 60 Lectures

Fundamentals of Dynamics: Reference frames. Inertial frames; Review of Newton's Laws of Motion. Galilean transformations; Galilean invariance. Momentum of variable-mass system: motion of rocket. Motion of a projectile in Uniform gravitational field Dynamics of a system of particles. Centre of Mass. Principle of conservation of momentum. Impulse. **(6 Lectures)**

Work and Energy: Work and Kinetic Energy Theorem. Conservative and non-conservative forces. Potential Energy. Energy diagram. Stable and unstable equilibrium. Elastic potential energy. Force as gradient of potential energy. Work & Potential energy. Work done by non-conservative forces. Law of conservation of Energy. **(4 Lectures)**

Collisions: Elastic and inelastic collisions between particles. Centre of Mass and Laboratory frames. **(3 Lectures)**

Rotational Dynamics: Angular momentum of a particle and system of particles. Torque. Principle of conservation of angular momentum. Rotation about a fixed axis. Moment of Inertia. Calculation of moment of inertia for rectangular, cylindrical and spherical bodies. Kinetic energy of rotation. Motion involving both translation and rotation. **(12 Lectures)**

Elasticity: Relation between Elastic constants. Twisting torque on a Cylinder or Wire. **(3 Lectures)**

Fluid Motion: Kinematics of Moving Fluids: Poiseuille's Equation for Flow of a Liquid through a Capillary Tube. **(2 Lectures)**

Gravitation and Central Force Motion: Law of gravitation. Gravitational potential energy. Inertial and gravitational mass. Potential and field due to spherical shell and solid sphere. **(3 Lectures)**

Motion of a particle under a central force field. Two-body problem and its reduction to one-body problem and its solution. The energy equation and energy diagram. Kepler's Laws. Satellite in circular orbit and applications. Geosynchronous orbits. Weightlessness. Basic idea of global positioning system (GPS).

(6 Lectures)

Oscillations: SHM: Simple Harmonic Oscillations. Differential equation of SHM and its solution. Kinetic energy, potential energy, total energy and their time-average values.

Damped oscillation. Forced oscillations: Transient and steady states; Resonance, sharpness of resonance; power dissipation and Quality Factor. **(7 Lectures)**

Non-Inertial Systems: Non-inertial frames and fictitious forces. Uniformly rotating frame. Laws of Physics in rotating coordinate systems. Centrifugal force. Coriolis force and its applications. Components of Velocity and Acceleration in Cylindrical and Spherical Coordinate Systems. **(4 Lectures)**

Special Theory of Relativity: Michelson-Morley Experiment and its outcome. Postulates of Special Theory of Relativity. Lorentz Transformations. Simultaneity and order of events. Lorentz contraction. Time dilation. Relativistic transformation of velocity, frequency and wave number. Relativistic addition of velocities. Variation of mass with velocity. Massless Particles. Mass-energy Equivalence. Relativistic Doppler effect. Relativistic Kinematics. Transformation of Energy and Momentum.

(10 Lectures)

Reference Books:

- An introduction to mechanics, D. Kleppner, R.J. Kolenkow, 1973, McGraw-Hill.
- Mechanics, Berkeley Physics, vol.1, C.Kittel, W.Knight, et.al. 2007, Tata McGraw-Hill.
- Physics, Resnick, Halliday and Walker 8/e. 2008, Wiley.
- Analytical Mechanics, G.R. Fowles and G.L. Cassiday. 2005, Cengage Learning.
- Feynman Lectures, Vol. I, R.P.Feynman, R.B.Leighton, M.Sands, 2008, Pearson Education
- Introduction to Special Relativity, R. Resnick, 2005, John Wiley and Sons.
- University Physics, Ronald Lane Reese, 2003, Thomson Brooks/Cole.

Additional Books for Reference

- Mechanics, D.S. Mathur, S. Chand and Company Limited, 2000
- University Physics. F.W Sears, M.W Zemansky, H.D Young 13/e, 1986, Addison Wesley
- Physics for scientists and Engineers with Modern Phys., J.W. Jewett, R.A. Serway, 2010, Cengage Learning
- Theoretical Mechanics, M.R. Spiegel, 2006, Tata McGraw Hill.

PHYSICS LAB-C II LAB

60 Lectures

1. Measurements of length (or diameter) using vernier caliper, screw gauge and travelling microscope.
2. To study the random error in observations.
3. To determine the height of a building using a Sextant.
4. To study the Motion of Spring and calculate (a) Spring constant, (b) **g** and (c) Modulus of rigidity.
5. To determine the Moment of Inertia of a Flywheel.
6. To determine **g** and velocity for a freely falling body using Digital Timing Technique
7. To determine Coefficient of Viscosity of water by Capillary Flow Method

(Poiseuille's method).

8. To determine the Young's Modulus of a Wire by Optical Lever Method.
9. To determine the Modulus of Rigidity of a Wire by Maxwell's needle.
10. To determine the elastic Constants of a wire by Searle's method.
11. To determine the value of g using Bar Pendulum.
12. To determine the value of g using Kater's Pendulum.

Reference Books

- Advanced Practical Physics for students, B. L. Flint and H.T. Worsnop, 1971, Asia Publishing House
- Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers
- A Text Book of Practical Physics, I.Prakash & Ramakrishna, 11th Edn, 2011, Kitab Mahal
- Engineering Practical Physics, S.Panigrahi & B.Mallick,2015, Cengage Learning India Pvt. Ltd.
- Practical Physics, G.L. Squires, 2015, 4th Edition, Cambridge University Press.
- Advanced Practical Physics, Vol. I, S. P. Singh, 2020, Pragati Prakashan

SEMESTER - II

PHYSICS-C III: ELECTRICITY AND MAGNETISM

(Credits: Theory-04, Practicals-02)
Theory: 60 Lectures

Electric Field and Electric Potential
Electric field: Electric field lines. Electric flux. Gauss' Law with applications to charge distributions with spherical, cylindrical and planar symmetry. **(6 Lectures)**

Conservative nature of Electrostatic Field. Electrostatic Potential. Laplace's and Poisson equations. The Uniqueness Theorem. Potential and Electric Field of a dipole. Force and Torque on a dipole. **(6 Lectures)**

Electrostatic energy of system of charges. Electrostatic energy of a charged sphere. Conductors in an electrostatic Field. Surface charge and force on a conductor. Capacitance of a system of charged conductors. Parallel-plate capacitor. Capacitance of an isolated conductor. Method of Images and its application to: (1) Plane Infinite Sheet and (2) Sphere. **(10 Lectures)**

Dielectric Properties of Matter: Electric Field in matter. Polarization, Polarization Charges. Electrical Susceptibility and Dielectric Constant. Capacitor (parallel plate, spherical, cylindrical) filled with dielectric. Displacement vector **D**. Relations between **E**, **P** and **D**. Gauss' Law in dielectrics. **(8 Lectures)**

Magnetic Field: Magnetic force between current elements and definition of Magnetic Field**B**. Biot-Savart's Law and its simple applications: straight wire and circular loop. Current Loop as a Magnetic Dipole and its Dipole Moment (Analogy with Electric Dipole). Ampere's Circuital Law and its application to (1) Solenoid and (2) Toroid. Properties of **B**: curl and divergence. Vector Potential. Magnetic Force on (1) point charge (2) current carrying wire (3) between current elements. Torque on a current loop in a uniform Magnetic Field. **(9 Lectures)**

Magnetic Properties of Matter: Magnetization vector (**M).** Magnetic Intensity(**H).** Magnetic Susceptibility and permeability. Relation between **B, H, M**. Ferromagnetism. B-H curve and hysteresis. **(4 Lectures)**

Electromagnetic Induction: Faraday's Law. Lenz's Law. Self Inductance and Mutual

Inductance. Reciprocity Theorem. Energy stored in a Magnetic Field. Introduction to Maxwell's Equations. Charge Conservation and Displacement current. **(6 Lectures)**

Electrical Circuits: AC Circuits: Kirchhoff's laws for AC circuits. Complex Reactance and Impedance. Series LCR Circuit: (1) Resonance, (2) Power Dissipation and (3)

Quality Factor, and (4) Band Width. Parallel LCR Circuit. **(4 Lectures)**

Network theorems: Ideal Constant-voltage and Constant-current Sources. Network Theorems: Thevenin theorem, Norton theorem, Superposition theorem, Reciprocity theorem, Maximum Power Transfer theorem. Applications to dc circuits. **(4 Lectures)**

Ballistic Galvanometer: Torque on a current Loop. Ballistic Galvanometer: Current and Charge Sensitivity. Electromagnetic damping. Logarithmic damping. CDR.
(3 Lectures)

Reference Books:

- Electricity, Magnetism & Electromagnetic Theory, S. Mahajan and Choudhury, 2012, Tata McGraw
- Electricity and Magnetism, Edward M. Purcell, 1986 McGraw-Hill Education
- Introduction to Electrodynamics, D.J. Griffiths, 3rd Edn., 1998, Benjamin Cummings.
- Feynman Lectures Vol.2, R.P.Feynman, R.B.Leighton, M. Sands, 2008, Pearson Education
- Elements of Electromagnetics, M.N.O. Sadiku, 2010, Oxford University Press.
- Electricity and Magnetism, J.H.Fewkes & J.Yarwood. Vol. I, 1991, Oxford Univ. Press.

PHYSICS LAB-C III LAB

60 Lectures

1. Use a Multimeter for measuring (a) Resistances, (b) AC and DC Voltages, (c) DC Current, (d) Capacitances, and (e) Checking electrical fuses.
2. To study the characteristics of a series RC Circuit.
3. To determine an unknown Low Resistance using Potentiometer.
4. To determine an unknown Low Resistance using Carey Foster's Bridge.
5. To compare capacitances using De'Sauty's bridge.
6. Measurement of field strength B and its variation in a solenoid (determine dB/dx)
7. To verify the Thevenin and Norton theorems.
8. To verify the Superposition, and Maximum power transfer theorems.
9. To determine self inductance of a coil by Anderson's bridge.
10. To study response curve of a Series LCR circuit and determine its (a) Resonant frequency, (b) Impedance at resonance, (c) Quality factor Q, and (d) Band width.
11. To study the response curve of a parallel LCR circuit and determine its (a) Anti-

resonant frequency and (b) Quality factor Q.

12. Measurement of charge and current sensitivity and CDR of Ballistic Galvanometer
13. Determine a high resistance by leakage method using Ballistic Galvanometer.
14. To determine self-inductance of a coil by Rayleigh's method.
15. To determine the mutual inductance of two coils by Absolute method.

Reference Books

- Advanced Practical Physics for students, B.L. Flint and H.T. Worsnop, 1971, Asia Publishing House
- A Text Book of Practical Physics, I.Prakash & Ramakrishna, 11th Ed., 2011, Kitab Mahal
- Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers
- Engineering Practical Physics, S.Panigrahi and B.Mallick, 2015, Cengage Learning.
- A Laboratory Manual of Physics for undergraduate classes, D.P.Khandelwal, 1985, Vani Pub.
- Advanced Practical Physics Vol. II, S. P. Singh, 2020, Pragati Prakashan.

PHYSICS-C IV: WAVES AND OPTICS

(Credits: Theory-04, Practicals-02)
Theory: 60 Lectures

Superposition of Collinear Harmonic oscillations: Linearity and Superposition Principle. Superposition of two collinear oscillations having (1) equal frequencies and

(2) different frequencies (Beats). Superposition of N collinear Harmonic Oscillations with (1) equal phase differences and (2) equal frequency differences. **(5 Lectures)**

Superposition of two perpendicular Harmonic Oscillations: Graphical and Analytical Methods. Lissajous Figures with equal an unequal frequency and their uses.

(2 Lectures)

Wave Motion: Plane and Spherical Waves. Longitudinal and Transverse Waves. Plane Progressive (Travelling) Waves. Wave Equation. Particle and Wave Velocities. Differential Equation. Pressure of a Longitudinal Wave. Energy Transport. Intensity of Wave. Water Waves: Ripple and Gravity Waves. **(4 Lectures)**

Velocity of Waves: Velocity of Transverse Vibrations of Stretched Strings. Velocity of Longitudinal Waves in a Fluid in a Pipe. Newton's Formula for Velocity of Sound. Laplace's Correction. **(6 Lectures)**

Superposition of Two Harmonic Waves: Standing (Stationary) Waves in a String: Fixed and Free Ends. Analytical Treatment. Phase and Group Velocities. Changes with respect to Position and Time. Energy of Vibrating String. Transfer of Energy. Normal

Modes of Stretched Strings. Plucked and Struck Strings. Melde's Experiment. Longitudinal Standing Waves and Normal Modes. Open and Closed Pipes. Superposition of N Harmonic Waves. **(7 Lectures)**

Wave Optics: Electromagnetic nature of light. Definition and properties of wave front. Huygens Principle. Temporal and Spatial Coherence. **(3 Lectures)**

Interference: Division of amplitude and wavefront. Young's double slit experiment. Lloyd's Mirror and Fresnel's Biprism. Phase change on reflection: Stokes' treatment. Interference in Thin Films: parallel and wedge-shaped films. Fringes of equal inclination (Haidinger Fringes); Fringes of equal thickness (Fizeau Fringes). Newton's Rings: Measurement of wavelength and refractive index. **(9 Lectures)**

Interferometer: Michelson Interferometer-(1) Idea of form of fringes (No theory required), (2) Determination of Wavelength, (3) Wavelength Difference, (4) Refractive Index, and (5) Visibility of Fringes. Fabry-Perot interferometer. **(4 Lectures)**

Diffraction: Kirchhoff's Integral Theorem, Fresnel-Kirchhoff's Integral formula. (Qualitative discussion only) **(2 Lectures)**

Fraunhofer diffraction: Single slit. Circular aperture, Resolving Power of a telescope. Double slit. Multiple slits. Diffraction grating. Resolving power of grating. **(8 Lectures)**

Fresnel Diffraction: Fresnel's Assumptions. Fresnel's Half-Period Zones for Plane Wave. Explanation of Rectilinear Propagation of Light. Theory of a Zone Plate: Multiple Foci of a Zone Plate. Fresnel's Integral, Fresnel diffraction pattern of a straight edge, a slit and a wire. **(7 Lectures)**

Holography: Principle of Holography. Recording and Reconstruction Method. Theory of Holography as Interference between two Plane Waves. Point source holograms. **(3 Lectures)**

Reference Books

- Waves: Berkeley Physics Course, vol. 3, Francis Crawford, 2007, Tata McGraw-Hill.
- Fundamentals of Optics, F.A. Jenkins and H.E. White, 1981, McGraw-Hill
- Principles of Optics, Max Born and Emil Wolf, 7th Edn., 1999, Pergamon Press.
- Optics, Ajoy Ghatak, 2008, Tata McGraw Hill
- The Physics of Vibrations and Waves, H. J. Pain, 2013, John Wiley and Sons.
- The Physics of Waves and Oscillations, N.K. Bajaj, 1998, Tata McGraw Hill.
- Fundamental of Optics, A. Kumar, H.R. Gulati and D.R. Khanna, 2011, R. Chand Publications.

PHYSICS LAB- C IV LAB

60 Lectures

1. To determine the frequency of an electric tuning fork by Melde's experiment andverify λ^2 –T law.
2. To investigate the motion of coupled oscillators.
3. To study Lissajous Figures.
4. Familiarization with: Schuster`s focusing; determination of angle of prism.
5. To determine refractive index of the Material of a prism using sodium source.
6. To determine the dispersive power and Cauchy constants of the material of aprism using mercury source.
7. To determine the wavelength of sodium source using Michelson's interferometer.
8. To determine wavelength of sodium light using Fresnel Biprism.
9. To determine wavelength of sodium light using Newton's Rings.
10. To determine the thickness of a thin paper by measuring the width of theinterference fringes produced by a wedge-shaped Film.
11. To determine wavelength of (1) Na source and (2) spectral lines of Hg source using plane diffraction grating.
12. To determine dispersive power and resolving power of a plane diffraction grating.

Reference Books

- Advanced Practical Physics for students, B.L. Flint and H.T. Worsnop, 1971, Asia Publishing House
- A Text Book of Practical Physics, I. Prakash & Ramakrishna, 11th Ed., 2011, Kitab Mahal
- Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers
- A Laboratory Manual of Physics for undergraduate classes, D.P.Khandelwal, 1985, Vani Pub.
- Advanced Practical Physics Vol. II, S. P. Singh, 2020, Pragati Prakashan

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Generic Elective Papers (GE) (Minor-Physics) (any four) for other Departments/Disciplines: (Credit: 06 each)

GE: MECHANICS

(Credits: Theory-04, Practicals-02)
Theory: 60 Lectures

Vectors: Vector algebra. Scalar and vector products. Derivatives of a vector with respect to a parameter. **(4 Lectures)**

Ordinary Differential Equations: 1st order homogeneous differential equations. 2nd order homogeneous differential equations with constant coefficients. **(6 Lectures)**

Laws of Motion: Frames of reference. Newton's Laws of motion. Dynamics of a system of particles. Centre of Mass. **(10 Lectures)**

Momentum and Energy: Conservation of momentum. Work and energy. Conservation of energy. Motion of rockets. **(6 Lectures)**

Rotational Motion: Angular velocity and angular momentum. Torque. Conservation of angular momentum. **(5 Lectures)**

Gravitation: Newton's Law of Gravitation. Motion of a particle in a central force field (motion is in a plane, angular momentum is conserved, areal velocity is constant). Kepler's Laws (statement only). Satellite in circular orbit and applications. Geosynchronous orbits. Basic idea of global positioning system (GPS). Weightlessness. Physiological effects on astronauts. **(8 Lectures)**

Oscillations: Simple harmonic motion. Differential equation of SHM and its solutions. Kinetic and Potential Energy, Total Energy and their time averages. Damped oscillations. **(6 Lectures)**

Elasticity: Hooke's law - Stress-strain diagram - Elastic moduli-Relation between elastic constants - Poisson's Ratio-Expression for Poisson's ratio in terms of elastic constants - Work done in stretching and work done in twisting a wire - Twisting couple on a cylinder - Determination of Rigidity modulus by static torsion - Torsional

pendulum-Determination of Rigidity modulus and moment of inertia - q, η and σ by Searles method. **(8 Lectures)**

Special Theory of Relativity: Constancy of speed of light. Postulates of Special Theory of Relativity. Length contraction. Time dilation. Relativistic addition of velocities. **(7 Lectures)**

Note: *Students are not familiar with vector calculus. Hence all examples involve differentiation either in one dimension or with respect to the radial coordinate*

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Reference Books:

- University Physics. F.W. Sears, M.W. Zemansky and H.D. Young, 13/e, 1986. Addison-Wesley
- Mechanics Berkeley Physics, v.1: Charles Kittel, et. al. 2007, Tata McGraw-Hill.
- Physics – Resnick, Halliday & Walker 9/e, 2010, Wiley
- Engineering Mechanics, Basudeb Bhattacharya, 2nd edn., 2015, Oxford University Press
- University Physics, Ronald Lane Reese, 2003, Thomson Brooks/Cole.

PHYSICS LAB: GE LAB: MECHANICS

60 Lectures

1. Measurements of length (or diameter) using vernier caliper, screw gauge andtravelling microscope.
2. To determine the Height of a Building using a Sextant.
3. To determine the Moment of Inertia of a Flywheel.
4. To determine the Young's Modulus of a Wire by Optical Lever Method.
5. To determine the Modulus of Rigidity of a Wire by Maxwell's needle.
6. To determine the Elastic Constants of a Wire by Searle's method.
7. To determine g by Bar Pendulum.
8. To determine g by Kater's Pendulum.
9. To study the Motion of a Spring and calculate (a) Spring Constant, (b) g.

Reference Books:

- Advanced Practical Physics for students, B.L. Flint and H.T. Worsnop, 1971, Asia Publishing House.
- Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers.
- Engineering Practical Physics, S.Panigrahi & B.Mallick,2015, Cengage Learning India Pvt. Ltd.
- A Text Book of Practical Physics, Indu Prakash and Ramakrishna, 11thEdition, 2011, Kitab Mahal, New Delhi.

GE: ELECTRICITY AND MAGNETISM

(Credits: Theory-04, Practicals-02)

Theory: 60 Lectures

Vector Analysis: Review of vector algebra (Scalar and Vector product), gradient, divergence, Curl and their significance, Vector Integration, Line, surface and volume integrals of Vector fields, Gauss-divergence theorem and Stoke's theorem of vectors (statement only).

(12 Lectures)

Electrostatics: Electrostatic Field, electric flux, Gauss's theorem of electrostatics. Applications of Gauss theorem- Electric field due to point charge, infinite line of charge, uniformly charged spherical shell and solid sphere, plane charged sheet, charged conductor. Electric potential as line integral of electric field, potential due to a point charge, electric dipole, uniformly charged spherical shell and solid sphere. Calculation of electric field from potential. Capacitance of an isolated spherical conductor. Parallel plate, spherical and cylindrical condenser. Energy per unit volume in electrostatic field. Dielectric medium, Polarisation, Displacement vector. Gauss's theorem in dielectrics. Parallel plate capacitor completely filled with dielectric.

(22 Lectures)

Magnetism:

Magnetostatics: Biot-Savart's law and its applications- straight conductor, circular coil, solenoid carrying current. Divergence and curl of magnetic field. Magnetic vector potential. Ampere's circuital law.

Magnetic properties of materials: Magnetic intensity, magnetic induction, permeability, magnetic susceptibility. Brief introduction of dia-, para-and ferro-magnetic materials. **(10 Lectures)**

Electromagnetic Induction: Faraday's laws of electromagnetic induction, Lenz's law, self and mutual inductance, L of single coil, M of two coils. Energy stored in magnetic field. **(6 Lectures)**

Maxwell`s equations and Electromagnetic wave propagation: Equation of continuity of current, Displacement current, Maxwell's equations, Poynting vector, energy density in electromagnetic field, electromagnetic wave propagation through vacuum and isotropic dielectric medium, transverse nature of EM waves, polarization.

(10 Lectures)

Reference Books:

- Electricity and Magnetism, Edward M. Purcell, 1986, McGraw-Hill Education
- Electricity & Magnetism, J.H. Fewkes & J.Yarwood. Vol. I, 1991, Oxford Univ. Press

- Electricity and Magnetism, D C Tayal, 1988, Himalaya Publishing House.
- University Physics, Ronald Lane Reese, 2003, Thomson Brooks/Cole.
- D.J.Griffiths, Introduction to Electrodynamics, 3rd Edn, 1998, Benjamin Cummings.

GE LAB: ELECTRICITY AND MAGNETISM

60 Lectures

1. To use a Multimeter for measuring (a) Resistances, (b) AC and DC Voltages, (c) DC Current, and (d) checking electrical fuses.
2. Ballistic Galvanometer:
   (i) Measurement of charge and current sensitivity
   (ii) Measurement of CDR
   (iii) Determine a high resistance by Leakage Method
   (iv) To determine Self Inductance of a Coil by Rayleigh's Method.
3. To compare capacitances using De'Sauty's bridge.
4. Measurement of field strength B and its variation in a Solenoid (Determine dB/dx)
5. To study the Characteristics of a Series RC Circuit.
6. To study a series LCR circuit LCR circuit and determine its (a) Resonant frequency, (b) Quality factor
7. To study a parallel LCR circuit and determine its (a) Anti-resonant frequency and (b) Quality factor Q
8. To determine a Low Resistance by Carey Foster's Bridge.
9. To verify the Thevenin and Norton theorems
10. To verify the Superposition, and Maximum Power Transfer Theorems

Reference Books

- Advanced Practical Physics for students, B.L.Flint & H.T.Worsnop, 1971, Asia Publishing House.
- Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers
- A Text Book of Practical Physics, I.Prakash & Ramakrishna, 11th Ed.2011, Kitab Mahal
- Engineering Practical Physics, S.Panigrahi & B.Mallick,2015, Cengage Learning India Pvt. Ltd.

GE: WAVES AND OPTICS

(Credits: Theory-04, Practicals-02)
Theory: 60 Lectures

Superposition of Two Collinear Harmonic oscillations: Linearity & Superposition Principle. (1) Oscillations having equal frequencies and (2) Oscillations having different frequencies (Beats). **(4 Lectures)**

Superposition of Two Perpendicular Harmonic Oscillations: Graphical and Analytical Methods. Lissajous Figures with equal an unequal frequency and their uses. **(2 Lectures)**

Waves Motion- General: Transverse waves on a string. Travelling and standing waves on a string. Normal Modes of a string. Group velocity, Phase velocity. Plane waves. Spherical waves, Wave intensity. **(7 Lectures)**

Fluids: Surface Tension: Synclastic and anticlastic surface - Excess of pressure - Application to spherical and cylindrical drops and bubbles - variation of surface tension with temperature - Jaegar's method. Viscosity - Rate flow of liquid in a capillary tube - Poiseuille's formula - Determination of coefficient of viscosity of a liquid - Variations of viscosity of liquid with temperature- lubrication. **(6 Lectures)**

Sound: Simple harmonic motion - forced vibrations and resonance - Fourier's Theorem - Application to saw tooth wave and square wave - Intensity and loudness of sound - Decibels - Intensity levels - musical notes - musical scale. Acoustics of buildings: Reverberation and time of reverberation - Absorption coefficient - Sabine's formula - measurement of reverberation time - Acoustic aspects of halls and auditoria. **(6 Lectures)**

Wave Optics: Electromagnetic nature of light. Definition and Properties of wave front. Huygens Principle. **(3 Lectures)**

Interference: Interference: Division of amplitude and division of wavefront. Young's Double Slit experiment. Lloyd's Mirror and Fresnel's Biprism. Phase change on reflection: Stokes' treatment. Interference in Thin Films: parallel and wedge-shaped films. Fringes of equal inclination (Haidinger Fringes); Fringes of equal thickness (Fizeau Fringes). Newton's Rings: measurement of wavelength and refractive index.

(10 Lectures)

Michelson's Interferometer: Idea of form of fringes (no theory needed), Determination of wavelength, Wavelength difference, Refractive index, and Visibility of fringes. **(3 Lectures)**

Diffraction: Fraunhofer diffraction- Single slit; Double Slit. Multiple slits and Diffraction grating. Fresnel Diffraction: Half-period zones. Zone plate. Fresnel Diffraction pattern of a straight edge, a slit and a wire using half-period zone analysis.

(14 Lectures)

Polarization: Transverse nature of light waves. Plane polarized light – production and analysis. Circular and elliptical polarization. **(5 Lectures)**

Reference Books:

- Fundamentals of Optics, F.A Jenkins and H.E White, 1976, McGraw-Hill
- Principles of Optics, B.K. Mathur, 1995, Gopal Printing
- Fundamentals of Optics, H.R. Gulati and D.R. Khanna, 1991, R. Chand Publications
- University Physics. F.W. Sears, M.W. Zemansky and H.D. Young. 13/e, 1986. Addison-Wesley

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GE LAB: WAVES AND OPTICS

60 Lectures

1. To investigate the motion of coupled oscillators
2. To determine the Frequency of an Electrically Maintained Tuning Fork by Melde's Experiment and to verify λ^2 – T Law.
3. To study Lissajous Figures
4. Familiarization with Schuster`s focussing; determination of angle of prism.
5. To determine the Coefficient of Viscosity of water by Capillary Flow Method (Poiseuille's method).
6. To determine the Refractive Index of the Material of a Prism using Sodium Light.
7. To determine Dispersive Power of the Material of a Prism using Mercury Light
8. To determine the value of Cauchy Constants.
9. To determine the Resolving Power of a Prism.
10. To determine wavelength of sodium light using Fresnel Biprism.
11. To determine wavelength of sodium light using Newton's Rings.
12. To determine the wavelength of Laser light using Diffraction of Single Slit.
13. To determine wavelength of (1) Sodium and (2) Spectral lines of the Mercury

light using plane diffraction Grating

14. To determine the Resolving Power of a Plane Diffraction Grating.
15. To measure the intensity using photosensor and laser in diffraction patterns ofsingle and double slits.

Reference Books:

- Advanced Practical Physics for students, B.L. Flint and H.T. Worsnop, 1971, Asia Publishing House.
- Advanced level Physics Practicals, Michael Nelson and Jon M. Ogborn, 4th Edition, reprinted 1985, Heinemann Educational Publishers
- A Text Book of Practical Physics, Indu Prakash and Ramakrishna, 11thEdition, 2011, Kitab Mahal, New Delhi.

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1. To design a CE amplifier of given gain (mid-gain) using voltage divider bias.
2. To design an inverting amplifier of given gain using Op-amp 741 and study its frequency response.
3. To design a non-inverting amplifier of given gain using Op-amp 741 and study its Frequency Response.
4. To study Differential Amplifier of given I/O specification using Op-amp.
5. To investigate a differentiator made using op-amp.
6. To design a Wien Bridge Oscillator using an op-amp.

Reference Books:

- Basic Electronics: A text lab manual, P.B. Zbar, A.P. Malvino, M.A. Miller, 1994, Mc-Graw Hill.
- Electronics: Fundamentals and Applications, J.D. Ryder, 2004, Prentice Hall.
- OP-Amps & Linear Integrated Circuit, R.A. Gayakwad, 4th Edn, 2000, Prentice Hall.
- Electronic Principle, Albert Malvino, 2008, Tata Mc-Graw Hill.

GE: MATHEMATICAL PHYSICS

(Credits: Theory-04, Practicals-02)
Theory: 60 Lectures

The emphasis of the course is on applications in solving problems of interest to physicists. Students to be examined on the basis of problems, seen and unseen.

Calculus of functions of more than one variable: Partial derivatives, exact and inexact differentials. Integrating factor, with simple illustration. Constrained Maximization using Lagrange Multipliers. **(6 Lectures)**

Fourier Series: Periodic functions. Orthogonality of sine and cosine functions, Dirichlet Conditions (Statement only). Expansion of periodic functions in a series of sine and cosine functions and determination of Fourier coefficients. Complex representation of Fourier series. Expansion of functions with arbitrary period. Expansion of non-periodic functions over an interval. Even and odd functions and their Fourier expansions. Application. Summing of Infinite Series. **(10 Lectures)**

Frobenius Method and Special Functions: Singular Points of Second Order Linear Differential Equations and their importance. Frobenius method and its applications to differential equations. Legendre, Bessel, Hermite & Laguerre Differential Equations. Properties of Legendre Polynomials: Rodrigues Formula, Orthogonality. Simple recurrence relations. **(16 Lectures)**

Some Special Integrals: Beta and Gamma Functions and Relation between them. Expression of Integrals in terms of Gamma Functions. Error Function (Probability Integral). **(4 Lectures)**

Partial Differential Equations: Solutions to partial differential equations, using separation of variables: Laplace's Equation in problems of rectangular, cylindrical and spherical symmetry. **(10 Lectures)**

Complex Analysis: Brief Revision of Complex Numbers and their Graphical Representation. Euler's formula, De Moivre's theorem, Roots of Complex Numbers. Functions of Complex Variables. Analyticity and Cauchy-Riemann Conditions. Examples of analytic functions. Singular functions: poles and branch points, order of singularity, branch cuts. Integration of a function of a complex variable. Cauchy's Inequality. Cauchy's Integral formula. **(14 Lectures)**

Reference Books:

- Mathematical Methods for Physicists: Arfken, Weber, 2005, Harris, Elsevier.

- Fourier Analysis by M.R. Spiegel, 2004, Tata McGraw-Hill.
- Mathematics for Physicists, Susan M. Lea, 2004, Thomson Brooks/Cole.
- An Introduction to Ordinary Differential Equations, E.A Coddington, 1961, PHI Learning
- Differential Equations, George F. Simmons, 2006, Tata McGraw-Hill.
- Partial Differential Equations for Scientists and Engineers, S.J. Farlow, 1993, Dover Publications.
- Mathematical methods for Scientists & Engineers, D.A. McQuarrie, 2003, Viva Books.

GE LAB: MATHEMATICAL PHYSICS

60 Lectures

The aim of this Lab is not just to teach computer programming and numerical analysis but to emphasize its role in solving problems in Physics.

- *The course will consist of lectures (both theory and practical) in the Lab*
- *Evaluation done on the basis of formulating the problem*
- *Aim at teaching students to construct the computational problem to be solved*

Topics	**Description with Applications**
Introduction and Overview	Computer architecture and organization, memory and Input/output devices
Basics of scientific computing	Binary and decimal arithmetic, Floating point numbers, algorithms, Sequence, Selection and Repetition, single and double precision arithmetic, underflow &overflow-emphasize the importance of making equations in terms of dimensionless variables, Iterative methods
Errors and error Analysis	Truncation and round off errors, Absolute and relative errors, Floating point computations.
Review of C & C++ Programming fundamentals	Introduction to Programming, constants, variables and data types, operators and Expressions, I/O statements, scanf and printf, c in and c out, Manipulators for data formatting, Control statements (decision making and looping statements) (*If-statement. If-else Statement. Nested if Structure. Else-if Statement. Ternary Operator. Goto Statement. Switch Statement. Unconditional and Conditional Looping. While Loop. Do-While Loop. FOR Loop. Break and Continue Statements. Nested Loops*), Arrays (*1D & 2D*) and strings, user defined functions, Structures and Unions, Idea of classes and objects
Programs: using C/C++ language	Sum & average of a list of numbers, largest of a given list of numbers and its location in the list, sorting of numbers in ascending descending order, Binary search

Random number generation	Area of circle, area of square, volume of sphere, value of π
Solution of Algebraic and Transcendental equations by Bisection, Newton Raphson and Secant methods	Solution of linear and quadratic equation, solving $\alpha = \tan\alpha$; $I = I_0 \left(\frac{\sin\alpha}{\alpha} \right)^2$ in optics
Interpolation by Newton Gregory Forward and Backward difference formula, Error estimation of linear interpolation	Evaluation of trigonometric functions e.g. *sin θ, cos θ, tan θ, etc.*
Numerical differentiation (Forward and Backward difference formula) and Integration (Trapezoidal and Simpson rules), Monte Carlo method	Given Position with equidistant time data to calculate velocity and acceleration and vice versa. Find the area of B-H Hysteresis loop
Solution of Ordinary Differential Equations (ODE) First order Differential equation Euler, modified Euler and Runge-Kutta (RK) second and fourth order methods	First order differential equation • Radioactive decay • Current in RC, LC circuits with DC source • Newton's law of cooling • Classical equations of motion Attempt following problems using RK 4 order method: • Solve the coupled differential equations $\frac{dx}{dt} = y + x - \frac{x^3}{3}$; $\frac{dy}{dx} = -x$ for four initial conditions x(0) = 0, y(0) = -1, -2, -3, -4. Plot x vs y for each of the four initial conditions on the same screen for $0 \le t \le 15$ The differential equation describing the motion of a pendulum is $\frac{d^2P}{dt^2} = -\sin(P)$. The pendulum is released from rest at an angular displacement α, i. e. $P(0) = \alpha$ and $P'(0) = 0$. Solve the equation for $\alpha = 0.1, 0.5$ and 1.0 and plot P as a function of time in the range $0 \le t \le 8\pi$. Also plot the analytic solution valid for small P $(\sin(P) = P$

Referred Books:

- Introduction to Numerical Analysis, S.S. Sastry, 5th Edn., 2012, PHI Learning Pvt. Ltd.
- Schaum's Outline of Programming with C++. J. Hubbard, 2000, McGraw-Hill Pub.
- Numerical Recipes in C++: The Art of Scientific Computing, W.H. Pressetal., 3rd Edn., 2007, Cambridge University Press.
- A first course in Numerical Methods, U.M. Ascher & C. Greif, 2012, PHI Learning.
- Elementary Numerical Analysis, K.E. Atkinson, 3rd Edn., 2007, Wiley India

Edition.
- Numerical Methods for Scientists & Engineers, R.W. Hamming, 1973, Courier Dover Pub.
- An Introduction to computational Physics, T. Pang, 2nd Edn., 2006,Cambridge Univ. Press

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Ability Enhancement Courses:

AECC: English Communication

English Communication Credits: 4

1. Introduction: Theory of Communication, Types and modes of Communication
2. Language of Communication:
Verbal and Non-verbal
(Spoken and Written)
Personal, Social and Business
Barriers and Strategies
Intra-personal, Inter-personal and Group communication
3. Speaking Skills:
Monologue
Dialogue
Group Discussion
Effective Communication/ Mis- Communication
Interview
Public Speech
4. Reading and Understanding
Close Reading
Comprehension
Summary Paraphrasing
Analysis and Interpretation
Translation(from Indian language to English and vice-versa)
Literary/Knowledge Texts
5. Writing Skills
Documenting
Report Writing
Making notes
Letter writing

Recommended Readings:

1. *Fluency in English* - Part II, Oxford University Press, 2006.
2. *Business English*, Pearson, 2008.
3. Language, Literature and Creativity, Orient Blackswan, 2013.
4. *Language through Literature* (forthcoming) ed. Dr. Gauri Mishra, Dr Ranjana Kaul, Dr Brati Biswas

ENVIRONMENTAL SCIENCES

Credits: 4

Unit-I: Introduction to Environmental Sciences

Definition, scope and importance of the environmental science, Natural Resources: Renewable and non-renewable resources: Natural resources and associated problems.

Unit-II: Ecosystem

Introduction, kinds of ecosystem, structure and functions, abiotic and biotic component, Ecological energetics, Energy flow models, Food chain and Food web, Ecological Pyramids-types, Ecological succession, Introduction, types, structure and function of the following ecosystem :- a. Forest ecosystem b. Grassland ecosystem c. Desert ecosystem d. Aquatic ecosystems

Unit-III: Biodiversity and its conservation

Introduction – Definition, value and types: genetic, species and ecosystem diversity. Bio- geographical classification and Hot-spots of India. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. Endangered and endemic species of India. Conservation of biodiversity: In-situ and Ex-situ conservation.

Unit-IV: Environmental issues and policies

Definition, cause, effects and control measures of Air, Water, Soil, Marine and Noise pollution. Solid Waste Management: Causes, effects and control measures of wastes. Seventeen Sustainable Developmental Goals, Environment Protection Act, Air Act, Water Act, Wildlife Protection Act, Forest Conservation Act, Public awareness.

REFERENCES

1. Bharucha E, (2002) The Biodiversity of India, Mapin Publishing
2. Cao G, Orru R (2014) Current Environmental Issues and Challenges. 2014th edition; Springer
3. Cunningham W P, Cunningham M A (2008) Principles of Environment Science. Enquiry and Applications. 5th Edition. Tata McGraw Hill, New Delhi
4. Dash M C, Dash S P (2009) Fundamentals of Ecology. 3rd McGraw Hill Education

5. Gibbs J, Malcolm L, Sterling J (2008) Problem-Solving in Conservation Biology and Wildlife Management. 2nd ed. Wiley-Blackwell
6. Ginley D, Cahen, D (2011) Fundamentals of Materials for Energy and Environmental Sustainability. Cambridge University Press
7. Gilbert M (2007) An Introduction to Environmental Engineering and Science, Prentice Hall, New Delhi
8. Khan I (2019) Forest Governance and Sustainable Resource Management. SAGE Publications. India.
9. Odum E P, Barrett W, (2005) Fundamentals of Ecology. 5th ed. Cengage Learning.
10. Sharma P D (2017) Ecology and Environment. 13th ed. Rastogi Publications
11. Thangadurai D, Ching G, Jeyabalan S, Islam S (2019) Biodiversity and Conservation: Characterization and Utilization of Plants, Microbes and Natural Resources for Sustainable Development and Ecosystem Management. United States: Apple Academic Press
12. Trivedi R K (2010) Handbook of Environmental Laws, Rules Guidelines, Compliances and Stadards, 3rd Edition. BS Publications

COURSE CODE: SHSS SKT 1201 GE 3104

प्राचीनभारतीयसंस्कृतिः, दर्शनं भाषाविज्ञानं च (1)

Prācīnabhāratīyasaṁskṛtiḥ, Darśanaṁ Bhāṣāvijñānaṁ Ca (1)

माध्यमः – संस्कृत/हिन्दी/आंग्लभाषा

Medium – Sanskrit/Hindi/English

L	T	P	Credits
3	1	0	4

उद्देश्यः/Objective:

1. संस्कृतेतर-विषयाणामध्येतृभ्यः संस्कृताध्ययनाय सौकर्योत्पादनम्; 2. भारतीयज्ञानसंपदाधारभूतानां वेदादि-शास्त्राणामुपनिषदां च रुचिरुत्पादनम्; 3. संस्कृतेनोपनिबद्धानां नीतिवाक्यानां गीतायां वर्णितस्य कर्मयोगस्य च तत्त्व-संधारणाय यत्नः; 4. सामान्य-भाषाविज्ञानस्य परिचयः।

पाठ्यक्रमाध्ययनस्य फलम् / Course Level Learning Outcome:

1. अध्येतारः वेदादि-शास्त्राणामुपनिषदां च तत्त्वान् ज्ञात्वा स्वाध्याय प्रयत्नशीलाः भवेयुः।
2. व्यावहारिकदृष्ट्या संस्कृतज्ञानेन अन्यविषयाणामध्येतारः तत्तद् स्वविषयानुगुणं संस्कृतभाषायामुप- लभ्यमानानां ग्रन्थानां प्रति यत्नशीलाः स्युः।
3. वेदोपनिषत्–गीता–नीतिशास्त्र–भाषाशास्त्रादीनां विषयाणां सम्यगध्ययनेनास्माकं पूर्वजानां वैदुष्येण परिचयः संजायेत।
4. भारतीय-चिन्तनपरम्परायाः समृद्धिं ज्ञातुमयं पाठ्यक्रमः प्रकृष्टमाध्यमः संजायेत।

पाठ्यक्रमः

मन्त्राणां सन्दर्भानां श्लोकानां च व्याख्या सारसंक्षेपश्च –

घटकम्-1: (क) यजुर्वेदः (34. 1-6)-शिवसंकल्पमन्त्राः; (ख) तैत्तिरीयोपनिषद् - शिक्षावल्ली (अनुशासनोपनिषद्)

घटकम्-2: भर्तृहरिः- नीतिशतकम् : 1-50 श्लोकाः

घटकम्-3: भगवद्गीता – तृतीयाध्यायः (कर्मयोगः)

घटकम्-4: सामान्यभाषाविज्ञानम्- (क) वर्णमाला, वर्णानाम् उच्चारणस्थानानि प्रयत्नाश्च; (ख) भाषाविज्ञानस्य सामान्यः

परिचयः, भाषापरिवर्तनस्य कारणानि, अर्थपरिवर्तनस्य कारणानि च

अनुशंसितग्रन्थाः -

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★★★

Annexure-XXXII

CENTRAL UNIVERSITY OF HARYANA

(*Established under the Central Universities Act, 2009*)

(NAAC Accredited 'A' Grade)



CBCS, LOCF and NEP-2020 Based

Curriculum and Syllabi

Of

M.Sc. Statistics

(w.e.f. 2021-2022)

DEPARTMENT OF STATISTICS
SCHOOL OF BASIC SCIENCES

Approved by :	**BOS**	**School Board**	**Academic Council**
Approval Status :	√	√	√
Approval Date :	08-09-2021	20-08-2021	?

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Vision and Mission

Vision and Mission of the University

Vision

To develop enlightened citizenship of a knowledge society for peace and prosperity of individuals, nation and the world, through promotion of innovation, creative endeavours, and scholarly inquiry.

Mission

To serve as a beacon of change, through multi-disciplinary learning, for creation of knowledge community, by building a strong character and nurturing a value-based transparent work ethics, promoting creative and critical thinking for holistic development and self-sustenance for the people of India. The University seeks to achieve this objective by cultivating an environment of excellence in teaching, research and innovation in pure and applied areas of learning.

1. Background

i) NEP-2020 and LOCF an integrated Approach

Considering the curricular reforms as instrumental for desired learning outcomes, all the academic departments of Central University of Haryana made a rigorous attempt to revise the curriculum of undergraduate and postgraduate programmes in alignment with National Education Policy-2020 and UGC Quality Mandate for Higher Education Institutions-2021. The process of revising the curriculum could be prompted with the adoption of "Comprehensive Roadmap for Implementation of NEP-2020" in 32nd meeting of the Academic Council of the University held on April 23, 2021. The roadmap identified the key features of the Policy and elucidated the Action Plan with well-defined responsibilities and indicative timeline for major academic reforms.

The process of revamping the curriculum started with the series of webinars and discussions conducted by the University to orient the teachers about the key features of the Policy, enabling them to revise the curriculum in sync with the Policy. Proper orientation of the faculty about the vision and provisions of NEP-2020 made it easier for them to appreciate and incorporate the vital aspects of the Policy in the revised curriculum focused on 'creating holistic, thoughtful, creative and well-rounded individuals equipped with the key 21st century skills' for the 'development of an enlightened, socially conscious, knowledgeable, and skilled nation'.

With NEP-2020 in background, the revised curricula articulate the spirit of the policy by emphasising upon—integrated approach to learning; innovative pedagogies and assessment strategies; multidisciplinary and cross-disciplinary education; creative and critical thinking; ethical and Constitutional values through value-based courses; 21st century capabilities across the range of disciplines through life skills, entrepreneurial and professional skills; community and constructive public engagement; social, moral and environmental awareness; Organic Living and Global Citizenship Education (GCED); holistic, inquiry-based, discovery-based, discussion-based, and analysis-based learning; exposure to Indian knowledge system, cultural traditions and classical literature through relevant courses offering 'Knowledge of India'; fine blend of modern pedagogies with indigenous and traditional ways of learning; flexibility in course choices; student-centric participatory learning; imaginative and flexible curricular structures to enable creative combination of disciplines for study; offering multiple entry and exit points initially in undergraduate programmes; alignment of Vocational courses with the International Standard Classification of Occupations maintained by the International Labour Organization; breaking the silos of disciplines; integration of extra-curricular and curricular aspects; exploring internships with local industry, businesses, artists and crafts persons; closer collaborations between industry and higher education institutions for technical , vocational and science programmes; and formative assessment tools to be aligned with the learning outcomes, capabilities, and dispositions as specified for each course. In case of UG programmes in Engineering and Vocational Studies, it was decided that the departments shall incorporate pertinent NEP recommendations while complying with AICTE, NBA, NSQF, International Standard Classification of Occupations, Sector Skill Council and other relevant agencies/sources. The University has also developed consensus on adoption of Blended Learning with 40% component of online teaching and 60% face to face classes for each programme.

The revised curricula of various programmes could be devised with concerted efforts of the faculty, Heads of the Departments and Deans of Schools of Study. The draft prepared by each department was discussed in series of discussion sessions conducted at Department, School and the University level. The leadership of the University has been a driving force behind the entire exercise of developing the uniform template and structure for the revised curriculum. The Vice Chancellor of the University conducted series of meetings with Heads and Deans to deliberate upon the vital parameters of the revised curriculum to formulate a uniform template featuring Background, Programme Outcomes, Programme Specific Outcomes, Postgraduate Attributes, Structure of Masters Course, Learning Outcome Index, Semester-wise Courses and Credit Distribution, Course-level Learning Outcomes, Teaching-Learning Process, Blended Learning, Assessment and Evaluation, Keywords, References and Appendices. The experts of various Boards of Studies and School Boards contributed to a large extent in giving the final shape to the revised curriculum of each programme.
To ensure the implementation of curricular reforms envisioned in NEP-2020, the University has decided to implement various provisions in a phased manner. Accordingly, the curriculum may be reviewed annually.
Statistics consist of data science that involves resorting, classifying, structuring, organizing, analyzing, and interpreting numerical information. To improve the organizational decision making, statistical analysis and related application are very much important. Recent applications of statistics is data mining, Big data etc. Data Mining is a relatively recent area, but capable of covering the inability to analyze huge data sets from the statistics side. To explore and analyze large data sets data mining is used either automatically or semi automatically allowing the extraction of useful information, patterns, associations or trends.

ii) About the Statistics

Recent archaeological discovery of two ancient cities of Dravidian civilization (i.e. Mohenzo Daro, Harappa), in the Indus valley revealed that about 6000 BC a people of advanced culture were settled in the region. Among other things a set of dice was found indicating their knowledge of gambling or chance. The kings and rulers even in ancient India required certain facts and figures in order to run the country and accordingly they collected information which is now known as statistical information.
According to ‘Arthasastra’ written by the great Indian economist ‘Kautilya’ (see Shamasastry 1929, Edwards 1961) a civil service existed and there were departments for accounts, revenue, mines, taxation, agriculture, and trade, etc. There was State owned gambling places which used to take five per cent of the winnings in return for a guarantee that there were no loaded dice. This indicates that some development of the probability theory existed during this period.
In 1860, India faced severe famine and the government had to take stringent steps to save the people from starvation, but the government's problem was the lack of information regarding the exact number of people living in the country and the amount of food required. In order to rectify the situation, the government introduced decennial census in 1872 but subsequently established an ad-hoc census organisation in 1881.
In 1868 as a part of statistical development in India, an annual volume of Statistical Abstract of British 1ndia was published for the first time. This annual volume which was published regularly

from London was finally transferred to India in 1923. In 1883, the most important development of the statistical set-up in the country took place when, in Calcutta, the All-India Statistical Conference was held, passing numerous resolutions for the future development of statistics in the country.

iii) About the Programme (Nature, extent and aims)

The post Graduate [programme in statistics will impart an advance knowledge basic and applied statistics top the graduate. It will prepare the students for taking up challenging assignments in academia and industry and also empower them with skill and knowledge for generation employment for their own and others. The programme introduce the students an advance development in statistical sciences as well as in the field of other allied sciences by providing them multidisciplinary and inter disciplinary courses. The design of choice based curriculum can each student with analytical and problem solving capabilities. It is designed to bring out the best of the ability of each students allow them to sharpen the scientific temper. The M. Sc Statistics programme is of two year duration which is divided into four semesters. The teaching and learning in the programme will involve theory practicals tutorials and seminar bases classes during the whole programme about 40% syllabus of each course may be delivered by online mode and with a blended teaching learning approach.

The Aims of the programme included

- To inculcate basic and advance knowledge of statistical sciences among students.
- To Provide higher education disciplinary and inter/multi-disciplinary research oriented knowledge to the students to make them lifelong learning.
- To provide a learn skilled and creative pool of graduates who already to take up challenging assignments in different kinds of industries research institutions and academia.

iv) Qualification Descriptors (possible career pathways)

On successful completion of the M.Sc. Statistics Programme, students of the Department are expected to work at different platforms in addition to live productive and meaningful lives. Some of the possible career paths for the postgraduate students may be:

- Indian Statistical Services
- Reserve Bank of India Research Officer
- Statistical Officer in Different Government Agenc**ies**
- Statistical Quality Control Officer in Industry
- Business analyst in Corporate Sector
- Data Analyst in Corporate Sector
- **Research Scientists in Statistics**
- **Teaching Profession to enhance and disseminate the statistical knowledge**
- **Officers in central statistical organization (CSO)**

2. PROGRAMME OUTCOMES (POs)

Students enrolled in the Master's Programmes offered by the Departments under the School of Basic Sciences will have the opportunity to learn and master the following components in addition to attain important essential skills and abilities:

PO-No.	Component	Outcomes
PO-1	Basic Knowledge	Capable of delivering basic disciplinary knowledge gained during the programme.
PO-2	In-depth Knowledge	Capable of describing advanced knowledge gained during the programme.
PO-3	Critical thinking and Problem-Solving abilities	Capable of analyzing the results critically and applying acquired knowledge to solve the problems.
PO-4	Creativity and innovation	Capable to identify, formulate, investigate and analyze the scientific problems and innovatively to design and create products and solutions to real life problems.
PO-5	Research aptitude and global competency	Ability to develop a research aptitude and apply knowledge to find the solution of burning research problems in the concerned and associated fields at global level.
PO-6	Holistic and multidisciplinary education	Ability to gain knowledge with the holistic and multidisciplinary approach across the fields.
PO-7	Skills enhancement	Learn specific sets of disciplinary or multidisciplinary skills and advanced techniques and apply them for betterment of mankind.
PO-8	Leadership and Teamwork abilities	Ability to learn and work in a group and capable of leading a team even.
PO-9	Environmental and human health awareness	Learn important aspects associated with environmental and human health. Ability to develop eco-friendly technologies.
PO-10	Ethical thinking and social awareness	Inculcate the professional and ethical attitude and ability to relate with social problems.
PO-11	lifelong learning skills and Entrepreneurship	Ability to learn lifelong learning skills which are important to provide better opportunities and improve quality of life. Capable to establish independent startup/innovation center etc.

3. PROGRAMME SPECIFIC OUTCOMES (PSOs)

The post graduates shall be able to realise the following outcomes by the end of program studies:

Number	Programme Specific Outcomes
PSO-1	Will have a strong foundation in theoretical concepts of Statistics.
PSO-2	Will be able to apply practical concepts of Statistics for solving real life problems.
PSO-3	Will be able to get comprehensive knowledge and understanding of basic concepts in statistics and its linkages with humanities, social sciences and life sciences.
PSO-4	Will have basic and advance knowledge of computational statistical techniques as required for employment in government sector and corporate world.
PSO-5	Will identify interdisciplinary applications of Statistics for enhancing career prospects in different fields and research areas.
PSO-6	Will be able to transform the existing statistical knowledge effectively for the development of new statistical ideas and concepts.
PSO-7	Will be able to analyze, interpret and present the data and bring out the meaning, correlations and interrelationships.
PSO-8	Will be able to use scientific approaches to develop the domain of human knowledge through the use of empirical data expressed in quantitative form.

4. Postgraduate Attributes

On completion of the post graduate programme in statistics, students are expected to equip with the skills of creative, critical and rational thinking associated with statistics and its use for human society. The following attributes are expected from the students of M.Sc. Statistics:

No.	P.G. Attributes
PGA-1	Disciplinary Knowledge
PGA-2	Creative and Critical Thinking
PGA-3	Reflective Thinking
PGA-4	Problem Solving
PGA-5	Analytical Reasoning
PGA-6	Communication Skills
PGA-7	Research Skills
PGA-8	Life Skills
PGA-9	Life-long Learning
PGA-10	Global Competency

5. Structure of Masters Course

Types of Courses	Nature	Total Credits	%
Core Courses (CC)	Compulsory	72	75
Elective Courses (EC)	Discipline Centric Elective Courses	16	16.7
	Generic Elective Courses	8	8.3
Skilled-based courses/ Self-study based courses	Skill Enhancement Courses	4	Nil

6. Learning Outcome Index
(Mapping of Courses with POs and PSOs)

6.1 A Mapping of Courses with POs (first year)

Semester	POs ⇨	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11
	Course No. ⇩											
I	CC-1	✓	✓	✓	✓		✓		✓		✓	✓
	CC-2	✓	✓	✓	✓	✓	✓		✓		✓	✓
	CC-3	✓	✓	✓	✓	✓	✓		✓		✓	✓
	CC-4	✓	✓	✓	✓	✓	✓		✓		✓	✓
	CC-5	✓		✓	✓			✓	✓		✓	✓
	GEC-1	✓		✓	✓		✓	✓	✓		✓	✓
	GEC-2	✓		✓	✓		✓	✓	✓		✓	✓
II	CC-6	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓
	CC-7	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓
	CC-8	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓
	CC-9	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	DCEC-1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	DCEC-2	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	GEC-3	✓		✓	✓		✓	✓	✓	✓	✓	✓
	GEC-4	✓		✓	✓		✓	✓	✓	✓	✓	✓

6.1B Mapping of Courses with POs (second year)

Semester	POs ⇨	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11
	Course No. ⇩											
III	CC-10	✓	✓	✓	✓	✓		✓		✓	✓	✓
	CC-11	✓	✓	✓	✓	✓	✓		✓	✓		✓
	CC-12	✓	✓	✓	✓	✓		✓	✓	✓	✓	✓
	CC-13	✓	✓	✓			✓	✓	✓	✓	✓	
	CC-14	✓		✓	✓	✓	✓		✓	✓	✓	✓
	DCEC-3	✓	✓	✓	✓	✓		✓	✓		✓	✓
	DCEC-4	✓	✓	✓		✓	✓	✓	✓		✓	✓
IV	CC-15	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓
	DCEC-5	✓	✓	✓	✓	✓		✓		✓	✓	
	DCEC-6	✓	✓	✓	✓	✓	✓		✓	✓		✓
	DCEC-7	✓	✓	✓	✓		✓	✓	✓	✓		✓
	DCEC-8	✓	✓	✓	✓	✓		✓	✓		✓	✓

6.2A Mapping of Courses with PSOs (first year)

Semester	PSOs ⇨	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6	PSO-7	PSO-8
	Course No. ⇩								
I	CC-1	✓	✓		✓	✓	✓		✓
	CC-2	✓	✓	✓	✓	✓	✓	✓	✓
	CC-3	✓	✓	✓	✓	✓	✓	✓	✓
	CC-4	✓	✓	✓	✓	✓	✓	✓	✓
	CC-5		✓	✓	✓	✓	✓	✓	✓
	GEC-1	✓	✓	✓		✓	✓	✓	✓
	GEC-2	✓	✓	✓		✓	✓	✓	✓
II	CC-6	✓	✓	✓	✓	✓	✓	✓	✓
	CC-7	✓	✓	✓	✓	✓	✓	✓	✓
	CC-8	✓	✓	✓	✓	✓	✓	✓	✓
	CC-9		✓	✓	✓	✓	✓	✓	✓
	DCEC-1	✓	✓	✓	✓	✓	✓	✓	✓
	DCEC-2	✓	✓	✓	✓	✓	✓		✓
	GEC-3	✓	✓	✓		✓	✓	✓	✓
	GEC-4	✓	✓	✓		✓	✓	✓	✓

6.2B Mapping of Courses with PSOs (second year)

Semester	PSOs ⇨ / Course No. ⇩	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
III	CC-10	✓	✓	✓	✓	✓	✓	✓	✓
	CC-11	✓	✓	✓	✓	✓	✓	✓	✓
	CC-12	✓	✓	✓	✓	✓	✓	✓	✓
	CC-13	✓	✓	✓	✓	✓	✓	✓	✓
	CC-14		✓	✓		✓	✓	✓	✓
	DCEC-3	✓	✓	✓	✓		✓	✓	✓
	DCEC-4	✓	✓		✓	✓	✓	✓	✓
IV	CC-15	✓	✓	✓	✓	✓	✓	✓	✓
	DCEC-5	✓	✓	✓	✓	✓	✓	✓	✓
	DCEC-6	✓	✓	✓	✓	✓		✓	✓
	DCEC-7	✓	✓	✓	✓	✓	✓	✓	
	DCEC-8	✓	✓	✓	✓	✓	✓		✓

7. Semester-wise Courses and Credit Distribution

SEMESTER-I (24-Credits)							
Sr. No.	**Course Code and Course No**	**Course Title**	**L**	**T**	**P**	**Hrs/ Week**	**Total Credits**
Core Courses (compulsory)							
CC-1	SBS ST 01 101 C 3104	Analysis and Linear Algebra	3	1	0	4	4
CC-2	SBS ST 01 102 C 3104	Probability Theory	3	1	0	4	4
CC-3	SBS ST 01 103 C 3104	Distribution Theory	3	1	0	4	4
CC-4	SBS ST 01 104 C 3104	Sampling Techniques	3	1	0	4	4
CC-5	SBS ST 01 105 C 0044	Practical	0	0	4	8	4
Generic Elective Courses (for students of other Departments**)**							
GEC-1	SBS ST 01 101 GE 3104	Introductory Statistics	2	1	1	5	4
GEC-2	SBS ST 01 102 GE 3104	Operations Research	2	1	1	5	4
SEMESTER-II (24-Credits)							
Sr. No.	**Course Code and Course No**	**Course Title**	**L**	**T**	**P**	**Hrs/ Week**	**Total Credits**
Core Courses (compulsory)							
CC-6	SBS ST 01 201 C 3104	Statistical Inference – I	3	1	0	4	4
CC-7	SBS ST 01 202 C 3104	Regression Analysis	3	1	0	4	4
CC-8	SBS ST 01 203 C 3104	Design of Experiments	3	1	0	4	4
CC-9	SBS ST 01 204 C 0044	Practical	0	0	4	8	4
Discipline Specific Elective Courses (any two depending on interest in specialization)							
DCEC-1	SBS ST 01 201 DCE 3104	Time Series and Statistical Quality Control	3	1	0	4	4
DCEC-2	SBS ST 01 202 DCE 3104	Operations Research	3	1	0	4	4
Generic Elective Courses (for students of other Departments**)**							
GEC-3	SBS ST 01 201 GE 3104	Applied Statistics	2	1	1	4	4

GEC-4	SBS ST 01 202 GE 3104	Statistical Methods	2	1	1	4	4
SEMESTER-III (24-Credits)							
Sr. No.	**Course Code and Course No**	**Course Title**	**L**	**T**	**P**	**Hrs/ Week**	**Total Credits**
Core Courses (compulsory)							
CC-10	SBS ST 01 301 C 3104	Multivariate Analysis	3	1	0	4	4
CC-11	SBS ST 01 302 C 3104	Statistical Inference – II	3	1	0	4	4
CC-12	SBS ST 01 303 C 3104	Econometrics	3	1	0	4	4
CC-13	SBS ST 01 304 C 4004	Seminar	4	0	0	4	4
CC-14	SBS ST 01 305 C 0044	Practical	0	0	4	8	4
Discipline Specific Elective Courses (any two depending on interest in specialization)							
DCEC-3	SBS ST 01 301 DCE 3104	Stochastic Processes	3	1	0	4	4
DCEC-4	SBS ST 01 302 DCE 3104	Demography and Vital Statistics	3	1	0	4	4
SEMESTER-IV (24-Credits)							
Sr. No.	**Course Code and Course No**	**Course Title**	**L**	**T**	**P**	**Hrs/ Week**	**Total Credits**
Core Courses (compulsory)							
CC-15	SBS ST 01 401 PROJ 00016	Minor Project/Dissertation	**-**	**-**	**-**	-	16
Discipline Centric Elective Courses (any two depending on interest in specialization)							
DCEC-5	SBS ST 01 401 DCE 3104	Order Statistics	3	1	0	4	4
DCEC-6	SBS ST 01 402 DCE 3104	Survival Analysis	3	1	0	4	4
DCEC-7	SBS ST 01 403 DCE 3104	Decision Theory and Sequential Analysis	3	1	0	4	4
DCEC-8	SBS ST 01 404 DCE 3104	Statistical Computing	3	1	0	4	4
OR							
CC-15	SBS ST 01 401 PROJ 00024	Major Project/Dissertation	-	-	-	-	24

8. Course-Level Learning Outcomes

Course Structure

<table>
<tr><td>Course No:
CC1</td><td colspan="3">Course Name:
Analysis and Linear Algebra</td><td colspan="4">Course Code:
SBS ST 01 101 C 3104</td></tr>
<tr><td>Batch:</td><td>Programme:</td><td>Semester:</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td>Contact Hrs per Week: 4</td></tr>
<tr><td>2021-2023</td><td>M.Sc. Statistics</td><td>I</td><td>3</td><td>1</td><td>0</td><td>4</td><td>Total Hours: 60</td></tr>
<tr><td colspan="3">Total Evaluation Marks: 100
CIE: 30 Marks
TEE: 70 Marks</td><td colspan="5">Examination Duration: 3 Hours
Pre-requisite of course: Fundamental theorems of differential and integral calculus, Riemann Integration, matrices and their types, inverse of a matrix, operations with matrices (addition, subtractions, multiplication, transpose).</td></tr>
<tr><td>Course Objective</td><td colspan="7">This course provides help to understand the mathematical concept of convergence and its mathematical formalisms. Students will be able to use some fundamental theorems of real analysis, complex analysis and linear algebra and their properties in the major statistics courses.</td></tr>
<tr><td>Course Outcomes:</td><td colspan="7">After completing this course, student is expected to learn the following:
CO1: Understand the convergence of sequence and series of real valued functions.
CO2: Study the complex regions and contour integrals.
CO3: Understand the rank of a matrix, characteristic roots & vectors of a matrix, properties of symmetric matrices.
CO4: Understand the concepts of vector space and subspaces.</td></tr>
<tr><td colspan="8">COURSE SYLLABUS</td></tr>
<tr><td colspan="8">NOTE: Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit I will be taught via online mode.</td></tr>
<tr><td>Unit No.</td><td colspan="5">Content of Each Unit</td><td colspan="2">Hours of Each Unit</td></tr>
<tr><td>I</td><td colspan="5">Recap of elements of set theory, introduction to real numbers, open and closed intervals (rectangles), compact sets, Bolzano-Weirstrass theorem. Sequences and series, their convergence, real valued functions, continuous functions.</td><td colspan="2">15</td></tr>
<tr><td>II</td><td colspan="5">Uniform continuity, Uniform convergence. Maxima-minima of functions. Complex numbers, analytic function, Cauchy fundamental theorem, Cauchy integral theorem, contour integrations.</td><td colspan="2">15</td></tr>
<tr><td>III</td><td colspan="5">Determinant and trace, rank, ranks of product of two matrices, elementary matrices and Echelon forms. Partitioned matrices:</td><td colspan="2">15</td></tr>
</table>

	addition, multiplication and inverse. Cayley Hamilton Theorem, diagonalization, generalized inverse: Definition and its computation.	
IV	Definite and semi definite quadratic forms, index and signatures, simultaneous diagonalization of symmetric matrices (equivalent quadratic forms). Vector spaces, sub-spaces, linearly dependence and independence, orthogonalization process, orthonormal basis.	15

Suggested Readings:

1. Bartle, R.G. & Sherbert, D.R. (2011). Introduction to Real Analysis, 4th Edition. Wiley.
2. Saff, E.B. & Snider, A.D. (2014). Fundamentals of Complex Analysis with Applications to Engineering, Science and Mathematics, 3rd Edition. Pearson.
3. Rudin, W. (2013). Principles of Mathematical Analysis, 3rd Edition. McGraw Hill.
4. Biswas, S. (2012). A Textbook of Matrix Algebra, 3rd Edition. PHI Learning.

Course No: CC-2	Course Name: Probability Theory				Course Code: SBS ST 01 102 C 3104		
Batch:	**Programme:**	**Semester:**	**L**	**T**	**P**	**Credits**	**Contact Hrs per Week: 4**
2021-2023	M.Sc. Statistics	I	3	1	0	4	**Total Hours: 60**
Total Evaluation Marks: 100 **CIE:** 30 Marks **TEE:** 70 Marks		**Examination Duration:** 3 hours					
		Pre-requisite of course:					
Course Objective	This course will lay the foundation of probability theory and statistical modelling of outcomes of real-life random experiments through various statistical distributions.						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1:** Understand the concepts of random variables, sigma-fields generated by random variables. **CO2:** Learn probability distributions and independence of random variables related to measurable functions. **CO3:** Gain the ability to understand the concepts of different types of generating function, sequence of random variables, convergence, modes of convergence of sequence of random variables. **CO4:** Learn the concepts of weak and strong laws of large numbers, and central limit theorem.						

COURSE SYLLABUS

NOTE: Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit I will be taught via online mode.

Unit No.	Content of Each Unit	Hours of Each Unit
I	Classes of sets, field, sigma field, minimal sigma field, Borel field, sequence of sets, limits of a sequence of sets, measure, probability measure, Integration with respect to measure. Random experiment, outcomes, sample space, events, various definitions of probability, laws of total and compound probability. Boole's inequality. Conditional probability, independence of events. Bayes Theorem.	15
II	Random variable, probability mass function, probability density function, cumulative distribution function. Expectation of a random variable, properties of expectation.. Bivariate distributions and the joint probability distribution. Independence of random variables. Marginal and conditional distributions. Conditional expectation and its properties.	15

III	Moment generating function, probability generating function, cumulant generating function, characteristic function and their properties. Inversion, continuity and uniqueness theorems.	15
IV	Convergence in probability, almost sure convergence, convergence in distribution and their relationships. Chebyshev's inequality, weak law of large numbers (WLLN), strong law of large numbers (SLLN), central limit theorems.	15

Suggested Readings:

1. Rohatgi V.K. & Saleh A.K. Md.E. (2015). An Introduction to Probability and Statistics, 3rd Edition. Wiley.
2. Rao, B.L.S.P. (2010): A First Course in Probability and Statistics. World Scientific.
3. Hogg, R.V., McKean, J. & Craig, A.T. (2013). Introduction to Mathematical Statistics, 7th Edition. Pearson.
4. Mukhopadhyay, P. (2015). Mathematical Statistics. New Central Book Agency.

Course No: CC-3	Course Name: Distribution Theory				Course Code: SBS ST 01 103 C 3104		
Batch:	**Programme:**	**Semester:**	**L**	**T**	**P**	**Credits**	**Contact Hrs per Week: 4**
2021-2023	M.Sc. Statistics	I	3	1	0	4	**Total Hours: 60**
Total Evaluation Marks: 100 **CIE:** 30 Marks **TEE:** 70 Marks		**Examination Duration:** 3 hours					
		Pre-requisite of course: Probability theory, Probability space.					

Course Objective	*The main objective of the course is to provide the detailed knowledge of the characterization of all the useful discrete and continuous distributions.*
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1:** Formulate the mathematical and statistical models for real data sets arising in various fields in order to analyze in respect of various useful characteristics of the populations. **CO2:** Understand how to use univariate distributions in real life problems. **CO3:** Understand central and Non-central χ^2, *t* and *F* distributions. **CO4:** Work with bivariate normal and multivariate normal distribution, which is a challenging problem in today's life.

COURSE SYLLABUS

NOTE: Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit I will be taught via online mode.

Unit No.	Content of Each Unit	Hours of Each Unit
I	Bernoulli, Binomial, Poisson, Geometric, Negative Binomial, Multinomial, Hypergeometric and discrete uniform distributions; their means, medians, modes, variances, moment generating functions, cumulant generating function, probability generating functions and characteristic functions, important properties with their proofs related to these distributions.	15
II	Continuous uniform, Exponential, Gamma, Normal, Beta, Cauchy, Laplace, Weibull, Pareto and lognormal with their properties including proofs; their means, medians, modes variances, moment generating functions, cumulant generating function and characteristic functions. **Concept of family of distributions with examples, reproductive**	15

	property of a family of distributions. Fitting of normal, binomial and Poisson distributions to real life data.	
III	Compound, truncated and mixture distributions. Central and Non-central Chi-square (χ^2), t and F distributions with their properties including their means, variances, moment generating functions, cumulant generating function and characteristic functions. Multidimensional random variables, its pdf/pmf and cdf.	15
IV	Bivariate normal distribution with its applications and important properties including their means, variances, covariance and joint moment generating function, Multivariate normal distribution, its marginal and conditional distributions and related properties.	15

Suggested Readings:

1. Krishnamoorthy, K. (2015). Handbook of Statistical Distributions with Applications, 2nd Edition. CRC Press.
2. Rohatgi V.K. & Saleh A.K. Md.E. (2015). An Introduction to Probability and Statistics, 3rd Edition. Wiley.
3. Goon, A.M., Gupta, M.K. & Dasgupta, B. (2016). Fundamentals of Statistics, Vol. I. World Press.
4. Forbes, C., Evans, M., Hastings, N. & Peacock, B. (2010). Statistical Distributions, 4th Edition. Wiley.

Course No: CC-4	Course Name: Sampling Techniques				Course Code: SBS ST 01 104 C 3104		
Batch:	**Programme:**	**Semester:**	**L**	**T**	**P**	**Credits**	**Contact Hrs per Week: 4**
2021-2023	M.Sc. Statistics	I	3	1	0	4	**Total Hours: 60**
Total Evaluation Marks: 100 **CIE:** 30 Marks **TEE:** 70 Marks		**Examination Duration:** 3 hours **Pre-requisite of course: Probability theory, population, parameter, estimator.**					

Course Objective	The objective of this course is to acquaint the students about: (i) the need & merits of sampling over census and (ii) the implementation of various sampling schemes along with their merits, demerits and comparisons in appropriate practical situations.
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1:** Learn the basic concepts of population and sample or the basic concepts of survey. **CO2:** Learn the principles of sample survey and the steps involved in selecting a sample. **CO3:** Understand the distinctive features of different sampling techniques and their related estimation problems. **CO4:** Learn the practical applications of the various sampling techniques in real life situations.

COURSE SYLLABUS

NOTE: Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit I will be taught via online mode.

Unit No.	Content of Each Unit	Hours of Each Unit
I	Introduction to sampling, concept of population and sample, census and sample surveys, sampling and non-sampling errors. Types of sampling, non-probability sampling, probability sampling, basic principles of sample surveys. Simple random sampling, sampling from finite populations with and without replacement, unbiased estimation and confidence intervals for population mean and total, simple random sampling of attributes.	15
II	Stratified sampling, reasons for stratification, choice of strata, choice of sampling unit, estimation of population mean and its variance, choice of sample sizes in different strata, variances of estimates with different allocation, effects of deviation from optimum allocations, estimation of the gain in precision due to stratification, cost function, construction of strata. Systematic Sampling: merits and demerits of systematic sampling, estimation of sample mean and its variance, comparison of systematic sampling with simple random and stratified sampling.	15
III	Ratio and regression methods of estimation, variances of the estimates, optimum property of ratio estimates, comparison among ratio, regression	15

	and simple random sampling estimates, ratio estimate in stratified sampling, comparison with the ratio and mean per unit. Cluster Sampling, estimates of mean and its variance for equal and unequal clusters, efficiency in terms of intraclass correlation, optimum unit of sampling, sampling with replacement, estimation of mean and its variance.	
IV	Sampling with varying probabilities with and without replacement, sampling with probability proportional to size, Lahiri's method of selection, Horvitz-Thompson estimator, its variance and unbiased estimate of this variance. Introduction of multistage sampling, two stage sampling with equal first stage units, estimation of its mean and variance, introduction of multiphase sampling, double sampling for ratio and regression methods of estimation.	15

Suggested Readings

1. Singh, D. & Chaudhary, F.S. (2016). Theory and Analysis of Sample Survey Designs. New Age International Publishers.
2. Arnab, R. (2017). Survey Sampling Theory and Applications. Academic Press.
3. Sukhatme, P.V., Sukhatme, B.V., Sukhatme, S. & Ashok, C. (2014). Sampling Theory of Surveys with Applications. New Delhi: Piyush Publications.
4. Cocharn, W.G. (2007). Sampling Techniques, 3rd Edition. Wiley.

Course No: CC-5	Course Name: PRACTICAL				Course Code: SBS ST 01 105 C 0044		
Batch:	**Programme:**	**Semester:**	**L**	**T**	**P**	**Credits**	**Contact Hrs per Week: 8**
2021-2023	M.Sc. Statistics	I	0	0	4	4	**Total Hours: 120**

Total Evaluation Marks: 100 **CIE:** 30 Marks **TEE:** 70 Marks	**Examination Duration:** 3 hours **Pre-requisite of course: Theoretical knowledge of all courses studied in this semester**
Course Objective	**To familiarize the students about the applications in the analysis of real life data using the concepts of the courses studied in this semester**
Course Outcomes:	**The students will be able to** **CO1: Fit a distribution to real life data obtained in a random experiment** **CO2: Draw a random sample from a population using appropriate sampling scheme and finding the estimators of population parameters.** **CO3: Find optimal sample size from strata in stratified sampling**

COURSE SYLLABUS

NOTE:

Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit I will be taught via online mode.

Content of Each Unit	Hours
Practicals based on Distribution Theory (SBS ST 01 103 C 3104) and Sampling Techniques (SBS ST 01 104 C 3104).	120

Course No: GEC-1	Course Name: Introductory Statistics				Course Code: SBS ST 01 101 GE 3104		
Batch:	**Programme:**	**Semester:**	**L**	**T**	**P**	**Credits**	**Contact Hrs per Week: 4**
2021-2023	M.Sc. Statistics	I	3	1	0	4	**Total Hours: 60**
Total Evaluation Marks: 100 **CIE:** 30 Marks **TEE:** 70 Marks		**Examination Duration:** 3 hours					
		Pre-requisite of course: Differentiation and Integration, discrete and continuous functions.					
Course Objective	The objective of this course is to define a variety of basic statistical terms and concepts, solve fundamental statistical problems, understanding of statistical fundamentals to interpret data.						
Course Outcomes:	After completing this course, student will be able to: **CO1:** Compute measures of central tendency, dispersion, skewness and kurtosis from the data. **CO2:** Identify the random experiments and the underlying random variables with probability distributions. **CO3:** Identify the discrete and continuous probability distributions along with their applications. **CO4:** Apply various tests of hypothesis about hypothetical value of population parameters and to draw valid conclusions.						

COURSE SYLLABUS

NOTE:

Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit I will be taught via online mode.

Unit No.	Content of Each Unit	Hours of Each Unit
I	Introduction to Statistical Analysis, Measures of Central Tendency: Mean, median, mode, geometric mean, harmonic mean. Measures of Dispersion: range, mean deviation, variance, standard deviation. Quartiles. Quartile deviation, coefficient of variation, measures of skewness, measures of kurtosis.	15
II	Random experiment, outcomes, sample space, events, classical definition of probability, random variables, probability mass function, probability density function, cumulative distribution function, mathematical expectation,	15

	Variance, Binomial, Poisson, Geometric, Exponential, Normal distributions.	
III	Null hypothesis, alternative hypothesis, type I error, type II error, level of significance, p-value and power of test. Tests for mean based on normal distribution – one sample t-test, two-sample t-test, paired-sample t-test. Tests for variance based on normal distribution – one sample and two-sample problem. One-way and Two-way analysis of variance (ANOVA) techniques.	15
IV	Karl Pearson's correlation coefficient, Spearman's rank correlation coefficient, principle of least square, lines of regression, simple linear regression, coefficient of determination. Multiple linear regression, coefficient of multiple determination.	15

Suggested Readings:

1. Goon, A.M., Gupta, M.K. & Dasgupta, B. (2016). Fundamentals of Statistics, Vol. I & II. World Press.
2. Das, N.G. (2012). Statistical Methods, Vol I & II. Tata McGraw Hill.
3. Walpole, R.E., Myers, R.H., Myers, S.L. & Ye, K.E (2012). Probability and Statistics for Engineers and Scientists. Pearson.
4. Rao, B.L.S.P. (2010): A First Course in Probability and Statistics. World Scientific.

Course No: GEC-2	Course Name: OPERATIONS RESEARCH				Course Code: SBS ST 01 102 GE 3104		
Batch:	**Programme:**	**Semester:**	**L**	**T**	**P**	**Credits**	**Contact Hrs per Week: 4**
2021-2023	M.Sc. Statistics	I	3	1	0	4	**Total Hours: 60**
Total Evaluation Marks: 100 **CIE:** 30 Marks **TEE:** 70 Marks		**Examination Duration:** 3 hours **Pre-requisite of course: Linear algebra, maxima and minima principles of calculus.**					
Course Objective	To provide the ideas of formulating mathematical modeling and their optimum solution in the context of practical problems belonging to Government/Private Sectors. Also, to give students a firm foundation in the advanced optimization techniques for the solution of the problems covered in course contents.						
Course Outcomes:	On completion of this course, students will be able to: **CO1:** Identify and develop operational research models from the verbal description of the real system. **CO2:** Understand the characteristics of different types of decision-making environments and decision-making approaches. **CO3:** Understand the mathematical tools that are needed to solve optimization problems. **CO4:** Analyze the inventory situations.						

COURSE SYLLABUS

NOTE:
Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit I will be taught via online mode.

Unit No.	Content of Each Unit	Hours of Each Unit
I	Origin and development of operations research (O.R.), modelling in O.R., applications of O.R., opportunities and shortcomings of O.R. Formulation of linear programming problem (LPP), graphical solution to LPP, properties of a solution to the LPP, generating extreme point solutions.	15

II	The simplex computational procedure, development of minimum feasible solution, a first feasible solution using slack variables, the artificial basis technique.	15
III	Two phase method and Charnes M-method with artificial variables. The duality problem of linear programming and its economic interpretation, transportation and assignment problems.	15
IV	Game theory problem as a linear programming problem, integer programming. Replacement models and sequencing theory. Inventory management: characteristics of inventory systems. Classification of items. Deterministic inventory systems with and without lead-time.	15

Suggested Readings

1. Taha, H.A. (2017). Operations Research: An Introduction, 10th Edition. Pearson.
2. Gass, S.I. (2010). Linear Programming, Methods and Applications, 5th Edition. Dover Books.
3. Gross, D., Shortle, J.F., Thompson, J.M. & Harris, C.M. (2017). Fundamentals of Queueing Theory, 5th Edition. Wiley.
4. Water, D. (2013). Inventory Control and Management, 2nd Edition. Wiley.

Course No: CC-6	Course Name: Statistical Inference - I				Course Code: SBS ST 01 201 C 3104		
Batch:	**Programme:**	**Semester:**	**L**	**T**	**P**	**Credits**	**Contact Hrs per Week: 4**
2021-2023	M.Sc. Statistics	II	3	1	0	4	**Total Hours: 60**
Total Evaluation Marks: 100 **CIE:** 30 Marks **TEE:** 70 Marks		**Examination Duration:** 3 hours **Pre-requisite of course:**					
Course Objective	*The objective of estimation theory is to arrive at an estimator that exhibits optimality. To provide a systematic account of Neyman Pearson theory of testing and closely related theory of point estimation and confidence sets, together with their applications.*						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1:** Understand the various estimation and testing procedures to deal with real life problems. **CO2:** Learn about the Fisher Information, lower bounds to variance of estimators, MVUE. **CO3:** Understand the concept of Neyman-Pearson fundamental lemma, UMP test and interval estimation. **CO4:** Understand the concept of critical regions, likelihood ratio test with its asymptotic distribution.						

COURSE SYLLABUS

NOTE:
Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit I will be taught via online mode.

Unit No.	Content of Each Unit	Hours of Each Unit
I	**Parameter, and estimator,** criteria of a good estimator- unbiasedness, consistency, efficiency, sufficiency. Minimal sufficient statistic. Exponential and Pitman families of distributions. Cramer-Rao lower bound approach to obtain minimum variance unbiased estimator. Uniformly minimum variance unbiased estimator, Complete statistic, Rao-Blackwell theorem, Lehmann-Scheffe theorem.	15
II	Method of moments, minimum chi-square estimation, maximum likelihood estimator and its properties, CAN & BAN estimators. Ancillary statistic and Basu' s theorem.	15

	Simple and composite hypothesis, concept of critical regions, test functions, two types of error, power of the test, level of significance, Neyman-Pearson lemma, uniformly most powerful (UMP) tests.	
III	Types A, A1 critical regions, likelihood ratio test (LRT) with its asymptotic distribution, UMP tests for monotone likelihood ratio family of distributions. Similar tests with Neyman structure, Construction of similar and UMPU tests through Neyman structure.	15
IV	Confidence interval, construction of confidence intervals using pivotal, shortest expected length confidence interval, uniformly most accurate one-sided confidence interval and its relation to UMP test for one sided null against one sided alternative hypothesis.	15

Suggested Readings:

1. Johnson, R.A. and Wichern, D.W. (2015): Applied Multivariate Statistical Analysis, Sixth Edition, Pearson Education India.
2. Hardle, W.K. and Hlavka, Z. (2015): Multivariate Statistics, Springer.
3. Anderson, T.W. (2003): An Introduction to Multivariate Statistical Analysis, Third Edition, Wiley.
4. Härdle, W.K. and Simar, L. (2015): Applied Multivariate Statistical Analysis, Springer.
5. Singh, B.M. (2004): Multivariate statistical analysis, South Asian Publishers.
6. Rao, C.R. (2002): Linear Statistical Inference and its applications, Second Edition, Wiley.

Course No: CC-7	Course Name: Regression Analysis				Course Code: SBS ST 01 202 C 3104		
Batch:	**Programme:**	**Semester:**	**L**	**T**	**P**	**Credits**	**Contact Hrs per Week: 4**
2021-2023	M.Sc. Statistics	II	3	1	0	4	**Total Hours: 60**
Total Evaluation Marks: 100 **CIE:** 30 Marks **TEE:** 70 Marks		**Examination Duration:** 3 hours					
		Pre-requisite of course: Linear algebra, normal distribution, leas square principle, statistical error.					
Course Objective	The objectives of this course are to develop theoretical foundation of regression models and understand fundamental concepts of regression analysis.						
Course Outcomes:	On completion of this course, students will be able to: **CO1:** Understand simple and multiple linear regression models with their applications. **CO2:** Learn the fitting of these models to simulated and real data sets. **CO3:** Learn model adequacy using classical diagnostics, awareness of potential problems (outliers, etc.) and application of remedies to deal with them. **CO4:** Understand the basic concepts of logistic, Poisson and generalized linear models.						

COURSE SYLLABUS

NOTE: Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit I will be taught via online mode.

Unit No.	Content of Each Unit	Hours of Each Unit
I	Simple Linear Regression: Simple linear regression model. Least-squares estimation of parameters. Hypothesis testing on the slope and intercept. Interval estimation in simple linear regression. Prediction of new observations. Coefficient of determination. Estimation by maximum likelihood. Multiple linear regression: Multiple linear regression models. Estimation of the model parameters. Hypothesis testing in multiple linear regression. Confidence intervals in multiple regression. Coefficient of determination and Adjusted R^2.	15
II	Model Adequacy: Checking of linearity between study and explanatory variable, Residual Analysis, Detection and treatment of outliers, Residual plots. The PRESS statistic. Outlier test based on Studentized Residual (R-student). Test for lack of fit of the regression model. Transformation and Weighting to Correct Model Inadequacies: Variance stabilizing transformations. Transformations to linearize the model.	15

	Analytical methods for selecting a transformation on study variable. Diagnostic for Leverage and Influence: Leverage, measures of influence.	
III	Generalized and weighted least square estimation. Polynomial Regression Models: Polynomial models in one variable. Orthogonal Polynomials. Piecewise polynomial (Splines). Variable Selection and Model Building: Incorrect model specifications. Evaluation of subset regression model. Computational techniques for variable selection.	15
IV	Logistic and Poisson regression models: Introduction, Linear predictor and link functions, logit, probit, odds ratio, maximum likelihood estimation, test of hypothesis. Generalized linear models: Exponential family of distribution, Linear predictors and link functions, Maximum likelihood estimation of GLM. Prediction and confidence interval with GLM.	15

Suggested Readings

1. Montegomery, D.C., Peck, E.A. & Vining, G.G. (2015). Introduction to Linear Regression Analysis, 5th Edition. Wiley.
2. Rao, C.R. (2009). Linear Statistical Inference and its Applications, 2nd Edition. Wiley.
3. Draper, N.R. & Smith, H. (2011). Applied Regression Analysis, 3rd Edition. Wiley.
4. Chatterjee, S. and Hadi, A.S. (2012). Regression Analysis by Example, 5th Edition. Wiley.
5. Fox, J. and Weisberg, S. (2019). An R Companion to Applied Regression, 3rd Edition. Sage Publications.

Course No: CC-8	Course Name: Design of Experiments				Course Code: SBS ST 01 203 C 3104		
Batch:	**Programme:**	**Semester:**	**L**	**T**	**P**	**Credits**	**Contact Hrs per Week: 4**
2021-2023	M.Sc. Statistics	II	3	1	0	4	**Total Hours: 60**
Total Evaluation Marks: 100 **CIE:** 30 Marks **TEE:** 70 Marks		**Examination Duration:** 3 hours **Pre-requisite of course: Linear algebra, Multiple linear regression, normal distribution.**					
Course Objective	To provide orientation of statistics while designing statistical experiments, particularly in agricultural set-up and in pharmaceutical production processes. Exposure to various statistical designs leading to the analysis of variance, eliminating heterogeneity of the data, construction of designs will be provided.						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1:** Understand the concepts of design of experiments and application of ANOVA, ANCOVA. **CO2:** Construct complete and partially confounded factorial designs and perform their analysis. **CO3:** Design and analyses of incomplete block designs, understand the concepts of efficiency of BIBD relative to RBD. **CO4:** Understand the concepts of first order, orthogonal and treatment-control designs.						

COURSE SYLLABUS

NOTE:
Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit I will be taught via online mode.

Unit No.	Content of Each Unit	Hours of Each Unit
I	Introduction to design of experiments. Three basic principles of design of experiments: randomization, replication and local control. Uniformity trials. Analysis of basic design, asymptotic relative efficiency, missing plot techniques, analysis of covariance for CRD and RBD.	15
II	Factorial experiments: 2^k, 3^2 and 3^3 systems only. Complete and partial confounding, factorial replication in 2^k systems.	15

	Two-level fractional factorial designs: introduction, the one-quarter fraction of the 2^k design. Alias structure in fractional factorials and other designs.	
III	Incomplete block design: balanced incomplete block design, simple lattice design, split-plot design, strip-plot design, comparison of two treatments, efficiency of BIBD relative to RBD.	15
IV	Response surface methodology, first order designs, and orthogonal designs, treatment-control designs, model variation and use of transformation.	15

Suggested Readings:

1. Montgomery, D.C. (2013). Design and Analysis of Experiments, 8th Edition. Wiley.
2. Toutenburg, H. & Shalabh (2010). Statistical Analysis of Designed Experiments, 3rd Edition. Springer.
3. Cobb, G.W. (2014). Introduction to Design and Analysis of Experiments. Wiley.
4. Lawson, J. (2014). Design and Analysis of Experiments with R. CRC Press.

Course No: CC-9	Course Name: Practical 102				Course Code: SBS ST 01 204 C 0044		
Batch:	**Programme:**	**Semester:**	**L**	**T**	**P**	**Credits**	**Contact Hrs per Week: 8**
2021-2023	M.Sc. Statistics	II	0	0	4	4	**Total Hours: 120**
Total Evaluation Marks: 100 **CIE:** 30 Marks **TEE:** 70 Marks		**Examination Duration:** 3 hours					
		Pre-requisite of course: The theoretical knowledge of all the theory courses taught in this semester					
Course Objective	**To apply the theoretical concepts in the analyses of real-life data**.						
Course Outcomes:	**The students will be capable to apply the statistical techniques in estimation, testing of hypotheses. They will be able to establish regression models for prediction of target variable. Students will be able to apply appropriate designs in comparative experiments**						

COURSE SYLLABUS

NOTE: Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit I will be taught via online mode.

Unit No.	Content of Each Unit	Hours
	Practicals based on Statistical Inference - I (SBS ST 01 201 C 3104), Regression Analysis (SBS ST 01 202 C 3104) and Design of Experiments (SBS ST 01 203 C 3104).	120

Course No: DCEC-1	Course Name: Time Series and Statistical Quality Control				Course Code: SBS ST 01 201 DCE 3104		
Batch:	**Programme:**	**Semester:**	**L**	**T**	**P**	**Credits**	**Contact Hrs per Week: 4**
2021-2023	M.Sc. Statistics	II	3	1	0	4	**Total Hours: 60**
Total Evaluation Marks: 100 **CIE:** 30 Marks **TEE:** 70 Marks		**Examination Duration:** 3 hours					
		Pre-requisite of course: Area properties of normal distribution, additive and multiplicative models.					
Course Objective	The objective of this course is to equip the students of M.Sc. Statistics with knowledge of industrial statistics as well as applications of Time series in real life.						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1:** Study the components of time series and its use to forecast the future values. **CO2:** Learn auto covariance and auto-correlation functions. **CO3:** Study the concept and applications of control charts for variables and attributes. **CO4:** Understand different sampling inspection plans and their applications.						

COURSE SYLLABUS

NOTE:
Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit I will be taught via online mode.

Unit No.	Content of Each Unit	Hours of Each Unit
I	Time series: objects, decomposition, examples of time series, trend component, polynomial, logistic, Gompertz, log-normal trend functions, smoothing of moving average, Spencer's formulae and effects, variate difference method, Measurement of seasonal and cyclical functions, Peridogram and harmonic analysis.	15
II	Concepts of auto regression, autocorrelation, partial autocorrelation and correlogram analysis. Linear models for stationary time series. First order moving average (MA(1)) process, second order moving average (MA(2)) process. First order autoregressive process (AR(1)), second order autoregressive process (AR(2)). Autoregressive moving	15

	average (ARMA) and autoregressive integrated moving average (ARIMA) models.	
III	Concept of quality and meaning of control, Chance and assignable causes of quality variation, product and process controls. Concept of 3-sigma limits. Modified and specifications limits. Different types of control charts like $\bar{X}$, R, np, p and c with their applications in industry.	15
IV	Sampling inspection v/s 100% inspection. Single, double, multiple and sequential sampling plans for attributes. Operating characteristic (OC), AOQL, ASN and ATI curves. Concept of producer's and consumer's risk, AQL and LTPD. Variable sampling plans.	15

Suggested Readings:

1. Montgomery, D.C., Jennings, C.L. & Kulahci, M. (2015). Introduction to Time Series Analysis and Forecasting, 2nd Edition. Wiley.
2. Brockwell, P.J. & Davis R.A. (2016). Introduction to Time Series and Forecasting, 2nd Edition. Springer.
3. Montgomery, D.C. (2012). Introduction to Statistical Quality Control, 7th Edition. Wiley.
4. Grant, E. & Leavenworth, R. (2012). Statistical Quality Control, 7th Edition. Tata McGraw Hill.

Course No: DCEC-2	Course Name: OPERATIONS RESEARCH				Course Code: SBS ST 01 202 DCE 3104		
Batch:	**Programme:**	**Semester:**	**L**	**T**	**P**	**Credits**	**Contact Hrs per Week: 4**
2021-2023	M.Sc. Statistics	II	3	1	0	4	**Total Hours: 60**
Total Evaluation Marks: 100 **CIE:** 30 Marks **TEE:** 70 Marks		**Examination Duration:** 3 hours **Pre-requisite of course: Linear algebra, Poisson process. Relation between exponential distribution and Poisson process.**					
Course Objective	To provide the ideas of formulating mathematical modeling and their optimum solution in the context of practical problems belonging to Government/Private Sectors. Also, to give students a firm foundation in the advanced optimization techniques for the solution of the problems covered in course contents.						
Course Outcomes:	On completion of this course, students will be able to: **CO1:** Identify and develop operational research models from the verbal description of the real system. **CO2:** Understand the characteristics of different types of decision-making environments and decision-making approaches. **CO3:** Understand the mathematical tools that are needed to solve optimization problems. **CO4:** Analyze the inventory and queueing models.						

COURSE SYLLABUS

NOTE:
Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit I will be taught via online mode.

Unit No.	Content of Each Unit	Hours of Each Unit
I	Origin and development of operations research (O.R.), modelling in O.R., applications of O.R., opportunities and shortcomings of O.R. Formulation of linear programming problem (LPP), graphical solution to LPP, properties of a solution to the LPP, generating extreme point solutions.	15
II	The simplex computational procedure, development of minimum feasible solution, a first feasible solution using slack variables, the	15

	artificial basis technique. Two phase method and Charnes M-method with artificial variables. The duality problem of linear programming and its economic interpretation, transportation and assignment problems.	
III	Inventory management: characteristics of inventory systems. Classification of items. Deterministic inventory systems with and without lead-time. All unit and incremental discounts. Single period stochastic models.	15
IV	Queueing Theory: Introduction of the queuing system, Various components of a queueing system. Pure Birth Process; Pure Death Process, Birth and Death Process, M/M/1 , M/M/1 (Generalized), M/M/1/FCFS/K/∞, M/M/C, Erlang's loss model.	15

Suggested Readings

1. Taha, H.A. (2017). Operations Research: An Introduction, 10th Edition. Pearson.
2. Gass, S.I. (2010). Linear Programming, Methods and Applications, 5th Edition. Dover Books.
3. Gross, D., Shortle, J.F., Thompson, J.M. & Harris, C.M. (2017). Fundamentals of Queueing Theory, 5th Edition. Wiley.
4. Water, D. (2013). Inventory Control and Management, 2nd Edition. Wiley.

Course No: GEC-3	**Course Name:** Applied Statistics-I				**Course Code:** SBS ST 01 201 GE 3104		
Batch:	**Programme:**	**Semester:**	**L**	**T**	**P**	**Credits**	**Contact Hrs per Week: 4**
2021-2023	M.Sc. Statistics	II	3	1	0	4	**Total Hours: 60**
Total Evaluation Marks: 100 **CIE:** 30 Marks **TEE:** 70 Marks		**Examination Duration:** 3 Hours					
		Pre-requisite of course: Time series data, Area property of Gaussian distribution.					

Course Objective	The course aims to study various models and components of time series analysis for forecasting purposes and various methods to control the quality of a product. It also gives the study of distribution of population with respect to birth, migration, aging and death.
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1:** Study the components of time series and their measurement. **CO2:** Study process control and its tools-control chart for variables and attributes. **CO3:** Learn the basic measures of mortality and fertility and their application. **CO4:** Understand life tables and their uses in real life problems.

COURSE SYLLABUS

NOTE:
Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit I will be taught via online mode.

Unit No.	Content of Each Unit	Hours of Each Unit
I	Time Series: Components of time series, Decomposition of time series- Additive and multiplicative model with their merits and demerits, Illustrations of time series, measurement of trend by method of moving averages, method of semi-averages and method of least squares (linear, quadratic and exponential). Measurement of seasonal variations by method of simple averages, method of ratio to trend.	15
II	Statistical Quality Control: Importance of statistical methods in industrial research and practice, determination of tolerance limits, causes of variations in quality: chance and assignable. General theory of control charts, process and product control, control charts for variables: X- bar and R-charts, control charts for attributes: p and c-charts.	15

III	Demographic Methods: Introduction, measurement of population, rates and ratios of vital events, measurement of mortality: Crude Death Rate, Specific Death Rate (w. r. t. age and sex), Infant Mortality Rate, Standardized death rates.	15
IV	Life (mortality) tables: definition of its main functions and uses, measurement of fertility and reproduction: Crude Birth Rate, General Fertility Rate and Total Fertility Rate. Measurement of population growth: Gross Reproductive Rate, Net Reproductive Rate.	15

Suggested Readings:

1. Mukhopadhyay, P. (2011). Applied Statistics, 2nd Edition. Books and Allied (P.) Ltd.
2. Goon, A.M., Gupta, M.K. & Dasgupta, B. (2016). Fundamentals of Statistics, Vol. II. 9th Edition. World Press.
3. Montegomery, D.C. (2013). Statistical Quality Control: A Modern Introduction, 7th Edition. Wiley.
4. Burr, J.T. (2014). Elementary Statistical Quality Control, 2nd Edition. CRC Press.

Course No: GEC-4	Course Name: Statistical Methods				Course Code: SBS ST 01 202 GE 3104		
Batch:	**Programme:**	**Semester:**	**L**	**T**	**P**	**Credits**	**Contact Hrs per Week: 4**
2021-2023	M.Sc. Statistics	II	3	1	0	4	**Total Hours: 60**
Total Evaluation Marks: 100 **CIE:** 30 Marks **TEE:** 70 Marks	**Examination Duration:** 3 hours **Pre-requisite of course: Quantitative techniques/elementary statistical methods.**						
Course Objective	The objective of this course is to define a variety of data types, representation and interpretation of data, sampling techniques and design of experiments. **To familiarize the students about the hypotheses testing problem in normal setting.**						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1:** able to learn about different types of data & scales also tabulated representation of data. **CO2:** understand how to represent data graphically. **CO3:** able to learn how to collect samples and analyze them by using different sampling techniques. **CO4:** understand the concept of design of experiments and their applications. **CO5** : **Able to apply simple tests of hypothesis for parameters of normal distribution (one and two sample problems)**						

COURSE SYLLABUS

NOTE:

Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit I will be taught via online mode.

Unit No.	Content of Each Unit	Hours of Each Unit
I	Statistical Data, Types of Data: attributes and variables, discrete & continuous data, Primary data, Secondary data, Different types of scales- nominal, ordinal, ratio and interval. Presentation of data: Construction of tables with one or more factors of classification.	15
II	Diagrammatic and graphical representation of data: Pictorial representation, Bar chart, Pie Chart, histogram, frequency polygon,	15

	frequency curve and ogives. Stem and leaf chart. Box Plot Central tendency and its measures: Mean, Median and Mode	
III	Concepts of population, parameter, sample and estimator, census and sample surveys, Basic concepts in sampling and designing of a large scale surveys, steps involved in sample survey. Simple random sampling with and without replacement; **Idea of Stratified sampling and Systematic sampling**. **Normal, binomial and Poisson distributions with applications. Null and alternative hypothesis, Type-I and Type II errors, steps involved in a test of significance, p-value, testing hypothetical value of parameters of normal distribution (one sample and two sample problems)**	15
IV	Experimental designs: Terminology, experimental error, basic principles, uniformity trials, fertility contour maps, choice of size and shape of plots and blocks. Basic designs: Completely Randomized Design (CRD), Randomized Block Design (RBD), Latin Square Design (LSD) – layout, model and statistical analysis.	15

1. Goon, A.M., Gupta, M.K. & Dasgupta, B. (2016). Fundamentals of Statistics, Vol. I & II. World Press.
2. Das, N.G. (2012). Statistical Methods, Vol I & II. Tata McGraw Hill.
3. Daniel, W.W. & Cross, C.L. (2012). Biostatistics: A Foundation for Analysis in the Health Sciences, 10th Edition. Wiley.
4. Montgomery, D. C. (2008): Design and Analysis of Experiments, John Wiley.

Course No: CC-10	Course Name: Multivariate Analysis						Course Code: SBS ST 01 301 C 3104
Batch:	**Programme:**	**Semester:**	**L**	**T**	**P**	**Credits**	**Contact Hours per Week: 4**
2021-2023	M.Sc. Statistics	III	3	1	0	4	**Total Hours: 60**
Total Evaluation Marks: 100 **CIE:** 30 Marks **TEE:** 70 Marks		**Examination Duration:** 3 hours **Pre-requisite of course: Linear algebra, dependent variables, bivariate normal distribution.**					
Course Objective	*The main objective of this course is to introduce students to the analysis of observations on several correlated random variables for a number of individuals. Multivariate analysis is applicable in almost all scientific studies, for example in Anthropology, Life sciences, machine learning, Agriculture and Economics, when one deals with several variables simultaneously.*						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1:** Account for important theorems and concepts in multivariate analysis. **CO2:** Understand the concept of Wishart and Hotelling's T^2 distribution. **CO3:** Understand the link between multivariate techniques and corresponding univariate techniques. **CO4:** Conduct statistical inference about multivariate means including hypothesis testing, confidence region calculation, etc.						

COURSE SYLLABUS

NOTE:
Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit I will be taught via online mode.

Unit No.	Content of Each Unit	Hours of Each Unit
I	Multivariate normal distribution, its properties and characterization. Random sampling from a multivariate normal distribution. Maximum likelihood estimators of parameters. Distribution of sample mean vector. Inference concerning the mean vector when the covariance matrix is	15

	known. Matrix normal distribution. Multivariate central limit theorem.	
II	Wishart matrix, its distribution and properties. Distribution of sample generalized variance. Hotelling's T^2 statistic and its distribution and properties. Applications in tests on mean vector for one and more multivariate normal populations. Mahalanobis' D^2.	15
III	**[Course Outcome (s) No. : CO3]** Likelihood ratio test criteria for testing of independence of sets of variables, equality of covariance matrices, identity of several multivariate normal populations, equality of a covariance matrix to a given matrix, equality of a mean vector and a covariance matrix to a given vector and a given matrix.	15
IV	**[Course Outcome (s) No. : CO4]** Classification and discrimination procedures for discrimination between two multivariate normal populations, sample discriminant function, tests associated with discriminant functions, classification into more than two multivariate normal populations. Principal components, canonical variables and canonical correlations. Multivariate analysis of variance [MANOVA] of one-way classified data. Wilk's lambda criterion.	15

Suggested Readings:

1. Johnson, R.A. and Wichern, D.W.: (2015). Applied Multivariate Statistical Analysis, Sixth Edition, Pearson Education India.
2. Hardle, W.K. and Hlavka, Z. (2015): Multivariate Statistics, Springer.
3. Anderson, T.W. (2003): An Introduction to Multivariate Statistical Analysis, Third Edition, Wiley.
4. Härdle, W.K. and Simar, L. (2015): Applied Multivariate Statistical Analysis, Springer.
5. Singh, B.M. (2004): Multivariate statistical analysis, South Asian Publishers.

Course No: CC-11	Course Name: Statistical Inference-II				Course Code: SBS ST 01 302 C 3104		
Batch:	**Programme:**	**Semester:**	**L**	**T**	**P**	**Credits**	**Contact Hrs per Week: 4**
2021-2023	M.Sc. Statistics	III	3	1	0	4	**Total Hours: 60**
Total Evaluation Marks: 100 **CIE:** 30 Marks **TEE:** 70 Marks		**Examination Duration:** 3 hours					
		Pre-requisite of course: Distribution theory, Bayes theorem, joint and conditional distribution.					
Course Objective	The main objective of the course is to provide the detailed knowledge of the characterization of another inferential procedure that is Bayesian and non-parametric Inference.						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1:** Describe the role of the posterior distribution, the likelihood function, prior and the posterior distribution about a parameter in Bayesian framework. **CO2:** Understand inferences for lifetime models in Bayesian framework. **CO3:** Learn the basic concepts of nonparametric techniques. **CO4:** Understand the sequential probability ratio test and its application.						

COURSE SYLLABUS

NOTE:
Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit I will be taught via online mode.

Unit No.	Content of Each Unit	Hours of Each Unit
I	Elements of the Bayesian paradigm. Introduction to prior and posterior distributions, loss functions. Bayes risks, Bayesian paradigm versus classical paradigm. Prior distribution, subjective determination of prior distribution, improper priors, non-informative priors, conjugate prior families, construction of conjugate families using sufficient statistic for fixed dimensions.	15
II	Bayesian estimation of parameters of some well-known distributions like binomial, multinomial, Poisson, normal, lognormal, exponential, Rayleigh and Weibull distributions. Credible and highest posterior density (HPD) interval, HPD	15

	credible intervals in case of normal, gamma, exponential and Weibull distributions.	
III	Concept of nonparametric and distribution-free methods, probability integral transformation, empirical distribution function, kernel, one-sample and two-sample *U*-Statistics, test of independence, sign test, rank-order statistics, Wilcoxon signed-Rank test. Wald-Wolfowitz runs test, Kolmogorov-Smirnov two-sample test, median test, Mann-Whitney U test.	15
IV	The sequential probability ratio test (SPRT) and its application to binomial, Poisson, geometric, exponential, normal, operating characteristic (OC) function of SPRT, average sample number (ASN) function and their application, Wald's fundamental identity and its uses.	15

Suggested Readings:

1. Berger, J.O. (2013): Statistical Decision Theory and Bayesian Analysis, Springer.
2. Hollander, M., Wolfe, D. and Chicken, E. (2013): Nonparametric Statistical Methods, 3rd Edition, Wiley.
3. Gibbons, J.D. and Chakraborti, S. (2010): Nonparametric Statistical Inference, 5th Edition, CRC Press.
4. Rohatgi, V.K. & Saleh, A.K. Md.E. (2015). An Introduction to Probability and Statistics, 3rd Edition. Wiley.

Course No: CC-12	Course Name: Econometrics				Course Code: SBS ST 01 303 C 3104		
Batch:	**Programme:**	**Semester:**	**L**	**T**	**P**	**Credits**	**Contact Hrs per Week: 4**
2021-2023	M.Sc. Statistics	III	3	1	0	4	**Total Hours: 60**
Total Evaluation Marks: 100 **CIE:** 30 Marks **TEE:** 70 Marks		**Examination Duration:** 3 hours					
		Pre-requisite of course: Linear algebra, Regression analysis.					
Course Objective	The purpose of this course is to give students a solid foundation in econometric techniques, various functions for economic analysis and future forecasting.						
Course Outcomes:	On completion of this course, students will be able to: **CO1:** Understand the basic concepts of econometric models. **CO1:** Learn knowledge of various econometric models, estimation methods and related econometric theories. **CO1:** Understand the statistical techniques to model relationships between variables and make predictions. **CO1:** Learn how to conduct econometric analysis of data.						

COURSE SYLLABUS

NOTE: Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit I will be taught via online mode.

Unit No.	Content of Each Unit	Hours of Each Unit
I	Introduction to econometrics. A review of least squares and maximum likelihood estimation methods of parameters in classical linear regression model and their properties. Generalized least squares estimation and prediction, construction of confidence regions and tests of hypotheses. Regression analysis under linear restrictions, restricted least squares estimation method and its properties. Autocorrelation, sources and consequences, Autoregressive process tests for autocorrelation, Durbin Watson test.	15
II	Problem of Multicollinearity, its implications. Source of multicollinearity, tools for handling the problem of multicollinearity. Remedies for multicollinearity. Ridge regression. Heteroskedasticity, consequences and tests for it, estimation procedures under heteroskedastic disturbances, Bartlett's test, Breusch Pagan test and Goldfelf Quandt test. Dummy Variable Models.	15

III	Specification Error Analysis, Tests for Structural Change and Stability, Asymptotic theory and regressors. Stein-Rule Estimation. Instrumental variable estimation. Measurement Error Models.	15
IV	Simultaneous equations model, problem of identification, necessary and sufficient condition for the identifiability of parameters in a structural equation, ordinary least squares, indirect least squares, two-stage least squares and limited information maximum likelihood method.	15

Suggested Readings

1. Gujrati, D.N. & Porter, D.C. (2017). Basic Econometrics, 6th Edition. McGraw Hill.
2. Maddala, G.S. & Lahiri, K. (2010). Introduction to Econometrics, 4th Edition. Wiley.
3. Greene, W.H. (2012). Econometric Analysis, 7th Edition. Pearson.
4. Studenmund, A.H. & Johnson, B.K. (2017). Using Econometrics: A Practical Guide, 7th Edition. Pearson.

Course No: CC-13	Course Name: Seminar				Course Code: SBS ST 01 304 C 4004		
Batch:	**Programme:**	**Semester:**	**L**	**T**	**P**	**Credits**	**Contact Hrs per Week: 4**
2021-2023	M.Sc. Statistics	III	4	0	0	4	**Total Hours: 60**
Total Evaluation Marks: 100 **CIE:** 30 Marks **TEE:** 70 Marks		**Examination Duration:** 3 Hours **Pre-requisite of course: Theoretical and applied knowledge of all courses studied up to Sem III.**					
Course Objective	**To inculcate the habit of self-learning**						
Course Outcomes:	**Students will be capable to study independently and apply the statistical techniques in real life problems. They will be capable to present the study in the unified manner starting from objective of the project problem, methodology used, and presentation of results.**						

COURSE SYLLABUS

NOTE:
Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit I will be taught via online mode.

Unit No.	Content of Each Unit	Hours
	Each student must present at least one seminar which will be followed by discussion session with participation from other students and the concerned faculty members present. The student must also submit the slides/write-up of the presentation content to the Student Advisor (Faculty). The seminar, participation in discussions, the submitted slides and overall attendance (as per ordinance) will form the basis of the evaluation. There will be no separate final exam for this course.	60

Course No: CC-14	Course Name: Practical 103				Course Code: SBS ST 01 305 C 0044		
Batch:	**Programme:**	**Semester:**	**L**	**T**	**P**	**Credits**	**Contact Hrs per Week: 8**
2021-2023	M.Sc. Statistics	III	0	0	4	4	**Total Hours: 120**

Total Evaluation Marks: 100 **CIE:** 30 Marks **TEE:** 70 Marks	**Examination Duration:** 3 hours **Pre-requisite of course: Basic knowledge of all courses studied in Sem III**
Course Objective	To trained the students to apply statistical techniques in the analysis of correlated multivariate data. Modeling of financial time series data, applying the non-parametric methods in the absence of normality assumption.
Course Outcomes:	**Students can analyze multivariate data, non normal data. They will be capable to apply Bayes techniques to incorporate the prior information to improve the results of classical statistics.**

COURSE SYLLABUS

NOTE:
Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit I will be taught via online mode.

Unit No.	Content of Each Unit	Hours
	Practicals based on Multivariate Analysis (SBS ST 01 301 C 3104), Statistical Inference – II (SBS ST 01 302 C 3104) and Econometrics (SBS ST 01 302 CC 4004).	120

Course No: DCEC-3	**Course Name:** Stochastic Processes				**Course Code:** SBS ST 01 301 DCE 3104		
Batch:	**Programme:**	**Semester:**	**L**	**T**	**P**	**Credits**	**Contact Hrs per Week: 4**
2021-2023	M.Sc. Statistics	III	3	1	0	4	**Total Hours: 60**
Total Evaluation Marks: 100 **CIE:** 30 Marks **TEE:** 70 Marks		**Examination Duration:** 3 Hours					
		Pre-requisite of course: Distribution theory, sequence of random variables, Multivariate distribution.					
Course Objective	The objective of this course is to apprise the students with the basic concepts of the theory of stochastic processes in continuous time, also to make them able to use various analytical and computational techniques to study stochastic models that appears in applications.						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1:** Study the fundamental concept of stochastic processes and its applications. **CO2:** Understand Markov processes and Markov chains and their applications in real world. **CO3:** Study the branching process and its properties. **CO4:** Understand Poisson processes and its variations.						

COURSE SYLLABUS

NOTE:
Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit I will be taught via online mode.

Unit No.	Content of Each Unit	Hours of Each Unit
I	Stochastic Processes: Introduction, classification according to state space and time domain. Countable state Markov chains, transition probability matrix, Chapman-Kolmogorov equations, calculation of n-step transition probabilities and their limits, stationary distribution.	15
II	Branching Processes: Properties of generating function of branching processes, probability of ultimate extinction, distribution of the total number of progeny, generalization of the classical Galton-Watson branching process, general branching processes, random walk and gambler's ruin problem.	15
III	Continuous-time Markov Processes: Poisson process and related distributions, generalizations of Poisson process, simple	15

	birth-process, simple death-process, simple birth-death process, linear birth-death process. First passage time distribution.	
IV	Renewal Theory: Elementary renewal theorem and applications. Statement and uses of key renewal theorem, central limit theorem for renewals, study of residual and excess lifetime's process. Renewal reward Process, Markov renewal and semi- Markov processes, Markov renewal equations.	15

Suggested Readings:

1. Medhi, J. (2012). Stochastic Processes, 3rd Edition. New Age International.
2. Ross, S.M. (2016). Stochastic Processes, 2nd Edition. Wiley India.
3. Karlin, S. & Taylor, H.M. (2012). A First Course in Stochastic Processes, 2nd Edition. Academic Press.
4. Prabhu, N.U. (2010). Stochastic Processes: Basic Theory and its Applications. World Scientific.

Course No: DCEC-4	Course Name: Demography and Vital Statistics				Course Code: SBS ST 01 302 DCE 3104		
Batch:	**Programme:**	**Semester:**	**L**	**T**	**P**	**Credits**	**Contact Hrs per Week: 4**
2021-2023	M.Sc. Statistics	III	3	1	0	4	**Total Hours: 60**
Total Evaluation Marks: 100 **CIE:** 30 Marks **TEE:** 70 Marks		**Examination Duration:** 3 Hours **Pre-requisite of course: Time series data, quantitative techniques.**					
Course Objective	The objective of the course is to make the students conversant with various techniques used in summarization and analysis of data related to demographic and vital events.						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1:** Understand the basic concepts of demography and vital statistics. **CO2:** Understand the trends of mortality and compare and contrast among different age and sex group. **CO3:** Identify the components of population change, including the effects of changing birth, death and migration rates, and demonstrate their influences on age structure. **CO4:** Do population projection by different methods.						

COURSE SYLLABUS

NOTE:
Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit I will be taught via online mode.

Unit No.	Content of Each Unit	Hours of Each Unit
I	Coverage and content errors in demographic data, use of balancing equations and Chandrasekharan-Deming formula to check completeness of registration data, adjustment of age data. Use of Whipple, Myer and UN indices, population composition, dependency ratio, population transition theory.	15
II	Measures of Fertility: Stochastic models for reproduction, distribution of time to first birth, inter-live birth intervals and	15

	of number of births. Estimation of parameters, estimation of parity progression ratio from open birth interval data.	
III	Measures of Mortality: Construction of abridged life tables, distribution of life table functions and their estimation. Stable and quasi-stable populations, intrinsic growth rate models for population growth and their fitting to population data. Stochastic models for population growth.	15
IV	Stochastic models for migration and for social and occupational mobility based on Markov chains. Estimation of measures of mobility. Methods for population projection. Use of Leslie matrix. Nuptuality and its measurements.	15

Suggested Readings:

1. Kumar, R. (2006): Technical Demography, New age International (P) Ltd, New Delhi.
2. Samuel, P., Patrick, H. and Michel, G. (2000): Demography: Measuring and Modeling Population Processes, Wiley-Blackwell.
3. Rowland, D.T. (2003): Demographic Methods and Concepts, Oxford university press, Inc., New York.
4. Pathak, K. B. and Ram, F. (2013): Techniques of Demographic Analysis, Himalaya Publishing House.
5. Keyfitz, N. and Caswell, H. (2005): Applied Mathematical Demography, Springer.

<table>
<tr><td>Course No:
CC-15</td><td colspan="3">Course Name: Minor Project/Dissertation</td><td colspan="3">Course Code: SBS ST 01 401 PROJ 00016</td></tr>
<tr><td rowspan="2">Batch:

2021-2023</td><td rowspan="2">Programme:

M.Sc. Statistics</td><td>Semester:</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td>Contact Hrs per Week: -</td></tr>
<tr><td>IV</td><td>-</td><td>-</td><td>-</td><td>16</td><td>Total Hours: -</td></tr>
<tr><td colspan="2" rowspan="2">Total Evaluation Marks: 400
CIE: 120 Marks
TEE: 280 Marks</td><td colspan="6">Examination Duration: -</td></tr>
<tr><td colspan="6">Pre-requisite of course: Knowledge of all courses studied in the M. Sc. programme.</td></tr>
<tr><td>Course Objective</td><td colspan="7">To inculcate the habit of self-learning among the students</td></tr>
<tr><td>Course Outcomes:</td><td colspan="7">Students will be capable to study independently and apply the statistical techniques in real life problems. They will be capable to present the study in the unified manner starting from objective of the project problem, methodology used, and presentation of results.</td></tr>
<tr><td colspan="8">COURSE SYLLABUS</td></tr>
<tr><td colspan="8">NOTE: Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit I will be taught via online mode.</td></tr>
<tr><td colspan="8">Content</td></tr>
<tr><td colspan="8">The aim of the dissertation or project work is to familiarize the students with advanced research. The topic for the project work is to be decided by the supervisor/guide concerned. The project report/ dissertation is to be evaluated by a committee constituted by the Head of Department of Statistics having at least one external expert.</td></tr>
</table>

Course No: DCEC-5	Course Name: Order Statistics				Course Code: SBS ST 01 401 DCE 3104		
Batch:	**Programme:**	**Semester:**	**L**	**T**	**P**	**Credits**	**Contact Hrs per Week: 4**
2021-2023	M.Sc. Statistics	IV	3	1	0	4	**Total Hours: 60**
Total Evaluation Marks: 100 **CIE:** 30 Marks **TEE:** 70 Marks		**Examination Duration:** 3 Hours **Pre-requisite of course: Distribution theory, joint, marginal and conditional distributions.**					
Course Objective	*The objective of the course is to learn general strategies for problems about order statistics and how to learn to find the median (or k^{th} largest) in linear average-case number of comparisons (and time).*						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1:** Understand the basic concepts of order statistics, joint, marginal and conditional probabili distributions of order statistics. **CO2:** Learn about distribution-free confidence intervals for population quantile and distributio free tolerance intervals for population distributions. **CO3:** Construct the recurrence relations and identities for moments of order statistics. **CO4:** Enhanced with the concepts of distributions of order statistics for independently and n identically distributed variates and also for dependent variates.						

COURSE SYLLABUS

NOTE:
Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit I will be taught via online mode.

Unit No.	Content of Each Unit	Hours of Each Unit
I	Introduction to order statistics, joint, marginal and conditional distributions of order statistics (discrete and continuous cases). Distribution of the range and other systematic statistics, order statistics as a Markov chain. Examples based on discrete and continuous distributions.	15
II	Distribution-free confidence intervals for population quantiles and distribution-free tolerance intervals. Distribution-free bounds for moments of order statistics and of the range.	15

	Approximations to moments in terms of the quantile function and its derivatives. lemma, uniformly most powerful (UMP) tests.	
III	Moments of order statistics, recurrence relations and identities for moments of order statistics. Large sample approximations to mean and variance of order statistics. Asymptotic distributions of order statistics.	15
IV	Order statistics for independently and not identically distributed (i.ni.d.) variates, Concomitants of order statistics. Random division of an interval and its applications. Order statistics from a sample containing a single outlier. Concepts of record values and generalized order statistics.	15

Suggested Readings:

1. Shahbaz, M.Q., Ahsanullah, M., Shahbaz, S.H. & Al-Zahrani, B.M. (2016). Ordered Random Variables: Theory and Applications. Springer.
2. David, H.A. & Nagaraja, H.N. (2005). Order Statistics, 3rd Edition. Wiley.
3. Ahsanullah, M., Nevzorov, V.B. & Shakil, M. (2013). An Introduction to Order Statistics, Atlantis Studies in Probability and Statistics, Vol. III. Atlantis Press.
4. Arnold, B.C., Balakrishnan, N. & Nagaraja, H.N. (2008). A First Course in Order Statistics. SIAM Publishers.

Course No: DCEC-6	Course Name: Survival Analysis				Course Code: SBS ST 01 402 DCE 3104		
Batch:	**Programme:**	**Semester:**	**L**	**T**	**P**	**Credits**	**Contact Hrs per Week: 4**
2021-2023	M.Sc. Statistics	IV	3	1	0	4	**Total Hours: 60**
Total Evaluation Marks: 100 **CIE:** 30 Marks **TEE:** 70 Marks		**Examination Duration:** 3 Hours					
		Pre-requisite of course: Distribution theory, order statistics, sampling.					

Course Objective	The objective of this course is to provide the applications of statistics in handling survival data. This course introduces the concept of censoring and various life time distributions used to analyze such data.
Course Outcomes:	On completion of this course, students will be able to: • Understand basic concepts of survival data and lifetime models. • Learn how to handle censored data under different scenarios. • Learn non-parametric estimation of survival function. • Learn the Log-Rank test for testing differences between survival curves and Cox' regression model for estimating and testing effects of covariates.

COURSE SYLLABUS

NOTE: Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit I will be taught via online mode.

Unit No.	Content of Each Unit	Hours of Each Unit
I	Concepts of survival function, failure rate or hazard function, mean residual life and their properties. Ageing classes- IFR, DFR, IFRA, DFRA, NBU, NBUE, BT and UBT, scaled TTT transform and characterization of ageing classes.	15
II	Life testing plans or censoring methods, right and left censoring, concepts of Type-I (time) and Type-II (failure), random censoring schemes. Life distributions-exponential, Weibull, log-logistic, gamma, log-normal distributions. Parametric inference- estimation of parameters associated with various life time distributions and life testing plans.	15
III	Nonparametric methods of estimation of survival function - actuarial estimator, Kaplan-Meier estimator. Tests of exponentiality against non-parametric classes-Total time on Test, Deshpande Test.	15
IV	Two sample problem - Gehan test, log-rank test, Mantel-Haenzel test. Cox proportional hazards model, competing risks model.	15

Suggested Readings

1. Deshpande, J.V. & Purohit, S.G. (2016). Life Time Data: Statistical Models and Methods, 2nd Edition. Word Scientific.
2. Lee, E.T. & Wang, J.W. (2015). Statistical Methods for Survival Data Analysis, 4th Edition. Wiley.
3. Miller, R.G. (2011). Survival Analysis, 2nd Edition. Wiley.
4. Moore, D.F. (2016). Applied Survival Analysis using R. Springer.

Course No: DCEC-7	Course Name: Decision theory and sequential analysis				Course Code: SBS ST 01 403 DCE 3104		
Batch:	**Programme:**	**Semester:**	**L**	**T**	**P**	**Credits**	**Contact Hrs per Week: 4**
2021-2023	M.Sc. Statistics	IV	3	1	0	4	**Total Hours: 60**
Total Evaluation Marks: 100 **CIE:** 30 Marks **TEE:** 70 Marks		**Examination Duration:** 3 Hours **Pre-requisite of course: Distribution theory, Bayesian analysis, sequence of random variables.**					
Course Objective	The main objective of this course is to provide the detailed knowledge of the decision theory and sequential analysis.						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1:** Understand the concept of decision theory and sequential analysis. **CO2:** Learn how to perform posterior decision analysis and hypothesis testing. **CO3:** Understand the decision rule and fundamental identity in sequential analysis. **CO4:** Learn the wider applications of decision principles of Bayesian and frequentist approaches.						

COURSE SYLLABUS

NOTE:
Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit I will be taught via online mode.

Unit No.	Content of Each Unit	Hours of Each Unit
I	Elements of decision theory: Expected loss, decision rules and risks - Bayesian expected loss, frequentist risks, randomized and nonrandomized decision rules, admissible decision rule, complete, essential complete and minimal complete classes of decision rules and their relationship, minimax and Bayes decision rule, estimation testing viewed as decision rule problem, Bayes and minimax estimators. Minimax and Bayes tests in simple cases.	15
II	Decision principles: the conditional Bayes decision principle and frequentist decision principles. Misuse of classical Inference procedures, the frequentist perspective, the	15

	conditional perspective, the likelihood principle, choosing a paradigm or decision principle. Utility theory: introduction, the utility of money.	
III	Bayesian decision theory: Posterior decision analysis, estimation, finite action problems and hypothesis testing. Minimax Analysis: Introduction, game theory, basic elements, general techniques for solving games, finite games, the minimax theorem.	15
IV	Sequential Decision rule: Stopping rule, terminal decision rule. Bayes and minimax sequential decision Rules. Invariant sequential decision problems, sequential test of a simple hypothesis. The sequential probability ratio test, the fundamental identity of sequential analysis.	15

Suggested Readings:

1. Robert, C.P. (2013): The Bayesian Choice: A Decision Theoretic Motivation, Springer.
2. Berger J.O. (2013): Statistical Decision Theory and Bayesian Analysis, Springer.
3. Wald, A. (2013): Sequential Analysis, Dover Publications.
4. Mukhopadhyay, N. and de Silva, B.M. (2008): Sequential Methods and Their Applications, CRC Press.

Course No: DCEC-8	Course Name: Statistical Computing				Course Code: SBS ST 01 404 DCE 3104		
Batch:	**Programme:**	**Semester:**	**L**	**T**	**P**	**Credits**	**Contact Hrs per Week: 4**
2021-2023	M.Sc. Statistics	IV	3	1	0	4	**Total Hours: 60**
Total Evaluation Marks: 100 **CIE:** 30 Marks **TEE:** 70 Marks		**Examination Duration:** 3 Hours					
		Pre-requisite of course:					

Course Objective	The students will study the statistical simulation using Computers. It contains introduction to System, Models, Simulation, Random Number Generation and Variance Reduction Techniques.
Course Outcomes:	On completion of this course, students will be able to: **CO1:** Understand the basic ideas of random number generation using different techniques. **CO2:** Learn theoretical methods and practicable techniques of statistical simulations. **CO3:** Understand how to apply Monte Carlo simulations and the EM algorithm. **CO4:** Learn how to handle real world problems with large scale data.

COURSE SYLLABUS

NOTE: Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit I will be taught via online mode.

Unit No.	Content of Each Unit	Hours of Each Unit
I	Introduction and need of statistical simulation. Random number generation, requisites of a good random number, methods of random number generation such as linear congruential and mixed congruential, statistical tests for pseudo random numbers. Methods of generating random variables such as inverse transforms, composition and acceptance-rejection methods.	15
II	Monte Carlo integration and variance reduction techniques: Hit or miss Monte Carlo method, sample mean Monte Carlo method, importance sampling, correlated sampling control variates, stratified sampling, antithetic variates, partition of region.	15
III	EM algorithm: applications to missing and incomplete data problems, mixture models. Smoothing with kernels, density estimation, simple non-parametric regression. Smoothing with kernels: density estimation, choice of kernels.	15

IV	Simulation based testing: simulating test statistics and power functions, permutation tests. Bootstrap methods: resampling paradigms, bias and standard errors, confidence intervals, bootstrapping in regression. Jackknife and cross validation: Jacknife in sample surveys, cross-validation for tuning parameters.	15

Suggesting Readings

1. Rubinstein, R.Y. and Kroese, D.P. (2008): Simulation and the Monte Carlo Method, Second Edition, Wiley.
2. Voss, J. (2014): An Introduction to Statistical Computing: A Simulation Approach, Wiley.
3. Ross, S.M. (2012): Simulation, Fifth Edition, Academic Press.
4. Thomopoulos, N.T. (2013): Essentials of Monte Carlo Simulation, Springer.

<table>
<tr><td>Course No:
CC-15</td><td colspan="3">Course Name: Major Project/Dissertation</td><td colspan="4">Course Code: SBS ST 01 401 PROJ 00024</td></tr>
<tr><td rowspan="2">Batch:

2021-2023</td><td rowspan="2">Programme:

M.Sc. Statistics</td><td>Semester:</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td>Contact Hrs per Week: -</td></tr>
<tr><td>IV</td><td>-</td><td>-</td><td>-</td><td>24</td><td>Total Hours: -</td></tr>
<tr><td colspan="2" rowspan="2">Total Evaluation Marks:
600

CIE: 180 Marks

TEE: 420 Marks</td><td colspan="6">Examination Duration: -</td></tr>
<tr><td colspan="6">Pre-requisite of course:</td></tr>
<tr><td>Course Objective</td><td colspan="7"></td></tr>
<tr><td>Course Outcomes:</td><td colspan="7"></td></tr>
<tr><td colspan="8">COURSE SYLLABUS</td></tr>
<tr><td colspan="8">NOTE:
Eight questions will be set, two from each of the UNIT. The candidates are required to attempt any five questions in all selecting at least one question from each section. All questions carry equal marks. Unit I will be taught via online mode.</td></tr>
<tr><td colspan="8">Content</td></tr>
<tr><td colspan="8">The aim of the dissertation or project work is to familiarize the students with advanced research. A departmental committee will distribute the topics according to the skill and merit of the students. The project report/dissertation will be evaluated by a committee constituted by the Head of Department of Statistics having at least one external expert.</td></tr>
</table>

9. Teaching-Learning Process

- Lectures
- Discussions
- Simulations
- Role Playing
- Participative Learning
- Interactive Sessions
- Seminars
- Research-based Learning/Dissertation or Project Work
- Technology-embedded Learning

10. Implementation of Blended Learning

Blended Learning is a pedagogical approach that combines face to-face classroom methods with computer-mediated activities in the process of teaching and learning. It implies nice blend of face-to-face and online activities to make the learning processes more interesting and engaging. It focuses on integration of traditional classroom activities and innovative ICT-enabled strategies. It emphasizes student-centric learning environment where the teacher is the facilitator for productive and measurable learning outcomes. It optimizes and compliments the face-to-face learning, giving ample freedom and flexibility to the students and teachers to access and explore the wide range of open-access sources such as video lectures, podcasts, recordings and articles through digital platforms. It gives freedom and autonomy to the teachers in selection of appropriate digital platforms, resources and time-slots to complement and supplement face to face learning. The Blended Learning doesn't undermine the role of the teacher, rather it gives him/her an opportunity to explore the unexplored in accordance with the requirements of the curriculum.

Key features of Blended Learning

- Student-centric pedagogical approach focusing on flexibility in timing, quality content, needs and interests of students and freedom to study through the mode of his/her choice;
- Freedom to Select variety of mediums and techniques;
- Increased student engagement in learning;
- Enhanced teacher and student interaction;
- Improved student learning outcomes;
- More flexible teaching and learning environment;
- More responsive for self and continuous learning;
- Better opportunities for experiential learning;
- Increased learning skills;
- Greater access to information, improved satisfaction and learning outcomes.

11. Assessment and Evaluation

- Continuous Comprehensive Evaluation at regular after achievement of each Course-level learning outcome
- Formative Assessment on the basis of activities of a learner throughout the programme instead of one-time assessment
- Oral Examinations to test presentation and communication skills
- Open Book Examination for better understanding and application of the knowledge acquired
- Group Examinations on Problem solving exercises
- Seminar Presentations
- Review of Literature
- Collaborative Assignments

12. Keywords

- LOCF
- NEP-2020
- Blended Learning
- Face to face (F to F) Learning
- Programme Outcomes
- Programme Specific Outcomes
- Course-level Learning Outcomes
- Postgraduate Attributes
- Learning Outcome Index
- Formative Assessment and Evaluation
- Comprehensive and Continuous Evaluation

13. References

- National Education Policy-2020. https://www.education.gov.in/sites/upload_files/mhrd/files/NEP_Final_English_0.pdf
- The draft subject specific LOCF templates available on UGC website. https://www.ugc.ac.in/ugc_notices.aspx?id=MjY5OQ==
- Draft Blended Mode of Teaching and Learning: Concept Note available on UGC website. https://www.ugc.ac.in/pdfnews/6100340_Concept-Note-Blended-Mode-of-Teaching-and-Learning.pdf

14. Appendices

Annexure-XXXIII

School of Engineering & Technology
Central University of Haryana, Mahendergarh
Proceedings / Minutes of the School Board Meeting
of School of Engineering & Technology, Held on 14.09.2021

The online meeting of the School Board of School of Engineering & Technology (SoET) was held on 14.09.2021. The following members were present in the meeting:

- Dr. Rajesh Kumar Dubey, Dean, SoET, HoD-EE & PPT - Chairperson
- Prof. Ashotosh Kumar Singh, Professor, NIT Kurukshetra, Subject Expert-Member
- Dr. Dhirendra Singhal, Professor, DCRUST Murthal, Subject Expert-Member
- Prof. Sathans, Professor, NIT Kurukshetra, Subject Expert-Member
- Dr. Sarbjeet Singh, Professor, Subject Expert-Member
- Dr. Vikash Garg, HoD, CE-Member
- Dr. Rakesh Kumar, HoD, CSE-Member
- Dr. Ajay Kumar Bansal, Associate Professor, EE-Member
- Dr. Sumit, Assistant Professor, EE, CUH-Member
- Dr. Neeraj Kumar, Assistant Professor, CE, CUH-Member
- Sh. Shammi Mehra, Assistant Professor, PPT, CUH-Member
- Sh. Anant Rajee Bara, Assistant Professor, CSE, CUH-Member
- Dr. Manish Kumar, Assistant Professor, EE, Special Invitee
- Prof. Rajendra Kumar Annayath, VC, DCRUST, Subject Expert-Member-ABSENT

The Dean of SoET welcomed all the members and after deliberations, it was resolved/ recommended by the School Board members as follows:

- The Scheme and Syllabi for B. Tech (Civil Engineering) for Semesters 7th and 8th (Annexure-1) recommended by Board of studies, Civil Engineering in the minutes of online meeting held on 04.09.2021 are approved for B.Tech (Civil Engineering) for session 2021-22 onwards (2018-19 admitted students).

- The Scheme and Syllabi for B. Tech (Computer Science & Engineering) for Semesters 7th and 8th (Annexure-2) recommended by Board of studies, Computer Science & Engineering in the minutes of online meeting held on 02.09.2021 are approved for B.Tech (Computer Science & Engineering) for session 2021-22 onwards (2018-19 admitted students).

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- The Scheme and Syllabi for B. Tech (Electrical Engineering) for Semesters 7th and 8th (Annexure-3) recommended by Board of studies, Electrical Engineering in the minutes of online meeting held on 26.08.2021 are approved for B.Tech. (Electrical Engineering) for session 2021-22 onwards (2018-19 admitted students).
- The Scheme and Syllabi for B. Tech (Printing & Packaging Technology) for Semesters 7th and 8th (Annexure-4) recommended by Board of studies, Printing & Packaging Technology in the minutes of online meeting held on 27.08.2021 are approved for B.Tech (Printing & Packaging Technology) for session 2021-22 onwards (2018-19 admitted students).
- On the basis of the recommendation of Board of studies, Civil Engineering in the minutes of online meeting held on 04.09.2021, the start of M.Tech. (Structural Engineering) program in Department of Civil Engineering was appraised and approved. The Scheme of Studies & Examinations and the Syllabi of M.Tech. (Structural Engineering) were discussed and approved by school board for the Batch 2021-22 onwards (Annexure-5).
- On the basis of the recommendation of Board of studies, Computer Science & Engineering in the minutes of online meeting held on 02.09.2021, the start of M.Tech. (Computer Science & Engineering) program in Department of Computer Science & Engineering appraised and approved. The Scheme and Syllabi of M.Tech. (Computer Science & Engineering) were discussed and approved by school board for the Batch 2021-22 onwards (Annexure-6).
- On the basis of the recommendation of Board of studies, Electrical Engineering in the minutes of online meeting held on 26.08.2021, the start of M.Tech. (Energy System and Management) program in the Department of Electrical Engineering appraised and approved. The Scheme and Syllabi of M.Tech. (Energy System and Management) were discussed and approved by school board for the Batch 2021-22 onwards (Annexure-7).

The meeting ended with vote of thanks to the Chair.

Sh. Anant Rajee | Dr. Shammi Mehra | Dr. Sumit | Dr. Neeraj

Dr. Manish Kumar | Dr. Ajay Kumar Bansal | Dr. Vikash Garg

Dr. Rajesh Kr. Dubey | Dr. Rakesh Kumar | Prof. Sarbjeet Singh

Prof. Ashotosh Kumar Singh | Prof. Dhirendra Singhal | Prof. Sathans

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DEPT. OF ELECTRICAL ENGG.
CENTRAL UNIVERSITY OF HARYANA, MAHENDERGARH
Proceedings / Minutes of the Meeting
of Board of Studies in Electrical Engg. Held on 26.08.2021

- - -

The online meeting of the Board of Studies in Electrical Engg. was held on 26.08.2021. The following were present

1. Dr. Ajay Kumar Bansal, HOD, EE- Chairperson
2. Prof. N. K. Jain, Subject Expert- Member
3. Prof. P. R. Sharma, Subject Expert- Member
4. Dr. Rajesh Kumar Dubey, Associate Professor, CUH- Member
5. Dr. Sumit, Assistant Professor, CUH- Member
6. Dr. Kalpana Chauhan, Assistant Professor, CUH- Special Invitee
7. Dr. Manish Kumar, Assistant Professor, CUH- Special Invitee
8. Dr. Munish Manas, Assistant Professor, CUH- Special Invitee
9. Dr. Muralidhar, Assistant Professor, CUH- Special Invitee

After deliberations, it was resolved/ recommended by the Board of Studies as follows:

1. The Scheme of Studies & Examinations and the Syllabi of B.Tech. (Electrical Engg.)- IV year (7th and 8th semesters) were discussed and approved for the Batch 2018-19 onwards (to be implemented from session 2021-22) (Annexure-1).
2. The BoS apprise the start of M.Tech. (Energy System and management) program in Department of Electrical Engineering. The Scheme of Studies & Examinations and the Syllabi of M.Tech. (Energy System and management)- were discussed and approved for the Batch 2021-22 onwards (Annexure-2).
3. The Departmental Research Committee (DRC) -Electrical Engineering meeting was held on 24/08/2021 and the minutes of meeting was discussed and approved (Annexure-3).
4. The formation of Research Advisory committee (RAC) for each Ph.D. students was discussed and approved (Annexure-4).

The meeting ended with vote of thanks to the Chair.

Dr. Manish Kumar | Dr. Sumit | Dr. Kalpana

Dr. Muralidhar | Dr. Munish Manas | Dr. Rajesh Kr. Dubey

Prof. N. K. Jain | Prof. P. R. Sharma | Dr. Ajay Kumar Bansal

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Scheme & Syllabus for B.Tech. in Electrical Engineering according to Choice Based Credit System (CBCS)

(Semester-VII to Semester-VIII)

Department of Electrical Engineering
For Session 2021-22 onwards
(Batch 2018-19 onwards)

School of Engineering & Technology

CENTRAL UNIVERSITY OF HARYANA
MAHENDERGARH-123031
HARYANA

Central University of Haryana, Mahendergarh

B.Tech. 4th YEAR (SEMESTER – VII)
Choice Based Credit System Scheme of Studies& Examinations w.e.f. 2021-22
(Batch 2018-19 onwards)

S. No.	Course Code	Course Title	Teaching Schedule			Credits
			L	T	P	
1	BT EE701A	Electric Drives	3	0	0	3
2	BT EE702A	Project Stage –I	0	0	6	3
3	BT EE703A	Summer Internship Presentation	0	3	0	3
4		**Program Elective – 6**	3	0	0	3
5		**Program Elective – 7**	3	0	0	3
6		**General Elective or Open Elective-4**	3	1	0	4
Total			**12**	**04**	**06**	**19**

L = Lecture, T = Tutorial, P = Practical, & C = Credits

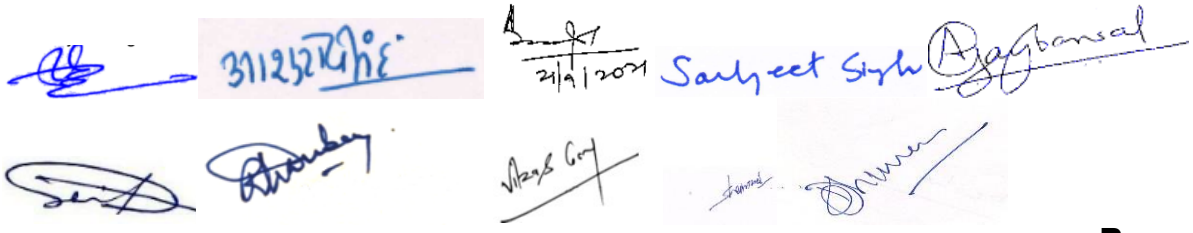
NOTE: - Examinees will be allowed to use only non-programmable scientific calculators in the examination. Other electronic gadgets and sharing of materials will not be permitted during the examinations.

PROGRAM ELECTIVE-6 (PE6)

EE704A	Digital Control Systems
EE705A	Control System Design
EE706A	Non-linear and optimal control theory

PROGRAM ELECTIVE-7 (PE7)

EE707A	Smart Grid
EE708A	Electrical and Hybrid Vehicles
EE709A	Power Quality and FACTs



Central University of Haryana, Mahendergarh
B.Tech. 4th YEAR (SEMESTER – VIII)
Choice Based Credit System Scheme of Studies & Examinations w.e.f. 2021-22
(Batch 2018-19 onwards)

Group A

S. No.	Course Code	Course Title	Teaching Schedule			Credits
			L	T	P	
1	BT EE801A	Project Stage II	0	0	20	10
2	BT EE802A	General Proficiency and Ethics	2	0	0	2
3		**Program Elective – 8**	3	0	0	3
4		**General Elective or Open Elective-3**	3	1	0	4
Total			**9**	**02**	**16**	**19**

L = Lecture, T = Tutorial, P = Practical, & C = Credits

Group B

S. No.	Course Code	Course Title	Teaching Schedule			Credits
			L	T	P	
1	BT EE801A	Industry Internship	0	0	24	14
2	BT EE802A	General Proficiency and Ethics (online)	2	0	0	2
3		**Program Elective – 8 (online)**	3	0	0	3
Total			**9**	**02**	**16**	**19**

L = Lecture, T = Tutorial, P = Practical, & C = Credits

NOTE: - Examinees will be allowed to use only non-programmable scientific calculators in the examination. Other electronic gadgets and sharing of materials will not be permitted during the examinations.

PROGRAM ELECTIVE-8 (PE8)

EE803A	Special Electrical Machines
EE804A	Power Electronics and Control for Renewable Energy Systems
EE805A	Robust Control

Program Name: B. Tech.-Electrical Engineering

Course Code: BT EE701 A	Course Name: ELECTRIC DRIVES	L	T	P	C
		3	-	-	3
Year and Semester	**4rd year 7th Semester**	**Contact hours per week:** (3 Hrs) **Exam:** (3hrs.)			
Pre-requisite of course	Electrical Machine, Power Electronics	**Evaluation**			
		CIE: 30	**TEE: 70**		

Course Outcomes: On completion of the course, student would be able to:

CO701.1	Understand the principle of electrical drives & be able to understand the dynamics of electrical drive systems.
CO701.2	Select a drive for a particular application based on power rating & to select a drive based on mechanical characteristics for a particular drive application
CO701.3	Operate state space model of DC motor and apply different power electronics converters for control of DC drives.
CO701.4	Learn speed control of induction motor drives in an energy efficient manner using power electronics
CO701.5	Familiarize with efficient use of electric drive.
CO701.6	Identify suitable form of electrical drives system

Module No	COURSE SYLLABUS CONTENTS OF MODULE	Hrs	Cos
1	**Electrical Drives:** Introduction, advantages, choice of electrical drives, status of ac and dc drives. **Dynamics of Electrical Drives:** Fundamental torque equations, multi-quadrant operation, equivalent values of drive parameters, load torque components, types of loads, steady state stability, load equalization. **Control of Electrical Drives:** Modes of operation, closed loop control of drives, sensing of current and speed**.**	**12**	**CO701.1,**
2	**Selection of Motor & its power rating:** Types of motors & their enclosures, thermal model of motor for heating & cooling, classes of motor duty, rate of motor**.** **Energy Conversion in Electric Drive**: losses in electrical drive system, energy conversion, use of efficient semiconductor converters, energy efficient operation of drives.	**10**	**CO701.2 CO701.5**
3	**DC Motor Drives:** Speed-torque characteristics of different types of dc motors, starting, types of braking, transient analysis, speed control methods, static control of dc motors. Converter fed dc drive & chopper fed dc drive.	**10**	**CO701.3**
4	**Induction Motor Drives:** Characteristics, analysis and performance, starting methods, braking methods, transient analysis, methods of speed control, vector control. Static	**13**	**CO701.4 CO701.6**

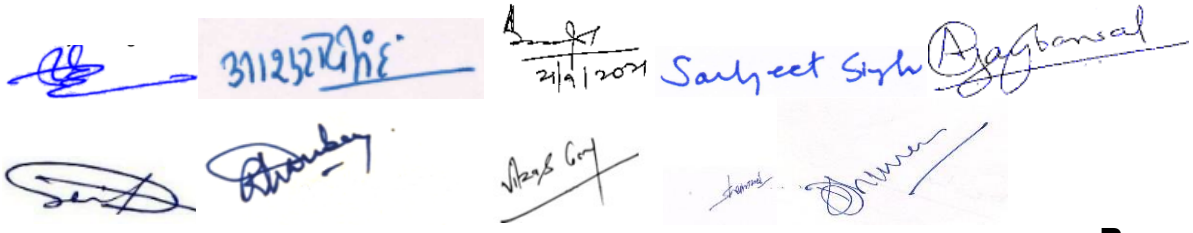
	control techniques- stator frequency control, stator voltage control, rotor resistance control. Static Scherbius system & static Kramer system. **Special Drives:** Switched Reluctance motor, Brushless dc motor. Selection of motor for particular applications.		

Text Books:

1. G.K. Dubey, "Fundamentals of Electric Drives", Narosa publishing House.
2. S.K. Pillai, "A First Course on Electric Drives", New Age International.
3. V. Subrahmanyam, "Electric Drives", McGraw Hill Education

Reference Books:

1. M. Chilkin, "Electric Drives", Mir Publishers, Moscow.
2. A. Mohammed El-Sharkawi, "Fundamentals of Electric Drives", Thomson Asia, Pvt. Ltd. Singapore.
3. N.K. De and K.Sen Prashant, "Electric Drives", Prentice Hall of India Ltd.
4. V. Subrahmanyam, "Electric Drives: Concepts and Applications", Tata McGraw Hill.



Program Name: B. Tech.-Electrical Engineering

Course Code: BT EE704 A	Course Name: DIGITAL CONTROL SYSTEMS	L	T	P	C
		3	-	-	3
Year and Semester	**4rd year 7th Semester**	**Contact hours per week:** (3 Hrs) **Exam:** (3hrs.)			
Pre-requisite of course	Control System, Signals and Systems	**Evaluation**			
		CIE: 30	**TEE: 70**		

Course Outcomes: On completion of the course, student would be able to:	
CO704.1	Obtain discrete representation of LTI systems.
CO704.2	Analyse stability of open loop and closed loop discrete-time systems.
CO704.3	Design and analyse digital controllers.
CO704.4	Design digital compensator and discrete observer for LTI systems.

Module No	COURSE SYLLABUS CONTENTS OF MODULE	Hrs	Cos
1	**Introduction:** Terminology: continuous time, discrete-time & digital signals; Basic structure of digital control scheme and brief description of its blocks. Advantages & problems of digital control, General principles of signal conversion: operation by A/ D & D/A converters, A/D and D/A converter circuits; Sample and hold circuit: Mathematical analysis of sampling process, Ideal sampler, Choice of sampling frequency, Aliasing; Sampling theorem, The Hold operation, ZOH. Unit sample sequence, Unit step sequence & Unit sinusoidal sequence. Difference Equation models & Impulse response models for discrete time systems. State space models of discrete systems, state space analysis, Controllability, reachability, reconstructibility and observability analysis.	**10**	**CO704.1, CO704.2**
2	**Transform Domain Processing:** Definition of Z-transform; The Z-transforms of typical functions such as Unit sample sequence, Unit step sequence, sampled ramp function, sampled exponential function, sampled sinusoids; Operations with Z transform such as shifting (forward & backward); Z transform Inversion; Final value & Initial value theorems; Transfer function models; Unit delayer Transfer function; Dynamic response; Stability in z-plane; Jury Stability test; Z-plane poles v/ s stability (& the nature of response functions); Mapping s-plane to z-plane, Bilinear transformation.	**10**	**CO704.2**
3	**Models Of Digital Control Devices & Systems:** z-domain description of sampled continuous-time plants, model of ADC & DAC, Interconnection of discrete-time & continuous time systems & their equivalent transfer functions; Implementation	**10**	**CO704.3**

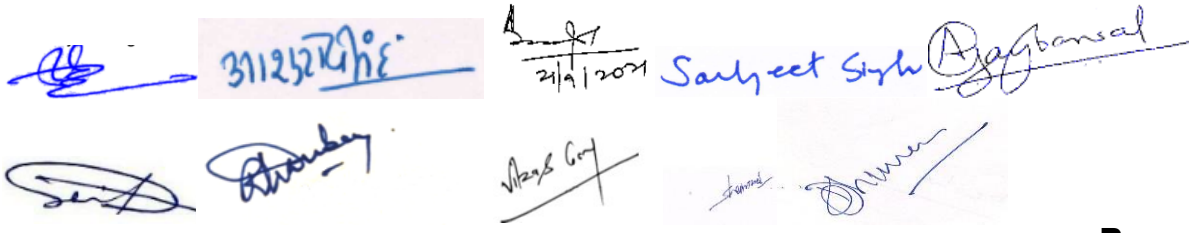
	of digital controllers, Recursive realizations: direct, cascade & parallel realizations, Non-recursive realization; Digital PID controller: Positional & velocity forms; Tuning rules for digital PID. Design of digital control system with dead beat response. Practical issues with dead beat response design.		
4	**Design of Digital Control Algorithms:** Basic structure of digital control system; Routes to the design of digital Controller, z-plane specifications of control system design: steady state accuracy, Steady state errors & error constants for type -0,-1,-2 systems, Transient accuracy, dominant poles, Effect of extra zero & pole on discrete time 2nd order system; Digital compensator design using frequency response plot; Digital compensator design using root locus plot. Design of discrete observer for LTI System. Design of set point tracker.	**10**	**CO704.4**

Text Books:

1. M. Gopal, "Digital Control Engg.", New Age International Publishers, New Delhi.
2. M. Gopal, "Digital Control & State Variable Methods (Conventional and Intelligent Control System)", Tata McGraw Hill Education Pvt. Ltd., New Delhi.
3. G.F. Franklin, J.D. Powell and M. L. Workman, "Digital Control of Dynamic Systems", Addison-Wesley, 1998.

Reference Books:

1. B.C. Kuo, "Digital Control Systems", Oxford University Press.
2. K. Ogata, "Discrete-time Control Systems", Pearson Education, New Jersey.
3. C.L. Phillips, & Jr. H.T. Nagle, "Digital Control System Analysis", Pearson Education, New Jersey.
4. C.H. Hopis and G.B. Lemont, "Digital Control System: Theory, Hardware & Software", McGraw-Hill Publications, New York.



Program Name: B. Tech-Electrical Engineering

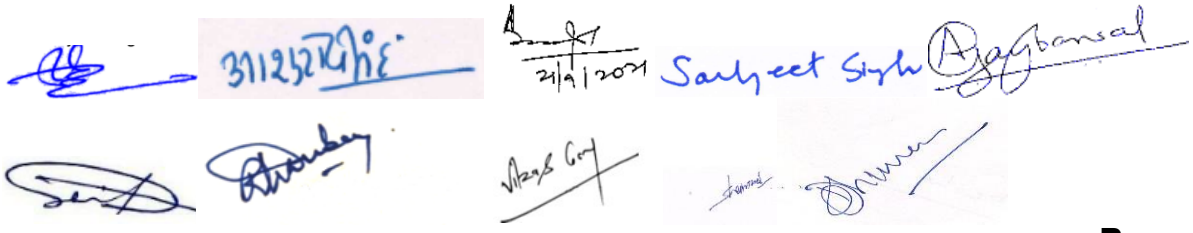
Course Code: BTEE705A	Course Name: CONTROL SYSTEM DESIGN	L	T	P	C
		3	0	-	3

Year and Semester	4thYear 7thSem	Contact hours per week: (3 Hrs.) Exam: (3hrs.)	
Pre-requisite of course	Control System	Evaluation	
		CIE: 30	TEE: 70

Course Outcomes: On completion of the course, student would be able to:

CO705.1	Understand the different design specifications of Control System.
CO705.2	Design of Control System in time and frequency domain.
CO705.3	Design of PID controllers in time and frequency domain.
CO705.4	Understand the state space representation of Control system.
CO705.5	Understand the concept of controllability & observability.
CO705.6	Design of Control system in state space representation.

Module No	COURSE SYLLABUS CONTENTS OF MODULE	Hrs.	Cos
1	**Design Specifications:** Introduction to time-domain and frequency-domain design specification and its physical relevance. Effect of gain on transient and steady state response. Effect of addition of pole on system performance. Effect of addition of zero on system response	**10**	**CO705.1,**
2	**Design of Control System in Time-Domain:** Introduction to compensator design in time-domain. Design of Lag, lead and lag-lead compensator in timedomain. Feedback and Feed forward compensator design. Feedback compensation. Realization of compensators. **Design of Control System in Frequency-Domain:** Compensator design in frequency domain to improve steady state and transient response. Feedback and Feed forward compensator design using bode-plot.	**15**	**CO705.2**
3	**Design of PID Controllers:** Design of P, PI, PD and PID controllers in time-domain and frequency-domain for first, second and third order systems. Control loop with auxiliary feedback and Feed forward control.	**9**	**CO705.3**
4	**Control System Design in State Space:** Review of state space representation. Concept of controllability & observability, effect of pole-zero cancellation on the controllability & observability of the system, pole placement	**11**	**CO705.4, CO705.5 CO705.6**



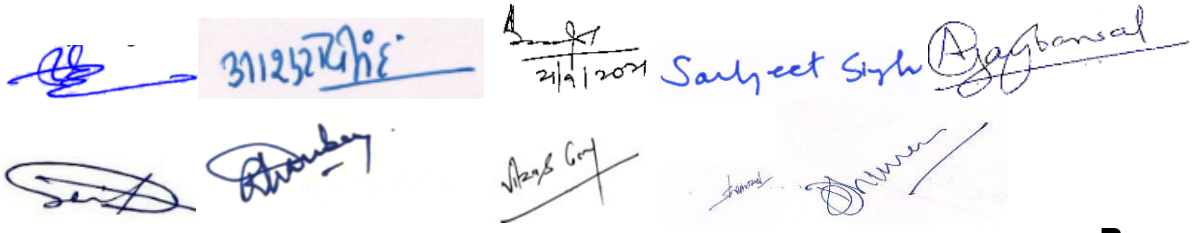
	design through state feedback. Ackerman's Formula for feedback gain design. Design of Observer. Reduced order observer. Separation Principle.		

Text Books:

1. N. Nise, "Control System Engineering", John Wiley, 2000.
2. I.J. Nagrath and M. Gopal, "Control System Engineering", New Age International, 2018.
3. B.C. Kuo, "Automatic Control system", Prentice Hall, 1995.

Reference Books:

1. J.J. D'Azzo and C. H. Houpis, "Linear control system analysis and design (conventional and modern)", McGraw Hill, 1995.
2. K. Ogata, "Modern Control Engineering", Prentice Hall, 2010.
3. R.T. Stefani and G. H. Hostetter, "Design of feedback Control Systems", Saunders College Pub, 1994.



Program Name: B. Tech-Electrical Engineering

Course Code: BTEE706A	Course Name: A NON-LINEAR AND OPTIMAL CONTROL SYSTEM	L	T	P	C
		3	0	-	3

Year and Semester	4th Year 7th Sem	Contact hours per week: (3 Hrs.) Exam: (3hrs.)	
Pre-requisite of course	Control System	Evaluation	
		CIE: 30	TEE: 70

Course Outcomes: On completion of the course, student would be able to:

CO706.1	Demonstrate non-linear system behaviour by phase plane and describing function methods.
CO706.2	Perform the stability analysis nonlinear systems by Lyapunov method develop design skills in optimal control problems
CO706.3	Design and apply state-of-the-art classical and modern computational methods to define and solve optimisation problems.
CO706.4	Understanding of feedback optimal control system

Module No	COURSE SYLLABUS CONTENTS OF MODULE	Hrs.	Cos
1	Linear versus nonlinear systems- Describing function analysis: Fundamentals, common nonlinearities (saturation, dead - zone, on - off non - linearity, backlash, hysteresis) and their describing functions. Describing function analysis of nonlinear systems. Reliability of describing method analysis. Compensation and design of nonlinear system using describing function method. Phase plane analysis: Phase portraits, Singular points characterization. Analysis of non - linear systems using phase plane technique. Existence of limit cycles. Linearization: Exact linearization, input - state linearization, input - output linearization.	**10**	**CO706.1,**
2	Concept of stability, Zero - input and BIBO stability, stability in the sense of Lyapunov and absolute stability, Stability in the small and stability in the large, Lyapunov stability definitions, First method of Lyapunov,. Second (or direct) method of Lyapunov stability theory for continuous and discrete time systems, Aids to generate Lyapunov function – Krasovskii's theorem, Variable gradient method.	**15**	**CO706.2**
3	Aizerman's and Kalman's conjecture. Construction of Lyapunovfunction - Methods of Aizerman, Zubov, Variable gradient method. Lure problem. Popov's stability criterion, Formulation of the optimal control Problem, Calculus of	**9**	**CO706.3**

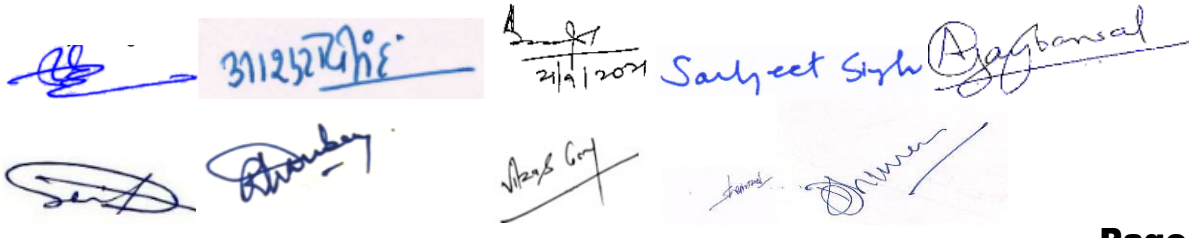
	variations, Minimum principle, Dynamic Programming, Numerical Solution of Two-point Boundary value problem.		
4	**Optimal Feedback Control:** Discrete-Time linear State regulator, Continuous-Time Linear state Regulator results of solve other linear problems, Suboptimal Linear regulators, Minimum-time Control of Linear Time-Invariant System. Stochastic Optimal Linear Estimation and Control Stochastic processes and linear systems, Optimal Estimation for Linear Discrete time Systems Stochastic Optimal Linear Regulator.	**11**	**CO706.4,**

Text Books:

1. M. Gopal, "Modern Control System Theory", New Age International, 2005.
2. K. Ogatta, "Modern Control Engineering", PHI, 2002..
3. B.C. Kuo, "Digital Control Systems", Oxford University Press, 1980.

References Books:

1. Anderson, D.O. Brian and John B. Moore, "Optimal Control: Linear Quadratic Methods", Courier Corporation, 2007.
2. J. Speyer and D. Jacobson, "Primer on Optimal Control Theory", SIAM, 2010
3. R. Stengel, "Optimal Control and Estimation, Dover", 1994
4. K. Astrom, "Introduction to Stochastic Control Theory", Dover, 2006
5. B. Anderson and J. Moore, "Optimal Control", Dover, 2007
6. A. Bryson and Y. Ho, "Applied Optimal Control", Taylor & Francis, 1975
7. A. Bryson, "Applied Linear Optimal Control", Cambridge University Press, 2002
8. M. Athans and P. Falb, "Optimal Control", Dover, 2006
9. D. Naidu, "Optimal Control Systems", CRC Press, 2002
10. F. Lewis and V. Syrmos, "Optimal Control", Wiley-Interscience, 1995
11. P. Dorato, C. Abdallah, and V. Cerone, "Linear Quadratic Control", Krieger Publishing, 2000



Program Name: B. Tech.-Electrical Engineering

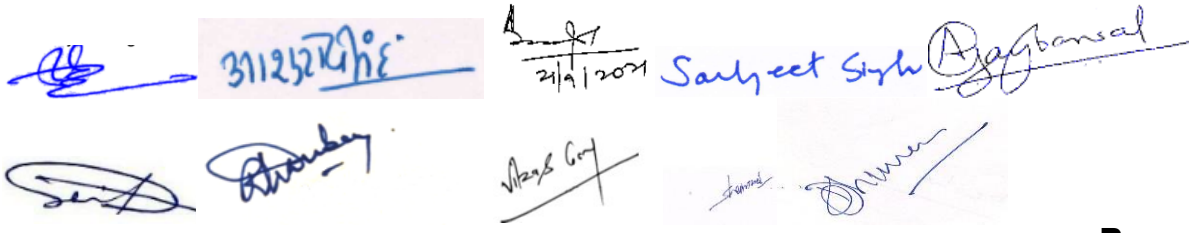
Course Code: BT EE707A	Course Name: SMART GRID	L	T	P	C
		3	0	-	3

Year and Semester	**4st year 7th Semester**	**Contact hours per week:** (4 Hrs) Exam**:** (3hrs.)	
Pre-requisite of course	Power System Analysis	**Evaluation**	
		CIE: 30	**TEE: 70**

Course Outcomes: On completion of the course, student would be able to:

CO707.1	To Understand basic concept of smart grid and its need, opportunities and barrier and communication in smart grid.
CO707.2	Explain the advanced metering infrastructure, communication infrastructure and protocol and demand side integration for smart metering.
CO707.3	Understand the concept of micro grid its need, operation, application, protection and control, islanding mode and small scale different type of distributed energy resources.
CO707.4	Analyze power quality issues and control operation of micro grid and ICT for smart grid

Module No	COURSE SYLLABUS CONTENTS OF MODULE	Hrs	Cos
1	**Introduction to Smart Grid:** Evolution of Electric Grid, Concept of Smart Grid, Definitions, Need of Smart Grid, Functions of Smart Grid, Opportunities & Barriers of Smart Grid, Difference between conventional & smart grid, Concept of Resilient & Self-Healing Grid, Present development & International policies in Smart Grid. Case study of Smart Grid ,CDM opportunities in Smart Grid, What is a Smart Grid?, The Smart Grid Enables the Electri Net SM, Local Energy Networks, Electric Transportation, Low-Carbon Central Generation, What Should Be the Attributes of the Smart Grid?, Why Do We Need a Smart Grid?, Is the Smart Grid a "Green Grid"?,	**10**	**CO707.1,**
2	**Sensing, Measurement, Control and Automation Technologies:** Smart metering and demand-side integration, Introduction, Smart metering, Evolution of electricity metering, Key components of smart metering, Smart meters: An overview of the hardware used Signal acquisition, Signal conditioning, Analogue to digital conversion, Computation, Input/output, Communication, Communications infrastructure and protocols for smart metering, Home-area network, Neighbourhood area network, Data concentrator, Meter data	**10**	**CO707.2,**



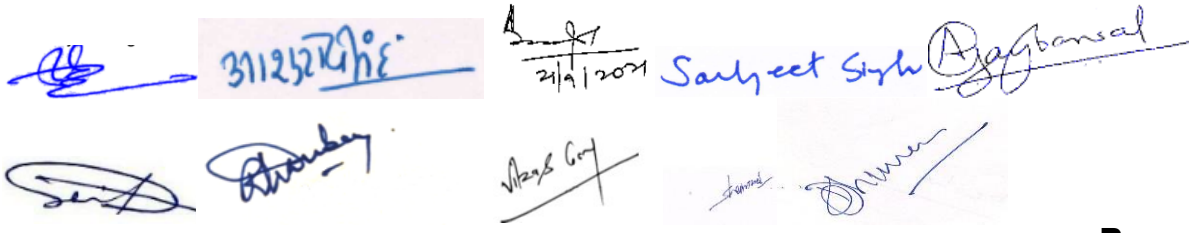
	management system, Protocols for communications, Demand-side integration, Services provided by DSI, Implementations of DSI, Hardware support to DSI implementations, Flexibility delivered by prosumers from the demand side, System support from DSI.		
3	**Micro Grids And Distributed Energy Resources:** Concept of micro grid, need & applications of micro grid, formation of micro grid, issues of interconnection, protection & control of micro grid. Islanding, need and benefits, different methods of islanding detection. Distributed Energy Resources: Small scale distributed generation, Distributed Generation Technology, Internal Combustion Engines, Gas Turbines, Combined Cycle Gas Turbines, Micro turbines, Fuel Cells, Solar Photovoltaic, Solar thermal, Wind power, Geothermal, - all sources as a DG. Advantages and disadvantages of DG.	**10**	**CO707.3,**
4	**Power Quality Management in Smart Grid:** Power Quality & EMC in Smart Grid, Power Quality issues of Grid connected Renewable Energy Sources, Power Quality Conditioners for Smart Grid, Web based Power Quality monitoring, Power Quality Audit. Information and Communication Technology for Smart Grid: Advanced Metering Infrastructure (AMI), Home Area Network (HAN), Neighbourhood Area Network (NAN), Wide Area Network (WAN). Bluetooth, Zig-Bee, GPS, Wi-Fi, Wi-Max based communication, Wireless Mesh Network, Broadband over Power line (BPL)	**10**	**CO707.4,**

Text Books:

1. A. Keyhani, "Design of Smart power grid renewable energy systems", Wiley IEEE, 2011.
1. W.G. Clark, "The Smart Grid: Enabling Energy Efficiency and Demand Response", CRCPress, 2009.
2. S. Borlase, "Smart Grid: Infrastructure,Technology and solutions " CRC Press.
3. J. Ekanayake, N. Jenkins, K. Liyanage, J. Wu, A. Yokoyama, "Smart Grid: Technology and Applications", Wiley.
4. A. Carvallo, J. Cooper, "The Advanced Smart Grid: Edge Power Driving Sustainability: 1", Artech House Publishers July 2011
5. M. Kezunovic, G. A. Mark, P. A. Alexander, J. G. Gilbert, "Substation Automation (Power Electronics and Power Systems)", Springer

Reference Books:

1. J.N. Green, R.G. Wilson "Control and Automation of Electric Power Distribution Systems (Power Engineering)", CRC Press.
2. R.C. Dugan, M.F. McGranghan, S. Santoso, H.W. Beaty, "Electrical Power System Quality", 2nd Edition, McGraw Hill Publication.
3. A.G. Phadke, J.S. Thorp, "Synchronized Phasor Measurements and Their Applications", Springer.



4. J. Momoh, “Smart Grid: Fundamentals of Design and Analysis”, Wiley.

Program Name: B.Tech.-Electrical Engineering

Course Code: BT EE708A	**Course Name: ELECTRICAL AND HYBRID VEHICLES**	**L**	**T**	**P**	**C**
		3	**-**	**-**	**3**

Year and Semester	**4st year 7th Semester**	**Contact hours per week:** (4 Hrs) Exam**:** (3hrs.)	
Pre-requisite of course	Electrical Vehicles	**Evaluation**	
		CIE: 30	**TEE: 70**

Course Outcomes: On completion of the course, student would be able to:	
CO708.1	Understand objective and scope of Electric vehicle and its recent trends
CO708.2	Explain the basics of conventional vehicle, their scope, performance, characteristic and its mathematical model.
CO708.3	Analyze social and environment impact of EHV and various topologies of electric drives suitable for hybrid electric vehicles.
CO708.4	Explain the basics and different topologies of Electric drive train and its configuration and analyze and control of advanced propulsion technique in EHV.
CO708.5	Understand the use of different energy storage technologies used for hybrid electric vehicles and their sizing and control.
CO708.6	Interpret working of different classification of energy management system used in Electric hybrid vehicle and its implementation and case study.

Module No	**COURSE SYLLABUS CONTENTS OF MODULE**	**Hrs**	**COs**
1	**Introduction:** Objective, scope and outcome of the course.	**1**	**CO708.1**
2	**Conventional Vehicles:** Basics of vehicle performance, vehicle power source characterization, Transmission characteristics, and mathematical model to describe vehicle performance.	**5**	**CO708.2**
3	**Hybrid Electric Vehicles:** History of hybrid and electric vehicles, social and environmental importance of hybrid and electric vehicles, impact of modern drive- trains on energy supplies. **Hybrid Electric Drive-trains:** Basic concept of hybrid traction, introduction to various hybrid drive-train topologies, power flow control in hybrid drive-train topologies, fuel efficiency analysis.	**7**	**CO708.3**
4	**Electric Trains:** Electric Drive-trains: Basic concept of electric traction, introduction to various electric drive train topologies, power flow control in electric drive-train	**10**	**CO708.4**

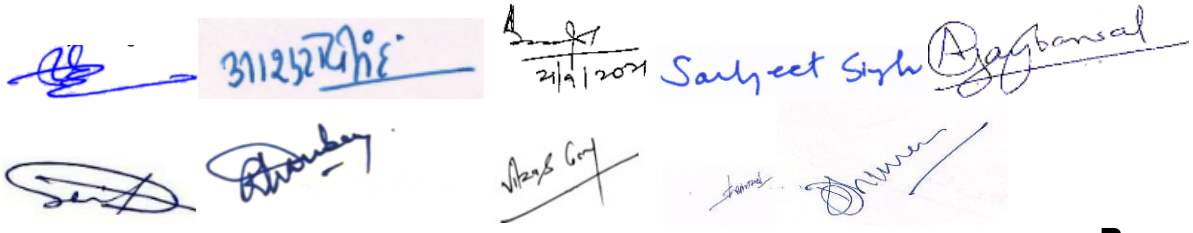
	topologies, fuel efficiency analysis. Electric Propulsion unit: Introduction to electric components used in hybrid and electric vehicles, Configuration and control of DC Motor drives, Configuration and control of Induction Motor drives, configuration and control of Permanent Magnet Motor drives, Configuration and control of Switch Reluctance Motor drives, drive system efficiency.		
5	**Energy Storage:** Energy Storage: Introduction to Energy Storage Requirements in Hybrid and Electric Vehicles, Battery based energy storage and its analysis, Fuel Cell based energy storage and its analysis, Super Capacitor based energy storage and its analysis, Flywheel based energy storage and its analysis, Hybridization of different energy storage devices. Sizing the drive system: Matching the electric machine and the internal combustion engine (ICE), Sizing the propulsion motor, sizing the power electronics, selecting the energy storage technology, Communications, supporting subsystems.	**10**	**CO708.5**
6	**Energy Management Strategies:** Energy Management Strategies: Introduction to energy management strategies used in hybrid and electric vehicles, classification of different energy management strategies, comparison of different energy management strategies, implementation issues of energy management strategies. **Case Studies:** Design of a Hybrid Electric Vehicle (HEV), Design of a Battery Electric Vehicle (BEV).	**8**	**CO708.6**

Text Books:

1. I. Hussein, "Electric and Hybrid Vehicles: Design Fundamentals", CRC Press, 2003
2. M. Ehsani, Y. Gao, S. E. Gay, A. Emadi, "Modern Electric, Hybrid Electric and Fuel Cell Vehicles: Fundamentals, Theory and Design", CRC Press , 2004
3. S. Dhameja, "Electric Vehicle Battery Systems", Newnes, 2000

Reference Books:

1. J. Larminie, J. Lowry, "Electric Vehicle Technology Explained", Wiley, 2003
2. C. Mi, M.A. Masrur, D.W. Gao, "Hybrid Electric Vehicles: Principle and Applications with Practical Perspectives", John Wiley & Sons Ltd., 2011.



Program Name: B.Tech.-Electrical Engineering

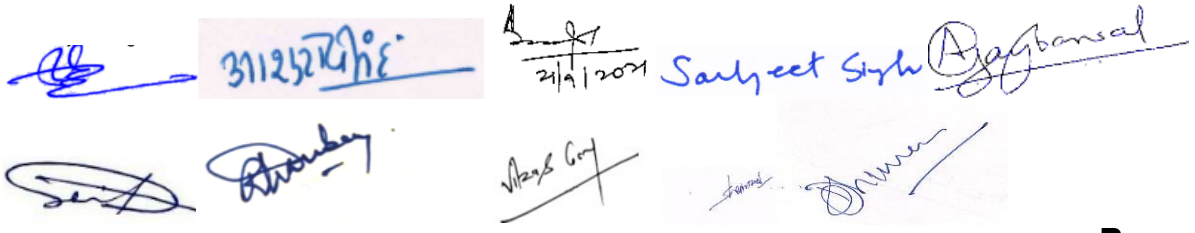
Course Code: BT EE709A	**Course Name: POWER QUALITY AND FACTS**	**L**	**T**	**P**	**C**
		3	**-**	**-**	**3**
Year and Semester	**4th year** **7th Semester**	**Contact hours per week:** (4 Hrs) Exam**:** (3hrs.)			
Pre-requisite of course	Power Quality and FACTS	**Evaluation**			
		CIE: 30	**TEE: 70**		

Course Outcomes: On completion of the course, student would be able to:	
CO709.1	Understand objective and scope of power quality and Facts.
CO709.2	Explain the basics of reactive and active power in transmission.
CO709.3	Explain the basics and different topologies of SVC, TCSC.
CO709.4	Understand the use of different voltage source converter based (FACTS) controllers
CO709.5	Understand the use of different application of FACTS devices.
CO709.6	Explain the power quality problems in distribution systems

Module No	COURSE SYLLABUS CONTENTS OF MODULE	Hrs	Cos
1	**Introduction:** Objective, scope and outcome of the course.	**1**	**CO709.1**
2	**Transmission Lines and Series/Shunt Reactive Power Compensation:** Basics of AC Transmission. Analysis of uncompensated AC transmis- sion lines. Passive Reactive Power Compensation. Shunt and series compensation at the mid-point of an AC line. Comparison of Series and Shunt Compensation	**5**	**CO709.2**
3	**Thyristor-based Flexible AC Transmission Controllers (FACTS):** Description and Characteristics of Thyristor-based FACTS devices: Static VAR Compensator (SVC), Thyristor Controlled Series Capacitor (TCSC), Thyristor Controlled Braking Resistor and Single Pole Single Throw (SPST) Switch. Configurations/Modes of Operation, Harmonics and control of SVC and TCSC. Fault Current Limiter.	**7**	**CO709.3**
4	**Voltage Source Converter based (FACTS) Controllers:** Voltage Source Converters (VSC): Six Pulse VSC, Multi-pulse and Mul- ti-level Converters, Pulse-Width Modulation for VSCs. Selective Har- monic Elimination, Sinusoidal PWM and Space	**10**	**CO709.4**

	Vector Modulation. STATCOM: Principle of Operation, Reactive Power Control: Type I and Type II controllers, Static Synchronous Series Compensator (SSSC) and Unified Power Flow Controller (UPFC): Principle of Operation and Control. Working principle of Inter phase Power Flow Controller. Other Devices: GTO Controlled Series Compensator. Fault Current Limiter.		
5	**Application of FACTS:** Application of FACTS devices for power-flow control and stability im- provement. Simulation example of power swing damping in a single- machine infinite bus system using a TCSC. Simulation example of voltage regulation of transmission mid-point voltage using a STATCOM.	**10**	**CO709.5**
6	**Power Quality Problems in Distribution Systems:** Power quality problems in distribution systems: transient and steady state variations in voltage and frequency. unbalance, sags, swells, interruptions, waveform distortions: harmonics, noise, notching, dc-offsets, fluctuations. flicker and its measurement. tolerance of equipment: cbema curve.	**8**	**CO709.6**

1. **Text books:**
2. N. G. Hingorani and L. Gyugyi, "Understanding FACTS: Concepts and Technol- ogy of FACTS Systems", Wiley-IEEE Press, 1999.
3. K. R. Padiyar, "FACTS Controllers in Power Transmission and Distribution", New Age International (P) Ltd. 2007.
4. T. J. E. Miller, "Reactive Power Control in Electric Systems", John Wiley and Sons, New York, 1983.
5. R. C. Dugan, "Electrical Power Systems Quality", McGraw Hill Education, 2012.



Program Name: B.Tech.-Electrical Engineering

Course Code: BT EE803A	Course Name: SPECIAL ELECTRICAL MACHINES	L	T	P	C
		3	-	-	3
Year and Semester	**4st year 8th Semester**	**Contact hours per week:** (4 Hrs) Exam**:** (3hrs.)			
Pre-requisite of course	Power Quality and FACTS	**Evaluation**			
		CIE: 30	**TEE: 70**		

Course Outcomes: On completion of the course, student would be able to:

CO803.1	Use different types of motor efficiently for various applications
CO803.2	Maintain different types induction machines for different applications
CO803.3	Maintain different types synchronous machines for different applications
CO803.4	Maintain different types of Permanent magnet motors
CO803.5	Maintain various types of Small specialised electric machines

Module No	COURSE SYLLABUS CONTENTS OF MODULE	Hrs	COs
1	**Stepping Motors:** Constructional features, principle of operation, types, modes of excitation, torque production in Variable Reluctance (VR) stepping motor, static and dynamic characteristics, introduction to drive circuits for stepper motor, suppressor circuits, closed loop control of stepper motor-applications	**1**	**CO803.1 CO803.2**
2	**Switched Reluctance Motors:** Principle of operation, constructional features, torque equation, power semiconductor switching circuits, frequency of variation of inductance of each phase winding - control circuits of srm-torque - speed characteristics, microprocessor based control of srm drive, applications.	**5**	**CO803.1 CO803.2**
3	**Synchronous Reluctance Motors Constructional Features:** Axial and radial air gap motors. operating principle, reluctance torque - phasor diagram, speed torque characteristics, applications.	**7**	**CO803.2 CO803.3**
4	**Permanent Magnet Brushless Dc Motors**: commutation in dc motors, electronic commutation - difference between mechanical and electronic commutators- hall sensors, optical sensors, construction and principle of pmbl dc motor, torque	**10**	**CO803.1 CO803.4**

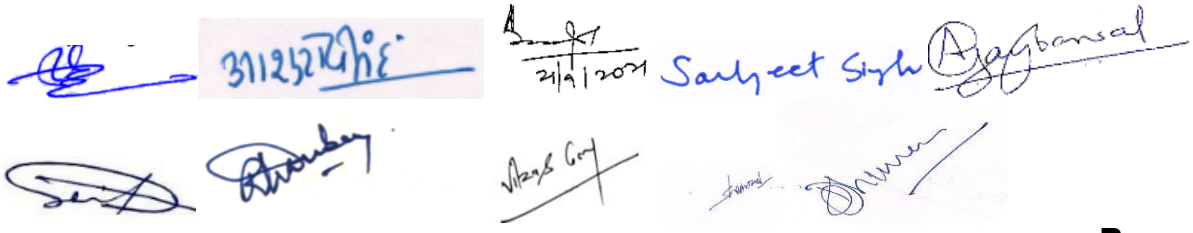
	and e.m.f equation, torque-speed characteristics, power controllers-drive circuits, applications		
5	**Permanent Magnet Synchronous Motors:** Construction and types, principle of operation, emf and torque equation, phasor diagramtorque speed characteristics, power controllers- self-control, vector control, microprocessor based control, applications	**10**	**CO803.4 CO803.5**

Text Books:

1. T. J. E. Miller, "Brushless Permanent Magnet and Reluctance Motor Drives", Oxford Science Publications, 1989.
2. T. Kenjo and A. Sugawara, "Stepping Motors and their Microprocessor Controls", Oxford Science Publications, 1984.
3. K. Venkataratnam, "Special Electrical Machines", CRC Press, 2009.

Reference Books:

1. R. Krishnan, "Permanent Magnet and BLDC Motor Drives", CRC Press, 2009.
2. X. Chang-liang, "Permanent Magnet Brushless DC Motor Drives and Controls", June 2012



Program Name: B.Tech.-Electrical Engineering

Course Code: BT EE804 A	Course Name: POWER ELECTRONICS AND CONTROL FOR RENEWABLE ENERGY SYSTEMS	L	T	P	C
		3	-	-	3

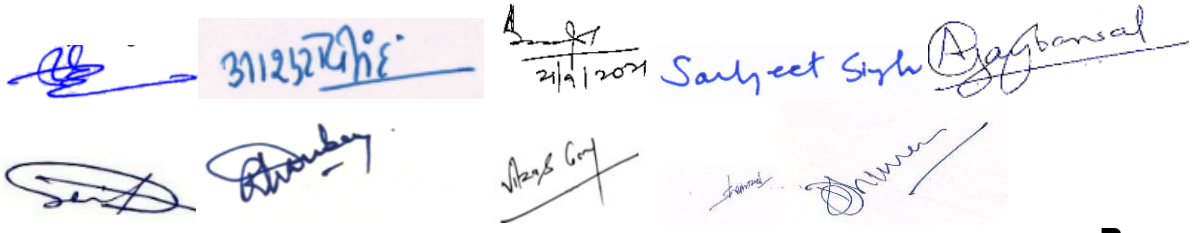
Year and Semester	**4rd year** **8th Semester**	**Contact hours per week:** (3 Hrs) **Exam:** (3hrs.)	
Pre-requisite of course	Power Electronics, Control Systems	**Evaluation**	
		CIE: 30	**TEE: 70**

Course Outcomes: On completion of the course, student would be able to:

CO804.1	Analyze power electronics converters controls
CO804.2	Apply power electronics converters in renewable energy systems
CO804.3	Design advance power electronics converters control schemes

Module No	COURSE SYLLABUS CONTENTS OF MODULE	Hrs	COs
1	**Fundamentals of Power Converters:** DC/DC converters, AC/DC converters, DC/AC converters, Classical Multilevel Inverters, SPWM, SVPWM.	**10**	**CO804.1, CO804.2**
2	**Modelling of Power Converters:** Introduction to Power Electronic Converters Modelling, Switched Model, Classical Averaged Model, Generalized Averaged Model, Small Signal Analysis	**10**	**CO804.2**
3	**Control of Power Converters**: General Control Principles of Power Electronic Converters, Linear Control Approaches for DC-DC Power Converters, Linear Control Approaches for DC-AC and AC-DC Power Converters, Energy-Based Control of Power Electronic Converters, Variable-Structure Control of Power Electronic Converters.	**10**	**CO804.2, CO804.3**
4	**Control of Renewable Energy Systems**: Control of voltage source converters with LCL filters, Control of three-phase converters including Phase Locked Loop, Control of PV systems, Control of Wind Energy Systems.	**10**	**CO804.3**

Text Books:



1. A. I. Bratcu, I. Munteanu, and S. Bacha, “Power Electronic Converters Modeling and Control”, Springer Press, 2013.
2. F. Blaabjerg, “Control of Power Electronic Converters and Systems”, Academic Press, 2018.

Reference Books:

1. F.A. Farret, M.G. Simões, “Modeling Power Electronics and Interfacing Energy Conversion Systems”, John Wiley & Sons, 2017.

Program Name: B. Tech.-Electrical Engineering

Course Code: BT EE805A	**Course Name: ROBUST CONTROL**	**L**	**T**	**P**	**C**
		3	**-**	**-**	**3**
Year and Semester	**4rd year 8th Semester**	**Contact hours per week:** (3 Hrs) **Exam:** (3hrs.)			
Pre-requisite of course	Control System	**Evaluation**			
		CIE: 30	**TEE: 70**		
Course Outcomes: On completion of the course, student would be able to:					
CO805.1	Understand LTI systems and its applications				
CO805.2	Apply Lyapunov theorem for any stability problem				
CO805.3	Design passive systems in frequency and time domain				

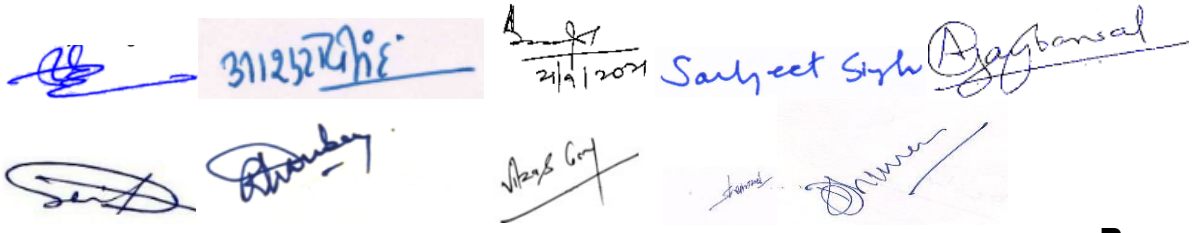
Module No	**COURSE SYLLABUS CONTENTS OF MODULE**	**Hrs**	**COs**
1	Modeling of Uncertain Systems, Signals and Norms, Lyapunov theory for LTI systems.	**10**	**CO805.1, CO805.2**
2	Passive Systems – Frequency Domain Passive Systems – Time Domain	**7**	**CO805.2**
3	Robust Stability And Performance, Stabilizing Controllers – Coprime Factorization	**8**	**CO805.2, CO805.3**
4	LQR, LQG problems, Ricatti equations and solutions, Ricatti equation solution through LMI, H-infinity control and mu-synthesis, Linear matrix inequalities for robust control	**10**	**CO805.3**

Text Books:

1. L. Fortuna, M. Frasca (Eds.), “Optimal and Robust Control”, CRC Press, 2012
2. K. Zhou, J.C. Doyle and K. Glover, “Robust and Optimal Control”, Prentice Hall, 1996

Reference Books:

1. J.C. Doyle, B.A. Francis and A.R. Tannenbaum, “Feedback Control Theory”, Macmillan, 1992



Annexure-XXXIV

DEPT. OF CIVIL ENGG.
CENTRAL UNIVERSITY OF HARYANA, MAHENDERGARH
Proceedings / Minutes of the Meeting
of Board of Studies in Civil Engineering held on 04/09/2021

The online meeting of the Board of Studies in Civil Engineering was held on 04/09/2021 The following were present

1. Dr. Vikas Garg, HOD, CE- Chairperson
2. Dr B R Chahar, Subject Expert- Member
3. Dr Baldev Setia, Subject Expert- Member
4. Dr. Neeraj, Assistant Professor, CUH- Member

After deliberations, it was resolved/ recommended by the Board of Studies as follows:

1. The Scheme of Studies & Examinations and the Syllabi of B.Tech. (Civil Engineering.)- IV year (7th and 8th semesters) were discussed and approved for the Batch 2018-19 onwards (to be implemented from session 2021-22) (Annexure-1).

2. The BoS apprise the start of M. Tech. (Structural Engineering) program in Department of Civil Engineering. The Scheme of Studies & Examinations and the Syllabi of M.Tech. were discussed and approved for the Batch 2021- 22 onwards (Annexure-2).

3. The Departmental Research Committee (DRC) - Civil Engineering meeting was held on 19/08/2021. During DRC meeting, PhD supervisors were allotted to all the PhD candidates and the minutes of meeting was discussed and approved (Annexure-3).

The meeting ended with vote of thanks to the Chair.

Abbroved by mail [copy attached]

Dr. B R Chahar

Dr. Baldev Setia

Dr. Neeraj 4/9/21

Dr. Vikas Garg 04/09/21

HOD CIVIL <hodcivil@cuh.ac.in>

Updated Syllabus of B.Tech (7th and 8th sem) and M.Tech (Structural Engineering)

Prof. B. R. Chahar <chahar@civil.iitd.ac.in> Wed, Sep 15, 2021 at 1:01 PM
Reply-To: chahar@civil.iitd.ac.in
To: "Dr. Neeraj Kumar" <neeraj0hchab@cuh.ac.in>
Cc: HOD CIVIL <hodcivil@cuh.ac.in>, chairmancivil@drcutm.org, "setia@nitkkr.ac.in" <setia@nitkkr.ac.in>

Fine with me.
Thanks and regards
BR Chahar
[Quoted text hidden]

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B. R. Chahar, PhD
Institute Chair Professor &
Professor of Civil Engineering
Indian Institute of Technology Delhi
Hauz Khas, New Delhi - 110 016 INDIA

Phone : +91-11-2659 1187
Fax : +91-11-2658 1117
Web Page: web.iitd.ac.in/~chahar/
Alternate Email : br.chahar@gmail.com

Residence
37 - West Avenue, IIT Delhi Campus
Phone - +91-11-2659 1636

CENTRAL UNIVERSITY OF HARYANA

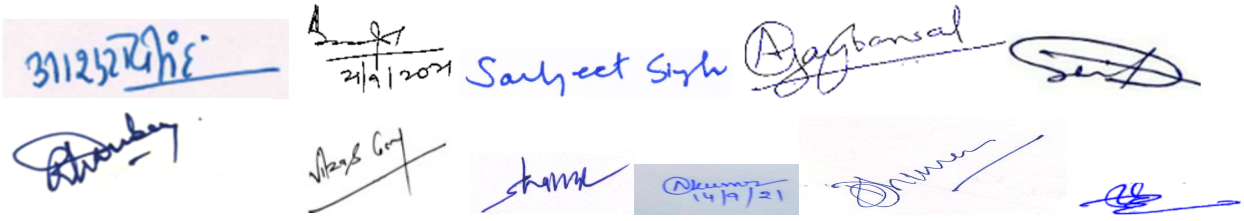
MAHENDARGARH

SCHEME OF STUDIES & EXAMINATIONS

B. Tech. in CIVIL ENGINEERING

Choice Based Credit System

(w.e.f. Session 2021-22)



Central University of Haryana
Department of Civil Engineering
B. Tech. 4th YEAR (SEMESTER – VII)
Scheme of Studies and Examinations

S. No.	Course No.	Course Title	Teaching Schedule			Credits
			L	T	P	
1	BTCE 701A	DESIGN OF HYDRAULIC STRUCTURES	3	-	-	3
2	BT CE 702A	EARTHQUAKE ENGINEERING	3	-	-	3
3	BT CE 703A	MINOR PROJECT	-	-	8	4
4	BT CE 704A	SUMMER INTERNSHIP	-	-	2	1
5	BT CE 705A	GENERAL FITNESS IN CIVIL ENGINEERING	-	-	2	0
6	BT MGT 706A	ENTREPRENEURSHIP AND STARTUPS	3	-	-	3
7	DCEC– III		3	-	-	3
8	DCEC – IV		3	-	-	3
Total			**15**	**0**	**12**	**20**

L = Lecture, T = Tutorial, P = Practical, & C = Credits

List of Departmental Core Elective Course (DCEC III)

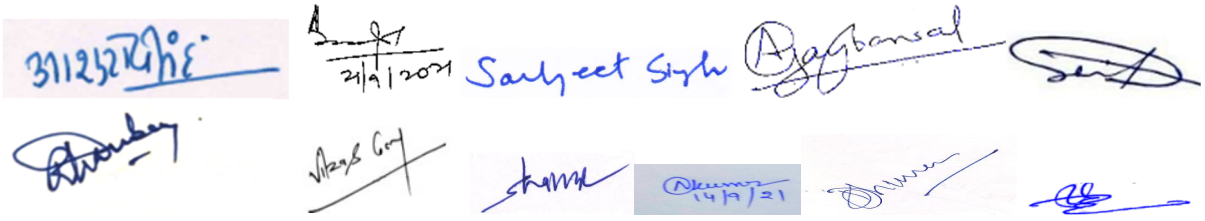
S. No.	Course No.	Course Title
1	BT CE -721A	DESIGN OF CONCRETE STRUCTURES-II
2	BT CE -722A	DESIGN OF STEEL STRUCTURES-II
3	BT CE-723A	BRIDGE ENGINEERING

List of Departmental Core Elective Course (DCEC IV)

S. No.	Course No.	Course Title
1	BT CE-724A	GROUND IMPROVEMENT TECHNIQUES
2	BT CE-725A	GEOTECHNICAL EXPLORATION AND INSTRUMENTATION
3	BT CE-726A	DESIGN WITH GEOSYNTHETICS

Note

1. Students will be permitted to opt for any one elective run by the other department. The choice of the students to choose any elective from any other department of university, those are offering electives for UG course.
2. Students will be permitted to opt for any two program elective (one from each basket) run by the department (DCEC). The minimum strength of the students should be 20 to run an elective
3. Assessment of Summer Internship, undergone at the end of VI semester, will be based on seminar, viva-voce, report and certificate of Summer Internship obtained by the student from the industry, institute, research lab, training center etc
4. The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.
5. Electronics gadgets including Cellular phones are not allowed in the examination



Central University of Haryana
Department of Civil Engineering
B. Tech. 4th YEAR (SEMESTER – VIII)
Scheme of Studies and Examinations

S. No.	Course Code	Course Title	Teaching Schedule			Credits
			L	T	P	
1	BTCE 801A	MAJOR PROJECT/INDUSTRY INTERNSHIP	-	-	16	8
2	BT CE 802A	DISASTER MANAGEMENT	3	-	-	3
3	DCEC – V		3	-	-	3
4	GEC – III		3	1	-	4
5	GEC – IV		3	1	-	4
Total			**12**	**2**	**16**	**22**

L = Lecture, T = Tutorial, P = Practical, & C = Credits

List of Departmental Core Elective Courses (DCEC V)

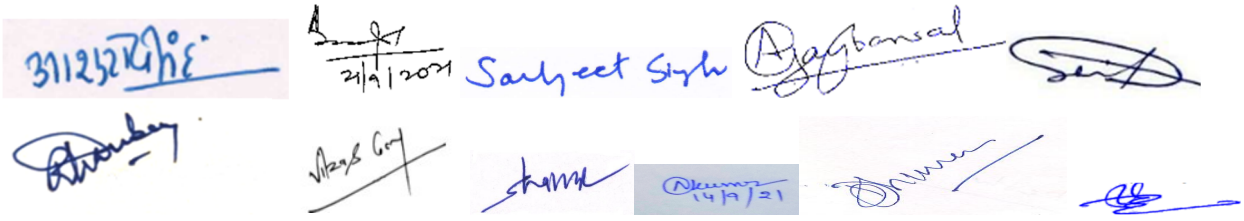
S. No.	Course Code	Course Title
1	BT CE -821A	PAVEMENT EVALUATION AND MANAGEMENT
2	BT CE -822A	AIRPORT PLANNING AND DESIGN
3	BT CE-823A	GROUNDWATER ENGINEERING
4	BT CE-824A	WATERSHED MANAGEMENT

List of General Elective Course (GEC) offered by the department

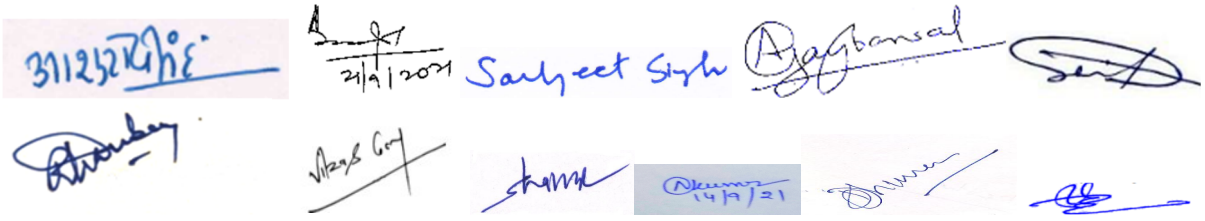
S. No.	Course Code	Course Title
1	BTCE 751A	ELEMENTS OF EARTHQUAKE ENGINEERING
2	BTCE 752A	ROAD SAFETY AUDIT
3	BTCE 851A	DISASTER MANAGEMENT
4	BTCE 852A	WATERSHED MANAGEMENT

Note:

1. Students are required to choose one group from Group A & Group B.
    a. In Group A students will attend all the classes regularly and do one project related to research work and they need to publish one paper in conference.
    b. In Group B students will move into the industry and do their live project in industry. They would be required to submit certificate and submit project report on completion of their industrial internship. They will complete all other subjects in online mode/ they can choose subjects from MOOC/ NPTEL/SWAYAM.
2. Students will be permitted to opt for any one elective run by the other department. The choice of the students to choose any elective from any other department of university, those are offering electives for UG course.



3. Students will be permitted to opt for any one program elective run by the department (DCEC). The minimum strength of the students should be 20 to run an elective
4. The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.
5. Electronics gadgets including Cellular phones are not allowed in the examination



BT CE-701A: DESIGN OF HYDRAULIC STRUCTURES

B. Tech. 4th Year (Semester – VII)

L	T	P	Credit
3	--	--	3

Course Outcomes

CO1: Students will acquire knowledge for the design of hydraulic structures like diversion headworks

CO2: To get knowledge about cross drainage works and design of syphon aqueduct

CO3: To get knowledge about Regulation works and design of fall structures

CO4: Students will develop knowledge for the design of dams including failures like gravity dam, earth dam & Arch Dam.

CO5: Student will assimilate the knowledge on various types of spillways and their design

UNIT - I

Diversion canal Headworks:

Various components and their functions, layout plan, selection of site for diversion headworks, Bligh's creep theory, Khosla's method of independent variables, use of Khosla's curves, various corrections, silt excluders.

Cross drainage works:

Classification and their selection, hydraulic design aspects of aqueducts, syphon aqueducts, super passage, canal syphon and level crossing, design of transitions.

UNIT - II

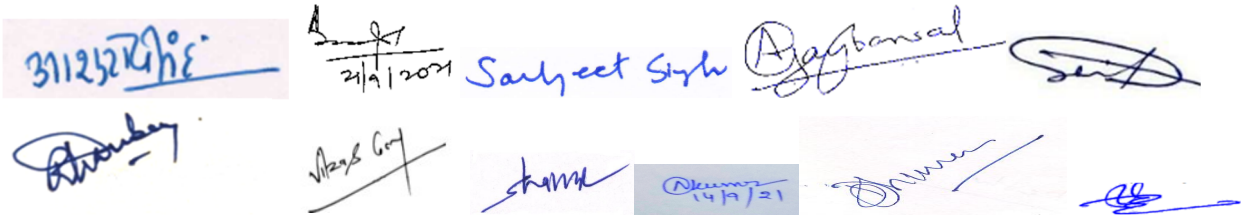
Regulation works: Canal falls-necessity and location, development of falls, design of cistern element, roughening devices, design of Sarda type fall, and design of straight Glacis fall. Off-take alignment, cross-regulator and distributory, head regulators, devices to control silt entry into the off-taking channel and silt ejector, canal escapes, types of escapes

UNIT - III

Storage Headworks: Types of dams, selection of a site, gravity dam-two dimensional design, forces acting, stability criterion, elementary profile of a dam, cutoffs and drainage galleries, arch dams-constant angle and constant radius arch dam, simple design and sketches, most economical angle, Earth dam, design principles, seepage through earth dams, seepage line, control of seepage, design of filters.

UNIT - IV

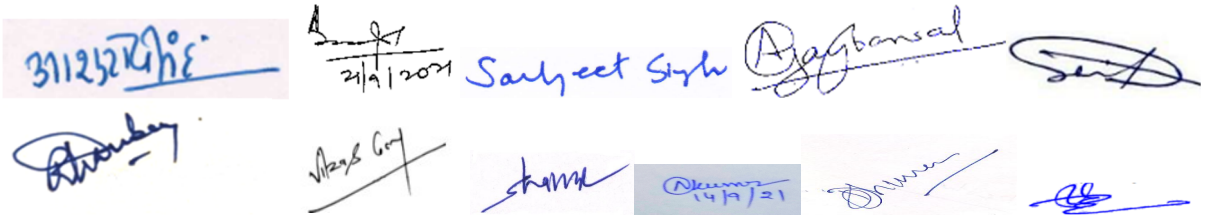
Spillways and Energy Dissipaters: Essential requirements of spillway and spillway's capacity, types of spillways and their suitability, Ogee spillways, chute, side channel, shaft and syphon spillways, energy dissipation below spillways, stilling basins, USBR and I.S. Stilling Basins.



Suggested Readings

1. Garg, S.K., *Irrigation Engg & Hydraulic Structures*, Khanna Publisher, 2013
2. *Guidelines for Lining of Irrigation Canals*, Govt. of Odissa, Water Resources Department, 2019
3. Modi, P.N., *Irrigation, Water Resources and Water Power Engg*, Standard Book House, 2014
4. Ojha, C. S. P., *Engineering Hydrology*, Oxford University Press, 2017
5. Punmia, B. C. and Pande, *Irrigation, and water power Engineering*, Standard Publisher, 2016
6. Sharma, S.K., *Irrigation Engg*, S.Chand Publishers, 2017
7. Singh, Bharat, *Fundamentals on Irrigation Engg.*, 6th Edition, Nem Chand & Bros, 1979
8. Subramanyam, K., *Engineering hydrology*, Tata McGraw Hill, 2013

Note: Latest Edition of Books is to be taken.



BT CE-702A: EARTHQUAKE ENGINEERING

B. Tech. 4th Year (Semester – VII)

L	T	P	Credit
3	--	--	3

Course Outcomes

CO1. Acquire knowledge of engineering seismology
CO2. Analyze the earth quake forces and response of SDOF and MDOF system
CO3. Learn the design philosophies of earthquake resistant structures using IS codes 1893:2002
CO4. Evaluate the condition of the existing RC and masonry buildings.

UNIT –I

Engineering Seismology: Engineering seismology, Seismic zones of India, Earthquake and its causes, Types of waves, location of earthquakes, seismograph, Impact of Earthquake.

UNIT-II

Theory of Vibration: Free Body Diagrams, Undamped single degree of freedom systems, Damped single degree of freedom system, Response to single degree of freedom system to harmonic loads.

UNIT –III

Earthquake Resistant Design: Philosophy of Earthquake resistant Design, Design Consideration, Construction Details, Architectural General guidelines for Masonry buildings, RC buildings and non structural elements.

Earthquake Forces: Seismic coefficient and response spectrum method of analysis as per IS 1893 Codal Provisions. Examples on seismic force calculation of buildings.

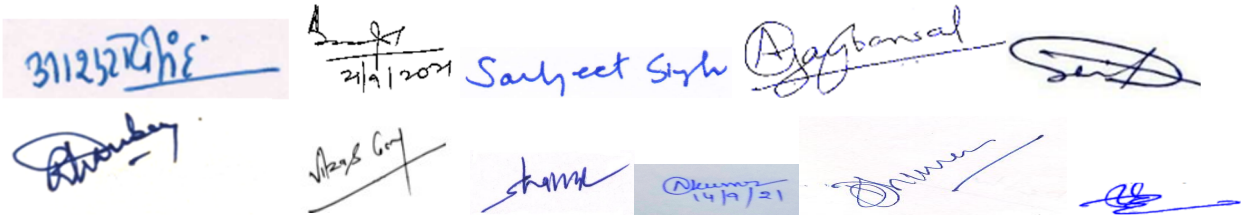
UNIT – IV

Ductility Provisions: Introduction, ductility, ductility consideration for RC beams, RC Columns, Lateral reinforcement in columns, special reinforcement in columns, and ductility consideration for Beam column joints.

Seismic Vulnerability Assessment: Seismic evaluation of building, Rapid visual Inspection simplified and detailed vulnerability assessment, Detailed In-situ investigation, Non-destructive test, Partially destructive test.

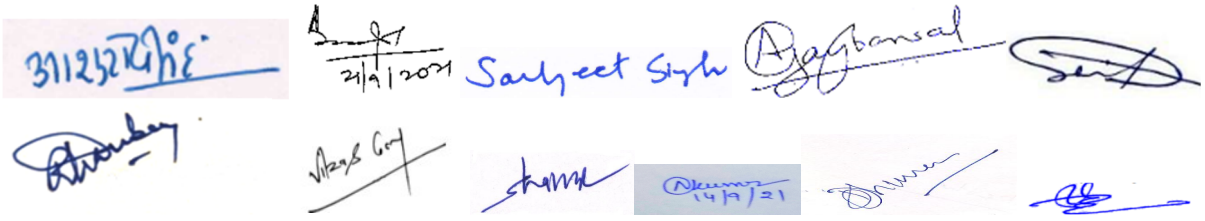
Suggested Readings

1. Agarwal, Pankaj, *Earthquake Resistant Design of Structures*, PHI learning Private Limited, 2011
2. Aggrawal, M. M., *Railway Engineering Second Edition.*, Oxford Publication, 2013.
3. Chopra, Anil Kr., *Structural Dynamics*, Pearson, 2007



4. Clough and Penzian, *Dynamics of Structures*, McGraw Hill Publishing Co., New York, 1993
5. Paz, Mario, *Structural Dynamics (Theory and Computation)*, CBS Publishers and Distributors, 2004
6. Roy, R. Carig, Jr., *Structural Dynamics (An Introduction to computer methods)*, John Wiley & Sons, 1981

Note: Latest Edition of Books is to be taken.



BT CE 703A: MINOR PROJECT

B. Tech. 4th Year (Semester – VII)

L	T	P	Credit
--	--	8	4

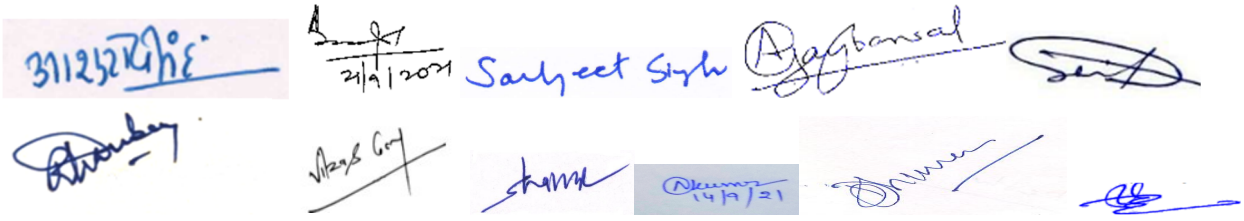
The project started in VII Semester will be continued in VIII Semester and will be evaluated through a panel of examiners consisting of the following:

Chairperson of Department:	Chairperson
Project coordinator:	Member
External expert:	To be appointed by the University

The student will be required to submit two copies of his/her project report to the department for record (one copy each for the department and participating teacher).

Project coordinator will be assigned the project load of, maximum of 2 hrs. per week including his own guiding load of one hr. However, the guiding teacher will be assigned maximum of one period of teaching load irrespective of number of students/groups under him/her.

The format of the cover page and the organization of the body of the report for all the B. Tech. will be finalized and circulated by the Project coordinator.



BT CE- 704A SUMMER INTERNSHIP

B. Tech. 4th Year (Semester – VII)

L	T	P	Credit
--	--	2	1

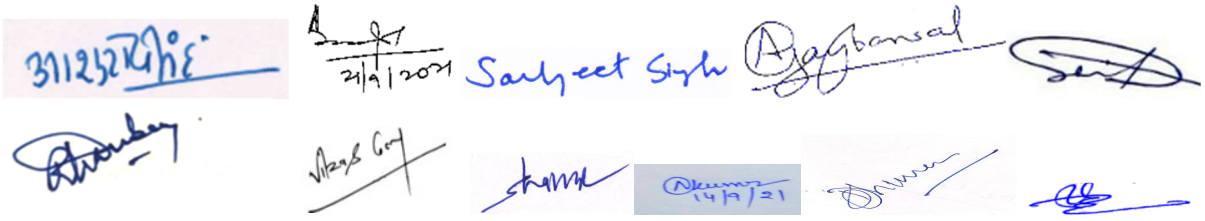
At the end of VI semester each student would undergo four weeks Industrial/ Summer Internship in an Industry/ Institute/ Professional Organization/ Research Laboratory etc. with the prior approval of the university and submit in the department a typed report along with a certificate from the organization.

The typed report should be in a prescribed format. The report will be evaluated in the VII Semester by a Committee consisting of teachers from different specialization to be constituted by the Chairperson of the department. The basis of evaluation will primarily be the knowledge and exposure of the student towards different processes and the functioning of the organization.

The internal marks distributions for the students who have undergone Summer Internship consist of 30 marks by the committee members consisting of faculty members of concerned department and 70 marks by the external examiner.

The student will interact with the committee through presentation to demonstrate his/her learning.

Teachers associated with evaluation work will be assigned 2 periods per week load.



BT CE-705A GENERAL FITNESS IN CIVIL ENGINEERING

B. Tech. 4th Year (Semester – VII)

L	T	P	Credit
--	--	2	0

The purpose of this course is to inculcate a sense of professionalism in a student along with personality development in terms of quality such as receiving, responding, temperament, attitude and outlook. The student efforts will be evaluated on the basis of his/ her performance / achievements in different walks of life. The evaluation will be made by the committee of examiners constituted as under:

1. Dean/ Head of Department	Chairperson
2. Coordinator of the department	Member
3. External expert	Appointed by the university

A. The student will present a written report before the committee with following in view: The student will present before the committee his/her achievements during the current academic session in the form of a written report highlighting followings:

I.	Academic Performance	**(10 Marks)**
II.	Extra Curricular Activities / Community Service, Hostel Activities	**(10 Marks)**
III.	Technical Activities / Industrial, Educational tour	**(10 Marks)**
IV.	Sports/games	**(10 Marks)**

Note: Report submitted by the students should be typed on both sides of the paper.

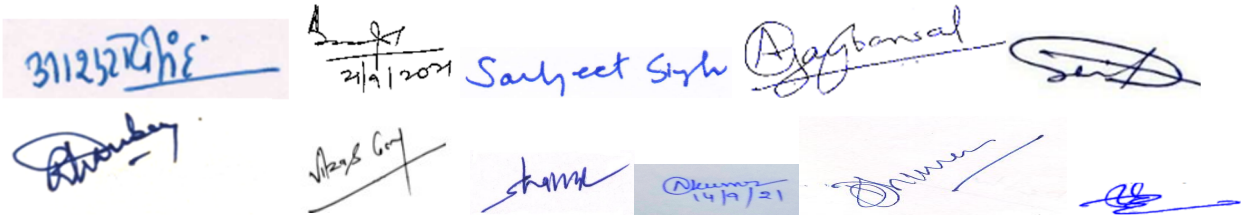
B. A student will support his/her achievement and verbal & communicative skill through presentation before the examiners. **(30 Marks)**

C. Faculty Counselor Assignment **(30 Marks)**

It will be the duty of the student to get evaluated by respective faculty counselor. A counselor will assess the student which reflects his/her learning graph including followings:

1. Discipline throughout the year
2. Sincerity towards study
3. How quickly the student assimilates professional value system etc.
4. Moral values & Ethics- Syllabus (one lecture/week on the topics of Human values/Ethics is to be delivered)

Note: Faculty Counselor should be in regular contact to the students throughout the year.



BT MGT – 706A: ENTREPRENEURSHIP AND STARTUPS

B. Tech. 4th Year (Semester – VII)

L	T	P	Credit
3	--	--	3

Course Outcome

CO1: Understand the concept of Entrepreneurship and Entrepreneurial Culture
CO2: Learn to create Entrepreneurial Venture
CO3: Learn the various government schemes of Entrepreneurship Development
CO4: Understand the theory of project management and case studies

UNIT – I

Entrepreneur & Entrepreneurship: Introduction; Evolution to the Concept of Entrepreneur; Role of Entrepreneurship in Economic development; Characteristics of successful Entrepreneurs; Need for an Entrepreneur; Functions of Entrepreneur; Types of Entrepreneurs –Women, Rural, Tourism, Agri-Preneurship and Social Entrepreneurship; Entrepreneur Vs a Manager; Entrepreneurial decision process; Factors affecting Entrepreneurship growth.

UNIT – II

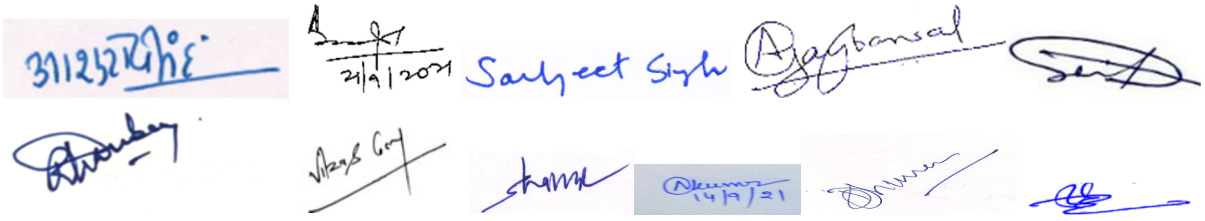
Entrepreneurial Motivation: Meaning, motivating factors, Theories of Entrepreneurial motivation; Entrepreneurial Motivational Behaviour's motives: Creativity, Self efficacy, Locus of Control, Risk taking, Leadership, Communication; Entrepreneurial Competencies: Meaning, Major Entrepreneurial Competencies; International Entrepreneurship – Opportunities and challenges; Forms of Business Ownerships.

UNIT – III

Business Start ups: Introduction, characteristics and types; Micro and Small Enterprises: meaning, importance, features and characteristics, Rationale behind micro and small enterprises, Scope of Micro and Small Enterprises; Entrepreneurship Project Development: Idea generation – sources & techniques, Identifying Opportunity, Business Plan Formulation, Project Appraisal, Developing a Marketing Plan, Business Plan Failures.

UNIT – IV

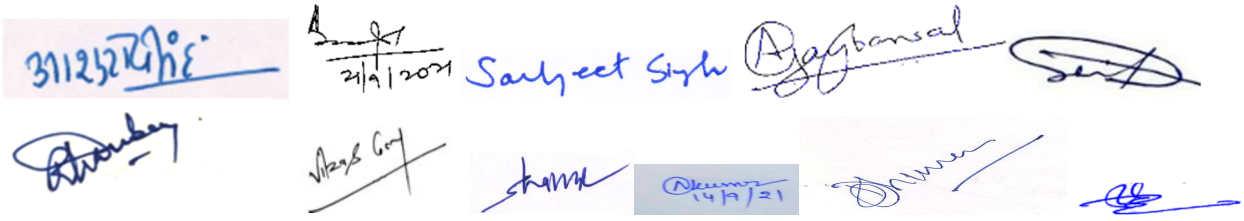
Government Support to new enterprises: Entrepreneurship Development Programmes (EDPs), Role of Central and State Government in promoting Entrepreneurship, Financing of an Enterprise, Agencies for Marketing Support, Agencies for Consulting, Training and other Support, Taxation benefits to small scale enterprises, MSME policy in India.



Suggested Readings

1. Dutta, B. (2009). *Entrepreneurship Management (Text and Cases)* (1 ed.). New Delhi: Excel Book, 2009
2. Hisrich, R. D., Peters, M. P., & Shepherd, D. A. (2017). *Entrepreneurship*. (10 ed.). Chennai: McGraw Hill Education (India) Private Limited, 2017
3. Khanka, S.S. (2016). *Entrepreneurial Development* (4 ed.). New Delhi: S. Chand & Company Ltd, 2016.
4. Scarborough, N.M., & Cornwall, J.R. (2014). *Essentials of Entrepreneurship and Small Business Management.* (8 ed.). New Delhi: Prentice Hall, 2014.

Note: Latest Edition of Books is to be taken.



ELECTIVE I

BT CE-721A: DESIGN OF CONCRETE STRUCTURES II

B. Tech. 4th Year (Semester – VII)

L	T	P	Credit
3	--	--	3

Course Outcomes

CO1. Understand the concept and design of Flat slab and staircases
CO2. Analyses and Design of water tanks by using IS code
CO3. Analyses and Design of curved beam members and retaining walls.
CO4. Learn to analyze yield line theory concept for slabs

UNIT –I

Flat slabs: Advantages of flat slabs, general design considerations, approximate direct design method, design of flat slabs, openings in flat slab, design examples.

Staircases: Introduction, Design of various types of staircases, design examples.

UNIT-II

Design of Curved Beams General Aspects, analysis of flexural and torsional moments in circular girder, moments in semi-circular beams supported on three columns, design Examples.

Retaining Walls: Introduction, Types of retaining walls, earth pressure on retaining walls, forces on retaining walls, structural behavior and design of a cantilever retaining wall, design examples.

UNIT –III

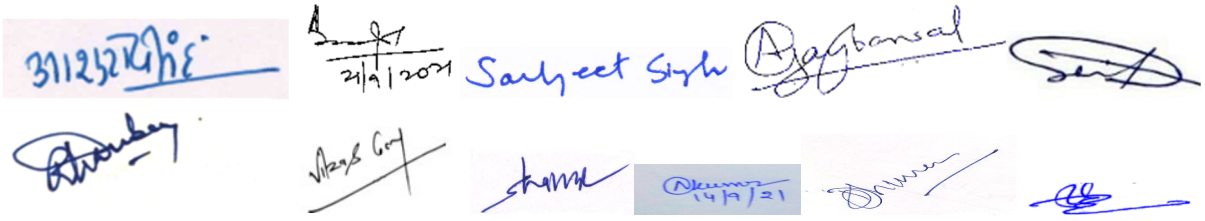
Water Tanks: Design requirements, rectangular and cylindrical underground and overhead tanks, Intze tanks, design considerations, design examples.

UNIT – IV

Yield Line Theory: Basic assumptions, Methods of analysis, yield line patterns and failure mechanisms, analysis of one way and two way rectangular and non-rectangular slabs, effect of top corner steel in square slabs, design examples.

Suggested Readings

1. Ferguson, *Reinforced Concrete Fundamentals* Keith, Revised Edition, John Wiley and Sons, 1981
2. Gambhir, M.L., *Reinforced Concrete Design*, Macmillan India Ltd., New Delhi, 2008
3. Jain P., and Krishna, J., *Plain and Reinforced concrete, Vol. 2,* Nem Chand and Bros., Roorkee, 2007
4. Syal I.C., and Ummat, Behaviour, *Analysis and Design of R.C.C. Structural Elements*, A.H. Wheelers, New Delhi, 2003
5. Varghese, P. C., *Advanced Reinforced Concrete Structures,* Tata McGraw Hill, 2005



ELECTIVE II

BT CE-722A: DESIGN OF STEEL STRUCTURES II

B. Tech. 4th Year (Semester – VII)

L	T	P	Credit
3	--	--	3

Course Outcomes

CO1. Plastic analysis and load carrying capacity of steel members
CO2. Design of steel stacks and its foundation
CO3. Analyses and Design of Water Tanks and Transmission Towers
CO4. Analyses and Design of Steel roof trusses and industrial frame buildings.

UNIT –I

Elementary Plastic Analysis and Design: Introduction, Scope of plastic analysis, ultimate load carrying capacity of tension members and compression members, flexural members, shape factor, mechanisms, plastic collapse, plastic analysis and design of simple portal frames.

UNIT-II

Design of Steel Stacks: Introduction, various loads to be considered for the design of steel stacks, design of steel stacks including foundation.

Cold formed Sections: Introduction and brief description of various types of cold formed sections

UNIT –III

Towers: Transmission line towers, microwave towers, Design loads, classification, design procedure and specification

Water Tank: Analysis and Design of Water Tank

UNIT – IV

Industrial Buildings: Loads, general arrangement and stability, design considerations, design of purlins, design of roof trusses, industrial building frames, bracings.

Suggested Readings

1. Arya A.S., and Ajmani, J.L., *Design of Steel Structures*, Nem Chand Brothers, Roorkee, 2011
2. BIS Codes IS 800:2007, IS 801:1975, IS 875
3. Chandra, Ram, *Design of Steel Structures, Vol. I & II*, Standard Book House, 2018
4. Dayaratnam, P., *Design of Steel Structures*, Wheeler Publishing, New Delhi, 2012
5. Gaylord and Gaylord, *Design of Steel Structures*, Mcgraw hill Publication, 1972

Note: Latest Edition of Books is to be taken.

ELECTIVE III

BT CE-723A: BRIDGE ENGINEERING

B. Tech. 4th Year (Semester – VII)

L	T	P	Credit
3	--	--	3

Course Outcomes

CO1: Learn about the general consideration and IRC codes related to Bridge Engineering
CO2: To impart knowledge for analysis and design of various types of bridges
CO3: Analyze the box culverts for the given loading and detail the box culverts
CO4: Development of Bridge substructure and different type of foundation, Bearing and Joints: Various types of expansion bearing and fixed bearings, elastomeric bearings, joints and their types.

UNIT-I

General Consideration: Site selection, various types of bridges and their suitability, loads, forces and IRC bridge loading and permissible stresses, Economic Spans.

UNIT-II

Design of RC bridges under concentrated loads using effective width and Pigeauds Method, Courbon's method of load distribution.

. UNIT-III

Detail design of T-beam bridge slab culvert and box culverts

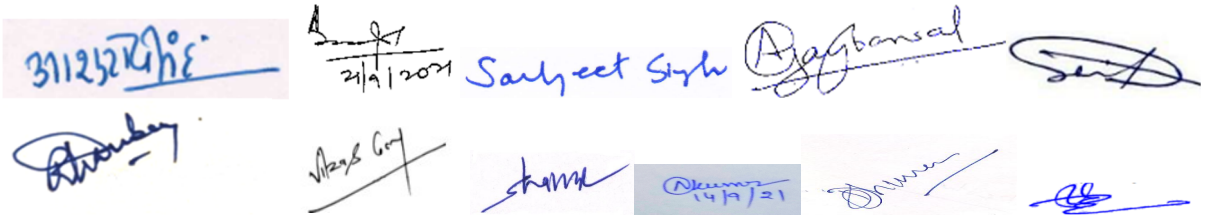
. UNIT-IV

Bridge substructure and bearings, Design of piers and pier caps. Abutments, Different types of foundations, used for design of substructure.

Suggested Readings

1. Ponnuswamy, S., *Bridge Engineering*, Tata McGraw Hill, 1986
2. Raina, V. K., *Concrete Bridge Practice*, Tata McGraw Hill, 1991
3. Raju, N. K., *Design of Bridges*, Oxford & IBH, 2016
4. Victor, D. J., *Essentials of Bridge Engineering*, Oxford & IBH, 2019

Note: Latest Edition of Books is to be taken



ELECTIVE IV

BT CE 724A: GROUND IMPROVEMENT TECHNIQUES

B. Tech. 4th Year (Semester – VII)

L	T	P	Credit
3	--	--	3

Course Outcomes

CO1. Identify the need and importance of ground improvement.
CO2. Determine different techniques to stabilize cohesionless and cohesive soils.
CO3. Improve the characteristics of the soil by using different techniques.
CO4. Apply the concept of soil reinforcement to enhance the soil in different areas of Civil Engineering.

UNIT –I

Introduction to ground improvement, need for ground improvement, classification of ground modification techniques, ground improvement potential, emerging trends in ground improvement. General Principal of Compaction: Mechanics, field procedure, quality control in field.

UNIT-II

Ground Improvement in Granular Soil: In place densification by (i) Vibroflotation (ii) Compaction pile (iii) Vibro-Compaction (iv) Dynamic Compaction (v) Blasting.

Ground Improvement in Cohesive Soil: Compressibility, vertical and radial consolidation, preloading methods. Types of drains, vertical drains, construction techniques.

UNIT –III

Stone Column: Function, design principles, load carrying capacity, construction techniques.

Ground Improvement by Grouting: Grouting in soil, types of grout, desirable characteristics, grouting pressure, grouting methods.

Soil Stabilization: Lime Stabilization-Base exchange mechanism, Pozzolanic reaction, lime-soil interaction, lime columns. Cement stabilization: Mechanism, amount, age and curing. Fly-ash - Lime Stabilization, Soil Bitumen Stabilization.

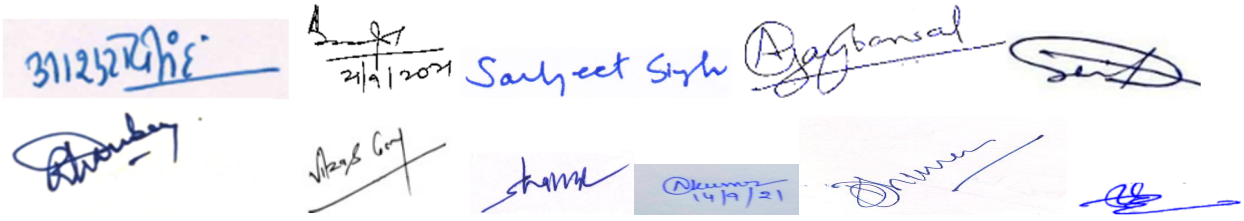
UNIT – IV

Soil Reinforcement: Mechanism, Types of reinforcing elements, reinforcement-soil interaction, Reinforcement of soil beneath the roads, foundations.

Geosynthetics, types of geosynthetics, functions of geosynthetics and their applications.

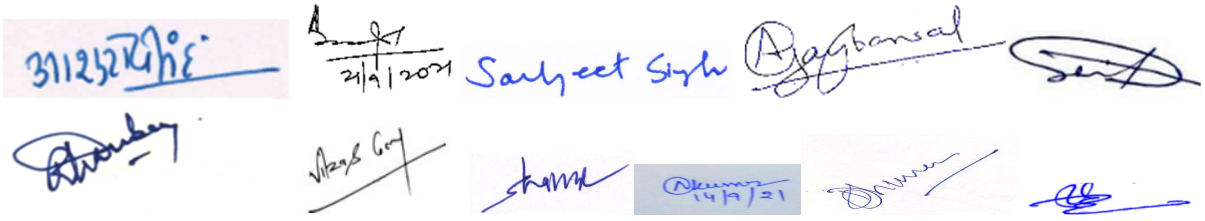
Suggested Readings

1. Das, B. M., *Principles of Foundation Engineering*, Cengage Learning, 2011.
2. Koerner, R. M., *Designing with Geosynthetics, Vol. 1 & 2.*, Xlibris Corporation. 2012.



3. Manfred. R. Hausmann, *Engineering Principles of Ground Modification*, McGraw Hill, 1989
4. Moseley, M. P., Kirsch, K., *Ground Improvement*, Spon Press, 2004.
5. Murthy, V.N.S., *A text book on Soil Mechanics and Foundation Engineering.*, CBS Publishers & Distributors, 2018.
6. Purushothamaraj, P., *Ground Improvement Techniques*, University Science Press, 2005

Note: Latest Edition of Books is to be taken.



ELECTIVE V

BT CE 725A: GEOTECHNICAL EXPLORATION AND INSTRUMENTATION

B. Tech. 4th Year (Semester – VII)

L	T	P	Credit
3	--	--	3

Course Outcomes

CO1. Identify relevant instrumentation required for characterizing the soil and rock with interdisciplinary approach.
CO2. Interpret field and laboratory data and prepare soil investigation report.
CO3. Prepare bore logs for different soil strata.
CO4. Implement various exploration methods in soil and rock.

UNIT –I

Introduction: Soil Formation, types of soils, physical and biological weathering, soil transport, deposition and stratification phenomena and Soil Classification.

Soil Exploration: Soil Exploration Programme for different Civil Engineering Projects.

UNIT-II

Exploration Methods: Methods of Boring, Auguring and Drilling. Machinery used for drilling, types of augers and their usage for various projects.

Soil Sampling: sampling methods, types of samples, storage of samples and their transport. Sample preparation, sample sizes, types of samplers and specifications for testing.

UNIT –III

Borehole Logging: Logging of Boreholes-logging methods,Ground water observations ,water table fluctuations and effects , Preparation of soil profiles , calculations

Field testing of soils: methods and specifications – visual identification tests, vane shear test, penetration tests, analysis of test results.

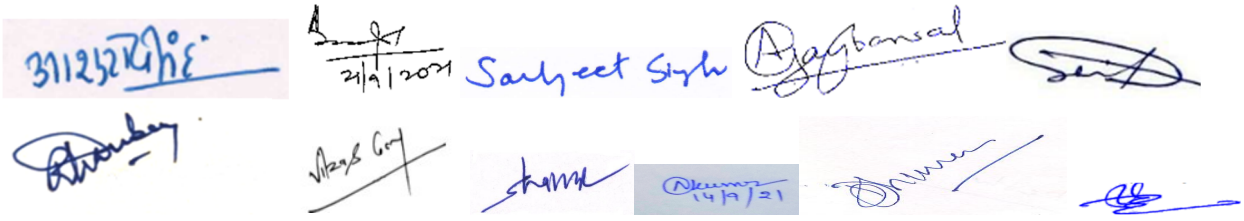
UNIT – IV

Report writing: Soil exploration Reports- identification, calculations and preparation.

Field Instrumentation: Rollers, Pressure meters, Piezometer, Pressure cells, Sensors, Inclinometers, Strain gauges etc.

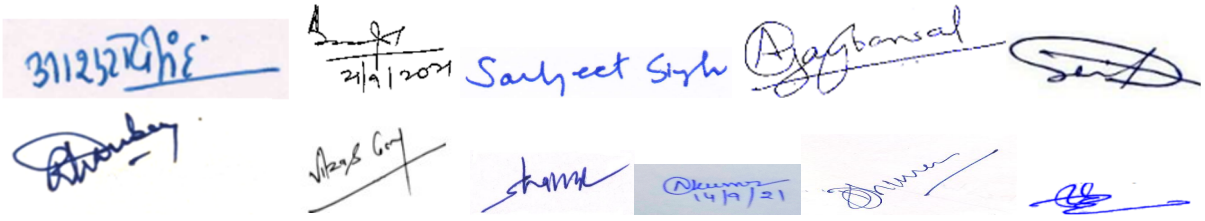
Suggested Readings

1. Bowles, J. E., *Foundation Analysis and Design*, McGraw Hill Companies, 1997.
2. Desai, M. D., *Ground Property Characterization from In-Situ Testing*, IGS-Surat Chapter, 2005.
3. Hvorslev, M. J., *Sub-Surface Exploration and Sampling of Soils for Civil Engineering Purposes*, US Waterways Experiment Station, Vicksburg, 1949.
4. Moseley, M. P., Kirsch, K. *Ground Improvement*, Spon Press, 2004.



5. Ranjan, G., and Rao, A. S. R., *Basic and Applied Soil Mechanics*, New Age international Publishers.

Note: Latest edition of books is to be referred.



ELECTIVE VI

BT CE-726A: DESIGN WITH GEOSYNTHETICS

B. Tech. 4th Year (Semester – VIII)

L	T	P	Credit
3	--	--	3

Course Outcomes

CO1. Select different type geosynthetics for intended purpose.
CO2. Evaluate properties of geosynthetics.
CO3. Design with geosynthetics in various civil engineering applications.
CO4. Apply geocomposite systems to solve contemporary geotechnical problems**.**

UNIT –I

Introduction: An overview on the development and applications various geosynthetics -the geotextiles, geogrids, geonets, geomembranes and geocomposites.

UNIT-II

Designing with geotextiles: Geotextile properties and test methods – functions, Designing for separation, reinforcement, stabilization, filtration, drainage.

Designing with geogrids: Geogrid properties and test methods – physical properties, mechanical properties, endurance properties and environmental properties, Designing for grid reinforcement and bearing capacity.

UNIT –III

Designing with geonets: Geonet properties and test methods – Physical properties, mechanical properties, hydraulic properties, endurance properties and environmental properties -Designing geonet for drainage.

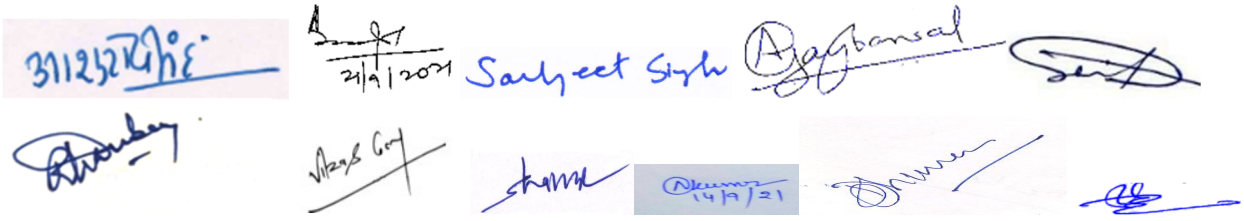
Designing with geomembranes: Geomembrane properties and test methods – physical properties, mechanical properties, chemical properties and biological hazard -Applications of geomembranes.

UNIT – IV

Designing with geocomposites: Geocomposites in seperation, reinforcement – reinforced geotextile composites – reinforced geomembrane composites – reinforced soil composites using discontinuous fibres and meshes, geocomposites in drainage and filtration.

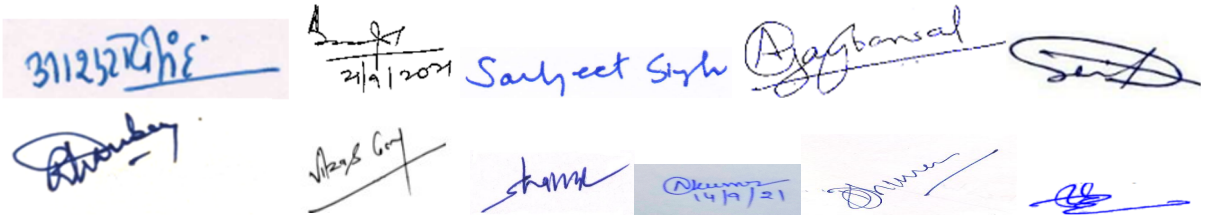
Suggested Readings:

1. G. L. Sivakumar Babu, *An Introduction to Soil Reinforcement and Geosynthetics*, University Press, 2005.
2. G. V. Rao, *Geosynthetics – An Introduction*, Sai Master Geoenvironmental Services Pvt. Ltd. Hyderabad, 2011.
3. R. M. Koerner, Designing with geosynthetics, Pearson Education Inc., 2005.



4. Shukla, *Fundamentals of Geosynthetic Engg.* Imperial College Press, London, 2006.

Note: Latest edition of books is to be referred.



BT CE 801A: MAJOR PROJECT
B. Tech. 4th Year (Semester – VIII)

L	T	P	Credit
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The primary objective of this course is to develop in students the professional quality of synthesis employing technical knowledge obtained in the field of Engineering & Technology through a project work involving design, analysis augmented with creativity, innovation and ingenuity.

Project involving design/ fabrication/ testing/ computer simulation/ case studies etc. which commences in the VII Semester will be completed in VIII Semester and will be evaluated through a panel of examiners consisting of the following:

Head of Department :	Chairperson
Project coordinator :	Member Secretary
Respective project supervisor :	Member

The student will be required to submit two copies of his/her project report to the department for record (one copy each for the department and participating teacher).

Project coordinator will be assigned the project load of maximum of 2 hrs. per week including his own guiding load of one hr. However, the guiding teacher will be assigned maximum of one period of teaching load irrespective of number of students/groups under him/her.

The format of the cover page and the organization of the body of the report for all the B.Tech. will be finalized and circulated by the Project coordinator.

BT CE 801A: INDUSTRIY INTERNSHIP

B. Tech. 4th Year (Semester – VIII)

L	T	P	Credit
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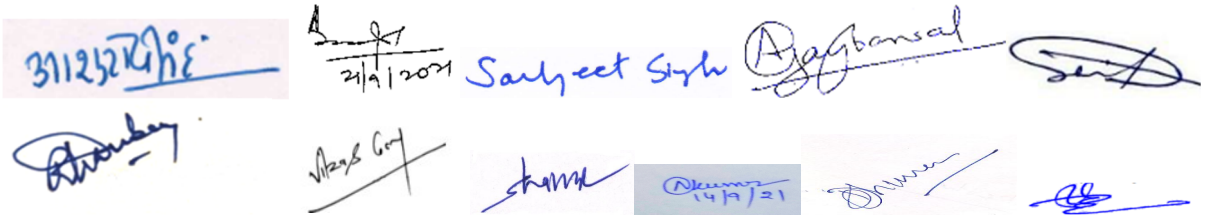
The students are required to undergo Industrial Training in State/Central PWD, Railways and other Originations or Institutional Project Work of duration not less than 4 months in a reputed organization or concerned institute. The students who wish to undergo industrial training, the industry chosen for undergoing the training should be at least a private limited company. The students shall submit and present the report at the university. The typed report should be in a prescribed format. The report will be evaluated by a Committee consisting of teachers from different specialization to be constituted by the Head of the department. The basis of evaluation will primarily be the knowledge and exposure of the student towards different processes and the functioning of the organization.

The student will interact with the committee through presentation to demonstrate his/her learning.

The final viva-voce of the Industrial Training will be conducted by an external examiner and one internal examiner appointed by the university. External examiner will be from the panel of examiners submitted by the concerned department. Assessment of Industrial Training will be based on seminar, viva-voce, report and certificate of Industrial Training obtained by the student from the industry.

The internal marks distributions for the students who have undergone Industrial Training consist of 30 marks by the committee members consisting of faculty members of concerned department and 70 marks by the external expert.

The teachers engaged for Industrial Internship work shall have a workload of 2 hours per group (at least 4 students) per week.



BT CE 802A: DISASTER MANAGEMENT
B. Tech. 4th Year (Semester – VIII)

L	T	P	Credit
3	--	--	3

Course Outcomes

CO1: Know the significance of disaster management,
CO2: Study the occurrences, reasons and mechanism of various types of disaster
CO3: Learn the preventive measures as Civil Engineer with latest codal provisions
CO4: Apply the latest technology in mitigation of disasters

UNIT-I

Introduction: Disaster, Emergency, Hazard, Mitigation, Disaster Prevention, Preparedness and Rehabilitation, Risk and Vulnerability, Classification of Disaster, Natural and Manmade Disasters, International day and Decade of Disaster Reduction.

Risk and Vulnerability to disaster mitigation and management options, Warning and Forecasting

UNIT-II

Hydro-Meteorological Based Disasters: Disaster Management Act 2005, Role of NDMA, NDRF, NIDM, Tropical Cyclones, Floods, droughts, mechanism, causes, role of Indian Metrological Department, Central Water Commission, structure and their impacts, classifications, vulnerability, Early Warning System, Forecasting, Flood Warning System, Drought Indicators, recurrence and declaration, Structural and Nonstructural Measures.

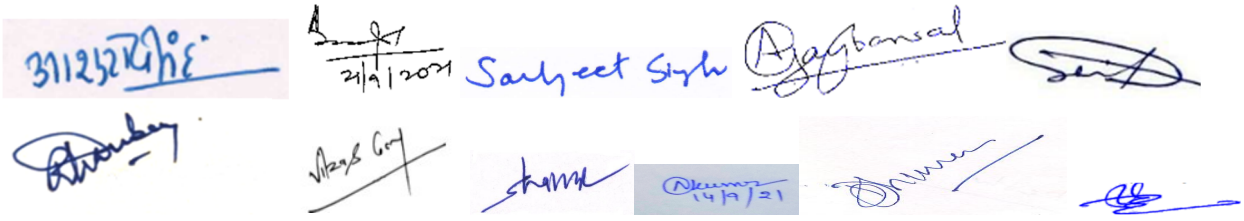
Desertification Zones, causes and impacts of desertification, Characteristics, Vulnerability to India and Steps taken to combat desertification, Forest Fires; Causes of Forest Fires; Impact of Forest Fires, Prevention.

UNIT-III

Geological Based Disasters: Earthquake, Reasons, Compression, Shear, Rayleigh and Love Waves; Magnitude and Intensity Scales, Direct and Indirect Impact of Earthquake; Seismic Zones in India, Factors, Indian Standards Guidelines for RCC and Masonry Structures, Prevention and Preparedness for Earthquake, Tsunamis, Landslides and avalanches: Definition, causes and structure; past lesson learnt and measures taken; their Characteristic features, Impact and prevention, Atlas (BMTRPC); structural and non structural measures.

UNIT-IV

Manmade Disasters: Chemical Industrial hazards; causes and factors, pre- and post disaster measures; control ; Indian Standard Guidelines and Compliance; Traffic accidents; classification and impact, Fire hazards; Classification as per Indian Standards; Fire risk assessment; Escape routes; fire fighting equipments; classification of buildings, fire zones, occupancy loads; .capacity

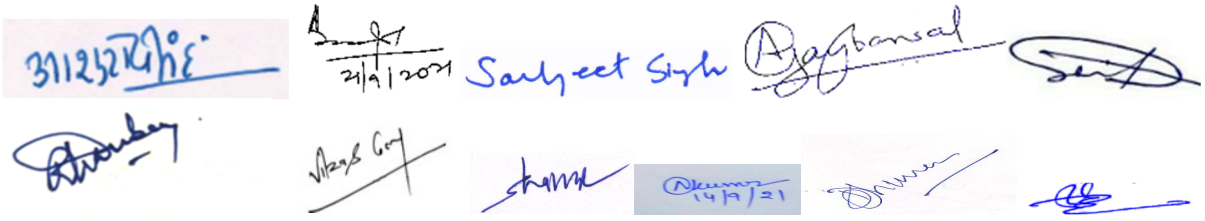


and arrangements of exists, Use of remote sensing and GIS in disaster mitigation and management.

Suggested Readings:

1. Abbott, Patrick Leon, *Natural Disasters*, Amazon Publications, 2002
2. Gauba Nidhi, Dhawan and Khan, Ambrina Sardar, *Disaster Management and Preparedness*, CBS Publishers & Distribution
3. Oosterom, Petervan, Zlatanova, Siyka, Fendel, Elfriede M., *Geo-information for Disaster Management*, Springer Publications, 2005
4. Schneid., Thomas D., *Disaster Management and Preparedness*, CRC Publication, USA, 2001
5. Singh, Savindra and Singh, Jeetendra, *Disaster Management*, Pravalika Publications, Allahabad
6. Wisner., Ben, *At Risk: Natural Hazards, People vulnerability and Disaster*, Amazon Publications, 2001

Note: Latest Edition of Books is to be taken.



ELECTIVE-I

BT CE 821A: PAVEMENT EVALUATION AND MANAGEMENT

B. Tech. 4th Year (Semester – VIII)

L	T	P	Credit
3	--	--	3

Course Outcomes

CO1. Assess pavement surface conditions and evaluate it.
CO2. Estimate the structural stability of pavements using various tests.
CO3. Design the overlay for a flexible pavement.
CO4. Design the overlay for a rigid pavements.
CO5. Differentiate amongst various design alternatives for pavements.
CO6. Demonstrate the ability to discuss pavement management system

UNIT –I

Pavement Evaluation and Performance: General concept of pavement evaluation, evaluation of pavement performance, evaluation of pavement structural capacity, evaluation of pavement distress, evaluation of pavement safety.

Types of Distress: Structural and functional, serviceability, fatigue cracking, pavement deformation and low temperature shrinkage cracking, Factors affecting performance, relation between performance and distress.

UNIT-II

Pavement Evaluation & Measuring Equipment: Functional & Structural Evaluation, Functional Parameters such as Roughness, Distress, Rutting, Skid Resistance etc. Structural Parameters such as Structural Capacity. Benkelman Beam, Bump Integrator, dynaflect. Demonstration of equipment for dynamic testing of pavements. Digital ultrasonic concrete tester. Pavement skid resistance measuring equipment, fatigue testing equipment.

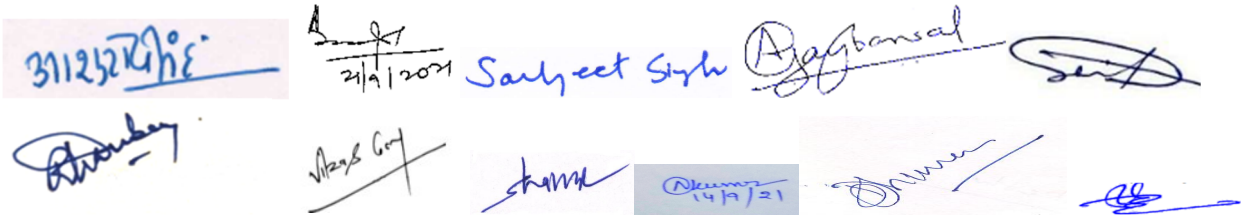
UNIT –III

Pavement Overlays: Flexible overlays and determination of overlay thickness. Rigid overlays and determination of overlay thickness. Design of Overlay by Benkelman Beam and Falling Weight Deflectometer.

Design Alternatives: Framework for pavement design, design objectives and constraints, Basic structural response models, characterization of physical design inputs, Generating alternative pavement design strategies. Economic evaluation of alternative pavement design strategies, analysis of alternative design strategies. Predicting distress, predicting performance, selection of optimal design strategies.

UNIT – IV

Pavement Management System: Introduction to Pavement Management System (PMS) & Maintenance Management System (MMS), construction, maintenance and rehabilitation.

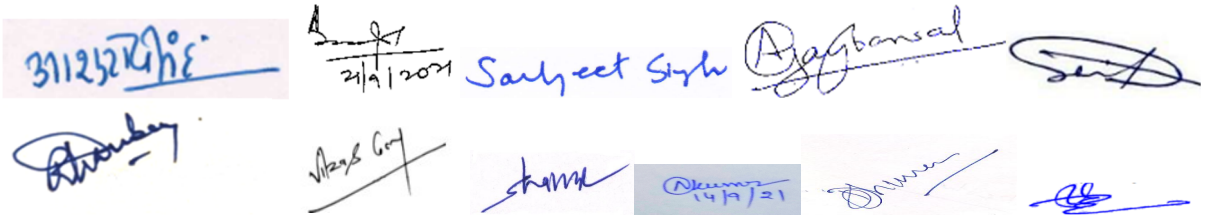


Feedback data system. Examples of Working Design and Management Systems. Implementation of a pavement management system.

Suggested Readings

1. Fwa, T.F., *The Handbook of Highway Engineering*, CRC Press, Taylor & Francies Group, 2006.
2. Hass, R., Hudson, W.R. and Zaniewski, J., *Modern Pavement Management*, Krieger 1994.
3. Khanna and Justo, *Highway Engineering*, Nem Chand & Brothers, Roorkee 2015

Note: Latest Edition of Books is to be taken.



ELECTIVE-II

BT CE 822A: AIRPORT PLANNING AND DESIGN

B. Tech. 4th Year (Semester – VIII)

L	T	P	Credit
3	--	--	3

Course Outcomes

CO1. Define different surveys pertaining to airport planning.
CO2. Classify different types of airports and their sections.
CO3. Interpret various design factors to design airport pavements.
CO4. Relate to the concepts of capacity – delay and space – time for airports.
CO5. Describe various obstructions and clearance requirements in airports.

UNIT –I

Airport Planning: Airport master plan, aircraft characteristics related to airport planning, air traffic demand analysis, planning surveys, airport zoning.
Geometric Design: Airport classification, runway and taxiway geometric standards, exit taxiways, separation and clearances.

UNIT-II

Terminal Area: Facilities, space requirement, number and size of gate positions, aircraft parking system.
Visual Aids: Airport day-time markings, airport lighting, visibility, visual aids.

UNIT –III

Structural design of airport pavements: Design Factors, Design of flexible and rigid pavements.

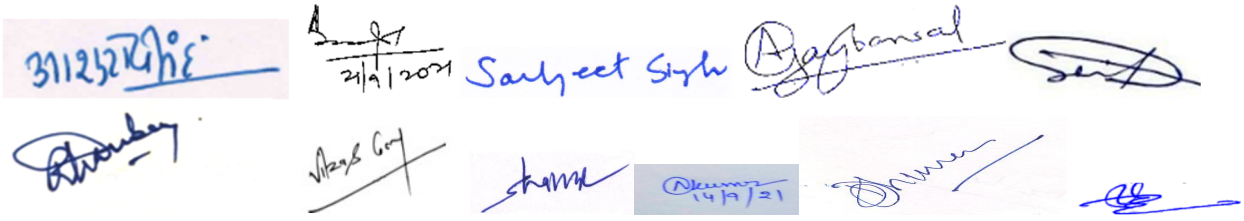
Airside capacity and delay: Overview of mathematical models for capacity and delay, space time concept, models for mixed traffic.

UNIT – IV

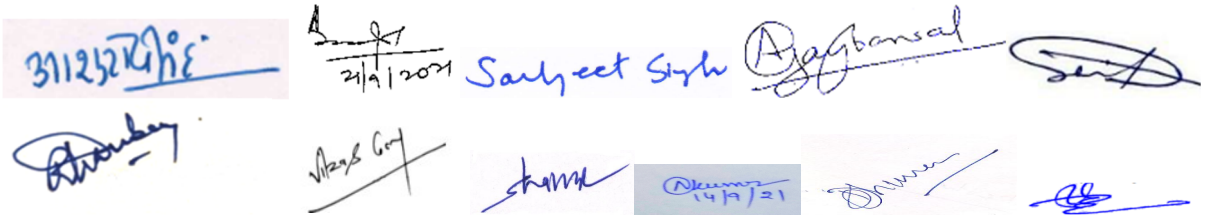
Air Traffic Control: Importance of flight rules, navigational aids, air traffic controls, obstruction and clearance requirements.
Airport Drainage: Design run-off, inlet size and location design, surface and subsurface design.

Suggested Readings

1. Ashford, N. and Wright, P. H., *Airport Engineering*, John Wiley & Sons, NY. 1992
2. Horonjeff, Robert and McKelvey, Francis X., *Planning & Design of Airports*, McGraw Hill, Inc., 1993.
3. Khanna, S. K., Arora M. G., and Jain, S. S., *Airport Planning & Design*, Nem Chand and Bros., Roorkee 2004.



Note: Latest Edition of Books is to be taken.



ELECTIVE-III

BT CE 823A: GROUNDWATER ENGINEERING

B. Tech. 4th Year (Semester –VIII)

L	T	P	Credit
3	--	--	3

Course Outcomes

CO1. Learn the properties of aquifers and equation of motions.
CO2. Understand the boundaries effect and thiems equilibrium formulas
CO3. Understand the construction and working of tube wells and their failures
CO4. Learn the various artificial method of recharge of ground water.

UNIT –I

Properties of Aquifers, Formation constants, compressibility of aquifers, Equation of motion for steady and unsteady ground water flow in isotropic homogeneous aquifers, Dupit`s assumptions. Unconfined flow with a recharge, tile drain problem. Ground water exploration and methods of investigations.

UNIT-II

Effect of boundaries, interference of water, leaky aquifers, Thiem`s equilibrium formula for unconfined and confined aquifers and determination of hydraulic properties of aquifers. Partial penetration of an aquifer by a well, spherical flow in a well. Non equilibrium formula for aquifer (unsteady radial flows).

UNIT –III

Tube wells, optimum capacity, silting of tube well, design of tube wells in different aquifers, tube well types, parts, bore hole, strains, its types, well pipe, casing pipe, blind pipe. Construction and working of tube wells, site selection, drilling operation, cable tool method, hydraulic method, rivers Rotary Method and drilling fluids, well screen assembly installation, verticality and alignment of tube wells, gravel packing, development of tube wells, sickness, in construction and corrosion and failure of tube wells.

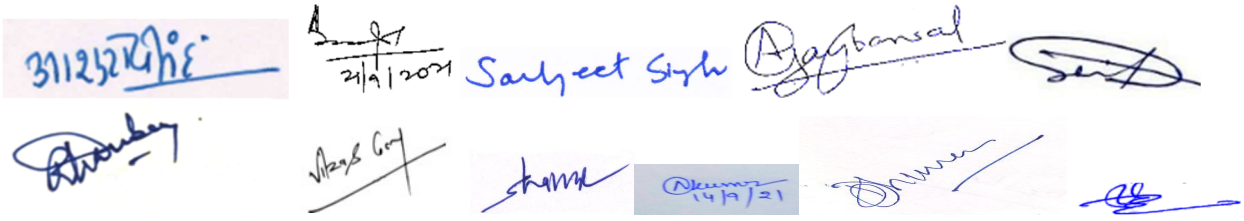
UNIT – IV

Artificial recharge of ground water, considerations and methods, recharge techniques induced infiltration, water spreading, flooding, basins, ditching, modification of natural channels, irrigation, recharge pits, shafts and recharge wells.

Suggested Readings

1. Raghunath, H.M., *Groundwater*, Wiley Eastern Ltd., N. Delhi, 1987
2. Todd, D.K., *Groundwater Hydrology*, John Wiley & Sons Inc., New York, 1980

Note: Latest Edition of Books is to be taken.



ELECTIVE-IV

BT CE 824A: WATERSHED MANAGEMENT

B. Tech. 4th Year (Semester – VIII)

L	T	P	Credit
3	--	--	3

Course Outcomes

CO1: Know the importance of watershed management
CO2: Understand the effects of watershed on community
CO3: Learn the concept of land drainage management
CO4: Apply the system water harvesting.

UNIT-I

Watershed Management Concept - Introduction- Concept of Watershed Management- History of Watershed Management and its Relevance to India- Watershed Characteristics; Climatic Characteristics- Physiographic Characteristics- Causes of Watershed Deterioration.

UNIT-II

Effect of Watershed on the Community- Water Resources Region of India Principles of Watershed Management- Integrated Watershed Management Approach (IWMA)- Objectives of IWMA- Envisaged Results- Success Criteria- Selection of Watershed Village

UNIT-III

Inadequate Surface and Subsurface Drainages- Remedial Measures in Wasteland Management- Land Drainage Management- Surface or Overland Drains, Subsurface or Underground Drains- Discharge and Spacing of tile Drain.

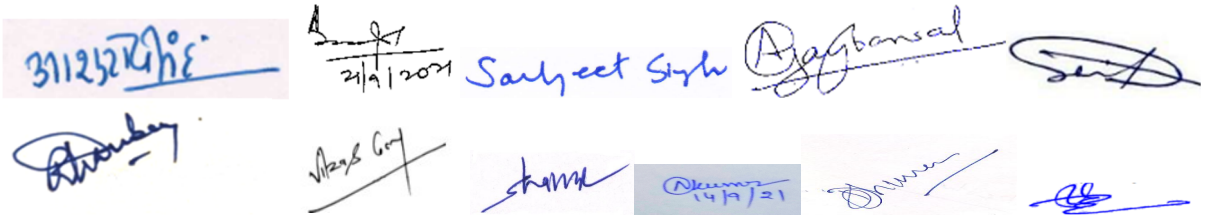
UNIT-IV

Flood Damage Mitigation Management - Introduction- Mitigation Measures- Structural Mitigation Measures- Non-Structural Mitigation Measures- Flood Plain Zoning- Flood Forecasting.

Water Harvesting- Introduction- Techniques of Water Harvesting- Indigenous Water Harvesting Methods in India- Engineering Methods of Water Harvesting.

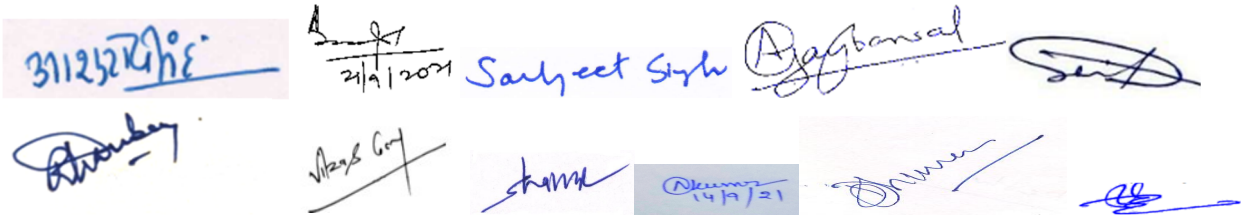
Suggested Readings:

1. James L.D., and Lee, R. R., Economics of Water Resources Planning, McGraw Hill Publishing Company, New York, 1971.
2. Linsely et al., *Water Resource Engineering*, McGraw Hill Publishing Company, New York, 1992.
3. Loukes et al.,, *Water Resources Systems Planning and Analysis*, Prentice Hall of India, New Delhi, 1980.



4. Roy, S.S., *Optimisation Theory and Applications*, John Wiley and Sons Inc., New York, 1984
5. Varshney, R.S., *Water Resources Systems Planning & Economics*, Nem Chand & Bro, 1990

Note: Latest Edition of Books is to be taken.



GENERAL ELECTIVE I

BT CE 751A: ELEMENTS OF EARTHQUAKE ENGINEERING

B. Tech. 4th Year (Semester – VII)

L	T	P	Credit
3	1	--	4

Course Outcomes

CO1. Acquire knowledge of engineering seismology
CO2. Analyze the earth quake forces on buildings
CO3. Learn the design philosophies of earthquake resistant structures using IS codes 1893:2002
CO4. Evaluate the condition of the existing RC and masonry buildings.

UNIT –I

Engineering Seismology: Engineering seismology, Seismic zones of India, Earthquake and its causes, Types of waves, location of earthquakes, seismograph, Impact of Earthquake.

UNIT-II

Earthquake Resistant Design: Philosophy of Earthquake resistant Design, Design Consideration, Construction Details, Architectural General guidelines for Masonry buildings, RC buildings and non structural elements.

UNIT –III

Earthquake Forces: Seismic coefficient and response spectrum method of analysis as per IS 1893 Codal Provisions. Examples on seismic force calculation of buildings.

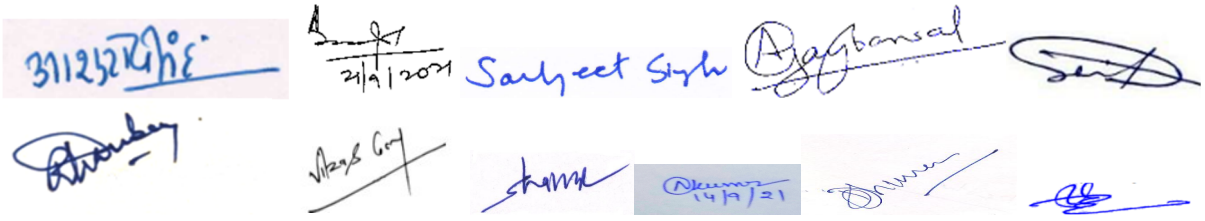
UNIT – IV

Seismic Vulnerability Assessment: Seismic evaluation of building, Rapid visual Inspection simplified and detailed vulnerability assessment, Detailed In-situ investigation, Non-destructive test, Partially destructive test.

Suggested Readings

1. Agarwal, Pankaj, *Earthquake Resistant Design of Structures*, PHI learning Private Limited, 2011
2. Aggrawal, M. M., *Railway Engineering Second Edition.*, Oxford Publication, 2013.
3. Chopra, Anil Kr., *Structural Dynamics*, Pearson, 2007
4. Clough and Penzian, *Dynamics of Structures*, McGraw Hill Publishing Co., New York, 1993
5. Paz, Mario, *Structural Dynamics (Theory and Computation)*, CBS Publishers and Distributors, 2004

Note: Latest Edition of Books is to be taken.



GENERAL ELECTIVE II

BT CE 752A: ROAD SAFETY AUDIT

B. Tech. 4th Year (Semester – VII)

L	T	P	Credit
3	1	--	4

Course Outcomes

CO1. Understand road safety scenario in India and World
CO2. Gain in-depth knowledge on road safety auditing process
CO3. Develop critical thinking for developing safe system approach and to understand traffic calming measures
CO4. Understanding the road safety engineering and crash investigation techniques.

UNIT –I

Road Safety Scenario Introduction to Road Safety scenario in India and World, Road Accident Characteristics, Need of Planning for Network, Land Use and Road Environment for Safety

UNIT-II

Road Safety Auditing Introduction to Road Safety Auditing, concept and need of Road Safety Audit (RSA), procedures in RSA, design standards, audit tasks, stages of road safety audit, Road Safety Audit types, road design issues in RSA's. Overview of Road Safety Hazards, Traffic Calming measures.

UNIT –III

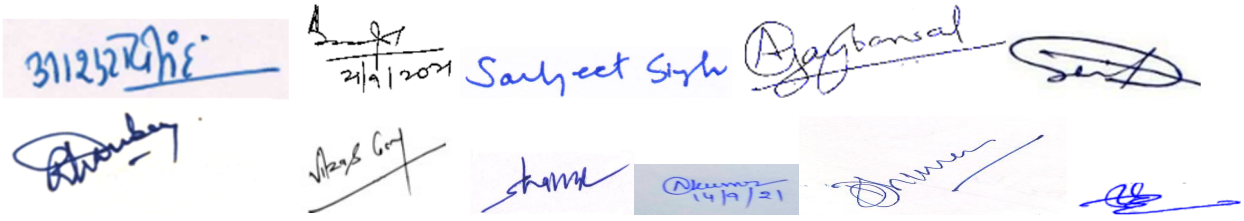
Safe System Approach A global perspective, speed management & safety, safe system and speed & assessing speed limit, type of speed limit & speed zone signs, infrastructure to support safe speed feedback and enforcement.

UNIT – IV

Road Safety Engineering & Crash Investigation Introduction to Road Safety Engineering & Crash Investigation, Human factors relating to crashes, crash investigation & crash problem diagnosing, crash costing, economic appraisal, safety provisions for workers at construction site, construction zone markings, signs, etc.

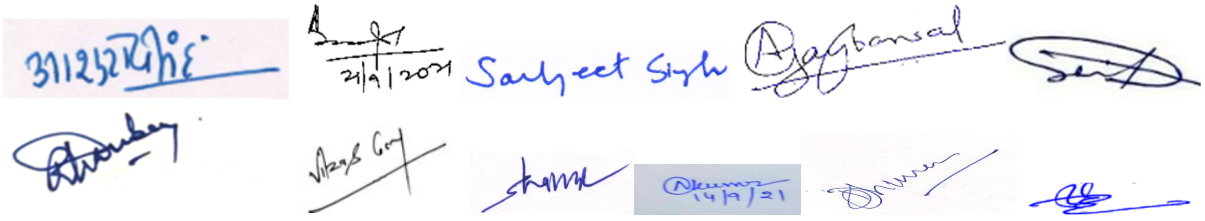
Suggested Readings

1. Babkov, V.F. *Road conditions and Traffic Safety*, MIR publications 1975
2. IRC:99-2018 "Guidelines for Traffic Calming Measures in Urban and Rural Areas"
3. IRC:119-2015 "Guidelines for Traffic Safety Barriers"
4. Khanna and Justo, *Highway Engineering*, Nem Chand & Brothers, Roorkee 2015
5. L.R. Kadyali, *Highway Engineering*, Nem Chand & Brothers, Roorkee 2015



6. Road Safety Audit Manual (IRC:SP-88-2019)

Note: Latest Edition of Books is to be taken.



GENERAL ELECTIVE III
BT CE 851A: DISASTER MANAGEMENT
B. Tech. 4th Year (Semester – VIII)

L	T	P	Credit
3	1	--	4

Course Outcomes
CO1: Know the significance of disaster management,
CO2: Study the occurrences, reasons and mechanism of various types of disaster
CO3: Learn the preventive measures as Civil Engineer with latest codal provisions
CO4: Apply the latest technology in mitigation of disasters

UNIT-I

Introduction: Disaster, Emergency, Hazard, Mitigation, Disaster Prevention, Preparedness and Rehabilitation, Risk and Vulnerability, Classification of Disaster, Natural and Manmade Disasters, International day and Decade of Disaster Reduction.

Risk and Vulnerability to disaster mitigation and management options, Warning and Forecasting

UNIT-II

Hydro-Meteorological Based Disasters: Disaster Management Act 2005, Role of NDMA, NDRF, NIDM, Tropical Cyclones, Floods, droughts, mechanism, causes, role of Indian Metrological Department, Central Water Commission, structure and their impacts, classifications, vulnerability, Early Warning System, Forecasting, Flood Warning System, Drought Indicators, recurrence and declaration, Structural and Nonstructural Measures.

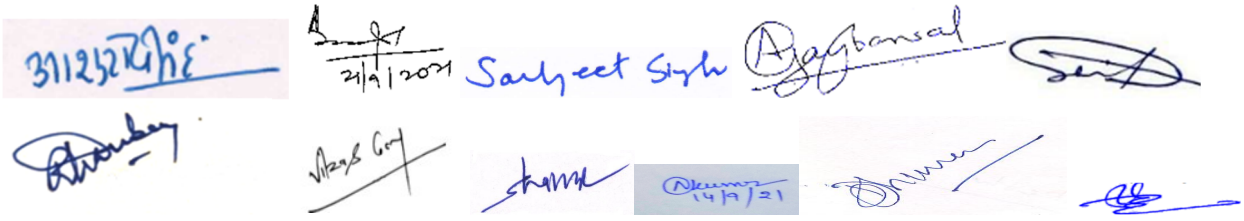
Desertification Zones, causes and impacts of desertification, Characteristics, Vulnerability to India and Steps taken to combat desertification, Forest Fires; Causes of Forest Fires; Impact of Forest Fires, Prevention.

UNIT-III

Geological Based Disasters: Earthquake, Reasons, Compression, Shear, Rayleigh and Love Waves; Magnitude and Intensity Scales, Direct and Indirect Impact of Earthquake; Seismic Zones in India, Factors, Indian Standards Guidelines for RCC and Masonry Structures, Prevention and Preparedness for Earthquake, Tsunamis, Landslides and avalanches: Definition, causes and structure; past lesson learnt and measures taken; their Characteristic features, Impact and prevention, Atlas (BMTRPC); structural and non structural measures.

UNIT-IV

Manmade Disasters: Chemical Industrial hazards; causes and factors, pre- and post disaster measures; control ; Indian Standard Guidelines and Compliance; Traffic accidents; classification

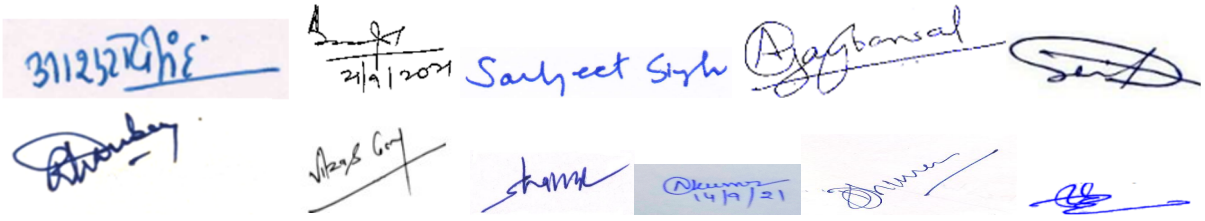


and impact, Fire hazards; Classification as per Indian Standards; Fire risk assessment; Escape routes; fire fighting equipments; classification of buildings, fire zones, occupancy loads; .capacity and arrangements of exists, Use of remote sensing and GIS in disaster mitigation and management.

Suggested Readings:

1. Abbott, Patrick Leon, *Natural Disasters*, Amazon Publications, 2002
2. Gauba Nidhi, Dhawan and Khan, Ambrina Sardar, *Disaster Management and Preparedness*, CBS Publishers & Distribution
3. Oosterom, Petervan, Zlatanova, Siyka, Fendel, Elfriede M., *Geo-information for Disaster Management*, Springer Publications, 2005
4. Schneid., Thomas D., *Disaster Management and Preparedness*, CRC Publication, USA, 2001
5. Singh, Savindra and Singh, Jeetendra, *Disaster Management*, Pravalika Publications, Allahabad
6. Wisner., Ben, *At Risk: Natural Hazards, People vulnerability and Disaster*, Amazon Publications, 2001

Note: Latest Edition of Books is to be taken.



GENERAL ELECTIVE-IV

BT CE 852A: WATERSHED MANAGEMENT

B. Tech. 4th Year (Semester – VIII)

L	T	P	Credit
3	1	--	4

Course Outcomes

CO1: Know the importance of watershed management
CO2: Understand the effects of watershed on community
CO3: Learn the concept of land drainage management
CO4: Apply the system water harvesting.

UNIT-I

Watershed Management Concept - Introduction- Concept of Watershed Management- History of Watershed Management and its Relevance to India- Watershed Characteristics; Climatic Characteristics- Physiographic Characteristics- Causes of Watershed Deterioration.

UNIT-II

Effect of Watershed on the Community- Water Resources Region of India Principles of Watershed Management- Integrated Watershed Management Approach (IWMA)- Objectives of IWMA- Envisaged Results- Success Criteria- Selection of Watershed Village

UNIT-III

Inadequate Surface and Subsurface Drainages- Remedial Measures in Wasteland Management- Land Drainage Management- Surface or Overland Drains, Subsurface or Underground Drains- Discharge and Spacing of tile Drain.

UNIT-IV

Flood Damage Mitigation Management - Introduction- Mitigation Measures- Structural Mitigation Measures- Non-Structural Mitigation Measures- Flood Plain Zoning- Flood Forecasting.

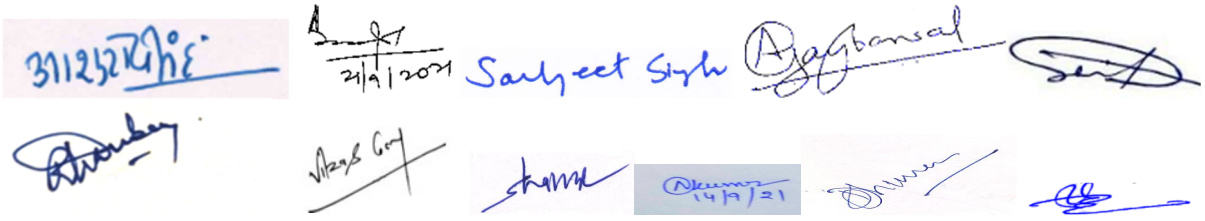
Water Harvesting- Introduction- Techniques of Water Harvesting- Indigenous Water Harvesting Methods in India- Engineering Methods of Water Harvesting.

Suggested Readings:

1. James L.D., and Lee, R. R., Economics of Water Resources Planning, McGraw Hill Publishing Company, New York, 1971.
2. Linsely et al., *Water Resource Engineering*, McGraw Hill Publishing Company, New York, 1992.

3. Loukes et al.,, *Water Resources Systems Planning and Analysis*, Prentice Hall of India, New Delhi, 1980.
4. Roy, S.S., *Optimisation Theory and Applications*, John Wiley and Sons Inc., New York, 1984
5. Varshney, R.S., *Water Resources Systems Planning & Economics*, Nem Chand & Bro, 1990

Note: Latest Edition of Books is to be taken.



DEPT. OF COMPUTER SCIENCE & ENGGINEERING
CENTRAL UNIVERSITY OF HARYANA, MAHENDERGARH
Proceedings / Minutes of the Meeting
of Board of Studies in Computer Science & Engg. held on 02.09.2021

- - -

The online meeting of the Board of Studies in Computer Science & Engg. was held on 02.09.2021. The following were present

1. Dr. Rakesh Kumar, HOD, CSE- Chairperson
2. Prof. Sukhwinder Singh, Subject Expert- Member
3. Prof. Anita Singhrova, Subject Expert- Member
4. Mr. Anant R. Bara, Assistant Professor-CSE, CUH- Member
5. Dr. Vishal Passricha, Assistant Professor-CSE, CUH- Special Invitee
6. Dr. Manish Kumar, Assistant Professor-CSE, CUH- Special Invitee
7. Dr. Benay Kumar Ray, Assistant Professor-CSE, CUH- Special Invitee
8. Ms. Sangeeta, Assistant Professor-CSE, CUH- Special Invitee

After deliberations, it was resolved/ recommended by the Board of Studies as follows:

1. Confirmed the minutes of last BoS meeting held on 09.09.2020.
2. Department's vision and mission was discussed and approved (**Annexure-1**).
3. The Scheme of Studies & Examinations and the Syllabi of B.Tech. (CSE)- IV year (7th and 8th semesters) were discussed and approved for the Batch 2018-19 onwards (to be implemented from session 2021-22) (**Annexure-2**).
4. The BoS apprise the start of M.Tech. (CSE) program in Department of Computer Science & Engineering. The Scheme of Studies & Examinations and the Syllabi of M.Tech. (CSE)- were discussed and approved for the Batch 2021-22 onwards (**Annexure-3**).
5. In view of NEP 2020/LOCF/OBE, the B.Tech. (CSE) First year curriculum was modified and Scheme of Studies & Examinations and the Syllabi of B.Tech. (CSE)- First year (1st and 2nd semesters) were discussed and approved for the Batch 2021-2 onwards (to be implemented from session 2021-22) (**Annexure-4**).
6. The Departmental Research Committee (DRC) -CSE meeting was held on 05/08/2021 and the minutes of meeting was discussed and approved (**Annexure-5**).
7. The formation of Research Advisory committee (RAC) (as per CUH PhD ordinance) for each Ph.D. student was discussed and approved. (**Annexure-6**)
8. The Panel of question paper setters, practical examiners moderator for B.Tech. (CSE) and M.Tech (CSE) for the forthcoming examinations was prepared and recommended.(**Annexure-7**)
9. The board authorized the chairman to provide an additional panel of examiners, if required.

The meeting ended with vote of thanks to the Chair.

Sangeeta 02/09/21
Ms. Sangeeta

B. Ray 2/9/21
Dr. Benay K. Ray

02/09/2021
Dr. Manish Kumar

9211 2/9/21
Dr. Vishal Passricha

02/09/2021
Mr. Anant R Bara

Anita
Prof. Anita Singhrova

Prof. Sukhwinder Singh*

02/09/2021
Dr. Rakesh Kumar

* sent confirmation via email.

Scanned with CamScanner

HOD CSE <hodcse@cuh.ac.in>

Minutes of BoS Meeting held on 02.09.2021

Sukhwinder Singh <sukhdalip@pu.ac.in> Wed, Sep 8, 2021 at 12:07 PM
To: "HOD-CSE, CUH" <hodcse@cuh.ac.in>

[Quoted text hidden]

Dear Dr. Rakesh

I here by endorse the minutes of meeting of BoS.

Please look into matter as discussed during the meeting that training, reserach seminars, dissertations etc are not to be put under tutorials.

Please refer to training component in **Annexure-2 of** Scheme of Studies & Examinations and the Syllabi of B.Tech. (CSE)- IV year (7^{th} and 8^{th} semesters) for the Batch 2018-19 onwards (to be implemented from session 2021-22).

Rest all is fine.

I am also attchng the TA/DA form as desired.

--
With Regards
Prof. Sukhwinder Singh
Department of CSE
University Institute of Engineering and Technology
Panjab University, Sector 25
Chandigarh-160014
+91-172-2534968(O), +91-172-2547986(Fax)

CUH_TAform.pdf
555K

HOD CSE <hodcse@cuh.ac.in>

Minutes of BoS Meeting held on 02.09.2021

Anita Singhrova <nidhianita@gmail.com>
To: "HOD-CSE, CUH" <hodcse@cuh.ac.in>

Tue, Sep 7, 2021 at 12:21 PM

sir,
I hereby accord my consent for the same.
Please find attached herewith the signed minutes.

Thanks and Regards
Prof. Anita Singhrova,
Department of Computer Science and Engineering,
Former Dean (Faculty of IT & CS) and Chairperson(CSE)
Deenbandhu Chhotu Ram University of Science and technology (DCRUST), Murthal,
Sonipat , Haryana, India.

[Quoted text hidden]

2 attachments

remuneration 09-07-2021.pdf
563K

CUH-minutes09-06-2021.pdf
325K

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Central University of Haryana
School of Engineering and Technology
Department of Computer Science and Engineering
B. Tech. 4thYEAR (SEMESTER–VII)

S. No.	Course Code	Course Title	Teaching Schedule			Credits
			L	T	P	
1	BT CS 701	Machine Learning	3	0	0	3
2	BT CS 702	Principles of Cloud Computing	3	1	0	4
3	BT CS 703	Machine Learning Lab	0	0	2	1
4	BT CS 704	Minor Project	0	0	8	4
5	BT CS 705	Summer Training****	0	2	0	2
6	**DCEC – 4 / PE - 4**					
	BT CS 721	Information Security	3	0	0	3
	BT CS 722	Software Testing	3	0	0	3
	BT CS 723	Big Data Analytics	3	0	0	3
	BT CS 724	High Performance Computing	3	0	0	3
	BT CS 725	Digital Image Processing	3	0	0	3
7	**DCEC – 5 / PE – 5 Lab**					
	BT CS 731	Competitive Programming	0	0	4	2
	BT CS 732	MATLAB/Scilab/Octave	0	0	4	2
8		OE/GEC	3	1	0	4
Total			12	3	14	23

Central University of Haryana
School of Engineering and Technology
Department of Computer Science and Engineering
B. Tech. 4th YEAR (SEMESTER–VIII)

Group 1

S. No.	Course Code	Course Title	Teaching Schedule			Credits
			L	T	P	
1	BT CS 801	Major Project	0	0	16	8
2	**DCEC – 6 / PE - 6**					
	BT CS 831	Software Project Management	3	0	0	3
	BT CS 832	Natural Language Processing	3	0	0	3
	BT CS 833	Professional Ethics and IPR	3	0	0	3
3	**DCEC – 7 / PE - 7**					
	BT CS 834	Internet of things	3	0	0	3
	BT CS 835	Cyber Security	3	0	0	3
	BT CS 836	Information Retrieval	3	0	0	3
4		OE/GEC	3	1	0	4
Total			**9**	**1**	**16**	**18**

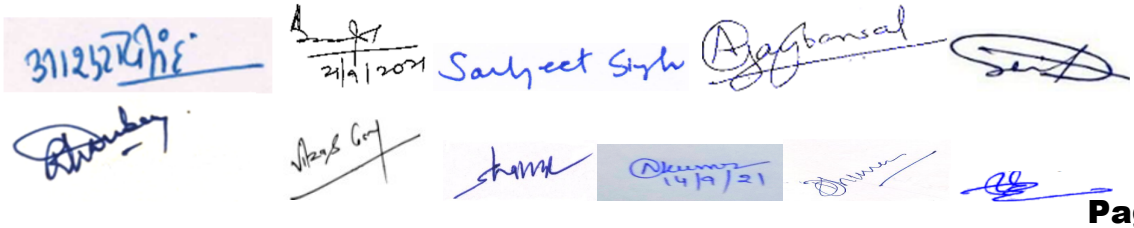
Group 2

S. No.	Course Code	Course Title	Teaching Schedule			Credits
			L	T	P	
1	BT CS 811	Industrial Internship	0	0	36	18
Total			**0**	**0**	**36**	**18**

L = Lecture, T = Tutorial, P = Practical, & C = Credits

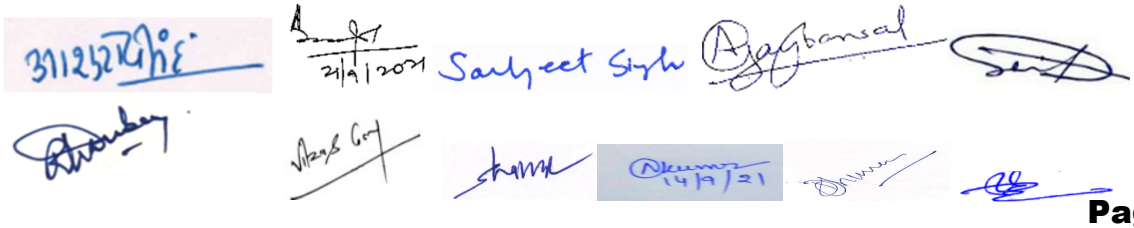
List of Open electives$
Offered by another department {This is only an indicative list (Not Exhaustive)}

S. No.	Course Title
1	Embedded System Design
2	Digital Image Processing
3	Digital Signal Processing
4	Mechatronics
5	Bioinformatics



6	VLSI System Design
7	Optimization Techniques
8	Mobile Communication
9	Satellite Communication
10	Information Theory and Coding
11	Video Activity Detection
12	Remote Sensing
13	Soft Computing
14	Entrepreneurship
15	Electric Vehicle
16	Technical Writing
17	Remote Sensing and GIS
18	Reinforcement Learning
19	Deep Learning
20	Computational Complexity
21	Real-Time Systems
22	Computer Vision
23	Introduction to Robotics
24	Pattern Recognition and Applications
25	Health Research Fundamentals
26	Soft Skills
27	Project Management
28	Operational Research

[$] Student can do the following courses through offline (in Department) or through online (MOOC/ NPTEL/Swyam). If the student chooses the online mode. He/ She has to submit the grade score card.



Program Name: B. Tech.-Computer Science and Engineering

Course Code: BT CS 701	**Course Name:** Machine Learning	**L**	**T**	**P**	**C**
		3	**0**	**-**	**3**
Year and Semester	**4th year** **7th Semester**	**Contact hours per week:** (3 Hrs.) **Exam:** (3hrs.)			
Pre-requisite of course	Nil	**Evaluation**			
		CIE: 30	**TEE: 70**		

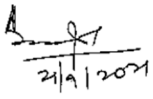
Course Objectives:

1. To introduce students to the basic concepts and techniques of Machine Learning.
2. To become familiar with regression methods, classification methods, clustering methods.
3. To enable students to apply machine learning concepts in real life problems.

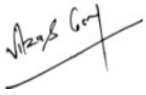
Course Outcomes: On completion of the course, student would be able to:

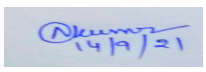
CO701.1	Gain knowledge about basic concepts of machine learning
CO701.2	Identity machine learning techniques suitable for given problem
CO701.3	Solve the problems using various machine learning techniques
CO701.4	Apply dimensionality reduction techniques
CO701.5	Design application using machine learning techniques

Module No	**COURSE SYLLABUS CONTENTS OF MODULE**	**Hrs**	**COs**
1	**Introduction** Introduction and Basic Concepts: Definition of ML, Taxonomy of ML, types of learning, hypothesis space and inductive bias, evaluation, cross-validation, Instance based learning, Feature reduction, Collaborative filtering-based recommendation, Gradient Decent learning.	**14**	**CO701.1, CO701.2**
2	**Kernel Methods and Support Vector Machines** The Two-Class Problem, Dual Representation, Soft Margin Classification; Origins of Kernel methods, Kernel Mapping, The Kernel Trick; Constructing Kernels, Support Vector Machines: Formulation and Computation; Radial Basis Function Networks; Positive Semi-Definite Kernels, Linear Kernel, Polynomial Kernel.	**13**	**CO701.1, CO701.2**
3	**Clustering** Basic Clustering Techniques, Standard k-Means (Lloyd) Algorithm, Generalized Clustering, Overpartitioning, Merging, Modifications to the k-Means Algorithm, k-Means Wrappers, Rough k-Means, Fuzzy k-Means, k-Harmonic Means Algorithm, Hybrid Clustering Algorithms; Estimation using Incomplete Data, Two classes, Multiple classes, Least squares for classification, Fisher's linear discriminant, Relation to least squares, Fisher's discriminant for multiple classes	**10**	**CO701.2, CO701.3, CO701.4**



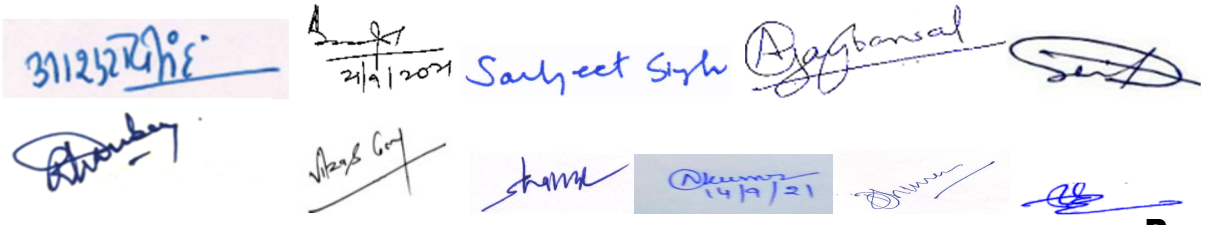




4	**Learning** Learning a Class from Examples, Linear, Non-linear, Multi-class and multi-label classification, Generalization error bounds: VC Dimension, Decision Trees: ID3, Classification and Regression Trees, Regression: Linear Regression, Multiple Linear Regression, Logistic Regression. Introduction to clustering, Hierarchical: AGNES, DIANA, Partitional: K-means clustering, KMode Clustering, Self-Organizing Map, Expectation Maximization, Gaussian Mixture Models	**8**	**CO701.2** **CO701.4** **CO701.5**

Text Books:

1. Alpaydin, E., 2020. *Introduction to Machine Learning*. MIT press.
2. Deisenroth, M.P., Faisal, A.A. and Ong, C.S., 2020. *Mathematics for Machine Learning*. Cambridge University Press.
3. Kubat, M., 2017. *An Introduction to Machine Learning*. Springer, Cham.
4. Marsland, S., 2015. *Machine Learning: An Algorithmic Perspective*. CRC press.
5. Mohri, M., Rostamizadeh, A. and Talwalkar, A., 2018. *Foundations of Machine Learning*. MIT press.
6. Murphy, K.P., 2012. *Machine Learning: A Probabilistic Perspective*. MIT press.



Course Code: BT CS 702	Course Name: Principles of Cloud Computing	L	T	P	C
		3	1	-	4
Year and Semester	**4th year** **7th Semester**	**Contact hours per week:** (4 Hrs.) **Exam:** (3hrs.)			
Pre-requisite of course	Nil	**Evaluation**			
		CIE: 30	**TEE: 70**		

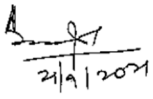
Course Objectives:

1. To understand the basics of Cloud Computing.
2. To explore the cloud architecture and virtualization technology
3. To learn about cloud management technique and cloud security

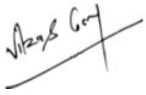
Course Outcomes: On completion of the course, student would be able to:

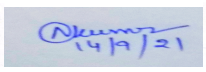
CO702.1	Having a clear understanding of the subject related concepts and of contemporary issues.
CO702.2	Having an ability to design virtualized platforms and understand the services of different cloud service providers.
CO702.3	Analyze the requirement of security in cloud environment.

Module No	COURSE SYLLABUS CONTENTS OF MODULE	Hrs	COs
1	**Introduction** **Definition of Cloud Computing**: Defining a Cloud, Cloud Types – NIST model, Cloud Cube model, Deployment models, Service models, Cloud Reference model, Characteristics of Cloud Computing, Benefits and advantages of Cloud Computing; **Cloud Architecture**: A brief introduction on Infrastructure, Platforms, Virtual Appliances, Communication Protocols, Applications, Connecting to the Cloud by Clients; Services and Applications by Type: IaaS, PaaS, SaaS, IDaaS and CaaS.	**14**	**CO702.1**
2	**Virtualization**: Use of Concepts of Abstraction and Virtualization: Virtualization technologies and tools, Load Balancing and Virtualization, Hypervisors, Porting of applications in the Cloud; Concepts of Infrastructure as a Service; Use of IaaS Application frameworks; Use of Google, Amazon and Microsoft Web Services	**13**	**CO702.1, CO702.2**
3	**Cloud Management**: Features of network management systems, Monitoring of an entire cloud computing deployment stack – an overview with mention of some products, Lifecycle management of cloud services. **Cloud Security**: Cloud security concerns, Security boundary, Security service boundary, Security of data, Identity management.	**10**	**CO702.2, CO702.3,**



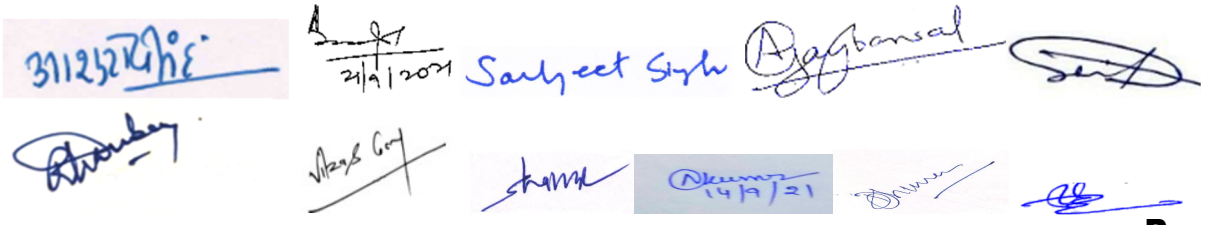




4	**Case Study on Open Source & Commercial Clouds**: Eucalyptus, Microsoft Azure, Amazon EC2, VM ware. **Cloud Federation**: Need of cloud federation, Advantages, Cloud federation Architecture, Pricing Model, Different Federation Formation Frameworks, Load balancing.	**8**	**CO702.3**

Text Books:

1. Buyya, R., Vecchiola, C. and Selvi, S.T., 2013. *Mastering Cloud Computing: Foundations and Applications Programming*. Newnes.
2. Miller, M., 2008. *Cloud Computing*. Pearson.
3. Moyer, C.M., 2011. *Building Applications in the Cloud: Concepts, Patterns, and Projects*. Pearson Education India.
4. Sosinsky, B., 2010. *Cloud Computing Bible*. John Wiley & Sons.
5. Velte, A.T., Velte, T.J. and Elsenpeter, R., 2019. *Cloud Computing: A Practical Approach*. Tata McGraw-Hill.



Course Code: BT CS 703	Course Name: Machine Learning Laboratory	L	T	P	C
		0	0	2	1
Year and Semester	**4th year 7th Semester**	**Contact hours per week:** (2 Hrs.) **Exam:** (3hrs.)			
Pre-requisite of course	Nil	**Evaluation**			
		CIE: 30	**TEE: 70**		

Course Objectives:

1. To introduce basic concepts and applications of machine learning.
2. To help students to learn the application of machine learning in the different fields of science.

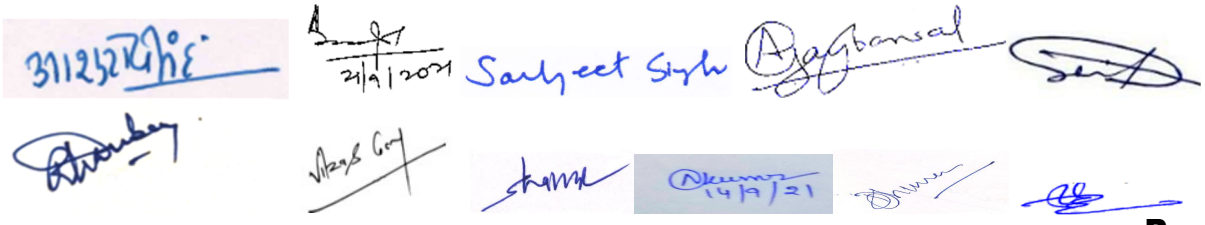
Course Outcomes: On completion of the course, student would be able to:

CO703.1	Gain knowledge about basic concepts of machine learning
CO703.2	Identity machine learning techniques suitable for given problem
CO703.3	Solve the problems using various machine learning techniques
CO703.4	Apply dimensionality reduction techniques
CO703.5	Design application using machine learning techniques

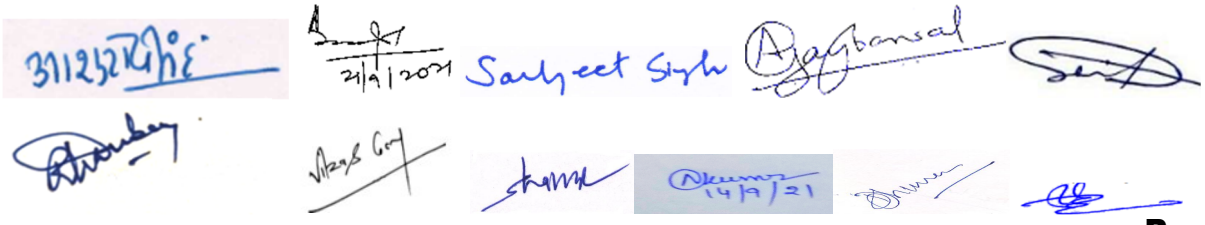
Module No	COURSE SYLLABUS List of Practicals	Hrs	COs
1	Implement Decision Tree learning.	2	CO703.1
2	Implement Logistic Regression.	2	CO703.1
3	Implement classification using Multilayer perceptron.	2	CO703.1
4	Implement classification using SVM	2	CO703.2
5	Implement Adaboost	2	CO703.2
6	Implement Bagging using Random Forests	2	CO703.2
7	Implement K-means Clustering to Find Natural Patterns in Data	2	CO703.3
8	Implement Hierarchical clustering.	2	CO703.3
9	Implement K-mode clustering	2	CO703.3
10	Implement Principal Component Analysis for Dimensionality Reduction.	2	CO703.4
11	Implement Multiple Correspondence Analysis for Dimensionality Reduction.	2	CO703.4
12	Implement Gaussian Mixture Model Using the Expectation Maximization.	2	CO703.4
13	Evaluating ML algorithm with balanced and unbalanced datasets.	2	CO703.5
14	Comparison of Machine Learning algorithms.	2	CO703.5
15	Implement k-nearest neighbors' algorithm	2	CO703.5

Text Books:

1. Alpaydin, E., 2020. *Introduction to Machine Learning*. MIT press.
2. Deisenroth, M.P., Faisal, A.A. and Ong, C.S., 2020. *Mathematics for Machine Learning*. Cambridge University Press.



3. Kubat, M., 2017. *An Introduction to Machine Learning*. Springer, Cham.
4. Marsland, S., 2015. *Machine learning: An Algorithmic Perspective*. CRC press.
5. Mohri, M., Rostamizadeh, A. and Talwalkar, A., 2018. *Foundations of Machine Learning*. MIT press.
6. Murphy, K.P., 2012. *Machine Learning: A Probabilistic Perspective*. MIT press.



Course Code: BT CS 704	Course Name: Minor Project	L	T	P	C
		0	0	8	4
Year and Semester	**4th year** **7th Semester**	**Contact hours per week:** (8 Hrs.) **Exam:** (3hrs.)			
Pre-requisite of course	Nil	**Evaluation**			
		CIE: 60	**TEE: 140**		

Course Objectives:

1. To address the real-world problems and find the required solution.
2. To design the problem solution as per the requirement analysis done.
3. To study the basic concepts of programming/ hardware/ emulator for Raspberry pi/Arduino/ ARM Cortex/ Intel Galileo etc.
4. To implement the minor project intended solution for project-based learning.
5. To test the minor project successfully.
6. To improve the team building, communication and management skills of the students.

Course Outcomes: On completion of the course, student would be able to:

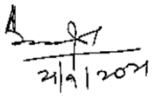
CO704.1	Demonstrate a through and systematic understanding of project contents.
CO704.2	Understand methodologies and professional way of documentation and communication.
CO704.3	Know the key stages in development of the project.
CO704.4	Extend or use the idea in minor project for major project.

Minor Project

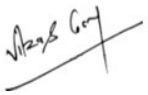
Students have to submit a project at the end of the semester. The student will submit a synopsis at the beginning of the semester for approval from the departmental committee in a specified format. The student will have to present the progress of the work through seminars or progress reports.

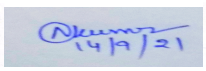
This course will be conducted largely as an individual or small group project under the direct supervision of a member of academic staff. The specific project topic undertaken will reflect the common interests and expertise of the student(s) and supervisor. Students will be required to:

1. Perform a literature search to review current knowledge and developments in the chosen technical area;
2. Undertake detailed technical work in the chosen area using one or more of:
   - theoretical studies
   - computer simulations
   - hardware construction;
3. Produce progress reports within the time frame specified for the project;
4. Deliver a seminar on the general area of work being undertaken and specific contributions to that field;
5. Prepare a formal report describing the work undertaken and results obtained so far; and

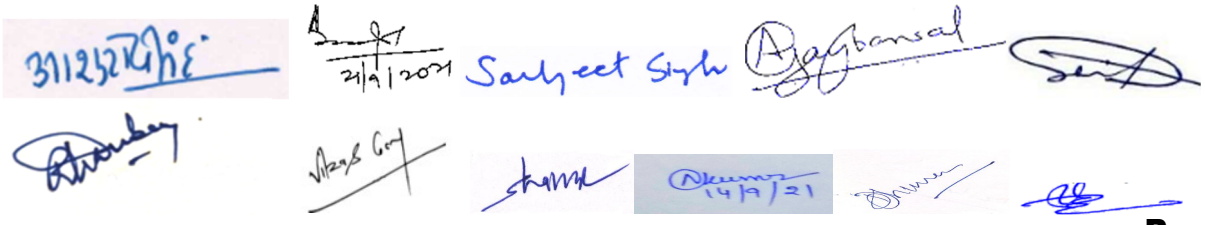






6. Present the work during external viva including demonstrations of operational hardware and software.



Course Code: BT CS 705	Course Name: Summer Training			L	T	P	C
				0	2	0	2
Year and Semester	**4th year 7th Semester**	**Contact hours per week:** (2 Hrs.) **Exam:** (3hrs.)					
Pre-requisite of course	Nil	**Evaluation**					
		CIE: 15	**TEE: 35**				

Course Objectives:

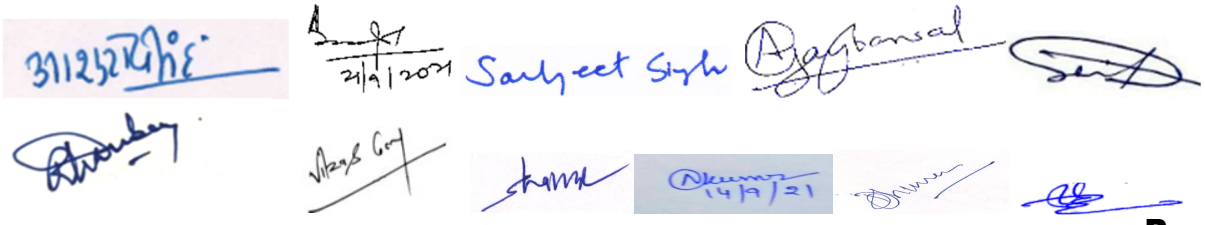
1. To allow the students to relate the classroom learning outcomes to the actual engineering field experiences in either governmental or private sectors.
2. To build up the student's disciplinary, ability and personality to communicate effectively through teams with the most updated various industries and technologies.
3. To introduce the students for first time to their expecting careers.
4. To build up the relation between the college and the various industrial fields as well as knowing the needs and expectations of these fields for the graduated students.
5. To enable the private and public organizations to identify the skills of the trainee, and polarizing him/her for jobs.

Course Outcomes: On completion of the course, student would be able to:

CO705.1	An ability to apply knowledge of mathematics, science, and engineering
CO705.2	An ability to function as a team
CO705.3	An ability to identify, formulate, and solve engineering problems
CO705.4	An understanding of professional and ethical responsibility
CO705.5	An ability to communicate effectively
CO705.6	The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
CO705.7	A knowledge of contemporary issues
CO705.8	An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Summer Training is a joint effort between the Engineering department, the public, and the private sectors in the area of specialization to allow students to practice the skills and knowledge. ST students are required to spend one and half months (6 working weeks) of practical training in a relevant field in industry at the end of the sixth semester.

Summer Training Report: Practical Training conducted after sixth semester will be evaluated in the seventh semester based on Viva-Voce.



Course Code: BT CS 721	Course Name: Information Security	L	T	P	C
		3	0	-	3
Year and Semester	**4th year** **7th Semester**	**Contact hours per week:** (3 Hrs.) **Exam:** (3hrs.)			
Pre-requisite of course	Nil	**Evaluation**			
		CIE: 30	**TEE: 70**		

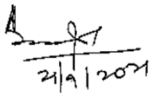
Course Objectives:

1. To understand the concepts of classical encryption techniques and concepts of finite fields and number theory.
2. To explore the working principles and utilities of various cryptographic algorithms including secret key cryptography, hashes and message digests, and public key algorithms.
3. To explore the design issues and working principles of various authentication protocols, PKI standards.
4. To apply the concepts of cryptographic utilities and authentication mechanisms to design secure applications

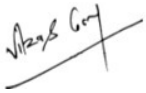
Course Outcomes: On completion of the course, student would be able to:

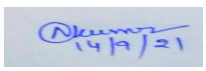
CO721.1	learn the mathematical fundamentals from abstract algebra and number theory for the design and analysis of various cryptographic primitives.
CO721.2	understand the role of cryptographic techniques in modern communication systems.
CO721.3	design cryptographic systems to meet the specifications in terms of security, circuit complexity and power consumption by effectively making use of various primitives
CO721.4	Investigate latest developments in cryptography and cryptanalysis through most recent publications in small groups and prepare presentations on these topics

Module No	COURSE SYLLABUS CONTENTS OF MODULE	Hrs	COs
1	**Properties of arithmetic operations-** Inverse Primes, GCD, Euclidean Algorithm, Modular Arithmetic, Properties of Modular Arithmetic, Computing Inverse, Fermat's Theorem, Random Number Generation.	**14**	**CO721.1**
2	**Classical Cryptography** – Substitution and Transposition Cipher, Modern Cryptographic Techniques, Private Key Cryptosystems, Block cipher, Standards, Data Encryption Standard, AES, Linear and differential cryptanalysis Stream cipher, Key stream generators, RC4 cryptosystem	**13**	**CO721.2**
3	**Public key cryptosystems** – One-way functions, Factorization problem, RSA crypto system, Discrete logarithm problem, Elgamal crypto system, Key management, Diffie Hellmann key exchange, Digital Signatures, Elgamal DSA.	**10**	**CO721.3**



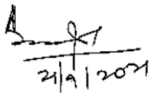




4	**Message authentication requirements** – Hash function, features of MD5 and SHA algorithms, Security of Hash function, Message Authentication Codes, Applications of authentication, electronic mail security, SSL/ TLS, Digital Certificate and X509.	**8**	**CO721.4**

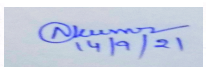
Text Books:

1. Cole, E., 2011. *Network Security Bible*. John Wiley & Sons.
2. Dummit, D.S. and Foote, R.M., 2004. *Abstract Algebra* (3rd Edition). Hoboken: Wiley.
3. Kranakis, E., 2013. *Primality and cryptography*. Springer-Verlag.
4. Stallings, W., 2006. *Cryptography and Network Security*, (4th Edition). Pearson Education India.
5. Stinson, D.R. and Paterson, M., 2018. *Cryptography: Theory and Practice*. CRC press.







Course Code: BT CS 722	Course Name: Software Testing	L	T	P	C
		3	0	-	3
Year and Semester	**4th year 7th Semester**	**Contact hours per week:** (3 Hrs.) **Exam:** (3hrs.)			
Pre-requisite of course	Nil	**Evaluation**			
		CIE: 30	**TEE: 70**		

Course Objectives:

1. To understand the basic software debugging methods.
2. To apply white box testing methods and techniques.
3. To apply black Box testing methods and techniques.
4. To analyze the test plans.
5. To apply the different testing tools (familiar with open-source tools)
6. To understand the quality Assurance models.

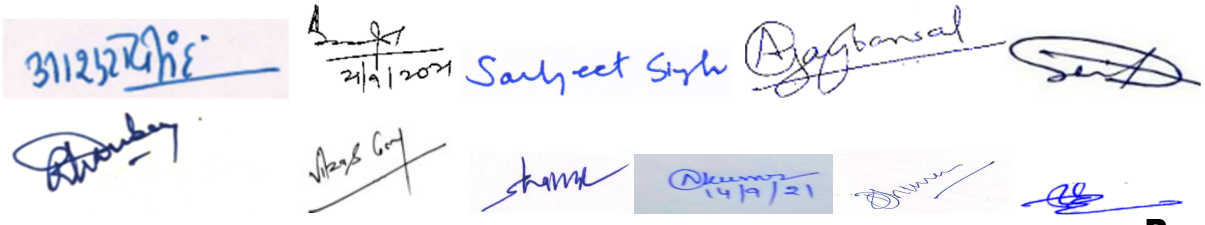
Course Outcomes: On completion of the course, student would be able to:

CO722.1	Identify various types of software risks and its impact on different software application
CO722.2	make selection of test cases and their optimization
CO722.3	get aware of various activities in testing and to generate test data using tools
CO722.4	apply the object-oriented concepts on test data

Module No	COURSE SYLLABUS CONTENTS OF MODULE	Hrs	COs
1	Software Testing, Importance of testing, Roles and Responsibilities, Testing Principles, Attributes of Good Test, V-Model SRS Verification, Source Code Reviews, Basic Introduction to - Functional Testing, Structural Testing Cyclomatic Complexity, Data Flow Testing, Mutation Testing.	**14**	**CO722.1**
2	Regression Testing: What is Regression Testing? Regression Test cases selection, Reducing the number of test cases, Code coverage prioritization technique. Reducing the number of test cases: Prioritization guidelines, Priority category, Risk Analysis.	**13**	**CO722.2**
3	Software Testing Activities: Levels of Testing, Debugging, Testing techniques and their applicability, Exploratory Testing Automated Test Data Generation: Test Data, Approaches to test data generation, Test Data Generation Tools, Software Testing Tools, and Software test Plan.	**10**	**CO722.3**
4	Object Oriented Testing: Definition, Issues, Class Testing, Object Oriented Integration and System Testing. Testing Web Applications: Web Testing, User Interface Testing, Usability Testing, Security Testing, Performance Testing, Database testing, Post Deployment Testing.	**8**	**CO722.4**

Text Books:

1. Ammann, P. and Offutt, J., 2016. *Introduction to Software Testing*. Cambridge University Press.
2. Beizer, B., 2003. *Software Testing Techniques*. Dreamtech Press.
3. Chauhan, N., 2010. *Software Testing: Principles and Practices*. Oxford university press.
4. Hetzel, B., 1988. *The Complete Guide to Software Testing*. QED Information Sciences, Inc.
5. Jorgensen, P.C., 2013. *Software Testing: A Craftsman's Approach*. Auerbach Publications.
6. Myers, G.J., Sandler, C. and Badgett, T., 2011. *The Art of Software Testing*. John Wiley & Sons.



Course Code: BT CS 723	Course Name: Big Data Analytics	L	T	P	C
		3	0	-	3
Year and Semester	**4th year 7th Semester**	**Contact hours per week:** (3 Hrs.) **Exam:** (3hrs.)			
Pre-requisite of course	Nil	**Evaluation**			
		CIE: 30	**TEE: 70**		

Course Objectives:

1. To provide an overview of an exciting growing field of big data analytics.
2. To introduce the tools required to manage and analyze big data like Hadoop.
3. To teach the fundamental techniques and principles in achieving big data analytics with scalability and streaming capability.

Course Outcomes: On completion of the course, student would be able to:

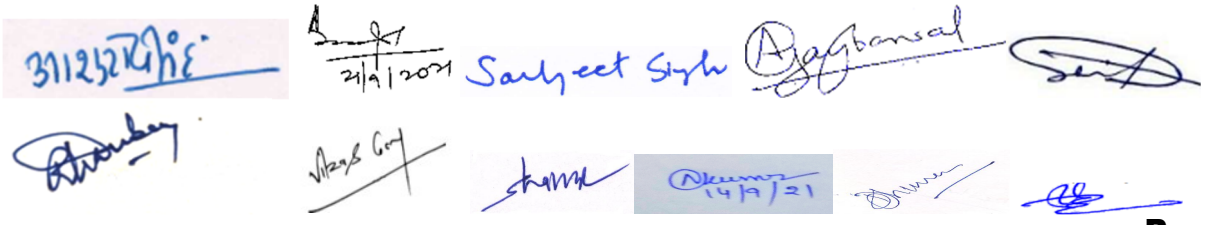
CO723.1	Having a clear understanding of the subject related concepts and of contemporary issues.
CO723.2	Having an ability to design and conduct experiments, as well as to analyze and interpret data
CO723.3	Having an ability to use techniques, skills and modern engineering tools necessary for engineering practice

Module No	COURSE SYLLABUS CONTENTS OF MODULE	Hrs	COs
1	**Introduction to big data and analytics:** Big Data Overview Characteristics of Big Data Business Intelligence vs Data Analytics. Data Analytics Life Cycle Data Analytics in Industries Exploring Big Data Challenges in handling Big Data.	**14**	**CO723.1**
2	**Big Data Tools:** Need of Big data tools - understanding distributed systems - Overview of Hadoop comparing SQL databases and Hadoop Hadoop Eco System - Distributed File System: HDFS, Design of HDFS writing files to HDFS Reading files from HDFS. Hadoop Daemons - Hadoop Cluster Architecture YARN Advantages of YARN.	**13**	**CO723.1, CO723.2**
3	**Introduction to MapReduce:** Developing MapReduce Program Anatomy of MapReduce Code -Simple Map Reduce Program - counting things Map Phase shuffle and sort - Reduce Phase Master slave architecture Job Processing in hadoop Map Reduce Pipelining. Use of Combiner - Block vs Split Size - working with Input and output format Key, Text, Sequence	**10**	**CO723.2**

4	**Frameworks:** Applications on Big Data Using Pig and Hive – Data processing operators in Pig – Hive services – HiveQL – Querying Data in Hive - fundamentals of HBase and ZooKeeper - IBM InfoSphere BigInsights and Streams.	**8**	**CO723.3**

Text Books:

1. Baesens, B., 2014. *Analytics in a Big Data World: The Essential Guide to Data Science and Its Applications*. John Wiley & Sons.
2. Bahga, A. and Madisetti, V., 2016. *Big Data Science & Analytics: A Hands-On Approach*. VPT Publisher.
3. Leskovec, J., Rajaraman, A. and Ullman, J.D., 2020. *Mining of Massive Data Sets*. Cambridge university press.
4. White, T., 2012. *Hadoop: The Definitive Guide*. (3rd Edition) " O'Reilly Media, Inc.".
5. White, T., 2015. *Hadoop: The Definitive Guide*. (4th Edition) " O'Reilly Media, Inc.".
6. Zikopoulos, P. and Eaton, C., 2011. *Understanding Big Data: Analytics for enterprise Class Hadoop and Streaming Data*. McGraw-Hill Osborne Media.



Course Code: BT CS 724	Course Name: High Performance Computing	L	T	P	C
		3	0	-	3
Year and Semester	**4th year 7th Semester**	**Contact hours per week:** (3 Hrs.) **Exam:** (3hrs.)			
Pre-requisite of course	Nil	**Evaluation**			
		CIE: 30	**TEE: 70**		

Course Objectives:

1. To provide systematic and treatment of the hardware and the software high performance techniques involved in current day computing.
2. To introduce the fundamentals of high-performance computing with the graphics processing units and many integrated cores using their architectures and corresponding programming environments
3. To introduce the learner to fundamental and advanced parallel algorithms through the GPU programming environments

Course Outcomes: On completion of the course, student would be able to:

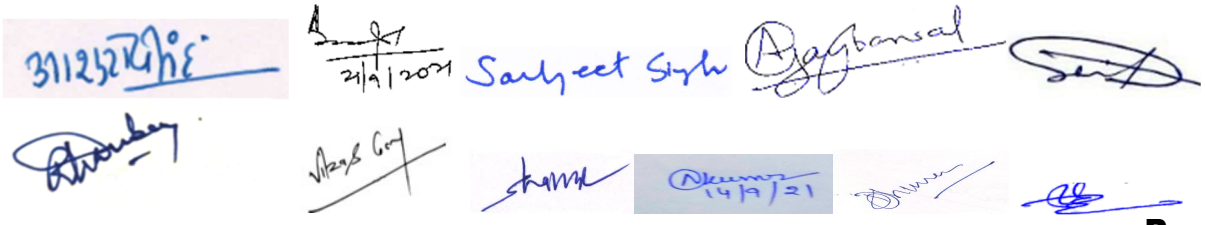
CO724.1	To knowledge the overview and analyze the performance metrics of high-performance computing
CO724.2	To comprehend the various High Performance Computing Paradigms and Job Management Systems
CO724.3	To design and develop various applications with OpenMP, MPI and CUDA
CO724.4	To analyze the benchmarks of high-performance computing
CO724.5	To demonstrate the various emerging trends of high-performance computing
CO724.6	To apply high performance computing concepts in problem solving

Module No	COURSE SYLLABUS CONTENTS OF MODULE	Hrs	COs
1	**Introduction to High Performance Computing (HPC)**: Overview of Parallel Computers and high-performance computing (HPC), History of HPC, Numerical and HPC libraries, Performance metrics. **HPC Paradigms**: Supercomputing, Cluster Computing, Grid Computing, Cloud Computing, Many cores Computing, Peta scale Systems	**14**	**CO724.1, CO724.2**
2	**Parallel Programming**: Introduction to OpenMP, Parallel constructs, Runtime Library routines, Work-sharing constructs, Scheduling clauses, Data environment clauses, atomic, master No wait Clause, Barrier Construct, overview of MPI, MPI Constructs, OpenMP vs MPI.	**13**	**CO724.2, CO724.3**
3	**Batch scheduling**: Condor, Slurm, SGE, PBS, Light weight Task Scheduling: Falkon, Sparrow Introduction to GPU Computing, CUDA Programming Model, CUDA API, Simple Matrix, Multiplication in CUDA, CUDA	**10**	**CO724.4, CO724.5**

	Memory Model, Shared Memory Matrix Multiplication, Additional CUDA API Features		
4	**Achieving Performance**: Measuring performance, identifying performance bottlenecks, Partitioning applications for heterogeneous resources, Using existing libraries and frameworks. **HPC Benchmarks**: HTC, MTC (Many Tasks Computing), Top Super computers in the world, Top Super Computer architectural details, Exploring HPC Benchmarks: HPL, Stream.	**8**	**CO724.5 CO724.6**

Text Books:

1. Czech, Z.J., 2017. *Introduction to Parallel Computing*. Cambridge University Press.
2. Eijkhout, V., van de Geijn, R. and Chow, E., 2016. *Introduction to High Performance Scientific Computing*. Zenodo.
3. Farber, R., 2011. *CUDA Application Design and Development*. Elsevier.



Course Code: BT CS 725	Course Name: Digital Image Processing	L	T	P	C
		3	0	-	3
Year and Semester	**4th year 7th Semester**	**Contact hours per week:** (4 Hrs.) **Exam:** (3hrs.)			
Pre-requisite of course	Nil	**Evaluation**			
		CIE: 30	**TEE: 70**		

Course Objectives:

1. To introduce the basic principles of digital images,
2. To understand the image data structures,
3. To study the image processing algorithms.

Course Outcomes: On completion of the course, student would be able to:

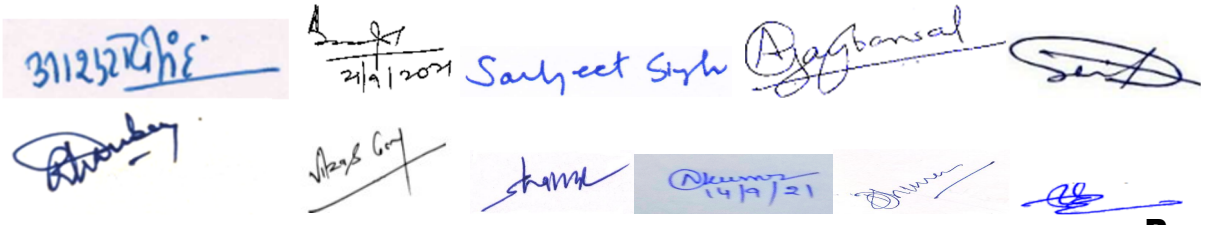
CO725.1	Understand the fundamental concepts of a digital image processing system
CO725.2	Analyze images in the frequency domain using various transform
CO725.3	Evaluate the techniques for image enhancement and image restoration
CO725.4	Interpret image compression standards
CO725.5	Categorize various compression techniques

Module No	COURSE SYLLABUS CONTENTS OF MODULE	Hrs	COs
1	**Introduction** Image Processing Fourier Transform and Z-Transform, Causality and stability, Toeplit and Circulate Matrics, orthogonal and unitary Matrices and Kroenker product, Markov Processes, KI Transform, Mean square Estimates and Orthogonal Principles Image sampling & Quantization: Band Limited Image, Sampling Versus Replication, Reconstruction of Image from samples Sampling Theorem, Sampling Theorem for Random Fields, Optimal Sampling, Non-rectangular Grid Sampling, Sampling Aperture, Display Aperture/ Interpolation Functions, Lagrange Interpolation, Moire Effect Image Quantization: Uniform Optimal Quantizer, Properties of Mean Square Quantizer, Compandor Design, Visual Quantization	**14**	**CO725.1, CO725.2**
2	**Image Transforms** Two Dimensional Orthogonal and Unitary Transforms and their properties, One Dimensional and Two Dimensional DFT, Cosine, Sine, Hadamard, SLANT, HAAR and KI Transforms and their properties, Approximation to KI Transforms. Image representation by stochastic models: One Dimensional Causal Models, AR, ARMA models, Spectral factorization, Non Causal Representation, Image Decomposition.	**13**	**CO725.2**

3	**Image Enhancement and Restoration** Point Operation, Histogram Modeling, Spatial Operations, Transform Operations, Multispectral Image Enhancement. Image Filtering: Image Observation Models, Inverse and Wiener filter, FIR Wiener Filters, Filtering using Image Transform, Causal Models and recursive filtering, Maximum entropy restoration, Extrapolation of band limited signal.	**10**	**CO725.3**
4	**Image Analysis and Image Compression** Spatial feature extraction, Edge detection, Boundary extraction, Boundary representations, Region representations, Moment representations, Structures, Texture, Image Segmentation, Image Classification Image Reconstruction from Projections: Data Compression: Pixel Coding, Predictive Techniques, Transform Coding Theory, Transform coding of Image, Coding of two-tone image.	**8**	**CO725.4, CO725.5**

Text Books:

1. Dougherty, E. R., 2020. *Digital image processing methods*. CRC Press.
2. Gonzalez, R.C., and Woods, R. E., 2009. *Digital Image Processing*. Pearson 3rd Edition, Cham.
3. Jain, A.K., 1989. *Fundamentals of Digital Image Processing*. Prentice-Hall, Inc.
4. Pratt, W.K., 2007. *Digital Image Processing.* John Wiley & Sons Inc., New York.
5. Shih, F. Y., 2017. *Image processing and mathematical morphology: fundamentals and applications.* CRC press.



Course Code: BT CS 731	Course Name: Competitive Programming	L	T	P	C
		0	0	4	2
Year and Semester	**4th year 7th Semester**	**Contact hours per week:** (4 Hrs.) **Exam:** (3hrs.)			
Pre-requisite of course	Nil	**Evaluation**			
		CIE: 30	**TEE: 70**		

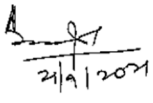
Course Objectives:

1. Introduce the competitive programming.
2. To understand the concepts of Data Structures and Algorithms
3. To apply in the programming challenges in competitive platforms like codechef.com, uva.onlinejudge.com
4. To make students aware about the approaches applied at the world competitions.

Course Outcomes: On completion of the course, student would be able to:

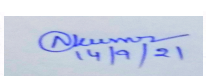
CO731.1	describe how algorithmic problems are solved
CO731.2	recognize the time and memory complexity of an algorithm or a structure
CO731.3	analyse the given problem and recognize subproblems
CO731.4	assemble the solutions of subproblems to solve the whole problem
CO731.5	assess advantages and shortcomings of different algorithms

Module No	COURSE SYLLABUS CONTENTS OF MODULE	Hrs	COs
1	Introduction: What is Competitive Programming, Programming Techniques, Recursive Algorithms, Bit Manipulation, Efficiency (Time complexity) with examples. Sorting and Searching: Bubble Sort, Merge sort, Sorting Lower Bound, Counting Sort, Sweep Line algorithms, Scheduling Events, Tasks and Deadlines, Binary Search.	**10**	**CO731.1**
2	Data Structures: Dynamic Arrays, Set Structures, Set versus Sorting, Map Versus Array, Priority Queue versus Multiset. Dynamic Programming: Basic concepts, When Greedy Fails, Finding an Optimal Solution, Counting Solutions, Longest Increasing Subsequence, Paths in a Grid, Knapsack Problems, From permutations to subsets, Counting Tilings.	**12**	**CO731.2**
3	Graph Algorithms: Basic of Graphs, Graph Traversal, Shortest Paths, Directed Acyclic Graphs, Successor Graphs, Minimum Spanning Trees. Algorithm Design Topics: Bit-parallel Algorithms, Amortized Analysis, Finding Minimum Values Range Queries: Queries on Static Arrays, Tree Structures	**12**	**CO731.3, CO731.4**
4	Tree Algorithms: Basic Techniques, Tree Queries (finding ancestors, subtrees and paths, lowest common Ancestors, Merging Data Structures).	**14**	**CO731.5**





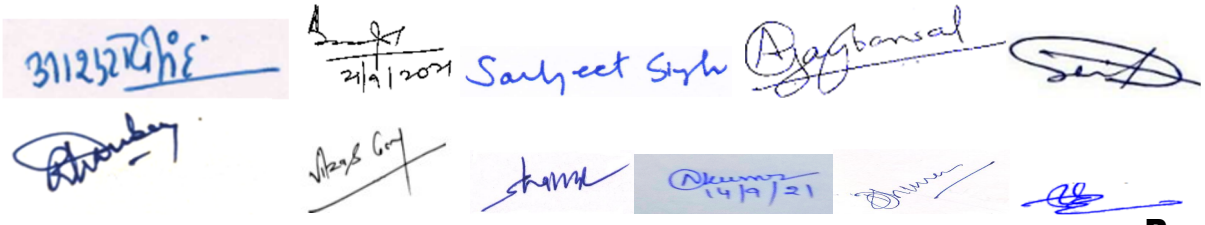





	Mathematics: Number Theory, Combinatorics, Matrices, Probability, Game Theory String Algorithms: Basic topics, String Hashing, Z-algorithm, Suffix Arrays		

Text Books:

1. Halim, S., Halim, F., Skiena, S. S., and Revilla, M. A., 2013. *Competitive Programming 3*. Lulu Independent Publish.
2. Laaksonen, A., 2020. *Guide to Competitive Programming*. Springer International Publishing.



Course Code: BT CS 732	Course Name: MATLAB	L	T	P	C
		0	0	4	2
Year and Semester	**4th year 7th Semester**	**Contact hours per week:** (4 Hrs.) **Exam:** (3hrs.)			
Pre-requisite of course	Nil	**Evaluation**			
		CIE: 30	**TEE: 70**		

Course Objectives:

1. To learn fundamental computer programming concepts such as variables, control structures, functions and many others.
2. To learn about various data types and how to handle them in MATLAB.
3. To learn the powerful support MATLAB provides for working with matrices.
4. To learn about file input/output.

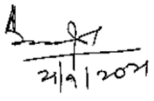
Course Outcomes: On completion of the course, student would be able to:

CO732.1	Understand the main features of the MATLAB development environment
CO732.2	Use the MATLAB GUI effectively
CO732.3	Write simple programs in MATLAB to solve scientific and mathematical problems
CO732.4	Create and control simple plot and user-interface graphics objects in MATLAB

Module No	COURSE SYLLABUS CONTENTS OF MODULE	Hrs	COs
1	Introduction to MATLAB: Getting Started, Scripts, Making Variables, Manipulating Variables, Basic Plotting. Visualization and Programming: Functions, Flow Control, Line Plots, Image/Surface Plots, Efficient Codes, Debugging	**14**	**CO732.1**
2	Solving Equations, Curve Fitting, and Numerical Techniques: Linear Algebra, Polynomials, Optimization, Differentiation/Integration, Differential Equations	**13**	**CO732.2**
3	Advanced Methods: Probability and Statistics, Data Structures, Images, File I/O	**10**	**CO732.3,**
4	Various Functions and Toolboxes: Documentation, Miscellaneous Useful Functions, Graphical User Interfaces, Simulink, Symbolic Toolbox, Image Processing, Hardware Interface	**8**	**CO732.4**

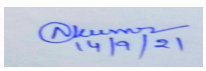
Text Books:

1. Dyer, K. B. (2018). Introduction to MATLAB®. In *Introduction to Mechanism Design* (pp. 79-100). CRC Press.
2. Etter, D.M., Kuncicky, D.C. and Hull, D.W., 2002. *Introduction to MATLAB*. Prentice Hall.
3. Lyshevski, S.E., 2005. *Engineering and Scientific Computations using MATLAB*. John Wiley & Sons.

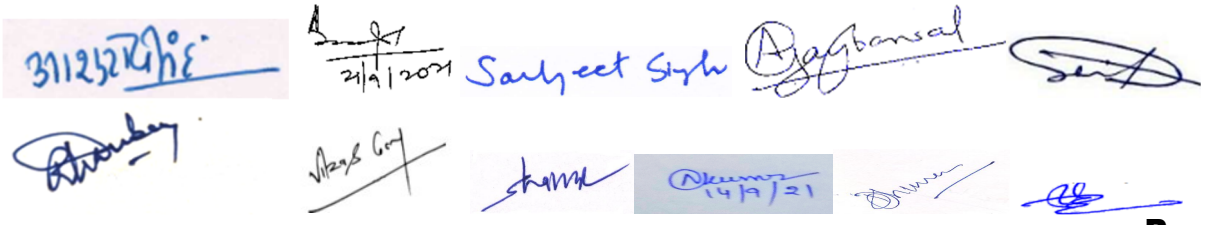






4. Moore, H. and Sanadhya, S., 2007. *MATLAB for Engineers*. Upper Saddle River, New Jersey: Prentice Hall.
5. Sigmon, K. and Davis, T.A., 2004. *MATLAB Primer*. Chapman and Hall/CRC.



Course Code: BT CS 801	Course Name: Major Project	L	T	P	C
		0	0	16	8
Year and Semester	**4th year** **8th Semester**	**Contact hours per week:** (16 Hrs.) **Exam:** (3hrs.)			
Pre-requisite of course	Minor Project	**Evaluation**			
		CIE: 60	**TEE: 140**		

Course Objectives:

1. To offer students a glimpse into real world problems and challenges that need IT based solutions.
2. To enable students to create very precise specifications of the IT solution to be designed.
3. To improve the team building, communication and management skills of the students.

Course Outcomes: On completion of the course, student would be able to:

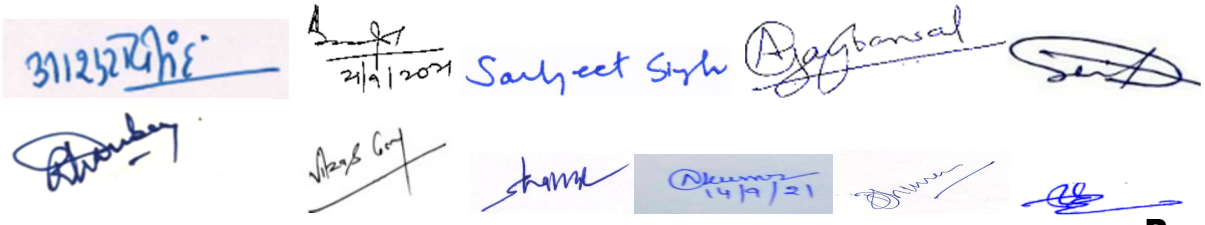
CO801.1	Understand project characteristics and various stages of a project.
CO801.2	To enable students to create very precise specifications of the IT solution to be designed.
CO801.3	Analyze the learning and understand techniques for Project planning, scheduling and Execution Control
CO801.4	Build and test the major project successfully
CO801.5	develop effective communication skill by delivering a seminar based on major project.

Major Project

Students have to submit a project at the end of the semester. The student will submit a synopsis at the beginning of the semester for approval from the departmental committee in a specified format. The student will have to present the progress of the work through seminars or progress reports.

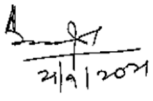
This course will be conducted largely as an individual or small group project under the direct supervision of a member of academic staff. The specific project topic undertaken will reflect the common interests and expertise of the student(s) and supervisor. Students will be required to:

1. Perform a literature search to review current knowledge and developments in the chosen technical area;
2. Undertake detailed technical work in the chosen area using one or more of:
   - Theoretical studies
   - Computer simulations
   - Hardware construction;
3. Produce progress reports within the time frame specified for the project;
4. Deliver a seminar on the general area of work being undertaken and specific contributions to that field;



5. Prepare a formal report describing the work undertaken and results obtained so far; and

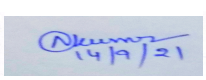
Present the work during external viva including demonstrations of operational hardware and software.












Course Code: BT CS 831	Course Name: Software Project Management	L	T	P	C
		3	0	-	3

Year and Semester	4th year 8th Semester	Contact hours per week: (3 Hrs.) Exam: (3hrs.)	
Pre-requisite of course	Software Engineering	Evaluation	
		CIE: 30	TEE: 70

Course Objectives:

1. To introduce the important concepts of project management related to managing software development.
2. To make students familiar with the different activities involved in Software Project Management.
3. To successfully plan and implement a software project management activity, and to complete a specific project in time with the available budget.

Course Outcomes: On completion of the course, student would be able to:

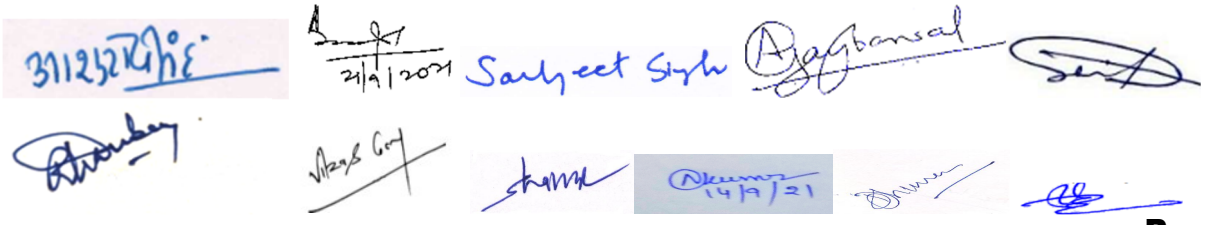
CO831.1	Identify the need for Software Project Management
CO831.2	Identify different techniques for software cost estimation
CO831.3	Understand activity planning and risk management
CO831.4	Manage and control projects

Module No	COURSE SYLLABUS CONTENTS OF MODULE	Hrs	COs
1	**Project Evaluation and Project Planning**: Importance of Software Project Management, Activities Methodologies, Categorization of Software Projects, Setting objectives, Management Principles, Management Control, Project portfolio Management, Cost-benefit evaluation technology, Risk evaluation, Strategic program Management, Stepwise Project Planning.	**14**	**CO831.1**
2	**Project Life Cycle and Effort Estimation:** Software process and Process Models, Choice of Process models, Mental delivery, Rapid Application development, Agile methods, Extreme Programming, SCRUM, managing interactive processes, Basics of Software estimation, Effort and Cost estimation techniques, COSMIC Full function points, COCOMO II- A Parametric Productivity Model, Staffing Pattern.	**13**	**CO831.2**
3	**Activity Planning and Risk Management:** Objectives of Activity planning, Project schedules, Activities, Sequencing and scheduling, Network Planning models, Forward Pass & Backward Pass techniques, Critical path (CRM) method, Risk identification, Assessment, Monitoring, PERT technique, Monte Carlo simulation, Resource Allocation, Creation of critical patterns, Cost schedules.	**10**	**CO831.3**

4	**Project Management and Control:** Framework for Management and control, Collection of data Project termination, visualizing progress, Cost monitoring, Earned Value Analysis, project tracking, change control, Software Configuration Management, Managing contracts, Contract Management.	**8**	**CO831.4**

Text Books:

1. Futrell, R.T., Shafer, D.F. And Shafer, L., 2002. *Quality Software Project Management*. Prentice Hall Professional.
2. Meredith, J.R., Shafer, S.M. And Mantel Jr, S.J., 2017. *Project Management: A Strategic Managerial Approach*. John Wiley & Sons.
3. Royce, W., 1998. *Software Project Management*. Pearson Education India.
4. Stellman, A. And Greene, J., 2005. *Applied Software Project Management*. " O'Reilly Media, Inc.".
5. Wysocki, R.K., 2010. *Effective Software Project Management*. John Wiley & Sons.



Course Code: BT CS 832	Course Name: Natural Language Processing	L	T	P	C
		3	0	-	3
Year and Semester	**4th year** **8th Semester**	**Contact hours per week:** (3 Hrs.) **Exam:** (3hrs.)			
Pre-requisite of course	Nil	**Evaluation**			
		CIE: 30	**TEE: 70**		

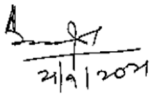
Course Objectives:

1. To introduce the fundamental concepts and techniques of natural language processing.
2. To give students a clear understanding of linguistics methods, various tools and aspects of NLP.
3. To gain an in-depth understanding of the computational properties of natural languages and the commonly used algorithms for processing linguistic information.

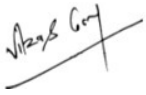
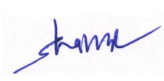
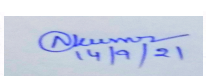
Course Outcomes: On completion of the course, student would be able to:

CO832.1	Describe the challenges involved in developing NLP solutions
CO832.2	Describe various recent statistical methods in natural language processing
CO832.3	Develop the linguistics and their application to part-of-speech tagging
CO832.4	Develop background to various tools and aspects of NLP like syntax and semantic analysis, parsing, machine translation, information retrieval and statistical discourse processing

Module No	COURSE SYLLABUS CONTENTS OF MODULE	Hrs	COs
1	**Introduction:** NLP tasks in syntax, semantics, and pragmatics. Applications such as information extraction, question answering, and machine translation. The problem of ambiguity. The role of machine learning. Brief history of the field.	**14**	**CO832.1**
2	**N-gram Language Models:** The role of language models. Simple N-gram models. Estimating parameters and smoothing. Evaluating language models. **Part of Speech Tagging and Sequence Labeling:** Lexical syntax. Hidden Markov Models (Forward and Viterbi algorithms and EM training)	**13**	**CO832.2**
3	**Syntactic parsing:** Grammar formalisms and treebanks. Efficient parsing for context-free grammars (CFGs). Statistical parsing and probabilistic CFGs (PCFGs). Lexicalized PCFGs. Neural shift-reduce dependency parsing **Semantic Analysis:** Lexical semantics and word-sense disambiguation. Compositional semantics. Semantic Role Labeling and Semantic Parsing.	**10**	**CO832.3**
4	**Mechanics of Speech:** Speech Production Mechanism, Nature of Speech Signal, Discrete Time Modeling of Speech Production, Representation of Speech Signals, Classification of Speech Sounds,	**8**	**CO832.4**



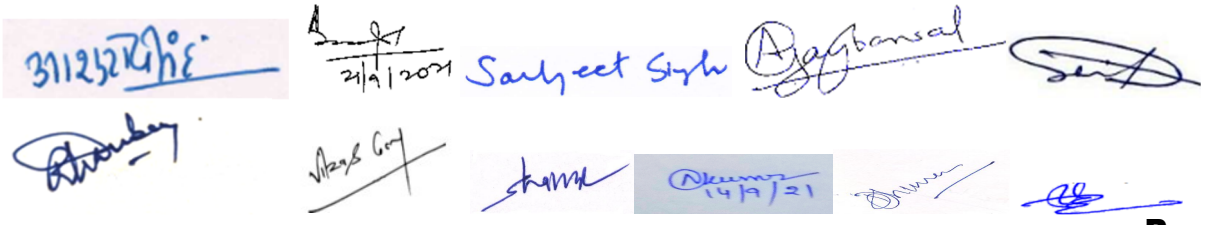







	Phones, Phonemes, Phonetics, IPA and Phonetic Alphabets, Articulatory Features, Auditory Perceptions, Anatomical Pathways from Ear to the Perception of Sound Peripheral Auditory System.		

Text Books:

1. Hapke, H., Howard, C. and Lane, H., 2019. *Natural Language Processing in Action*. Simon and Schuster.
2. Jurafsky, D., 2000. *Speech & Language processing*. Pearson Education India.
3. Manning, C. and Schutze, H., 1999. *Foundations of Statistical Natural Language Processing*. MIT press.
4. Rabiner, L.R. and Juang, B.H., 1999. *Fundamentals of Speech Recognition*. Tsinghua University Press.
5. Thanaki, J., 2017. *Python Natural Language Processing*. Packt Publishing Ltd.



Course Code: BT CS 833	Course Name: Professional Ethics and IPR	L	T	P	C
		3	0	-	3
Year and Semester	**4th year** **8th Semester**	**Contact hours per week:** (3 Hrs.) **Exam:** (3hrs.)			
Pre-requisite of course	Nil	**Evaluation**			
		CIE: 30	**TEE: 70**		

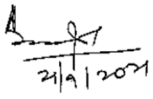
Course Objectives:

1. To provide basic knowledge about engineering Ethics, Variety of moral issues and Moral dilemmas, Professional Ideals and Virtues
2. To provide basic familiarity about Engineers as responsible Experimenters, Research Ethics, Codes of Ethics, Industrial Standards, Exposure to Safety and Risk, Risk Benefit Analysis
3. To have an idea about the Collegiality and Loyalty, Collective Bargaining, Confidentiality, Occupational Crime, Professional, Employee, Intellectual Property Rights.
4. To have an adequate knowledge about MNC's, Business, Environmental, Computer Ethics, Honesty, Moral Leadership, sample Code of Conduct.

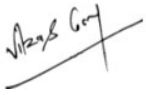
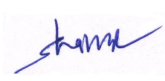
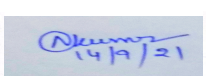
Course Outcomes: On completion of the course, student would be able to:

CO833.1	Identify and analyze an ethical issue in the subject matter under investigation or in a relevant field
CO833.2	Identify the multiple ethical interests at stake in a real-world situation or practice
CO833.3	Articulate what makes a particular course of action ethically defensible
CO833.4	Assess their own ethical values and the social context of problems
CO833.5	Identify ethical concerns in research and intellectual contexts, including academic integrity, use and citation of sources, the objective presentation of data, and the treatment of human

Module No	COURSE SYLLABUS CONTENTS OF MODULE	Hrs	COs
1	**Values:** Concept, Types, Rokeach Value Survey **Different Kinds of Values:** Individual, Societal, Material, Psychological, Cultural, Moral and Ethical, Spiritual; The Burgeoning Crises at Each of these levels. **Modern Approach to the Study of the Values:** Analyzing Individual Human Values such as Creativity, Freedom, Wisdom and Love; Value Spectrum for a Good Life; The Indian Concept of Values, Comparison of Eastern and Western concept of values.	**10**	**CO833.1, CO833.2**
2	**Ethics:** Values, Morals and Ethics; Need for Ethics in Professional Life; Kohlberg's Theory of Moral Development and its Applicability to Engineers. **Professional Ethics:** Values in Work Life; Professional Ethics and Ethos; Codes of Conduct, Whistle-Blowing, Corporate Social Responsibility, Case Studies on Ethics in Business.	**12**	**CO833.3, CO833.4**



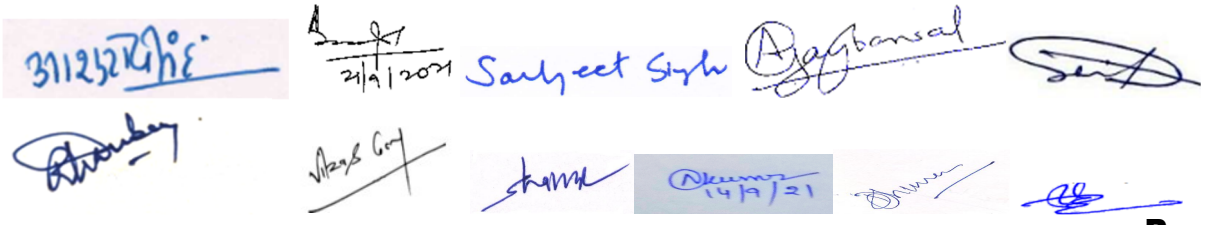







3	**Introduction to IPR:** Nature and Enforcement, International Character of IPRs, Role of IPRs in Economic Development. **Patents:** Introduction to Patents, Object of Patent Law, Inventions not Patentable, Obtaining Patents, Rights and Obligations of a Patentee. **Copyrights:** Introduction to Copyrights, Subject-Matters of Copyright, Rights Conferred by Copyright, Infringement, Assignment and Licensing of Copyrights, Copyright Societies, International Copyright, Performer's Rights.	**12**	**CO833.4**
4	**Trademarks:** Functions, Significance and types of Trademarks, Distinctiveness and Deceptive Similarity, Registration Procedure, Trademark Registry, Grounds for Refusal of Registration of Trademarks, Concurrent Use, Character Merchandising. **Trade Secrets:** Meaning, Types of Trade Secrets, Statutory Position of Trade Secrets in India, Proofs Required in Trade Secret Litigation Case.	**14**	**CO833.5**

Text Books:

1. Durkheim, E., 2013. *Professional Ethics and Civic Morals*. Routledge.
2. Fleddermann, C.B., 1999. *Engineering Ethics.* Upper Saddle River, NJ: Prentice Hall.
3. Friedman, B. and Kahn Jr, P.H., 2007. Human Values, Ethics, and Design. In *The human-computer interaction handbook* (pp. 1267-1292). CRC press.
4. Govindarajan, M., Natarajan, S. and Senthilkumar, V.S., 2009. *Engineering Ethics Includes Human Values*. Prentice-Hall of India Private Limited.
5. Harris Jr, C.E., Pritchard, M.S., Rabins, M.J., James, R. and Englehardt, E., 2013. *Engineering Ethics: Concepts and Cases.* Cengage Learning.
6. Naagarazan, R.S., 2007. *A Textbook on Professional Ethics and Human Values*. New Age International.
7. Piccolo, F. L. (2016). *Ethics and planning research*. Routledge.
8. Whitbeck, C., 2011. *Ethics in Engineering Practice and Research*. Cambridge University Press.



Course Code: BT CS 834	Course Name: Internet of Things	L	T	P	C
		3	0	-	3
Year and Semester	**4th year 8th Semester**	**Contact hours per week:** (3 Hrs.) **Exam:** (3hrs.)			
Pre-requisite of course	Nil	**Evaluation**			
		CIE: 30	**TEE: 70**		

Course Objectives:

1. To understand the definition and significance of the Internet of Things
2. To gives a foundation in the Internet of Things, including the components, tools, and analysis
3. To understand the factors that contributed to the emergence of IoT
4. To examine the potential business opportunities that IoT can uncover

Course Outcomes: On completion of the course, student would be able to:

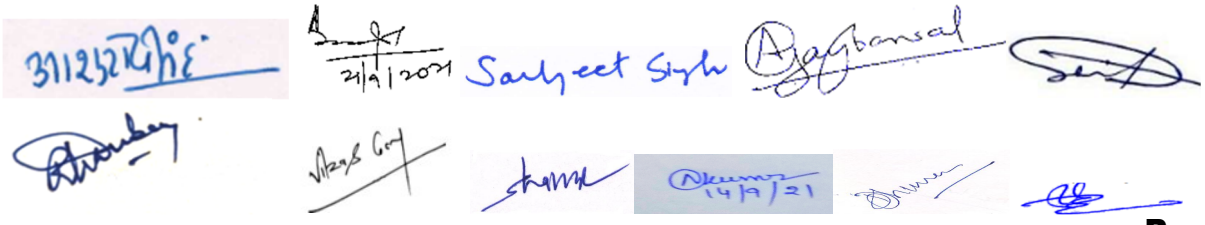
CO834.1	Able to understand the application areas of IOT
CO834.2	Able to realize the revolution of Internet in Mobile Devices, Cloud & Sensor Networks
CO834.3	Able to understand building blocks of Internet of Things and characteristics

Module No	COURSE SYLLABUS CONTENTS OF MODULE	Hrs	COs
1	**Introduction To Internet of Things:** Definition & Characteristics of IoT - Challenges and Issues - Physical Design of IoT, Logical Design of IoT - IoT Functional Blocks, Security. **Components In Internet of Things:** Control Units Communication modules Bluetooth Zigbee Wifi GPS- IOT Protocols, MQTT, Wired Communication, Power Sources.	**14**	**CO834.1**
2	**Technologies Behind IoT:** Four pillars of IOT paradigm, - RFID, Wireless Sensor Networks, SCADA (Supervisory Control and Data Acquisition), M2M - IOT Enabling Technologies - BigData Analytics, Cloud Computing, Embedded Systems.	**13**	**CO834.1, CO834.2**
3	**Programming The Microcontroller For IoT:** Working principles of sensors IOT deployment for Raspberry Pi /Arduino /Equivalent platform Reading from Sensors, Communication: Connecting microcontroller with mobile devices, communication through Bluetooth, wifi and USB - Contiki OS. **Resource Management in IoT:** Clustering, Clustering for Scalability, Clustering Protocols for IOT.	**10**	**CO834.2, CO834.3**

4	**IoT Applications and case studies:** Business models for the internet of things, Smart city, smart mobility and transport, smart buildings and infrastructure, smart health, environment monitoring and surveillance.	**8**	**CO834.3**

Text Books:

1. Bahga, A. and Madisetti, V., 2014. *Internet of Things: A hands-on approach*. Vpt.
2. Doukas, C., 2012. *Building Internet of Things with the ARDUINO*. CreateSpace Independent Publishing Platform.
3. Greengard, S. (2021). *The internet of things*. MIT press.
4. Hassan, Q. F., & Madani, S. A. (Eds.). (2017). *Internet of things: Challenges, advances, and applications*. CRC Press.
5. Uckelmann, D., Harrison, M. and Michahelles, F. eds., 2011. *Architecting the Internet of Things*. Springer Science & Business Media.
6. Vermesan, O. and Friess, P., 2014. *Internet of Things-from Research and Innovation to Market Deployment*. Aalborg: River publishers.



Course Code: BT CS 835	Course Name: Cyber Security	L	T	P	C
		3	0	-	3
Year and Semester	**4th year** **8th Semester**	**Contact hours per week:** (3 Hrs.) **Exam:** (3hrs.)			
Pre-requisite of course	Nil	**Evaluation**			
		CIE: 30	**TEE: 70**		

Course Objectives:

1. Exhibit knowledge to secure corrupted systems, protect personal data, and secure computer networks in an organization.
2. Practice with an expertise in academics to design and implement security solutions.
3. Understand key terms and concepts in Cryptography, Governance and Compliance.
4. Develop cyber security strategies and policies
5. Understand principles of web security and to guarantee a secure network by monitoring and analyzing the nature of attacks through cyber/computer forensics software/tools.

Course Outcomes: On completion of the course, student would be able to:

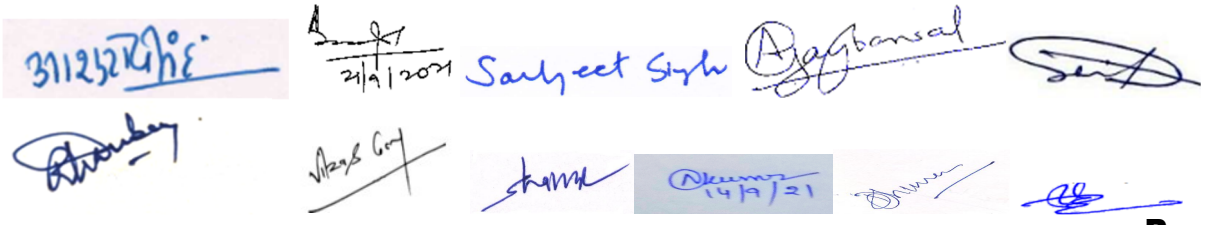
CO835.1	To make a solid foundation in digital security to protect device from threats.
CO835.2	To learn access control mechanism and understand how to protect servers.
CO835.3	To understand the importance of a network basics and brief introduction on security of network protocols.
CO835.4	To understand cyber-attacks and learn data privacy issues and preventive measures.

Module No	COURSE SYLLABUS CONTENTS OF MODULE	Hrs	COs
1	Basics of digital security, protecting personal computers and devices, protecting devices from Virus and Malware, Identity, Authentication and Authorization, need for strong credentials, keeping credentials secure, Protecting servers using physical and logical security.	**14**	**CO835.1**
2	Networking basics (home network and large-scale business networks), Networking protocols, Security of protocols, SSL/ TLS, Network security basics, basics of error control mechanism, Secure Electronic Transactions, Web Security Considerations.	**13**	**CO835.2**
3	Database and program security, OS security, Security policies, Models of Security, IP security Architecture, Security of Databases, Reliability and Integrity, Protection of information, Program Security, Malicious Code, Virus Signatures, Trapdoors.	**10**	**CO835.3**
4	Introduction to cyber-attacks, application security (design, development and testing), operations security, monitoring, identifying threats and remediating them, Principles of data security - Confidentiality, Integrity and Availability, Data Privacy, Data	**8**	**CO835.4**

	breaches, preventing attacks and breaches with security controls, Compliance standards, Computer Ethics.		

Text Books:

1. Brooks, C.J., Grow, C., Craig, P. and Short, D., 2018. *Cybersecurity Essentials*. John Wiley & Sons.
2. Graham, J., Olson, R. and Howard, R. eds., 2016. *Cyber Security Essentials*. CRC Press.
3. Gupta, B.B., Agrawal, D.P., and Wang, H., 2018. *Computer and Cyber Security: Principles, Algorithm, Applications, and Perspectives*. CRC Press.
4. Krutz, R.L. and Vines, R.D., 2010. *Cloud Security: A Comprehensive Guide to Secure Cloud Computing*. Wiley Publishing.
5. Pfleeger, C.P., 1988. *Security in Computing*. Prentice-Hall, Inc.
6. Sammons, J. and Cross, M., 2016. *The Basics of Cyber Safety: Computer and Mobile Device Safety Made Easy*. Elsevier.
7. Wu, C.H.J. and Irwin, J.D., 2016. *Introduction to Computer Networks and Cybersecurity*. CRC Press.



Course Code: BT CS 836	Course Name: Information Retrieval	L	T	P	C
		3	0	-	3

Year and Semester	4th year 8th Semester	Contact hours per week: (3 Hrs.) Exam: (3hrs.)	
Pre-requisite of course	Nil	Evaluation	
		CIE: 30	TEE: 70

Course Objectives:

1. To become familiar with difference between Information retrieval and data Base Management Systems
2. To learn different indexing techniques to apply Data Base systems
3. To understand various searching techniques to retrieve data from databases and ware houses.

Course Outcomes: On completion of the course, student would be able to:

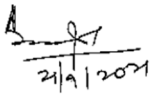
CO836.1	understand basic Information Retrieval Systems
CO836.2	identify the different types of indices: inverted index, positional index, bi-word index etc
CO836.3	enumerate various types of indices. And also understand the concept of efficient storage of indices.
CO836.4	understand the basic concept of Search Engines their architecture and various functional components
CO836.5	understand the basic concept of Web crawlers and their architecture

Module No	COURSE SYLLABUS CONTENTS OF MODULE	Hrs	COs
1	**Introduction to Information Retrieval**: Information retrieval problem, an inverted index, Processing Boolean queries, The extended Boolean model versus ranked retrieval, an inverted index, Bi-word indexes, Positional indexes, Combination schemes. **Index construction**: Hardware basics, Blocked sort-based indexing, Single-pass in-memory indexing, Distributed indexing, Dynamic indexing, other types of indexes	**14**	**CO836.1**
2	**Index compression**: Statistical properties of terms in information retrieval, Heaps' law: Estimating the number of terms, Zipf's law: Modeling the distribution of terms, Dictionary compression, Dictionary as a string, Blocked storage, Posting's file compression. **Scoring, term weighting and the vector space model**: Parametric and zone indexes, Weighted zone scoring, Learning weights, The optimal weight, Term frequency and weighting, Inverse document frequency, Tf-idf weighting, The vector space model for scoring, Variant tf-idf functions	**13**	**CO836.2**
3	**Computing scores in a complete search system:** Efficient scoring and ranking, Inexact top K document retrieval, Index elimination, Champion lists, Static quality scores and ordering,	**10**	**CO836.3, CO836.4**

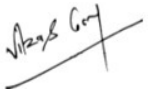
	Impact ordering, Cluster pruning, Components of an information retrieval system, Tiered indexes. **Web search basics**: Background and history, Web characteristics, The web graph, Spam, Advertising as the economic model, The search user experience, User query needs Crawling, Crawler architecture, DNS resolution, The URL frontier, Link analysis, The Web as a graph, Anchor text and the web graph, PageRank, Markov chains, The PageRank computation, Topic-specific PageRank		
4	**Language models for information retrieval**: Language models, Finite automata and language models, Types of language models, Multinomial distributions over words, the query likelihood model, using query likelihood language models in IR, Estimating the query generation probability, Language modelling versus other approaches in IR	**8**	**CO836.4** **CO836.5**

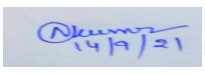
Text Books:

1. Baeza-Yates, R. and Ribeiro-Neto, B., 1999. *Modern Information Retrieval*. New York: ACM press.
2. Croft, W.B., Metzler, D. and Strohman, T., 2010. *Search Engines: Information Retrieval in Practice* (Vol. 520, pp. 131-141). Reading: Addison-Wesley.
3. Kubat, M., 2017. *An Introduction to Machine Learning*. Springer, Cham.
4. Schütze, H., Manning, C.D. and Raghavan, P., 2008. *Introduction to Information Retrieval* (Vol. 39, pp. 234-265). Cambridge: Cambridge University Press.

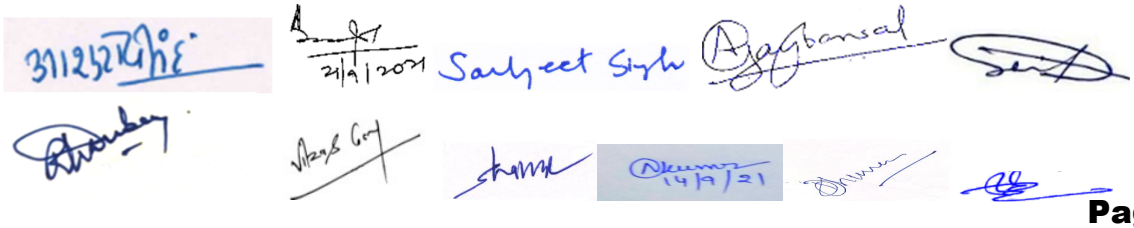






Course Code:	Course Name: Industrial Internship	L	T	P	C
BT CS 811		0	0	36	18
Year and Semester	**4th year 8th Semester**	**Contact hours per week:** (36 Hrs.)			



Central University of Haryana, Mahendergarh
Department of Printing and Packaging Technology
School of Engineering and Technology

Proceedings/Minutes of the meeting of the board of studies (BOS) in the Department of Printing and Packaging Technology held on 27.08.2019

The online meeting of the board of studies (BOS) in Printing and Packaging Technology was held on 27.08.2019. The following were present:

1. Dr. Rajesh Kumar Dubey, Dean and Chairman
2. Mr. Sandeep Boora, TIC, Department of Printing and Packaging Technology
3. Prof. (Dr.) Rajendra Kumar Annayath, Subject Expert- Member
4. Prof. Ambrish Pandey, Subject Expert- Member
5. Mr. Shammi Mehra, CUH- Member
6. Mr.Tarun Singh, CUH- Special Invitee
7. Mr. Anil, CUH- Special Invitee

After deliberations, it was resolved/recommended by the board of studies (BOS) as follows:

1. The scheme of studies & Examinations and Syllabi of B.Tech (Printing and Packaging Technology- IV year (7^{th} and 8^{th} semesters) were discussed and approved for the Batch 2018-19 onwards (to be implemented from session 2021-22) Annexure-I.
2. In view of NEP 2020/LOCF/OBE, the B. Tech (Printing and Packaging Technology) - First year curriculum was modified and Scheme of studies & Examination and the Syllabi of B.Tech (Printing and Packaging Technology) – First year (1^{st} and 2^{nd} semesters) were discussed and approved for the batch 2021-22 onwards (to be implemented from session 2021-22) Annexure-II.

The meeting ended with vote of thanks to the chair.

Dr. Rajesh Kumar Dubey | Mr. Sandeep Boora | Prof. (Dr.) Rajendra Kumar Annayath

Prof. Ambrish Pandey | Mr. Shammi Mehra | Mr. Tarun Singh | Mr. Anil

Minutes of BoS meeting

2 messages

HOD PPT <hodppt@cuh.ac.in> Wed, Sep 22, 2021 at 3:42 PM
To: profanayath@gmail.com

Respected Sir,

You are requested to please spare your valuable time to sign the following documents as given below:

1. Minutes of the BoS meeting
2. Scheme & Syllabus for B.Tech(Printing and Packaging Technology)- 7th & 8th Semesters for the current session.

2 attachments



Minutes of Meeting Final BOS.jpeg
739K

Scheme & Syllabu-B.Tech(PT)-7th & 8th sem(2020-21) -.docx
76K

Col Comdt Prof Dr Rajendrakumar Anayath <profanayath@gmail.com> Mon, Sep 27, 2021 at 1:52 PM
To: HOD PPT <hodppt@cuh.ac.in>

Agreed with all the proceedings as well as Scheme and Syllabi.
Please go ahead for further process.
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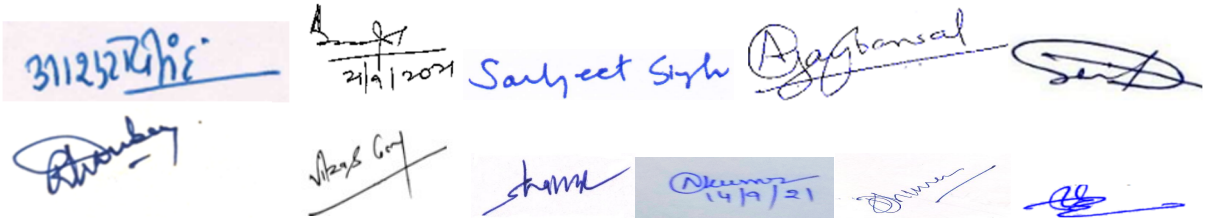
Scheme & Syllabus for B.Tech in Printing and Packaging Technology according to Choice Based Credit System (CBCS)

(Semester VII and Semester VIII)

Department of Printing and Packaging Technology
w.e.f. Session 2021-22



School of Engineering & Technology
CENTRAL UNIVERSITY OF HARYANA
MAHENDERGARH-123031
HARYANA



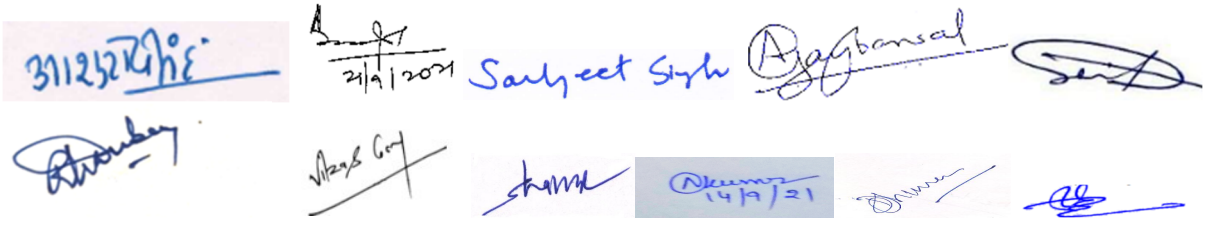
Central University of Haryana
School of Engineering and Technology
Department of Printing and Packaging Technology
B.Tech. 4th YEAR (SEMESTER – VII)

S. No.	Course Code	Course Title	Teaching Schedule			Credits
			L	T	P	
1	BT PPT701A	Print Entrepreneurship	3	0	0	3
2	BT PPT702A	Minor Project	0	0	10	5
3	BT PPT703A	Summer Internship Presentation	0	2	0	2
4	**Program Elective-4 (Any one)**					
	BT PPT704A	Book Publishing	3	0	0	3
	BT PPT705A	Printing Ink Technology	3	0	0	3
5	**Program Elective-5 (Any one)**					
	BT PPT706A	Packaging Machineries and Processes	3	0	0	3
	BT PPT707A	Paper Substrate in Packaging	3	0	0	3
6	**Program Elective-6(Any one)**					
	BT PPT708A	Hybrid Printing Technology	3	0	0	3
	BT PPT709A	Printing Organization and Plant Layout	3	0	0	3
Total			**12**	**2**	**10**	**19**

L = Lecture, T = Tutorial, P = Practical, & C = Credits

Central University of Haryana
School of Engineering and Technology
Department of Printing and Packaging Technology
B.Tech. 4th YEAR (SEMESTER – VIII)
Group A

S. No.	Course Code	Course Title	Teaching Schedule			Credits
			L	T	P	
1	BT PPT801A	Major Project	0	0	20	10
2	**Program Elective – 7 (Any one)**					
	BT PPT802A	Quality control & Waste Management	3	0	0	3
	BT PPT803A	Packaging of Industrial and Hazardous Goods	3	0	0	3
3	**Program Elective – 8 (Any one)**					
	BT PPT804A	Food and Pharmaceutical Packaging	3	0	0	3
	BT PPT805A	Industrial Packaging	3	0	0	3
4	**GEC**		3	1	0	4



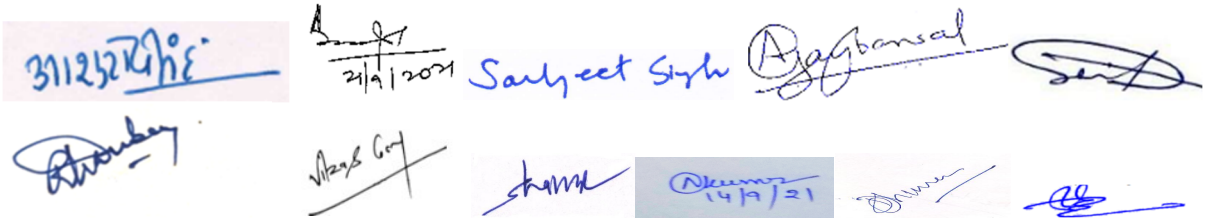
Total	**9**	**01**	**20**	**20**

L = Lecture, T = Tutorial, P = Practical, & C = Credits

Group B

S. No.	**Course Code**	**Course Title**	**Teaching Schedule**			**Credits**
			L	**T**	**P**	
1	BT PPT809A	Industry Internship	NA	NA	NA	17
	GEC-Online		3	0	0	3
Total			**3**	**0**	**0**	**20**

L = Lecture, T = Tutorial, P = Practical, & C = Credits



B. Tech Printing and Packaging Technology
SYLLABI OF EXAMINATIONS
B. Tech 4th Year (2021-22)

Program Name: **B. Tech Printing and Packaging Technology**

Course Code: BT PPT701A	**Course Name: Print Entrepreneurship**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**
Year and Semester	**4th Year 7th Semester**	**Contact hours per week:** (3 Hrs.)			
Prerequisite of course	**Management**	**Evaluation**			
		CIE: 30		**TEE: 70**	

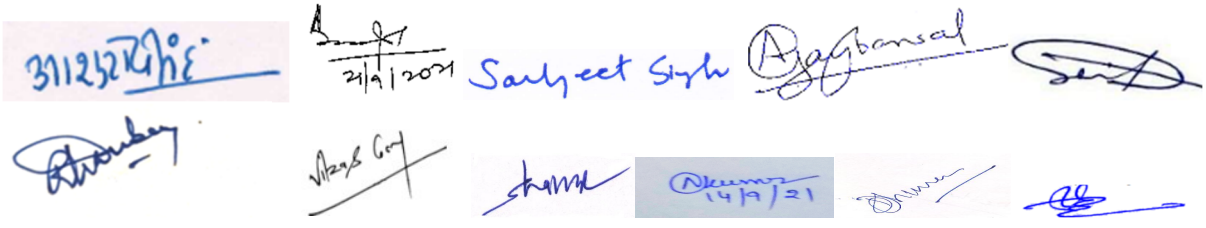
Course Level Learning Outcomes: On completion of the course, student would be able to:

- Explain Entrepreneurship.
- Outline the new business start methods.
- Discuss types of business & plans of business.
- Describe different forms of ownership & entrepreneurship development.

Unit	COURSE SYLLABUS
1	Entrepreneurship: Definition, Types of Entrepreneurs**,** qualities and pre-requisites of entrepreneur, Entrepreneurship spirits, Significance of entrepreneur in Economic Development, Economic, social and psychological need for entrepreneurship, Identifying & Evaluating Business opportunities.
2	Quick Start Method: Methods and Procedures to start and expand one's own business, Franchises, creating your own franchise, Multi-Level marketing schemes, Buying an existing business.
3	Business Planning Process: Requirement of good business plan .Business Plan-the major benefits, sub plan, Business plan-blueprint to success and financing, Small manufactures business plan, Feasibility Report, Project Reports.
4	Forms of Ownership: Different forms of ownership-sole proprietorship, partnership, joint stock company, Selling, Selling your venture, planning for succession, Valuation of a business, Responsibility of a good employer, Risk management, Entrepreneurship development Programmes, Role of Govt. and promotional agencies in entrepreneurship development.

Suggested readings:

1. B Janakiram, *Management & Entrepreneurship*, Excel book India, 2010.
2. B Janakiram, *Entrepreneurial Development*, December 2007.
3. Jasmer Singh Saini, *Entrepreneurship Development Programmes & Practices*, Deep and Deep Publications, 2002.
4. Jose Paul, N. Ajith Kumar, *Entrepreneurship Development & Management*, Himalaya Publishing House, 2000
5. Tata McGraw-Hill, *Entrepreneurship Developmen*t - Colombo Plan Staff College for Technician Education, 1998



B. Tech Printing and Packaging Technology
SYLLABI OF EXAMINATIONS
B. Tech 4th Year (2021-22)

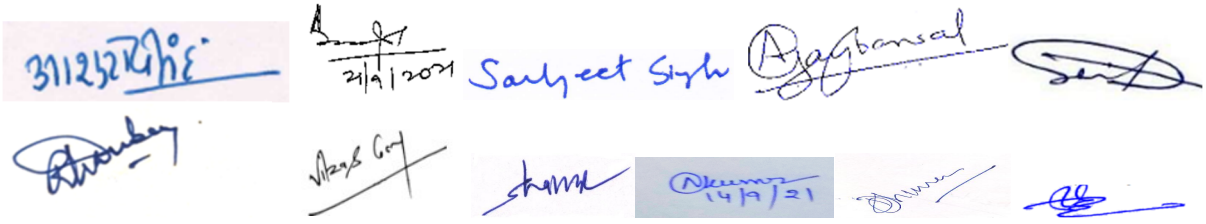
Program Name: B. Tech Printing and Packaging Technology

Course Code: BT PPT702A	Course Name: Minor Project	L	T	P	C
		0	0	10	5
Year and Semester	4th Year 7th Semester	Evaluation			
Prerequisite of course	Nil	CIE: 45		TEE: 105	

B. Tech Printing and Packaging Technology
SYLLABI OF EXAMINATIONS
B. Tech 4th Year (2021-22)

Program Name: B. Tech Printing and Packaging Technology

Course Code: BT PPT703A	Course Name: Summer Internship Presentation	L	T	P	C
		0	2	0	2
Year and Semester	4th Year 7th Semester	Evaluation			
Prerequisite of course	Knowledge of printing processes	CIE: 30		TEE: 70	
Report of summer internship will be evaluated by a committee duly constituted by the HOD/Dean.					



B. Tech Printing and Packaging Technology
SYLLABI OF EXAMINATIONS
B. Tech 4th Year (2021-22)

Program Name: **B. Tech Printing and Packaging Technology**

Course Code: BT PPT704A	**Course Name: Book Publishing**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**
Year and Semester	**4th Year 7th Semester**	**Contact hours per week:** (3 Hrs.)			
Prerequisite of course	**Basics of design and management**	**Evaluation**			
		CIE: 30		**TEE: 70**	

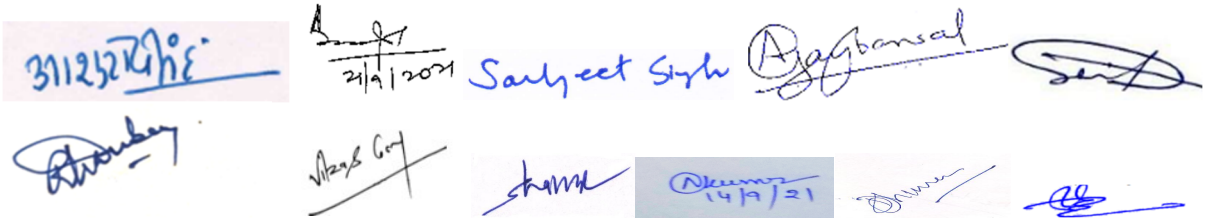
Course Level Learning Outcomes: On completion of the course, student would be able to:

- Describe the basic knowledge of book publishing houses.
- Explain the structure of press organization.
- Discuss the marketing & distribution in book publishing.
- Write the legal aspects in book publishing.

Unit	**COURSE SYLLABUS**
1	Definition and concept, parts of a book, basic steps in book publishing, areas of publishing - general publishing, educational publishing, professional publishing and reference publishing house - the role of commissioning editor, the desk editor, the designer, the production manager, the sale/marketing manager, the publicity manager, the warehouse or distribution department, the accounts department, the management.
2	Press Organization Hierarchy - editorial organization, mechanical aspects of organization - composition, printing, basic operations business aspects of organization, flowcharts of staff in organization, Circulation and Advertisement departments, distribution channels.
3	Marketing and Distribution in Book Publishing Home market, export market, closed market, advertising and publicity, types of distribution, conventional and modern channels of distribution. International book trade and barriers. Import and export of books. Relationship of the Editor with the manuscript. Evaluation procedures. External review and its associated problems. Editorial Organization in Publishing The editorial functions in newspapers, journals, magazines and books.
4	Legal Aspects in book Publishing Copyright, types of agreement between author and publishers, the outright sale of the copyright, profit sharing agreement, the royalty system, commission agreements The press and the law-libel, defense against libel, mitigation & damages.

Suggested readings:

1. Sinha & Sinha, *Computer Fundamentals: Concepts, Systems & Applications,* BPB Publications; 6th edition (30 November 2004).
2. Hugh Speirs, *Introduction to Prepress*, Pira International (January 1, 2003).
3. Winn L. Rosch, *Hardware Bible, QUE*; 6th edition (21 February 2003).
4. Adobe Creative Team, *Adobe PageMaker 6.5 Classroom in a Book*, Adobe; Pap/Cdr edition (16 May 1997).
5. David Bergsland, *Printing in a Digital World*, Delmar Cengage Learning; 1st edition (21 September 1996).
6. Frank J. Romano, *Desktop Typography with QuarkXPress*, TAB Books Inc; 2nd edition (1 December 1992.



B. Tech Printing and Packaging Technology
SYLLABI OF EXAMINATIONS
B. Tech 4th Year (2021-22)

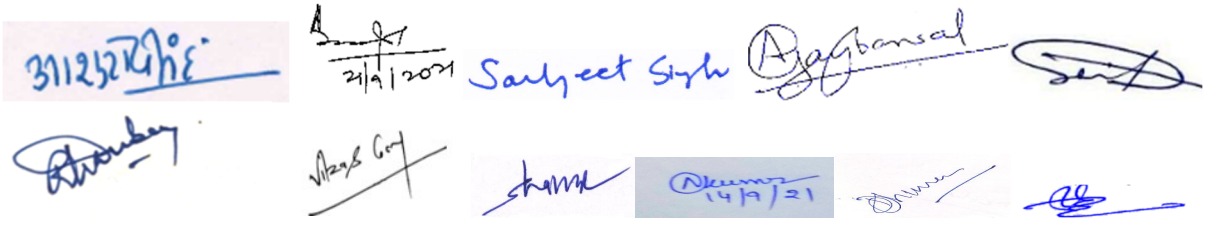
Program Name: B. Tech. - Printing and Packaging Technology

Course Code: BT PPT705A	**Course Name: Printing Ink Technology**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**
Year and Semester	**4th Year 7th Semester**	**Contact hours per week:** (3 Hrs.)			
Prerequisite of course	**Basics of printing inks**	**Evaluation**			
		CIE: 30		**TEE: 70**	

Course Level Learning Outcomes: On completion of the course, student would be able to:

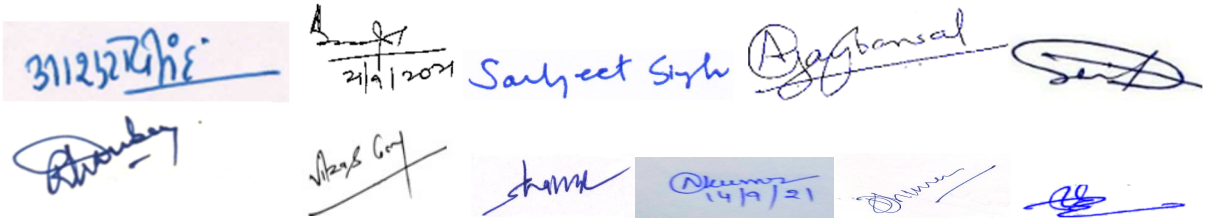
- Describe various ingredients and vehicles used in printing ink.
- Discuss drying mechanisms used for ink drying.
- Explain ink requirements for various printing processes.
- Discuss security inks and various tests for printing ink.

Unit	**COURSE SYLLABUS**
1	Introduction, solvent based inks, water based ink, ingredients in Ink- pigments properties, types, carbon black, inorganic pigments, organic pigments, physical characteristics of organic pigments. Vehicles- vehicles for liquid inks, vehicles for paste inks, UV curing vehicles. Additives - driers, extenders, anti-oxidants, waxes. Oils- vegetable drying oils, semi drying oils, non-drying oils.
2	Drying mechanisms - physical drying mechanisms, absorption drying, evaporation drying, chemical drying systems, oxidation polymerization drying, radiation drying and curing, microwave drying, infrared drying. Viscosity - Newtonian flow, units of viscosity, viscosity & temperature, factors influencing viscosity, simple low viscosity inks, complex high viscosity inks. Ink requirements for printing processes.
3	Ink requirements for printing processes – offset, letterpress, flexography, gravure, screen printing. Optical properties of ink films, rheology and ink transfer requirements, ink distribution and transfer on the press, method for the direct measurement of ink setting on coated paper. Paste inks - single roll mill, twin roll mill, triple roll mill, ball mill, twin horizontal mixer, uni-roll mill, high speed stirrer milling. Liquid inks - ball mill, pearl mill, sand mill, bead mill, shot mill. Trends and developments in the ink manufacturing process.
4	Security Inks: Range of security inks, special security features - fluorescence, phosphorescence, reflected by improved filters, magnetism, security printing inks for cheques. Tests for chemical resistance, light fastness, rub resistance test, crumpling resistance test, grinding control, color control, control of the rheological properties, control of drying time, control of various specific properties. Introduction to Nano inks.



Suggested readings:

1. Krishan Kumar Aggarwal, *Complete Printing Inks Industries*, Creative publication, 2018.
2. Alfred Seymour, *Modern Printing Inks: A Practical Handbook for Printing Ink Manufacturers and Printers*, Forgotten Books, 2018.
3. NIIR Board, *the Complete Technology Book on Printing Inks*, Asia Pacific Business Press Inc., 2018.
4. Robert Leach, Ray Pierce, *The Printing Ink Manual*, Springer; 4th Edition, 1999 edition (30 September 1993).



B. Tech Printing and Packaging Technology
SYLLABI OF EXAMINATIONS
B. Tech 4th Year (2021-22)

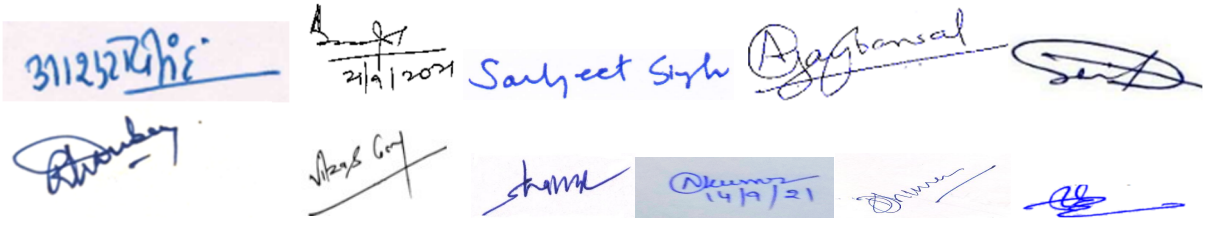
Program Name: B. Tech. - Printing and Packaging Technology

Course Code: BT PPT706A	**Course Name: Packaging Machineries and Processes**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**
Year and Semester	**4th Year 7th Semester**	**Contact hours per week:** (3 Hrs.)			
Prerequisite of course	**Basics of packaging materials**	**Evaluation**			
		CIE: 30		**TEE: 70**	

Course Level Learning Outcomes: On completion of the course, student would be able to:

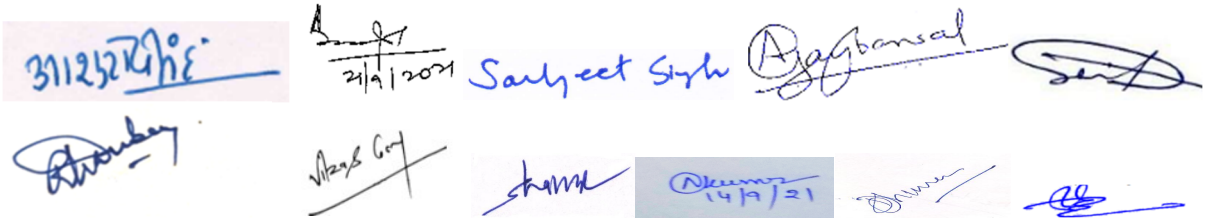
- Describe manufacturing process of metal cans.
- Discuss different packaging machineries used for line operations and systems.
- Explain various machineries used for conversions of different packaging materials.
- Outline the filling machine required for the line operations.

Unit	**COURSE SYLLABUS**
1	Introduction and Manufacturing Metals Cans & Drums: Introduction, Machineries used for conversion, online packaging, Ancillaries Machines and equipment, Online and Offline inspection equipment. Metal Cans-Three piece, can manufacturing machine and its various sections-Coating Equipments. Metal drum-Types-Different machines used in manufacturing.
2	Machineries for Manufacturing of Sacks, Flexible Laminates & Corrugated Box: Sacks-Types-Machine used in manufacturing of bags. Folding Cartons -Types of Cartons-Machine used in carton manufacturing. Flexible Laminates-Types of lamination techniques-Different components of the Lamination Machine. Corrugated Box-Board construction-Machine used in manufacturing.
3	Wrapping Machines & Equipments: Wrapping Machine-Style of wrapping-Machines used, Shrink Wrapping Machine-Machine types and its parameters, Stretch Wrapping Machine-Pre-stretching film-Types of Wrapper models.
4	Types of fillers, VFFS, HFFS and Multiwall Sack filling: Filling machineries by count-Filling machineries-Liquid-Carbonated, Design consideration and selection of fillers. Types of Solid fillers. Vertical Form fill seal (VFFS), Horizontal Form fill seal (HFFS) Machines- Machine overview, and Types-Different section on the machine-New technologies available. Multiwall bag-Types of filling technique.



Suggested readings:

1. Shrikant P. Athavale, *Handbook of Printing, Packaging and Lamination: Packaging Technology*, Notion Press; 1st edition (12 September 2018).
2. F Joseph Hanlon, *Handbook of Package Engineering*, McGraw-Hill, 2016.
3. Soroka, Walter, *Fundamentals of Packaging Technology*, Institute of Packaging, Professionals, St. Charles, IL (2014).
4. Anne Emblem, *Packaging Technology: Fundamentals, Materials and Processes*, Wood head Publishing; 1st edition (29 October 2012).
5. John Henry, *Packaging Machinery Handbook: The Complete Guide to Automated Packaging Machinery Including Packaging*, Create Space Independent Pub. (17 November 2012).
6. Richard Crowson, *Assembly Processes, Finishing, Packaging, and Automation*, CRC Press, January 13, 2006.
7. Jeffrey H. Hooper, *Confectionery Packaging Equipment*, Springer; 1999th edition (30 September 1998.



B. Tech Printing and Packaging Technology
SYLLABI OF EXAMINATIONS
B. Tech 4th Year (2021-22)

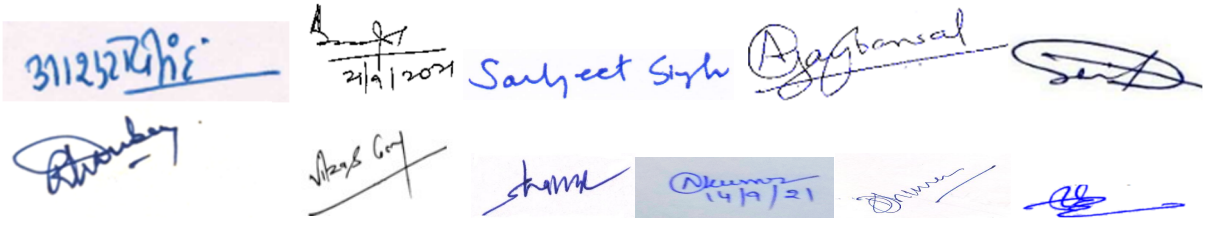
Program Name: **B. Tech Printing and Packaging Technology**

Course Code: BT PPT707A	**Course Name: Paper Substrate in Packaging**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**
Year and Semester	**4th Year 7th Semester**	**Contact hours per week:** (3 Hrs.)			
Pre-requisite of course	**Basics knowledge of paper**	**Evaluation**			
		CIE: 30		**TEE: 70**	

Course Level Learning Outcomes: On completion of the course, student would be able to:

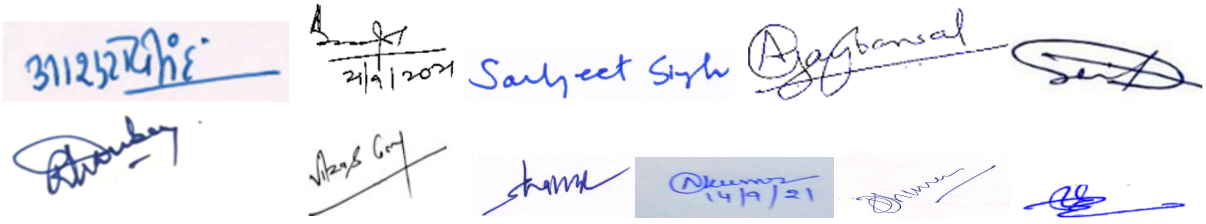
- Describe raw materials used in paper.
- List of various pulping processes.
- Explain paper making processes.
- Discuss various properties of paper.

Unit	**COURSE SYLLABUS**
1	Raw Materials and Preparation: Fibrous raw materials –Soft and Hard Wood, Wood structure and morphology, Non wood fibers and recycled paper, Non fibrous Additives, Sizing Agents, Binders, Fillers and Additives, Wood harvesting, logging, sorting, Debarking, Chipping, Screening & Storage.
2	Pulping: Types- Mechanical, Chemical and semi-chemical- Mechanical pulping, Stone ground wood, pressurized grinding, Refiner pulping, refiner plates, Assisted mechanical pulping, thermo mechanical, chemi-mechanical, chemithermo-mechanical, Chemical pulping- Kraft and Sulfite – Pulping Chemistry - Liquor Chemicals and reactions- Digester Temperature and Pressure - Chemical recovery and environmental effects- Pulp properties – Processing of pulp for paper making.
3	Paper Making: Preparation of pulp – Repulping/dispersion, Beating and Refining, Bleaching, Recycled paper – Deinking, Washing and Flotation Foudrinier Paper Machine- Dry and Wet end operations- Surface treatments- Sizing, Coating and Super calendaring.
4	Paper properties: Optical properties – Color, brightness, smoothness, gloss, opacity and rub resistance, Strength properties–thickness, grammage, tensile, tear, bursting strength, stiffness, Grain direction, Wire and Felt sides. End use property testers – Abrasion, compression, crush resistance.



Suggested readings:

1. Herbert Holik, *Hand book of Paper and Board*, Wiley-VCH, 2006.
2. Mark J. Kirwan, *Paper and paperboard Packaging Technology*, Blackwell Publishing, 2005.
3. Herbert Sixta, *Handbook of Pulp*, Vol.1, Wiley-VCH, 2005.
4. G.A. Smook, *Handbook for pulp and paper technologists*, Angus Wilde Publications, 2001.



B. Tech Printing and Packaging Technology
SYLLABI OF EXAMINATIONS
B. Tech 4th Year (2021-22)

Program Name: **B. Tech Printing and Packaging Technology**

Course Code: BT PPT708A	**Course Name: Hybrid Printing Technology**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**
Year and Semester	**4th Year 7th Semester**	**Contact hours per week:** (3 Hrs.)			
Prerequisite of course	**Digital and conventional printing**	**Evaluation**			
		CIE: 30		**TEE: 70**	

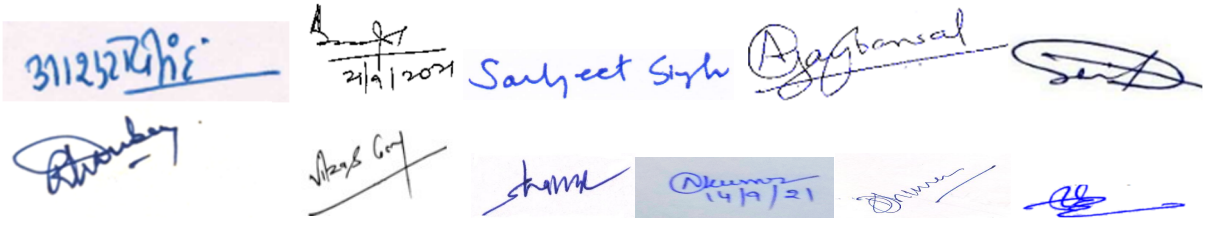
Course Level Learning Outcomes: On completion of the course, student would be able to:

- Overview of Printing Methods and Technologies
- Describe concept of Hybrid Printing and its application.
- Describe Hybrid Printing Systems combining Conventional Printing Technologies
- Understand in-line and off-line print production.

Unit	**COURSE SYLLABUS**
1	Overview of Printing Methods and Technologies, Combination Variants of Hybrid Printing Systems.
2	System Concepts and Examples of Implementations. Hybrid Printing Systems combining Conventional Printing Technologies, Hybrid Printing Systems combining NIP Technologies.
3	Hybrid Printing Systems combining Conventional and NIP Technologies, Hybrid Printing Systems combining Computer to Press/Direct Imaging with NIP Technologies, Hybrid Printing Systems combining Conventional Printing Technologies with Computer to Press Technologies.
4	Hybrid Techniques for In-line Print Production, Hybrid Techniques for Off-line Print Production.

Suggested readings:

1. Michael Limburg, *Gutenberg goes digital: All You Need to Know about Computer to Plate Technology*, Blue Print, 2012
2. David Bann, *the All New Print Production Handbook*, Rotovision, 2011.
3. Bergsland, David, *Introduction to digital publishing*, Cengage Learning, 2002.
4. Kipphan, Helmut, *ed. Handbook of print media: technologies and production methods*, Springer Science & Business Media, 2001.
5. Phil Green, *Understanding Digital Color*, 2nd edition, printing Industries, 1999.
6. Robin McAllister, *Scanning and Image Manipulation*, Delmar Cengage Learning, 1996.
7. Anton & Peter Kammermeier, *Scanning & Printing*, Focal Press, 1992.



B. Tech Printing and Packaging Technology
SYLLABI OF EXAMINATIONS
B. Tech 4th Year (2021-22)

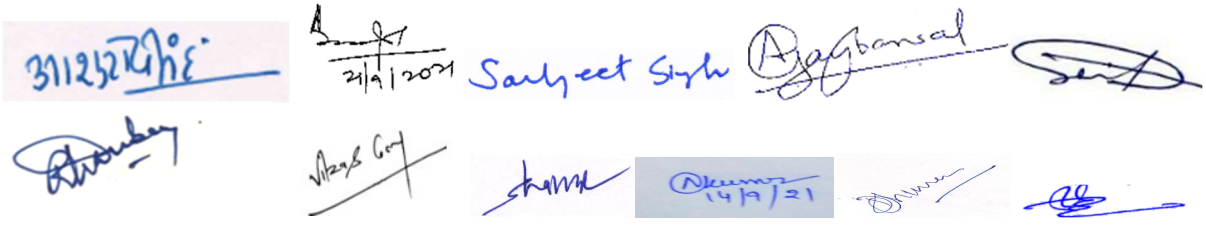
Program Name: B. Tech. - Printing and Packaging Technology

Course Code: BT PPT709A	**Course Name: Printing Organization and Plant Layout**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**
Year and Semester	**4th Year 7th Semester**	**Contact hours per week:** (3 Hrs.)			
Prerequisite of course	**Basics of management**	**Evaluation**			
		CIE: 30		**TEE: 70**	

Course Level Learning Outcomes: On completion of the course, student would be able to:

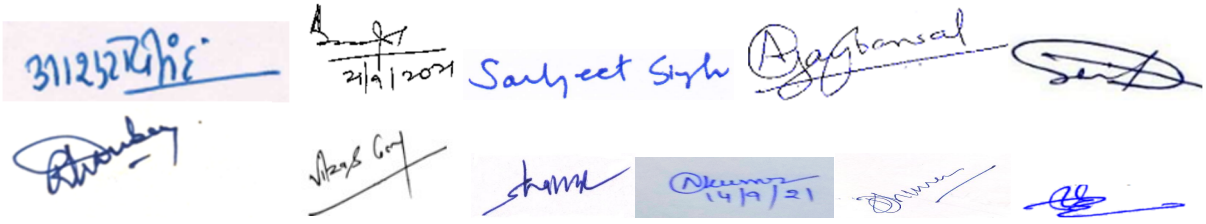
- Describe print organization and management.
- Discuss strategic issues of location.
- Explain methods and types of plant layout.
- Outline of factory building and its types.

Unit	**COURSE SYLLABUS**
1	Printing Organization: Management- Nature scope and importance of Management, Functions of Management –Scientific, Management. Production and operations Management – Locations and Layout of plant, Maintenance management Structure: Structure of organization, Formal and Informal organization, Market research, Sales promotion and Purpose of business management. Workflow and organizational structure in a printing press.
2	Strategic issues of location. The supply-distribution system, Dynamic nature of plant location, strategy-factors influencing choice of location. State regulations on location. Backward areas and Industrial policy. Govt. Policies for decentralization, Industrial estates, comparison of locations-urban v/s rural areas advantages, sub-urban area. Economic survey of site selection. Analytical approach.
3	Objectives of good plant layout, principles of plant layout, importance of plant layout, situations in which layout problems may arise, factors influencing plant layout, Methods of plant and factory layout. Types of plant layout -product layout or live layout - process layout or functional layout-combination layout. Symptoms of bad layout. Flow pattern-line flow, L type flow, circular flow, U type flow, Characteristics and place of application. Factors governing flow patterns: Combination of line flow and S type of pattern. Combination of line flow and circular type. Work station design-Storage Space Requirements.
4	Introduction, Advantages of a good factory building, Factors affecting the factory building - nature of manufacturing process- flexibility-expandability-service facilities-employee facilities-lighting-heating- ventilating-air conditioning-appearance- durable construction-security measures- noise control. Types of factory building - single story building, high bay and monitor type buildings, multi-story buildings, building of special types. Types of construction of factory building: Wood frame construction, Brick construction, Slow burning mill construction.



Suggested readings:

1. NIIR Board of Consultants & Engineers, *The Complete Book on Printing Technology with Process Flow Diagrams, Plant Layouts and Machinery Details (Offset, Gravure, Flexographic, Security, Web Offset and Pad Printing)*, 2nd Revised Edition, 1 January 2019.
2. Gerard Blokdyk, *Organization design: Implement, Administer, Manage, Create Space Independent Publishing Platform* (September 24, 2017).
3. Jack Greene, *Plant Layout and Facility Planning: Edition Two*, Create Space Independent Publishing Platform; 2nd edition (September 15, 2013).
4. Charles Conover, *Designing for Print: An In-Depth Guide to Planning, Creating, and Producing Successful Design*, Wiley; 2nd edition (25 November 2011).
5. A. John Geis, *Printing Plant Layout and Facility Design, Printing Industries Pr*; 3rd edition (1 May 2010).

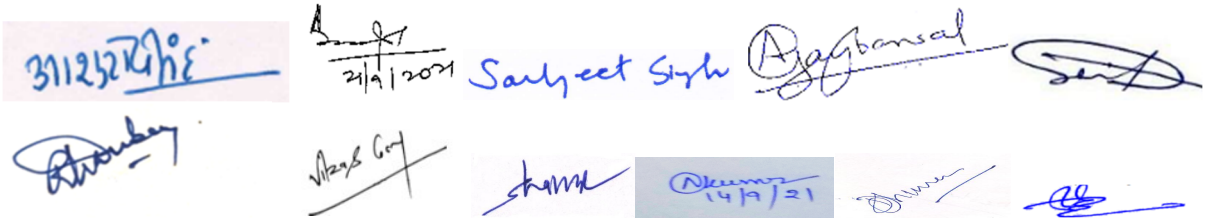


B. Tech Printing and Packaging Technology
SYLLABI OF EXAMINATIONS
B. Tech 4th Year (2021-22)

(Group A)

Program Name: B. Tech Printing and Packaging Technology

Course Code: BT PPT801A	Course Name: Major Project	L	T	P	C
		0	0	20	10
Year and Semester	4th Year 8th Semester	Evaluation			
Prerequisite of course	Nil	CIE: 90		TEE: 210	



B. Tech Printing and Packaging Technology
SYLLABI OF EXAMINATIONS
B. Tech 4th Year (2021-22)

Program Name: B. Tech. - Printing and Packaging Technology

Course Code: BT PPT802A	**Course Name: Quality Control & Waste Management**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**
Year and Semester	**4th Yr. 8th Semester**	**Contact hours per week:** (3 Hrs.)			
Prerequisite of course	**Basics of Management**	**Evaluation**			
		CIE: 30		**TEE: 70**	

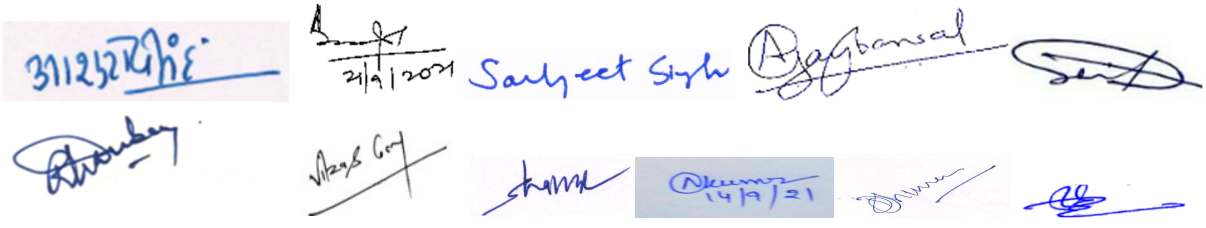
Course Level Learning Outcomes: On completion of the course, student would be able to:

- Describe the quality and its functions.
- Discuss the environmental impact of printing and packaging industry.
- List of ISO series.
- Explain various quality aspects on packages.

Unit	**COURSE SYLLABUS**
1	Definition of Quality, Quality control, its meaning, objective, and functions, Quality Cost, economic consideration, Quality Assurance, Comparative study of quality control and quality assurance, Benefits of Quality Control in Printing Industry, TQM, Quality Circles.
2	Solid, Liquid and Gaseous wastes in printing and packaging organizations, Environmental impact of printing and packaging industry, SWOT Analysis, wastage reduction in printing and packaging industries. Green protocol and green printing concepts.
3	Establishing Quality control programme in different departments of Printing organization. Introduction to ISO: 9000 and ISO: 14000 series. Environment Management system, QMS and EMS, Paper and paper board testing instruments for testing printability, print quality and end-user requirements. ISO standards for Graphic technology- ISO 12647- Process Control for halftone color separation, Proof and production prints, ISO 16760:2014 – Prepress data exchange. ISO 16762 & 16763 for Post press, ISO 284b for Printing ink ISO/TC 130 for digital printing and ISO/TC 122 for packaging.
4	Quality of packages, Press sheet control devices used for production of multi-color printing jobs, Basic principles of these instruments and devices how they function and what they measure, minimum instrumentation necessary to produce a product consistent with the appropriate quality level.

Suggested readings:

1. Amitava Mitra, *Fundamentals of Quality Control and Improvement*, Wiley; 4th edition (21 June 2016).
2. John Pichtel, *Waste management practices*, CRC Press; 2nd edition (31 March 2014).
3. U S Environmental Protection Agency, *Handbook: Quality Assurance/Quality Control (Qa/Qc) Procedures for Hazardous Waste Incineration*, Bibliogov (1 March 2013).
4. A.K. Bewoor V.A. Kulkarni, *Quality Control*, Wiley (1 January 2009).
5. George Tchobanoglous, Frank Kreith, U S Environmental Protection Agency, *Handbook of Solid Waste Management*, Second Edition, The McGraw-Hill Companies, Inc., 2002.



B. Tech Printing and Packaging Technology
SYLLABI OF EXAMINATIONS
B. Tech 4th Year (2021-22)

Program Name: **B. Tech Printing and Packaging Technology**

Course Code: BT PPT803A	**Course Name: Packaging of Industrial and Hazardous Goods**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**
Year and Semester	**4th Year 8th Semester**	**Contact hours per week:** (3 Hrs.)			
Prerequisite of course	**Basics of packaging**	**Evaluation**			
		CIE: 30		**TEE: 70**	

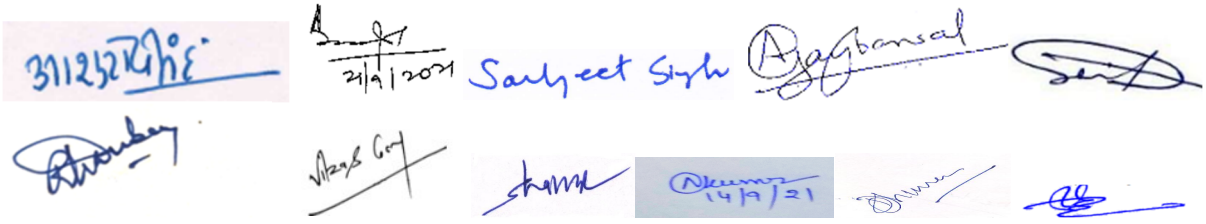
Course Level Learning Outcomes: On completion of the course, student would be able to:

- Describe the packaging of industrial products.
- Discuss wood packaging forms.
- Explain product protection methods.
- Write packaging of chemical products.

Unit	**COURSE SYLLABUS**
1	Introduction & Classification: Introduction to industrial products packaging, difference between consumer and industrial packaging needs. The packaging Considerations and package design approach, protective requirements and distribution – hazards, their sensitivity influencing packaging design and development criteria Industrial Products Classification – Product Group Wise, Its Nature, Classification & Requirements; Heavy, Medium and Light Engineering Goods; Electronic Products; Auto Components/ Spares, Chemicals and others.
2	Wood as Packaging Material: Classification of wood – Groups, softwood & hardwood, plywood Properties of wood – Density, Moisture Content Defects found in wood – Knots, Cross Grain, Cupping, checking and others. Introduction to Wood seasoning & Preservation. Wood Packaging Forms, Wooden Boxes & Crates – Difference & Types. Introduction to Wooden Pallets, Palletized Boxes & Box Pallets and their various components.
3	Product Protection: Corrosion – Types and Preventive Methods, Introduction to Desiccants Cushioning – Concept, Fragility & Cushion Factor, Shock & Vibration. Open & Closed cell cushions and various cushioning Materials. Internal Fitments – Functions & Different Materials; Types of Internal Fitments - Corner supports, Pads, Liners/collars, Trays, Slotted Partitions and others. Concept of Reinforcement & Unitization. Bulk Carriers: Intermediate Bulk Containers (IBC) – Rigid & Flexible – Types, Materials of Constructions & Various designs. Corrugated Fibreboard Boxes, Paper Sacks, Jerry Cans, Fibre Drums and others.
4	Packaging of Chemicals: Cement, Fertilizers, Pesticides/ Insecticides, Petroleum products etc., Alternate bulk Packaging systems and their applications and benefits. Functions of chemical Packaging, Recent developments in chemical packaging.

Suggested readings:

1. Marianne R. Klimchuk, Sandra A. Krasovec, *Packaging Design*, Wiley; 2nd edition (January 14, 2013).
2. Daniel Goodwin, Dennis Young, *Protective Packaging for Distribution: Design and Development*, DEStech Publications, Inc. (1 September 2010).
3. Joseph F.L. Robert S Keley, *Handbook of Package Engineering*, CRC Press, Published April 23, 1998.
4. F. A. Paine, *Fundamentals of Packaging*, Blackie and Son Ltd (January 1, 1962).
5. Friedman W.F. and J.J. Kipness, *Industrial Products packaging*, John Wiley & Sons, 1960.



B. Tech Printing and Packaging Technology
SYLLABI OF EXAMINATIONS
B. Tech 4th Year (2021-22)

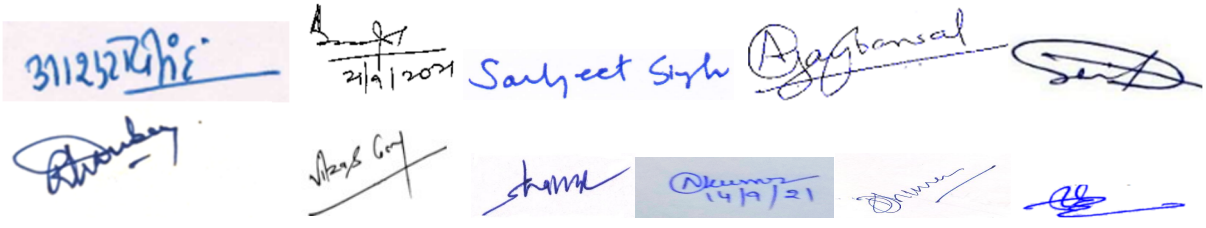
Program Name: B. Tech. - Printing and Packaging Technology

Course Code: BT PPT804A	**Course Name: Food and Pharmaceutical Packaging**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**
Year and Semester	**4th Year 8th Semester**	**Contact hours per week:** (3 Hrs.)			
Prerequisite of course	**Basics of packaging**	**Evaluation**			
		CIE: 30		**TEE: 70**	

Course Level Learning Outcomes: On completion of the course, student would be able to:

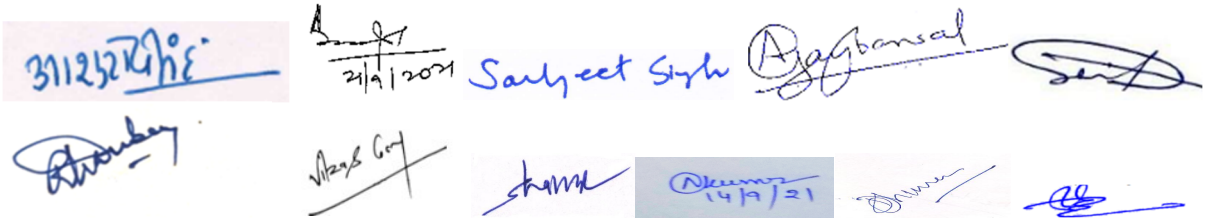
- Describe barrier material for a specific food product based on barrier properties.
- Explain food preservation techniques.
- Discuss various characteristics of pharmaceutical drugs.
- List cosmetic packaging materials & techniques.

Unit	**COURSE SYLLABUS**
1	Introduction to Food Packaging: An overview & Introduction to the science, technology, socio economic needs and packaging functions. Types of food – Perishable / Semi-perishable, acidity of food product. Gas and Vapor permeation - Basic concepts and theory of permeation and units. Barrier materials used in Food Packaging - Food-package compatibility and migration issues.
2	Food Preservation Techniques: Drying – Cold Preservation (Refrigeration, Deep Freezing) – Pickling – Sterilization (Retort/Canning, Irradiation) Modified & Controlled Atmosphere Packaging – Gases used – Vacuum Packaging, Active Food Ingredients.
3	Packaging of Drugs: Introduction, Classification, design guidelines. Packaging of Drugs - Injectable– Material used for drug packaging: Glass, Rubber, Plastic, Aluminum, paper and board.
4	Cosmetic Packaging: Introduction, Classification, Factors affecting Cosmetics Packaging, Cosmetic packaging materials and Techniques.



Suggested readings:

1. Dipak Kumar Sarkar, *Packaging Technology and Engineering: Pharmaceutical, Medical and Food Applications*. Wiley, September 2020.
2. Shrikant P. Athavale, *Handbook of Printing, Packaging and Lamination: Packaging Technology*, Notion Press; 1st edition (12 September 2018).
3. F Joseph Hanlon, McGraw-Hill, *Handbook of Package Engineering*, 2016.
4. Alexandru Grumezescu, *Food Packaging*, 1st Edition, Academic Press, 14th September 2016.
5. Soroka, Walter, *Fundamentals of Packaging Technology*, Institute of Packaging, Professionals, St. Charles, IL (2014).
6. Gordon L. Robertson, *Food Packaging: Principles and Practice*, Third Edition, CRC Press; 3rd edition (18 January 2013).
7. Edward J. Bauer, *Pharmaceutical Packaging*, CRC Press; 1st edition (25 March 2009).



B. Tech Printing and Packaging Technology
SYLLABI OF EXAMINATIONS
B. Tech 4th Year (2021-22)

Program Name: **B. Tech Printing and Packaging Technology**

Course Code: BT PPT805A	**Course Name: Industrial Packaging**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**
Year and Semester	**4th Year 8th Semester**	**Contact hours per week:** (3 Hrs.)			
Prerequisite of course	**Basics of packaging**	**Evaluation**			
		CIE: 30		**TEE: 70**	

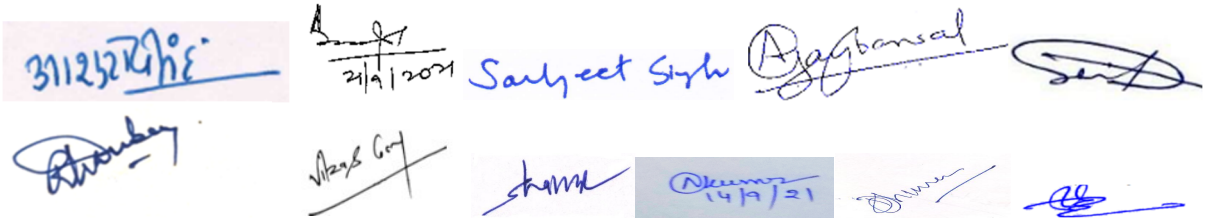
Course Level Learning Outcomes: On completion of the course, student would be able to:

- Discuss the importance of bulk packaging.
- Explain various packaging materials.
- Describe new packaging products.
- Discuss the various hazards in packaging.

Unit	**COURSE SYLLABUS**
1	Introduction to packaging, meaning of Bulk Packaging, bulk packaging consideration, Product needs, Product weights. Difference between bulk packaging and retail, Application of bulk packaging, advantages and disadvantages.
2	Bulk Packaging systems: Intermediate Bulk Containers (IBC) - Rigid IBC tanks, Flexible IBC Tanks, Designing, advantages, application, acquisition and disposal, safety, container costs, container types. Flexible Intermediate Bulk Containers (FIBC) - history, Electrostatic properties, Applications, uses of flood barrier, emptying FIBC. Woven sacks- Gunny sack, paper sack, plastic bags. Bulk Shrink Wrap- Introduction, Composition, and Manufacturing, application, Stretch Wrapping- Introduction, manufacturing, functions, Application- Manual, Semi-Automatic wrappers and Automatic wrappers.
3	Material used in bulk packaging- LDPE, LLDPE, HDPE, PP, PVC, Nylon, Polyester Other materials like- Corrugated, Bags, Metals, Wood.
4	Bulk Packaging for Hazardous Materials, Industrial packaging types. Selection of proper packaging for industrial product- Flexible industrial packaging paper and plastic, rigid industrial packaging wooden, metal and plastic.

Suggested readings:

1. Shrikant P. Athavale, *Handbook of Printing, Packaging and Lamination: Packaging Technology*, Notion Press; 1st edition (12 September 2018).
2. Walter-Soroka, *Fundamentals of packaging technology*, CPP; Institute Of Packaging Professionals, Published by Institute of Packaging Professional; 5th edition (January 1, 2014), 2014.
3. Fumi Sasada, Giles Murray, *the Eight Elements of Powerful Package Design*, November 19, 2013.
4. Kit L. Yam, *The Wiley Encyclopedia of Packaging Technology*, 3rd Edition, September 2009.

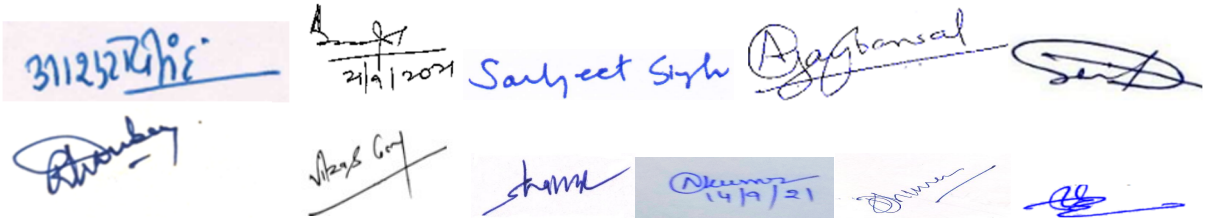


B. Tech Printing and Packaging Technology
SYLLABI OF EXAMINATIONS
B. Tech 4th Year (2021-22)

(Group B)

Program Name: B. Tech Printing and Packaging Technology

Course Code: BT PPT809A	**Course Name: Industry Internship**	**L**	**T**	**P**	**C**
		NA	**NA**	**NA**	**17**
Year and Semester	**4th Year 8th Semester**	**Evaluation**			
Prerequisite of course	**Nil**	**CIE: 150**		**TEE: 350**	



Central University of Haryana

('A' Grade, NAAC Accredited)

DEPARTMENT OF ELECTRICAL ENGINEERING (DEE)

NEP 2020/LOCF/OBE/NBA CURRICULUM (2021 -2022)

Program Name: M. Tech. - Energy System and Management

NEP 2020/LOCF/OBE/NBA CURRICULUM (2021 -2022)

Program Name: M. Tech. - Energy System and Management

- **Background**
- **Vision and Mission**
- **Programme Educational Objectives (PEOs):**
- **Program Specific Outcomes (PSO's)**
- **Program Outcomes (PO)**
- **Semester-wise courses and credit distribution**
- **Course Level Learning outcome**

NEP 2020/LOCF/OBE/NBA CURRICULUM (2021 -2022)

Program Name: M. Tech. - Energy System and Management

Background

Considering the curricular reforms as instrumental for desired learning outcomes, all the academic departments of Central University of Haryana made a rigorous attempt to revise the curriculum of undergraduate and postgraduate programmes in alignment with National Education Policy-2020 and UGC Quality Mandate for Higher Education Institutions-2021. The process of revising the curriculum could be prompted with the adoption of "Comprehensive Roadmap for Implementation of NEP-2020" in 32nd meeting of the Academic Council of the University held on April 23, 2021. The Roadmap identified the key features of the Policy and elucidated the Action Plan with well-defined responsibilities and indicative timeline for major academic reforms.

The process of revamping the curriculum started with the series of webinars and discussions conducted by the University to orient the teachers about the key features of the Policy, enabling them to revise the curriculum in sync with the Policy. Proper orientation of the faculty about the vision and provisions of NEP-2020 made it easier for them to appreciate and incorporate the vital aspects of the Policy in the revised curriculum focused on 'creating holistic, thoughtful, creative and well-rounded individuals equipped with the key 21st century skills' for the 'development of an enlightened, socially conscious, knowledgeable, and skilled nation'.

With NEP-2020 in background, the revised curricula articulate the spirit of the policy by emphasising upon— integrated approach to learning; innovative pedagogies and assessment strategies; multidisciplinary and cross-disciplinary education; creative and critical thinking; ethical and Constitutional values through value-based courses; 21st century capabilities across the range of disciplines through life skills, entrepreneurial and professional skills; community and constructive public engagement; social, moral and environmental awareness; Organic Living and Global Citizenship Education (GCED); holistic, inquiry-based, discovery-based, discussion-based, and analysis-based learning; exposure to Indian knowledge system, cultural traditions and classical literature through relevant courses offering 'Knowledge of India'; fine blend of modern pedagogies with indigenous and traditional ways of learning; flexibility in course choices; student-centric participatory learning; imaginative and flexible curricular structures to enable creative combination of disciplines for study; offering multiple entry and

exit points initially in undergraduate programmes; alignment of Vocational courses with the International Standard Classification of Occupations maintained by the International Labour Organization; breaking the silos of disciplines; integration of extra-curricular and curricular aspects; exploring internships with local industry, businesses, artists and crafts persons; closer collaborations between industry and higher education institutions for technical , vocational and science programmes; and formative assessment tools to be aligned with the learning outcomes, capabilities, and dispositions as specified for each course. In case of UG/PG programmes in Engineering and Vocational Studies, it was decided that the departments shall incorporate pertinent NEP recommendations while complying with AICTE, NBA, NSQF, International Standard Classification of Occupations, Sector Skill Council and other relevant agencies/sources. The University has also developed consensus on adoption of Blended Learning with 40% component of online teaching and 60% face to face classes for each programme.

The revised curricula of various programmes could be devised with concerted efforts of the faculty, Heads of the Departments and Deans of Schools of Study. The draft prepared by each department was discussed in series of discussion sessions conducted at Department, School and the University level. The leadership of the University has been a driving force behind the entire exercise of developing the uniform template and structure for the revised curriculum. The Vice Chancellor of the University conducted series of meetings with Heads and Deans to deliberate upon the vital parameters of the revised curriculum to formulate a uniform template featuring Background, Programme Outcomes, Programme Specific Outcomes, Postgraduate Attributes, Structure of Masters Course, Learning Outcome Index, Semester-wise Courses and Credit Distribution, Course-level Learning Outcomes, Teaching-Learning Process, Blended Learning, Assessment and Evaluation, Keywords, References and Appendices. The experts of various Boards of Studies and School Boards contributed to a large extent in giving the final shape to the revised curriculum of each programme.

To ensure the implementation of curricular reforms envisioned in NEP-2020, the University has decided to implement various provisions in a phased manner. Accordingly, the curriculum may be reviewed annually.

Program Name: M. Tech. - Energy System and Management

Vision and Mission

UNIVERSITY VISION

To develop enlightened citizenship of a knowledge society for peace and prosperity of individuals, nation and the world, through promotion of innovation, creative endeavours, and scholarly inquiry.

UNIVERSITY MISSION

To serve as a beacon of change, through multi-disciplinary learning, for creation of knowledge community, by building a strong character and nurturing a value-based transparent work ethics, promoting creative and critical thinking for holistic development and self-sustenance for the people of India. The University seeks to achieve this objective by cultivating an environment of excellence in teaching, research and innovation in pure and applied areas of learning.

DEPARTMENT VISION AND MISSION

VISION

- To strive incessantly for excellence towards education and research in electrical technologies by nurturing and contributing to state of art perspectives useful to industry and society.

MISSION

- **M1:** To prepare the students for fundamentals in Electrical, Electronics and computational technology.
- **M2:** To prepare the foundation for undertaking the research for systems involving emerging field of Electrical Engineering.
- **M3:** To prepare the professional skill for undertaking consultancy assignments for solving Industrial & Non- industrial problems.
- **M4:** To prepare dynamic entrepreneurial resources, useful for the society.

Mapping of University Vision and Mission to Department Vision and Mission

Acclaimed as modal Centre of Learning and Research by

University Vision and Mission	**Department Vision and Mission**
High quality knowledge society creation for peace and prosperity of individuals, nation and the world, through and scholarly inquiry	**Yes**
Promotion of innovation, creative endeavours, research and development	**Yes**
Students excellence through multi-disciplinary learning, value-based transparent work ethics, creative and critical thinking	**Yes**
Environment of excellence in teaching, research and innovation in pure and applied areas of learning	**Yes**

Program Name: M. Tech.- Energy System and Management

Programme Educational Objectives (PEOs):

The Department of Electrical Engineering in consultation with various stakeholders have formulated the Programme Educational Objectives (PEO's) that are broad statements that describe the career and professional accomplishments that the program is preparing its graduates to achieve in few years, subsequent to receiving the degree. The PEO's of the M. Tech. programme in Energy System and Management are as follows:

- **PEO1:** To impart knowledge on various recent developments in the energy sector, with a prime focus on non-conventional energy sources, including resource management and assessment.
- **PEO2:** To develop the Graduates into effective collaborators/innovators in efforts to address social, technical and engineering challenges being faced by Energy and Management sector
- **PEO3:** To prepare Graduates for innovative and independent research work in academia/industry to develop and maintain energy systems and processes and to deploy the wisdom.
- **PEO4:** To prepare Graduates to exhibit a high level of professionalism, integrity, environmental and social responsibility, and life-long independent learning ability.

Program Specific Outcomes (PSO's):

- PSO1 Basic Science: The ability to remember and understand the basic concept of electrical and electronic engineering, computer programming, design and analyze different electrical network and basics of physics, chemistry and knowledge of mathematics.
- PSO2 Core Competence: The proficiency to understand, evaluate and analyze the design concepts of electrical circuits and remember fundamentals and designing concept of electrical machines, power system, power electronics, control system and electrical drives, analog electronics and other electrical core subjects.
- PSO3 Interdisciplinary Skills: The ability to design and solve problems in the field of Interdisciplinary subjects by applying the knowledge acquired from communication system, DBMS, artificial intelligence, renewable energy system, & other allied topics.
- PSO4 Successful Career and Entrepreneurship: The skills to develop, adopt, assess the latest innovative industry best practices and to analyze, comprehend the young mindsets accordingly in their attitude for higher studies, research and to possess successful path as young entrepreneur.

PEOs to Mission statement mapping

PEO's	MISSION OF THE DEPARTMENT			
	M1	M2	M3	M4
PEO1	3	3	1	
PEO2	2	3	2	
PEO3	2	2	3	
PEO4	2	2	2	3

Program Name: M. Tech.- Energy System and Management

Program Outcomes - M.Tech (Energy System and Management)

The course would enable the students to

PO1: Resource assessment and mapping, energy planning and implementation techniques including basics of various energy systems and devices with specialization in one of the areas/subareas of various renewable energy technologies,

PO2: Understand the contemporary developments and evolve innovative methods/techniques to address the challenges being faced/anticipated to be faced to bring the research and developments into actual use,

PO3: Conduct independent experimental and numerical research, as well as to organize, analyze and present data to produce meaningful conclusions.

PO4: Understand professional, legal and ethical issues and responsibilities.

PO5: Address the environmental issues arose due to conventional energy based economy and to address them with renewable energy for sustainable development.

PO6: Acquire skills to share ideas through technical reports, presentations and journal publications.

PO7: Learn the project planning and development, project management techniques including financial and economic analysis

PO8: Understand the need for, and an ability to engage in life-long learning and continual updating of professional skills.

PO9: Work as a team member with leadership skills.

PO10: Understand and take active part understanding, formulation and implementation of Govt policies and suggest modification / up gradation time to time.

Mapping of PEO's with PO's

S. No.	*Program Educational Objectives*	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4
1	To build a strong foundation in the students in Mathematics, Science and Engineering fundamentals so as to enable them apply the same to analyze, design, innovate and develop products for real life applications	√	√	√	√	√	√	√	√	√	√	√	√	√	√
2	To foster and imbibe values and ethics, positive attitude, effective communication skills, leadership qualities and team spirit for a rewarding personal and professional career with a deep commitment and concern for the society.	√	√	√	√	√	√	√	√	√	√	√	√	√	√
3	To provide a holistic academic environment befitting research, academic excellence, entrepreneurship and desire for creating new knowledge so as to become industry and professionally ready to meet global challenges			√	√		√	√	√	√		√	√	√	√

M.Tech. (Energy System and Management) Semester – I
Choice Based Credit System Scheme of Studies w.e.f. 2021-22

Sl. No.	Course Code	Course Title	Teaching Schedule			Credits
			L	T	P	
Core Courses (Compulsory)						
1	MTESM-101	Energy conservation and management	3	1	0	4
2	MTESM-102	Introduction to Renewable Energy Systems	3	1	0	4
3		Program Elective - 1	3	1	0	4
4		Program Elective - 2	3	1	0	4
5	MTEMS-111	Energy laboratory -1	0	0	4	2
6	MTEMS-112	Specialization specific Current Topic Presentation -1	0	2	0	2
7		**General Elective or Open Elective-1**	3	1	0	4
8	MTEMS-113	Social & Extra Activity	0	0	2	1
9		Audit-I/MOOC	-	-	-	-
List of Program Electives (Any two electives to be chosen)						
10	MTESM-103	Energy Storage Systems for Electric Vehicles				
11	MTEMS-104	Bio Fuels & Bio Energy				
12	MTEMS-105	Renewable Energy Generation and Control				
13	MTEMS-106	Operation of Restructured Power System Protection				
14	MTEMS-107	Advanced Power System Analysis				
15	MTEMS-108	Digital Signal Processing				
16	MTEMS-109	Reactive Power Control and FACTS Devices				
17	MTESM-110	Advanced Control System				
Total			**15**	**07**	**06**	**25**

L= Lecture, T = Tutorial, P = Practical, & C = Credits

Central University of Haryana, Mahendergarh
M.Tech. (Energy System and Management) Semester – II
Choice Based Credit System Scheme of Studies w.e.f. 2021-22

Sl. No.	Course Code	Course Title	Teaching Schedule			Credits
			L	T	P	
Core Courses (Compulsory)						
1	MTESM-201	Management of Rural Energy System	3	1	0	4
2	MTESM-202	Solar Thermal Technologies & Application	3	1	0	4
3		Program Elective – 2	3	1	0	4
4		Program Elective – 3	3	1	0	4
5	MTEMS-211	Energy laboratory -2	0	0	4	2
6	MTESM-212	Specialization specific Current Topic Presentation -2	0	2	0	2
7		**General Elective or Open Elective-2**	3	1	0	4
8		Audit-II/MOOC	-	-	-	-
List of Program Electives (Any two electives to be chosen)						
8	MTESM-203	Electric Drive System				
9	MTESM-204	Power Quality				
10	MTESM-205	Smart Grids				
11	MTESM-206	Wind and Small Hydro Energy Systems				
12	MTESM-207	Electric and Hybrid Vehicles				
13	MTESM-208	Industrial Load Modelling and Control				
14	MTESM-209	Engineering Optimization				
15	MTESM-210	Nonlinear and Digital Control Systems				
Total			**15**	**07**	**04**	**24**

L= Lecture, T = Tutorial, P = Practical, & C = Credits

LIST OF AUDIT/MOOC COURSES 1 & 2

S. No.	Subject Code	Subject Title	Credits
1	MT AU 101	English for Research Paper Writing	0
2	MT AU 102	Disaster Management	0
3	MT AU 103	Sanskrit for Technical Knowledge	0
4	MT AU 104	Value Education	0
5	MT AU 105	Constitution of India	0
6	MT AU 106	Pedagogy Studies	0
7	MT AU 107	Stress Management by Yoga	0
8	MT AU 108	Personality Development through Life Enlightenment Skills	0

Central University of Haryana, Mahendergarh
M.Tech. (Energy System and Management) Semester – III
Choice Based Credit System Scheme of Studies w.e.f. 2021-22

Sl. No.	Course Code	Course Title	Teaching Schedule			Credits
			L	T	P	
1		Program Elective – 4	3	1	0	4
2		Open Elective-3/MOOCs	3	1	0	4
3	MTESM-305	M.Tech Dissertation-I: Group A/ Group B	-	-	-	10
4	MTESM-306	Specialization specific Current Topic Presentation -3	0	2	0	2
Elective Courses (Program Elective - 4)						
5	MTESM-301	Energy Auditing And Management				
6	MTESM-302	Waste to Energy Conversion				
7	MTESM-303	Economics and Financing of Renewable Energy Systems				
8	MTESM-304	Life Cycle Assessment of Renewable Systems				
Total			**06**	**04**	**0**	**20**

L= Lecture, T = Tutorial, P = Practical, & C = Credits

Group A= Research Based Projects, **Group B=** Industrial Based Projects/ Training
General Elective or Open Elective = Offer by other departments, MOOCs= relevant to Branch

Central University of Haryana, Mahendergarh
M.Tech. (Energy System and Management) Semester – IV
Choice Based Credit System Scheme of Studies w.e.f. 2021-22

Sl. No.	Course Code	Course Title	Teaching Schedule			Credits
			L	T	P	
1	MTESM-400	M.Tech Dissertation-II	-	-	-	30
Total			**-**	-	-	**30**

L= Lecture, T = Tutorial, P = Practical, & C = Credits

GRAND TOTAL CREDITS = 99

MTESM-101 ENERGY CONSERVATION AND MANAGEMENT

Semester - I

L	T	P	Credits
3	1	0	4

Class works Marks: 30
Exam Marks: 70
Total Marks: 100
Duration of Examination: 3 Hrs

Course Outcomes:

At the end of this course students will demonstrate the ability to

1. Understand the concept of energy scenario
2. Understand the theory of tariff and thermal management in electrical system.
3. Understand the basic concepts of energy audit& management.
4. Analyze energy saving opportunities.

UNIT I

Energy scenario:

Commercial and Non-commercial energy, primary energy resources, commercial energy production, final energy consumption, energy needs of growing economy, long term energy scenario, energy pricing, energy sector reforms, energy and environment, energy security, energy conservation and its importance, restructuring of the energy supply sector, energy strategy for the future, air pollution, climate change. Energy Conservation Act-2001 and its features.

UNIT II

Basics of Energy and its various forms:

Electricity tariff, load management and maximum demand control, power factor improvement, selection & location of capacitors, Thermal Basics-fuels, thermal energy contents of fuel, temperature & pressure, heat capacity, sensible and latent heat, evaporation, condensation, steam, moist air and humidity & heat transfer, units and conversion.

UNIT III

Energy Management & Audit:

Definition, energy audit, need, types of energy audit. Energy management (audit)approach understanding energy costs, bench marking, energy performance, matching energy use to requirement, maximizing system efficiencies, optimizing the input energy requirements, fuel & energy substitution, energy audit instruments.

UNIT IV

Energy Efficiency in Electrical Systems:

Electrical system: Electricity billing, electrical load management and maximum demand control, power factor improvement and its benefit, selection and location of capacitors, performance assessment of PF capacitors, distribution and transformer losses. Electric motors: Types, losses in induction motors, motor efficiency, factors affecting motor performance, rewinding and motor replacement issues, energy saving opportunities with energy efficient motors.

UNIT V

Energy Efficiency in Industrial Systems:

Pumps and Pumping System: Types, performance evaluation, efficient system operation, flow control strategies and energy conservation opportunities. Cooling Tower: Types and performance evaluation, efficient system operation, flow control strategies and energy saving opportunities, assessment of cooling towers.

UNIT VI

Energy Efficient Technologies in Electrical Systems:

Maximum demand controllers, automatic power factor controllers, energy efficient motors, soft starters with energy saver, variable speed drives, energy efficient transformers, electronic ballast, occupancy sensors, energy efficient lighting controls, energy saving potential of each technology.

TEXT BOOKS:

1. "Optimizing Energy Efficiencies in Industry", G. G. Rajan, Tata McGraw Hill.
2. Energy Auditing and Conservation; Methods, Measurements, Management and Case Study"", Hemisphere Publishers.
3. "Industrial Energy Conservation", Charles M. Gottschalk, John Wiley and Sons.

REFERENCE BOOKS:

1. “Utilization of Electrical Energy and Conservation”, S. C. Tripathy, McGraw Hill, 1991.
2. “Success stories of Energy Conservation by BEE”, New Delhi (www.bee-india.org).
3. “Guide books for National Certification Examination for Energy Manager / Energy Auditors Book-1”, General Aspects (available online)
4. “Guide books for National Certification Examination for Energy Manager / Energy Auditors Book-3”, Electrical Utilities (available online).

MTEMS-102 INTRODUCTION TO RENEWABLE ENERGY SYSTEMS
Semester - I

L	T	P	Credits
3	1	0	4

Class works Marks: 30
Exam Marks: 70
Total Marks: 100
Duration of Examination: 3 Hrs

Course Outcomes:
At the end of this course students will demonstrate the ability to

1. To provide knowledge of solar energy concept and applications.
2. To impart knowledge of geothermal, ocean and tidal energy and their applications.
3. To understand the design of wind mills and applications.
4. To understand the turbines and generators for small scale hydroelectric generation.
5. To understand the important parts of a biogas plant, design and principle of bio-diesel.

UNIT I

Need of sources of renewable energy: Introduction to different sources of renewable energy, e.g., Solar Energy, Wind Energy, Bio-mass, Geothermal Energy, Ocean energy, Solar Energy and Applications.

Basic concepts of radiations: Solar radiation, Direct and Indirect radiation, Radiation measuring instrument, applications etc.

Solar Energy: Basics of solar thermal applications both low and high temperature ranges such as water heating, air heating, steam generation, desalination of water, crop drying and power generation, Principle of photovoltaics including introduction to various components of a photovoltaic systems for standalone/hybrid/grid connected systems

UNIT II

Wind Energy: Wind Resource assessment including instrumentation used in resource assessment, basic theory of wind, wind power generators both for decentralized applications and grid connected systems, performance characteristics, Augmentation of wind power, Betz criteria

Bioenergy: Types and availability of biomass resources, various methods of biomass utilisation for energy generation: gasification, briquette, palatization, syn-gas, Anaerobic/Aerobic digestion, ethanol and biodiesel production, types of Bio-gas digesters, Combustion characteristics of biogas and its different utilizations,

UNIT III

Geothermal Energy: availability and methods of utilisation of geothermal resource for thermal applications and electricity generation

Hydro Energy: Basic principle of hydroelectric power generation, classification of hydropower projects (pico, micro, mini, small hydro sand large hydro projects), types of hydro turbine, various components of hydropower projects.

Ocean Energy: Principles utilization, thermodynamic cycles, tidal and wave energy, potential and conversion technique, Principle of ocean thermal energy conversion system.

UNIT IV

Fuel Cells and Hydrogen Energy: Introduction, principle of fuel cells, thermodynamic analysis of fuel cells, types of fuel cells, fuel cell batteries, applications of fuel cells. Hydrogen as a renewable energy source, sources of hydrogen, fuel for vehicles, hydrogen

production- direct electrolysis of water, thermal decomposition of water, biological and biochemical methods of hydrogen production.

Text/References:

1. Duffie, J. A., & Beckman, W. A. (2013). Solar engineering of thermal processes, fourth edition, Wiley.
2. Tiwari, G. N., & Ghosal, M. K. (2007). Fundamentals of renewable energy sources. Alpha Science International Limited.
3. Mukherjee, D., & Chakrabarti, S. (2004). Fundamentals of renewable energy systems. New Age International.
4. Sukhatme, S. P. (2005). Solar Energy Principles of Thermal Collection and storage Tata McGraw Hill Publishing Company Ltd. New Delhi.
5. Kothari, D. P., Singal, K. C., & Ranjan, R. (2011). Renewable energy sources and emerging technologies. PHI Learning Pvt. Ltd.

MTEMS-103 ENERGY STORAGE SYSTEMS FOR ELECTRIC VEHICLES

Semester - I

L	T	P	Credits
3	1	0	4

Class-work Marks: 40
Exam Marks: 60
Total Marks : 100
Duration of Examination: 3 Hrs

Course Outcomes:
At the end of this course students will demonstrate the ability to

1. To provide knowledge of energy storage system concept and applications.
2. To understand the design of Electric Vehicles and applications.
3. To impart knowledge of Hybrid Electric Vehicles and different batteries and their applications

Unit 1

Introduction of Energy Storage Systems and Vehicle Dynamics
General background on alternative energy sources and sustainability, Introduction to electric-based transportation, Overview of Land-Marine-Space vehicle electrification, Description of vehicle dynamics and dynamic equations, Vehicle performance, and fuel economy characteristics, Basic concept of regenerative braking energy

Unit 2

Electric Vehicles
Electric vehicles configuration Energy and power requirements for various HEVs and EVs Vehicle performance and driving cycles

Unit 3

Hybrid Electric Vehicles
Fundamentals of hybrid electric vehicles Series hybrid electric vehicles Parallel hybrid electric vehicles Start – stop hybrids, Mild hybrids, strong and full hybrids, Extended range hybrid vehicles, and full electric vehicles (BEV)

Unit 4

Energy Storage Systems Batteries
Supercapacitors, Fuel Cells and Hydrogen Storage, Battery Recycling Technologies, Battery Applications for Stationary and Secondary Use, Battery Chargers and Battery Testing Procedures, Battery Management Systems (BMS), Battery Thermal Management, Regulations and Safety Aspects of High Voltage Batteries.

References:
1. Iqbal Hussein, Electric and Hybrid Vehicles: Design Fundamentals, CRC Press, 2003.
2. Mehrdad Ehsani, Yimi Gao, Sebastian E. Gay, Ali Emadi, Modern Electric, Hybrid Electric and Fuel Cell Vehicles: Fundamentals, Theory and Design, CRC Press, 2004.
3. James Larminie, John Lowry, Electric Vehicle Technology Explained, Wiley, 2003.
4. Huggins R. A., Energy Storage: Fundamentals, Materials and Applications. Springer ,2015.

5. O'Hayre R., Cha S., Colella W., and Prinz F. B, Fuel Cell Fundamentals, Second Edition, Wiley, 2009.

MTESM-104 BIO FUELS AND BIO ENERGY

Semester - I

L	T	P	Credits
3	1	0	4

Class works Marks: 30
Exam Marks: 70
Total Marks: 100
Duration of Examination: 3 Hrs

Course Outcomes:

At the end of this course students will demonstrate the ability to

To enable students to acquire knowledge on cutting-edge technologies for conversion of various biomass feedstock to bioenergy / biofuel production and their utilization in combustion engines / devices and fuel cells. On successful completion of the course, the students would be able to contribute towards providing biomass based sustainable energy solutions.

UNIT I

Biomass resource assessment: Introduction, Classification and properties of biomass, Biomass characterization, different energy conversion methods, Bio Energy Resources, World Bio Energy

Potential, India's Bio Energy Potential, Biomass Resources and classification, Physio-chemical characteristics. Biomass Combustion, Loose biomass densification, Biomass based power generation and utilization for domestic cooking, Improved biomass cookstoves.

UNIT II

Biogas Systems: Technology of Biogas production, Biogas Plants, Digester types, Digester design, Chemical kinetics and mathematical modeling of bio methanation process, Dung, Vegetable Waste and Municipal Waste based Biogas plants, Biogas as fuel for transportation, Lighting, Running Dual Fuel Engines, Electricity generation, Biogas Bottling Plant Technology, Application of Biogas slurry in agriculture, Design of Biogas for cold climates. Case studies and numerical.

UNIT III

Biomass Gasifiers: History , Principle , Design of Bio mass Gasifiers , updraft gasifier, down draft gasifier, zero carbon biomass gasification plants, Gasification of plastic-rich waste, applications for cooking, electricity generation, Gasifier Engines, Operation of spark ignition and compression ignition engine with wood gas, methanol, ethanol and biogas, Biomass integrated gasification/combined cycles systems, gasification, pyrolysis, liquification, biomass pretreatment and processing, Case studies, biodiesel, improved biomass cookstove, biohydrogen generation, electricity generation from biomass gasifier, engine systems, bio-gasoline, bio-diesel and duel fuel engine, case studies.

UNIT IV

Biofuel: Bioethanol production from lignocelluloses, waste material, including crop residue, sugar and starch; biodiesel production from vegetable oil and animal fat, algae; biofuel derived from; economics of biofuel production; environmental impacts of biofuels; biofuel blends; green diesel from vegetable oil; biodiesel production process, by-product utilization**.** Production of butanol and propanol; Production of biohydrogen; production of hydrogen by fermentative bacteria.

Bio-refinery concept: Bio-refinery concept: definition; different types of bio-refinery; challenge and opportunities; Fuel and chemical production from saccharides, lingocellulosic biomass, protein; vegetable oil; algal biorefinery.

Text/References:

1. Mutha, V. K. (2010). Handbook of bioenergy and biofuel SBS Publishers, Delhi
2. Clark, J. H., &Deswarte, F. (Eds.). (2014). Introduction to chemicals from biomass. John Wiley & Sons.
3. Klass, D. L. (1998). Biomass for renewable energy, fuels, and chemicals. Elsevier.
4. Mukunda, H. S. (2011). Understanding clean energy and fuels from biomass. Wiley India.
5. Higman C. and Burgt M v d (2003); Gasification, Elsevier Science
6. Speight, J. (2008). Synthetic fuels handbook: properties, process and performance. McGraw-Hill
7. Dahiya, A. (Ed.). (2014). Bioenergy: Biomass to biofuels. Academic Press.
8. Hall, D. O., &Overend, R. P. (1987). Biomass: regenerable energy.
9. San Pietro, A. (Ed.). (2012). Biochemical and photosynthetic aspects of energy production. Elsevier. New York

MTESM -105 RENEWABLE ENERGY GENERATIONS AND CONTROL

Semester - I

L	T	P	Credits
3	1	0	4

Class-work Marks : 40
Exam Marks : 60
Total Marks : 100
Duration of Examination : 3 Hrs

Course Outcomes:

At the end of this course students will demonstrate the ability to

An undergraduate student taking this course will have foundation knowledge of various forms of renewable energy sources. Students will be able to learn about the solar energy and their utilization, wind energy and its applications, fuel cells, biomass, geothermal energy, MHD generation and ocean thermal energy, and hybrid renewable energy sources and technology.

UNIT 1

Introduction to energy sources: Primary and secondary energy sources, limitations to primary sources, Indian Energy Scene, Conventional and non-conventional energy sources, Prospects of renewable energy sources, MNRE and various schemes for promotion of Renewable Energy utilization.

Photo-voltaic, Fuel cells Powered generation: Distributed generation versus traditional power systems, Basic characteristics of sunlight - solar energy resource - photovoltaic cell - cell efficiency – characteristics - equivalent circuit – photo voltaic for battery charging – charge regulators – PV modules – battery backup – limitations – equipment's and systems – types of fuel cells – losses in fuel cells – solar- thermal power generation

UNIT 2

Wind Turbines and Embedded Generation: Wind Source- Wind statistics- energy in the wind- aerodynamics- rotor types- forces developed by blades- aerodynamic modelsbraking systems- tower- control and monitoring systems- power performance – wind driven induction generators – power circle diagram- steady state performance- modelling- integration issues- impact on central generation- transmission and distribution systems- wind farm.

UNIT 3

Isolated generation and Energy storage for Distributed Generation: Wind- diesel systems- fuel savings- permanent magnet alternators- modelling- steady state equivalent circuit- self excited induction generators- integrated wind- solar systems, battery energy storage, SMES, capacitor and other energy storage systems.

UNIT 4

Gas turbine powered Distributed generators and other Renewable Sources: Gas turbine types, mini and micro gas turbine generators, micro- hydel electric systems- power potential-scheme layout- generation efficiency and turbine power flow, isolated and parallel operation of generators- tidal and other sources and applications.

Text/ Reference books:

1. G.D. Rai, “Non-Conventional Energy Sources”, Khanna Publications, 1st Edition 2011
2. B.K.Khan, “Non-Conventional Energy Resources”, Tata McGraw-Hill Education. 2006
3. L.E. Ferris and D. Infield , “Renewable Energy in Power Systems”, Wiley, 1st Edition, 2008,
4. M.R. Patel, “Wind and Solar Power System, Design, Analysis and Operation”, CRC Press, 2nd Edition 2006.
5. John F. Walker & Jenkins, N., “Wind Energy Technology,” John Wiley and sons, Chichester, U.K., 1997.
6. Van Overstraeton R. J and Mertens R P., “Physics, Technology and use of photovoltaic”, AdemHilger, Bristol, 1996.

MTESM-106 OPERATION OF RESTRUCTURED POWER SYSTEM PROTECTION

Semester - I

L	T	P	Credits
3	1	0	4

Class-work Marks : 40
Exam Marks : 60
Total Marks : 100
Duration of Examination : 3 Hrs

Course Outcomes:

At the end of this course students will demonstrate the ability to

1. To provide in-depth understanding of operation of deregulated electricity market systems.
2. To examine topical issues in electricity markets and how these are handled world-wide in various markets.
3. To train the students to analyze various types of electricity market operational and control issues under congestion management.
4. To understand the operation of ancillary
5. To learn different pricing mechanism and power trading in restructured power system.

UNIT -1

Deregulation of Electricity Supply Industries: Introduction to deregulation, different entities in deregulated electricity markets, background of deregulation around the world, benefits from competitive electricity markets, different key issues of competitive electricity markets, market Clearing Price(MCP) - Market operations: Day-ahead and Hour-Ahead Markets, Elastic and Inelastic demand, technical challenges, Power System Restructuring and electricity reforms in India, key features of electricity act 2003.

UNIT-2

Market Models: Market Models based on energy trading, contractual agreement: Pool & Bilateral models, different independent models, role of ISO, market power, Bidding and auction mechanisms, optimal power flow, economical load dispatch and unit commitment in deregulated environment, market models in Indian market context, and power trading in India.

UNIT-3

Transmission Open Access and pricing issues: Power wheeling, transmission open access, cost component in transmission pricing, basic objectives, different methods of transmission pricing, Short run and long run marginal transmission price structure, development in international transmission pricing, reactive power pricing structure, and its calculation for generator's reactive support, numerical examples, impact of FACTS devices on transmission pricing.

Transmission congestion management: Transmission congestion, impact of transmission congestion, different methods of congestion management, financial transmission right, flow gate rights, market power and congestion issues, numerical examples, international experiences of transmission congestion management, security management: spinning reserves, interruptible load options.

UNIT-4

Available transfer capability determination: Definitions, principles of ATC determination, factors affecting ATC, static and dynamic ATC, static ATC determination using DC power transfer distribution factors, AC power transfer distribution factors, ATC with line outage contingencies, LODFs with DC and AC, dynamic ATC and its determination, ATC enhancement with FACTS controllers, numerical examples.

Ancillary Services management: Description of ancillary services, types of ancillary services, ancillary service management in US, UK, Austrailia, Sweden etc., reactive power as an ancillary service and its management, AGC as an ancillary service, AGC pricing, spinning reserve, black start capability, ancillary services auction.

Text/ Reference books:

1. Lio Lee Lai, Power System restructuring and deregulation. John Wiley and Sons, UK. 2001.

2. K. Bhattacharya, MHT Bollen and J.C Doolder, Operation of Restructured Power Systems, Kluwer Academic Publishers, USA, 2001.

3. Shahidehpour, Mohammad, Hatim Yamin, and Zuyi Li. *Market operations in electric power systems: forecasting, scheduling, and risk management*. John Wiley & Sons, 2003.

4. M. Shahedehpor, 'Restructured Electric Power Systems,: Operation, trading and volatility', Marcel Dekker, Inc.

5. M. Ilic, 'Power Systems Restructuring-Engineering and Economics', Kluwer Int. Series, 2000.

6.A.J Wood and B.F Wollenberg. Power System Operation and Control, John Wiley and Sons.

7.S.A Soman, S.A Khaperde, Shubha Pandit, Computational Methods for large Sparse Power System Analysis: An Object Oriented Approach. Kluwer Academic Publishers.

8.Understanding electric utilities and de-regulation, Lorrin Philipson, H. Lee Willis, Marcel Dekker Pub., 1998.

9.Power system economics: designing markets for electricity Steven Stoft, John Wiley & Sons, 2002

MTESM-107 **ADVANCED POWER SYSTEM ANALYSIS**

Semester - I

L	T	P	Credits
3	1	0	4

Class-work Marks : 40
Exam Marks : 60
Total Marks : 100
Duration of Examination : 3 Hrs

Course Outcomes:

At the end of this course students will demonstrate the ability to

1. To develop a detailed understanding of the range of analysis tools applied to the operation, design and investigation of modern electric power systems.
2. To Model and predict the operation of power system components, including three phase fault studies, stability studies and power system security.
3. To enable the students to understand the load flow techniques and monitoring of power system that causes the smooth and reliable operation of complex power system.

UNIT-1

Bus Impedance Algorithm: Partial network, building algorithm for bus impedance matrix, Addition of links, addition of branches, (considering mutual coupling) removal of links, modification of bus impedance matrix for network changes, Formation of bus admittance matrix and modification, Gauss elimination, Node elimination (Kron reduction), LU factorization, Schemes of Ordering, Sparsity, Calculation of Z bus elements for Y bus, Numerical examples

UNIT-2

Balanced and unbalanced network elements: Representation of three phase network elements, representation under balanced and unbalanced excitation, transformation matrices, symmetrical components, sequence impedances, unbalanced elements, three phase power invariance.

UNIT-3

Short circuit studies: Network representations for single line to ground fault, line to line fault, LL-G fault, and 3-phase faults, network short circuit studies using Z bus, Short circuit calculations for various types of faults in matrix form, numerical examples. Load flow studies: Load flow and its importance. classification of buses, load flow techniques, Iterative solutions and computer flow charts using Gauss-Seidel and Newton-Raphson methods, Decoupled and fast decoupled methods, representation of regulating and off nominal ratio transformers and modification of Ybus, comparison of methods, numerical examples.

UNIT-4

Introduction to AC-DC load flow problems: formation and solutions. Power system security: Introduction to Power system security, Adding removing multiple lines, piece-wise solution of interconnected systems, analysis of single and multiple contingencies, analysis with sensitivity factors, system reduction for contingency and fault analysis.

Text/ Reference books:

1. G.W. Stagg & A.H EI-Abaid, 'Computer methods in Power system analysis', McGraw Hill, New York.
2. M. A. Pai, 'Computer Techniques in Power System Analysis', 2nd Edi., TMH-New Delhi.
3. Kusic., 'Computer-Aided Power System Analysis', Prentice Hall of India, New Delhi.
4. John J.Grainger and W.D.Stevenson, 'Power System Analysis', McGraw Hill, New York, 1994.
5. A.J. Wood & W.F. Wollenberg, 'Power Generation, Operation, and Control', 2nd Edn, John Wiley & Sons, New York, 1996.
6. O.I. Elgerd, 'Electric Energy Systems Theory: An Introduction', McGraw Hill, New York, 1982.

MTESM-108 **DIGITAL SIGNAL PROCESSING**

Semester - I

L	T	P	Credits
3	1	0	4

Class-work Marks : 40
Exam Marks : 60
Total Marks : 100
Duration of Examination : 3 Hrs

Course Outcomes:

At the end of this course students will demonstrate the ability to

- To enable the students to understand and review the concept of DT Signals and DT Systems.
- To understand and analyze discrete time signals and systems using Z-transform, DTFT, DFT and FFT.
- To understand and analyze FIR & IIR filters
- To build the concept of Adaptive and Multi-rate Digital Signal Processing
- To apply DSP tools in different types of digital signals in real life such as Speech signal, Image signal, Biomedical signals etc.

UNIT I

Discrete Signals: **Review** of discrete–time sequences and systems, Linearity, Shift invariance, Causality and Stability Criterion.

UNIT 2

Z-Transforms and System Function : **Review** of Z-Transforms, Region of convergence, Relation between Z-transform and Fourier transform, Inverse Z-Transform and its evaluation; System Function.

Discrete Fourier Transform and FFT: Discrete Fourier Transform (DFT), Fast Fourier Transform (FFT) algorithms using decimation in time and decimation in frequency techniques, Chirp Z- Transform.

UNIT 3

IIR and FIR Filter design: Basic structures of digital filters; Review of Approximation of filter functions; IIR filter design based on analog filter functions- Invariant and modified invariant response techniques, Bilinear transformation method, Design based on least square method. Significance of Linear phase .response, FIR filters design - Frequency sampling and Windowing techniques, Computer aided design.

UNIT 4

Adaptive and Multi-rate Digital Signal Processing: Introduction to adaptive filters, Application of adaptive filters; **Multi-rate processing -** Decimation & Interpolation, Filter design with sampling rate conversion, by a rational factor I/D.

DSP Applications: Applications in speech and image processing, Biomedical signal and power spectrum estimation.

Text/ Reference books:

1. Li Tan, Digital Signal Processing Fundamentals and Applications, Academic Press, 2008.
2. J.G.Proakis & D.G.Manolakis, Digital Signal Processing, Principles, algorithms and Applications, Fourth edition, PHI, 2007.
3. Texas Instruments: Digital Signal Processing Applications with TMS 320 Family, Second edition, PHI, 2005.
4. Mitra, S.K, Digital Signal Processing: A Computer Based Approach, Third Edition, TMH, 2006.

MTESM-109 REACTIVE POWER CONTROL AND FACTS DEVICES

Semester - I

L	T	P	Credits
3	1	0	4

Class-work Marks : 40
Exam Marks : 60
Total Marks : 100
Duration of Examination : 3 Hrs

Course Outcomes:

At the end of this course students will demonstrate the ability to

1. An ability to apply knowledge of FACTS Controllers.
2. An ability to design a Compensators within realistic constraints.
3. An ability to identify, model, and solve real network problems with FACTS controllers
4. The broad education necessary to understand the impact of engineering solutions in a global perspective
5. A knowledge of recent trend in FACTS controllers and application of FACTS controllers.

UNIT-1

Reactive Power Control in Electric Transmission Systems, Loading Capability and Stability Considerations, Introduction to related concepts and systems requirements. Flexible AC Transmission Systems (FACTS) Devices: Configuration of FACTS devices, Principles of operation and control techniques.

UNIT-2

Static Series Compensators, TCSC and Applications: Objectives of series compensation, Operation of the TCSC, Different modes of operation, Modelling of TCSC and their comparison, Variable reactance model, Modelling for Power Flow and stability studies. Applications: Improvement of the system stability limit, Enhancement of system damping-SSR Mitigation.

UNIT-3

Voltage Source Converter Based FACTS Controllers: Static Synchronous Compensator (STATCOM), Principle of operation, V-I Characteristics. Comparison with SVC, Applications: Steady state power transfer, Enhancement of transient stability, Prevention of voltage instability. SSSC-operation of SSSC and the control of power flow, Modelling of SSSC in load flow and transient stability studies, Comparison with TCSC, Applications: SSR Mitigation-UPFC and IPFC operating principles and their characteristics, Control structure, Applications.

UNIT-4

Co-Ordination of FACTS Controllers: Controller interactions, SVC, SVC interaction, Coordination of multiple controllers using linear control techniques, Control coordination using genetic algorithms.

Application of FACT devices in: Power System Satiability analysis, Reactive power control, Optimal power flow analysis, Wide area monitoring.

Text/ Reference books:

1. Arrillaga J, HVDC transmission, IET
2. Padiyar K R, HVDC Power transmission System, New age International
3. Padiyar K R, FACTS Controllers in Power Transmission and Distribution, New Age International (P) Limited, Publishers, New Delhi
4. John A T, Flexible A.C. Transmission Systems, Institution of Electrical and Electronic Engineers (IEEE) .
5. Sood V K, HVDC and FACTS controllers – Applications of Static Converters in Power System, Kluwer Academic Publishers

MTESM-110 **ADVANCED CONTROL SYSTEM**

Semester - II

L	T	P	Credits
3	1	0	4

Class-work Marks : 40
Exam Marks : 60
Total Marks : 100
Duration of Examination : 3 Hrs

Course Outcomes:

At the end of this course students will demonstrate the ability to

1. Apply linear algebra to complex real world problems in order to obtain models that are expressed using state space equations.
2. Analyze the system behaviour based on the mathematical model of that system where the model may be expressed in state-space domain
3. Analyze the behaviour of closed loop systems using tools like Matlab
4. Design controllers using the concept of state feedback and pole placement tech.
5. Write a report that effectively communicates the results of an analysis or design

Unit 1

Math Modelling of Dynamical Systems: Newtonian and Lagrangian approaches, Concept of dynamical state of a system, Concept of equilibrium point, linearization of non-linear model.

Review of Linear Algebra concepts: Field, Vector space, linear combination, linear independence, bases of a vector space, representation of any vector on different basis, matrix representation of a linear operator, Change of basis, rank, nullity, range space and null space of a matrix, Eigen value and Eigen vector of a matrix, similarity transform, Diagonalisation.

Unit 2

Modern Control Analysis: Concept and computation of systems modes, controllability theorem and its proof, Observability theorem and its proof, Controllable and observable subspaces.

Stability Analysis: Stability of linear systems, stability types and their definitions for any general system, Stability of an equilibrium point, Lyapunov stability theory for LTI systems, Quadratic forms and Lyapunov functions.

Unit 3

Modern Control Design: Converting the math model to controllable canonical form and its use for pole placement, Concept of linear observer and its design, Design of reduced order observer, Compensator design using separation principle, Poles of compensator, Open loop and close-loop systems.

Unit 4

Optimal Control Theory: Introduction to the philosophy of optimal control, formulation of optimal control problem, different performance criterion, Linear quadratic regulator (LQR) and optimum gain matrix, Riccati equations, conceptual models and statistical models for random processes, Kalman filter.

Suggested reading

1. Bernard Friedland, “Control System Design: An Introduction to State-Space Methods”, Dover Publications, Inc. Mineola, New York, 2012

2. Thomas Kailath, “Linear Systems”, Prentice-Hall Inc., New Jersey, 1986

3. M. Gopal, “Modern Control System Theory”, New Age International (P) Limited, New Delhi, 2000

MTESM-111 ENERGY LABORATORY-1

Semester - I

L	T	P	Credits		
0	0	4	2	Class-work Marks	: 30
				Exam Marks	: 70
				Total Marks	: 100

Course Outcome: Upon completion of the course, the students will be able to:
1. Understand the working of solar PV and wind energy technology to generate electricity.
2. Measure solar radiation and wind standalone and do technical analysis.
3. Conduct experiments related to wind and solar PV do technical analysis to study their characteristics.

List of Experiments:

1. To determine I-V & P-V characteristics of PV module by varying radiation and temperature.
2. To determine I-V & P-V characteristics of series and parallel combination of PV modules
3. To show the effect of variation of tilt angle on PV module power.
4. Analysis and characterization of wind standalone system.
5. Evaluation of cut-in speed and cut-off speed.
6. I-V characteristics of wind turbine at different wind speed.
7. Impact of load and wind speed on power output and its quality.
8. Evaluation of the active, reactive power and net energy flow between grid tied inverter, artificial grid & load.

Note:

1. At least 7 experiments are to be performed by students in the semester.
2. At least 6 experiments should be performed from the above list; remaining two experiments may either be performed from the above list or designed and set by the Dept. as per the scope of the syllabus

MTESM-201 MANAGEMENT OF RURAL ENERGY SYSTEM

Semester - II

L	T	P	Credits
3	1	0	4

Class works Marks: 30
Exam Marks: 70
Total Marks: 100
Duration of Examination: 3 Hrs

Course Outcomes:

At the end of this course students will demonstrate the ability to

1. To impart knowledge about the planning and design aspects of electrification of rural areas.

UNIT I

Electrical load survey and forecasting, rural load management. Route survey and profiling of transmission and distribution lines.

UNIT II

Mechanical design of low-tension distribution lines, selection of poles/supports etc. Electrical design of low-tension distribution lines: selection of conductors and insulators etc.

UNIT III

Planning, selection and design of substations for rural electrical system. Load flow methods for transmission and distribution system; fault analysis: different types of faults and their calculation procedures

UNIT IV

Co-ordination between power and tele-communication lines Maintenance of transmission and distribution lines Case study of a typical system

Text/References:

1. Kamaraju, V., "Electric Power Distribution System", Tata McGraw Hill Education Private Limited.
2. Grainger, J.J. and Stevenson, W.D., "Power System Analysis", Tata McGraw Hill Publishing Company Limited.
3. Jangwala, N.K., "Modern Trends and Practices in Power Subtransmission and Distribution Systems", Vol.-I and II, CBIP Publication.
4. Widmer, P. and Arter, A., "Village Electrification", MHPG, SKAT Publication.
5. Pabla A.S., "Electric Power Distribution",5th edition,Tata McGraw Hill Publishing Company.
6. Harker, K., "Power System Commissioning and Maintenance Practice", The

MTESM-202 SOLAR THERMAL TECHNOLOGIES AND APPLICATIONS
Semester - II

L	T	P	Credits
3	1	0	4

Class works Marks: 30
Exam Marks: 70
Total Marks: 100
Duration of Examination: 3 Hrs

Course Outcomes:

At the end of this course students will demonstrate the ability to

Various types of solar thermal collectors. Details of thermal performance of different thermal collector configurations are included. Emphasis has been given to the concentrating collector for power generation and the application of solar energy for industrial process heat. Solar thermal energy storage through different mechanics and processes and also discussed. The course is designed with objectives to make the students capable to analyze the performance of solar thermal systems.

UNIT I

Basics for solar thermal system: Different design and components; Radiation transmission and absorption through glazing; Selective surfaces: Ideal coating characteristics, Anti reflection coating;
Flat plate collector: Theory and basic design aspects; Thermal analysis and effective heat loss; Performance analysis methods; Thermal analysis and effective energy loss of evacuated tube collector; Flat plate solar dryer: Issues and challenges.

UNIT II

Concentrating collector: Classification of concentrating collector; concentrating collector configurations; concentration ratio: optical, geometrical; Thermal performance of concentrating collector; Optical and thermal performance of different concentrating collector designs; Parabolic trough concentrators; Compound parabolic concentrator; Concentrators with point focus.

UNIT III

Solar thermal power plant: Central receiver systems; Heliostats; Comparison of various designs: Parabolic trough systems, Rankine cycle, Parabolic Dish - Stirling System, Combined cycle

UNIT IV

Solar industrial process heat: Integration of solar thermal system with industrial processes; Mechanical design considerations; Economics of industrial process heat
Solar thermal energy storage: Sensible storage; Latent heat storage; Thermo-chemical storage; High temperature storage; Designing thermal storage systems

Text/References:

1. Duffie J. A. and Beckman W. A. (2013), Solar Engineering of Thermal Processes, John Wiley
2. Garg H. P. and Prakash S. (2000), Solar Energy: Fundamental and Application, Tata McGraw Hill
3. Goswami D. Y. (2015), Principles of Solar Engineering, Taylor and Francis

4. Tiwari G. N. (2002), Solar Energy: Fundamentals, Design, Modeling and Applications, Narosa
5. Nayak J. K. and Sukhatme S. P. (2006), Solar Energy: Principles of Thermal Collection and Storage, Tata McGraw Hill
6. Serrano, M. I. R. (2017). Concentrating solar thermal technologies. In Concentrating Solar Thermal Technologies (pp. 11-24). Springer, Cham.
7. Tyagi, H., Chakraborty, P. R., Powar, S., & Agarwal, A. K. (Eds.). (2019). Solar Energy:

MTESM-203 ELECTRIC DRIVE SYSTEM

Semester - II

L	T	P	Credits
3	1	0	4

Class-work Marks : 40
Exam Marks : 60
Total Marks : 100
Duration of Examination : 3 Hrs

Course Outcomes:

At the end of this course students will demonstrate the ability to

1. Model and simulate electric drive systems
2. Design modulation strategies of power electronics converters, for drives application
3. Design appropriate current/voltage regulators for electric drives
4. Select and implement the drives for Industrial Process
5. Implement various variable speed drives in Electrical Energy Conversion System

Unit 1

Dynamics of Electric Drives: Fundamentals of torque equation. Speed torque convention and multi-quadrant operation, components of load torques. Classification of load torques steady state stability. Load equation, Speed control and drive classification. Close loop control of drives.

Unit 2

DC motor Drives-Modelling of DC machines. • Steady state characteristics with armature and speed control. Phase controlled DC motor drives, chopper controlled DC motor drives.

Unit 3

Poly-phase induction machines- Dynamic modelling of induction machines. • Small signal equations, control characteristics of induction machines.

Phase-controlled induction machines. Stator voltage control. Slip energy recovery scheme, frequency control and vector control of induction motor drives.

Unit 4

Traction motor: Starting.Speed-Time characteristics.Braking. Traction motors used in practice.

Industrial Drives-Digital Control of Electric Drives. Stepper motor.Servo motor and their Applications.

Suggested reading

1. G.K, Dubey, "Power semiconductor controlled Drives", Prentice Hall international, New Jersey, 1989.

2. R.Krishanam, “Electric motor drives modelling, analysis and control”, PHI-India-2009.

3. G. K. Dubey,“Fundamentals of electric Drives”, Narosa Publishing House, 2nd edition, 2011.

4. W. Leonhard, “Control of Electrical drives”, Springer, 3rd edition, 2001.

5. P.C. Krause –, “Analysis of Electric Machine”, Wiley-IEEE press 3rdedition.

6. K. Bose,“Modern Power Electronics and AC Drives”, Prentice Hall publication, 1st edition, 2001.

MTESM-204 **POWER QUALITY**

Semester - II

L	T	P	Credits
3	1	0	4

Class-work Marks : 40
Exam Marks : 60
Total Marks : 100
Duration of Examination : 3 Hrs

Course Outcomes:

At the end of this course students will demonstrate the ability to

1. Identify different power quality problems present in residential, commercial and industrial power systems.
2. Understand the waveform processing techniques and their applications for power quality assessment.
3. Apply basic principles to carry out harmonic load flow studies and the filter design concepts to mitigate harmonics.
4. Design a grounding mat for a substation

Unit 1

Introduction-power quality-voltage quality-overview of power, Quality phenomena classification of power quality issues, Power quality measures and standards-THD-TIF-DIN-C-message weights, Flicker factor transient phenomena-occurrence of power quality problems, Power acceptability curves-IEEE guides, Standards and recommended practices

Unit 2

Harmonics-individual and total harmonic distortion, RMS value of a harmonic waveform, Triplex harmonics. Important harmonic introducing devices.SMPS, Three phase power converters-arcing devices saturable devices, Harmonic distortion of fluorescent lamps-effect of power system harmonics on power system equipment and loads.

Unit 3

Modelling of networks and components under non-sinusoidal conditions, Transmission and distribution systems, Shunt capacitors-transformers.Electric machines, Ground systems loads that cause power quality problems, Power quality problems created by drives and its impact on drive.

Unit 4

Power factor improvement- Passive Compensation, Passive Filtering.Harmonic Resonance. Impedance Scan Analysis, Active Power Factor Corrected Single Phase Front End, Control Methods for Single Phase APFC, Three Phase APFC and Control Techniques, PFC based on Bilateral Single Phase and Three Phase Converter, Hamilton-Jacobi-Bellman equation - model reference adaptive systems (MRAS) - Design hypothesis.

Suggested reading

1. G.T. Heydt, “Electric power quality”, McGraw-Hill Professional, 2007

2. Math H. Bollen, “Understanding Power Quality Problems”, IEEE Press, 2000

3. J. Arrillaga, “Power System Quality Assessment”, John wiley, 2000

4. J. Arrillaga, B.C. Smith, N.R. Watson & A. R.Wood ,”Power system Harmonic Analysis”, Wiley, 1997

MTESM-205 **SMART GRIDS**

Semester - II

L	T	P	Credits
3	1	0	4

Class-work Marks : 40
Exam Marks : 60
Total Marks : 100
Duration of Examination : 3 Hrs

Course Outcomes:

At the end of this course students will demonstrate the ability to

1. To understand the basic concepts, components and architecture of smart grid
2. To understand the various measurement technologies in smart grid
3. To educate the importance of renewable energy in smart
4. To know about battery technology and energy storage
5. To brief about role of Electric Vehicles in smart grid

Unit 1

Introduction to Smart Grid, Evolution of Electric Grid, Concept of Smart Grid, Definitions, Need of Smart Grid, Concept of Robust &Self-Healing Grid, Present development & International policies in Smart Grid , Introduction to Smart Meters, Real Time Prizing, Smart Appliances, Automatic Meter Reading (AMR), Outage Management System (OMS).

Unit 2

Plug in Hybrid Electric Vehicles(PHEV), Vehicle to Grid, Smart Sensors, Home & Building Automation, Smart Substations, Substation Automation, Feeder Automation, Geographic Information System (GIS), Intelligent Electronic Devices (IED) & their application for monitoring & protection, Smart storage like Battery, SMES, Pumped Hydro, Compressed Air Energy Storage, Wide Area Measurement System (WAMS), Phase Measurement Unit (PMU).

Unit 3

Concept of micro-grid, need & applications of micro-grid, Formation of micro-grid, Issues of interconnection, Protection & control of micro-grid, Plastic & Organic solar cells, Thin film solar cells, Variable speed wind generators, fuel-cells, micro-turbines, Captive power plants, Integration of renewable energy sources.

Unit 4

Power Quality & EMC in Smart Grid, Power Quality issues of Grid connected Renewable Energy Sources, Power Quality Conditioners for Smart Grid, Web based Power Quality monitoring, Power Quality Audit, Advanced Metering Infrastructure (AMI), Home Area Network (HAN), Neighbourhood Area Network (NAN), Wide Area Network (WAN), Bluetooth, ZigBee, GPS, Wi-Fi, Wi-Max based communication, Wireless Mesh Network.Basics of CLOUD Computing &Cyber Security for Smart Grid, Broadband over Power line (BPL). IP based protocols

Suggested reading

1. Ali Keyhani, “Design of smart power grid renewable energy systems”, Wiley IEEE,2011.

2. Clark W. Gellings, “The Smart Grid: Enabling Energy Efficiency and Demand Response”, CRC Press, 2009.

3. JanakaEkanayake, Nick Jenkins, KithsiriLiyanage, “Smart Grid: Technology and Applications”, Wiley 2012.

4. Stuart Borlas’e, “Smart Grid:Infrastructure, Technology and solutions “CRC Press.

5. A.G.Phadke , “Synchronized Phasor Measurement and their Applications”,Springer

MTESM-206 WIND AND SMALL HYDRO ENERGY SYSTEMS

Semester -II

L	T	P	Credits		
3	1	0	4	**Class-work Marks**	**: 40**
				Exam Marks	**: 60**
				Total Marks	**: 100**
				Duration of Examination	**: 3 Hrs**

Course Outcomes:

At the end of this course students will demonstrate the ability to

1. To understand wind and hydro energy resource assessment techniques.
2. To understand the principles of conversion to useful form of energy from these resources.
3. To understand the working principles of the conversion devices, limitations, cost of energy generation and environmental issues

Unit 1

Basics of Wind Energy: Atmospheric circulations, classification, factors influencing wind, wind shear, turbulence, wind speed monitoring, Wind resource assessment, Weibull distribution, Betz limit, Aerodynamic theories, Axial momentum, Blade element and combine theory, Rotor characteristics, Maximum power coefficient, Tip loss correction

. **Unit 2**

Wind energy conversion systems: Classification, applications, power, torque and speed characteristics Aerodynamic design principles etc, wind turbine design considerations: methodology, theoretical simulation of wind turbine characteristics.

Principle of WEG: Stand alone, grid connected; Hybrid applications of WECS; Wind pumps, performance analysis of wind pumps, design concept and testing, economics of Wind energy utilization, Wind energy Program in India.

Unit 3

Hydrology: Resource assessment, Potential of hydropower in India, Classification of Hydropower Plants, Small Hydropower Systems, Overview of micro, mini and small hydro systems, Status of Hydropower Worldwide and India

Hydraulic Turbines: types and operational aspects, classification of turbines, elements of turbine, selection and design criteria, geometric similarity operating characteristic curves; Speed and voltage regulation Selection of site for hydroelectric plant, Essential elements of hydroelectric power plant.

Unit 4

Economics: cost structure, Initial and operation cost, environmental issues related to large hydro projects, Potential of hydro power in North East India

Suggested reading

1. 1 Johnson G. L. (2006). Wind Energy Systems (Electronic Edition), Prentice Hall
2. Wagner H. and Mathur J. (2011). Introduction to Hydro Energy Systems: Basics, Technology and Operation, Springer Reference Books
3. Hau E. (2000). Wind Turbines: Fundamentals, Technologies, Application and Economics, Springer
4. Mathew S. (2006). Wind Energy: Fundamentals, Resource Analysis and Economics, Springer
5. Burton T. Sharpe D. Jenkins N. and Bossanyi E. (2001). Wind Energy Handbook, John Wiley
6. Nag P. K. (2008). Power Plant Engineering, Third Edition, Tata McGraw Hill
7. Jiandong T. (et al.) (1997). Mini Hydropower, John Wiley

MTESM-207 ELECTRIC AND HYBRID VECHILES

Semester - II

L	T	P	Credits
3	1	0	4

Class-work Marks : 40
Exam Marks : 60
Total Marks : 100
Duration of Examination : 3 Hrs

Course Outcomes:

At the end of this course students will demonstrate the ability to

1. Develop the electric propulsion unit and its control for application of electric vehicles.
2. Analyze different power converter topology used for electric vehicle application.

Unit 1

History of hybrid and electric vehicles, Social and environmental importance of hybrid and electric vehicles, Impact of modern drive-trains on energy supplies, Basics of vehicle performance, vehicle power source characterization, Transmission characteristics, Mathematical models to describe vehicle performance

Unit 2

Basic concept of hybrid traction, Introduction to various hybrid drive-train topologies, Power flow control in hybrid drive-train topologies, Fuel efficiency analysis, Basic concept of hybrid traction, Introduction to various hybrid drive-train topologies, Power flow control in hybrid drive-train topologies, Fuel efficiency analysis.

Unit 3

Introduction to electric components used in hybrid and electric vehicles, Configuration and control of DC Motor drives, Configuration and control of Introduction Motor drives, configuration and control of Permanent Magnet Motor drives, Configuration and control of Switch Reluctance Motor drives, drive system efficiency

Unit 4

Matching the electric machine and the internal combustion engine (ICE), Sizing the propulsion motor, sizing the power electronics, Selecting the energy storage technology, Communications, supporting subsystems, Introduction to energy management and their strategies used in hybrid and electric vehicle, Classification of different energy management strategies, Comparison of different energy management strategies, Implementation issues of energy strategies

Suggested reading

1.Sira -Ramirez, R. Silva Ortigoza, “Control Design Techniques in Power Electronics Devices”, Springer.

2. Siew-Chong Tan, Yuk-Ming Lai, Chi Kong Tse, “Sliding mode control of switching Power Converters”

MTESM-208 INDUSTRIAL LOAD MODELING AND CONTROL

Semester - II

L	T	P	Credits
3	1	0	4

Class-work Marks	**: 40**
Exam Marks	**: 60**
Total Marks	**: 100**
Duration of Examination	**: 3 Hrs**

Course Outcomes:

At the end of this course students will demonstrate the ability to

1. Knowledge about load control techniques in industries and its application.
2. Learn different types of industrial processes and optimize the process using tools like LINDO and LINGO.
3. Apply load management to reduce demand of electricity during peak time.
4. Apply different energy saving opportunities in industries.

Unit 1

Electric Energy Scenario-Demand Side Management-Industrial Load Management, Load Curves-Load Shaping Objectives, Methodologies-Barriers, Classification of Industrial, Loads, Continuous and Batch processes -Load Modelling

Unit 2

Electricity pricing – Dynamic and spot pricing -Models, Direct load control- Interruptible load control, Bottom up approach- scheduling- Formulation of load, Models, Optimization and control algorithms - Case studies

Unit 3

Cooling and heating loads, load profiling, Modelling- Cool storage, Types-Control strategies, Optimal operation, Problem formulation- Case studies, power units, Operating and control strategies, Power Pooling- Operation models

Unit 4

Energy banking, Industrial Cogeneration, Selection of Schemes Optimal Operating Strategies, Peak load saving, Constraints Problem formulation- Case study, Integrated Load management for Industries

Suggested reading

1. C.O. Bjork " Industrial Load Management - Theory, Practice and Simulations", Elsevier, the Netherlands,1989

2. C.W. Gellings and S.N. Talukdar,. Load management concepts. IEEE Press, New York, 1986, pp. 3-28

3. Y. Manichaikul and F.C. Schweppe ," Physically based Industrial load", IEEE Trans. on PAS, April 1981

4. H. G. Stoll, "Least cost Electricity Utility Planning", Wiley Interscience Publication, USA, 1989.

5. I.J.Nagarath and D.P.Kothari, .Modern Power System Engineering., Tata McGraw Hill publishers, NewDelhi, 1995

6. IEEE Bronze Book- “Recommended Practice for Energy Conservation and cost effective planning in Industrial facilities”, IEEE Inc, USA

MTESM-209 **ENGINEERING OPTIMIZATION**

Semester -II

L	T	P	Credits		
3	1	0	4	Class-work Marks	: 40
				Exam Marks	: 60
				Total Marks	: 100
				Duration of Examination	: 3 Hrs

Course Outcomes:

At the end of this course students will demonstrate the ability to

1. Knowledge about vector spaces, linear transformation, Eigen values and Eigen vectors of linear operators.
2. To learn about linear programming problems and understanding the simple method for solving linear programming problems in various fields of science and technology.
3. Acquire knowledge about nonlinear programming and various techniques used for solving constrained and unconstrained nonlinear programming problems.
4. Understanding the concept of random variables, functions of random variable and their probability distribution.
5. Understand stochastic processes and their classification

Unit 1

Concepts of optimization: Engineering applications, Statement of optimization, Problem, Classification - type and size of the problem, Classical Optimization Techniques: Single and multi-variable problems, Types of Constraints, Semi definite case-saddle point

Linear programming: Standard form-Geometry of LP problems-Theorem of LP, Relation to convexity - formulation of LP problems - simplex method and algorithm, Matrix form- two phase method. Duality, dual simplex method- LU Decomposition

Unit 2

Sensitivity analysis: Artificial variables and complementary solutionsQP, Engineering Applications:Minimum cost flow problem, Network problems-transportation, assignment & allocation, scheduling,Karmarkar method-unbalanced and routing problems.

Nonlinear programming: Non linearity concepts-convex and concave functions, non-linear programming -gradient and Hessian, Unconstrained optimization, First & Second order necessary conditions- Minimisation & Maximisation, Local & Global convergence, Speed of convergence

Unit 3

Basic decent methods: Fibonacci & Golden section search - Gradient methods – Newton, Method-Lagrange multiplier method - Kuhn-tucker conditions, Quasi-Newton method-separable, convex programming -Frank and Wolfe method, Engineering Applications

Nonlinear programming- Constrained optimization: Characteristics of constraints-Direct methods- SLP,SQP-Indirect, Methods, Transformation techniques-penalty function-Langrange multiplier methods checking convergence- Engineering applications

Unit 4

Dynamic programming: Multistage decision process- Concept of sub optimization and principle of optimality, Computational procedure- Engineering applications, Genetic algorithms, Simulated, Annealing Methods - Optimization programming, tools and Softwarepackages

Suggested reading

1. David G Luenberger, “Linear and Non Linear Programming”, 2nd Ed, Addison-Wesley Pub.Co.,Massachusetts, 2003

2. W.L.Winston, “Operation Research-Applications & Algorithms”,2nd Ed., PWS-KENT Pub.Co.,Boston, 2007

3. S.S.Rao, “Engineering Optimization”, 3rd Ed.,New Age International (P) Ltd,New Delhi, 2007

4. W.F.Stocker, “Design of Thermal Systems”, 3rd Ed., McGraw Hill, New York. 1990

5. G.B.Dantzig, “Linear Programming and Extensions” Princeton University Press, N.J., 1963.

6. L.C.W.Dixton, ”Non Linear Optimisation: theory and algorithms” Birkhauser, Boston, 1980

MTESM-210 NON-LINEAR AND DIGITAL CONTROL SYSTEMS

Semester - II

L	T	P	Credits		
3	1	0	4	Class-work Marks	: 40
				Exam Marks	: 60
				Total Marks	: 100
				Duration of Examination	: 3 Hrs

Course Outcomes:

At the end of this course students will demonstrate the ability to

1. The ability to understand the characteristics of various types of nonlinearities present in physical systems.
2. The ability to carry out the stability analysis of non-linear control systems.
3. The ability to carry out the analysis and design of digital control systems.
4. The ability to design compensators for digital control system to achieve desired specifications.
5. The ability to represent digital control systems using state space models.
6. The ability to analyze the effect sampling on stability, controllability and observability.
7. The ability to design digital controllers for industrial applications.

Unit 1

Overview of nonlinear Control-Introduction to Advanced Calculus, Elementary notions of Topology, Smooth Manifolds, Sub-manifolds, Tangent Vectors, Vector Fields, Lyapunov stability for autonomous and non-autonomous systems, Input-Output Stability and Input-to-State Stability, Absolute Stability

Unit 2

Passivity analysis and applications to control design, Lyapunov-based feedback control design, Feedback linearization and back stepping, Sussmann‘s Theorem and global Decompositions, The Control Lie Algebra, the observation space, Local Co-ordinates, Transformations, Exact Linearization Via Feedback

Unit 3

Introduction to discrete-time systems, Frequency domain approach – Analysis and discretization, Time domain approach, analysis and discretization, State space formulation for discretized systems

Unit 4

Engineering aspects of computer controlled systems, Sampled data systems, Control of Sampled data systems, Concept of differential sampling, Closed loop analysis of differentially sampled systems, Control design based on differential sampling, Recent applications of Digital Control

Suggested reading

1. H. K. Khalil, “Nonlinear Systems”, 3rd edition, Prentice Hall, 2001
2. H. K. Khalil, “Nonlinear Control”, Pearson, 2015
3. J. J. E. Slotine and W. Li, “Applied nonlinear systems”, Prentice Hall, 1991

4. A. Nijemjer and A. van der schaft, “Nonlinear dynamical control systems”, Springer, 1989 5.
5. M. Vidyasagar, “Nonlinear Systems Analysis, Society for Industrial and Applied Mathematics”, 2002
6. Alberto Isidori, “Nonlinear Control Systems”, Third Edition, Springer, 1995

MTESM-211 ENERGY LABORATORY-2

Semester - I

L T P Credits Class-work Marks : 30

0 0 4 2 **Exam Marks : 70**
Total Marks : 100

Course Outcome: Upon completion of the course, the students will be able to:
1. Understand the working of solar PV and wind energy technology to generate electricity.
2. Measure solar radiation, sunshine hours, and do technical analysis of photovoltaic system.
3. Conduct experiments related to wind standalone as well as hybrid wind solar system, do technical analysis to study their characteristics.
4. Apply the concept to end use applications

List of Experiments:

1. To show the effect of variation of tilt angle on PV module power.
2. Workout power flow calculations of stand- alone PV system of DC load with battery
3. Workout power flow calculations of stand- alone PV system of AC load with battery.
4. To demonstrate the effect of shading on module output power.
5. Synchronization of grid tied inverter, observation of current waveform and calculations for distortion and power factor of grid tied inverter
6. Recording of bright sunshine hours using Campbell-Stokers recorder.
7. To measure the solar radiation using Thermoelectric pyranometer in different global sunshine conditions.
8. P,V and f measurement of output of wind generator.

Note:

1. At least 7 experiments are to be performed by students in the semester.
2. At least 6 experiments should be performed from the above list; remaining two experiments may either be performed from the above list or designed and set by the Dept. as per the scope of the syllabus

MTESM-301 ENERGY AUDITING AND MANAGEMENT

Semester - II

L T P Credits **Class-work Marks : 40**

3 1 0 4

Exam Marks : 60
Total Marks : 100
Duration of Examination : 3 Hrs

Course Outcomes:

At the end of this course students will demonstrate the ability to

1. To enable the students to understand the concept of energy management and energy management opportunities
2. To understand the different methods used to control peak demand
3. To know energy auditing procedure
4. To understand the different methods used for the economic analysis of energy projects

Unit 1

System approach and End use approach to efficient use of Electricity, Electricity tariff types, Energy auditing: Types and objectives - audit instruments, ECO assessment and Economic methods, Specific energy analysis-Minimum energy paths-consumption models, Case study

Unit 2

Electric motors-Energy efficient controls and starting efficiency-Motor Efficiency and Load, Analysis Energy efficient /high efficient Motors-Case study, Load Matching and selection of motors, Variable speed drives; Pumps and Fans-Efficient Control strategies, Optimal selection and sizing, Optimal operation and Storage; Case study

Unit 3

Transformer Loading/Efficiency analysis, Feeder/cable loss evaluation, case study, Reactive Power management-Capacitor, Sizing-Degreeof Compensation-Capacitor losses, Location-Placement, Maintenance ,Case study

Peak Demand controls- Methodologies, Types of Industrial loads-Optimal Load, scheduling-case study, Lighting- Energy efficient light sources-Energy conservation in Lighting, Schemes, Electronic ballast-Power quality issues-Luminaries, case study

Unit 4

Cogeneration-Types and Schemes, Optimal operation of cogeneration plants-case study, Electric loads of Air conditioning &Refrigeration, Energy conservation measures- Cool storage, Types-Optimal operation case study

Electric water heating, Geysers-Solar Water Heaters, Power Consumption in Compressors, Energy conservation measures, Electrolytic Process, Computer Controls- software-EMS

Suggested reading

1. Anthony J. Pansini, Kenneth D. Smalling, .Guide to Electric Load Management., Pennwell Pub; (1998)
2. Howard E. Jordan, .Energy-Efficient Electric Motors and Their Applications., Plenum Pub Corp; 2ndedition (1994)
3. Giovanni Petrecca, .Industrial Energy Management: Principles and Applications., The Kluwerinternational series -207,1999
4. Handbook on Energy Audit and Environment Management , Y P Abbi and Shashank Jain, TERI,2006
5. Handbook of Energy Audits Albert Thumann, William J. Younger, Terry Niehus, 2009

MTESM-302 WASTE TO ENERGY CONVERSION

Semester - II

L	T	P	Credits
3	1	0	4

Class works Marks: 30
Exam Marks: 70
Total Marks: 100
Duration of Examination: 3 Hrs

Course Outcomes:

At the end of this course students will demonstrate the ability to

- To enable students to understand of the concept of waste to energy.
- To learn about the best available technologies for waste to energy.
- To link legal, technical & management principles for production of energy from waste.

UNIT I

Introduction to energy from waste: characterization and classification of waste as fuel; agrobased, forest residues, industrial waste, Municipal solid waste

Solid Waste Sources: Solid Waste Sources, types compositions and Properties, Municipal Solid Waste, Physical, chemical and biological properties, Waste Collection and transfer stations, Waste minimization and recycling of municipal waste, Segregation of waste, Size Reduction, Managing Waste, Status of technologies for generation of Energy from Waste.

UNIT II

Waste Treatment and Disposal: Aerobic composting, Furnace types and designs, Medical waste /Pharmaceutical waste treatment Technologies, concept of Bioremediation, Incineration, Environmental impacts, Measures to mitigate environmental effects due to incineration

Land Fill method of Solid waste disposal: Land fill classifications, Types, methods and Siting consideration, Layout and preliminary design of landfills: Composition, characteristics, generation, movement and control of landfill leachate and gases, Environmental monitoring system for land fill gases.

UNIT III

Energy Generation from Waste (Biochemical Conversion): Sources of energy generation, Anaerobic digestion of sewage and municipal wastes, Direct combustion of MSW-refuse derived solid fuel, Industrial waste, Agro residues, Anaerobic Digestion: Biogas production, Land fill gas generation and utilization, Thermochemical conversion: Sources of energy generation, Gasification of waste using gasifiers, Briquetting, Utilization and advantages of briquetting, Case studies of Commercial Waste to Energy Plants , Present status (National and International) of Technologies for Conversion of Waste into Energy, Design of Waste to Energy Plants for Cities, small townships and villages.

UNIT IV

Waste to energy options: Biochemical and Thermochemical routes; Biochemical Options – Anaerobic Digestion, Fermentation; Thermochemical Options – Pyrolysis, Gasification and Incineration; Other options – Biodiesel synthesis, Briquetting and Torrefaction, Hazardous waste management;

Properties of fuels derived from waste to energy: Producer gas, Biogas, Ethanol and Briquettes, Comparison of properties with conventional fuels; Landfills: Gas generation and collection in landfills, Introduction to transfer stations

Environmental Impact: Benefits of Biochemical and Thermochemical conversions

Text/References:

1. Energy from Waste - An Evaluation of Conversion Technologies by C Parker and T Roberts (Ed),
2. Parker, C., & Roberts, T. (1985). Energy from waste: an evaluation of conversion technologies. Elsevier Applied Science, London.
3. Shah, K. L. (2000). Basics of solid and hazardous waste management technology, Prentice Hall.
4. Christensen, T. H., Cossu, R., & Stegmann, R. (Eds.). (2005). Landfilling of waste: leachate. CRC Press.
5. White, P., Dranke, M., &Hindle, P. (2012). Integrated solid waste management: a lifecycle inventory. Springer Science & Business Media.
6. Klinghoffer, Naomi B., and Marco J. Castaldi, eds. Waste to energy conversion technology. Elsevier, 2013.
7. Kalogirou, E. N. (2017). Waste-to-Energy technologies and global applications. CRC Press.

MTESM-303 ECONOMICS AND FINANCING OF RENEWABLE ENERGY SYSTEMS

Semester – II

L	T	P	Credits
3	1	0	4

Class-work Marks	**: 40**
Exam Marks	**: 60**
Total Marks	**: 100**
Duration of Examination	**: 3 Hrs**

Course Outcomes:

At the end of this course students will demonstrate the ability to

1. To impart knowledge on fundamentals of economic principles and their applications in the broad field of supply and demand of energy
2. To make students inquisitive about the problems of energy economics and arousing their interest on practical problem solving skills.

Unit 1

Energy economics: Basic concepts, energy data, energy cost, energy balance. Relevance of economic and financial viability evaluation of renewable energy technologies, Basics of engineering economics

Unit 2

Energy accounting framework: Economic theory of demand, production and cost market structure; National energy map of India, Energy subsidy – National and international perspectives

Unit 3

Concepts of economic attributes: Calculation of unit cost of power generation from different sources with examples, different models and methods, Social cost – benefit analysis of renewable energy technologies. Financial feasibility evaluation of renewable energy technologies, Technology dissemination models, Volume and learning effects on costs of renewable energy systems, Dynamics of fuel substitution by renewable energy systems and quantification of benefits

Application of econometrics: input and output optimization; energy planning and forecasting - different methods, Economic approach to environmental protection and management.

Unit 4

Financial incentives: Fiscal, financial and other incentives for promotion of renewable energy systems and their effect on financial and economic viability, electricity tariff types. Financing of renewable energy systems, Carbon finance potential of renewable energy technologies and impact of other incentives. Software for financial evaluation of renewable energy systems. Case studies on financial and economic feasibility evaluation of renewable energy projects

Suggested reading

1. Campbell, H. F., & Brown, R. P. (2003). Benefit-cost analysis: financial and economic appraisal using spreadsheets. Cambridge University Press.
2. Kandpal, T. C., & Garg, H. P. (2003). Financial evaluation of renewable energy technologies. MacMillam India Limited.
3. Park, C. S. (2002). Contemporary engineering economics (Vol. 4). Upper Saddle River, NJ: Prentice Hall.
4. Kroemer, K. H., Kroemer, H. B., & Kroemer-Elbert, K. E. (2001). Ergonomics: how to design for ease and efficiency. Pearson College Division.
5. Dorsman, A. B., Ediger, V. Ş., & Karan, M. B. (Eds.). (2018). Energy Economy, Finance and Geostrategy. Springer.
6. Banks, F. E. (2012). Energy economics: a modern introduction. Springer Science & Business Media.
7. Thuesen G. J. and Fabrycky W. J. (2001); Engineering Economy, Ninth Edition, Prentice Hall India
8. Ayyub, B. M. (2014). Risk analysis in engineering and economics. CRC Press.

MTESM-304 LIFE CYCLE ASSESSMENT OF RENEWABLE SYSTEMS

Semester – II

L	T	P	Credits
3	0	0	3

Class-work Marks	**: 40**
Exam Marks	**: 60**
Total Marks	**: 100**
Duration of Examination	**: 3 Hrs**

Course Outcomes:

At the end of this course students will demonstrate the ability to

1. Understand the characteristics of life cycle assessment
2. Understand the risk and life cycle framework for sustainability
3. Understand the life cycle assessment of renewable energy sources

Unit 1

Life Cycle Analysis: An introduction to sustainability concept and life cycle analysis, introduction to material flow and waste management, study of water resources and food nexus.

Main Characteristics of Life Cycle Assessment: What is LCA?, role of LCA in relation to products, role of LCA in wider applications, strength and limitations of LCA, LCA as part of a tool box, management of LCA projects.

Unit 2

Life Cycle Framework: Risk and life cycle framework for sustainability: introduction, risk, environmental risk assessment, example chemicals and health effects, character of environmental problems

Unit 3

Life Cycle Assessment of Renewable Energy Sources: Life cycle assessment of biodiesel from palm oil, life-cycle assessment of bio methane from lignocelluloses biomass, application of life cycle assessment on agricultural production systems with reference to lignocelluloses biogas and bio ethanol production as transport fuels.

Unit 4

Life Cycle Inventory and Impact Assessments: Life cycle inventory and impact assessments, unit processes and system boundary, data quality, procedure for life cycle impact assessment, LCIA in practice with examples, interpretation of LCIA results.

Unit 5

ISO Terminologies: Factors for good LCA study, ISO terminologies, LCA steps recap, chemical release and fate and transport, and green sustainable materials

Suggested reading:

1. B. Jeroen, Guinee, “Hand Book on Life Cycle Assessment”, Kluwer Academic Publications, 2001.
2. K.Walter, “Background and Future Prospects in Life Cycle Assessment”, Springer,2004.
3. Anoop Singh ,“Life Cycle Assessment of Renewable Energy sources”, Springer, 1995.

MASTER OF TECHNOLOGY

DEGREE PROGRAMME

in

STRUCTURAL ENGINEERING

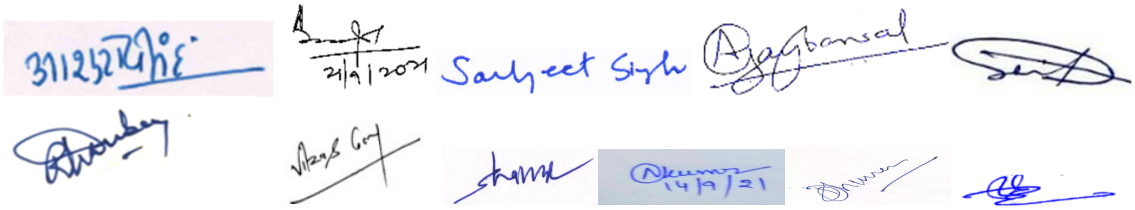
(Department of Civil Engineering)

CURRICULUM
(W.e.f. Session 2021-22)



School of Engineering & Technology

CENTRAL UNIVERSITY OF HARYANA
MAHENDERGARH-123031
HARYANA



ABOUT UNIVERSITY

Central University of Haryana is a Central University established under the Central Universities Act, 2009 of the Parliament. It is one of the 15 Central Universities established by MHRD, GoI under the XIth Five Year Plan (2007-12). The University is fully funded by the UGC. The Permanent Campus of the University is situated in 488 acres of land at Jant-Pali Villages, Mahendergarh district of Haryana from where CUH is running its academic operations.

OBJECTIVE

The objective of the University shall be:

- To disseminate and advance knowledge by providing instructional and research facilities in such branches of learning as it may deem fit;
- To make special provisions for integrated courses in humanities, social sciences, science and technology in its educational programmes;
- To take appropriate measures for promoting innovations in teaching-learning process and interdisciplinary studies and research;
- To educate and train manpower for the development of the country;
- To establish linkages with industries for the promotion of science and technology; and
- To pay special attention to the improvement of the social and economic conditions and welfare of the people, their intellectual, academic and cultural development.

VISION OF THE UNIVERSITY

To develop enlightened citizenship of a knowledge society for peace and prosperity of individuals, nation and the world, through promotion of innovation, creative endeavours, and scholarly inquiry.

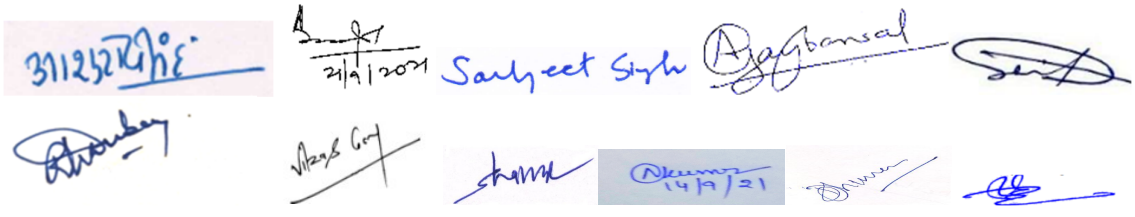
MISSION OF THE UNIVERSITY

To serve as a beacon of change, through multi-disciplinary learning, for creation of knowledge community, by building a strong character and nurturing a value-based transparent work ethics, promoting creative and critical thinking for holistic development and self-sustenance for the people of India. The University seeks to achieve this objective by cultivating an environment of excellence in teaching, research and innovation in pure and applied areas of learning.

ABOUT CIVIL ENGINEERING DEPARTMENT

The Civil Engineering Department was established under the School of Engineering and Technology, Central University of Haryana in year 2016 with Bachelors of Technology as primary program. Under this program 60 seats are allotted for student admissions via CUCET, LEET etc. The department boasts of its highly competent and research-oriented faculty. The department is equipped with various civil engineering labs having all basic equipment viz: Concrete lab, Hydraulics lab, Transportation lab, Geotechnical lab Structural Analysis lab and Environmental lab. The department has also started Ph.D. program from year 2020 under various specializations like: Water Resources Engineering and Fluvial Hydraulics, Structural Engineering, Transportation engineering, Concrete Technology and related areas to Civil Engineering.

VISION OF THE DEPARTMENT



The Department of Civil Engineering will provide quality education and research facilities that promote fundamental understanding of civil engineering to provide a strong foundation to fulfil the industrial needs for the future change and improve the condition of humanity.

MISSION OF THE DEPARTMENT

- To offer Under-Graduate and Postgraduate programmes in civil engineering and other skill development courses that add value to student competencies.
- To promote quality education, research and consultancy for industrial and societal needs.
- To prepare the professional skill for undertaking consultancy assignments for solving Industrial & Non- industrial problems.
- To prepare dynamic entrepreneurial resources, useful for society.

ABOUT PROGRAMME

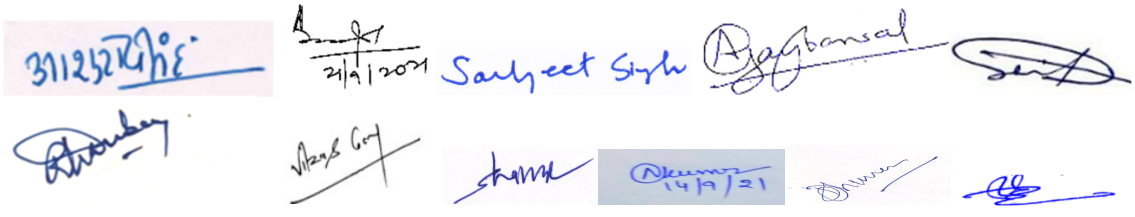
M.Tech. in Civil Engineering with specialization in Structural Engineering is a two-year postgraduate programme that involves the analysis and design of steel and concrete structures and analysis of structures for dynamic forces and study of advanced materials. It requires knowledge and competence in the areas of materials, response of individual structural components, and the behaviour of entire structural systems. This programme trains individuals in advanced concepts of structural engineering by in-depth coursework, hands-on modelling projects and dissertation work. Students undergo coursework during the first year on various aspects of structural engineering and apply these constructs to a major research project during the second year. Students are imparted advanced learning in Analysis and Design of Structures, Structural Dynamics and Earthquake Resistant Design of Structures, Repair and Rehabilitation of Structures and Advanced Materials. The students are exposed to practical learning by working on real-world projects in the Structure Design lab integrated with the latest design software and construction material lab. The practical lab sessions require students to apply theoretical knowledge to realize their value through implementation. The objective of the program is to produce structural engineers who integrate and build on the Program's core curricular concepts in the pursuit of professional leadership, teamwork, life-long learning, and career advancement.

VISION OF THE PROGRAM

To become a centre of excellence in structural engineering education and research responsive to Global Challenges.

MISSION OF THE PROGRAM

1. To impart quality Structural Engineering Education that leads to innovative professionals who undertake research / investigations / developmental works independently.
2. To develop professionals with masters in the structural engineering field to generate cutting edge technologies & futuristic knowledge, focusing on the socio-economic needs.
3. To prepare professionals with emphasis on leadership, team work, adaptation to changing needs and ethical conduct.



PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

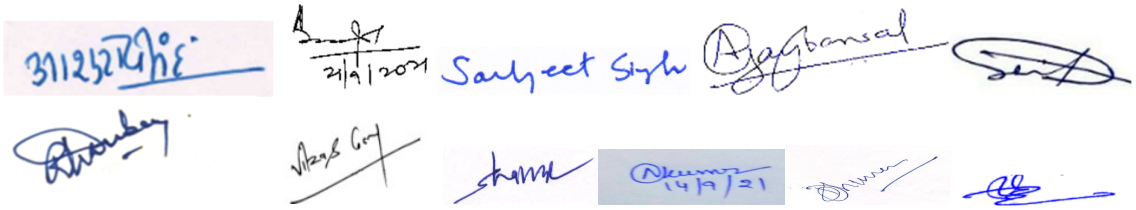
Post-Graduates of the Program will be able to:

PEO1: Identify and analyze the present problems in structural engineering systems.
PEO2: Design the components of structural systems complying with relevant standards and codes.
PEO3: Identify and apply sustainable, alternative and cost-effective recent construction materials adopting quality control practices.
PEO4: Continue to learn changing technologies and new developments in the field of engineering tools, instrumentation and software for solving structural engineering problems.
PEO5: Lead and accomplish their assignments with spirit of teamwork and ethical conduct.

PROGRAMME OUTCOMES (POs)

Post-Graduates of the Program will be able to:

PO1: Solve problems related to structural engineering by acquiring knowledge of science, engineering and mathematics.
PO2: Analyze, design and conduct experiments, interpret and report results of complex structural engineering problems.
PO3: Design civil engineering structures as per specifications and standard codes.
PO4: Apply engineering tools, instrumentation and software for solving structural engineering problems.
PO5: Operate in inter-disciplinary engineering teams with social responsibility and ethical values.

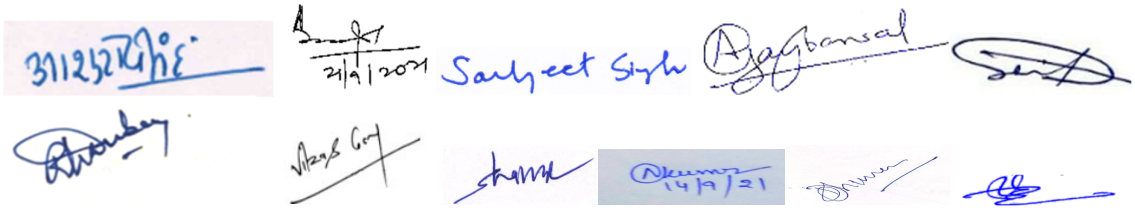


SCHEME OF M. TECH (CIVIL) STRUCTURAL ENGINEERING

SEMESTER-I						
Sr. No.	**Course No.**	**Course Title**	**Teaching Schedule**			**Credits**
			L	**T**	**P**	
1.	**MTCE 101**	ADVANCED SOLID MECHANICS	3	1		4
2.	**MTCE102**	ADVANCED REINFORCED CONCRETE DESIGN	3	1	-	4
3.	**MTCE103**	CONDITION ASSESSMENT & RETROFITTING OF STRUCTURES	3	1	-	4
4.	**PE-I**		3	1	-	4
5.	**PE-II**		3	1	-	4
6.	**MTCE 104**	COMPUTER APPLICATIONS IN STRUCTURAL ENGINEERING LABORATORY	-	-	4	2
7.	**MTCE 105**	SEMINAR-I	-	-	4	2
8.	**Audit-I**	AUDIT COURSE-1	2	-	-	0
			15	**5**	**8**	**24**

SEMESTER-II						
Sr. No.	**Course No.**	**Subject**	**Teaching Schedule**			**Credits**
			L	**T**	**P**	
1.	**MTCE 201**	ADVANCED STRUCTURAL ANALYSIS	3	1	-	4
2.	**MTCE202**	STRUCTURAL DYNAMICS	3	1	-	4
3.	**MTCE203**	ADVANCED CONCRETE TECHNOLOGY	3	1	-	4
4.	**PE-III**		3	1	-	4
5.	**PE-IV**		3	1	-	4
6.	**MTCE 204**	ADVANCED CONCRETE TECHNOLOGY LABORATORY	-	-	4	2
7.	**MTCE 205**	SEMINAR-II	-	-	4	2
8	**Audit-II**	AUDIT COURSE-II	2	-	-	0
			15	**5**	**8**	**24**

SEMESTER-III						
Sr. No.	**Course No.**	**Subject**	**Teaching Schedule**			**Credits**
			L	**T**	**P**	
1.	**MTCE 301**	DISSERTATION PHASE-I (To be continued in the next semester)	-	-	-	10
2.	**MTCE 302**	RESEARCH METHODOLOGY	4	2	-	6



3.	**GEC-I**		3	1	-	4
			7	**3**	**24**	**20**

SEMESTER-IV						
Sr. No.	**Course No.**	**Subject**	**Teaching Schedule**			**Credits**
			L	**T**	**P**	
1.	**MTCE 401**	DISSERTATION PHASE-II (In continuation to the previous semester)	-	-	-	30

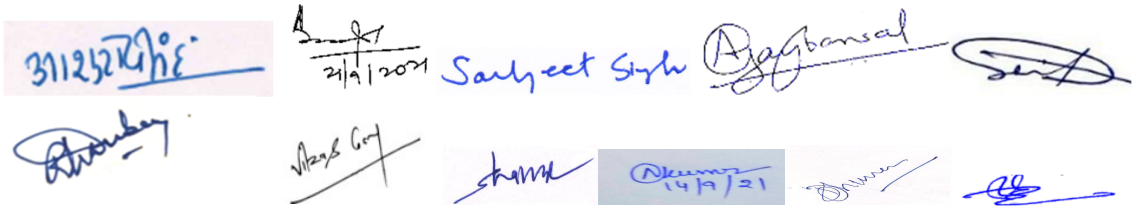
List of Programme Electives (PE)

PROGRAM ELECTIVES FOR SEMESTER-I		
Sr. No.	**Course No.**	**Course Title**
1	**MTCE 111**	EARTHQUAKE RESISTANT DESIGN OF STRUCTURES
2	**MTCE 112**	DESIGN OF PRESTRESSED CONCRETE STRUCTURES
3	**MTCE 113**	ADVANCED FOUNDATION DESIGN
4	**MTCE 114**	CEMENT COMPOSITE MATERIALS
5	**MTCE 115**	FINITE ELEMENT METHOD
6	**MTCE 116**	ANALYSIS AND DESIGN OF HIGH-RISE BUILDINGS
7	**MTCE 117**	STRUCTURAL HEALTH MONITORING
8	**MTCE 118**	SMART CITIES: INFRASTRUCTURE, PLANNING AND MANAGEMENT

PROGRAM ELECTIVES FOR SEMESTER-II		
Sr. No.	**Course No.**	**Course Title**
1	**MTCE 211**	DESIGN OF BRIDGES
2	**MTCE 212**	THEORY OF PLATES
3	**MTCE 213**	OFFSHORE STRUCTURES
4	**MTCE 214**	EARTH RETAINING STRUCTURES
5	**MTCE 215**	ADVANCED NUMERICAL ANALYSIS
6	**MTCE 216**	GEOTECHNICAL EARTHQUAKE ENGINEERING
7	**MTCE 217**	ANALYSIS AND DESIGN OF TUNNELS
8	**MTCE 218**	ADVANCED STEEL STRUCTURES DESIGN

LIST OF AUDIT COURSE 1 & 2

S. No.	Subject Code	Subject Title	Credits
1	MT AU 101	English for Research Paper Writing	0
2	MT AU 102	Disaster Management	0
3	MT AU 103	Sanskrit for Technical Knowledge	0
4	MT AU 104	Value Education	0
5	MT AU 105	Constitution of India	0
6	MT AU 106	Pedagogy Studies	0
7	MT AU 107	Stress Management by Yoga	0



8	MT AU 108	Personality Development through Life Enlightenment Skills	0

MTCE-101: ADVANCED SOLID MECHANICS
M. TECH (CIVIL) STRUCTURAL ENGINEERING

L	T	P	Credit
3	1	--	4

Course Outcomes

CO1: Understand the solving Methods of three-dimensional stress and strain analysis and extend to allow the student to obtain solutions using analytical as well as numerical methods.

CO2: Analysis of principal stresses and strains, state of stress and strain, true stress-true strain and generalized Hooke's law and failure criteria.

CO3: Understand plastic deformation of solids, including the analysis of residual stresses and the collapse load of structures subjected to temperature and mechanical loading.

CO4: Understand the responses of materials to fatigue and fracture, as well as their creep and visco-elastic behavior.

Unit I

Analysis of Stress: Body Force, Surface Force and Stress Vector, The State of Stress at a Point, Normal and Shear Stress Components, Rectangular Stress Components, Principal Stresses, Stress-Invariants Principal Planes, The State of Stress Referred to Principal Axes, Mohr's Circles for the Three-Dimensional State of Stress, Planes of Maximum Shear, Octahedral Stresses, The State of Pure Shear, Lame's Ellipsoid, Differential Equations of Equilibrium.

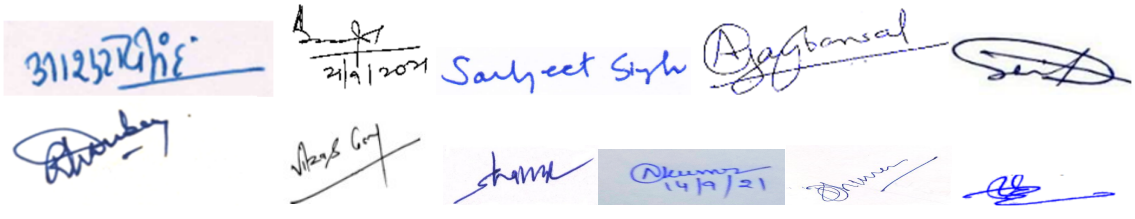
Unit II

Analysis of Strain: Deformations, Deformation in the Neighbourhood of a Point, Change in Length of a Linear Element—Linear Components, Rectangular Strain Components, The State of Strain at a Point. Cubical Dilatation, Change in the Angle between Two Line Elements, Principal Axes of Strain and Principal Strains, Plane State of Strain, Plane Strains in Polar Coordinates, Compatibility Conditions, Strain Deviator and its Invariants. Hooke's Law and the Principle of Superposition

Unit III

Theories of Failure or Yield Criteria and Introduction to Ideally Plastic Solid, Significance of the Theories of Failure, Use of Factor of Safety in Design, Mohr's Theory of Failure, Stress Space and Strain Space, Prandtl–Reuss Equations, Saint Venant Equations, , Work Done by Forces and Elastic Strain Energy Stored, Maxwell–Betti–Rayleigh Reciprocal Theorem, First Theorem of Castigliano Statically Indeterminate Structures, Theorem of Virtual Work Kirchhoff 's Theorem, Second Theorem of Castigliano or Menabrea's Theorem, Generalisation of Castigliano's Theorem or Engesser's Theorem.

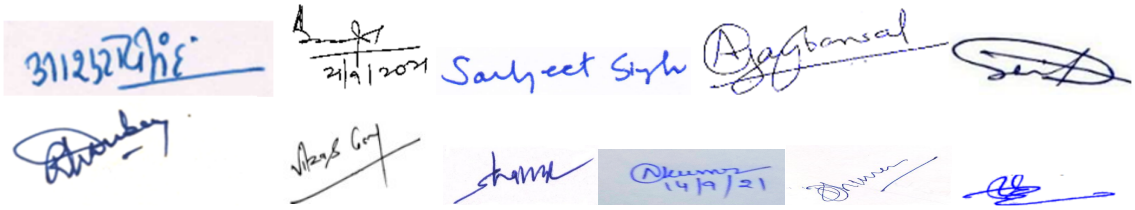
Unit IV



Introduction to Composite Materials, Stress–Strain Relations, Basic Cases of Elastic Symmetry Laminates , Ply Stress and Ply Strain, Failure Criteria of Composite Materials, Micromechanics of Composites.
Fracture Mechanics, Brittle Fracture, Stress Intensity Factor, Fracture Toughness, Fracture Conditions, Fracture Modes, Plane Stress and Plane Strain, Plastic Collapse at a Notch

Suggested readings:

1. Housner,GW and Vreeland JR "*The Analysis of Stress and Deformation*", Mcmillan London, 1998.
3. Kazimi, SMA, "*Solid Mechanics*" Tata McGraw Hill, New Delhi, 1999.
4. Srinath, LS, "*Advanced Mechanics of Solids*" Tata Mcgraw Hill, New Delhi, 2000.
5. Timoshenko, SP and Goodier,JN, "*Theory of Elasticity*", McGraw Hill, New York, 2002.
6. Westergaard, HM, "*Theory of Elasticity and Plasticity*", Harvard University Press, Cambridge, 1998.



MT CE 102: ADVANCED REINFORCED CONCRETE DESIGN
M. TECH (CIVIL) STRUCTURAL ENGINEERING

L	T	P	Credits
3	1	--	4

Course Outcome

CO1: Deign of slender columns and shear walls.

CO2: Understand strut-tie model and its applications.

CO3: Determine the failure mechanics and yield line pattern in slabs.

CO4: Design of deep beams and curved beams.

UNIT- I

Slender columns and walls: Effective length, unbraced and braced columns, stability index, columns subjected to combined axial and biaxial bending, braced and unbraced walls, slenderness of walls, design of walls for vertical and in- plane horizontal forces.

Shear walls: Classification of shear walls, classification according to behaviour and design of rectangular and flanged shear walls.

UNIT- II

Deep Beams: General features, behaviour of deep beams, parameters influencing design of deep beams, flexural bending stresses, shear stresses in deep beams, IS code provisions, Introduction to strut-tie models, Strut-tie model for deep beams, design examples. Design parameters of Continuous beams and design examples.

UNIT- III

Yield Line Theory: Basic assumptions, Methods of analysis, yield line patterns and failure mechanisms, analysis of one way and two way rectangular and non-rectangular slabs, effect of top corner steel in square slabs, design examples.

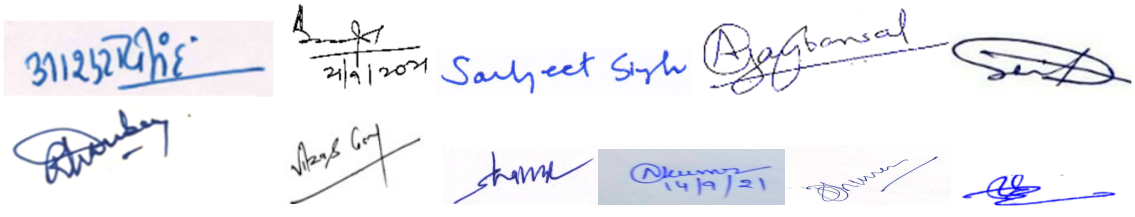
UNIT- IV

Design Bunkers and silos, Airy's theory, Janssen's theory. Design examples

Computation of deflection and crack width: short term and long-term deflection of beams and slabs, calculation of deflection as per IS 456, factors affecting crack width in beams, calculation of crack width as per. IS 456, shrinkage and thermal cracking.

Suggested Books:

1. Jain, AK, *"Reinforced Concrete Limit Slate Design"*, Nem chand & Bros, 1999
2. Krishna, Raju, *"Advanced Reinforced Concrete Design"*, C.B.S. Publication, 1986
3. Ferguson, PM, Breen, JE and Jigsa JO, *"Reinforced Concrete fundamentals"*, John wily & sons, 1988



4. Varghese, PC, "*Advanced Reinforced Concrete Design*", Prentice Hall of India, 2001

MTCE 103: CONDITION ASSESSMENT AND RETROFITTING OF STRUCTURES
M. TECH (CIVIL) STRUCTURAL ENGINEERING

L	T	P	Credits
3	1	--	4

Course Outcome

CO1: Understand the background of repair, strengthening, retrofitting and rehabilitations of reinforced concrete structures.

CO2: Understand the concept of distress mapping in the reinforced concrete structures.

CO3: Understand the strategies of surface repair and retrofitting techniques.

CO4: Attain knowledge of rehabilitation of existing buildings.

UNIT-I

Deterioration of Concrete Buildings: Embedded Metal Corrosion, Disintegration Mechanisms, Moisture Effects, Thermal Effects, Structural Effects, Faulty Construction.
Evaluation of Concrete Buildings: Visual Investigation, Destructive Testing Systems, Non-Destructive Testing Techniques, Semi-Destructive Testing Techniques, Chemical Testing.

UNIT-II

Surface Repair & Retrofitting Techniques: Strategy & Design, Selection of Repair Materials, Surface Preparation, Bonding repair Materials to Existing concrete, Placement Methods, Epoxy Bonded Replacement Concrete, Preplaced Aggregate Concrete, Shotcrete/Gunite, Grouting, Injection Grouting, Micro concrete.

UNIT-III

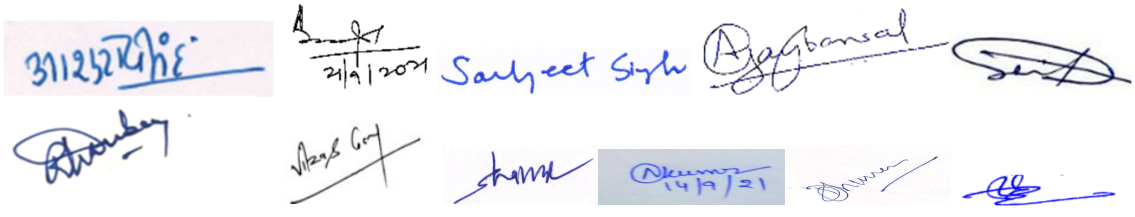
Strengthening Techniques: Strengthening Techniques, Beam Shear Capacity Strengthening, Shear Transfer Strengthening between Members, Column Strengthening, Flexural Strengthening, and Crack Stabilization
Seismic Rehabilitation: Guidelines for Seismic Rehabilitation of Existing Buildings, Seismic Vulnerability and Strategies for Seismic Retrofit.

UNIT-IV

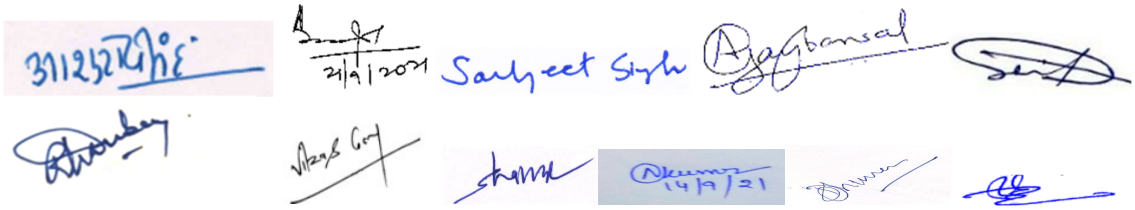
Earthquake Resistant Design: Introduction to IS 1893:2002, Behaviour of buildings and structures during past earthquakes and lessons learnt goals of earthquake resistant design. Linear static procedure for seismic load calculation – IS 1893-2002, Design examples.

Suggested Readings:

1. *ATC- 40: "Seismic Evaluation and Retrofit of Concrete Buildings", Vol. 1 & 2*, 1997.
2. Bohni, H, "*Corrosion in Concrete Structures*", CRC Press, 2005.



3. Bungey, S, Lillard, G and Grantham, MG, "*Testing of Concrete in Structures*", Taylor and Francis, 2006.
4. Emmons, PH, "*Concrete Repair and Maintenance"*, Galgotia Publication, 2012.
5. *FEMA 273; NEHRP "Guidelines for the Seismic Rehabilitation of Buildings"*, 1999.
6. Malhotra, VM and Carino, NJ, "*Handbook on Non-destructive Testing of Concrete"*, CRC Press, 2004.
7. Priestley, MJN, Seible, F and Calvi, GM, "*Seismic Design and Retrofit of Bridges"*, John Wiley, 1996.



MTCE 104: COMPUTER APPLICATIONS IN STRUCTURAL ENGINEERING LABORATORY

M. TECH (CIVIL) STRUCTURAL ENGINEERING

L	T	P	Credit
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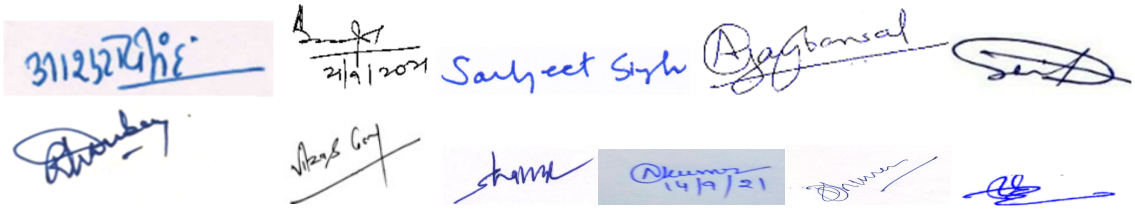
Course Outcome

CO1: Impart knowledge in the latest technology on Computer Aided Design, Analysis of building and Computer Aided Engineering Analysis

CO2: Create ability to work with inter-disciplinary groups in professional and research organizations.

List of Experiments

1. Analysis and design of Multi-storey framed building against earthquake & wind loading using STAAD Pro/ SAP/ETABS.
2. Determine the stress and deformation of one way and two-way slab using ABAQUS/ANSYS/MATLAB
3. Determine the stress and deformation of singly and doubly reinforced concrete beam using ABAQUS/ ANSYS/MATLAB
4. Determination of Settlement of Footing using PLAXIS.
5. Determine the response of building subjected to an earthquake using PLAXIS.
6. Determine the dynamic analysis of a Generator on elastic foundation using PLAXIS

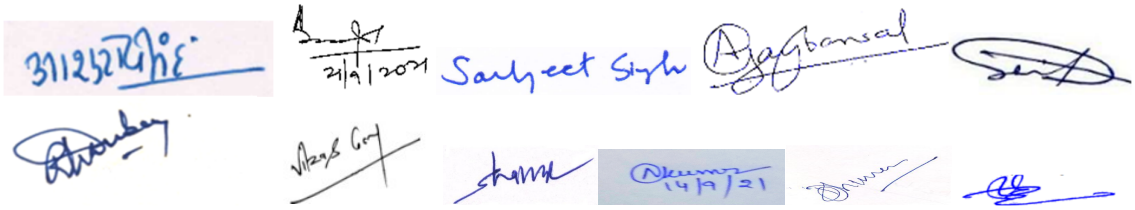


MTCE 105: SEMINAR-I
M. TECH (CIVIL) STRUCTURAL ENGINEERING

L	T	P	Credit
--	--	4	2

Seminar will be of 45-minute duration during which the presentation will be followed by questions session by the faculty and students. Every student shall be required to submit the topic of his/her seminar in consultation with the associated faculty/mentor well in advance so that the same may be displayed on the notice board. The presenter has to write a report comprising of abstract, literature review, brief details of the background of the topic, methods used, findings and references/List of sources from where the material for presentation has been collected and students need to submit two copies of the seminar report to the department.

The seminar report, the submitted slides, presentation skills and overall attendance will form the basis of the evaluation. There will be no separate final exam for this course.



MT CE 111: EARTHQUAKE RESISTANT DESIGN OF STRUCTURES
M. TECH (CIVIL) STRUCTURAL ENGINEERING

L	T	P	Credit
3	1	-	4

Course Outcome

CO1: Understand the concept of earthquake resistant building.
CO2: Design of earthquake resistant reinforced concrete and masonary building.
CO3: Analyse the seismic forces on reinforced concrete buildings.
CO4: Apply IS 13920 codal provisions of ductile detailing in seismic design of RC buildings.

UNIT I

Seismic-Resistant Building Architecture: Introduction-Functional planning-Continuous load path-Overall form-simplicity and symmetry-elongated shapes-stiffness and strength-Horizontal and Vertical members-Twisting of buildings-Ductility-definition-ductility relationships-flexible buildings-framing systems-choice of construction materials-unconfined concrete-confined concrete-masonry-reinforcing steel.

Introduction to Earthquake Resistant Design: Seismic design requirements-regular and irregular configurations basic assumptions-design earthquake loads-basic load combinations-permissible stresses-seismic methods of analysis-factors in seismic analysis-equivalent lateral force method-dynamic analysis response spectrum method-Time history method.

UNIT II

Design Forces for Buildings Introduction; Equivalent static method; Mode superposition technique; Dynamic in elastic time history analysis; Advantages and disadvantages of these methods; Determination of lateral forces as per IS 1893 (Part 1) – Equivalent static method, Model analysis using response spectrum

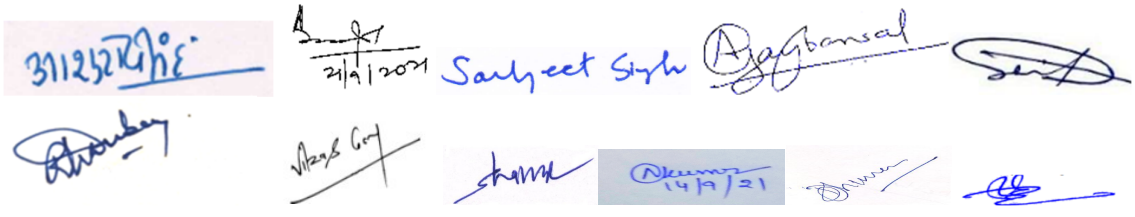
Reinforced Concrete Building: Principles of earthquake resistant deign of RC members-Structural models for frame buildings- Seismic methods of analysis- Seismic deign methods-IS code based methods for seismic design- Seismic evaluation and retrofitting- Vertical irregularities- Plan configuration problems- Lateral load resisting systems- Determination of design lateral forces Equivalent lateral force procedure- Lateral distribution of base shear.

UNIT III

Masonry Buildings: Introduction Elastic properties of masonry assemblage- Categories of masonry buildings- Behaviour of unreinforced and reinforced masonry walls- Behaviour of walls- Box action and bands- Behaviour of infill walls- Improving seismic behaviour of masonry buildings- Load combinations and permissible stresses- Seismic design requirements-Lateral load analysis of masonry buildings.

UNIT IV

Ductility Considerations in Earthquake Resistant Design of RC Buildings: Introduction-Impact of Ductility- Requirements for Ductility- Assessment of Ductility- Factors affecting

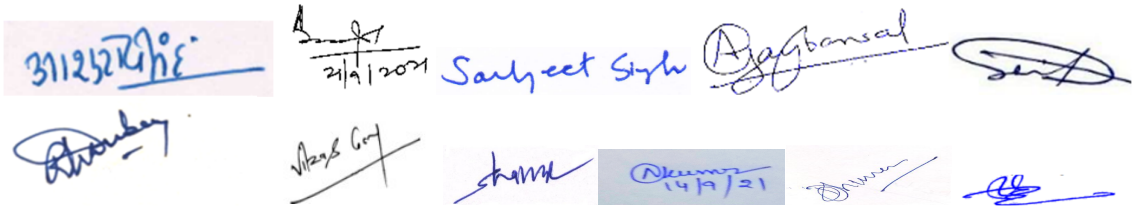


Ductility- Ductile detailing considerations as per IS 13920. Behaviour of beams, columns and joints in RC buildings during earthquakes- Vulnerability of open ground storey and short columns during earthquakes.

Capacity Based Design: Introduction to Capacity Design, Capacity Design for Beams and Columns Case studies

Suggested Readings:

1. Agarwal, P, Shrikhande, M, *"Earthquake resistant design of structures"*, Prentice-Hall of India, 2006.
2. *IS: 1893 (Part-1) -2016. Criteria for Earthquake Resistant – Design of structures.* B.I.S., New Delhi.
3. *IS: 4326-1993, Earthquake Resistant Design and Construction of Building,* Code of Practice B.I.S., New Delhi.
4. *IS: 13920- 2016, Ductile detailing of concrete structures subjected to seismic force – Guidelines,* B.I.S., New Delhi
5. Naeim, F, *"The seismic design handbook"*, Edited, Kluwer Academic publishers, 2001.
6. Paulay, T, Priestley, MJN, *"Seismic design of reinforced concrete and masonry buildings"*, John Wiley & Sons, 1991.



MT CE 112: DESIGN OF PRESTRESSED CONCRETE STRUCTURES
M. TECH (CIVIL) STRUCTURAL ENGINEERING

L	T	P	Credit
3	1	-	4

Course Outcome

CO1: Understand the need for prestressing in a structure.

CO2: Explain the methods, types and advantages of prestressing.

CO3: Design a prestressed concrete structural elements and systems.

CO4: Attain knowledge of IS 11343 code for prestressing of concrete structure.

UNIT I

Introduction: Basic concepts, Advantages, Materials required, Systems and methods of prestressing, Analysis of sections, Stress concept, Strength concept, Load balancing concept, Effect of loading on the tensile stresses in tendons , Effect of tendon profile on deflections , Factors influencing deflections , Calculation of deflections , Short term and long term deflections, Losses of prestress, Estimation of crack width

UNIT II

Flexural Design: Basic assumptions for calculating flexural stresses, Permissible stresses in steel and concrete as per I.S.1343 Code, Design of sections of Type I and Type II post-tensioned and pre-tensioned beams, Check for strength limit based on I.S. 1343 Code, Layout of cables in post-tensioned beams, Location of wires in pre-tensioned beams, Design for shear based on I.S. 1343 Code

UNIT III

Deflection: Factors influencing deflections, Short term deflections of uncracked members, Prediction of long term deflections due to creep and shrinkage, Check for serviceability limit state of deflection.

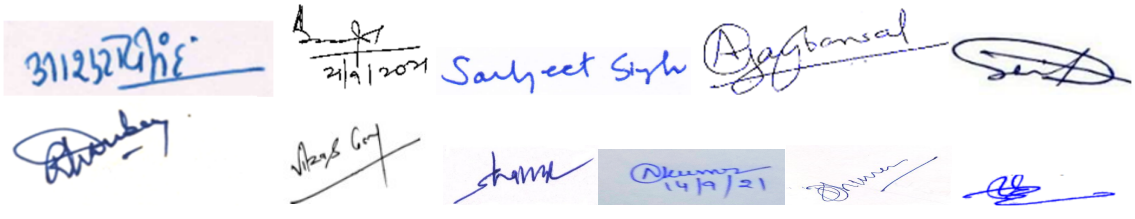
Anchorage: Determination of anchorage zone stresses in post-tensioned beams by Magnel's method, Guyon's method and IS1343 code, design of anchorage zone reinforcement, Check for transfer bond length in pre-tensioned beams

UNIT IV

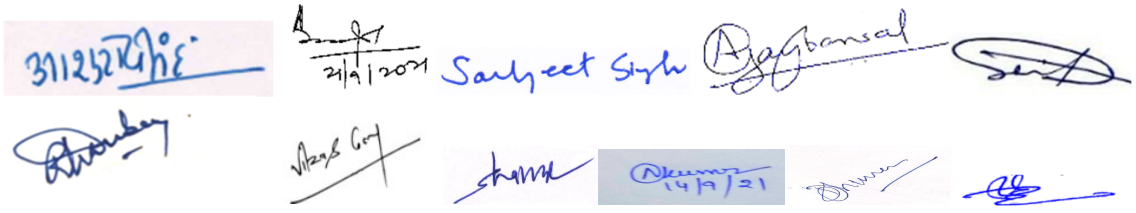
Composite Beams: Analysis and design of composite beams, Methods of achieving continuity in continuous beams, Analysis for secondary moments, Concordant cable and linear transformation, Calculation of stresses, Principles of design.

Suggested Readings:

1. Dayaratnam, P, "*Prestressed Concrete Structures*", Oxford and IBH, 2013
2. IS 1343:1980, "*Code of Practice for Prestressed Concrete, Bureau of Indian Standards*", New Delhi, 2012
3. IS 3370- Part 4, "*Indian standard Code of practice for concrete structures for the storage of liquid- Design tables, code of practice"*, Bureau of Indian standards, New Delhi, 2008.
4. Krishna Raju, N, *"Prestressed concrete"*, 5th Edition, Tata McGraw Hill Company, New Delhi, 2012



5. Lin, TY, and Burns, NH, *"Design of prestressed Concrete Structures"*, Third Edition, Wiley India Pvt. Ltd., New Delhi, 2013.
6. Rajagopalan, N, *"Prestressed Concrete"*, Narosa Publishing House, 2002



MTCE 113 ADVANCED FOUNDATION DESIGN
M. TECH (CIVIL) STRUCTURAL ENGINEERING

L	T	P	Credit
3	1	-	4

Course outcomes:

CO1: Gain knowledge of about advanced topics of foundation design and analyses, supplementing their comprehensive knowledge acquired in basic foundation engineering course

CO2: Develop profound understanding of shallow and deep foundation analyses

CO3: Develop understanding of choice of foundation design parameters

CO4: Learn about cause and effect of dynamic loads on foundation

UNIT- I

Design of combined footings by Rigid method, Combined footings (rectangular & trapezoidal), strap footings, strip footing, Types of rafts, bearing capacity & settlements of raft foundation, Design of raft foundation – Conventional rigid method, Elastic methods, Coefficient of sub-grade reaction, IS code (IS-2950) procedure

UNIT- II

Introduction Necessity of pile foundations, Classification, Load bearing capacity of single pile by Static formula, Dynamic formula, Pile load test and Penetration tests. Introduction, Pile groups, group action of piles in sand and clay, group efficiency of piles, settlement of piles, negative skin friction, laterally loaded piles and under reamed piles, Proportioning and Design of Pile foundations

UNIT- III

Machine Foundations: Introduction, free and forced vibrations, Types of Machine foundations, degrees of freedom of a block foundation, general criteria for design of machine foundation, vibration analysis of a machine foundation, determination of natural frequency, vibration isolation and control.

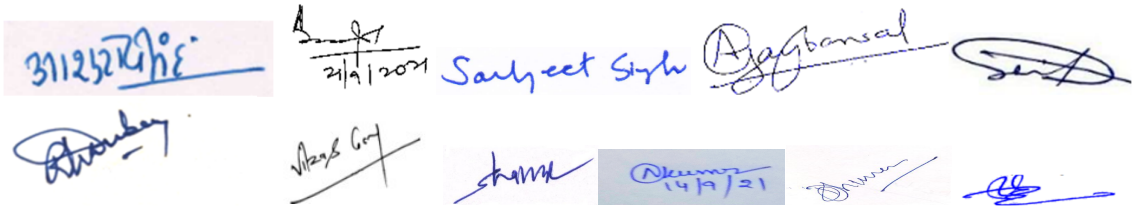
Sheet Piles: Types, Design of Cantilever sheet piling wall, Design of Anchored Bulkheads, Anchorage methods, Design of Braced sheeting cuts, Design of Cellular cofferdams.

UNIT- IV

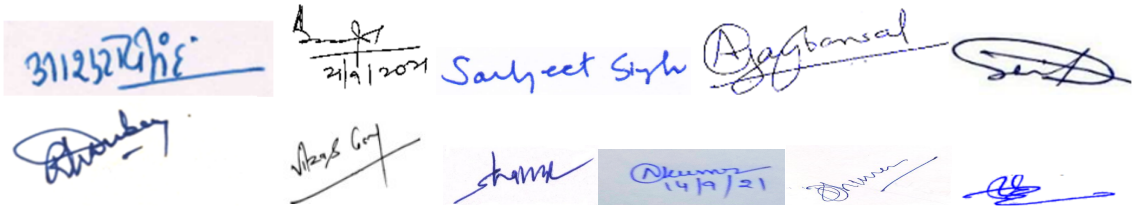
Bridge Substructures: Elements of Bridge substructure, Discharge for design of foundations, Design of pier cap, Design of Pier, Types of Well foundations, Design of well cap, well steining, Well curb, Cutting Edge, Bottom plug, Sinking of wells, tilts and shifts.

Suggested Books

1. Bowles, JE, "*Foundation Analysis & Design*", McGraw-Hill Companies, 2017.
2. Donald P Coduto, "*Foundation Design Principles and Practices*", Pearson, Indian edition, Phi Learning, 2014.
3. Murthy, VNS, "*Advanced Foundation Engineering*", CBS Publishers and Distributors Pvt. Ltd., 2017.



4. Poulos, HG and Davis, E H, "*Pile Foundation Analysis and Design*", John wiley & sons,1980.
5. Tomlinson, M J, "*Foundation Design and Construction*", Prentice Hall, 2003.



MT CE 114: CEMENT COMPOSITE MATERIALS
M. TECH (CIVIL) STRUCTURAL ENGINEERING

L	T	P	Credit
3	1	--	4

Course Outcomes:

CO1: Understand the concepts and practical knowledge of modern Civil Engineering techniques for design of steel structures.
CO2: Understand the concepts of plastic analysis and design.
CO3: Analysis and design of elevated circular tanks.
CO4: Analysis and design of light gauge steel.

Unit I

Fibre Reinforced Concrete: Properties of Constituent Materials, Mix Proportions, Mixing and Casting Procedures, Properties of Freshly mixed FRC, Mechanics and properties of Fibre reinforced concrete, Composite Material approach, Application of fibre reinforced concrete.

Unit II

Fly Ash Concrete: Classification of Indian Flyashes, Properties of Flyash, Reaction Mechanism, Proportioning of Flyash concretes, Properties of Flyash concrete in fresh and hardened state, Durability of flyash concrete.

Unit III

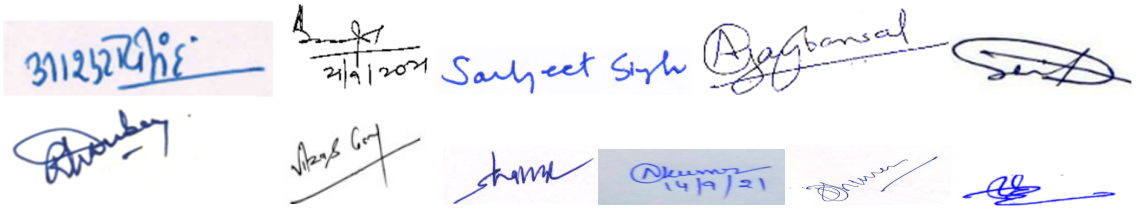
Polymer Concrete: Terminology used in polymer concrete, Properties of constituent materials, Ploymer impregnated concrete, Polymer modified concrete, Properties and applications of polymer concrete and polymer impregnated concrete.
Ferro Cement: Constituent materials and their properties, Mechanical properties of fero cement, Construction techniques and application of ferro cement.

Unit IV

High Performance Concrete: Materials for high performance concrete, Supplementary cementing materials, Properties and durability of high performance concrete, Introduction to silica fume concrete, Properties and applications of silica fume concrete.
Light Weight Concrete: Properties of light weight concretes, Pumice concrete, Aerated cement mortars, No fines concrete, Design and applications of light weight concrete
.

Suggested readings:

1. Neville, Adam M., and Jeffrey John Brooks. "*Concrete technology*". England: Longman Scientific & Technical, 1987.
2. Gambhir, Murari Lal. "*Concrete technology: theory and practice*". Tata McGraw-Hill Education, 2013.



MT CE 115: FINITE ELEMENT METHOD
M. TECH (CIVIL) STRUCTURAL ENGINEERING

L	T	P	Credits
3	1	-	4

Course Outcomes

CO1: Understand basics of FEM to relate stresses and strains.
CO2: Analyse one, two and three dimensional and dynamic problems using FEM.
CO3: Understand the use of the basic finite elements for structural applications using truss, beam, frame, and plane elements;

Unit-I

Differential equilibrium equations - strain displacement relation - linear constitutive relation special cases - Principle of stationary potential energy - application to finite element methods. Some numerical techniques in finite element analysis.

Unit-II

Displacement models - convergence requirements. Natural coordinate systems – Shape function. Interpolation function - Linear and quadratic elements - Lagrange and Serendipity elements - Strain displacement matrix - element stiffness matrix and nodal load vector. Numerical Integration and Modelling Considerations, Element characteristics, Two Dimensional Isoparametric Elements, Some practical applications, some improved elements in two dimensional problems.

Unit-III

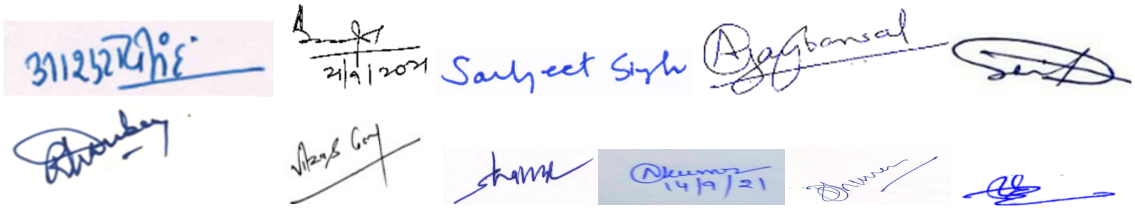
Finite elements of a column, Element characteristics, Beams and Frames, Bending of plates, Techniques for Nonlinear Analysis, Three Dimensional Problems in Stress Analysis.

Unit-IV

Analysis of framed Structures, Analysis of plate bending: Basic theory of plate bending - displacement functions - plate bending Elements. Plane stress and plane strain analysis: Triangular elements - Rectangular elements.

Suggested readings:

1. Abel, JF and Desai, CA, "*Finite Element Method*", Van Nostrand Reinhold, New York, 2004.
2. Bathe, KJ, "*Finite Element Procedures*", India Private Limited, New Delhi, 1997.
3. Chandrupatla, TR and Belegundu AD, "*Introduction to Finite Elements in Engineering*", India Private Limited, New Delhi, 1997.
4. Reddy, JN, "*An Introduction to the Finite Element Method*", Tata McGraw Hill, New Delhi, 2003.
5. Zienkiewiez, OC, "*The Finite Element Method*", Mcgraw Hill, London, 1991.



MTCE 116: ANALYSIS AND DESIGN OF HIGH-RISE BUILDINGS
M. TECH (CIVIL) STRUCTURAL ENGINEERING

L	T	P	Credits
3	1	-	4

Course Outcomes

CO1: Understand the concepts related to analysis and design of tall buildings.
CO2: Understand the importance of symmetry and regularities in tall buildings.
CO3: Design of Towers and Chimney.
CO4: Understand computer applications for analysis and design of tall buildings.

UNIT-I

Structural systems for multi-storey buildings, gravity and lateral loads on buildings, analysis of multi-storey frames. Behaviour of framed tube, tube-in-tube systems, and bundled tube systems.

UNIT-II

Importance of symmetry and regularity in plan, and regularity in elevation. Analysis for torsion in buildings.
Design of buildings with shear walls and coupled shear walls.

UNIT-III

Chimney Design: General aspects, design factor, stresses in shafts due to self-weight and wind load, stresses in hoop reinforcement, stresses due to temperature gradient, design of chimneys. Design examples

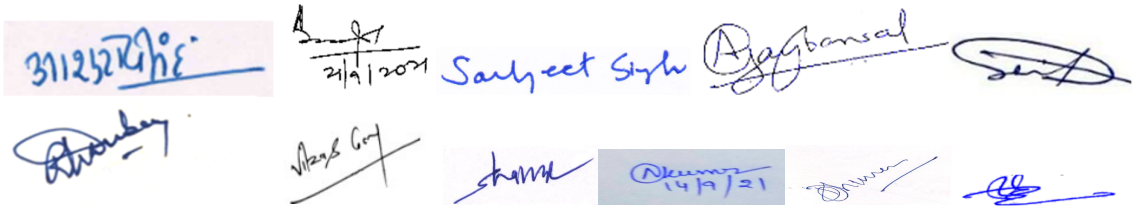
Tower Design: Introduction, design principles, computation of moments due to wind load, wind load analysis with circular group of columns, design examples.

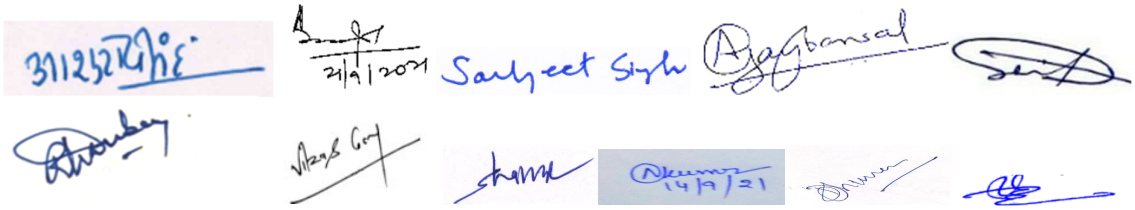
UNIT-IV

Design and detailing of various members and beam-column joints for ductility. The capacity design principle. Performance based design philosophy.
Design of raft and pile foundations. Application of MS-Excel, ETABS and SAFE software for design of tall buildings.

Suggested Books:

1. *Design of Multi Storeyed Buildings, Vol. 1 & 2*, CPWD Publications, 1976
2. Smith, BS and Coull, A, "*Tall Building Structures*", Wiley India, 1991.
3. Schueller, W, "*High Rise Building Structures*", Wiley, 1986
4. Shah, VL, Karve, SR, "*Illustrated Design of Reinforced Concrete Buildings*", (GF+3storeyed), Structures Publications, Pune, 2013
5. Taranath, BS, "*Structural Analysis and Design of Tall Buildings*", Mc-Graw Hill, 1988.
6. Varyani, UH, "*Structural Design of Multi-storeyed Buildings*", 2nd Ed., South Asian Publishers, New Delhi, 2002





MT CE 117: STRUCTURAL HEALTH MONITORING
M. TECH (CIVIL) STRUCTURAL ENGINEERING

L	T	P	Credit
3	1	-	4

Course Outcome

CO1: Describe the distress in the structure understanding the causes and factors.

CO2: Assess the health of structure using static field methods.

CO3: Apply dynamic field tests to evaluate the health of structure.

CO4: Apply repairs and rehabilitation measures of the structure

UNIT I

Structural Health: Factors affecting Health of Structures, Causes of Distress, Regular Maintenance. Structural Health Monitoring: Concepts, Various Measures, Structural Safety in Alteration.

UNIT II

Structural Audit: Assessment of Health of Structure, Collapse and Investigation, Investigation Management, SHM Procedures.

Static Field Testing: Types of Static Tests, Simulation and Loading Methods, sensor systems and hardware requirements, Static Response Measurement.

UNIT III

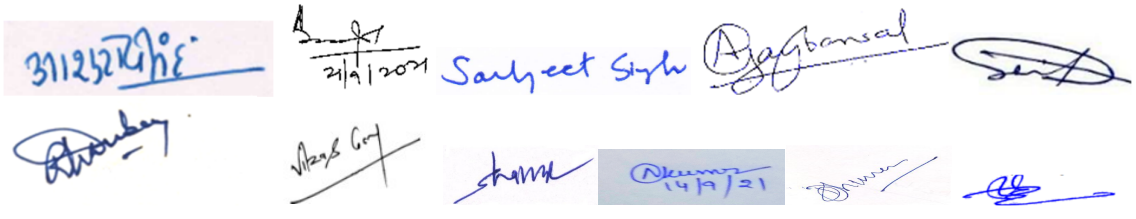
Dynamic Field Testing: Types of Dynamic Field Test, Stress History Data, Dynamic Response Methods, Hardware for Remote Data Acquisition Systems, Remote Structural Health Monitoring.

UNIT IV

Introduction to Repairs and Rehabilitations of Structures: Case Studies (Site Visits), piezo–electric materials and other smart materials, electro–mechanical impedance (EMI) technique, adaptations of EMI technique.

Suggested Readings:

1. Health Monitoring of Structural Materials and Components_Methods with Applications, Douglas E Adams, John Wiley and Sons, 2007.
2. Structural Health Monitoring, Daniel Balageas, Claus_Peter Fritzen, Alfredo Güemes, John Wiley and Sons, 2006.
3. Structural Health Monitoring and Intelligent Infrastructure, Vol1, J. P. Ou, H. Li and Z. D. Duan, Taylor and Francis Group, London, UK, 2006.
4. Structural Health Monitoring with Wafer Active Sensors, Victor Giurglutiu, Academic Press Inc, 2007



MT CE 118: SMART CITIES: INFRASTRUCTURE PLANNING AND MANAGEMENT
M. TECH (CIVIL) STRUCTURAL ENGINEERING

L	T	P	Credit
3	1	--	4

Course Outcomes: At the end of the course the students should be able to:

CO1. Identify the challenges faced by the developing cities.

CO2. Distinguish and understand the similarities and differences among the various definitions of smart cities.

CO3. Understand the dimensions of smart cities.

CO4. Assess current situation of a given city as per the definitions given by Bureau of Indian Standards.

CO5. Understand the concept of smart infrastructure with focus on smart urban energy smart transportation systems and solid waste management.

UNIT –I

Introduction: Introduction to smart cities, urbanization, challenges faced by growing cities, need of transforming a city into a smart city, infrastructure required to enable a smart city. **Global Initiatives and Perspective :** Understanding global and national smart city initiatives, benefits of guidelines to smart and sustainable cities, developing and managing a smart city. Indian perspective for smart infrastructure

UNIT-II

Smart Cities Framework : Smart city as a system, approach by international commission (s), reference framework for smart cities, smart cities reference architecture.
Stakeholders and Challenges : Understanding smart city markets and stake holders, Importance of collaboration withing the city, Indian perspective and challenges.

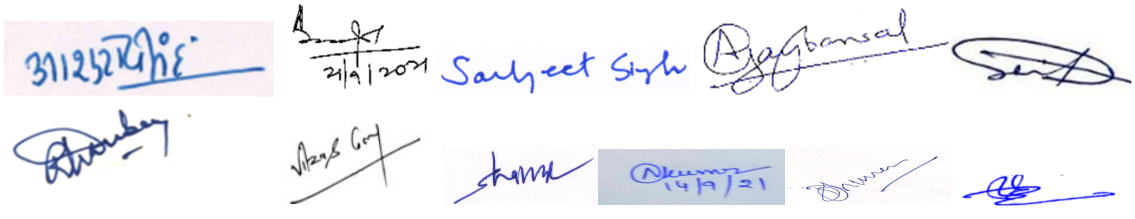
UNIT –III

Indian Smart City Mission : Indian smart city mission, Key elements of smart city proposals, Features of smart city
ICT Framework: ICT framework for smart infrastructure by Indian Standards, Categorizing standardization activities

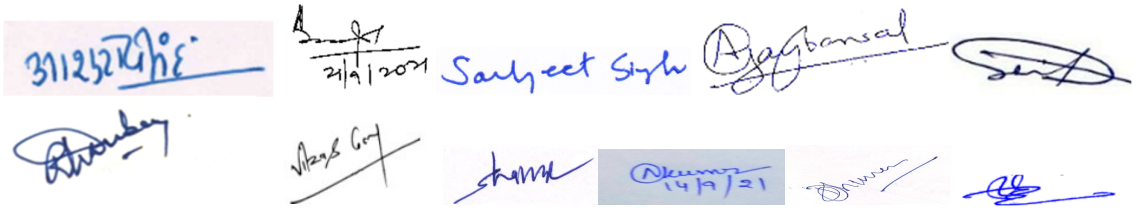
UNIT – IV

Societal Integration and Development : Smart Urban Energy Systems, Smart Urban Transportation Systems, Smart Waste Management.
Case studies

Suggested Readings



1. Coletta, C Evans, L, Heaphy, L, Kitchin, R, "*Creating Smart Cities*", published by Routledge, 2019.
2. Sharma, S, "*Smart Cities Unbundled*", published by Bloomsbury, 2018.
3. "*Sustainable Smart Cities in India: Challenges and Future Perspectives*", Editors: Sharma, P, Rajput, S (Eds.), published by Springer, 2017.



MTCE 201: ADVANCED STRUCTURAL ANALYSIS
M. TECH (CIVIL) STRUCTURAL ENGINEERING

L	T	P	Credits
3	1	--	4

Course Outcome

CO1: Understand flexibility & stiffness matrix analysis of 2D structures.

CO2: Understand flexibility & stiffness matrix analysis of 3D structures.

CO3: Write computer programs for Matrices of 2D and 3D structural elements.

UNIT- I

Basic Concepts: Degrees of freedom, Static and Kinematic indeterminacy, Stiffness and flexibility, Behaviour of structures - Principle of superposition - Stiffness and flexibility matrices in single, two and n-co-ordinates Stiffness and flexibility for prismatic members and non-prismatic members.

UNIT- II

Direct stiffness method 2D Element: Development of stiffness matrices for Truss element, beam element, Transformation of coordinates, assembly of global matrices-stiffness matrix, load matrix, boundary conditions, and solution techniques. Flexibility method applied to statically determinate and indeterminate structures – Choice of redundant - Transformation of redundant Application to symmetrical structures - Comparison between stiffness and flexibility methods.

UNIT- III

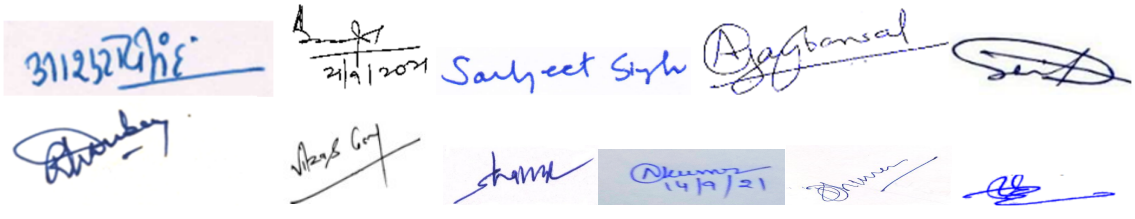
Direct stiffness method 3D Element: Stiffness matrices for Truss element, beam element and grid element, transformation matrix for 3D truss elements & 3D beam element, computer programming, application to practical problems.

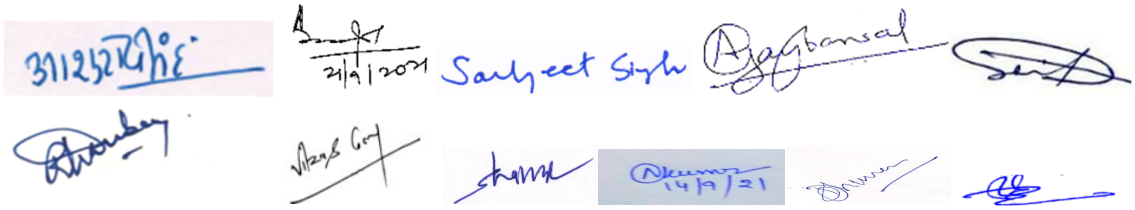
UNIT- IV

Analysis of substructures using the stiffness method and flexibility method with tridiagonalization - Analysis by Iteration method - frames with prismatic members - non-prismatic members.

Suggested Books:

1. Jain, AK, "*Advanced Structural Analysis with Computer Applications*", Nem Chand & Bros, Roorkee.
2. Majeed, KI, "*Non-Linear Structural Analysis*", Butterworth Ltd. London.
3. Martin, HC, "*Introduction to Matrix Method of Structural Analysis*", McGraw Hill Book Co.
4. Wang, CK, "*Matrix Method of Structural Analysis*", International Text Book, Pasadena.





MT CE 202: STRUCTURAL DYNAMICS
M. TECH (CIVIL) STRUCTURAL ENGINEERING

L	T	P	Credit
3	1	-	4

Course Outcome

CO1: Understand the concept of earthquake occurrence and seismology.
CO2: Attain knowledge of IS 1893:2002 code for earthquake resistant deign of structures.
CO3: Understand the response of structures under dynamic loading.
CO4: Apply the seismic evaluation method for condition assessment of structures

UNIT I

Seismology: Earthquake phenomenon cause of earthquakes-Faults- Plate tectonics Seismic waves- Terms associated with earthquakes-Magnitude/Intensity of an earthquake-scales Energy released-Earthquake measuring instruments- Seismoscope, Seismograph, accelerograph Characteristics of strong ground motions- Seismic zones of India.

Vibrations: Dynamics of Single Degree of Freedom Systems, undamped and damped, free and forced vibrations; Steady-state and transient response, impulse response. Harmonic response

UNIT II

Equation of Motion: Solution of equation of motion; Duhamel Integral method, Response spectra, Fourier transforms and analysis in frequency domain.

Earthquake resistant design: Introduction to IS 1893:2002, Behaviour of buildings and structures during past earthquakes and lessons learnt goals of earthquake resistant design. Linear static procedure for seismic load calculation – IS 1893-2002, Design the 5 storey earthquake resistant structures.

UNIT III

Seismic Waves and Local Site Effects: Body and surface waves; Factors affecting ground motion characteristics; Local site effects basic physical concept, impedance contrast, resonance, basement topography, attenuation, trapping; Basin-edge, topography, ridge, valley, slope; Lateral discontinuity.

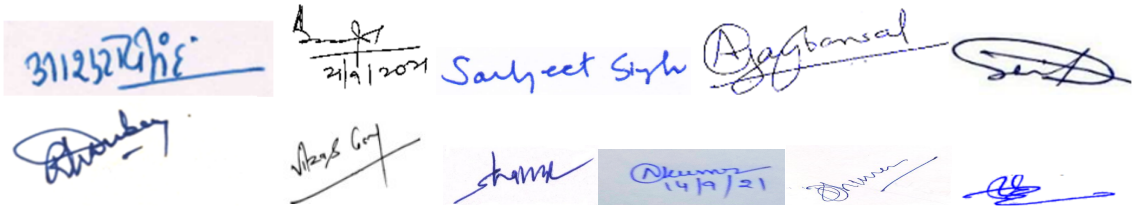
UNIT IV

Qualitative Methods of Seismic Evaluation: Rapid visual screening procedure (RVSP) and simplified evaluation of buildings; Visual inspection method and Non-destructive testing (NDT) method.

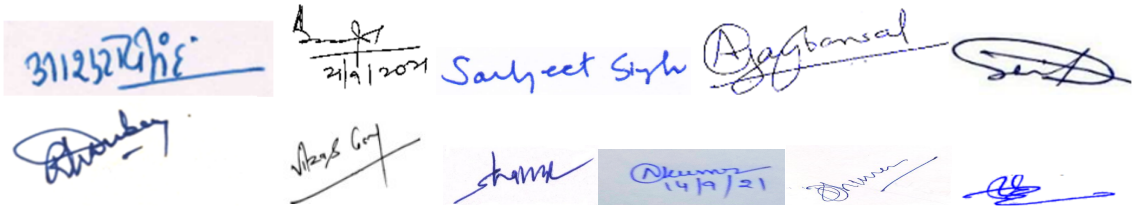
Quantitative Methods of Seismic Evaluation: Performance based method using nonlinear static push-over analysis (NSP) and non linear dynamic method of analysis (NDP).

Suggested Readings:

1. Chopra, AK, "*Dynamics of Structures*", Pearson Education Limited, 2019.



2. Craig, R R, Jr. and Kurdila, A, "*Fundamentals of Structural Dynamics*", John Wiley & Sons., 2011.
3. Humar, J L, "*Dynamics of Structures"*, Taylor & Francis Group, 2012.
4. Katsikadelis, J.T. *Dynamic Analysis of Structures.* Elsevier Science and Technology, 2020.
5. Kramer, S.L. *Geotechnical Earthquake Engineering.* Pearson Education ltd., 2013.
6. Reiter, L. *Earthquake Hazard Analysis.* Columbia University Press, 1991.
7. Paz, Mario and Kim, Y.H. *Structural Dynamics-Theory and Computation.* Springer, 2019.
8. Villaverde, R. *Fundamental Concepts of Earthquake Engineering.* Taylor & Francis., 2009.
9. Wolf, J. P. *Dynamic Soil-Structure Interaction.* Prentice-Hall, 1985.



MTCE 203: ADVANCED CONCRETE TECHNOLOGY
M. TECH (CIVIL) STRUCTURAL ENGINEERING

L	T	P	Credit
3	1	--	4

Course Outcome

1. Understand new technology applied in field of advanced construction.
2. Understand, analyze, compare and evaluate the technology used in design of special concretes and special construction methods.
3. Understand the problems associated with construction in extreme weather conditions.
4. Understand the factors affecting fresh and hardened state behaviour of concrete.

UNIT I

Construction Materials: Classifications of Construction Materials. Consideration of physical, mechanical, thermo physical properties, characteristics behaviour under stress, selection criteria for construction materials, green building materials, waste products, reuse and recycling. Materials for making Mortar and concrete, properties, hardening of lime, types of lime, lime concrete uses, cement, aggregates, water, characteristics, properties and uses of Pozzolana materials, Types of mortars, special mortars, properties and applications, admixtures.

UNIT II

Ready-Mix Concrete; Various Methods of Handling and Placing Concrete, accelerated curing, Hot and cold weather concreting, Under water concreting, Rheological behaviour of fresh Concrete-Properties of fresh and hardened concrete-Strength, Elastic properties, Creep and Shrinkage, Variability of concrete strength, Interfacial Transition Zone. Effects of age, aggregate content, and its shape, richness of mix, curing on Strength of Concrete

Pumping of Concrete; Grouting and Mass Concreting Operations, Prestressing, Steel and Composite Construction Methods**,** Fabrication and erection of structures including heavy structures, Prefab construction, Industrialised construction and Modular coordination.

UNIT III

Construction Methods, Construction in Marine Environments, High Rise Construction, Bridge Construction including Segmental Construction, Incremental Construction and Push Launching Techniques; Geosynthetics; Safety, Quality Measures and Reliability.

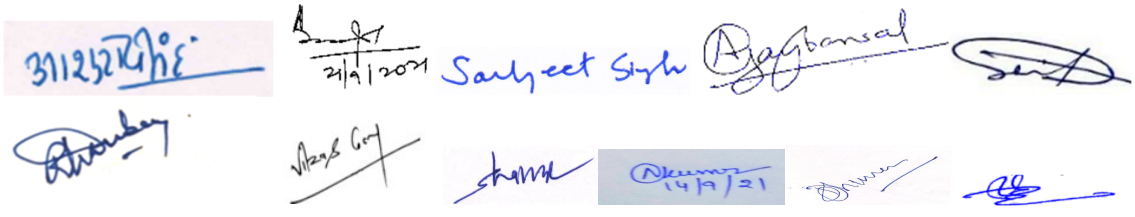
Corrosion of concrete in various environments. Corrosion of reinforcing steel. Ferro-cement, material and properties. Polymers, fibers and composites, Architectural use and aesthetics of composites. Polymer concrete composites.

UNIT IV

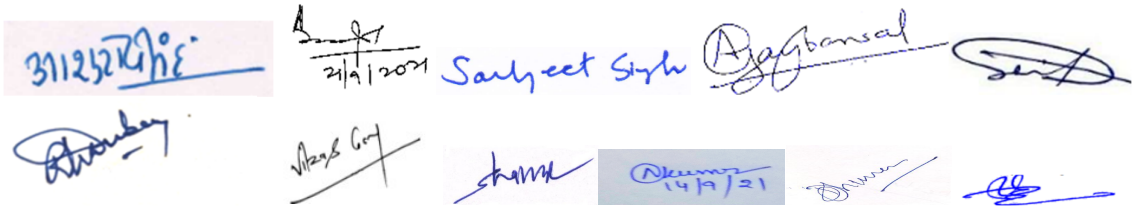
Special concrete such as high strength, Lightweight, heavy weight, vacuum processed, concrete. Mass concrete, high performance concrete, Pumpable concrete, Self-Compacting concrete, Air entrained concrete, Ferro cement, fiber reinforced concrete, Deterioration and repair technology of concrete, Distress and type of repairs.

Non-Destructive testing methods - Semi-destructive testing methods.

Suggested Readings:



1. Duggal, SK, “Building Materials”, New Age International Publications, 2006.
2. Gambhir, ML, “*Concrete Technology*”, Tata McGraw Hill (Second Edition), 1995.
3. Mehata, PK, Paulo, Monteiro, JM, “*Concrete microstructure, properties & Materials”*, Prentice Hall INC & Mcgraw Hill USA.
4. Neville, AM, Brook, JJ, “*Properties of Concrete*”, Addison Wesley, 1999.
5. Orchard, DF, “*Concrete Technology -Vol I. & II*”, Applied Science Publishers (Fourth edition), 1963
6. Rangawala, SC, “*Engineering Materials*”, Chortor Publications, 1991.
7. Shetty, MS, “*Concrete Technology*” S.Chand & Company New Delhi, 2005.
8. Short, Kenniburg, “*Light Weight Concrete*”, Asia Publishing House, Bombay, 1963.



MTCE 204: ADVANCED CONCRETE TECHNOLOGY LABORATORY
M. TECH (CIVIL) STRUCTURAL ENGINEERING

L	T	P	Credit
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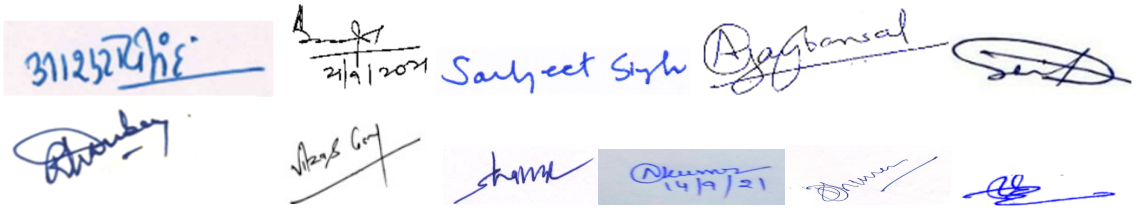
Course Outcome

CO1: Design of high-performance concrete.
CO2: Understand the factor affecting properties of concrete.
CO3: Understand the technology used for non-destructive testing of concrete.

List of Experiments

1. Stress-strain behaviour of concrete.
2. Effect of shape and size on compressive strength of concrete.
3. Determination of split tensile strength of concrete its relationship with compressive strength.
4. Determination of modulus of rupture of concrete and its relationship with compressive strength.
5. Effect of curing temperature on concrete strength.
6. Non-destructive testing of concrete.
7. Design of Ultra-high strength concrete
8. Design of High-performance concrete.
9. To determine heat of hydration of Portland Cement and Portland pozzolanic Cement.

Note: The students will be required to carry out atleast 05 experiments / exercises from the above list and any other two experiments either from the above list or designed by the faculty based on the theory course.

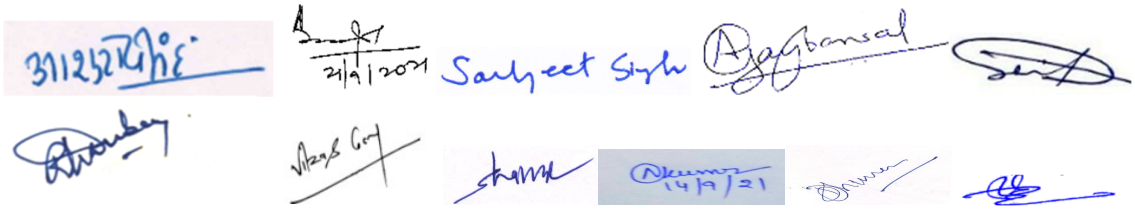


MTCE 205: SEMINAR II
M. TECH (CIVIL) STRUCTURAL ENGINEERING

L	T	P	Credit
--	--	4	2

Seminar will be of 45-minute duration during which the presentation will be followed by questions session by the audience comprising faculty and students. Every student shall be required to submit the topic of his/her seminar in consultation with the associated faculty/Mentor well in advance so that the same may be displayed on the notice board. The presenter has to write a report comprising of abstract, literature review, brief details of the background of the topic, methods used, findings and references/list of sources from where the material for presentation has been collected and students need to submit two copies of the seminar report to the department.

The seminar report, the submitted slides, presentation skills and overall attendance will form the basis of the evaluation. There will be no separate final exam for this course.



MTCE 211: DESIGN OF BRIDGES

M. TECH (CIVIL) STRUCTURAL ENGINEERING

L	T	P	Credits
3	1	-	4

Course Outcomes:

1. Understand general consideration and IRC codes related to bridge Engineering
2. Understand the analysis and design of various types of bridges.
3. Analyse the design parameters and response box culverts.
4. Understand the design parameters of bridge substructure.

UNIT-I

General Consideration: Site selection, various types of bridges and their suitability, loads, forces and IRC bridge loading and permissible stresses, Economic Spans.

UNIT-II

Design of RC bridges under concentrated loads using effective width and Pigeauds Method, Courbon's method of load distribution.

UNIT-III

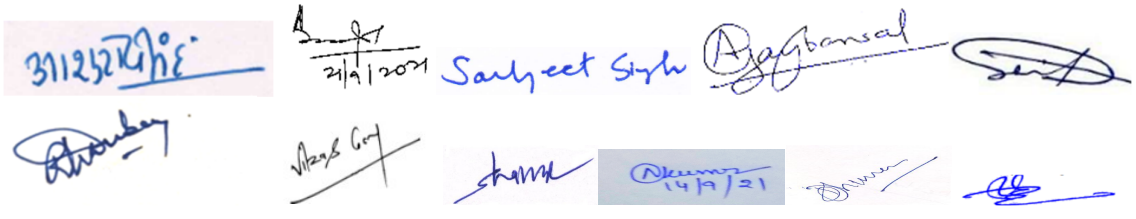
Detail design of T-beam bridge slab culvert and box culverts

UNIT-IV

Bridge substructure and bearings, Design of piers and pier caps. Abutments, Different types of foundations, used for design of substructure.

Suggested readings:

1. Ponnuswamy, S, "*Bridge Engineering*", Tata McGraw Hill
2. Raina, VK, "*Concrete Bridge Practice*", Tata McGraw Hill
3. Raju, NK, "*Design of Bridges*", Oxford & IBH
4. Victor, DJ, "*Essentials of Bridge Engineering*", Oxford & IBH



MTCE 212: THEORY OF PLATES
M. TECH (CIVIL) STRUCTURAL ENGINEERING

L	T	P	Credits
3	1	--	4

Course outcomes:
CO1: Understand classical theory of plates and shells
CO2: Importance and applications of plate and shell structures
CO3: Analytical solutions and numerical techniques for design of plate and shells.

Unit-I

Plates: Introduction, Classification of pates, Governing equation of thin rectangular plate, Navier's Method of solution for Rectangular Plates subjected to point load, uniformly distributed load, patch load and linear hydro-static load, Levy's Solution.

Unit-II

Bending of Orthotropic plates and Governing equation of thin rectangular plate, Analysis and Design of Grid flat thin slab system, Governing equation of Circular plate, Triangular plate and Elliptical plate, Structural behaviour of Folded plate roofs, Slab-beam analysis of folded plates, The vibration of plates.

Unit-III

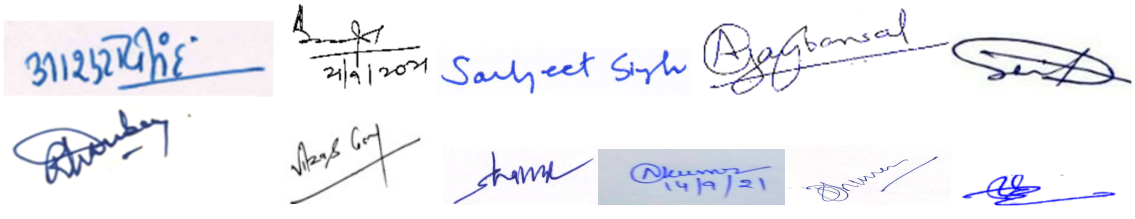
Shells: Introduction, Type of shells, Equation of equilibrium of Spherical Shells, Design of Spherical shells with/without circular ring beam, Equation of Equilibrium of Conical Shells, Umbrella Shells.

Unit-IV

Conical water tank, Design of conical roof including edge beam, Equation of Equilibrium of cylindrical shells, Semi-circular shells, Circular cylindrical shells under axisymmetric loading, Analysis of doubly curved shells, Hipped roof.

Suggested readings:

1. Chatterjee, BK, "*Theory and Design of Concrete Shells*" Spon Press; Revised edition, 1988.
2. Kruas, H, "*Thin Elastic Shells*", John Wiley & Sons Ltd, 1968.
3. Mansfield, EH, "*The Bending and Stretching of Plates,*" 2nd edition, Cambridge University Press, 1989.
4. Ramaswamy, GS, "*Design and Construction of Shell Structures*", CBS Publishers, New Delhi, 1996.
5. Timoshenko, SP, and Krieger SW, "*Theory of Plates and Shells,*" McGraw-Hill, 1959.



MTCE 213: OFFSHORE STRUCTURES
M. TECH (CIVIL) STRUCTURAL ENGINEERING

L	T	P	Credit
3	1	-	4

Course Outcomes

CO1: Students will acquire knowledge for the Concept of offshore installation
CO2: To get knowledge about transportation of offshore structures
CO3: Students will develop knowledge for the installation of offshore structure
CO4: Student will assimilate the knowledge on various types of offshore materials

UNIT I

Concepts of offshore installations: Fixed and floating structures; Spars and TLP's; Modular topsides and integrated topsides; deck levels and jacket configurations; Spar and TLP hull arrangements;

Fabrication yard, grillage and foundation conditions; Fabrication sequence of Launch jacket, lift jackets, topsides and modules; Weighing and weight control; Skidded, Trailer and lifted Loadout methods;

UNIT II

Transportation: Cargo barges; Launch barges; layout of cargo arrangement; Sea fastening layout and design; Static and dynamic stability of barge; Motion analysis of barge – cargo system; Transportation analysis. Transportation fatigue analysis;

UNIT III

Installation Schemes: Lifting and launch schemes for jackets, upending and setting, on bottom stability; Float-over installations; Dynamics of barge – cargo system;

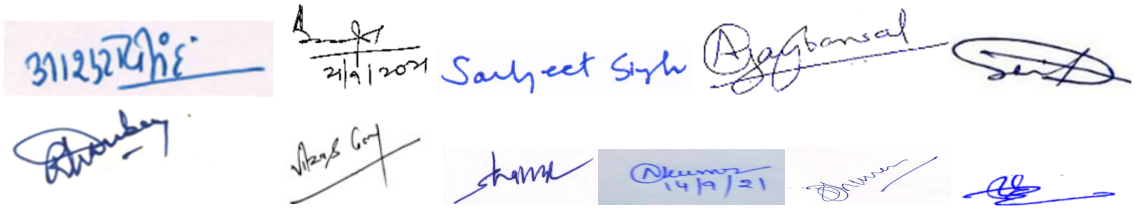
Installation aids: Launch cradle design; Buoyancy tank design; Lift points – padeyes and trunnions; spreader frame and spreader bar concepts; Mudmat concepts and design methods; Lifting topside modules and towers; Bumpers and guides; Grouting and leveling of jackets;

UNIT IV

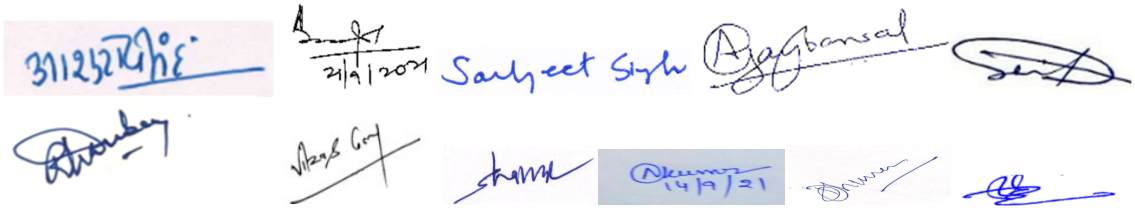
Materials for Offshore Applications : Introduction - Factors Affecting Materials selection, Classification of Materials; Structural Steel; Topside Materials- Materials Applications, Materials for Seawater Systems, Materials for Process Piping and Equipment; Material for HPHT Applications- Limitations of Materials for HPHT Application; Advanced Composite Materials; Elastomers; Corrosion Control; Material Reliability and Monitoring; Fracture Control.

Suggested Readings

1. Baris, S, and Tettenborn, A, *"Offshore Contracts and Liabilities (Maritime and Transport Law Library)"*, 2014.
2. Chakrabarti, SS, Chakrabarti, SK, *"Hydrodynamics of Offshore Structures"*, 2003.
3. Chakrabarti, SK, *"Handbook of Offshore Engineering* (Vol.1 & 2)", Elsevier Publishers, 2005
4. El-Reedy, MA, *"Offshore Structures: Design", Construction and Maintenance*, 2012.
5. Graff, *"Introduction to Offshore Structures: Design, Fabrication, Installation."*, 1981.



6. Offshore Technology Conference Volumes, O.C. Zienkiewicz, R., Wlewis and K.G. Stagg, '*Numerical Methods in offshore Engineering*', Wiley Interscience Publication, 1978.



MT CE 214: EARTH RETAINING STRUCTURES
M. TECH (CIVIL) STRUCTURAL ENGINEERING

L	T	P	Credits
3	1	-	4

Course Outcomes:

CO1: Determine the earth pressure on the retaining wall.

CO2: Analyse the distribution of earth pressure on sheet piles and Coffer Dam.

CO3: Design of earth retaining walls.

UNIT- I

Review of Earth pressure: Introduction, different types and their coefficients, earth pressure as a stability problems, classical theories of earth pressure –Rankine's and Coulomb's theories for active and passive earth pressure, Computation of lateral earth pressure in homogeneous and layered soils in various ground conditions, graphical solutions for Coulomb's theory in active and passive conditions.

UNIT- II

Retaining wall: Types, material, method of construction, nature of forces acting, type of failures of retaining walls, comparison of different earth pressure theories and application in retaining wall. Stability analysis and design aspects, application of theory of elasticity in analysis of earth pressure distribution.

UNIT- III

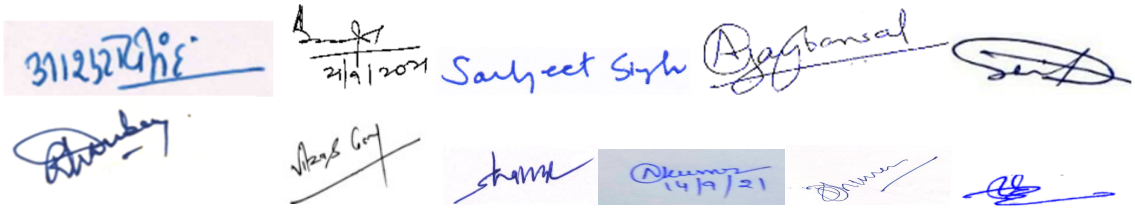
Sheet Pile and Cofferdam: Type, material, method of construction, distribution of earth pressure and related approximation. Sheet Pile Structures – Types of Sheet piles, cantilever sheet piles in sands and clays, anchored sheet piles – free earth and fixed earth support methods, – types of cofferdam, suitability, merits and demerits – Design of single – wall cofferdams and their stability aspects distinction between Sheet Pile and Retaining wall.

UNIT- IV

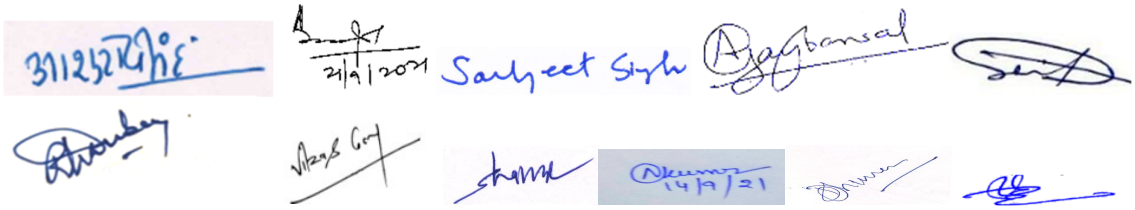
Earth Dams: Classification, features of an earth dam, seepage control in embankments and foundations, stability analysis: introduction to analysis based on general failure surfaces, method of slices, use of stability charts, stability of earth dams during different stages - steady seepage, rapid drawdown, end of construction, slope protection, filters, embankment construction materials and construction, quality control, grouting techniques.

Suggested Books

1. Arora, KR, "*Soil Mechanics and Foundation Engineering"*,Standard Publishers, 2009.
2. Bowles, J E, "*Foundation Analysis & Design*", McGraw-Hill Companies, 2017.
3. Chris, RI, Clayton, Rick I. Woods, Andrew J. Bond, Jarbas Milititsky, "*Earth Pressure and Earth Retaining Structures*", CRC Press,2013.
4. Das, BM, "*Principles of Foundation Engineering*", Nelson Engineering, 2004.



5. Coduto, DP, "*Foundation Design Principles and Practices*", Pearson, Indian edition, Phi Learning, 2014.
6. *"Earth and Rock-Fill Dams: General Design and Construction Considerations"* by United States Army Corps of Engineers, University Press of the Pacific,2004.



MT CE 215: ADVANCED NUMERICAL ANALYSIS
M. TECH (CIVIL) STRUCTURAL ENGINEERING

L	T	P	Credits
3	1	-	4

Course Outcomes:

CO1: Understand the advanced mathematical computation.

CO2: Analyse the different numerical problems by numerical techniques.

UNIT- I

Error analysis, significant digits, inherent errors, numerical errors, absolute and relative error, error propagation, conditioning & stability.

UNIT- II

Solution of linear simultaneous equations, direct and iterative algorithms based on Gauss elimination, Gauss Jordan method, Gauss Seidel method

Numerical solution to non-linear system of equations, bisection method, false position method, Newton-Raphson method, Secant method, fixed point method

UNIT- III

Interpolation formulae, Polynomial forms, linear interpolation, lagrange interpolation polynomial, Newton interpolation polynomial, forward and backward differences

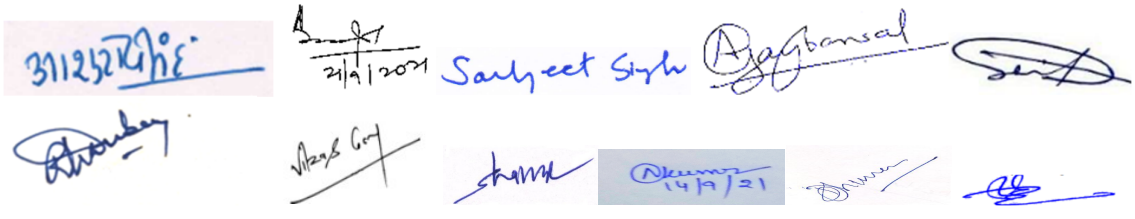
Numerical differentiation by forward difference quotient. Central difference quotient, Richardson extrapolation and numerical integration by Trapezoidal rule, Simpson's 1/3 rule, Romberg integration, Gaussian integration

UNIT- IV

Numerical solution of ordinary differential equations by Taylor series method, Euler's method, Runge-kutta method, Picard's method, Heun's method, polygon Method.

Suggested Books:

1. Akai, TJ, *"Numerical Methods"*, John Wiley & Sons lnc, Singapore,1994.
2. Baron, ML, Salvadori, MG, "Numerical Methods in Engineering" PHI Pvt.Ltd.1963.
3. Shastry, SS, *"Introductory Method of Numerical Analysis*", PHI Pvt.Ltd.,1997
4. Saxena, HC, "Finite Differences and Numerical Analysis", S.Chand& Co.Delhi,2001.



MT CE 216: GEOTECHNICAL EARTHQUAKE ENGINEERING
M. TECH (CIVIL) STRUCTURAL ENGINEERING

L	T	P	Credit
3	1	-	4

Course Outcome

CO1: Understand the concept of seismic wave propagation and dynamic soil properties.
CO2: Design of earth retaining walls for seismic load.
CO3: Infer the liquefaction phenomenon and its effects.
CO4: Learn the concept of landslides and slope stability.

UNIT I

Introduction: Background and lessons learnt from damages in past earthquakes.
Wave Propagation: Waves in semi-infinite media – one, two- and three-dimensional wave propagation; Attenuation of stress waves – material and radiation damping; Dispersion, waves in a layered medium.
Dynamic Soil Properties: Stress & strain conditions, concept of stress path; Measurement of seismic response of soil at low and high strain, using laboratory tests; Cyclic triaxial, cyclic direct simple shear, resonant column, shaking table, centrifuge and using field tests - standard penetration test, plate load test, block vibration test, SASW/MASW tests, cross bore hole; Evaluation of damping and elastic coefficients; Stress-strain behavior of cyclically loaded soils; Effect of strain level on the dynamic soil properties; Equivalent linear and cyclic nonlinear models; Static and dynamic characteristics of soils.

UNIT II

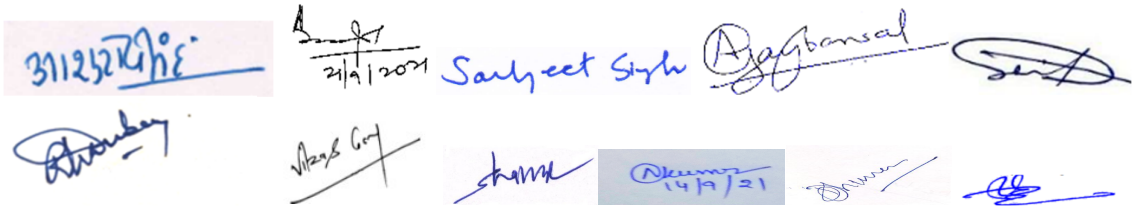
Liquefaction: Introduction, pore pressure, liquefaction related phenomena – flow liquefaction and cyclic mobility, factors affecting liquefaction, liquefaction of cohesionless soils and sensitive clays, liquefaction susceptibility; State Criteria –CVR line, SSL, FLS; Evaluation of liquefaction potential: characterization of earthquake loading and liquefaction resistance, cyclic stress ratio, Seed and Idriss method; Effects of liquefaction.

UNIT III

Ground Response Analysis: Introduction, one, two and three dimensional analyses; Equivalent and nonlinear finite element approaches; Introduction to soil-structure interaction.
Earth Pressure: Active and passive earth pressures; Terzaghi's passive wedge theory, numerical methods, earth pressure measurements.; Seismic design of retaining walls: types, modes of failures, static pressure, seismic response (including M-O Method), seismic displacement, design considerations.

UNIT IV

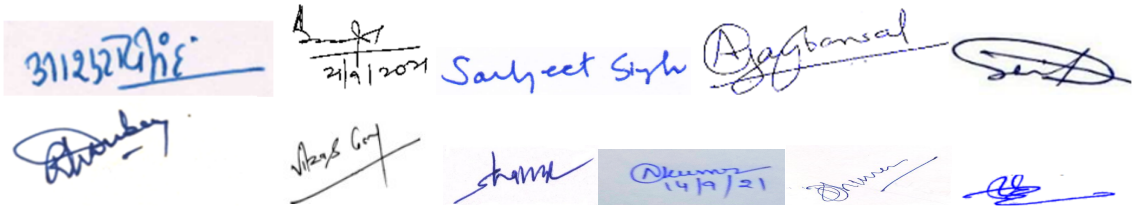
Seismic Slope Stability: Types of earthquake induced landslides; Evaluation of slope stability – stability analysis with dynamic loading, friction circle method, effective and total stress



methods of analysis, factor of safety, yield acceleration, damage potential, displacement analysis, effect of saturated and submerged conditions.

Suggested Readings:

1. Day Robert, W, *"Geotechnical Earthquake Engineering Handbook"*, McGraw-Hill. 2001
2. Kameshwara, Rao, NSV, *"Dynamic Soil Tests & Applications"*, Wheeler Publications. 2000
3. Kramer, SL, *"Geotechnical-Earthquake Engineering"*, Pearson Education – Indian Low Price Edition. 2004
4. Prakash, S, *"Soil Dynamics"*, McGraw Hill Book Company. 1981
5. Ranjan, G.and Rao ASR, *"Basic and Applied Soil Mechanics"*, New Age Int. Ltd. 2000
6. Saran, S, *"Soil Dynamics & Machine Foundation"*, Galgotia Publication. 2006



MT CE 217: ANALYSIS AND DESIGN OF TUNNELS
M. TECH (CIVIL) STRUCTURAL ENGINEERING

L	T	P	Credit
3	1	--	4

Course Outcomes: At the end of the course the students should be able to:

CO1. Classify different rock mass and parameters associated with them.

CO2. Demonstrate the understanding of design approach and support methods for tunnels.

CO3. Relate different excavation techniques with sub-strata.

CO4. Understand the concepts of tunneling in soft ground.

UNIT –I

Introduction: Historical review of the development of tunnelling, its advantages and disadvantages.

Classification and Characterization : Classification and Characterization of Rock and Rock Mass, determination of Ground Types, determination of mechanical and hydraulic rock parameters, objectives and methods.

UNIT-II

Geotechnical Design and Tunnel Layout: Introduction to structured design approach, Identification of influencing factors. Analysis of ground behaviour, using closed form solutions and numerical simulations, Support methods, effects and characteristics of supports, Assignment of excavation and support methods to characteristic geotechnical situations, Analysis of system behaviour; estimation of stresses and deformation, structural design of shotcrete linings, Special measures in soft soils, for tunnels with high overburden, and tunnels below the groundwater table.

UNIT –III

Conventional and Mechanical Excavation Techniques including basics in TBM : Excavation Methods, Excavation by Drilling and Blasting, Mechanized excavation Techniques, Excavation of large and deep tunnels and Caverns, Methods of Sinking Shafts.

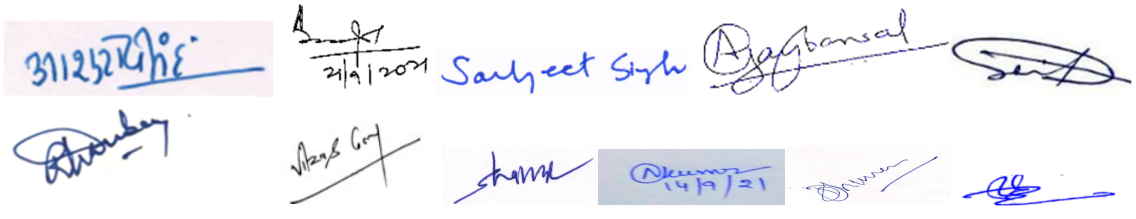
Design of Tunnels: Determination of appropriate location, size, shape and alignment, Assessment of behavior of tunneling media - deformation modulus and support pressure measurement, instrumentation and monitoring of rockmass performance, application of numerical modelling in space design, earthquake effects on tunnels, design of underground space in rocks with the help of field data.

UNIT – IV

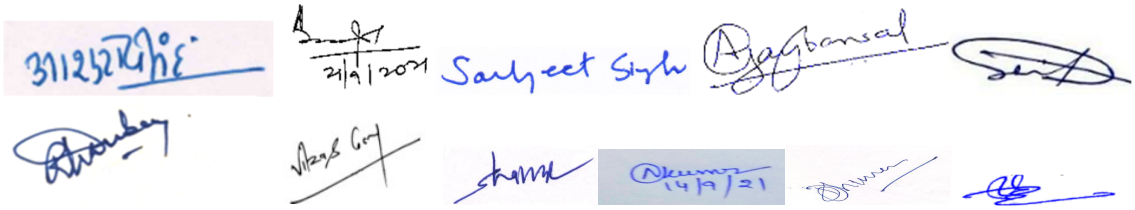
Soft ground tunnelling : Design considerations, lining type, short term and long-term behavior, subsidence, instrumentation and monitoring, case study.

Case studies of planning and design : Metro, highway tunnel, underground station, storage of oil & gas, food, Water/sewage treatment plants, immersed tunnels.

Suggested Readings



1. Heidelberg, VB, Lunardi, P, “Design and construction of tunnels”, Springer, 2008.
2. Jimeno, Carcedo, Jimeno, “*Drilling and blasting of rocks”*.
3. Whittaker, BN, Frith, RC, “*Tunnelling: Design, Stability and Construction Books*” IMM publication, 1990
4. Whittaker, and Frith, “*Planning design and construction of tunnels”*.



MT CE 218: ADVANCED STEEL STRUCTURES DESIGN
M. TECH (CIVIL) STRUCTURAL ENGINEERING

L	T	P	Credit
3	1	--	4

Course Outcomes:

CO1: Understand the concepts and practical knowledge of modern Civil Engineering techniques for design of steel structures.
CO2: Understand the concepts of plastic analysis and design.
CO3: Analysis and design of elevated circular tanks.
CO4: Analysis and design of light gauge steel.

Unit I

Planning of industrial structures, Design of braced and unbraced industrial portals in steel, Design of gantry girder, Design of single and multi bay industrial sheds in steel. Design of tie rods, sag rods, grit angles.

Unit II

Transmission Line Towers, Analysis by Tension Coefficients, Member Selection; Steel Tanks and Stacks, Different Configurations and components of Elevated Circular Tanks.

Unit III

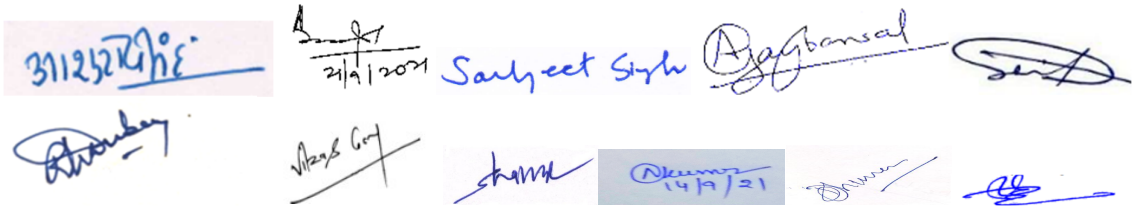
Plastic Design, Plastic Hinge, Plastic Collapse Load, Plastic Analysis of Frames; Wind Loads on Industrial Buildings, Design of Purlins, Braced and Unbraced Section.

Unit IV

Machine foundations, Design of foundations for impact and rotary and reciprocating type machines. Analysis and design of Virendeel Girders. Design in Light Gauge Steel; Aluminum Structures; Residual Stresses

Suggested readings:

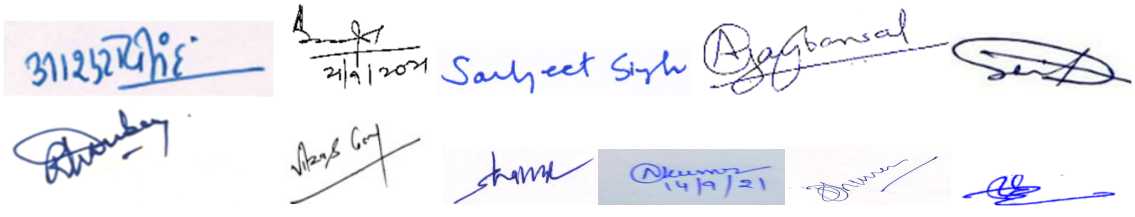
1. Arya, AS and Ajmani JL, "*Design of Steel Structures*" Nem Chand & Bros., Roorkee, 1996.
2. Dayaratnam, P, "*Design of Steel Structures*" Wheeler Publishers, Allahabad, 1996
3. Neal, BG, "*Plastic Analysis of Structures*" Chapman Hall, London, 1977
4. Raz, SA, "*Structural Design in Steel*", New Age International Publishers, New Delhi, 2002.



MT CE 301: DISSERTATION PHASE-I
M. TECH (CIVIL) STRUCTURAL ENGINEERING

L	T	P	Credit
-	-	--	10

Every student will carry out dissertation under the supervision of a Supervisor(s). The topic shall be approved by a Committee constituted by the Head of the concerned Department. Every student will be required to present two seminar talks, first at the beginning of the Dissertation (Phase-I) to present the scope of the work and to finalize the topic, and second towards the end of the semester, presenting the work carried out by him/her in the semester. The committee constituted will screen both the presentations so as to award the grades. A student scoring 'F' grade (Fail) shall have to improve this grade before continuing his/her Dissertation in the 4th semester failing which he/she shall have to repeat the Dissertation (Phase-I) next time in the next semester.



MT CE 302: RESEARCH METHODOLOGY
M. TECH (CIVIL) STRUCTURAL ENGINEERING

L	T	P	Credit
4	2	--	6

Course Outcomes:

CO1: Understand research problem, meaning and design.
CO2: Apply the computer tools in research.
CO3: Understanding of research ethics.

UNIT –I

Introduction of Research Methodology: Concept of research and its applications: characteristics features, objectives, scope, reliability and validity of research, Scientific process: Meaning and Definition, Steps involved in research process, a brief history of scientific process.

Formulation of research problem: Objectives of research problem. Research Design-Meaning, Need and features of good research design, defining problem, preparing research design analysis and interpretation of data, Basic Principles of Experimental Techniques.

UNIT II

Scientific Methodology: Meaning, Scope, Primary sources of literature survey- journal, patents etc. Secondary sources of literature survey - books, reference books, text books. Paper Writing and preparation of Dissertation: Basic concepts of paper writing - Steps of paper writing, Methods of presentation, Precautions in preparing the research Dissertation – Concepts of bibliography and annexure, Discussion of results, Drawing conclusions, Giving suggestion and recommendation of concerned persons.

UNIT III

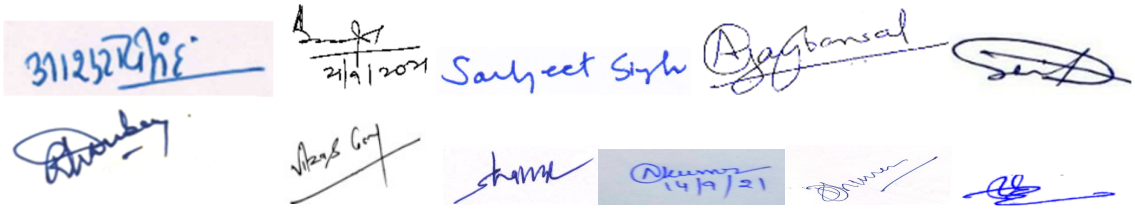
Computer Applications: a. Spreadsheet tool: Introduction to spread-sheet applications, features & functions, using formulae & functions, data storing, features for statistical data analysis, generating charts/graphs & other features. Tools: Microsoft Excel, Open office and similar or other advanced tools b. Presentation tool: Introduction to presentation tool, features & functions, creating presentations, customising presentation. [Tools used: Microsoft Power point, Open Office or any other tool]

UNIT IV

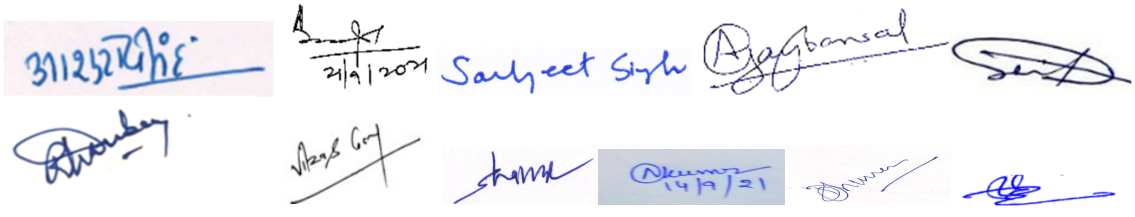
Measurement Scales and Evaluation: Concepts of Measurement Scales; Primary Levels of Measurement; Classification of Measurement Scales; Validity and Reliability Analysis
Scholarly Writing Characteristics of Scholarly Writing; Standard Guidelines; Critical Reviews; Research Proposals; Research Reports; Thesis/Dissertations; Research Papers; Impact Factor of Journals; Citation and Acknowledgement; Plagiarism and Self-Plagiarism; Reproducibility and Accountability

Suggested Readings:

1. Bowen, W. G. and Rudenstine, N. L. *In pursuit of the Ph.D.* Princeton University Press, 1992.
2. Davis, G. B. and Parker, C. A. *Writing the Doctoral Dissertation: A Systematic Approach.* 3rd Edition, Barron's Educational Series, 2012.



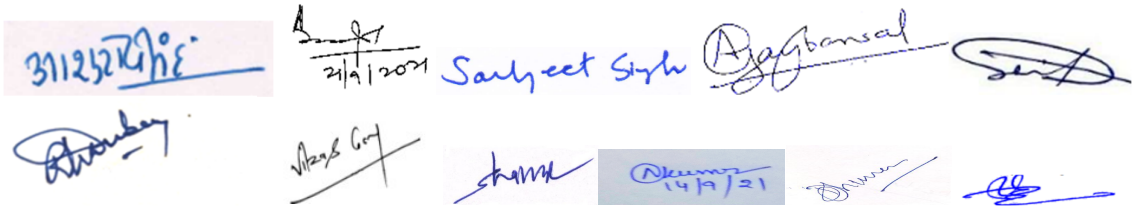
3. Gash, S. *Effective Literature Searching for Research*. 2nd Revised ed., Gower, 1989
4. Kothari, C. R. and Garg, G. *Research Methodology: Methods and Techniques.* 4th Multi-Colour Edition, New Age International Publishers, 2019.
5. Kumar, R. *Research Methodology: A Step-by-step Guide for Beginners.* 4th ed., Sage Publications, 2014.
6. Lester, J. D. and Lester, J. D. Jr., *Writing Research Papers: A Complete Guide.* 15th ed., Longman, 2014.



MT CE 401: DISSERTATION PHASE-II
M. TECH (CIVIL) STRUCTURAL ENGINEERING

L	T	P	Credit
-	-	--	30

The Dissertation Phase-1 will be continued as Dissertation Phase-II in 4th Semester. The award of the grades shall be done by an internal Committee constituted by the Head of the Department. This assessment shall be based on presentation (s), report, etc. before this committee. In case a student scores 'F' grade, failing which he/ she will not be allowed to submit the dissertation. At the end of the semester, every student will be required to submit three bound copies of his/her Master's dissertation of the office of the concerned Department. Out of these, one copy will be kept for department record & one copy shall be for the supervisor. A copy of the dissertation will be sent to the external examiner by mail by the concerned department, after his/her appointment and intimation from the university. Dissertation will be evaluated by a committee of examiners consisting of the Head of the Department, dissertation supervisor(s) and one external examiner. There shall be no requirement of a separate evaluation report on the Master Dissertation from the external examiner. The external examiner shall be appointed by the University from a panel of examiners submitted by the respective Supervisor to the HoD. The student shall defend his/her dissertation through presentation before this committee and the committee will award the grades. Student scoring 'F' grade in the exam shall have to resubmit his /her Dissertation after making all correction / improvements and this dissertation shall be evaluated as above.



Central University of Haryana

('A' Grade, NAAC Accredited)

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

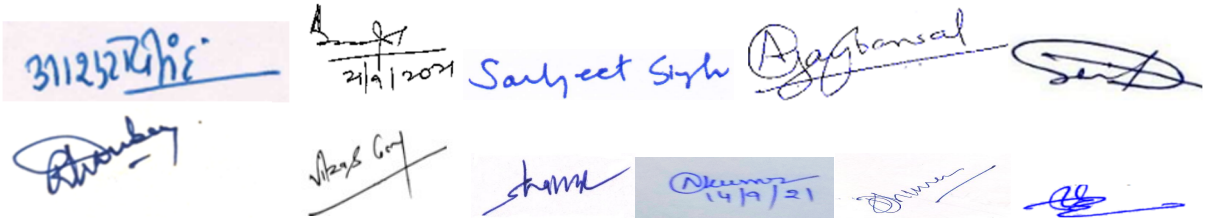
NEP 2020/LOCF/OBE/NBA CURRICULUM (2021 -2022)
Program Name: M. Tech. - Computer Science and Engineering

Background

Considering the curricular reforms as instrumental for desired learning outcomes, all the academic departments of Central University of Haryana made a rigorous attempt to revise the curriculum of undergraduate and postgraduate programmes in alignment with National Education Policy-2020 and UGC Quality Mandate for Higher Education Institutions-2021. The process of revising the curriculum could be prompted with the adoption of "Comprehensive Roadmap for Implementation of NEP-2020" in the 32nd meeting of the Academic Council of the University held on April 23, 2021. The Roadmap identified the key features of the Policy and elucidated the Action Plan with well-defined responsibilities and indicative timeline for major academic reforms.

The process of revamping the curriculum started with the series of webinars and discussions conducted by the University to orient the teachers about the key features of the Policy, enabling them to revise the curriculum in sync with the Policy. Proper orientation of the faculty about the vision and provisions of NEP-2020 made it easier for them to appreciate and incorporate the vital aspects of the Policy in the revised curriculum focused on 'creating holistic, thoughtful, creative and well-rounded individuals equipped with the key 21st century skills' for the 'development of an enlightened, socially conscious, knowledgeable, and skilled nation'.

With NEP-2020 in background, the revised curricula articulate the spirit of the policy by emphasizing upon— integrated approach to learning; innovative pedagogies and assessment strategies; multidisciplinary and cross-disciplinary education; creative and critical thinking; ethical and Constitutional values through value-based courses; 21st century capabilities across the range of disciplines through life skills, entrepreneurial and professional skills; community and constructive public engagement; social, moral and environmental awareness; Organic Living and Global Citizenship Education (GCED); holistic, inquiry-based, discovery-based, discussion-based, and analysis-based learning; exposure to Indian knowledge system, cultural traditions and classical literature through relevant courses offering 'Knowledge of India'; fine blend of modern pedagogies with indigenous and traditional ways of learning; flexibility in course choices; student-centric participatory learning; imaginative and flexible curricular structures to enable creative combination of disciplines for study; offering multiple entry and exit points initially in undergraduate programmes; alignment of Vocational courses with the International Standard Classification of Occupations maintained by the International Labour Organization; breaking the silos of disciplines; integration of extra-curricular and curricular aspects; exploring internships with local industry, businesses, artists and crafts persons; closer collaborations between industry and higher education institutions for technical , vocational and science programmes; and formative assessment tools to be aligned with the learning outcomes, capabilities, and dispositions as specified for each course. In case of UG programmes in Engineering and Vocational Studies, it was decided that the departments shall incorporate pertinent NEP recommendations while complying with AICTE, NBA, NSQF, International Standard Classification of Occupations, Sector Skill Council and other relevant agencies/sources. The University has also developed



consensus on adoption of Blended Learning with 40% component of online teaching and 60% face to face classes for each programme.

The revised curricula of various programmes could be devised with concerted efforts of the faculty, Heads of the Departments and Deans of Schools of Study. The draft prepared by each department was discussed in a series of discussion sessions conducted at Department, School and the University level. The leadership of the University has been a driving force behind the entire exercise of developing the uniform template and structure for the revised curriculum. The Vice Chancellor of the University conducted series of meetings with Heads and Deans to deliberate upon the vital parameters of the revised curriculum to formulate a uniform template featuring Background, Programme Outcomes, Programme Specific Outcomes, Postgraduate Attributes, Structure of Masters Course, Learning Outcome Index, Semester-wise Courses and Credit Distribution, Course-level Learning Outcomes, Teaching-Learning Process, Blended Learning, Assessment and Evaluation, Keywords, References and Appendices. The experts of various Boards of Studies and School Boards contributed to a large extent in giving the final shape to the revised curriculum of each programme.

To ensure the implementation of curricular reforms envisioned in NEP-2020, the University has decided to implement various provisions in a phased manner. Accordingly, the curriculum may be reviewed annually.

Vision and Mission

UNIVERSITY VISION

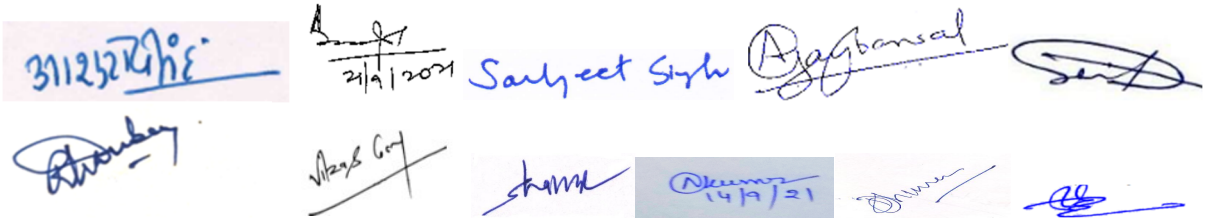
To develop enlightened citizenship of a knowledge society for peace and prosperity of individuals, nation and the world, through promotion of innovation, creative endeavours, and scholarly inquiry.

UNIVERSITY MISSION

To serve as a beacon of change, through multi-disciplinary learning, for creation of knowledge community, by building a strong character and nurturing a value-based transparent work ethics, promoting creative and critical thinking for holistic development and self-sustenance for the people of India. The University seeks to achieve this objective by cultivating an environment of excellence in teaching, research and innovation in pure and applied areas of learning.

DEPARTMENT VISION AND MISSION

VISION



- To provide a sound technical foundation combined with intelligence, critical thinking and experiential learning while encouraging entrepreneurship through open innovation.

MISSION

- **M1:** To provide students with excellent engineering education by endowing students with the knowledge and technical skills.
- **M2:** To prepare the foundation for undertaking the research for systems involving emerging field of Computer Science & Engineering.
- **M3:** To produce motivated professional technocrat capable of generating solutions for industrial and other real-life problems.
- **M4:** To prepare dynamic entrepreneurs with ethical values that will be useful for the society.

Mapping of University Vision and Mission to Department Vision and Mission

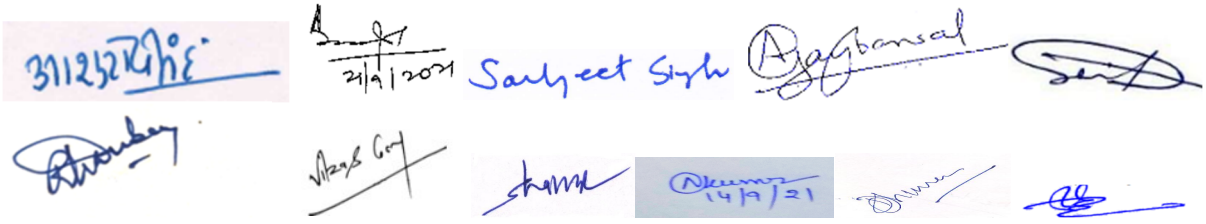
Acclaimed as modal Centre of Learning and Research by

University Vision and Mission	**Department Vision and Mission**
High quality knowledge society creation for peace and prosperity of individuals, nation and the world, through and scholarly inquiry	**M1**
Promotion of innovation, creative endeavours, research and development	**M2,M3**
Students excellence through multi-disciplinary learning, value-based transparent work ethics, creative and critical thinking	**M3,M4**
Environment of excellence in teaching, research and innovation in pure and applied areas of learning	**M1, M2**

Programme Educational Objectives (PEOs):

The Department of Computer Science & Engineering in consultation with various stakeholders have formulated the Programme Educational Objectives (PEO's) that are broad statements that describe the career and professional accomplishments that the program is preparing its graduates to achieve in a few years, subsequent to receiving the degree. The PEO's of the M. Tech. programme in Computer Science and Engineering are as follows:

- **PEO1:** To impart knowledge and skills to analyze, design, test and implement a diverse range of software.



- **PEO2:** To develop teamwork capability so that they can work on multidisciplinary and innovative projects and exhibit a high level of professional and ethical values.
- **PEO3:** To employ their skills with a strong base to prepare them for higher learning and research activities.
- **PEO4:** To interact with their peers in industry and society as engineering professionals and leaders to set up technical ambience in the society.

Program Specific Outcomes (PSO's):

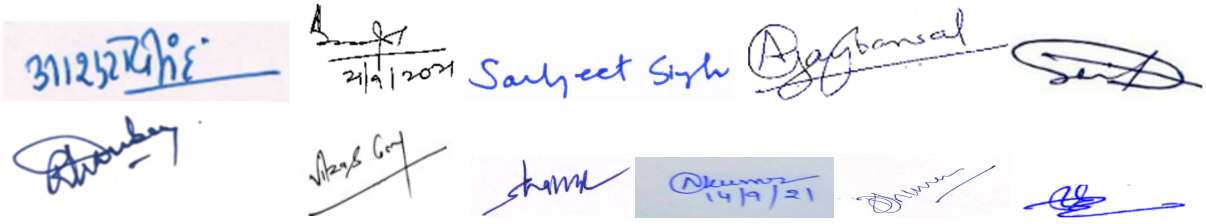
- **PSO-1:** Augmented knowledge of Computer Science and technologies
- **PSO-2:** Enhanced capability to develop computational tools and applications and improved skills to solve contemporary challenges
- **PSO-3:** Exhibit attitude for continuous learning and deliver proactive solutions for futuristic challenges
- **PSO-4:** Should be able to handle research problems and write dissertations.

PEOs to Mission statement mapping

PEO's	MISSION OF THE DEPARTMENT			
	M1	M2	M3	M4
PEO1	3	2	1	1
PEO2	3	2	3	1
PEO3	3	1	3	3
PEO4	2	3	1	1

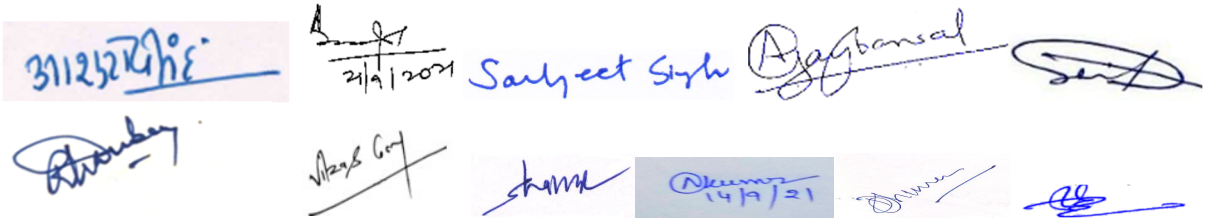
Program Outcomes (POs)

PO1	Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.



PO3	Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6	Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	Critically analyze existing literature in an area of specialization, conduct investigative research to develop innovative methodologies to tackle issues identified and contribute to the development of technological knowledge and intellectual property.
PO8	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	To write and present a substantial technical report/document.
PO10	Contribute and communicate effectively in multidisciplinary and multicultural scenarios.
PO11	Critically evaluate the outcomes of one's actions and apply self corrective measures to improve the performance.
PO12	Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

Mapping of PEO's with PO's



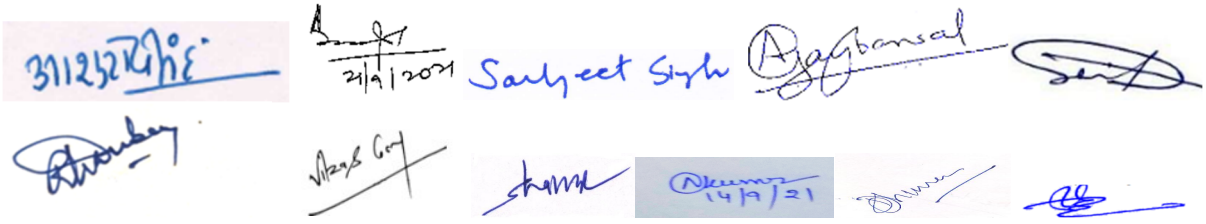
S. No.	*Program Educational Objectives*	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
1	To impart knowledge and skills to analyze, design, test and implement a diverse range of software.	√	√	√	√	√	√	√		√	√	√	√
2	To develop teamwork capability so that they can work on multidisciplinary and innovative projects and exhibit a high level of professional and ethical values.	√	√	√	√	√		√	√	√	√	√	√
3	To employ their skill with a strong base to prepare them for higher learning and research activities.	√	√	√	√	√		√	√	√			√
4	To interact with their peers in industry and society as engineering professionals and leaders to set up technical ambience in the society.	√	√	√	√	√		√	√	√	√		√

M. Tech. - Computer Science and Engineering

SCHEME OF EXAMINATIONS

(SEMESTER–I)

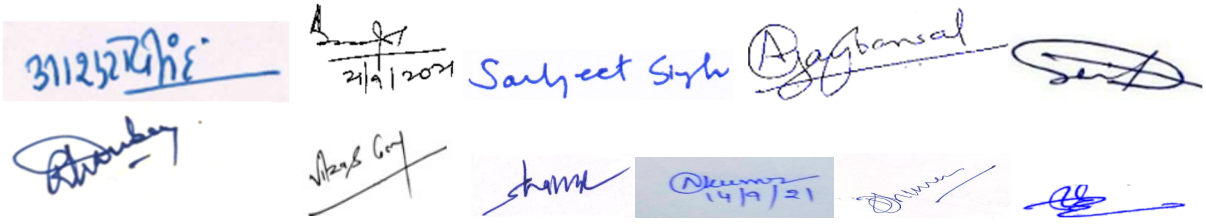
S. No.	Course Code	Course Title	Teaching Schedule			Credits
			L	T	P	
1	MT CS 101	Advanced Databases	3	1	0	4
2	MT CS 102	Advanced Computer Networks	3	1	0	4
3		PE-1	3	0	0	3



4		PE-2	3	0	0	3
5		Open Elective(GEC)	4	0	0	4
6	MT CS 103	Advanced Databases Lab	0	0	2	1
7	MT CS 104	Advanced Computer Networks Lab	0	0	2	1
8		PE Lab-1	0	0	2	1
9		PE Lab-2	0	0	2	1
10		Audit Course-1	2	0	0	0
Total						22

(SEMESTER–II)

S. No.	Course Code	Course Title	Teaching Schedule			Credits
			L	T	P	
1	MT CS 201	Machine Learning	3	1	0	4
2	MT CS 202	Advanced Algorithms	3	1	0	4
3		PE-3	3	0	0	3
4		PE-4	3	0	0	3
5	MT CS 203	Machine Learning Lab.	0	0	2	1
6	MT CS 204	Advanced Algorithms Lab.	0	0	2	1
7		PE Lab-3	0	0	2	1
8		PE Lab-4	0	0	2	1
9	MT CS 205	Research Seminar	0	4	0	4
10		Audit Course-2	2	0	0	0



Total				22

(SEMESTER–III)

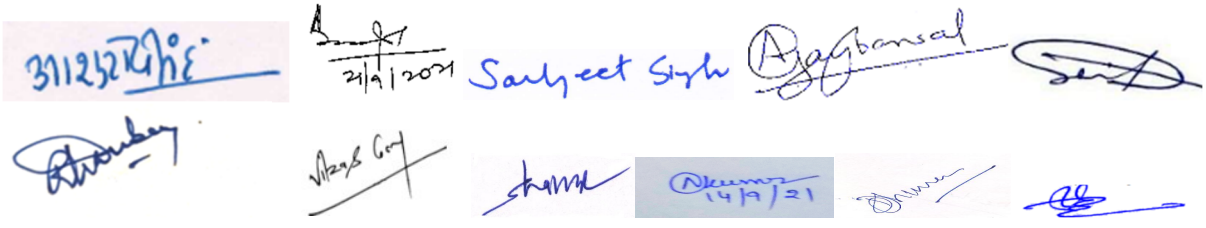
S. No.	Course Code	Course Title	Teaching Schedule			Credits
			L	T	P	
1	MT CS 301	Research Methodology and IPR	3	0	0	3
2	MT CS 302	Pre-Dissertation	0	0	22*	22
3		PE-5	3	0	0	3
Total						28

(SEMESTER–IV)

S. No.	Course Code	Course Title	Teaching Schedule			Credits
			L	T	P	
1	MT CS 401	Dissertation	0	0	30*	30
Total						30

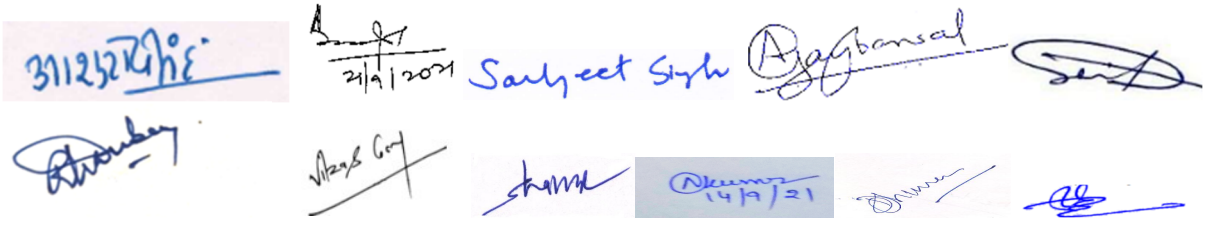
Note:

1. **The contents of all laboratories are based on the corresponding theoretical subjects only.**
2. *** These are part of Seminar/dissertation.**
3. **Student has to complete two audit courses (one each in 1st and 2nd semester).**



LIST OF PROGRAM ELECTIVES (PE)

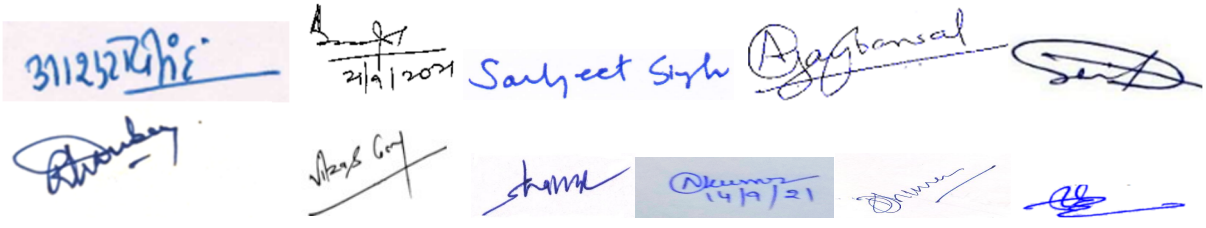
S.No.	Subject Code	Subject Title	Credits
PE-1			
1	MT CS 105	Information Retrieval	3
2	MT CS 106	Logic & Computation	3
3	MT CS 107	Software Testing & Quality Management	3
PE-2			
4	MT CS 108	Big Data Analytics	3
5	MT CS 109	Distributed System	3
6	MT CS 110	Digital Image Processing	3
PE-3			
7	MT CS 206	Bioinformatics	3
8	MT CS 207	Cyber Security	3
9	MT CS 208	Natural Language Processing	3
PE-4			
10	MT CS 209	Cloud Computing	3
11	MT CS 210	Deep Learning	3
12	MT CS 211	Internet of Things	3
PE-5			
13	MT CS 303	Blockchain Technologies	3
14	MT CS 304	Software Project Management	3



15	MT CS 305	Remote Sensing	3
16	MT CS 306	Wireless and Mobile Networks	3
17	MT CS 307	Computer Vision	3
18	MT CS 308	Entrepreneurship	3

LIST OF PROGRAM ELECTIVES LAB (PE Lab)

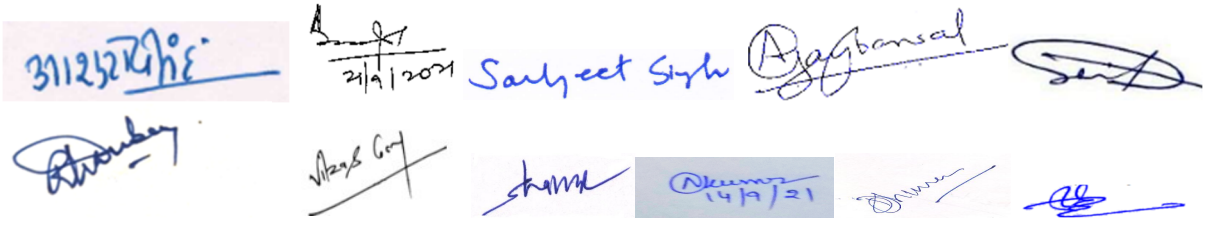
S.No.	Subject Code	Subject Title	Credits
PE Lab-1			
1	MT CS 110	Information Retrieval Lab	3
2	MT CS 111	Logic & Computation Lab	3
3	MT CS 112	Software Testing & Quality Management Lab	3
PE Lab-2			
4	MT CS 113	Big Data Analytics Lab	3
5	MT CS 114	Distributed System Lab	3
6	MT CS 115	Digital Image Processing Lab	3
PE Lab-3			
7	MT CS 212	Bioinformatics Lab	3
8	MT CS 213	Cyber Security Lab	3
9	MT CS 214	Natural Language Processing Lab	3
PE Lab-4			
10	MT CS 215	Cloud Computing Lab	3



11	MT CS 216	Deep Learning Lab	3
12	MT CS 217	Internet of Things Lab	3

LIST OF AUDIT COURSE 1 & 2

S. No.	Subject Code	Subject Title	Credits
1	MT AU 101	English for Research Paper Writing	0
2	MT AU 102	Disaster Management	0
3	MT AU 103	Sanskrit for Technical Knowledge	0
4	MT AU 104	Value Education	0
5	MT AU 105	Constitution of India	0
6	MT AU 106	Pedagogy Studies	0
7	MT AU 107	Stress Management by Yoga	0
8	MT AU 108	Personality Development through Life Enlightenment Skills	0



Program Name: M. Tech.-Computer Science and Engineering

Course Code: MT CS 101	**Course Name: Advanced Databases**	**L**	**T**	**P**	**C**
		3	**1**	**0**	**4**
Year and Semester	**1st year** **1st Semester**	**Contact hours per week:** (4 Hrs.) **Exam:** (3hrs.)			
Prerequisite of course	Database Management Systems	**Evaluation**			
		CIE: 30	**TEE: 70**		

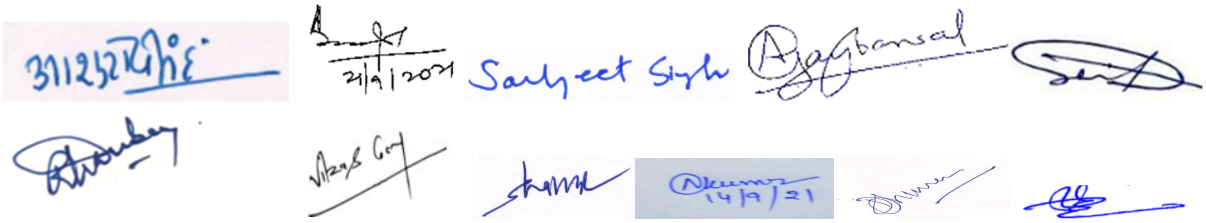
Course Objectives:

1. To provide good understanding of emerging database technologies
2. To design databases in a variety of technologies like xml, object oriented etc.
3. To provide in depth information about system implementation techniques and database system architecture.

Course Outcomes: On completion of the course, students would be able to:

CO101.1	Describe different database concepts and issues related to Transaction and Concurrency control in databases.
CO101.2	Identify object-oriented, relational, parallel and distributed databases and database technologies like xml.
CO101.3	Apply various backup and recovery techniques in a database.
CO101.4	Familiarize yourself with concepts of data mining and knowledge discovery.

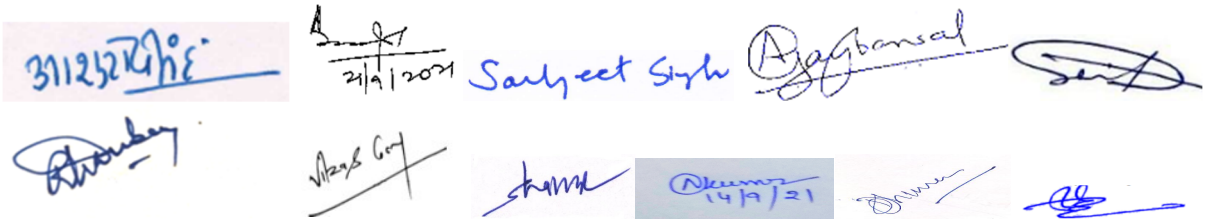
Module No	**COURSE SYLLABUS CONTENTS OF MODULE**	**Hrs**	**COs**
1	**Introduction:** Database System Concepts and Architecture, Data Independence, Data Models, SQL: DDL, DML, DCL, Database Integrity, Normalization: 1NF, 2NF, 3NF, BCNF, 4NF, 5NF. **Advanced Transaction Processing and Concurrency Control:** Transaction Concepts, Concurrency Control: Locking Methods, Timestamping Methods, Optimistic Methods for Concurrency Control, Concurrency Control in Distributed Systems.	**10**	**CO101.1**



2	**Object Oriented and Object Relational Databases:** Object Oriented Concepts with respect to Database Systems, Object Oriented Data Model, OODB, OODBMS, ODMG, ODL, OQL, ORDBMS, ORDBMS Design, ORDBMS Query Language. **Parallel and Distributed Databases:** Parallel Databases, Distributed Databases, Differences between them, Architecture of Distributed Databases, Architecture of Parallel Databases, Key elements of Parallel Database Processing, Fragmentation, Replication and Allocation for distributed databases, Intra-query parallelism, Inter-query parallelism, Intra-operation parallelism, Inter-operation parallelism.	**12**	**CO101.1, CO101.2**
3	**Backup and Recovery Techniques:** Backup and Recovery Concepts, Types of Database Failures, Types of Database Recovery, Recovery Techniques: Deferred Update, Immediate Update, Shadow Paging, Checkpoints, Buffer Management, Recovery Control in Distributed Systems. **XML and Internet Databases:** Structured, Semi Structured, and Unstructured Data, XML Hierarchical Data Model, XML Documents, DTD, XML Schema, XML Querying: XPath, XQuery.	**12**	**CO101.3**
4	**Emerging Database Technologies:** Introduction to Deductive Database Systems, Temporal Databases, Multimedia Databases, Mobile Databases, Main Memory Databases, Spatial and Multidimensional Databases. **Data Warehousing and Mining:** Introduction to OLAP, OLTP and differences between them, Data Warehouse, Data Warehouse Architecture, Data Marts, Data Mining, Data Mining Process, Knowledge Discovery.	**11**	**CO101.4**

Reference Books:

1. Date, C.J., 1975. An introduction to database systems. Pearson Education India.
2. Ramakrishnan, R., Gehrke, J. and Gehrke, J., 2003. Database management systems (Vol. 3). New York: McGraw-Hill.
3. Ramez, E., 2007. Fundamentals of Database Systems: For VTU. Pearson Education India.



4. Silberschatz, A., Korth, H.F. and Sudarshan, S., 1997. Database system concepts (Vol. 4). New York: McGraw-Hill.
5. Singh, S.K., 2009. Database systems: Concepts, design and applications. Pearson Education India.

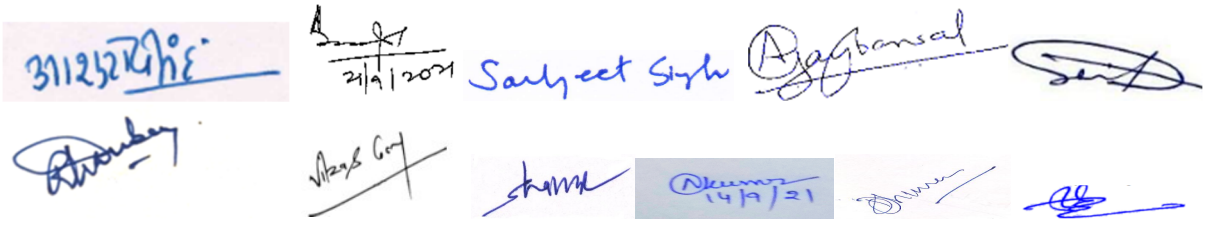
COURSE ARTICULATION MATRIX

COs	PO1	PO 2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO101.1	2		1		2			1				
CO101.2	3		2	1	3			1				
CO101.3	3		2	1	3			1				
CO101.4	2		2	1	3			1				

MAPPING OF COs WITH PSOs

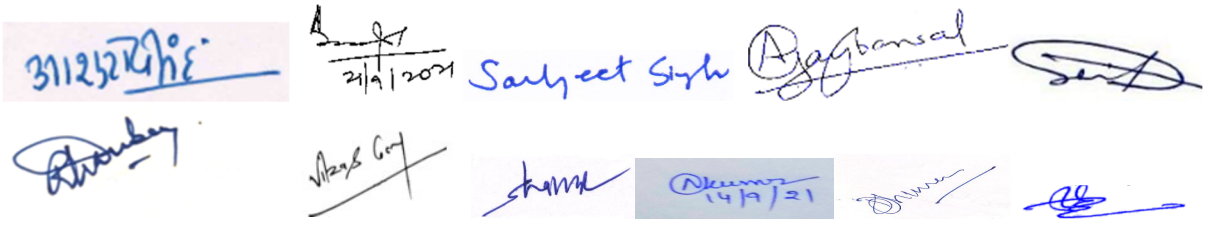
COs	PSO 1	PSO2	PSO3	PSO4
CO101.1	2	2	2	1
CO101.2	3	2	2	1
CO101.3	3	2	2	1
CO101.4	2	2	2	1

Course Code: MT CS 102	**Course Name: Advanced Computer Networks**	**L**	**T**	**P**	**C**
		3	**1**	**0**	**4**
Year and Semester	**1st year** **1st Semester**	**Contact hours per week:** (4 Hrs.) **Exam:** (3 Hrs.)			
Prerequisite of course	Basics of Computer Networks	**Evaluation**			
		CIE: 30	**TEE: 70**		



Course Objectives: 1. To introduce students about layered architecture of functions performed by each layer of the TCP/IP protocol suite which runs the Internet. 2. To introduce students about the MAC protocols used in various LANs, MANs, WANs 3. To make students understand how mobility is supported at the Network Layer. 4. To make students understand how the UDP and TCP transport the data. 5. To introduce students to different network security protocols used in modern networks	
Course Outcomes: On completion of the course, student would be able to:	
CO102.1	Understand the role and functions of physical layer of the TCP/IP protocol
CO102.2	Understand the design issues and challenges arises at each of the layers below the application layer
CO102.3	Understand the requirement of IPv6 Protocol over IPv4
CO102.4	Understand the basic requirement of network security

Module No	**COURSE SYLLABUS CONTENTS OF MODULE**	**Hrs**	**COs**
1	Introduction: Overview of computer networks, seven-layer architecture, TCP/IP suite of protocols. Review of Physical layer: Analog Signal, Digital Signal, Periodic Analog Signal: peak amplitude, period and frequency, phase, wavelength, time and frequency domain, composite signal, bandwidth, Digital Signal: Transmission of Digital Signals, bit rate, baseband transmission, Broadband transmission, Transmission impairment, Line Coding Schemes: characteristics, unipolar, bipolar, polar, Multilevel, and Multi transition.	**12**	**CO102.1**
2	Application layer HTTP, HTTP with Non-persistent and persistent connection, HTTP message format, WWW, DNS, SMTP, SNMP. Transport layer Design issues, functions, Transmission Control Protocol (TCP), Connectionless transport: User Datagram Protocol (UDP), UDP segment structure, UDP checksum,	**11**	**CO102.2**



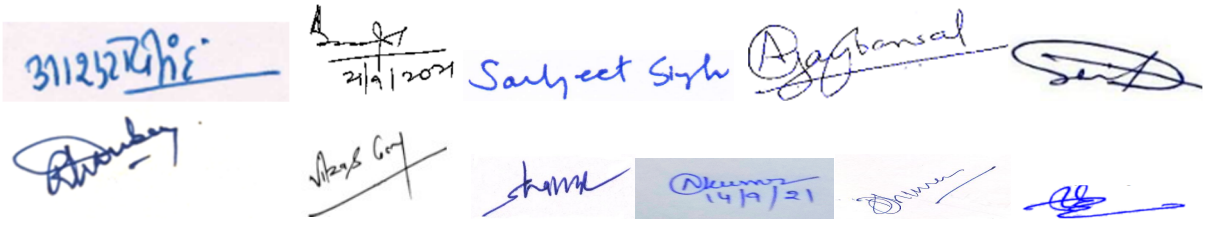
	Principle of reliable data transfer, Principles of Congestion Control, .		
3	Network layer: IPv4: header format, IPv4 address, classful address, classless addressing, subnet IPv6: Why IPv6, New in IPv6, IPv6 addressing, Unicast, Anycast, Multicast, Header format, transition from IPv4 to IPv6, basic protocol, extensions and options, support for QoS, security, neighbour discovery, auto-configuration, Routing Protocols- RIP, OSPF, BGP, IP over ATM.	**12**	**CO102.3**
4	MAC protocols for high-speed LANS, MANs, and wireless LANs: Aloha, CSMA, CSMA/CD, CSMA/CA, Reservation, polling, token passing Network security: Network security at various layers. Secure-HTTP, SSL, ESP, Authentication header, Key distribution protocols. Digital signatures, digital certificates.	**10**	**CO102.4**

Reference Books:

1. Chappell, L., 1998. Introduction to Cisco router configuration. Cisco Systems.
2. Forouzan Behrouz, A., Data Communication and Networking, 4th Edition, Tata McGraw Hill, 2017.
3. Keshav, S., An Engineering Approach to Computer Network, Pearson Education, 2002.
4. Kurose, J. and Ross, K.,, Computer Networking – A Top-Down Approach Featuring the Internet, 7th Edition, Pearson Education, 2016.
5. Stallings, W., 1998. SNMP, SNMPv2, SNMPv3, and RMON 1 and 2. Addison-Wesley Longman Publishing Co., Inc..
6. Stallings, W., 2007. Data and computer communications. Pearson Education India.
7. Stallings, W., Data and Computer Communications, 10th edition, Pearson Education, 2013
8. Tanenbaum, A.S., 2013, Computer Networks, 3rd Ed., PHI.
9. Tanenbaum, A.S., Computer Networks, 5th Edition, Pearson Education, 2013

COURSE ARTICULATION MATRIX

COs	PO1	PO 2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 0	PO1 1	PO1 2
CO102. 1	2	2	1		2			1				

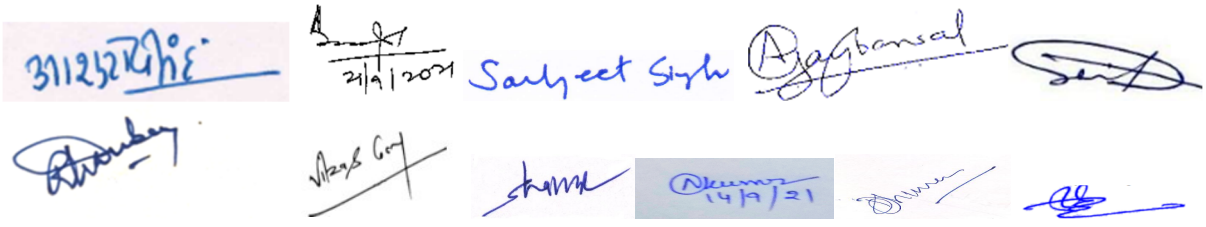


CO102.2	2	2	1	1	2			1				
CO102.3	2	2	1	1	2			1				
CO102.4	2	2	1	1	2			1				

MAPPING OF COs WITH PSOs

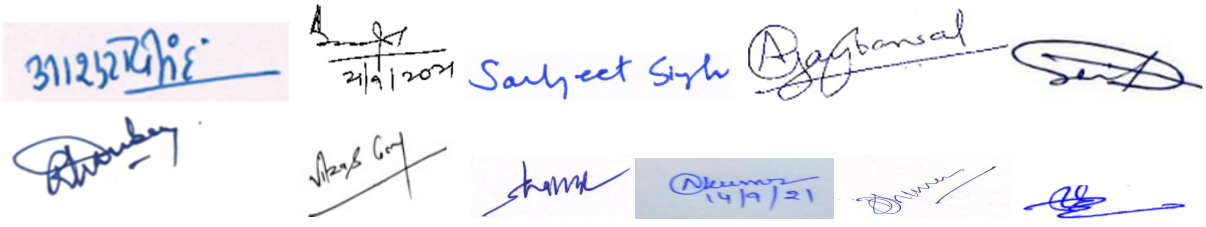
COs	PSO 1	PSO2	PSO3	PSO4
CO102.1	3	1	1	1
CO102.2	3	1	2	1
CO102.3	3	1	2	1
CO102.4	3	1	2	1

<table>
<tr><td rowspan="2">Course Code:
MT CS 201</td><td colspan="2" rowspan="2">Course Name: Machine Learning</td><td>L</td><td>T</td><td>P</td><td>C</td></tr>
<tr><td>3</td><td>1</td><td>0</td><td>4</td></tr>
<tr><td>Year and Semester</td><td>1st year
2nd Semester</td><td colspan="4">Contact hours per week: (4 Hrs.)
Exam: (3hrs.)</td></tr>
<tr><td rowspan="2">Prerequisite of course</td><td rowspan="2">Nil</td><td colspan="4">Evaluation</td></tr>
<tr><td colspan="2">CIE: 30</td><td colspan="2">TEE: 70</td></tr>
<tr><td colspan="6">Course Objectives:
1. To design and implement machine learning solutions to classification, regression, and clustering problems
2. To evaluate and interpret the results of the algorithms.</td></tr>
<tr><td colspan="6">Course Outcomes: On completion of the course, student would be able to:</td></tr>
</table>



CO201.1	Gain knowledge about basic concepts of Machine Learning and Identify machine learning techniques suitable for a given problem
CO201.2	understand a wide variety of learning algorithm and how to evaluate models generated from data
CO201.3	Apply the algorithm to real problems, optimize the models learned.
CO201.4	Apply Dimensionality reduction techniques.

Module No	**COURSE SYLLABUS CONTENTS OF MODULE**	**Hrs**	**COs**
1	Introduction and Basic Concepts: Definition of ML, Taxonomy of ML, Supervised Learning, Housing Price Prediction, Regression Vs Classification, Unsupervised Learning, Clustering, Clustering Genes, Latent Semantic Analysis (LSA), Reinforcement Learning. Supervised Learning, Linear Regression, Classification and Logistic Regression, Generalized Linear Models (GLM), Constructing GLM, Discriminative Algorithms, Dataset Loading and Visualization, Gradient Descent Visualization.	**10**	**CO201.1**
2	Weighted Least Squares, Netwon's Method, Perceptron, Maximum Entropy and Exponential Families, Generative Learning algorithms, Gaussian discriminant analysis, Naive Bayes, Laplace Smoothing, Kernel Methods, Support Vector Machines. Learning End-Sem: Bias-Variance and Error Analysis, Bias/variance tradeoff, Error Analysis, Normal Equations, Variance, Gradient Descent.	**11**	**CO201.2** **CO201.3**
3	k-means clustering algorithm, Mixtures of Gaussians, Expectation Maximization algorithm, Variational inference and Variational Autoencoders, Principal Component Analysis. Independent Component Analysis. Markov Decision Process (MDP): Bellman Equations, Value iteration and policy iteration, Value function approximation.	**12**	**CO201.2** **CO201.3** **CO201.4**
4	Deep Learning: Neural Networks, Vectorization, Backpropagation, Forward propagation Regularization and	**12**	**CO201.2** **CO201.3**



	model selection: Cross validation, Feature Selection, Bayesian statistics and regularization, Reinforcement Learning and Control: Markov decision processes, Learning a model for an MDP, Continuous state MDPs.		

Reference Books:

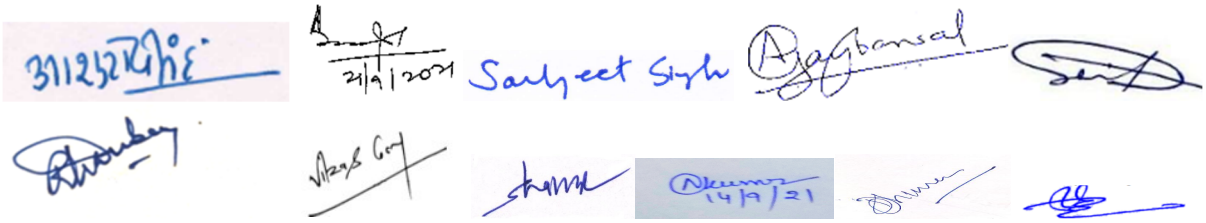
1. Kubat, M., 2017. An introduction to machine learning. Springer, Cham.
2. Murphy, K.P., 2012. Machine learning: a probabilistic perspective. MIT press.
3. Shalev-Shwartz, S. and Ben-David, S., 2014. Understanding machine learning: From theory to algorithms. Cambridge university press.
4. Svensén, M. and Bishop, C.M., 2007. Pattern recognition and machine learning.

COURSE ARTICULATION MATRIX

COs	PO1	PO 2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 0	PO1 1	PO1 2
CO201. 1	2											
CO201. 2	2											
CO201. 3	3	2	2		2			1				1
CO201. 4	3	2			2			1				1

MAPPING OF COs WITH PSOs

COs	PSO 1	PSO2	PSO3	PSO4
CO201.1	2	1	1	1
CO201.2	2	1	1	1
CO201.3	3	2	2	1
CO201.4	3	2	2	1



Course Code: MT CS 202	Course Name: Advanced Algorithms	L	T	P	C
		3	1	0	4

Year and Semester	1st year 2nd Semester	Contact hours per week: (4 Hrs.) Exam: (3hrs.)
Prerequisite of course	Data Structure & Algorithms	Evaluation
		CIE: 30 / TEE: 70

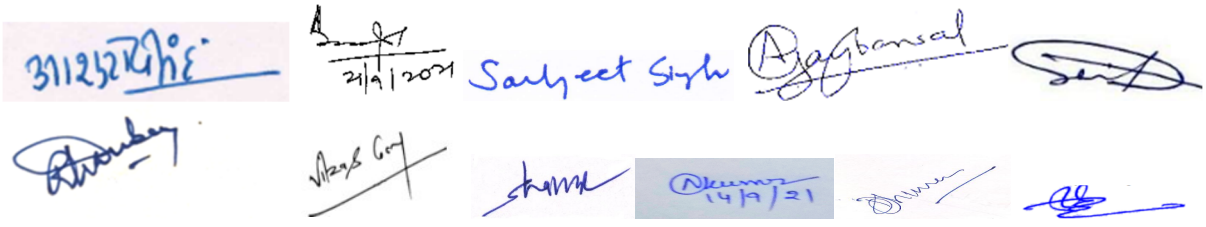
Course Objectives:

1. To learn the performance analysis of algorithms.
2. To be familiar with runtimes of algorithms.
3. To be exposed to problem solving via different approaches .
4. To understand NP completeness and satisfiability.
5. To learn Graph and Matrix solving approaches.

Course Outcomes: On completion of the course, student would be able to:

CO202.1	Analyze the complexity/performance of different algorithms
CO202.2	Categorize the different problems in various classes according to their complexity
CO202.3	Design a solution for applying all the relevant standards and with realistic constraints.
CO202.4	Understand different classes of problems concerning their computation difficulties.

Module No	COURSE SYLLABUS CONTENTS OF MODULE	Hrs	COs
1	Basics Design and Analysis Techniques with comparisons: of Divide-and-Conquer, Dynamic Programming and Greedy Algorithms, Comparison of dynamic programming and Greedy algorithm with Knapsack as case study. Theoretical foundation of greedy algorithms, Matroids and Greedy methods.	**10**	**CO202.1 CO202.2**



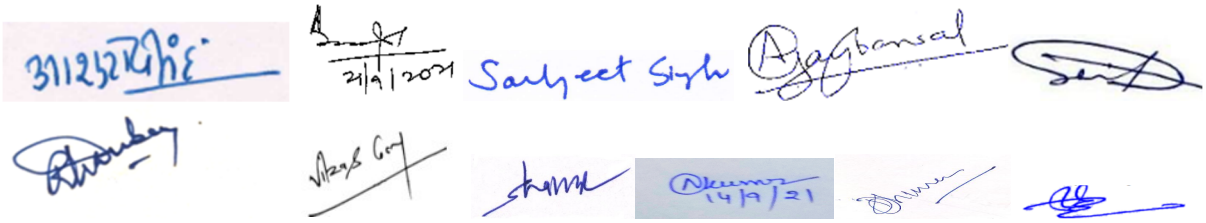
2	Review of Graph Theory, Internal Representations, Traversal algorithms, Tree, Spanning tree generation. Maximum Flow: Flow networks, The ford-fulkerson method, Computational Geometry: Line segments properties, determining whether any pair of segment intersects, Finding a convex hull, finding the closest pair of points	**13**	**CO202.1**
3	Matrix Operations: Solving system of linear equation, Inverting Matrices, Symmetric positive-definite matrices and least square approximation. Representation of polynomials, The DFT and FFT, efficient FFT implementation ,Elementary number-theoretic notion, Greatest common divisor, modular arithmetic, solving modular linear equation, Chinese remainder theorem.	**12**	**CO202.1 CO202.3**
4	NP-Completeness, Polynomial time, Polynomial time verification, NP completeness and reducibility. Few examples NP complete problems. Approximation Algorithms- the vertex-cover problem, The Traveling-Salesman Problem, The set covering problem, Randomization and linear programming, Subset-sum problem.	**10**	**CO202.1 CO202.3 CO202.4**

Reference Books:

1. Cormen, T.H., Leiserson, C.E., Rivest, R.L. and Stein, C., 2009. Introduction to algorithms. MIT press.
2. Kleinberg, J. and Tardos, E., 2006. Algorithm design. Pearson Education India.
3. Levitin, A., 2011. Introduction To Design And Analysis Of Algorithms. Pearson Education India.
4. Skiena, S.S., 2012. Sorting and searching. In The Algorithm Design Manual (pp. 103-144). Springer, London.

COURSE ARTICULATION MATRIX

COs	PO1	PO 2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 0	PO1 1	PO1 2
CO202. 1	2	3										
CO202. 2	3	1										



CO202.3	3	2	3		2							1
CO202.4	2											1

MAPPING OF COs WITH PSOs

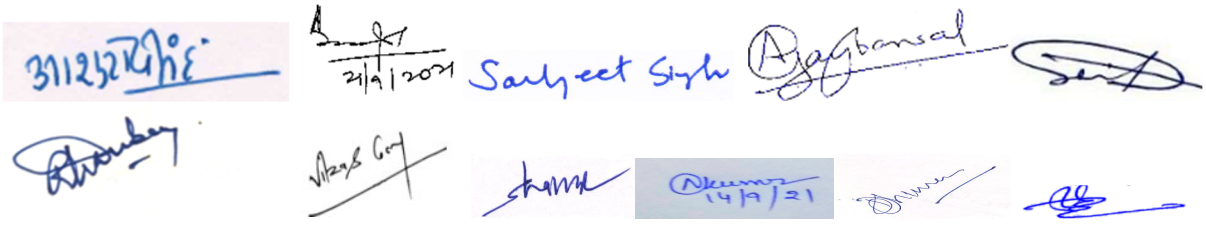
COs	PSO 1	PSO2	PSO3	PSO4
CO202.1	2			1
CO202.2	2			1
CO202.3	3	2	2	1
CO202.4	2		1	1

Course Code: MT CS 301	**Course Name: Research Methodology and IPR**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**
Year and Semester	**2nd year** **3rd Semester**	**Contact hours per week:** (3 Hrs.) **Exam:** (3hrs.)			
Prerequisite of course	Nil	**Evaluation**			
		CIE: 30	**TEE: 70**		

Course Objectives: This course is to familiarize participants with basic of research and the research process. This introduces the student to the basics of Intellectual Property Rights, Copy Right Laws Trade Marks and Issues related to Patents. The overall idea of the course is to help and encourage the student for startups and innovations.

Course Outcomes: On completion of the course, student would be able to:

CO301.1	Formulate a research problem for a given engineering domain.
CO301.2	Analyze the available literature for a given research problem.
CO301.3	Develop technical writing and presentation skills.
CO301.4	Comprehend concepts related to patents, trademark and copyright.

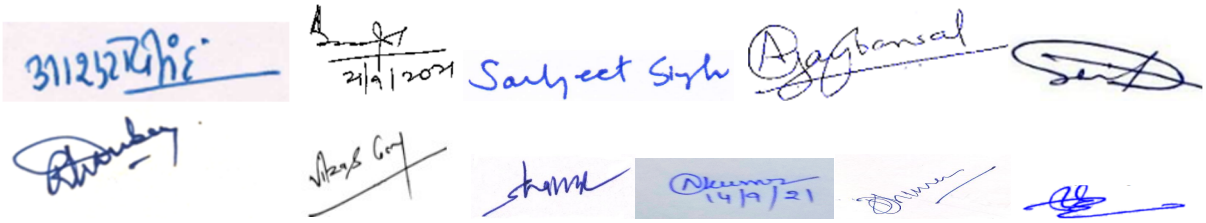


CO301.5	Analyze ethical and professional issues which arise in the intellectual property law context

Module No	COURSE SYLLABUS CONTENTS OF MODULE	Hrs	COs
1	Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem. Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations	**10**	**CO301.1** **CO301.2**
2	Effective literature studies approaches, analysis, Plagiarism, Research ethics Effective technical writing, how to write report, Paper Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee	**13**	**CO301.2** **CO301.3**
3	Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property. Procedure for grants of patents, Patenting under PCT.	**12**	**CO301.4**
4	Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications. New Developments in IPR: Administration of Patent System. New developments in IPR; IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies, IPR and IITs. related to patent filing, case studies- IPR of Hardware, computer software.	**10**	**CO301.5**

Reference Books:

1. Goddard, W. and Melville, S., 2004. Research methodology: An introduction. Juta and Company Ltd.
2. Halbert, D.J., 2006. Resisting intellectual property. Routledge.
3. Ramappa, T., 2000. Intellectual Property Rights Under WTO: Tasks Before India. Wheeler Publ.



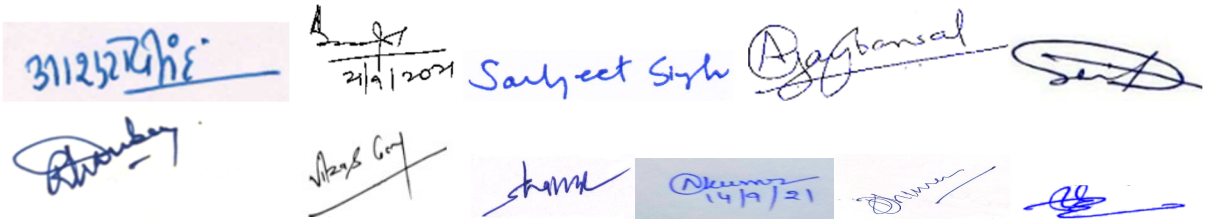
4. Ranjit Kumar., 2009, Research methodology: A step-by-step guide for beginners, Sage Publications, 5th edition.

COURSE ARTICULATION MATRIX

COs	PO1	PO 2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 0	PO1 1	PO1 2
CO301. 1	1	2						3				
CO301. 2	2	2	1					3		2		2
CO301. 3	1	1			2			3		2		2
CO301. 4	1	1			2			3		2		2
CO301. 5	2	2	1					3		2		2

MAPPING OF COs WITH PSOs

COs	PSO 1	PSO2	PSO3	PSO4
CO301.1	2		1	1
CO301.2	2		1	1
CO301.3	2		1	1
CO301.4	1		1	1
CO301.5	1		1	1



Syllabus of Electives Subjects

Course Code: MT CS 105	Course Name: Information Retrieval	L	T	P	C
		3	0	0	3

Year and Semester	1st year 1st Semester	Contact hours per week: (3 Hrs.) Exam: (3hrs.)
Prerequisite of course	Nil	Evaluation
		CIE: 30 / TEE: 70

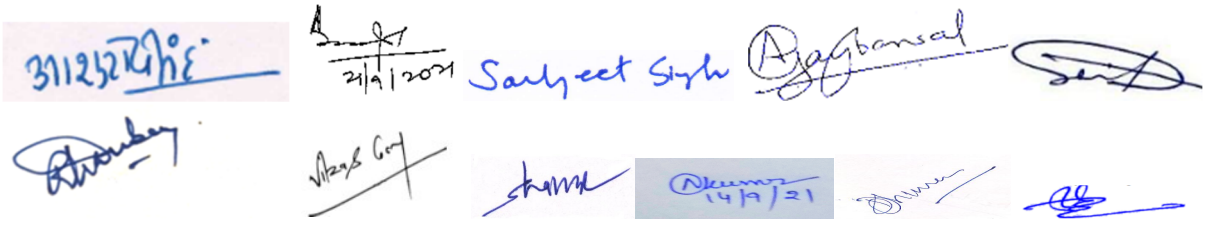
Course Objectives:

1. To learn the information retrieval models.
2. To be familiar with Web Search Engine.
3. To be exposed to Link Analysis.
4. To understand Hadoop and Map Reduce.
5. To learn document text mining techniques.

Course Outcomes: On completion of the course, student would be able to:

CO105.1	Identify the different issues in informal retrieval and web searching.
CO105.2	Analyse and understand various applications of web search in the real world.
CO105.3	Use the various techniques for text mining and analyse their performance.

Module No	COURSE SYLLABUS CONTENTS OF MODULE	Hrs	COs
1	Introduction: Introduction- History of IR, Components of IR, Issues, Open source Search Engine Frameworks, the impact of the web on IR, The role of artificial intelligence (AI) in IR, IR Versus Web Search, Components of a Search engine, Characterizing the web.	**10**	**CO105.1**
2	Information Retrieval: Boolean and vector-space retrieval models, Term weighting, TF-IDF weighting, cosine similarity, Preprocessing, Inverted indices, efficient processing with sparse vectors, Language Model based IR, Probabilistic IR,	**10**	**CO105.1**



	Latent Semantic Indexing, Relevance feedback and query expansion.		
3	Web Search Engine – Introduction and Crawling: Web search overview, web structure, the user, paid placement, search engine optimization/ spam. Web size measurement, search engine optimization/spam, Web Search Architectures, crawling, meta-crawlers, Focused Crawling, web indexes, Near-duplicate detection, Index Compression, XML retrieval. Web Search – Link Analysis and Specialized Search: Link Analysis –hubs and authorities – Page Rank and HITS algorithms -Searching and Ranking – Relevance Scoring and ranking for Web – Similarity.	**12**	**CO105.2**
4	Hadoop & Map Reduce – Evaluation – Personalized search – Collaborative filtering and content-based recommendation of documents and products – handling "invisible" Web – Snippet generation, Summarization, Question Answering, Cross-Lingual Retrieval. Document Text Mining: Information filtering; organization and relevance feedback, Text Mining, Text classification and clustering. Categorization algorithms: naive Bayes; decision trees; and nearest neighbor – Clustering algorithms: agglomerative clustering; k-means; expectation maximization (EM).	**13**	**CO105.3**

Reference Books:

1. Baeza-Yates, R. and Ribeiro-Neto, B., 1999. Modern information retrieval (Vol. 463). New York: ACM press.
2. Croft, W.B., Metzler, D. and Strohman, T., 2010. Search engines: Information retrieval in practice (Vol. 520, pp. 131-141). Reading: Addison-Wesley.
3. Levene, M., 2011. An introduction to search engines and web navigation. John Wiley & Sons.
4. Schütze, H., Manning, C.D. and Raghavan, P., 2008. Introduction to information retrieval (Vol. 39, pp. 234-265). Cambridge: Cambridge University Press.

COURSE ARTICULATION MATRIX

COs	PO1	PO 2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 0	PO1 1	PO1 2
CO105. 1	3											1
CO105. 2	3	2		1	2			1				1
CO105. 3	3		2		2			1				1

MAPPING OF COs WITH PSOs

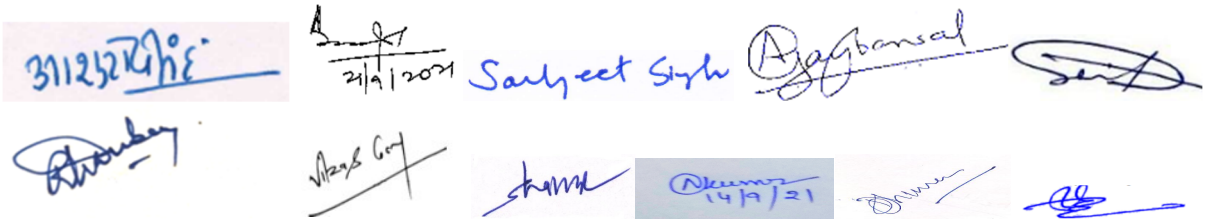
COs	PSO 1	PSO2	PSO3	PSO4
CO105.1	3		1	1
CO105.2	3	2	2	1
CO105.3	3	1	2	1

Course Code: MT CS 106	**Course Name: Logic & Computation**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**
Year and Semester	**1st year** **1st Semester**	**Contact hours per week:** (3 Hrs.) **Exam:** (3hrs.)			
Prerequisite of course	Discrete Structure	**Evaluation**			
		CIE: 30		**TEE: 70**	

Course Objectives:

1. To learn proof theory and compactness
2. To be familiar with decision problems, SAT and BDDs.
3. To be exposed to reactive systems and temporal logics.
4. To understand probabilistic verification & analysis.
5. To learn Simulation and bisimulation

Course Outcomes: On completion of the course, student would be able to:



CO106.1	Understand the basics of logical computation
CO106.2	Classify the problems into various categories.
CO106.3	Analyse the algorithms based on BDD and SAT models
CO106.4	Do basic simulations and make interpretations of logical writing.

Module No	**COURSE SYLLABUS CONTENTS OF MODULE**	**Hrs**	**COs**
1	Syntax, semantics & model theory for FOL, Proof theory & its soundness, Completeness of FOL, Compactness, Lowenheim-Skolem, & related theorems, FOL as the foundations of mathematics, Undecidability of FOL & arithmetic, The decision problem	**11**	**CO106.1**
2	SAT algorithm & efficiently decidable cases, including 2SAT & HORNSAT, BDDs (Boolean Decision Diagrams), Linear arithmetic, Uninterpreted functions & equality, Combining decision procedures	**11**	**CO106.2 CO106.3**
3	Reactive systems, Temporal calculi, mu-calculus, fixpoints, Temporal logics (CTL*, LTL, CTL), Explicit model checking: algorithms, probabilistic verification & analysis, Symbolic model checking: algorithms based on BDDs & SAT, Bounded model checking	**12**	**CO106.3**
4	Simulation & bisimulation, Stuttering, refinement maps, theories of refinement, Homomorphisms & conservative abstractions, Abstract interpretation	**11**	**CO106.4**

Reference Books:

1. Baader, F. and Nipkow, T., 1998. Term Rewriting and All That, Cambridge Univ. Press, Cambridge XII.
2. Ebbinghaus, H.D., Flum, J., Thomas, W. and Ferebee, A.S., 1994. Mathematical logic (Vol. 1910). New York: Springer.
3. Kaufmann, M., Manolios, P. and Moore, J.S. eds., 2013. Computer-aided reasoning: ACL2 case studies (Vol. 4). Springer Science & Business Media.
4. Robinson, A.J. and Voronkov, A. eds., 2001. Handbook of automated reasoning (Vol. 1). Elsevier.

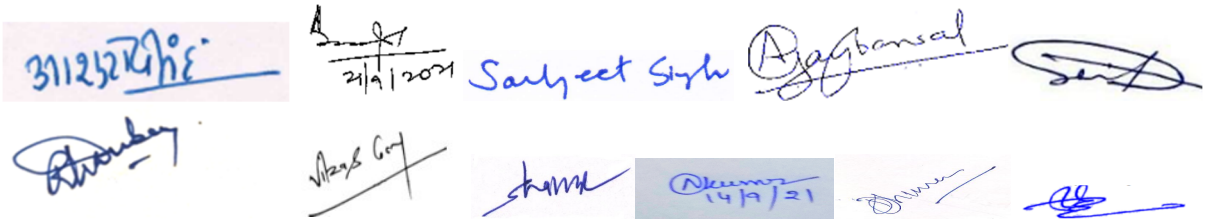
COURSE ARTICULATION MATRIX

COs	PO1	PO 2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 0	PO1 1	PO1 2
CO106. 1	2											
CO106. 2	2											
CO106. 3	2	2	2		2							1
CO106. 4	2				2							1

MAPPING OF COs WITH PSOs

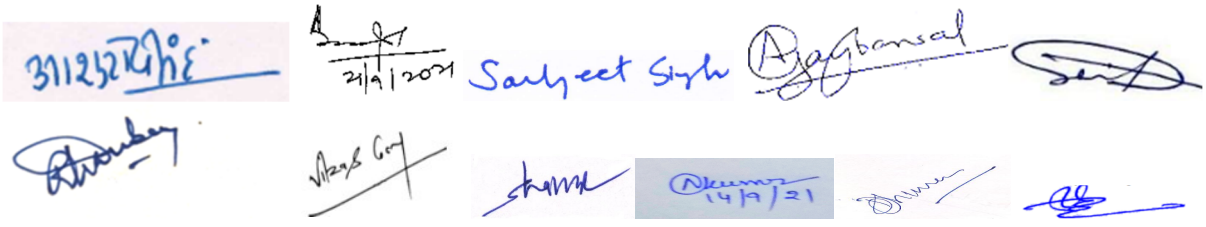
COs	PSO 1	PSO2	PSO3	PSO4
CO106.1	2			1
CO106.2	2			1
CO106.3	2	1		1
CO106.4	2		2	1

Course Code: MT CS 107	**Course Name: Software Testing & Quality Management**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**
Year and Semester	**1st year** **1st Semester**	**Contact hours per week:** (3 Hrs.) **Exam:** (3hrs.)			
Prerequisite of course	Software Engineering	**Evaluation**			
		CIE: 30	**TEE: 70**		
Course Objectives: 1. To understand various methods and techniques of software testing and quality					



management concepts 2. To develop error free and quality software.	
Course Outcomes: On completion of the course, student would be able to:	
CO107.1	Understand software testing and quality assurance as a fundamental component of software life cycle
CO107.2	Define the scope of SW T&QA projects
CO107.3	Prepare test plans and schedules for a T&QA project
CO107.4	Efficiently perform T&QA activities using modern software tools

Module No	COURSE SYLLABUS CONTENTS OF MODULE	Hrs	COs
1	**Introduction:** Software Engineering, Software Process Models, Management Process, Scheduling, Estimation, Software Metrics. **Software Quality:** Quality Concepts, Quality Control, Quality Assurance, Cost of Quality, SQA Activities, Total Quality Management Principles, Software Reviews, Formal Technical Reviews, Software Reliability, Software Safety, ISO Approaches to Quality Assurance Systems.	**11**	**CO107.1**
2	**Standards, Practices, Conventions and Metrics:** Quality Assurance Standards, ISO 9000, ISO 9001:2000, ISO 9126 Quality Factors, CMM, Six Sigma, Software Quality Assurance Metrics, Advantages, QA Techniques, Introduction to SPICE. **Risk and Software Configuration Management:** Software Risks, The RMMM Plan, Software Configuration Management Process: Version Control, Change Control.	**12**	**CO107.1** **CO107.2**
3	**Software Testing:** Testing, Test Strategies for Conventional and Object Oriented Software, Unit and Integration Testing, Validation Testing, System Testing, Metrics for Source Code, Metrics for Testing, Debugging.	**11**	**CO107.3**



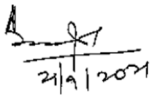
	Testing Techniques for Conventional and Object Oriented Software: Black Box and White Box Testing, Basis Path Testing, Control Structure Testing, Object Oriented Testing Methods: Applicability of Conventional Test Case Design Methods, Testing Methods Applicable at the Class Level.		
4	**Testing Process:** Test Plan development, Requirement Phase Testing, Design Phase Testing, Program Phase Testing, Execute Test and Record Results. **Testing Specialized Systems and Applications:** Testing Client/Server Systems, Testing Web based Systems, Testing in Multiplatform Environment, Testing Off-the-Shelf Software, Testing for Real Time Systems, Testing Security.	**11**	**CO107.4**

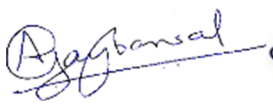
Reference Books:

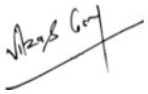
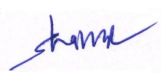
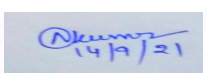
1. Beizer, B., 2003. Software testing techniques. Dreamtech Press.
2. Godbole, N.S., 2004. Software quality assurance: Principles and practice. Alpha Science Int'l Ltd.
3. Pfleeger, S.L. and Atlee, J.M., 1998. Software engineering: theory and practice. Pearson Education India.
4. Pressman, R.S., 2005. Software engineering: a practitioner's approach. Palgrave macmillan.
5. Sommerville, I., Software Engineering: For VTU, 8/e. Pearson Education India.

COURSE ARTICULATION MATRIX

COs	PO1	PO 2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 0	PO1 1	PO1 2
CO107. 1	2							2				
CO107. 2	2	2										
CO107. 3	2		2									2





CO107.4	2	2	2		2							2

MAPPING OF COs WITH PSOs

COs	PSO 1	PSO2	PSO3	PSO4
CO107.1	2			1
CO107.2	2			1
CO107.3	2		1	1
CO107.4	2	2	2	1

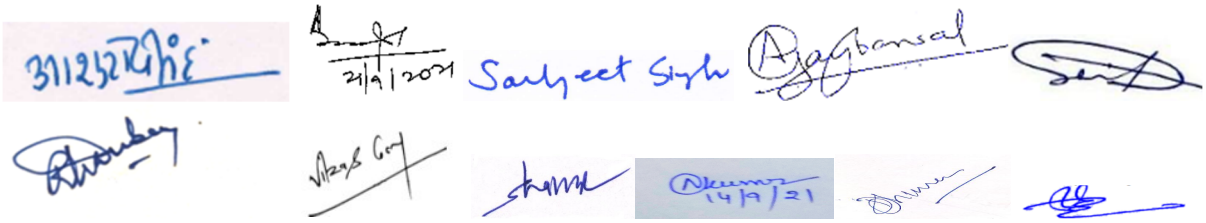
Course Code: MT CS 108	**Course Name: Big Data Analytics**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**
Year and Semester	**1st year** **1st Semester**	**Contact hours per week:** (3 Hrs.) **Exam:** (3hrs.)			
Prerequisite of course	DBMS	**Evaluation**			
		CIE: 30	**TEE: 70**		

Course Objectives:

1. To optimize business decisions and create competitive advantage with Big Data analytics
2. To explore the fundamental concepts of big data analytics.
3. To learn to analyze big data using intelligent techniques.
4. To understand the various search methods and visualization techniques.
5. To learn to use various techniques for mining data streams.
6. To understand the applications using Map Reduce Concepts.
7. To introduce programming tools PIG & HIVE in the Hadoop ecosystem.

Course Outcomes: On completion of the course, student would be able to:

CO108.1	Analyze big data challenges in different domains including social media, transportation, finance and medicine
CO108.2	Learn to use various techniques for mining data streams.

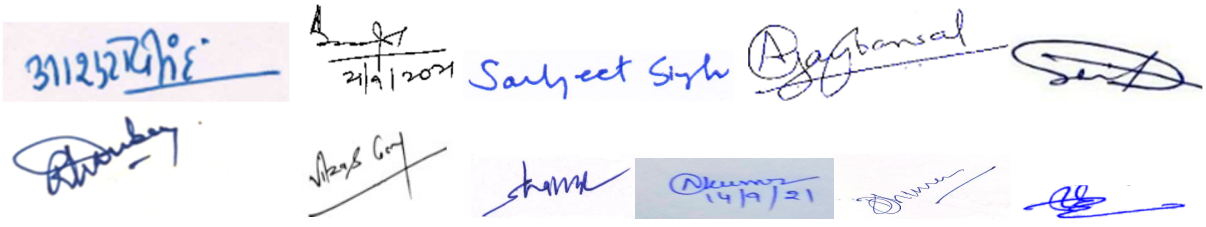


CO108.3	Understand the use of Hadoop and Map Reduce
CO108.4	Understand programming tools PIG & HIVE in the Hadoop ecosystem.

Module No	COURSE SYLLABUS CONTENTS OF MODULE	Hrs	COs
1	Introduction to big data : Introduction to Big Data Platform – Challenges of Conventional Systems - Intelligent data analysis – Nature of Data - Analytic Processes and Tools - Analysis vs Reporting.	**10**	**CO108.1**
2	Mining data streams : Introduction To Streams Concepts – Stream Data Model and Architecture - Stream Computing - Sampling Data in a Stream – Filtering Streams – Counting Distinct Elements in a Stream – Estimating Moments – Counting Oneness in a Window – Decaying Window - Real time Analytics Platform(RTAP) Applications - Case Studies - Real Time Sentiment Analysis- Stock Market Predictions.	**12**	**CO108.2**
3	Hadoop: History of Hadoop- the Hadoop Distributed File System – Components of Hadoop Analysing the Data with Hadoop- Scaling Out- Hadoop Streaming- Design of HDFS-Java interfaces to HDFS Basics- Developing a Map Reduce Application-How Map Reduce Works-Anatomy of a Map Reduce Job run-Failures-Job Scheduling-Shuffle and Sort – Task execution - Map Reduce Types and Formats- Map Reduce Features- Hadoop environment	**12**	**CO108.3**
4	Frameworks: Applications on Big Data Using Pig and Hive – Data processing operators in Pig – Hive services – HiveQL – Querying Data in Hive - fundamentals of HBase and ZooKeeper - IBM InfoSphere BigInsights and Streams.	**11**	**CO108.4**

Reference Books:

1. Berthold, M. and Hand, D.J., 2003. Intelligent data analysis (Vol. 2). Berlin: Springer.
2. Franks, B., 2012. Taming the big data tidal wave: Finding opportunities in huge data streams with advanced analytics (Vol. 49). John Wiley & Sons.
3. Han, J., Pei, J. and Kamber, M., 2011. Data mining: concepts and techniques. Elsevier.



4. Myatt, G.J., 2007. Making sense of data: a practical guide to exploratory data analysis and data mining. John Wiley & Sons.
5. Rajaraman, A. and Ullman, J.D., 2011. Mining of massive datasets. Cambridge University Press.
6. Warden, P., 2011. Big data glossary. O'Reilly Media, Inc..
7. White, T., 2012. Hadoop: The definitive guide. " O'Reilly Media, Inc.".
8. Zikopoulos, P. and Eaton, C., 2011. Understanding big data: Analytics for enterprise class hadoop and streaming data. McGraw-Hill Osborne Media.

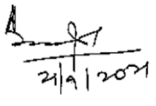
COURSE ARTICULATION MATRIX

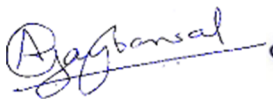
COs	PO1	PO 2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 0	PO1 1	PO1 2
CO108.1	3	2										
CO108.2	2											
CO108.3	2	1			2							1
CO108.4	2	1			2							1

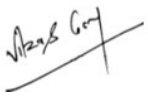
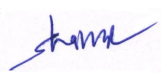
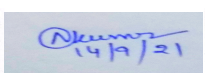
MAPPING OF COs WITH PSOs

COs	PSO 1	PSO2	PSO3	PSO4
CO108.1	2			1
CO108.2	2	2	2	1
CO108.3	2	1	1	1
CO108.4	2	1	1	1

Course Code: MT CS 109	**Course Name: Distributed System**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**
Year and Semester	**1st year** **1st Semester**	**Contact hours per week:** (3 Hrs.) **Exam:** (3hrs.)			
Prerequisite of course	Computer Network	**Evaluation**			
		CIE: 30	**TEE: 70**		

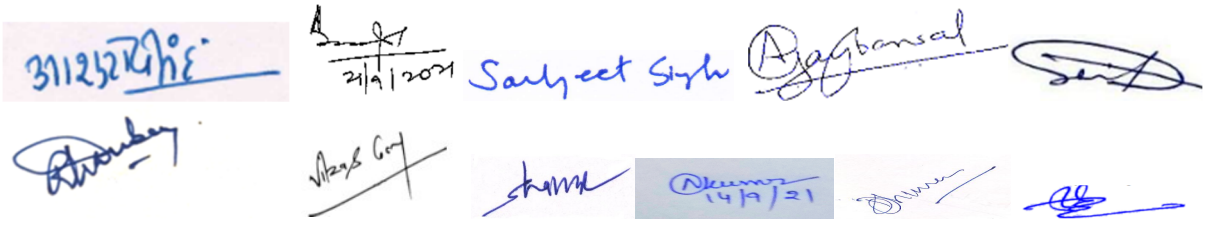




Course Objectives: 1. To learn and analyze how a set of connected computers can form a functional, usable and high-performance distributed system. 2. To learn the principles, architectures, algorithms and programming models used in distributed systems. 3. To examine state-of-the-art distributed File systems. 4. To design and implement sample distributed systems.	
Course Outcomes: On completion of the course, student would be able to:	
CO109.1	Learn the basic concept and functions of high-performance distributed systems.
CO109.2	Analyze algorithms for synchronization in distributed systems
CO109.3	Analyze the importance of deadlock in the context of distributed system
CO109.4	Understand the use of Distributed File System and Transaction

Module No	COURSE SYLLABUS CONTENTS OF MODULE	Hrs	COs
1	Fundamentals of Distributed Systems: Introduction, Definition, Evolution of Distributed Computing System, Benefits and Needs- Parallel and Distributed Systems Hardware concepts, Design Issue and challenges, example applications of distributed Systems. Remote Procedure Calls: Introduction, Problems with Socket, The RPC Model, Implementing RPC mechanism, RPC issues, Transparency of RPC, parameter-passing and call semantic, Communication protocols for RPC's, CORBA, RMI and etc.	**11**	**CO109.1**
2	Clock Synchronization: Clock Synchronization, absence of global clock, Logical clocks, Lamport's & vectors logical clocks, Causal ordering of messages, Physical Clock Synchronization. Distributed Mutual Exclusion: Classification of distributed mutual exclusion, Token based and non-token-based algorithms, performance metric for distributed mutual exclusion algorithms.	**12**	**CO109.2**



3	Distributed Deadlock Detection: system model, deadlock prevention, avoidance, detection & resolution, distributed deadlock detection algorithm Distributed Shared Memory: Introduction, Architecture of DSM Systems Design and implementation, granularly, structure of shared memory space Consistency models, replacement strategy, Thrashing.	**11**	**CO109.3**
4	Distributed File Systems: Distributed File System Design, The File Service Interface, True file service, Directory service, Structured File, Semantics of File Sharing, File Caching Scheme, Trends in Distributed File Systems. Distributed Transaction: Flat and nested distributed transactions, Distributed Transaction Model, Atomic Commit protocols, Two Phase Commit Protocol. Case Studies of different distributed system-based application	**11**	**CO109.4**

Reference Books:

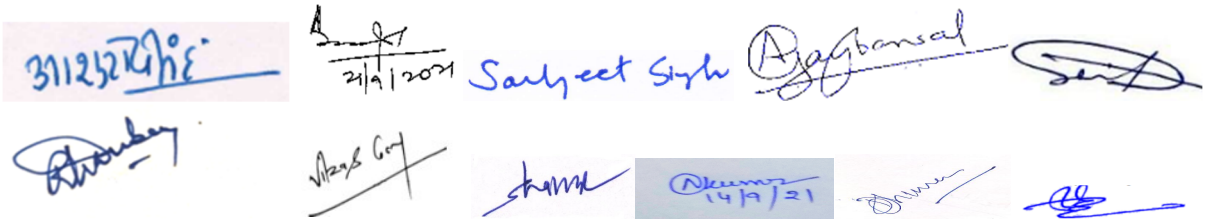
1. Coulouris, G.F., Dollimore, J. and Kindberg, T., 2009. Distributed systems: concepts and design. Pearson education.
2. Ghosh, S., 2006. Distributed systems: an algorithmic approach. Chapman and Hall/CRC.
3. Kshemkalyani, A.D. and Singhal, M., 2011. Distributed computing: principles, algorithms, and systems. Cambridge University Press.
4. Sinha, P.K., 1998. Distributed operating systems: concepts and design. PHI Learning Pvt. Ltd..
5. Tanenbaum, A. S. and Steen, M. V., 2007, Distributed Systems - Principles and Paradigms, 2nd Edition, PHI.

COURSE ARTICULATION MATRIX

COs	PO1	PO 2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 0	PO1 1	PO1 2
CO109.1	2											
CO109.2	2	2	1									2
CO109.3	2	2										2
CO109.4	2											2

MAPPING OF COs WITH PSOs

COs	PSO 1	PSO2	PSO3	PSO4
CO109.1	2			
CO109.2	2	1	2	1
CO109.3	2	1	2	1
CO109.4	2			



Course Code: MT CS 110	Course Name: Digital Image Processing	L	T	P	C
		3	0	-	3

Year and Semester	1st year 1st Semester	Contact hours per week: (3 Hrs.) Exam: (3hrs.)
Pre-requisite of course	Nil	Evaluation
		CIE: 30 / TEE: 70

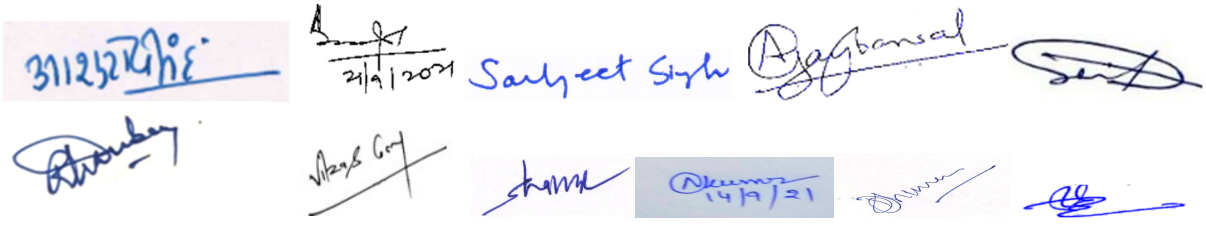
Course Objectives:

1. To introduce the basic principles of digital images,
2. To understand the image data structures,
3. To study the image processing algorithms.

Course Outcomes: On completion of the course, student would be able to:

CO110.1	Understand the fundamental concepts of a digital image processing system
CO110.2	Analyze images in the frequency domain using various transform
CO110.3	Evaluate the techniques for image enhancement and image restoration
CO110.4	Interpret image compression standards
CO110.5	Categorize various compression techniques

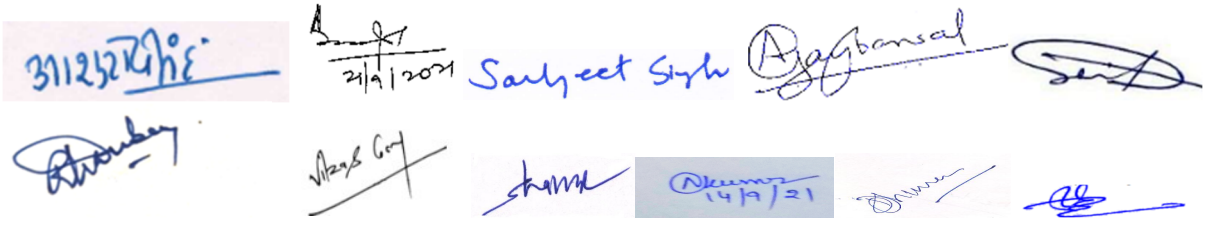
Module No	COURSE SYLLABUS CONTENTS OF MODULE	Hrs	COs
1	**Introduction** Image Processing Fourier Transform and Z-Transform, Causality and stability, Toeplit and Circulate Matrics, orthogonal and unitary Matrices and Kroenker product, Markov Processes, KI Transform, Mean square Estimates and Orthogonal Principles Image sampling & Quantization: Band Limited Image, Sampling Versus Replication, Reconstruction of Image from samples Sampling Theorem, Sampling Theorem for Random Fields, Optimal Sampling, Non-rectangular Grid Sampling, Sampling	**14**	**CO110.1, CO110.2**



	Aperture, Display Aperture/ Interpolation Functions, Lagrange Interpolation, Moire Effect Image Quantization: Uniform Optimal Quantizer, Properties of Mean Square Quantizer, Compandor Design, Visual Quantization		
2	**Image Transforms** Two Dimensional Orthogonal and Unitary Transforms and their properties, One Dimensional and Two Dimensional DFT, Cosine, Sine, Hadamard, SLANT, HAAR and KI Transforms and their properties, Approximation to KI Transforms. Image representation by stochastic models: One Dimensional Causal Models, AR, ARMA models, Spectral factorization, Non Causal Representation, Image Decomposition.	**13**	**CO110.2**
3	**Image Enhancement and Restoration** Point Operation, Histogram Modeling, Spatial Operations, Transform Operations, Multispectral Image Enhancement. Image Filtering: Image Observation Models, Inverse and Wiener filter, FIR Wiener Filters, Filtering using Image Transform, Causal Models and recursive filtering, Maximum entropy restoration, Extrapolation of band limited signal.	**10**	**CO110.3**
4	**Image Analysis and Image Compression** Spatial feature extraction, Edge detection, Boundary extraction, Boundary representations, Region representations, Moment representations, Structures, Texture, Image Segmentation, Image Classification Image Reconstruction from Projections: Data Compression: Pixel Coding, Predictive Techniques, Transform Coding Theory, Transform coding of Image, Coding of two-tone image.	**8**	**CO110.4, CO110.5**

Text Books:

1. Dougherty, E. R. (2020). *Digital image processing methods*. CRC Press.
2. Gonzalez, R.C., and Woods, R. E., 2009. *Digital Image Processing*. Pearson 3rd Edition, Cham.
3. Jain, A.K., 1989. *Fundamentals of Digital Image Processing*. Prentice-Hall, Inc.
4. Pratt, W.K., 2007. *Digital Image Processing.* John Wiley & Sons Inc., New York.



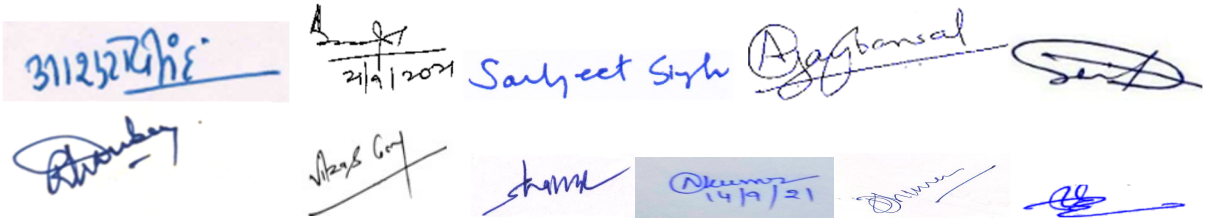
5. Shih, F. Y. (2017). *Image processing and mathematical morphology: fundamentals and applications*. CRC press.

COURSE ARTICULATION MATRIX

COs	PO1	PO 2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 0	PO1 1	PO1 2
CO110. 1	3		2	2	2	1	1			1		3
CO110. 2	3		2	1	2		1	1			1	1
CO110. 3	2	2	2	3	1				1	1	1	2
CO110. 4	2	2	2	1						1	1	1
CO110. 5	3	2	2	3	1	2	1			1	1	2

MAPPING OF COs WITH PSOs

COs	PSO 1	PSO2	PSO3	PSO4
CO110.1	2	2	2	1
CO110.2	2	2	1	1
CO110.3	1	2	2	1
CO110.4	2	2	2	1
CO110.5	2	2	1	1



Course Code: MT CS 206	Course Name: Bioinformatics	L	T	P	C
		3	0	0	3
Year and Semester	**1st year** **2nd Semester**	**Contact hours per week:** (3 Hrs.) **Exam:** (3hrs.)			
Prerequisite of course	Nil	**Evaluation**			
		CIE: 30	**TEE: 70**		

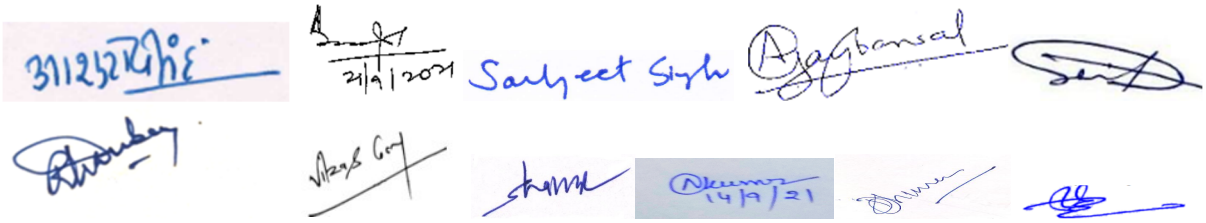
Course Objectives:

1. To provide students with the basics of bioinformatics algorithms that have been applied over various types of biological data.
2. To provide hands on training on various computational tools and techniques employed in Biological sequence analysis
3. To bring exposure to multiple sequence alignment and protein functional annotation

Course Outcomes: On completion of the course, student would be able to:

CO206.1	Describe about the different types of Biological databases
CO206.2	Describe about pairwise sequence alignment , algorithms and tools for pairwise alignment
CO206.3	Describe about protein folding and its significance
CO206.4	Apply algorithms and analysis methods to the real-world problems

Module No	COURSE SYLLABUS CONTENTS OF MODULE	Hrs	COs
1	**Introduction to Bioinformatics:** What is a Database, Types of Databases, Biological Databases, Pitfalls of Biological Databases, Information Retrieval from Biological Databases. Introduction to Bioinformatics Tools: BLAST, FASTA, RasMol.	**11**	**CO206.1**



2	**Sequences:** Problem statement, Edit distance and substitution matrices, HMMs and pairwise HMMs, Global and local alignments, Spliced alignment, Space-efficient sequence alignment, Multiple alignment, Database searching tools, Sequence by hybridization, Profile HMMs.	**12**	**CO206.2**
3	**Structures:** Protein structure alignment, Protein Structure Prediction: Methods for predicting the secondary and tertiary structure of proteins. Techniques: neural networks, SVMs, genetic algorithms and stochastic global optimization.	**10**	**CO206.3**
4	**Transcriptomics:** Methods for analysing gene expression and microarray data. Techniques: clustering, SVMs. Agent-based Genome Analysis: Automation of genome analysis using intelligent software agents. Drug Discovery Informatics: Approaches to drug discovery using bioinformatics techniques.	**12**	**CO206.4**

Reference Books:

1. Compeau, P. and Pevzner, P., 2018. Bioinformatics algorithms: an active learning approach. La Jolla, California: Active Learning Publishers.
2. Jones, N.C., Pevzner, P.A. and Pevzner, P., 2004. An introduction to bioinformatics algorithms. MIT press.
3. Krawetz, S.A. and Womble, D.D. eds., 2003. Introduction to bioinformatics: a theoretical and practical approach. Springer Science & Business Media.
4. Lesk, A., 2019. Introduction to bioinformatics. Oxford university press.
5. Mandoiu, I. and Zelikovsky, A., 2008. Bioinformatics algorithms: techniques and applications (Vol. 3). John Wiley & Sons.

COURSE ARTICULATION MATRIX

COs	PO1	PO 2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 0	PO1 1	PO1 2
CO206.1	2	1	1	1								
CO206.2	2	2	1	1	2			1				
CO206.3	2	2	2	1	2		1	1				
CO206.4	2	2	2	2	2		1	1				1

MAPPING OF COs WITH PSOs

COs	PSO 1	PSO2	PSO3	PSO4
CO206.1	2	1	1	1
CO206.2	2	2	1	1
CO206.3	2	2	1	1
CO206.4	3	2	2	1

Course Code: MT CS 207	**Course Name: Cyber Security**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**
Year and Semester	**1st year** **2nd Semester**	**Contact hours per week:** (3 Hrs.) **Exam:** (3hrs.)			
Prerequisite of course	Cryptography/ Network Security	**Evaluation**			
		CIE: 30	**TEE: 70**		

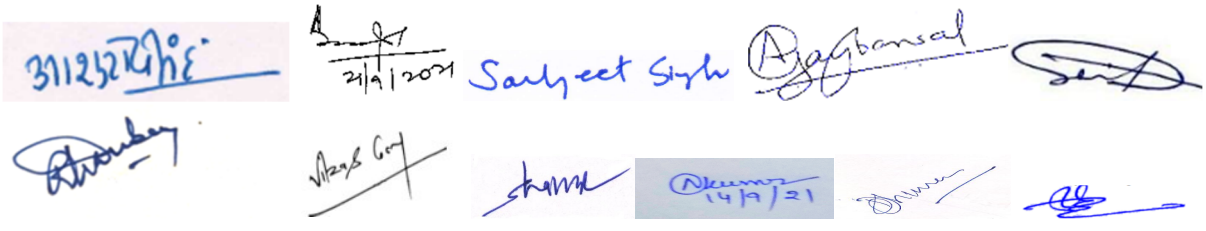
Course Objectives:

1. To learn Public Key cryptography.
2. To be familiar with elliptic curve cryptography.
3. To be exposed Knowledge proofs
4. To understand Email & cloud security.
5. To learn encryption techniques.

Course Outcomes: On completion of the course, student would be able to:

CO207.1	Understand the requirements of the basics of cyber security
CO207.2	Identify the need of PKI and security Protocols
CO207.3	Recognize the underlying technology behind attribute based encryption
CO207.4	Design and implement new ways of security methods for digital space.

Module No	**COURSE SYLLABUS** **CONTENTS OF MODULE**	**Hrs**	**COs**



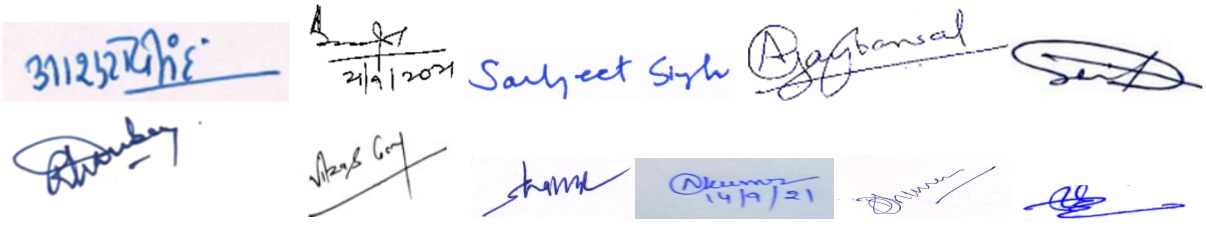
1	Overview of Public Key Cryptography, Symmetric Cryptography, Digital Signature, Encryption/Decryption Algorithms, Public Key Infrastructure, Internet Key Exchange Protocol	**10**	**CO207.1**
2	Elliptic curve operations, computational hardness of elliptic curve (ECDLP, ECFP, CDHP, DDHP), elliptic curve digital signature algorithm (ECDSA), elliptic curve Diffie-Hellman protocol, elliptic curve PKI, Security protocols in real life applications (research articles)	**13**	**CO207.2**
3	Zero knowledge proof system, pairing based cryptography, bilinear mapping, chosen ciphertext security models, identity-based encryption, attribute-based encryption, different access control models	**12**	**CO207.3**
4	Email Security, PGP and S-MIME, Cloud security through PKI, Application in e-commerce, e-business, e-payment, e-health and mobile applications	**10**	**CO207.4**

Reference Books:

1. Bloch, M. and Barros, J., 2011. Physical-layer security: from information theory to security engineering. Cambridge University Press.
2. Goldreich, O., 2009. Foundations of cryptography: volume 2, basic applications. Cambridge university press.
3. Katz, J. and Lindell, Y., 2020. Introduction to modern cryptography. CRC press.
4. Stinson, D.R., 2005. Cryptography: theory and practice. Chapman and Hall/CRC.
5. Weise, J., 2001. Public key infrastructure overview. Sun BluePrints OnLine, August, pp.1-27.

COURSE ARTICULATION MATRIX

COs	PO1	PO 2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 0	PO1 1	PO1 2
CO207.1	2											
CO207.2	2	2										2
CO207.3	2	2										2
CO207.4	2		3		2							2



MAPPING OF COs WITH PSOs

COs	PSO 1	PSO2	PSO3	PSO4
CO207.1	2			
CO207.2	2		2	1
CO207.3	2		2	1
CO207.4	2	3	2	1

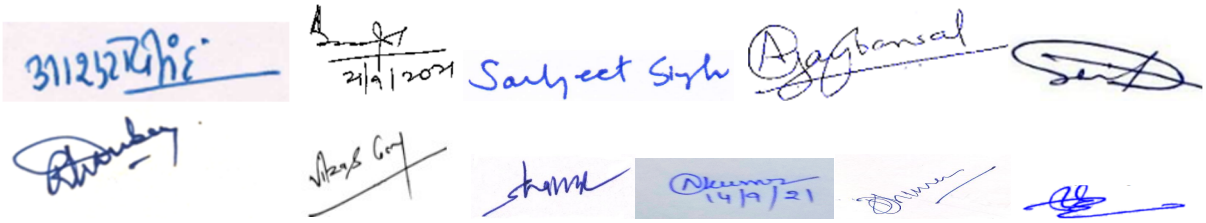
Course Code: MT CS 208	**Course Name: Natural Language Processing**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**
Year and Semester	**1st year** **2nd Semester**	**Contact hours per week:** (3 Hrs.) **Exam:** (3hrs.)			
Prerequisite of course	Nil	**Evaluation**			
		CIE: 30	**TEE: 70**		

Course Objectives:

1. To introduce the fundamental concepts and techniques of natural language processing
2. To give students a clear understanding of linguistics methods, various tools and aspects of NLP
3. To gain an in-depth understanding of the computational properties of natural languages and the commonly used algorithms for processing linguistic information

Course Outcomes: On completion of the course, student would be able to:

CO208.1	Describe the challenges involved in developing NLP solutions
CO208.2	Develop the linguistics and their application to part-of-speech tagging
CO208.3	Develop background to various tools and aspects of NLP like syntax and semantic analysis, parsing, machine translation, information retrieval and statistical discourse processing
CO208.4	Analyse and develop the classification model of speech



Module No	COURSE SYLLABUS CONTENTS OF MODULE	Hrs	COs
1	Introduction: NLP tasks in syntax, semantics, and pragmatics. Applications such as information extraction, question answering, and machine translation. The problem of ambiguity. The role of machine learning. Brief history of the field.	**10**	**CO208.1**
2	N-gram Language Models: The role of language models. Simple N-gram models. Estimating parameters and smoothing. Evaluating language models. Part of Speech Tagging and Sequence Labeling: Lexical syntax. Hidden Markov Models (Forward and Viterbi algorithms and EM training)	**12**	**CO208.2**
3	Syntactic parsing: Grammar formalisms and treebanks. Efficient parsing for context-free grammars (CFGs). Statistical parsing and probabilistic CFGs (PCFGs). Lexicalized PCFGs. Neural shift-reduce dependency parsing Semantic Analysis: Lexical semantics and word-sense disambiguation. Compositional semantics. Semantic Role Labeling and Semantic Parsing.	**11**	**CO208.3**
4	Mechanics of Speech: Speech Production Mechanism, Nature of Speech Signal, Discrete Time Modeling of Speech Production, Representation of Speech Signals, Classification of Speech Sounds, Phones, Phonemes, Phonetics, IPA and Phonetic Alphabets, Articulatory Features, Auditory Perceptions, Anatomical Pathways from Ear to the Perception of Sound Peripheral Auditory System.	**12**	**CO208.4**

Reference Books:

1. Hapke, H., Howard, C. and Lane, H., 2019. Natural Language Processing in Action: Understanding, analyzing, and generating text with Python. Simon and Schuster.
2. Jurafsky, D. and Martin, J.H., 2020, Speech and Language Processing, Pearson.
3. Manning, C. and Schutze, H., 1999. Foundations of statistical natural language processing. MIT press.
4. Rabiner, L.R. and Juang, B.H., 2009. B. Yegnanarayana, Fundamentals of Speech Recognition.
5. Thanaki, J., 2017. Python natural language processing. Packt Publishing Ltd.

COURSE ARTICULATION MATRIX

COs	PO1	PO 2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 0	PO1 1	PO1 2
CO208.1	2	1	1									
CO208.2	2	1	1		2							
CO208.3	3	2	2	2	2			1				2
CO208.4	3	2	2	2	2			1				2

MAPPING OF COs WITH PSOs

COs	PSO 1	PSO2	PSO3	PSO4
CO208.1	2	1	1	1
CO208.2	2	1	1	1
CO208.3	3	2	2	1
CO208.4	3	2	2	1

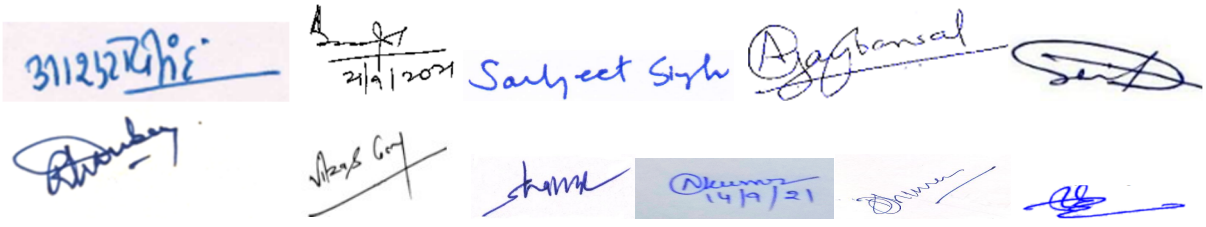
Course Code: MT CS 209	**Course Name: Cloud Computing**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**
Year and Semester	**1st year** **2nd Semester**	**Contact hours per week:** (3 Hrs.) **Exam:** (3hrs.)			
Prerequisite of course	Distributed System	**Evaluation**			
		CIE: 30	**TEE: 70**		

Course Objectives:

1. To understand the basics of Cloud Computing.
2. To understand the cloud architecture and virtualization technology
3. To learn about the deployment of cloud service
4. To learn about cloud security

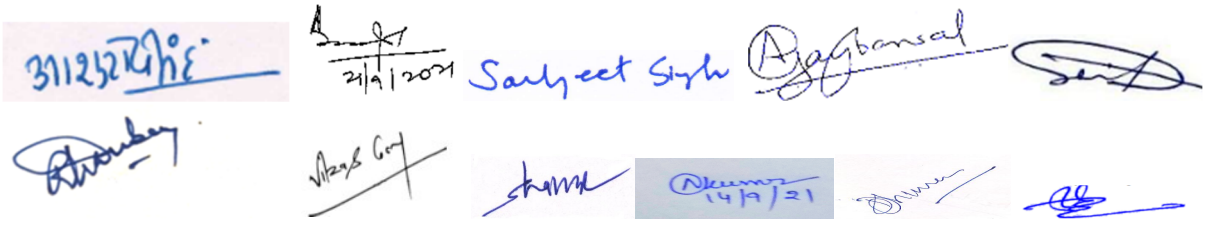
Course Outcomes: On completion of the course, student would be able to:

CO209.1	Identify cloud services for application



CO209.2	Understand the requirement of virtualization for cloud Computing
CO209.3	Analyze authentication, confidentiality and privacy issues in the Cloud computing environment.
CO209.4	Understand the requirements of cloud federation

Module No	COURSE SYLLABUS CONTENTS OF MODULE	Hrs	COs
1	**Introduction** **Definition of Cloud Computing**: Defining a Cloud, Cloud Types – NIST model, Cloud Cube model, Deployment models, Service models, Cloud Reference model, Characteristics of Cloud Computing, Benefits and advantages of Cloud Computing; **Cloud Architecture**: A brief introduction on Infrastructure, Platforms, Virtual Appliances, Communication Protocols, Applications, Connecting to the Cloud by Clients; Services and Applications by Type: IaaS, PaaS, SaaS, IDaaS and CaaS.	**12**	**CO209.1**
2	**Virtualization**: Definition, Understanding and Benefits of Virtualization. Implementation Level of Virtualization, Virtualization Structure/Tools and Mechanisms, Hypervisor, VMware, KVM, Xen. Virtualization of CPU, Memory, I/O Devices, Virtual Cluster and Resources Management, Virtualization of Server, Desktop, Network, and Virtualization of data-center.	**12**	**CO209.2**
3	**Service Deployment**: Understanding the deployment of different cloud service using the services provided by Amazon Ec2, Google App Engine, Microsoft Azure and etc **Cloud Security**: Cloud security concerns, Security boundary, Security service boundary, Security of data, Identity management.	**10**	**CO209.3**
4	**Case Study on Open Source & Commercial Clouds**: Eucalyptus, Microsoft Azure, Amazon EC2, VM ware.	**11**	**CO209.4**



	Cloud Federation: Need of cloud federation, Advantages, Cloud federation Architecture, Pricing Model, Different Federation Formation Frameworks, Load balancing.		

Reference Books:

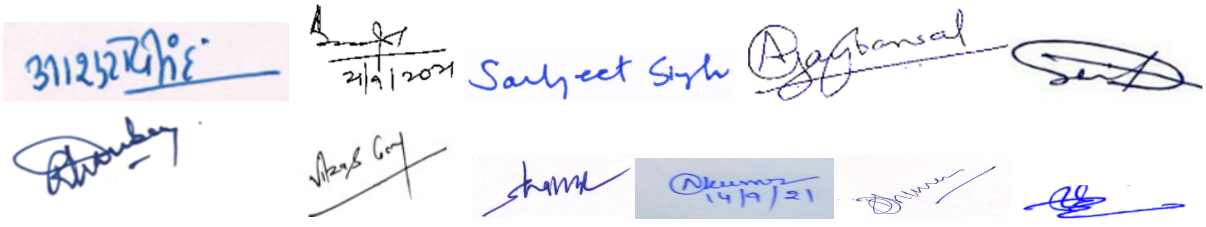
1. Buyya, R., Vecchiola, C. and Selvi, S.T., 2013. Mastering cloud computing: foundations and applications programming. Newnes.
2. Miller, M., 2008. Cloud computing: Web-based applications that change the way you work and collaborate online. Que publishing.
3. Moyer, C.M., 2011. Building Applications in the Cloud: Concepts, Patterns, and Projects. Pearson Education India.
4. Sosinsky, B., 2012. Cloud Computing Bible WILEY INDIA Pvt. Ltd ISBN: 9788126529803 Reprint.
5. Velte, A.T., Velte, T.J. and Elsenpeter, R., 2019. Cloud Computing: A Practical Approach. ISSN, 2278, p.0181.

COURSE ARTICULATION MATRIX

COs	PO1	PO 2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 0	PO1 1	PO1 2
CO209. 1	2											
CO209. 2	2				1							
CO209. 3	2	2	1	2								2
CO209. 4	2	2										2

MAPPING OF COs WITH PSOs

COs	PSO 1	PSO2	PSO3	PSO4
CO209.1	2			1
CO209.2	2			1
CO209.3	2	1	2	1



CO209.4	2		2	1

Course Code: MT CS 210	**Course Name: Deep Learning**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**
Year and Semester	**1st year** **2nd Semester**	**Contact hours per week:** (3 Hrs.) **Exam:** (3hrs.)			
Prerequisite of course	Discrete Structures	**Evaluation**			
		CIE: 30	**TEE: 70**		

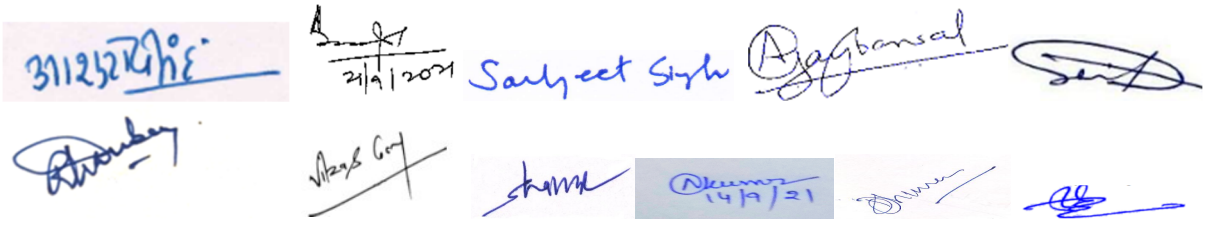
Course Objectives:

1. To introduce major deep learning algorithms and the problem settings
2. To familiarize yourself with applications to solve real world problems.

Course Outcomes: On completion of the course, student would be able to:

CO210.1	Identify the deep learning algorithms, which are more appropriate for various types of learning tasks in various domains.
CO210.2	Apply scaling up deep learning techniques and associated computing techniques and technologies
CO210.3	Recognize various ways of selecting suitable model parameters for different applications.

Module No	**COURSE SYLLABUS CONTENTS OF MODULE**	**Hrs**	**COs**
1	Introduction to Deep Learning: History of Deep Learning, Deep Learning revolution, Perspectives and Issues in deep learning framework, review of fundamental learning techniques. Difficulty of training deep neural networks, Greedy layerwise training. Limitations of deep learning	**10**	**CO210.1**
2	Artificial Neural Networks: Neural Network Representation, Activation functions, Thresholding, cost functions, hypotheses and tasks; training data; maximum likelihood based cost, cross	**11**	**CO210.1**



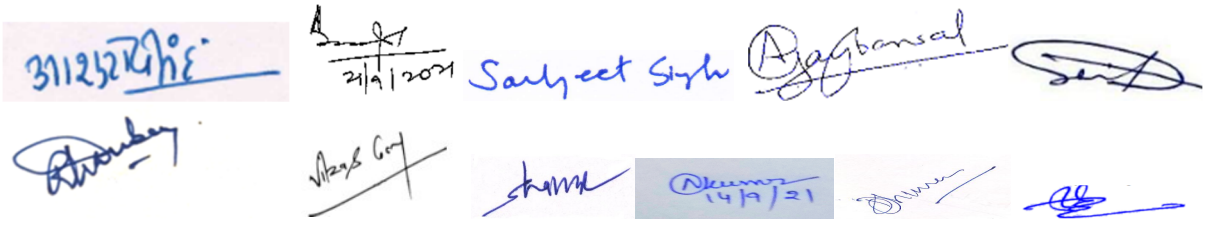
	entropy, MSE cost; sigmoid units; Backpropagation, Random Initialization, Multilayer Perceptrons (MLPs), Representation Power of MLPs, Gradient Descent, Feedforward Neural Networks, Backpropagation, Gradient Descent (GD).		
3	Convolutional Neural Networks: Building blocks of CNNs, Architectures, convolution / pooling layers, Padding, Strided convolutions, Convolutions over volumes, Softmax regression, Deep Learning frameworks, Training and testing on different distributions, Bias and Variance with mismatched data distributions, Transfer learning, Multi-task learning, end-to-end deep learning, CNN models: LeNet – 5, AlexNet, VGG – 16, Residual Networks.	**12**	**CO210.2 CO210.3**
4	Recurrent Neural Networks: Recurrent Neural Network Model, Vanishing gradients with RNNs, Gated Recurrent Unit (GRU), LSTM (long short term memory), Encoder Decoder architectures, Deep Unsupervised Learning: Autoencoders (standard, sparse, demising, contractive, etc), Variational Autoencoders, Adversarial Generative Networks, Autoencoder and Deep Boltzmann Machine.	**12**	**CO210.3**

Reference Books:

1. Bengio, Y., Goodfellow, I.J. and Courville, A., 2015. Deep Learning.(2015). Book in preparation for MIT Press, 99, p.100.
2. Buduma, N. and Locascio, N., 2017. Fundamentals of deep learning: Designing next-generation machine intelligence algorithms. " O'Reilly Media, Inc.".
3. Hochreiter, S. and Schmidhuber, J., 1997. Long short-term memory. Neural computation, 9(8), pp.1735-1780.
4. Patterson, J. and Gibson, A., 2017. Deep learning: A practitioner's approach. " O'Reilly Media, Inc.".
5. Svensén, M. and Bishop, C.M., 2007. Pattern recognition and machine learning.
6. Yegnanarayana, B., 2009. Artificial neural networks. PHI Learning Pvt. Ltd..
7. Zocca, V., Spacagna, G., Slater, D. and Roelants, P., 2017. Python deep learning. Packt Publishing Ltd.

COURSE ARTICULATION MATRIX

COs	PO1	PO 2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 0	PO1 1	PO1 2



CO210.1	2											1
CO210.2	2		2		2			1				2
CO210.3	2	2	2									2

MAPPING OF COs WITH PSOs

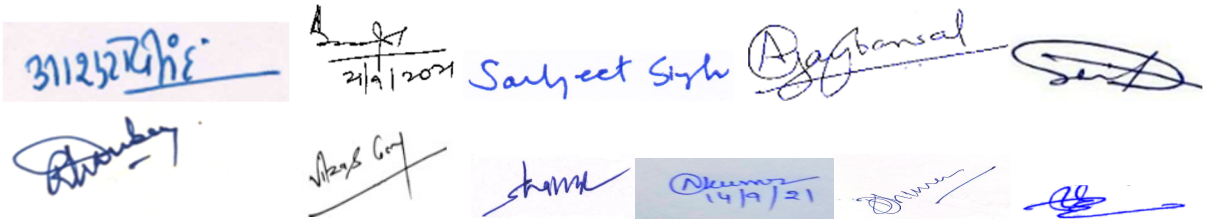
COs	PSO 1	PSO2	PSO3	PSO4
CO210.1	2		2	1
CO210.2	2	2	2	1
CO210.3	2		2	1

Course Code: MT CS 211	**Course Name: Internet of Things**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**
Year and Semester	**1st year** **2nd Semester**	**Contact hours per week:** (3 Hrs.) **Exam:** (3hrs.)			
Prerequisite of course	Computer Networks	**Evaluation**			
		CIE: 30	**TEE: 70**		

Course Objectives:

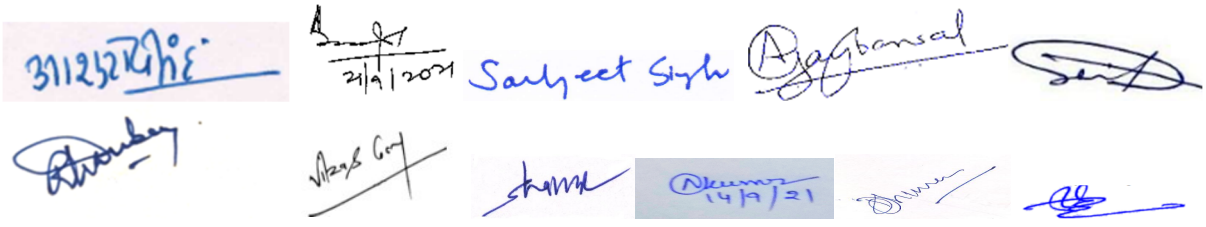
1. To enable students to build an IoT system from the ground up.
2. To gain the necessary knowledge to use cloud services for processing and storage of the data produced by the IoT devices.
3. To develop knowledge and critical understanding of the underlying principles of Cloud Computing and IoT systems, and the commercial and business implications of technical advances in this area.

Course Outcomes: On completion of the course, student would be able to:



CO211.1	Apply the subject related concepts and develop analytical skills of contemporary issues
CO211.2	Explore the relationship between IoT, cloud computing, and big data
CO211.3	Design a component or a product applying all the relevant standards and with realistic constraints.
CO211.4	Write the microcontroller programming on Raspberry Pi /Arduino /Equivalent platform

Module No	COURSE SYLLABUS CONTENTS OF MODULE	Hrs	COs
1	**Introduction To Internet of Things:** Definition & Characteristics of IoT - Challenges and Issues - Physical Design of IoT, Logical Design of IoT - IoT Functional Blocks, Security. **Components In Internet of Things:** Control Units Communication modules Bluetooth Zigbee Wifi GPS- IOT Protocols, MQTT, Wired Communication, Power Sources.	**11**	**CO211.1**
2	**Technologies Behind IoT:** Four pillars of IOT paradigm, - RFID, Wireless Sensor Networks, SCADA (Supervisory Control and Data Acquisition), M2M - IOT Enabling Technologies - BigData Analytics, Cloud Computing, Embedded Systems.	**11**	**CO211.2**
3	**Programming The Microcontroller For IoT:** Working principles of sensors IOT deployment for Raspberry Pi /Arduino /Equivalent platformReading from Sensors, Communication: Connecting microcontroller with mobile devices, communication through Bluetooth, wifi and USB - Contiki OS. **Resource Management in IoT:** Clustering, Clustering for Scalability, Clustering Protocols for IOT.	**12**	**CO211.3** **CO211.4**
4	**IoT Applications and case studies:** Business models for the internet of things, Smart city, smart mobility and transport, smart buildings and infrastructure, smart health, environment monitoring and surveillance.	**11**	**CO211.3**



Reference Books:

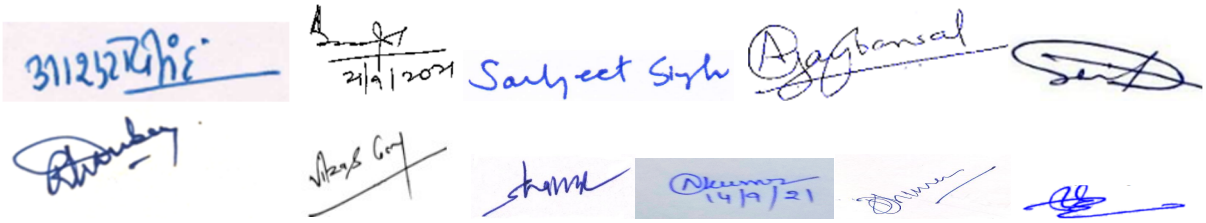
1. Bahga, A. and Madisetti, V., 2014. Internet of Things: A hands-on approach. Vpt.
2. Doukas, C., 2012. Building Internet of Things with the ARDUINO. CreateSpace Independent Publishing Platform.
3. Uckelmann, D., Harrison, M. and Michahelles, F. eds., 2011. Architecting the internet of things. Springer Science & Business Media.
4. Vermesan, O. and Friess, P. eds., 2014. Internet of things-from research and innovation to market deployment (Vol. 29). Aalborg: River publishers.
5. Weber, R.H. and Weber, R., 2010. Internet of things (Vol. 12). Heidelberg: Springer.
6. Holler, J., Tsiatsis, V., Mulligan, C., Karnouskos, S., Avesand, S. and Boyle, D., 2014. Internet of Things. Academic Press.

COURSE ARTICULATION MATRIX

COs	PO1	PO 2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 0	PO1 1	PO1 2
CO211. 1	2	2	1					1				
CO211. 2	2	1										
CO211. 3	2	2	3	1	2			1				
CO211. 4	2	2	3		2			1				1

MAPPING OF COs WITH PSOs

COs	PSO 1	PSO2	PSO3	PSO4
CO211.1	2	1	1	1
CO211.2	2	1		1
CO211.3	2	2	1	1
CO211.4	2	2	2	1



Course Code: MT CS 303	Course Name: Blockchain Technologies	L	T	P	C
		3	0	0	3
Year and Semester	**2nd year** **3rd Semester**	**Contact hours per week:** (3 Hrs.) **Exam:** (3hrs.)			
Prerequisite of course	Cryptography/ Network Security	**Evaluation**			
		CIE: 30	**TEE: 70**		

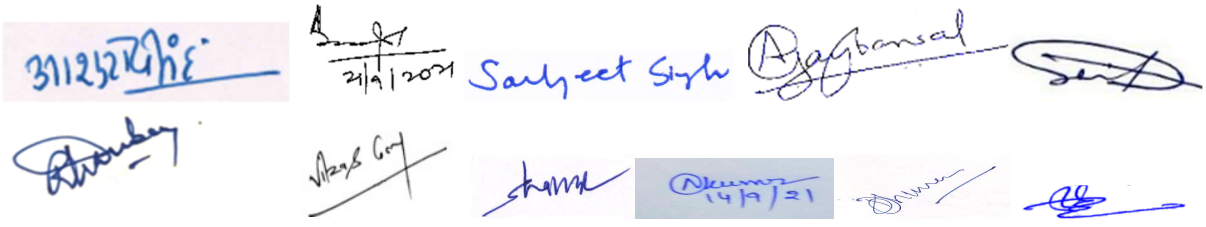
Course Objectives:

1. To learn the concept of blockchain.
2. To be familiar with recent advancement in blockchain
3. To be exposed to various usage of blockchains.
4. To understand smart contracts and associated vulnerabilities.
5. To learn implementation of blockchain.

Course Outcomes: On completion of the course, student would be able to:

CO303.1	Understand the requirements of the basic design of blockchain
CO303.2	Identify the need of blockchains to find the solution to the real-world problems
CO303.3	Recognize the underlying technology of transactions, blocks, proof-of-work, and consensus building
CO303.4	Design and implement new ways of using blockchain for applications other than cryptocurrency

Module No	COURSE SYLLABUS CONTENTS OF MODULE	Hrs	COs
1	Blockchain concepts, evolution, structure, characteristics, a sample blockchain application, the blockchain stack, benefits and challenges, Public Ledgers, Blocks in a Blockchain, Blockchains as public ledgers, Transactions, Distributed consensus. Building a block: Elements of Cryptography-Cryptographic Hash functions, Merkle Tree, Elements of Game Theory	**12**	**CO303.1**



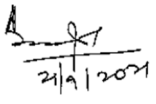
2	Design methodology for blockchain applications, blockchain application templates, blockchain application development, Ethereum, Solidity, Sample use cases from Industries, Business problems.	**11**	**CO303.2**
3	Smart contract, structure of a contract, interacting with smart contracts using Geth client and Mist wallet, smart contract examples, smart contract patterns, Byzantine fault tolerance, proof-of-work vs proof-of-stake, Security and Privacy of Blockchains, smart contract vulnerabilities, Scalability of Blockchains	**12**	**CO303.3**
4	Blockchain Applications: Internet of Things, Medical Record Management System, Domain Name Service and future of Blockchain.	**10**	**CO303.4**

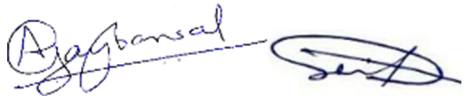
Reference Books:

1. Bambara, J.J., Allen, P.R., Iyer, K., Madsen, R., Lederer, S. and Wuehler, M., 2018. Blockchain: A practical guide to developing business, law, and technology solutions. McGraw Hill Professional.
2. Dhillon, V., Metcalf, D. and Hooper, M., 2017. Blockchain enabled applications. Berkeley, CA: Apress.
3. Mougayar, W., 2016. The business blockchain: promise, practice, and application of the next Internet technology. John Wiley & Sons.
4. Singhal, B., Dhameja, G. and Panda, P.S., 2018. Beginning Blockchain: A Beginner's Guide to building Blockchain solutions. Apress.
5. Wattenhofer, R., 2019. Blockchain science: Distributed ledger technology. Inverted Forest Publishing.

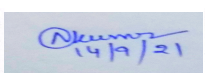
COURSE ARTICULATION MATRIX

COs	PO1	PO 2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 0	PO1 1	PO1 2
CO303. 1	2											
CO303. 2	2	2										2









CO303.3	2	2			1							1
CO303.4	2		2		2			2				2

MAPPING OF COs WITH PSOs

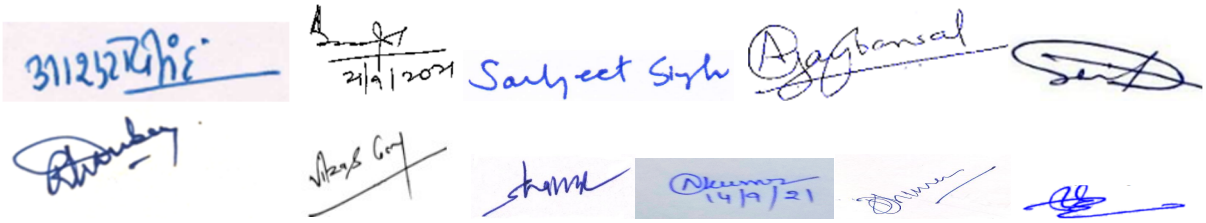
COs	PSO 1	PSO2	PSO3	PSO4
CO303.1	2			1
CO303.2	2		1	1
CO303.3	2		2	1
CO303.4	2	2	2	1

Course Code: MT CS 304	**Course Name: Software Project Management**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**
Year and Semester	**2nd year** **3rd Semester**	**Contact hours per week:** (3 Hrs.) **Exam:** (3hrs.)			
Prerequisite of course	Software Engineering	**Evaluation**			
		CIE: 30	**TEE: 70**		

Course Objectives:

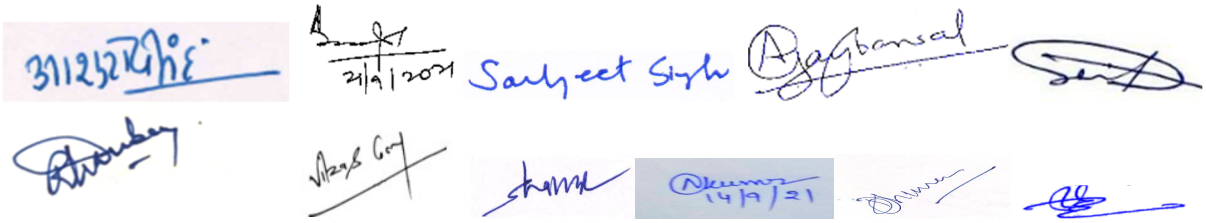
1. To introduce the primary important concepts of project management related to managing software development projects.
2. To be familiar with the different activities involved in Software Project Management.
3. To successfully plan and implement a software project management activity

Course Outcomes: On completion of the course, student would be able to:



CO304.1	Identify the different project contexts and suggest an appropriate management strategy.
CO304.2	Practice the role of professional ethics in successful software development.
CO304.3	Identify and describe the key phases of project management.
CO304.4	To perform the Project Scheduling, tracking, Risk analysis, Quality management and Project Cost estimation using different techniques

Module No	COURSE SYLLABUS CONTENTS OF MODULE	Hrs	COs
1	**Introduction to project management:** Introduction, Importance of software project management, Project and different types of project, What is management?, Problems with software projects, Environmental Appraisal with Projects, Requirement Specification, Management Control, Steps in project planning	**11**	**CO304.1**
2	**Programme management and project evaluation:** Programme Management, Managing resources within programme, Strategic programme management, Aids to programme management, Evaluation / Assessment of projects, Cost-benefit Analysis, Cash flow forecasting, Cost-benefit evaluation techniques, Risk evaluation	**11**	**CO304.2** **CO304.3**
3	**Project approach and Software effort estimation:** Selection of an appropriate project technology, Choice of process model, Data Structure, Delivery Model, Basis for software estimation, Problem with over and under estimates, Estimation Techniques, Expert judgment, Albrecht Function Point Analysis, Function points Mark II, COSMIC Function point, COCOMO Model	**12**	**CO304.3**
4	**Activity Planning:** Objective of Planning, Project Schedule, Activities – Sequencing and Scheduling, Development of Project Network, Time Estimation, Forward and backward Pass, Critical Path and Activities. Risk Management	**11**	**CO304.4**



	Risk, Risk categories, identification, assessment, planning, management PERT and CPM Models, Monte Carlo Simulation		

Reference Books:

1. Chandra, P., 2009. Projects 7/E. Tata McGraw-Hill Education.
2. Cotterell, M. and Hughes, B., Software Project Management, 2017, Tata McGraw Hill Publication.
3. Futrell, R.T., Shafer, D.F. and Shafer, L., 2002. Quality software project management. Prentice Hall Professional.
4. Morris, P.W. and Pinto, J.K. eds., 2010. The Wiley guide to project organization and project management competencies (Vol. 8). John Wiley & Sons.
5. Stellman, A. and Greene, J., 2005. Applied software project management. " O'Reilly Media, Inc.".

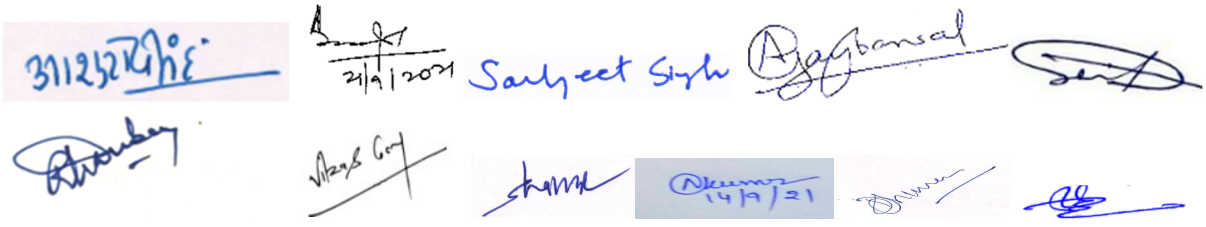
COURSE ARTICULATION MATRIX

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO304.1	3	2	1	1	1			2	2			
CO304.2	3	2	2	2	1			2	2			
CO304.3	3	2	1	2	2			2	2			
CO304.4	3	2	2	2	1			2	2			

MAPPING OF COs WITH PSOs

COs	PSO 1	PSO2	PSO3	PSO4
CO304.1	3	1	1	1
CO304.2	3	2	2	1
CO304.3	3	2	2	1
CO304.4	3	2	2	1

Course Code:	**Course Name:** Remote Sensing	**L**	**T**	**P**	**C**



MT CS 305			3	0	0	3
Year and Semester	**2nd year** **3rd Semester**	**Contact hours per week:** (3 Hrs.) **Exam:** (3hrs.)				
Prerequisite of course	Nil	**Evaluation**				
		CIE: 30	**TEE: 70**			

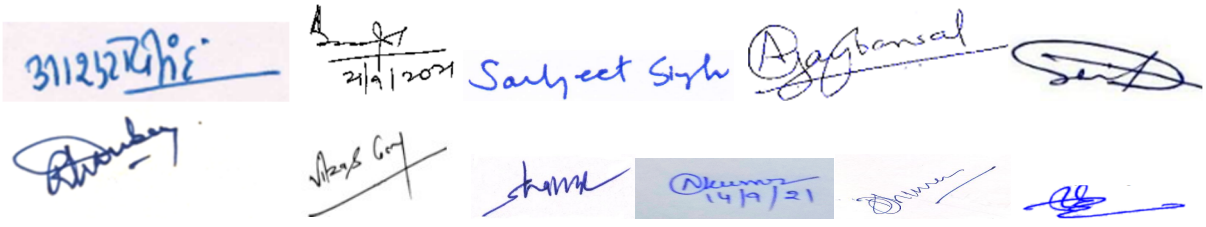
Course Objectives:

1. To apply principles of Remote sensing to collect, map and retrieve spatial information
2. To learn to identify different earth surface features from satellite images
3. To understand the uses of Data Acquisition Sensors, Electro optical sensors, Thermal sensors

Course Outcomes: On completion of the course, student would be able to:

CO305.1	Select the type of remote sensing technique / data for required purpose
CO305.2	Identify the earth surface features from satellite images
CO305.3	Describe the use of Data Acquisition Sensors, Electro optical sensors, Thermal sensors
CO305.4	Analyze the Data and its characteristics

Module No	COURSE SYLLABUS CONTENTS OF MODULE	Hrs	COs
1	**Physics of Remote Sensing:** Sources of Energy, Active and Passive Radiation, Electromagnetic Radiation - Reflectance, Transmission, Absorption, Thermal Emissions, Interaction with Atmosphere, Atmospheric windows, Spectral reflectance of Earth's surface features, Multi concept of Remote Sensing.	**10**	**CO305.1**
2	**Data Acquisition Platforms:** Various types of platforms, different types of aircraft, manned and unmanned space crafts used for data acquisition - characteristics of different types of platforms - LANDSAT, SPOT, IRS, ERS, INSAT and other platforms.	**12**	**CO305.2**



3	**Data Acquisition Sensors (Visible & Infrared):** Photographic products, Resolving power of lenses and films, Optomechanical / Electro optical sensors - spatial, spectral and radiometric resolution, Thermal sensors, Geometric Characteristics of thermal imagery, calibration of thermal scanner, signal to noise ratio.	**11**	**CO305.3**
4	**Data Analysis:** Data Products and Their Characteristics, Data Preprocessing – Atmospheric, Radiometric, Geometric Corrections - Basic Principles of Visual Interpretation, Equipment for Visual Interpretation, Ground Truth, Ground Truth Equipment. Applications: Geosciences, Water Resources, Land use – Land cover, Transportation Engineering.	**12**	**CO305.4**

Reference Books:

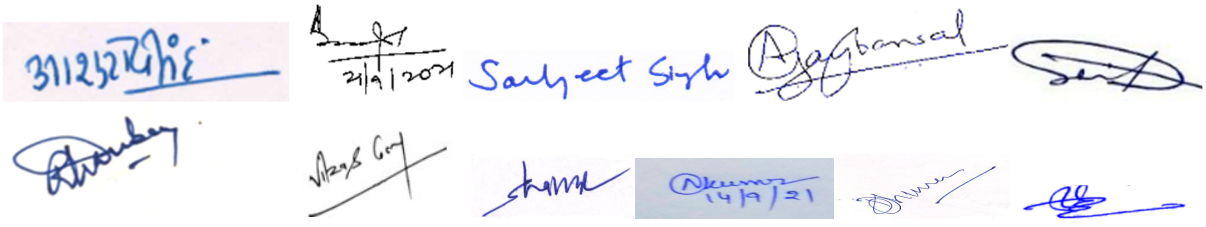
1. Campbell, J.B. and Wynne, R.H., 2011. Introduction to remote sensing. Guilford Press.
2. Elachi, C. and Van Zyl, J.J., 2021. Introduction to the physics and techniques of remote sensing. John Wiley & Sons.
3. Lillesand, T., Kiefer, R.W. and Chipman, J., 2015. Remote sensing and image interpretation. John Wiley & Sons.
4. Mätzler, C. ed., 2006. Thermal microwave radiation: applications for remote sensing (Vol. 52). Iet.
5. Rees, W.G., 2013. Physical principles of remote sensing. Cambridge university press.

COURSE ARTICULATION MATRIX

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO305.1	3	2	1		1							
CO305.2	3	2				1	2	1				
CO305.3	3	1		2	2							
CO305.4	1	3		1		2						1

MAPPING OF COs WITH PSOs

COs	PSO 1	PSO2	PSO3	PSO4



CO305.1	2		1	1
CO305.2	2	2		1
CO305.3	2			1
CO305.4	2	2	2	1
CO305.5				1

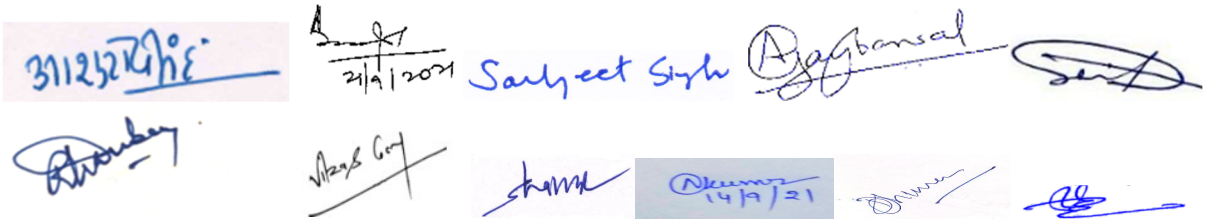
Course Code: MT CS 306	**Course Name: Wireless and Mobile Networks**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**
Year and Semester	**2nd year** **3rd Semester**	**Contact hours per week:** (3 Hrs.) **Exam:** (3hrs.)			
Prerequisite of course	Nil	**Evaluation**			
		CIE: 30	**TEE: 70**		

Course Objectives:

1. To learn about basic communication technology
2. To analyze the working principle of MAC protocol
3. To design and analyze routing protocols for multi-hop wireless networks
4. To learn about wireless sensor network

Course Outcomes: On completion of the course, student would be able to:

CO306.1	Identify issues related to environment, communication, protocols in mobile computing
CO306.2	Analyze the performance of mac protocols for wired and wireless networks
CO306.3	Analyze performance of transport layer protocols in mobile Ad-hoc networks
CO306.4	Understand the concept of wireless sensor network



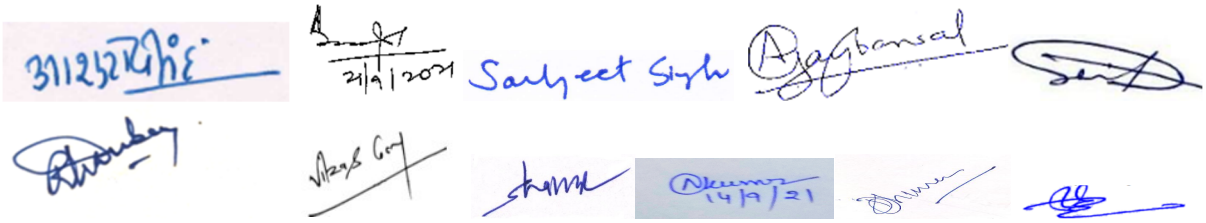
Module No	COURSE SYLLABUS CONTENTS OF MODULE	Hrs	COs
1	Basic communication Technologies, Introduction to Mobile Networks, Types of Wireless networks (MANET: Mobile ad-hoc networks, WSN: Wireless Sensor Networks, VANET: Vehicular Ad-hoc Networks, PAN: Personal Area Networks, DTN: Delay Tolerant Network), Wireless Communication Fundamentals, Cellular Wireless Networks, Mobile Ad-hoc Networks	**12**	**CO306.1**
2	Medium Access Control Layer: MACA, MACAW, Wireless LAN, Mobile Network Layer (Mobile IP), DHCP	**11**	**CO306.2**
3	Routing in Mobile Ad hoc Networks (MANET): AODV (Ad-hoc On-Demand Distance Vector Routing Protocol), DSR (Dynamic Source Routing), Secure routing protocols in MANET	**11**	**CO306.3**
4	Wireless Sensor Networks: (Routing protocols, Localization methods, Sensor Deployment Strategies), Delay Tolerant Networks, Vehicular Ad-hoc Networks, Wireless Access Protocol, GPS, RFID.	**11**	**CO306.4**

Reference Books:

1. Cordeiro, C.D.M. and Agrawal, D.P., 2011. Ad hoc and sensor networks: theory and applications. World Scientific Publishing Company.
2. Schiller, J.H., 2003. Mobile communications. Pearson education.
3. Schwartz, M., 2005. Mobile wireless communications (Vol. 25). Cambridge: Cambridge University Press.
4. Talukder, A.K., Yavagal, R.R. and Talukder, A.K., 2005. Mobile Computing. Tata McGraw-Hill Education.

COURSE ARTICULATION MATRIX

COs	PO1	PO 2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 0	PO1 1	PO1 2
CO306.1	2											
CO306.2	2	2										2

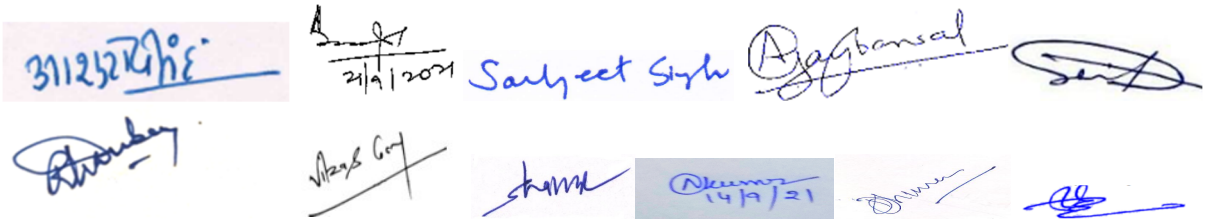


CO306.3	2	2										2
CO306.4	2											2

MAPPING OF COs WITH PSOs

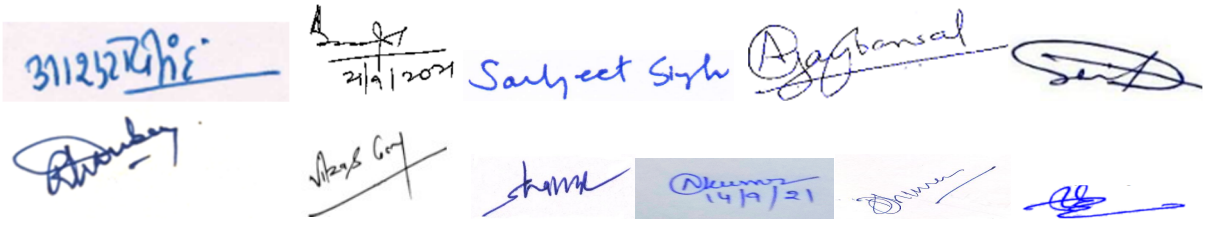
COs	PSO 1	PSO2	PSO3	PSO4
CO306.1	2			1
CO306.2	2		2	1
CO306.3	2		2	1
CO306.4	2		2	1

<table>
<tr><td rowspan="2">Course Code:
MT CS 307</td><td colspan="2" rowspan="2">Course Name: Computer Vision</td><td>L</td><td>T</td><td>P</td><td>C</td></tr>
<tr><td>3</td><td>0</td><td>0</td><td>3</td></tr>
<tr><td>Year and Semester</td><td>1st year
2nd Semester</td><td colspan="4">Contact hours per week: (3 Hrs.)
Exam: (3hrs.)</td></tr>
<tr><td rowspan="2">Prerequisite of course</td><td colspan="2" rowspan="2"></td><td colspan="4">Evaluation</td></tr>
<tr><td colspan="2">CIE: 30</td><td colspan="2">TEE: 70</td></tr>
<tr><td colspan="6">Course Objectives:
1. To recognize and describe both the theoretical and practical aspects of computing with images.
2. To describe the foundation of image formation and image analysis.
3. To understand the geometric relationships between 2D images and the 3D world.
4. To have gained exposure to motion, matching, recognition, extraction, and categorization from images.</td></tr>
<tr><td colspan="6">Course Outcomes: On completion of the course, student would be able to:</td></tr>
<tr><td>CO307.1</td><td colspan="5">Understand the basics of 2D and 3D Computer Vision.</td></tr>
</table>



CO307.2	Design and describe various methods used for motion, registration, alignment, detection, recognition and matching in images.
CO307.3	Build computer vision applications.

Module No	COURSE SYLLABUS CONTENTS OF MODULE	Hrs	COs
1	**Introduction and Digital Image Formation:** Overview, Fundamentals of Image Formation, What is computer vision? A brief history. **Image Formation and Image Models:** Geometric Camera Models, Geometric Camera Calibration, Radiometry, Measuring Light, Shadows and shading, Color. **Early Vision - Multiple Images:** The Geometry of Multiple Views, Stereopsis, Affine Structure from Motion, Projective Structure from Motion. **Feature Detection and Matching:** Points and patches, Edges, Lines.	**12**	**CO307.3**
2	**Mid Level Vision:** Segmentation by Clustering, Segmentation by Fitting a Model, Segmentation and Fitting using Probabilistic Methods, Tracking with Linear Dynamic Models. **Feature-Based Alignment:** 2D and 3D feature-based alignment, Pose estimation, Geometric intrinsic calibration. **High Level Vision – Geometric Methods:** Model-Based Vision, Smooth Surfaces and their Outlines, Aspect Graphs, Range Data. **Structure from Motion:** Triangulation, Two-frame structure from motion, Factorization, Bundle adjustment, Constrained structure and motion.	**12**	**CO307.1**
3	**High Level Vision -Probabilistic and Inferential Methods:** Recognition by Relations between Templates, Geometric Templates from Spatial Relations, Application, Image Based Rendering. **Dense Motion Estimation:** Translational alignment, Parametric motion, Spline-based motion, Optical flow, Layered motion.	**10**	**CO307.2**



4	**3D Reconstruction:** Shape from X, Active range finding, Surface representations, Point-based representations - Volumetric representations - Model-based reconstruction - Recovering texture maps. **Recognition:** Object detection, Face recognition, Instance recognition, Category recognition, Context and scene understanding.	**11**	**CO307.3**

Reference Books:

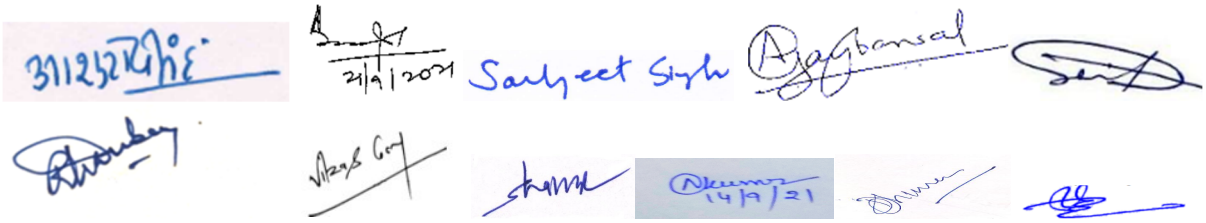
1. Forsyth, D. and Ponce, J., 2011. Computer vision: A modern approach (p. 792). Prentice hall.
2. Gonzalez, R.C. and Woods, R.E., 2002. Digital image processing, Pearson.
3. Gupta, M., Konar, D., Bhattacharyya, S. and Biswas, S., 2020. Computer Vision and Machine Intelligence in Medical Image Analysis. Springer Singapore.
4. Prince, S.J., 2012. Computer vision: models, learning, and inference. Cambridge University Press.
5. Szeliski, R., 2010. Computer vision: algorithms and applications. Springer Science & Business Media.

COURSE ARTICULATION MATRIX

COs	PO1	PO 2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 0	PO1 1	PO1 2
CO307. 1	2											
CO307. 2	2	2			1							2
CO307. 3	2	2	2		2			2				2

MAPPING OF COs WITH PSOs

COs	PSO 1	PSO2	PSO3	PSO4
CO307.1	2			1
CO307.2	2	1	2	1
CO307.3	2	2	2	1



Course Code: MT CS 308	Course Name: Entrepreneurship	L	T	P	C
		3	0	0	3
Year and Semester	**2nd year** **3rd Semester**	**Contact hours per week:** (3 Hrs.) **Exam:** (3hrs.)			
Prerequisite of course		**Evaluation**			
		CIE: 30	**TEE: 70**		

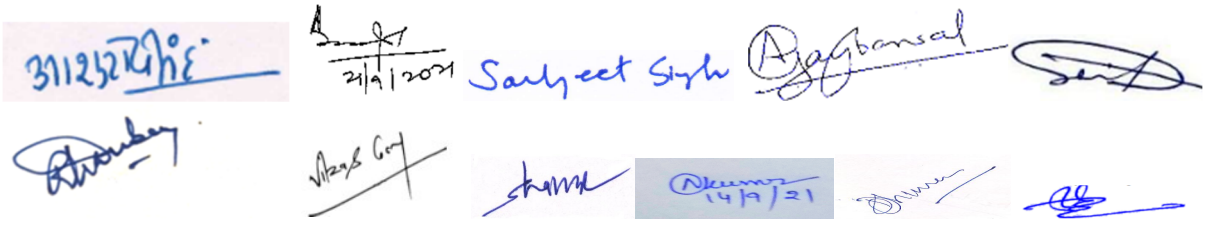
Course Objectives:

1. To acquire necessary knowledge and skills required for organizing and carrying out entrepreneurial activities
2. To develop the ability of analysing and understanding business situations in which entrepreneurs act.
3. To master the knowledge necessary to plan entrepreneurial activities.
4. To contribute to their entrepreneurial and managerial potentials.

Course Outcomes: On completion of the course, student would be able to:

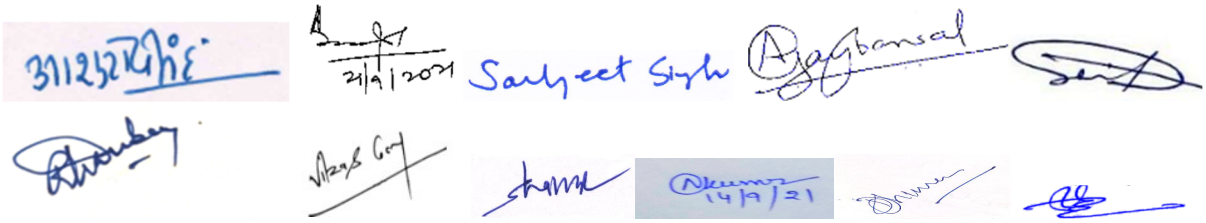
CO308.1	Understand the role of Entrepreneurship in Economic development
CO308.2	Classify among various types of Entrepreneurship and business ownerships
CO308.3	Interpret various entrepreneurial motivation theories and competencies
CO308.4	Plan Business Start ups
CO308.5	Identify various agencies for entrepreneurial training, financing, marketing support and consultancy

Module No	COURSE SYLLABUS CONTENTS OF MODULE	Hrs	COs
1	Introduction to the Concept of Entrepreneur & Entrepreneurship; Evolution to the Concept of Entrepreneur; Role of Entrepreneurship in Economic development;	**12**	**CO308.1 & CO308.2**



	Characteristics of successful Entrepreneurs; Need for an Entrepreneur; Functions of Entrepreneur; Types of Entrepreneurs –Women, Rural, Tourism, Agri-Preneurship and Social Entrepreneurship; Entrepreneur Vs a Manager; Entrepreneurial decision process; Factors affecting Entrepreneurship growth.		
2	Entrepreneurial Motivation: Meaning, motivating factors, Theories of Entrepreneurial motivation; Entrepreneurial Motivation Behaviour's motives: Creativity, Self efficacy, Locus of Control, Risk taking, Leadership, Communication; Entrepreneurial Competencies: Meaning, Major Entrepreneurial Competencies; International Entrepreneurship – Opportunities and challenges; Forms of Business Ownerships.	**11**	**CO308.2 & CO308.3**
3	Business Start ups – Introduction, characteristics and types; Micro and Small Enterprises: meaning, importance, features and characteristics, Rationale behind micro and small enterprises, Scope of Micro and Small Enterprises; Entrepreneurship Project Development: Idea generation – sources & techniques, Identifying Opportunity, Business Plan Formulation, Project Appraisal, Developing a Marketing Plan, Business Plan Failures.	**12**	**CO308.4**
4	Govt. Support to new enterprises: Entrepreneurship Development Programmes (EDPs), Role of Central and State Government in promoting Entrepreneurship, Financing of an Enterprise, Agencies for Marketing Support, Agencies for Consulting, Training and other Support, Taxation benefits to small scale enterprises. MSME policy in India.	**10**	**CO308.5**

Reference Books:



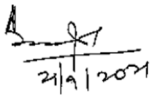
1. Dutta, B. (2009). *Entrepreneurship Management (Text and Cases)* (1 ed.). New Delhi: Excel Book
2. Hisrich, R. D., Peters, M. P., & Shepherd, D. A. (2017). *Entrepreneurship*. (10 ed.). Chennai: McGraw Hill Education (India) Private Limited.
3. Khanka, S.S. (2016). *Entrepreneurial Development* (4 ed.). New Delhi: S. Chand & Company Ltd.
4. Scarborough, N.M., & Cornwall, J.R. (2014). *Essentials of Entrepreneurship and Small Business Management.* (8 ed.). New Delhi: Prentice Hall.

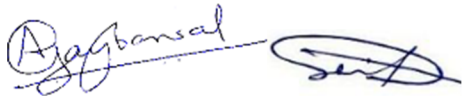
COURSE ARTICULATION MATRIX

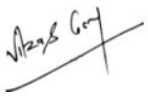
COs	PO1	PO 2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO1 0	PO1 1	PO1 2
CO308. 1						2					1	1
CO308. 2						2					2	2
CO308. 3						2					2	2
CO308. 4						3				1	3	3
CO308. 5						3				1	3	3

MAPPING OF COs WITH PSOs

COs	PSO 1	PSO2	PSO3	PSO4
CO308.1				
CO308.2				
CO308.3		2	3	
CO308.4		2	3	2
CO308.5		2	3	

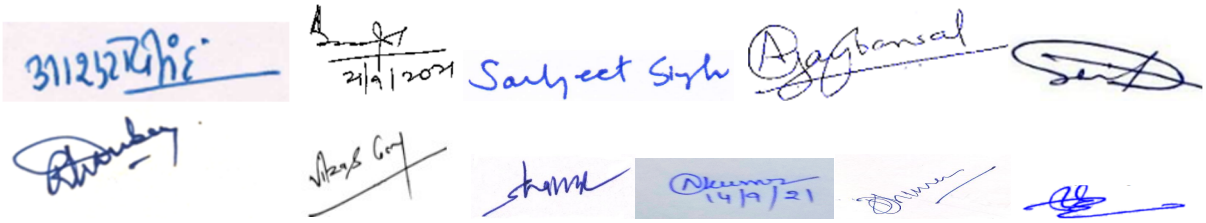













Annexure-XL

सत्यमेव जयते

न्यायालय मुख्य आयुक्त दिव्यांगजन

COURT OF CHIEF COMMISSIONER FOR PERSONS WITH DISABILITIES (DIVYANGJAN)

दिव्यांगजन सशक्तिकरण विभाग/Department of Empowerment of Persons with Disabilities (Divyangjan)
सामाजिक न्याय और अधिकारिता मंत्रालय/Ministry of Social Justice and Empowerment
भारत सरकार/Government of India

Case No. 12793/1031/2021

कुलसचिव कार्यालय, हरियाणा केंद्रीय विश्वविद्यालय
Registrar Office, Central University of Haryana
Diary / Receipt No. 10066
Date 04.10.21

Complainant:

Ms. Meena Kadian,
R/o Chullayan Pana, V.P.O. Beri,
Tehsil Beri, District-Jhajjar (Haryana),
Email: meena.kadian@live.com; Mobile: 8587085406

Respondent:

Registrar,
Central University of Haryana,
Village Jant Pali,
District-Mahandergarh - 123031 (Haryana)
Email: registraroffice@cuh.ac.in

R29468

1. Gist of Complaint:

1.1 The complainant, Ms. Meena Kadian, F-35, a person with 100% Locomotor Disability (both lower limbs) initially had filed this complaint on 20.08.2019 before the State Commissioner for Persons with Disabilities, Government of Haryana regarding non-implementation of 5% reservation policy in admission to Ph.D. and denial of her admission to Ph.D. in disability category for the Academic Session 2019-2020. After hearing the complaint [Case No.111/19], SCPD Haryana decided to transfer the case to this Court on 02.07.2021 as the respondent being a Central University had disputed the jurisdiction of SCPD Haryana and only the Chief Commissioner for Persons with Disabilities, Government of India has the jurisdiction to decide the case.

1.2 She has alleged that the respondent Central University of Haryana (CUH) had not notified in the Information Bulletin for Academic Session 2019-2020 a single seat for students with disabilities for admission to Ph.D. under disability quota. She had applied for admission to Ph.D Law under PwD category and even after qualifying the interview, the respondent denied to provide interview and told the complainant that there is no reservation for PwD category in Law Department.

सरोजिनी हाउस, 6, भगवान दास रोड, नई दिल्ली–110001; दूरभाष: 23386054, 23386154; टेलीफैक्स : 23386006
Sarojini House, 6, Bhagwan Dass Road, New Delhi-110001 ; Tel.: 23386054, 23386154 ; Telefax : 23386006
E-mail: ccpd@nic.in ; Website: www.ccdisabilities.nic.in
(कृपया भविष्य में पत्राचार के लिए उपरोक्त फाईल/केस संख्या अवश्य लिखें)

1.3 The complainant further submitted that the total intake of the Ph.D. Programme in Academic Session 2019-20 was 98 in CUH, which means 5 seats should have been allotted to PwD category. The CUH should disclose how many candidates and in which department has been admitted in Ph.D Programme 2019-20.

2. Submissions made by the Respondent

2.1 The respondent filed their reply dated 03.08.2021 and submitted that 5% reservation is admissible to PwD candidates in admission in Central University of Haryana (CUH). Due to small number of seats offered by the Departments for M.Phil./Ph.D. admission, there was administrative difficulty in providing 5% reservation department-wise. Hence, the matter was put up before the Standing Committee (Admissions) which is having one member as representative of PwD category.

2.2 In pursuance of the resolution passed by the Standing Committee (Admissions) in its meeting held on 08.10.2020, the Central Admission Advisory Committee 2020-21 consisting of one member as representative of PwD category, prepared the Seat Matrices in which 5% reservation to PwD candidates has been provided taking University as a single unit and the seats were allotted to the Departments alphabetically to implement the 5% reservation to PwD candidates. CUH offered a total of 36 seats in M.Phil. and 221 seats in Ph.D. A total of 02 seats in M.Phil and 11 seats in Ph.D. were reserved for PwD candidates and the seats were allotted to the departments in alphabetical order to implement the reservation in Research Programmes.

2.3 The Department of Law, CUH offered 07 seats for Ph.D. Programme (03 UR, 01 SC, 01 ST, 01 OBC and 01 EWS) IN Academic Session 2019-20. As per the provisions of RPwD Act, 2016, 5% of 07 seats can be calculated as 0.35 seats i.e. even less than half could be reserved from PwD candidates. In view of the above, no seat was advertised under PwD category in the Department of Law for the Academic Session 2019-2020.

2.4 Respondent also submitted that similar controversy had arisen before the Court of Chief Commissioner for Persons with Disabilities in Case No.12456/1031/2020 – Shri Bhadur Lal Vs Central University of Haryana, wherein this Court had held that no further intervention is required in this matter and the case was closed.

3. Submissions made in Rejoinder

3. **Submissions made in Rejoinder**

3.1 Complainant in her Rejoinder dated 16.08.2021 denied the reply and stated to be wrong and misleading as the reply is based on the data of Academic Session 2020-21 but the instant case pertains to the Academic Session 2019-2020 where there were no provisions made by the respondent for the implementation of RPwD Act, 2016 in Ph.D. admissions. All the provisions of reservation for PwD category were made on the recommendations of the Standing Committee (Admissions) vide Resolution No.14 in its 31st meeting held on 08.10.2020, i.e. after one year of the pursuance of this case (before the SCPD Haryana). So at the time this conflict arose, there was no reservation provided for PwD category in Ph.D. admissions.

3.2 As per the printed Information Bulletin of the respondent, seats allotted to all the Departments were bifurcated only under UR, SC, ST, OBC and EWS, with a Note that – **"PWD reservation shall be provided as per Government of India rules. The seats reserved for the PWD shall be separately notified within the department-wise intake capacity as given above."** The respondent had not notified a single seat for PwD students in the Academic Session 2019-2020 for admission to Ph.D. The respondent was, therefore, on fault during Academic Session 2019-2020 for Ph.D. admissions and complainant was denied her fundamental right of equal opportunity in studies.

4. **Hearing:** The case was heard via Video Conferencing by Commissioner for Persons with Disabilities on **14.09.2021.** The following were present:

(1) Ms. Meena Kadian, complainant
(2) Dr. Pardeep Singh, Incharge – Legal Cell, for respondent

5. **Observation/Recommendations:**

5.1 Both the parties were heard.

5.2 The grievance of the complainant pertains to not implementing reservation for persons with disabilities in the Ph.D. seats of the respondent University in the year 2019. She expressed that although she had qualified under unreserved category, yet she was not given a seat as she figured in the waiting list. If the University had applied the reservation as per the Rights of Persons with Disabilities Act, 2016 she would have been definitely selected. She further express that she again applied in the year 2020, but she was disqualified by the University. In the year 2020, the University has initiated a system of reservation in which seats were reserved in each department with name starting from letter

TRUE COPY

A to H and no seats were reserved for departments with names starting from letter L to Z. The complainant is from Law Discipline and there were 25 vacancies which were advertised and not even one was reserved for persons with disabilities, whereas in the Department of History total seats advertised were one which was reserved for persons with disabilities. If this criteria had not been followed, the complainant would have got the Ph.D. seat.

5.3 The respondent admitted that yes they did not apply the principle of reservation in the year 2019, which was a mistake on their part. However, in the year 2020, they have applied the principle of alphabetical order and filled all 25 seats in the Law Discipline.

5.4 This Court does not understand the logic behind this system of applying reservation. Logically reservation should be in those disciplines, where the number of seats is more in number or in other words, the reservation should be in proportion with the number of vacancies. It is clear that if there is only one seat and it is reserved for persons with disabilities, it is highly likely that no person will be available, and reservation would go waste.

5.5 This Court finds the grievance of the complainant genuine. Injustice has been done to her by the University by following no reservation in 2019 and applying an irrational criterion in the year 2020. After lots of deliberations in the matter with the respondent and the complainant, the Court recommends that since there were 25 seats in the Law Department, the University may compensate the complainant by increasing one more seat and adjust the complainant against it. The complainant further expressed that she could reach this Court at a later stage because she first filed her grievance before Haryana State Commissioner, where her complaint was pending for a long time and thereafter a reply was received in this matter that the jurisdiction is of the CCPD, New Delhi. Hence, she has not delayed in filing her grievance and seeking justice. The respondent may adjust the complainant in Law Department for the year 2020.

5.6 The case is disposed off.

Dated: 28.09.2021

Upma Srivastava

(Upma Srivastava)
Commissioner
for Persons with Disabilities

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हरियाणा केंद्रीय विश्वविद्यालय

(संसद के अधिनियम संख्या-25 (2009) के तहत स्थापित)

जांट-पाली, महेंद्रगढ़- 123031 (हरियाणा)

CENTRAL UNIVERSITY OF HARYANA

(Established vide Act No. 25 (2009) of Parliament)

Jant-Pali, Mahendergarh-123031 (Haryana)

Annexure-XLI

No: CUH/2021/A&C/ 464

Date: 28.07.2021

अधिसूचना/ NOTIFICATION

(ACADEMIC CALENDAR 2021-22)

In pursuance of the UGC Guidelines on "Examinations and Academic Calendar in view of COVID-19 Pandemic-July, 2021" dated 16.07.2021 & as recommended by the Committee constituted for preparation/ finalizing of the Academic Calendar for the Academic Session 2021-22, the Academic Calendar of the University for the Academic Session 2021-22 (For Fresh Batch (First Semester/Year) is notified as under:

ACADEMIC CALENDAR 2021-22

[For Fresh Batch (First Semester/Year)]

Activity	Date(s)
Completion of Admission Process for UG/PG Programmes#	26.09.2021
Last date for admission against vacant seats	31.10.2021
Commencement of Classes— Fresh batch of UG and PG Students (First Semester/Year)	27.09.2021
Dispersal of classes (First Sem.)	16.01.2022
Winter/Preparatory Break	17.01.2022 to 30.01.2022
Conduct of Examinations	31.01.2022 to 11.02.2022
Semester Break	12.02.2022 to 20.02.2022
Commencement of Classes for Even Semester	21.02.2022
Dispersal of Classes	11.06.2022
Preparatory Break	12.06.2022 to 19.06.2022
Conduct of Examinations	20.06.2022 to 30.06.2022
Summer Break	01.07.2022 to 31.07.2022
Commencement of Next Academic Session for this batch	01.08.2022

Admission Process for UG Programmes to commence only after the declaration of results by CBSE, ICSE and State Boards.

28.7.2021

Note:

A) The Department(s) in which programmes of studies are governed by any Regulatory Body/ Council, the Department(s) may prepare the Academic Calendar as per the norms of the respective Regulatory Body/ Council and take the approval of Competent Authority.

B) As per UGC Guidelines, if there is a delay in declaration of result of the qualifying examinations, the University may plan and start the academic session by October 18, 2021.

28.7.2021

Assistant Registrar
(Academic & Council Branch)

Copy of above is forwarded to the following for information and necessary action:

1. Vice-Chancellor's Secretariat (for kind information of Vice-Chancellor), CUH
2. Office of the Registrar (for kind information of Registrar), CUH
3. Director, IQAC, CUH
4. Dean (Academic), CUH
5. All Deans/HoDs/TICs, CUH
6. Controller of Examinations, CUH
7. Proctor, CUH
8. All the Wardens (Boys & Girls Hostel), CUH
9. Finance Officer, CUH
10. All Administrative Branch Heads, CUH
11. ICT Section (for uploading on the University Website), CUH

हरियाणा केंद्रीय विश्वविद्यालय

(संसद के अधिनियम संख्या-25 (2009) के तहत स्थापित)

जांट-पाली, महेंद्रगढ़- 123031 (हरियाणा)

CENTRAL UNIVERSITY OF HARYANA

(Established vide Act No. 25 (2009) of Parliament)

Jant-Pali, Mahendergarh-123031 (Haryana)

No: CUH/2021/A&C/455 Date: 29.06.2021

अधिसूचना/ NOTIFICATION

(ACADEMIC CALENDAR 2021-22)

With the approval of the Competent Authority and as recommended by the Committee constituted vide Notification No-CUH/2021/A&C/432 dated 26.05.2021 for preparation/ finalizing of the Academic Calendar for the Academic Session 2021-22, the Academic Calendar of the University for the Academic Session 2021-22, is notified as under:

ACADEMIC CALENDAR 2021-22

Activity	Date(s)
Commencement of Classes i. Students of 2nd/ 3rd /4th Year	30.08.2021
Dispersal of Classes	18.12.2021
Preparatory Break	19.12.2021 to 26.12.2021
Conduct of Examinations	27.12.2021 to 16.01.2022
Semester/ Winter Break	17.01.2022 to 30.01.2022
Commencement of Classes for Even Semester	31.01.2022
Dispersal of Classes	28.05.2022
Preparatory Break	29.05.2022 to 05.06.2022
Conduct of Examinations	06.06.2022 to 30.06.2022
Summer Vacations	01.07.2022 to 10.08.2022
Commencement of Next Academic Session for this batch	11.08.2022

Note:

A) The Department(s) in which programmes of studies are governed by any Regulatory Body/ Council, the Department(s) may prepare the Academic Calendar as per the norms of the respective Regulatory Body/ Council and take the approval of Competent Authority.

B) The Academic Calendar of the Fresh Batch (First Semester/Year) for the session 2021-22 will be planned after receipt of necessary guidelines relating to admissions/academic calendar issued by University Grants Commission.

29.6.2021

Assistant Registrar
(Academic & Council Branch)

Copy of above is forwarded to the following for information and necessary action:

1. Vice-Chancellor's Secretariat (for kind information of Vice-Chancellor), CUH
2. Office of the Registrar (for kind information of Registrar), CUH
3. Director, IQAC, CUH
4. Dean (Academic), CUH
5. All Deans/HoDs/TICs, CUH
6. Controller of Examinations, CUH
7. Proctor, CUH
8. All the Wardens (Boys & Girls Hostel), CUH
9. Finance Officer, CUH
10. All Administrative Branch Heads, CUH
11. ICT Section (for uploading on the University Website), CUH

Annexure-XLII

AGENDA ITEM FOR ACADEMIC COUNCIL MEETING

To consider and approve the decision taken by Hon'ble Vice Chancellor to Condone the delay for submission of Ph.D. Thesis to Scholar Ms. Tushma Devi Roll no. 5055, Doctor of Philosophy (Political Science)

Statement of Case:-

It is submitted that Ms. Tushma Devi was a scholar of Doctor of Philosophy (Political Science) and her last date of submission of thesis was 10-03-2019. The candidate was further given an extension of one year, as per the ordinance clause no. 11 (b), wherein it reads ***" The School board on the recommendation of the Department/Centre/BRS may, however, subsequently accept the request of a person whose name has been removed from the rolls of the University under Sub-Clause (A) (III) above to get re-registered and become eligible for submission of his /her thesis, provided he/she submits his/her theists within one year from the date of such re-registration"*** . Accordingly, the last date for submission was 11-03-2020. The thesis could not be submitted due to some pending fees issues with the Finance Branch. The Hon'ble Vice Chancellor has condone the delay and allowed the submission of thesis and condone the period from 11-03-2020 to 10-09-2020, keeping in mind the COVID-19 pandemic.

Dated: 18/08/2021 Academic Section

17-08-2021

Agenda:-

To consider and approve the decision taken by the Hon'ble Vice Chancellor in condoning the delay for submission of Ph.D. thesis of Tushma Devi, Roll no. 5055, Doctor of Philosophy (Political Science)

Submitted for consideration.

18/08/2021

Assistant Registrar (Examinations)

18/8/2021

Controller of Examinations (I/C)

Academic Branch

Annexure-XLIII

TO BE PUBLISHED IN GAZETTE OF INDIA PART–III, SECTION 4

No.F./NRC/NCTE/HR....- M.P.Ed./342nd (Virtual) Meeting/2021/ 21566

Dated: 16 SEP 21

RECOGNITION ORDER

WHEREAS in terms of Section 14(1) of the NCTE Act, 1993, the institution had submitted application offline on **10.07.2020** to the Northern Regional Committee of NCTE for grant of recognition/permission for M.P.Ed. Programme.

2. AND, WHEREAS on scrutiny/perusal, veracity of the facts & figures as per the application submitted by the institution, the documents attached therewith, the affidavit and the input received from the visiting team in the form of visiting team report including videography and also the reply submitted by the institution in compliance to the decision of clause 7(13) of the NCTE Regulations, 2014, as amended from time to time the Northern Regional Committee having satisfied itself that the institution fulfils the requirements under the provisions of NCTE Act, Rules and the extant Regulations including the Norms and Standards for the proposed Teacher Education course, such as, instructional facilities, infrastructural facilities, library, accommodation, financial resources, laboratory, etc. for running the course and has selected/appointed qualified teaching staff as per norms duly approved by the affiliating body, decided to grant recognition/ permission to the institution in its **342nd (Virtual) Meeting held on 03rd September, 2021** for M.P.Ed. course.

3. NOW, THEREFORE, in exercise of the powers vested under Section 14(3)(a) of the NCTE Act, 1993, the Northern Regional Committee hereby grants recognition/permission to the following institution for conducting Teacher Education programme with an annual intake mentioned against its name from the **CURRENT academic session** under clause 7(16) of NCTE (Recognition Norms & Procedure) Regulations, 2014, as amended from time to time, subject to fulfilment of the conditions mentioned below: -

Sl. No.	File No.	Name and address of the Institution	Course	Duration	Approved annual intake	Name of the Affiliating Body
1.	HR...	Central University of Haryana, Plot no.-931/1167, Door/Plot No.-Khewat No.-250, Khatoni no.-380-470, Village-Jant-pali, Post office-Pali, Tehsil-Mahendergarh, District-Mahandergarh, Haryana.	M.P.Ed.	2 Years	One Unit (40)	Central University of Haryana, Mahandergah, Haryana.

4. The other important details of the institution are as under: -

Name of the Sponsoring Society	Central University of Haryana, Door /Plot No.-250, Khatoni No.-380 to 470, Village-Jant Pali, Post office-Pali, Tehsil-Mahandergarh, District-Mahandergarh – 249401, Haryana.
Phone Number / E-mail address of the institution	9977330947 registrar@cuh.ac.in

Contd.2/.....

प्राप्ति सं/ Receipt No. 9912
दिनांक / Dated 27.09.21 / 29.09.21
Registrar Officer, Central University of Haryana
Diary No. 153
Dated: 29/09/2021
Academic Section
AR-Academic

5. **The institution shall adhere to the fulfillment of the provisions of the NCTE Regulations, 2014, as amended from time to time, and ensure the following before commencement of the session: -**

(i) The institution shall comply with various other norms and standards prescribed in the NCTE Regulations, as amended from time to time.

(ii) The institution shall make admissions only after it obtains affiliation from the examining body in terms of Clause 8(10) of the NCTE (Recognition Norms & Procedure) Regulations, 2014.

(iii) The institution shall comply with condition laid down in clause 8(3) of the NCTE Regulations, 2014, as amended vide Notification on 29.04.2017 which provides as under: -

- ***An institution, which has been recognised by the Council shall obtain accreditation from an accrediting agency identified by the Council within five years of the date of recognition.***
- ***All existing Teacher Education Institutions which have not been accredited so far or have not been accredited within five years from the date of its recognition shall be required to get themselves accredited by the aforesaid accrediting agency within a period of one year from the date of notification of these Regulations.***
- ***The accreditation once obtained shall be valid for a period of five years and the recognised and already accredited Teacher Education Institutions shall be required to get accreditation renewed by the agency identified for the purpose by the Council before the lapse of the earlier accreditation.***

(iv) The institution shall ensure that the required number of academic staff for conducting the course is always in position.

(v) The Norms for teaching staff in respect of their qualifications and experience shall be as per provisions of NCTE Regulations, 2014, as amended from time to time.

6. Further, the recognition is subject to fulfilment of all such other requirements as may be prescribed by other regulatory bodies like UGC, affiliating University/ Body, State Government etc. as applicable, and compliance of the following by the affiliating body, State Govt and also the concerned recognised Institution: -

(i) The affiliating body/State Govt. shall be required to verify the authenticity of the land & building documents submitted by the institution, with the required land & built up area as well as appointment of requisite teaching & non-teaching staff as per provisions of the NCTE Regulations, 2014 before grant of affiliation to the institution.

(ii) The affiliating body shall ensure that the institution is a composite institution as per definition of a "composite institution" given in the NCTE Regulation, 2014. If at any stage, it is found that the institution is not a composite institution, the recognition granted shall be treated as withdrawn and the sole responsibility of the same will be of the institution. However, the existing stand-alone institutions shall gradually move towards becoming composite institutions.

Contd.3/.....

2.	**The Manager,** **Central University of Haryana,** **Door /Plot No.-250, Khatoni No.-380 to 470,** **Village-Jant Pali, Post office-Pali, Tehsil-Mahandergarh,** **District-Mahandergarh – 249401, Harayan.**	
3.	**The Principal Secretary,** **Department of Higher Education,** **New Haryana Civil Secretariat,** **Sector-17-C, 5th Floor, Room No.-528,** **Chandigarh-160017.**	**With a request to ensure compliance of the terms & conditions as laid down above by the institution.**
4.	**The Registrar,** **Central University of Haryana,** **Plot no.-931/1167, Door/Plot No.-Khewat No.-250,** **Khatoni no.-380-470, Village-Jant-pali,** **Post office-Pali, Tehsil-Mahendergarh,** **District-Mahandergarh, Haryana.**	
5.	**The Secretary,** **Department of School Education and Literacy,** **Ministry of Education,** **Govt. of India,** **Shastri Bhawan, New Delhi- 110001.**	
6.	**The US (EDP),** **National Council for Teacher Education,** **G-7, Sector-10, (Near Sector-10 Metro Station) Dwarka,** **New Delhi- 110075.**	
7.	**Legal Consultant, NRC, NCTE for compliance of court matter, if any.**	
8.	**Computer Section, NRC, for uploading on website.**	
9.	**Institution file**	
10.	**Guard file.**	

Regional Director

(iii) The NOC of the affiliating body and staff approval thereof submitted by the institution, if found fake, at any stage, the recognitions granted shall be treated as withdrawn, and the sole responsibility of the same will be of the institution.

7. The institution shall submit a Self-Appraisal Report to the Regional Committee at the end of each academic year along the statement of annual accounts duly audited by a Chartered Accountant.

8. The institution shall maintain & update its Web-site as per provisions of NCTE Regulations and always display as mandatory disclosure the following: -

(i) Copy of Application Form
(ii) Land and Building Particulars
(iii) Staff Profile
(iv) Recognition Order
(v) Information regarding fulfillment of norms & standards and other conditions for the course.

9. The Educational Institution shall follow Uniform Accounting System as brought out by ICAI and accepted by the MHRD.

10. The Institution shall fill the GIS Application within one month from the date of issue of this order.

11. If the institution contravenes any of the above conditions or the provisions of the NCTE Act, Rules and Regulations, the Regional Committee shall withdraw recognition under provisions of Section 17(1) of the NCTE Act, 1993.

12. Further, if the institution is not satisfied with the Order, it may prefer an Appeal under Section 18 of the NCTE Act, 1993 through "online mode" available on NCTE's website www.ncte.gov.in within 60 days from the date of issue of this order. The guidelines for filing appeal may be seen on NCTE's website.

By Order,

14/9/14

(Dr. Rammurti Meena)
Regional Director

The Manager
Govt. of India Press
Department of Publications (Gazette Section)
Civil Lines, Delhi – 110 054

Copy to:-

1.	**The HOD,** **Central University of Haryana,** **Plot no.-931/1167, Door/Plot No.-Khewat No.-250,** **Khatoni no.-380-470, Village-Jant-pali,** **Post office-Pali, Tehsil-Mahendergarh,** **District-Mahandergarh, Haryana.**

Contd.4/.....

MEMORANDUM OF UNDERSTANDING (MOU)

BETWEEN

Department of Printing and Packaging Technology

School of Engineering and Technology

Central University of Haryana, Mahendergarh, Haryana

('A' Grade, NAAC Accredited)

&

Offset Printer's Association, 2051, B-XX,

Gobind Nagar, Ludhiana, Punjab

Registered Under Societies Act,

Registration No. 1694 of 1995-96

MEMORANDUM OF UNDERSTANDING

This **Memorandum of Understanding** (hereinafter called as the 'MOU' is entered on the 29th day of -September- Two Thousand Twenty One (29/09/2021),

Between

Department of Printing and Packaging Technology, School of Engineering and Technology, Central University of Haryana, Mahendergarh, Haryana, the First Party represented herein by its **Name of Competent Authority / Representative** (hereinafter referred as **'First Party',** the institution which expression, unless excluded by or repugnant to the subject or context shall include its successors – in- office, administrators and assigns).

AND

Offset Printer's Association, 2051, B-XX, Gobind Nagar, Ludhiana, Punjab, the Second Party, and represented herein by its Zonal / Divisional Head, **Name of Competent Authority / Representative,** (hereinafter referred to as **"Second Party",** company which expression, unless excluded by or repugnant to the subject or context shall include its successors – in-office, administrators and assigns).

(First Party and Second Party are hereinafter jointly referred to as 'Parties' and individually as 'Party')

WHREAS:

A) First Party & Second Party will collaborate to promote effective use of mutual resources for enhanced opportunities for students.

B) The Parties intend to cooperate for Skill Based Training, Education and Research.

NOW THREFORE, IN CONSIDERATION OF THE MUTUAL PROMISES SET FORTH IN THIS MOU, THE PARTIES HERE TO AGREE AS FOLLOWS:

CLAUSE I CO-OPERATION

1.1 Both Parties are united by common interests and objectives, and they shall establish channels of communication and co-operation that will promote and advance their respective operations within the **Institution** and its related wings. The Parties shall keep each other informed of potential opportunities and shall share all information that may be relevant to secure additional opportunities for one another.

1.2 First Party and Second Party co-operation will facilitate effective utilization of the intellectual capabilities of the faculty of First Party providing significant inputs to them in developing suitable teaching / training systems, keeping in mind the needs of the industry, the Second Party.

1.3 The general terms of co-operation shall be governed by this MOU.

CLAUSE II SCOPE OF THE MoU

2.1 The building graduates from the institutions can play a key role in technological up gradation, innovation and competitiveness of an industry. Both parties believe that close co-operation between the two would be of major benefit to the student community to enhance their skills and knowledge.

2.2 **Curriculum Design:** Second Party will give valuable inputs to the First Party in teaching / training methodology for better training & placement of students.

2.3 **Industrial Training & Visits:** Industry and Institution interaction will give an insight into the latest developments / requirements of the industries; the Second Party to permit the Faculty and Students of the First Party to visit its group companies and also involve in Industrial Training Programs for the First Party. The industrial training and exposure provided to students and faculty through this association will build confidence and prepare the students to have a smooth transition from academic to working career. The Second Party will provide its Labs / Workshops / Industrial Sites for the hands-on training of the learners enrolled with the First Party.

2.4 **Internships and Placements of Students:** Second Party will actively engage to help the delivery of the Internship and placement of students of the First Party into internships/jobs.

2.5 **Research and Development:** Both Parties have agreed to carry out the joint research activities in the fields of, **Printing and Packaging Technology.**

2.6 **Skill Development Programs:** Second Party to train the students of First Party on the emerging technologies in this field, in order to bridge the skill gaps and make them industrial ready.

2.7 **Expert Lectures:** Second Party to extend the necessary support to deliver expert lectures to the students of the First Party on the technology trends and in house requirements.

2.8 **Faculty Development Programs:** Second Party to train the Faculties of First Party for imparting industrial exposure / training as per the industrial requirements considering the National Occupational Standards in concerned sector, if available.

2.9 There is no financial commitment on the part of the **Department of Printing and Packaging Technology, School of Engineering and Technology, Central University of Haryana, Mahendergarh, Haryana,** the First Party to take up any activity mentioned in the MoU. If there is any financial consideration, it will be dealt separately.

CLAUSE III INTELLECTUAL PROPERTY

3.1 Nothing contained in this MOU shall, by express grant, implication, Estoppel or otherwise, create in either Party any right, title, interest, or license in or to the intellectual property (including but not limited to know-how, inventions, patents, copy rights and designs) of the other Party.

CLAUSE IV VALIDITY

4.1 This agreement will be valid initially for a period of 3 years. It can be extended further with mutual consent.

4.2 Both parties may terminate this MOU upon 30 calendar days' notice in writing. In the event of Termination, both parties have to discharge existing obligations.

CLAUSE V RELATIONSHIP BETWEEN THE PARTIES

5.1 It is expressly agreed that **First Party** and Second **Party** are acting under this MOU as independent entities, and the relationship established under this MOU shall not be constructed as a partnership. Neither Party is authorized to use the other Party' name in any way, to make any representations or create any obligation or liability, expressed or implied, on behalf of the other Party, without the prior written consent of the other Party. Neither Party shall have, nor represent itself as having, any authority under the terms of this MOU to make agreements of any kind in the name of or binding upon the other Party, to pledge the other Party' credit, or to extend credit on behalf of the other Party.

First Party

Second Party

AGREED:

For **Central University of Haryana**

(Prof. Tankeshwar Kumar)

(Vice Chancellor, CUH)

For **Offset Printers' Association**

(Prof. Kamal Mohan Chopra)

General Secretary (OPA)

Department of Printing and Packaging Technology	**Offset Printers' Association**
Central University of Haryana	2051, B-XX, Gobind Nagar, Ludhiana
01285-260189	2404093,2404221
E-mail:- hodppt@cuh.ac.in	E-mail:- offsetprintersassociation@gmail.com
Website:- www.cuh.ac.in	Web:-opaindia.in

Witness:

(Prof. Sarika Sharma)

(Registrar, CUH)

Witness:

(Mr. Ashwani)

General Secretary, Jalandhar

Printer's Association

Witness:

(Dr. Rajesh Kumar Dubey)

(Dean, SoET)

L&T Electrical & Automation
Products

Correspondence Address
Switchgear Training Centre
A25, Imperia Complex, First Floor,
Mohan Cooperative Industrial Estate,
Near Sarita Vihar/Mohan Estate Metro
Main Mathura Road, New Delhi - 110044
Tel.:011-42260600
www.Lntebg.com

Date. 30.09.2021

Memorandum of Undertaking
Between
Central University of Haryana &
L&T Electrical and Automation
(A Unit of Schneider Electric India Pvt. Ltd.) New Delhi

Objective of MOU:

- *To Establish the collaboration between the Institute and Industry, with an inside view of providing Institute a window to the world of the Industry.*

Key Benefits to Institute by Industry-Institute Collaboration:

- *To create a Strong Brand Image of the Institute*
- *Chances of placement are Enhanced in Campus placements with Corporates*
- *Chances to get better recognition by AICTE*

Key Benefits to Students by Industry-Institute Collaboration:

- *Industry Experience from the beginning of curriculum & An inside exposure to the Corporate work culture*
- *A Unique opportunity to gain knowledge on the world's latest technologies & products*
- *To get Organized Training from the Industry leader with certificate of participation.*
- *Opportunity to get Projects work done on latest equipment's & products in the professional environment.*

Initiative & Support to be Provided by the Institute:

- *To provide the Syllabus from 1st to 7th Semester of EE/EEE/ECE Course to Figure out the Practical/Hands-on Session at Training Centre*
- *To send the Complete Batch of the Students (Semester vise) at L&T E&A Switchgear Training Centre as per schedule for attending the Practical Training & Hands-on Sessions.*
- *To send Faculties for FDP as per Yearly Training Schedules (Training Calendar Fee Will be Applicable)*

कुलपति
Vice-Chancellor
Central University of Haryana
केन्द्रीय विश्वविद्यालय हरियाणा
Internal

L&T Electrical & Automation
Products

Correspondence Address
Switchgear Training Centre
A25, Imperia Complex, First Floor,
Mohan Cooperative Industrial Estate,
Near Sarita Vihar/Mohan Estate Metro
Main Mathura Road, New Delhi - 110044
Tel.:011-42260600
www.Lntebg.com

Date. 30.09.2021

Initiative & Support Provided by L&T Electrical & Automation:

1. Sharing of L&T E&A New Products/Demo Kits for Setting up/ Upgrading the Lab set-up in the Institute, at Special prices.
2. To Provide Training & Hand on session for B-Tech Students as per schedule, Once in Every Semester. Agenda of the Practical Trainings & Hands on Sessions imparted to the Students & the course fee will be applicable as per the Annexure-1.
3. This MoU shall be effective from July-2021 to June-2025 (4Years)
4. Industry Expert talks for Student to motivate them for their carrier as per mutual convenient time once in every year.

Terms & Conditions: -

a) For any Session Need to be Conducted at Institute Premises, Faculty Traveling and Stay arrangement will be in Institute Scope
b) During Sessions in our training center, Traveling & Staying of Students will be the Students/Institute responsibility
c) Students Break First, Lunch, and Snacks Will be Provided in the Training Center during the Training Program.
d) Study Material, Stationary will be provided at Training Centre
e) After Successful completion of Trainings, The Student will be awarded by the Certificate.

For Central University of Haryana

T. Kumar
30/9/21

Name: Dr. TANKESHWAR KUMAR

Mob: 9991291816

E-mail: vc@cuh.ac.in

कुलपति
Vice-Chancellor
हरियाणा केन्द्रीय विश्वविद्यालय
Central University of Haryana
केसली, हरियाणा 123029
Kesli, Haryana 123029

For L&T Electrical & Automation

Sanjay
30/09/2021

Name: SANJAY AGGARWAL

Mob: 9899020306

E-mail: Sanjay.aggarwal@LNTEBG

L&T Electrical & Automation ★ New Delhi ★

L&T Electrical & Automation
Products

Correspondence Address
Switchgear Training Centre
A25, Imperia Complex, First Floor,
Mohan Cooperative Industrial Estate,
Near Sarita Vihar/Mohan Estate Metro
Main Mathura Road, New Delhi - 110044
Tel.:011-42260600
www.Lntebg.com

Annexure-1

Industry and Academics Collaboration (Year-2021-25)

Year wise Training Curriculum (4 Year Plan)

Academic Year	Semister	Agenda/Plan	Schedule	Traning Days	Fee/Student
1st Year	I Sem/II Sem	Industrial Visit,Basics of Electrical, Electrical Safety	As per Mutual Discussion	1 Day	1000
2nd Year	III Sem	Introduction to Industrial Electrical System Basics of Motor, AC Drives, Soft Starter and PLC (Automation)	As Per Mutual Discussion	3 Days/5 days	3000/5000
	IV Sem	Basics of Transformer, Selection, Protection Introduction to Power System Protection with Relays Industry 4.0 and Smart Switchgear	As per Mutual Discussion	3 Days/5 Days	3000/5000
3rd Year	V Sem	Basics of Motor, AC Drives, Soft Starter and PLC (Automation) Introduction to MV switchgear Fundamental of Earthing Concept	As Per Mutual Discussion	3 Days/5 Days	3000/5000
	VI Sem	Digital Energy Management System/PMS Energy Conservation	As Per Mutual Discussion	3 days/ 5 days	3000/5000
4th Year	VII Sem	Selection, Application of LV Switchgear Industrial Automation- Programing of PLC, Drive, Soft Satrter Digital Energy and Industrial Communications	As Per Mutual Discussion	3 Days/5 days	3000/5000
	VIII Sem	Internship (Complete Revision What Learned in our Previous Trainings) and Project Work- Tips for Campus to Corporate	4 Lectures in a Month (Every Friday)	6 Months	10000

Please Note:- GST will be Extra on the above base Fee as Applicable

This instrument MOU should be considered as first document bringing both organizations together with large interest to work together in a platform on various projects of mutual interest.

The MOU is established in English
Executed in India on 30-09-2021 in two originals

For Central University of Haryana	For L&T Electrical and Automation (A Unit of SEIPL)
Name: TANKESHWAR KUMAR	Name: SANJAY AGGARWAL
Designation: Vice-Chancellor	Designation: Head STC - Delhi
Signature: T. Kumar 30/9/21	Signature: 30/09/2021
Witness:	Witness:
Name: Dr. Rajesh Kumar Dubey	Name: Amit Kumar
Designation: Dean, SOET	Designation: Manager (Training)
Signature: 30.09.21	Signature: 30.09.2021

कुलपति
Vice-Chancellor
हरियाणा केन्द्रीय विश्वविद्यालय
Central University of Haryana
महेन्द्रगढ़, हरियाणा-123029
Mahendergarh, Haryana-123029

L&T Electrical & Automation ★ New Delhi ★

ACADEMIC ALLIANCE

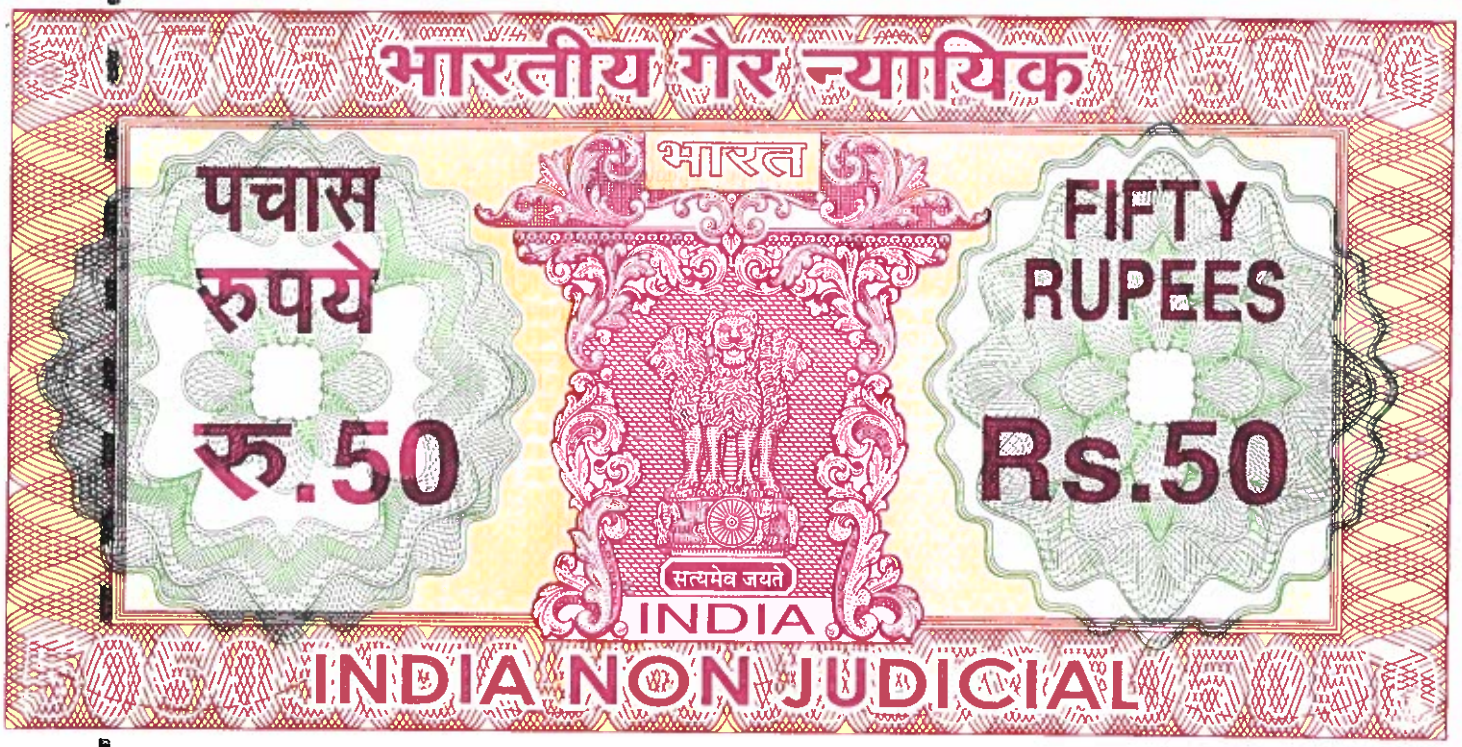
BETWEEN

J. C. BOSE UNIVERSITY OF SCIENCE & TECHNOLOGY, YMCA, FARIDABAD

AND

CENTRAL UNIVERSITY OF HARYANA, MAHENDARGARH

केन्द्रीय विश्वविद्यालय हरियाणा
CENTRAL UNIVERSITY OF HARYANA



हरियाणा HARYANA

H 925243

This Academic Alliance is made on the day of 16/9/2021

BY AND BETWEEN THE PARTIES

Central University of Haryana is a Central University established under the Central Universities Act, 2009 of the Parliament. It is one of the 15 Central Universities established by MHRD, GoI under the XIth Five Year Plan (2007-12). The University is fully funded by the UGC.Permanent Campus of the University is situated in 488 acres of land at Jant-Pali Villages, Mahendergarh district of Haryana from where CUH is running its academic operations.

And

J.C BOSE University of Science and Technology, YMCA, Faridabad, (erstwhile YMCA University of Science and Technology, Faridabad) was established in the year 1969, as a joint venture of the National Council of YMCAs of India, Govt of Haryana, and the Central Agencies for Development Aid, Bonn,

Vice Chancellor
J.C. Bose University of Science
and Technology, YMCA, Faridabad

47176

14-09-2021 REGISTRAR , J. C. BOSE UNIVERSITY OF SCIENCE & TECHNOLOGY ,

YMCA FARIDABAD

Germany University is working towards the development of science and technology by synthesizing teaching, research and creative activities. It provides an enviable research environment and state-of-the art technological exposure to its scholars.It is situated at NH-2,Sector-6,Faridabad,Haryana.

In line with the development of joint collaboration in accordance with our mutual interests in developing programs of academic and scholarly exchanges and for the purpose of establishing a long-term mutually beneficial association for research **Central University of Haryana,Mahendargarh** and **J.C. Bose University of Science & Technology, YMCA,Faridabad**, join in the following academic alliance. Both parties agree to exercise their best efforts to develop the following forms of cooperation:

1. Establish ties of academic cooperation in the recent area of Development.
2. Promote mutual understanding, academic collaboration and research to explore the ways and means to achieve self-reliance in India.
3. To jointly organize seminars, conferences, workshops, and short-term continuing education programs on mutual interest topics with participation from faculty from both sides.
4. To guide research candidates registered in either of the institutions for doctoral and post-graduate programs with joint-supervision.
5. To cooperate on any other activities that may be identified on a consensual basis as and when such an opportunity arises.
6. To access the research facilities for each institution.
7. The exchange of Scholars for focussed research projects.

The Collaborative Platform will connect the faculties, students, and researchers across different disciplines. Both parties can develop specialized groups for academic and research, leading to cutting-edge innovations and research with the fruitful translational outcome.

Vice Chancellor
J.C. Bose University of Science
and Technology, YMCA, Faridabad

Both, **J.C. Bose University of Science & Technology, YMCA, Faridabad** and **Central University of Haryana, Mahendargarh** are committed to working together to develop specific agreements on the points above. These agreements will provide logistical and management details appropriate to the successful operation of the program.These agreements will fulfill the spirit and purpose of this general academic alliance.

DURATION and TERMINATION

This academic alliance shall commence on its date of execution by the Parties and will be terminated:

(a) after 5 Years; or

(b) at any time for convenience by either party with 30 days' written notice; or

whichever of the above occurs the earlier.

Notwithstanding this understanding, the academic alliance may be subject to modification or revision by mutual written agreement.

ASSIGNMENT

No party can assign this agreement to any other party without the consent of each other.

LEGAL COMPLIANCE

Jurisdictional Laws: The parties acknowledge that activities under this academic alliance , depending on their nature, be subject to law of the land. Each party agrees to assist the other party to understand the requirements of the local laws in relation to activities undertaken under this academic alliance.

LOGOS, NAMES, AND MARKS

The parties agree that neither this document nor any performances or actions taken in connection therewith shall create a partnership or joint venture between them, and that neither shall advertise, state or otherwise imply anything to the contrary. Unless otherwise agreed in writing, neither party shall use, display, or otherwise engage the logos, names, trademarks, or other identification or protected intellectual property of the other.

Vice Chancellor
J.C. Bose University of Science
and Technology, YMCA, Faridabad

DISPUTE RESOLUTION

The parties resolve to negotiate on all issues in an open and cooperative manner. Should any dispute arise between them in relation to this academic alliance, the parties shall seek to resolve them on the basis of mutual trust and cooperation. Should no such resolution be achieved, the parties shall state their disagreement in writing and either party may exercise its right to terminate this memorandum forthwith and without prejudice or penalty.

FORCE MAJURE

Neither Party shall have any liability whatsoever or be deemed to be in default for any delay or failure in performance under this alliance resulting from acts beyond the control of that Party including but not limited to acts of God, war or national emergency, accident, fire, riot or epidemics.

NOTICE

Any notice, approval, consent, request or other communication required or permitted to be given or made under this alliance will be in writing in the English language and will be served or delivered to the registered office address individual party as placed in this alliance in its preamble.

SEVERABILITY

If any provision of this agreement became invalid unenforceable, or prohibited by law such provisions shall be considered as inoperative and reminder will be operative and shall continue remain valid.

RELATIONSHIP

This duty shall survive even after the termination of this Academic Alliance for next 5 years after the expiry of the academic alliance.

AGREEMENT

The following signatories, on behalf of their respective organizations, agree, without prejudice, to meet the terms of the academic alliance.

Each party shall bear its own cost to implement this academic alliance.

Vice Chancellor
J.C. Bose University of Science
and Technology, YMCA, Faridabad

All information and/or data that may be exchanged, acquired and shared in connection with the areas of cooperation shall be treated as strictly confidential and shall not be divulged without the written consent of the disclosing party unless the same has already been in public domain. This obligation shall continue to bind the Parties hereto notwithstanding the termination of the academic alliance.

Signatories

Central University of Haryana, Mahendergarh	**J.C. Bose University of Science & Technology, YMCA,Faridabad**
T.Kumar 16/9/21 Dr. Tankeshwar Kumar (V.C., CUH)	Vice Chancellor J.C. Bose University of Science and Technology, YMCA, Faridabad 16/9/2021
Witness 1 Vikas Garg 16/9/21 (Dr. Vikas Garg)	Witness 1 16/9/2021 Dr. Ravi Kumar
Witness 2 Jumar Dr. Jitendra Kumar	Witness 2 16/9/2021 Dr. Rashmi Popli

सत्यमेव जयते

विश्वविद्यालय अनुदान आयोग
University Grants Commission
शिक्षा मंत्रालय, भारत सरकार
(Ministry of Education, Govt. of India)
बहादुरशाह जफर मार्ग नई दिल्ली – 110 002
Bahadurshah Zafar Marg, New Delhi-110002
Phone : 011-23604309,

ज्ञान-विज्ञान विमुक्तये

F.No.24-9/2021(CU)

September, 2021

10 SEP 2021

The Registrar
All Central Universities
As per list attached

Sub: Public Notice regarding CA/CS/ICWA qualification to be treated equivalent to PG Degree-regarding

Sir/Madam,

I am directed to invite your kind attention to this office Public Notice DO No.9-35/2016(CPP-II) dated 15.04.2021 (copy enclosed) and to say that UGC had received requests from the Institute of Chartered Accountants of India, the Institute of Company Secretaries of India and the Institute of Cost Accountants of India to consider the qualification being awarded by them, i.e, Chartered Accountant (CA), Company Secretary(CS) and Cost and Works Accountants (ICWA) respectively, equivalent to Post Graduation Degree.

The Commission in its 550th meeting held on 18th February, 2021 decided that:
"CA/CS/ICWA qualification be considered equivalent to PG Degree"

You are requested to take appropriate/necessary action as per instruction issued by UGC in the Public Notice.

Yours faithfully,

(A.S.Sajwan)
Under Secretary

Encl: as above

O/C
15/9/21

प्रेषित
ISSUED

ज्ञान-विज्ञान विमुक्तये

प्रो. रजनीश जैन
सचिव
Prof. Rajnish Jain
Secretary

सत्यमेव जयते

विश्वविद्यालय अनुदान आयोग
University Grants Commission
(शिक्षा मंत्रालय, भारत सरकार)
(Ministry of Education, Govt. of India)
बहादुरशाह जफर मार्ग, नई दिल्ली-110002
Bahadur Shah Zafar Marg, New Delhi-110002
Ph.: 011-23236288/23239337
Fax : 011-2323 9858
E-mail : secyugc@nic.in

D.O.No.9-35/2016 (CPP-II)

15th April, 2021

PUBLIC NOTICE

CA / CS / ICWA Qualification to be treated equivalent to PG Degree

UGC had received requests from the Institute of Chartered Accountants of India, the Institute of Company Secretaries of India and the Institute of Cost Accountants of India to consider the qualification being awarded by them, i.e., Chartered Accountant (CA), Company Secretary (CS) and Cost and Works Accountants (ICWA) respectively, equivalent to Post Graduation Degree.

The Commission in its 550th meeting held on 18th February, 2021 decided that:

"CA/CS/ICWA qualification be considered equivalent to PG Degree."

(Rajnish Jain)

SL. NO	NAME OF UNIVERSITY
1	Central University of South Bihar
2	Mahatma Gandhi Central University
3	Guru Ghasidas Vishwavidyalaya
4A	University of Delhi
4B	University College of Medical Sciences
5	Jamia Millia Islamia
6	JawaharLal Nehru University
7	Central University of Gujarat
8	Central University of Haryana
9	Central University of Himachal Pradesh
10	Central University of Jammu
11	Central University of Kashmir
12	Central University of Jharkhand
13	Central University of Karnataka
14	Central University of Kerala
15	Dr. Harisingh Gour Vishwavidyalaya
16	The Indira Gandhi National Tribal University
17	Mahatma Gandhi Antarrashtriya Hindi Vishwavidyalaya
18	Central University of Odisha
19	Central University of Punjab
20	Pondicherry University
21	Central University of Rajasthan
22	Central University of Tamil Nadu
23	Maulana Azad National Urdu University
24	University of Hyderabad
25	English and Foreign Languages University
26	Hemwati Nandan Bahuguna Garhwal University
27	Aligarh Muslim University
28	Banaras Hindu University
29	Babasaheb Bhimrao Ambedkar University
30	University of Allahabad
31	Visva Bharati
32	Assam University
33	Tezpur University
34	Rajiv Gandhi University
35	Manipur University
36	North Eastern Hill University
37	Mizoram University
38	Nagaland University
39	Sikkim University
40	Tripura University
41	Central University of Andhra Pradesh
42	Central Tribal University of Andhra Pradesh
43	Shri Lal Bahadur Shastri National Sanskrit University
44	Central Sanskrit University, New Delhi
45	National Sanskrit University, Tirupathi

School of Interdisciplinary and Applied Sciences

Central University of Haryana

Proceedings of minutes of meeting of School Board

Following school (**School of Interdisciplinary and Applied Sciences)** board external members accorded the approval of different Scheme and Syllabi of M.Sc. and Ph.D. courses of different departments under the school.

1. Prof. H. S. Balyan, CCS University, Meerut
2. Dr. Deabais Mohanty, NII, New Delhi
3. Prof. G. D. Sharma, University of Patanjali, Haridwar

Following agenda items were resolved:

1. Approval of M.Sc. Course curriculum of Department of Biochemistry. Biotechnology, Microbiology, Nutrition Biology, Yoga, Environmental Sciences, Library and Information Sciences, M.Pharma Pharmaceutical Sciences.

2. Approval of Ph.D. Course curriculum of Department of Biochemistry, Biotechnology, Microbiology, Nutrition Biology, Pharmaceutical Sciences, Library and Information Sciences

3. Department of Pharmaceutical Sciences is planning to initiate M.Pharma in Pharmacognosy from next academic session of 2022 onwards. The same was intimated to School Board for information and approval.

All the above agenda items were approved by Prof. H. S. Balyan, Dr. Deabasis Mohanty and Prof. G. D. Sharma (dated Oct, 8, 2021).

Dean School Of Interdisciplinary and Applied Sciences <deansls@cuh.ac.in>

Approval of revised syllabi from Central University of Haryana

Dr.GD Sharma <ganesh.dyoga@gmail.com> Thu, Oct 7, 2021 at 11:19 AM
To: Dean School Of Interdisciplinary and Applied Sciences <deansls@cuh.ac.in>

Dear Madam,
Kindly refer to your office mail dated 30th September, 2021 vide which syllabus of various Departments have also been forwarded.
I am happy to inform you that I agree and approve all the contents of the syllabus from my Side.
With kind regards,

On Thu, 30 Sep, 2021, 11:33 am Dean School Of Interdisciplinary and Applied Sciences, <deansls@cuh.ac.in> wrote:

Dear Professors

Greetings from Central University of Haryana

I am pleased to inform you that your name has been nominated by the Hon'ble Vice Chancellor as a member of the School Board of School of Interdisciplinary and Applied Sciences. Our school has the following departments: Biochemistry, Biotechnology, Environmental Sciences, Microbiology, Nutrition Biology, Pharmaceutical Sciences, Library and Information Sciences and Yoga. As per the New Education Policy- 2020, all the departments under this school have revised their course curriculum for PG and PhD programmes.

The revised curricula has been discussed at length at university level and have been approved by the respective Board of Studies of each department. The university is proposing to implement the revised curriculum in the coming academic session 2021 onwards. The Academic council meeting is scheduled on 12th Oct, 2021 with approval of syllabi from the School Board.

Please find attached herewith the revised course curriculum of each department for your suggestions/comments or approval.

Further the Department of Pharmaceutical Sciences is planning to initiate M.Pharma in one more specialized branch Pharmaceutical Sciences from the next academic session of 2022 onwards. This is also for your intimation and necessary approval, please.

Thanking you

With best regards

Dean School Of Interdisciplinary and Applied Sciences <deansls@cuh.ac.in>

Approval of revised syllabi from Central University of Haryana

Fri, Oct 8, 2021 at 1:29 PM

Debasisa Mohanty <deb@nii.ac.in>
To: Dean School Of Interdisciplinary and Applied Sciences <deansls@cuh.ac.in>

Dear Prof. Sangwan
I have gone through the syllabus for various courses you had sent to me.
Overall they all look fine.
I give my approval for further processing of the same in your Academic Committee.
Thanks & regards.
Debasisa Mohanty

On Thu, Sep 30, 2021 at 11:33 AM Dean School Of Interdisciplinary and Applied Sciences <deansls@cuh.ac.in> wrote:

Dear Professors

Greetings from Central University of Haryana

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Thanking you

With best regards

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D. Mohanty, Ph.D.,FNASc,FASc,FNA
Staff Scientist - VII
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Aruna Asaf Ali Marg
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Tel: +91-11-26703749, +91-11-26715016
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deb@nii.res.in

Dean School Of Interdisciplinary and Applied Sciences <deansls@cuh.ac.in>

Approval of revised syllabi from Central University of Haryana

Harindra Singh Balyan <hsbalyan@gmail.com> Thu, Oct 7, 2021 at 2:49 PM
To: Dean School Of Interdisciplinary and Applied Sciences <deansls@cuh.ac.in>

Dear Sir/Madam

I have examined all the syllabi that have been prepared very meticulously, giving details of relevant topics. The syllabi will help in providing up-to-date information and knowledge in the subjects to the students shaping their careers for meeting the emerging challenges of the future. So, from my side, the syllabi stand approved.

Kind regards.

H. S. Balyan FNASc, FNAAS, FNA
Hony. Emeritus Professor & INSA Honorary Scientist
Department of Genetics & Plant Breeding
Ch. Charan Singh University, Meerut, India
Orchid ID:0000-0003-4346-5898
Tel:91-121-2763564 (Res), 91-121-2768195
Telefax:91-121-2768195
Cell:09412515497

On Thu, Oct 7, 2021 at 11:10 AM Dean School Of Interdisciplinary and Applied Sciences <deansls@cuh.ac.in> wrote:
Dear Prof Balyan

Submitted for your kind attention, please.

Regards

---------- Forwarded message ---------
From: **Dean School Of Interdisciplinary and Applied Sciences** <deansls@cuh.ac.in>
Date: Thu, Sep 30, 2021 at 11:32 AM
Subject: Approval of revised syllabi from Central University of Haryana
To: <rajkpandit@gmail.com>, <deb@nii.ac.in>, <hsbalyan@gmail.com>, <ganesh.dyoga@gmail.com>, <drdpathak@gmail.com>

Dear Professors

Greetings from Central University of Haryana

I am pleased to inform you that your name has been nominated by the Hon'ble Vice Chancellor as a member of the School Board of School of Interdisciplinary and Applied Sciences. Our school has the following departments: Biochemistry, Biotechnology, Environmental Sciences, Microbiology, Nutrition Biology, Pharmaceutical Sciences, Library and Information Sciences and Yoga. As per the New Education Policy- 2020, all the departments under this school have revised their course curriculum for PG and PhD programmes.

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Thanking you

CENTRAL UNIVERSITY OF HARYANA

DEPARTMENT OF BIOCHEMISTRY

Learning Outcomes based Curriculum Framework (LOCF)

M.Sc. Biochemistry (Two-Year) Programme

Syllabus (2021-22)

(As per National Education Policy 2020)

SCHOOL OF INTERDICIPLINARY AND APPLIED SCIENCES

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1. Background

Biochemistry is one of the most **fascinating subjects** as it deals with the **chemical language of Life**, be it human, animal, plant or microorganism. Biochemistry is one of the most upcoming and highly in demand subject in the Indian as well as the foreign universities. The **basic foundation in Biochemistry is a necessary pre-requisite for any kind of life science, biotechnological, medical, paramedical and biological research activity**. By considering above facts, Department of Biochemistry, Central University of Haryana has been established in July 2015 under the arena of School of Interdisciplinary and Applied Sciences (SIAS). The department envisions imparting high quality teaching and research to its students to engross them in the world of applied and basic sciences. The department is committed to continue its efforts to develop and strengthen infrastructure for research in almost all aspects of biochemistry. The department offers a high quality and interdisciplinary learning environment for post graduate and PhD students. Department offers exciting research opportunities for postgraduate students and highly personalized training to PhD students. The faculty is setting a tradition of excellence in teaching, while their research accomplishments have been well recognized nationally and internationally in the areas of biochemistry, molecular biology and cellular biology, genomics and proteomics research etc. In nutshell, the department has been set up with a major goal of spear heading the applied biology teaching and cutting-edge research with effervescent zeal and dedication. The department is pursuing research in almost all areas of modern biochemistry including plant secondary metabolites, functional genomics, medicinal and aromatic plants, clinical biochemistry, discovery and development of antifungals & antimicrobials, fluoride and drug resistance, cancer biology etc owing to the trained faculties. The Department is equipped with the modern and sophisticated scientific equipment's like Spectrophotometer, PCR, RT-PCR, Gel Doc, rotary evaporator etc. Each year students appear and qualify the National level examinations like CSIR-JRF-NET, GATE. The long-term research goals for the department, are to place Department of Biochemistry as a research laboratory engaged in high quality research on plant molecular biology, cancer and neurobiology, antimicrobials and discovering novel drug molecules and mechanisms for prevention of human diseases including metabolic diseases, cardiovascular diseases, cancer and genetic diseases.

The vision and mission of Department of Biochemistry is to:

- Impart a broad fundamental knowledge for the concept and principles of Biochemistry
- Provide opportunities for hands on training and experience in research-oriented education, & application skills in protein biochemistry, molecular biology, genomics, biochemical assays and molecular diagnostics

Programs and number of seats offered

S. No.	Program	Seats	Admission criteria
1	M.Sc. Biochemistry	31	Admission to M.Sc program is through CUCET entrance examination that is based on the CUCET score. A candidate having a bachelor degree under 10+2+3 system, recognized by the university, or a degree recognized as its equivalent is admissible to master program.

Four categories of courses will be offered to the admitted students:

Core Courses:

Include theoretical as well as practical courses and seminars

Discipline Centric Elective Course:

- Include theoretical as well as practical learning through Department specific courses.
- Student must opt for two out of four or more courses offered by the Department)

Generic Elective courses (GEC):

- In 1st and 3rd semester students will opt for any one of the open elective courses offered by other departments of the University.

Skill Enhancement Course:

- A separate project training-based course that leads to a dissertation worth of twenty credits. This course is also included as among one of the Core Courses

A student is required to accumulate a total of <u>100 credits</u> to fulfill the requirements for a Master of Science degree in Biochemistry.

2. Program Outcome:

- **Basic and applied knowledge:** Interdisciplinary knowledge to find solution for the complex biological problems
- **Problem analysis:** Ability to analyse society related/ applied research problem, design and execute experiments to find relevant solutions
- **Advanced Usage of Technology**: Apply advanced instrumentation tools, online resources with an understanding of the troubleshooting and limitations
- **Ethics:** Commitment towards professional ethics and responsibilities as a social endeavor to bring harmony with nature
- **Lifelong learning:** Scientific skills for industrial applications and entrepreneurship

PO1: An ability to apply knowledge of Biochemistry to all branches of Life Science understanding and applications.

PO2: An ability to design and conduct experiments in biochemistry, as well as to analyze and interpret data.

PO3: A broad education necessary to understand the impact of biochemistry in a global, economic, environmental and societal context.

3. Program Specific Outcome

PSO1: Acquire deep scientific knowledge in the subjects like cell and molecular biology, plant biochemistry, metabolism, immunology etc

PSO2: Gain skill-oriented and innovative capabilities in the field of Biochemistry in general, clinical biochemistry and molecular diagnostics in particular to meet competitive research requirements.

PSO3: Develop effective means of communicating biochemical concepts / methods; both orally as well as in writing.

PSO4: Gain proficiency in laboratory techniques of various aspects of biochemistry and also be able to apply processes of experimentation and hypothesis testing to biochemical methods

PSO5: Develop special industrial oriented skills to establish and perform macromolecules based scaled-up industrial process.

PSO6: Demonstrate analytical and problem-solving skills to combat human diseases and resolve problems in the field of agriculture.

PS07: Develop understanding and applications of modern state of art computational tools and statistical methods in biological sciences

PSO8: Learn to work independently and as a team for retrieving information from various e-resources, carry out research investigations and result interpretations.

PSO9: Effectively work and lead in a team in professional environment, demonstrate professional integrity with value-based learnings and be able to serve with responsibility towards society and country with knowledge and understanding of fundamental science

4. Postgraduate Attributes

- Disciplinary knowledge
- Creative and critical thinking
- Reflective thinking
- Problem solving
- Analytical reasoning
- Communication skills
- Research skills
- Life skills

- Multicultural competence
- Moral and ethical values
- Lifelong learning
- Global competence

The purpose of study Biochemistry is to **understand structure, composition, signaling, energy flow and biochemical processes** that give rise to the **complexity of life**. Students who opt the Biochemistry course will have the basic and advanced knowledge about the metabolic processes, their mechanism, and diagnosis of different biological activities taking place inside the human body. It compressively deals with the biochemical aspect of environmental pollutants' effect on human health with their prevention and control. It unveils the chemical basis of life in all living organisms including plants, animals and microorganisms. Biochemistry has contributed enormously to the growth of modern medical and health science and agriculture. Biochemistry has applications in clinical diagnosis, understanding pathology of diseases, treatment of diseases, designing of drugs and understanding their metabolism and manufacture of various biological products like amino acids, proteins, antibiotics, hormones, enzymes, nutrients, etc. Understanding the biochemical basis of vital processes of plants such as photosynthesis, respiration, hormonal regulation, nutrient assimilation have helped in developing superior varieties of crop plants with better growth attributes and yield. The learning outcomes of Biochemistry course is to understand the objectives of Biochemistry i.e. analyze, appreciate, understand the concepts of biochemical reactions occur in living systems, which enable them to understand the various perspectives of applied sciences that benefit mankind.

Biochemistry is a career oriented, high demand fundamental course with applications in all biological research, be it plants, animal, human and microbes. It provides opportunity to students to develop their career in the following areas:

- Healthcare industry
- Diagnostics research
- Food and packaging industries
- Medical Instrument companies
- Research Companies and Laboratories
- Drug manufacturing industries
- Public Health Entities
- Blood research and Services
- Industrial Laboratories
- Cancer research institutes

- Research Departments
- Educational Institutes
- Environmental Pollution Control
- Agriculture and fisheries
- Forensic Science
- Hospitals
- Public Health Laboratories
- Cosmetic Industries etc.
- Genomics Industries
- Diagnostics and testing Industries

Students passionate about their job to study structures and functions of proteins, carbohydrates, fats, lipids, process of metabolism, molecular basis of the action of genes, biochemical pathways, and diagnosis of different ailments can make a career in the Biochemistry field after pursuing this course.

5. Structure of Master's Course

Credit Summary of Courses Offered by Department of Biochemistry

(Academic Session 2021-22)

Total Credits: 100

Semester	**Credits**				**Total credits**
	Core courses	**Skill enhancement core course**	**Elective courses**		
			DCEC (For Department of Biochemistry students)	**GEC (For other Department students)**	
I	21	-	-	4	**25**
II	21	-	4	-	**25**
III	17	-	4	4	**25**
IV	-	22+3	-	-	**25**
Total	**59**	**25**	**8**	**8**	**100**

6. Learning Outcome Index

Core Courses

PSO	CC-1	CC-2	CC-3	CC-4	CC-5	CC-6	CC-7	CC-8	CC-9	CC-10	CC-11	CC-12	CC-13	CC-14	CC-15	CC-16
PSO-1	X	X		X	X		X	X	X	X	X		X	X	X	X
PSO-2		X	X	X	X	X	X	X		X		X			X	
PSO-3	X	X	X	X		X	X			X	X	X	X	X	X	X
PSO-4	X	X	X		X	X		X	X	X	X			X	X	X
PSO-5	X		X	X	X	X	X	X	X	X	X	X	X	X		X
PSO-6	X	X	X		X		X	X				X	X	X	X	X
PSO-7		X	X	X	X	X			X	X	X			X		X
PSO-8	X	X		X	X		X	X	X		X	X	X		X	X
PSO-9	X	X	X		X		X	X				X	X	X	X	X

Learning Outcome Index, Elective Courses

PSO	EC-1	EC-2	EC-3	EC-4	EC-5	EC-6	EC-7
PSO-1	X	X		X			X
PSO-2	X	X	X	X	X		X
PSO-3		X		X		X	X
PSO-4	X	X	X		X	X	
PSO-5	X	X	X	X	X		
PSO-6	X	X	X	X	X	X	X
PSO-7			X		X	X	X
PSO-8	X	X		X	X	X	X
PSO-9	X	X	X	X	X	X	X

7. Semester-wise Courses and Credit Distribution

Semester-I (Total credits 25)

Course code	Course title	L	T	P	Type of course	Credit
SIAS BC 11 01 C 4004	Cell and Molecular Biology	4	0	0	Core (CC-1)	4
SIAS BC 11 02 C 4004	Biomolecules and Metabolism	4	0	0	Core (2)	4
SIAS BC 11 03 C 3104	Analytical Biochemistry	3	1	0	Core (3)	4
SIAS BC 11 04 C 3104	Protein Biochemistry	3	1	0	Core (4)	4
SIAS BC 11 05 C 00105	Practical Skills in Basic Biochemistry	0	0	10	Core (5)	5
	Generic Elective Course (to be opted from other Department)	4	0	0	GEC	4

Semester-II (Total credits 25)

Course Code	Course Title	L	T	P	Type of Course	Credit
SIAS BC 12 01 C 4004	Enzymology & Enzyme technology	4	0	0	Core (6)	4
SIAS BC 12 02 C 4004	Immunology	4	0	0	Core (7)	4
SIAS BC 12 03 C 4004	Recombinant DNA Technology	4	0	0	Core (8)	4
SIAS BC 12 04 C 3104	Bioinformatics	3	1	0	Core (9)	4
SIAS BC 12 05 C 00105	Practical Skills in Biochemical Techniques	0	0	10	Core (10)	5
SIAS BC 12 01 DCEC 4004	Cell Culture Technology	4	0	0	DCEC (EC-1)	4
SIAS BC 12 02 DCEC 4004	Biochemical Toxicology	4	0	0	DCEC (2)	4
SIAS BC 12 03 DCEC 3104	Biostatistics	3	1	0	DCEC (3)	4

8. One of the courses will be opted by the student from DCEC.

Semester-III (Total credits 25)

Course Code	Course title	L	T	P	Type of course	Credit
SIAS BC 13 01 C 3104	Genomics and Proteomics	3	1	0	Core (11)	4
SIAS BC 13 02 C 4004	Clinical Biochemistry	4	0	0	Core (12)	4
SIAS BC 13 03 C 4004	Plant Biochemistry	4	0	0	Core (13)	4
SIAS BC 13 04 C 00105	Practical Skills in Advanced Biochemistry	0	0	10	Core (14)	5
SIAS BC 13 01 DCEC 4004	Cancer Biology	4	0	0	DCEC (4)	4
SIAS BC 13 02 DCEC 4004	Molecular Diagnostics	4	0	0	DCEC (5)	4
SIAS BC 13 03 DCEC 3104	Computational Biology	3	1	0	DCEC (6)	4
SIAS BC 13 04 DCEC 4004	Human Health and Disease	4	0	0	DCEC (7)	
	Generic Elective Course (to be opted from other Department)	4	0	0	GEC	4

One of the courses will be opted by the student from DCEC**.**

Semester-IV (Total credits 25)

Course code	Course title	Type of course	Credit
SIAS BC 1 4 01 SEC 0003	Presentation and Research Skills	Core (15)	3
SIAS BC 1 4 02 SEC 0020	Dissertation	Core (16)	22
	Total credits of the Program		**100**

Note: In general, 40 % of each course will be covered through online mode while rest 60% will be covered by offline mode

Generic Elective Course: Offered by Department of Biochemistry to students from other Departments of the University.

Semester	Type of course	Course code	Course title	Credit
I	GEC	SIAS BC 1 1 01 GEC 4004	Fundamental of Biochemistry	4
		SIAS BC 1 1 02 GEC 4004	Biochemical and Environmental Toxicology	
III	GEC	SIAS BC 1 3 01 GEC 4004	Clinical Biochemistry	4
		SIAS BC 1 3 02 GEC 4004	Analytical Techniques	

8. Course Level Learning Outcomes

SEMESTER-I

SEMESTER-I

Course title: Cell and Molecular Biology **Credit: 4**
Course code: SIAS BC 11 02 C 3104 **Lecture: 60**

Course objectives:
The focus of Cell and Molecular Biology is the study of the fine structure and function of the cell. In this course we will emphasize on Eukaryotic cell biology and will cover topics such as membrane structure and composition, transport, and trafficking, the cytoskeleton and cell movement. We also cover important cellular processes including DNA replication, transcription, and translation.

Student learning outcomes:
Upon completion of this course, the student will be able to:

- Describe the fundamental principles of cellular biology
- Have a conceptual understanding of the molecular basis of various cellular processes
- Know how cell function and structure are related
- Be able to think critically and interpret hypothetical experimental observations based on class concepts.

Unit-I
Introduction to Cell Biology, Membranes and Cell Architecture, Nucleus architecture, Membrane Transport, Membrane Trafficking, Vesicular Traffic, Secretion, and Endocytosis Glycosylation & COP-Mediated Vesicular Transport, Moving proteins into membranes and organelles.

Unit-II
Cellular Organization and Movement, Cytoskeleton-Microfilaments and Intermediate Filaments, Microtubules, Microtubule-Based Movement - Intracellular Transport, Motile Appendages, Cell-Cell Organization and the Extracellular Space, the Extracellular Matrix (ECM), Integrating Cells into Tissues.

Unit-III
DNA: Structure and function, Chromosome and chromatin, DNA replication and its regulation (prokaryotes and eukaryotes), DNA polymerases of Prokaryotes. Mechanism of replication in prokaryotes. Eukaryotic DNA polymerases. Mechanism of replication in eukaryotes. DNA damage and repair, DNA Mutation, Types of mutations, Genetic system of Mitochondria and plastids, Gene recombination Homologous and site-specific recombination.

Unit-IV
Transcription and its regulation (prokaryotes and eukaryotes), Prokaryotic RNA polymerase. Nature of prokaryotic promoters. Mechanism of prokaryotic transcription. Eukaryotic RNA polymerases. Nature of eukaryotic promoters, Mechanism of eukaryotic transcription. Inhibitors of transcription. Translation and its regulation (prokaryotes and eukaryotes), adapter role of RNA in protein synthesis; genetic code; wobble hypothesis; ribosomes, activation of amino acids; initiation, elongation, and termination of protein synthesis in prokaryotes and eukaryotes. Control of translation: role of guanine nucleotides; translational control of gene expression

Suggested reading:

1. Essential Cell Biology, 4th edition, Alberts, Bray, Hopkin, Johnson, Lewis, Raff, Roberts, and Walter.
2. Essentials of Stem Cell biology (2013) 3rd ed., Lanza RP and Anthony A, Elsevier Academic Press,
3. Molecular Cell Biology. Seventh Edition. Lodish et. al. Freeman Press. (ISBN-13: 978-1-4292-3413-9)

4. The Cell: A Molecular Approach (2018) 8th ed., Cooper, GM, Oxford University Press.
5. Molecular Biology of the Gene (2017) 7th ed., Watson JD, Tania B, Stephen PB, Alexander G, Michael L and Richard L, Pearson Education.

SEMESTER-I

Course title: Biomolecules and Metabolism **Credit: 4**
Course code: SIAS BC 11 02 C 3104 **Lecture: 60**

Course objectives: The course is aimed to give students an exposure of chemical interactions inside the cell. It provides deeper insight into structures, properties and functions of major bio-molecules and metabolic pathways in the living systems.

Learning outcomes:
Upon completion of this course, the student will be able to:

- Evaluate the structure of carbohydrates and their functions
- Acquire knowledge on the building blocks of lipids, classification and their properties
- Understand the various orders of structure, classification, properties and biological importance of proteins
- Evaluate the structure and hierarchical organization of nucleic acids with their biological functions

Unit I

Carbohydrates: Brief review of configurational and conformational aspects of carbohydrates. Structure, properties and importance of structural (cellulose and chitin) and storage polysaccharides (starch and glycogen), Structure elucidation of polysaccharides (starch, glycogen and cellulose). Glycoproteins-structure and functions. Lipoproteins. Glycolysis, citric acid cycle, pentose phosphate pathway and its regulation. Gluconeogenesis, glycogenesis and glycogenolysis.

Unit II

Lipids: Building blocks of lipids - fatty acids, glycerol. Storage lipids - triacylglycerol and waxes. Structural lipids in membranes- Phospholipids, glycerophospholipids, galactolipids, sulpholipids, sphingolipids and sterols. Oxidation of odd and even number of fatty acids. Fatty acid biosynthesis.

Unit III

Amino acids and Proteins: Review of classification and structure of amino acids, acid – base properties of amino acids. Ionic properties of peptides and proteins. Primary, secondary, tertiary and quaternary structure of proteins. General reactions of amino acid metabolism - Transamination, decarboxylation, oxidative and non-oxidative deamination of amino acids. Urea cycle and its regulation.

Unit IV

Nucleic acids: Nomenclature, classification and structure of Nucleotides and Nucleic Acids, structure of nitrogenous bases, nucleosides and nucleotide, The Chemical Structures of DNA and RNA, Double Helical DNA, The Watson– Crick Structure: B-DNA, Denaturation and Renaturation. Biosynthesis and degradation of purine and pyrimidine nucleotides and its regulation.

Suggested readings:

1. Lehninger: Principles of Biochemistry (2017) 7th ed., Nelson DL and Cox MM, WH Freeman and Company (New York), ISBN:978-1319108243.

2. Voet's Principles of Biochemistry (2018) Global ed., Voet D, Voet JG and Pratt CW, John Wiley and Sons, ISBN:978-1119451662.
3. Biochemistry (2015) 8th ed., Berg JM, Stryer L and Tymoczko JL, WH Freemanand Company (New York), ISBN: 9781464126109
4. Textbook of Biochemistry with Clinical Correlations (2011)7th ed., Devlin TM, JohnWiley & Sons, Inc, ISBN 13:978-0470281734.
5. Harper's Illustrated Biochemistry (2018) 7thed., Rodwell VW, Bender DA, Botham KM, Kennelly PJ and Weil PA, McGraw-Hill, ISBN 13:978-1259837937.

SEMESTER-I

Course title: Analytical Biochemistry **Credit: 4**
Course code: SIAS BC 11 04 C 4004 **Lecture: 60**

Course objective: To provide basic and advance understanding of the core principles and working mechanism of various tools and techniques used in biological experiments.

Learning outcomes:

Upon completion of this course, the student will be able to:

- Understand the biochemical techniques used in research and industry
- Demonstrate principles of various basic and advanced techniques used in biological experiments
- Critically analyze and interpret the results obtained from biological experiments
- Relate the principles and applications of spectroscopic, electrochemical and mass spectrometric detection at quantitative and qualitative analysis in the area of bioanalysis

Unit-I

Microscopy; principle, resolving, magnification power, Lens defects, application of compound microscopy, Factors affecting resolution, Fluorescence microscopy, phase contrast microscopy, confocal microscopy, atomic force microscopy (AFM) and electron microscopy (SEM, TEM and STEM). Sample preparation for SEM and TEM.

Unit-II

Agarose gel electrophoresis, polyacrylamide gel electrophoresis (native and SDS-PAGE), Blotting (Western, Southern, Northern), iso-electric focusing (IEF), 2-Dimensional gel electrophoresis, pulse field electrophoresis, principle and applications of centrifugation, Rotor types, differential centrifugation, density gradient centrifugation (rate zonal and isopycnic), and ultracentrifugation.

Unit-III

Principle and types of Chromatography; Planner chromatography (paper, Thin layer chromatography, column chromatography (gel filtration, ion exchange, affinity), principle and application of High performance liquid chromatography (HPLC) and gas chromatography (GC). Radioactivity; Geiger-Müller and, Scintillation counter, autoradiography, non-radiolabeling, Safety measures of radioisotopes handling.

Unit-IV

Beer-Lambert's Law, principle and instrumentation of UV-visible, infrared (IR), Florescence, AAS, NMR spectroscopy, Mass spectrometry (MS), electrospray ionization mass spectrometry (ESI-MS), MALDI, tandem MS for protein identification, Circular Dichroism (CD), flow cytometry, and ELISA. SDS-PAGE

Suggested readings:

1. Principles and Techniques of Biochemistry and Molecular Biology (2018) 8th ed. Wilson K and Walker J, Cambridge University Press, ISBN No. 131661476X.
2. Physical Biochemistry: Principles and Applications (2010) 2nd ed., Sheehan, D., Wiley Blackwell (West Sussex), ISBN: 978-0-470-85602-4 / ISBN: 978-0-470-85603-1.
3. Physical Biochemistry: Applications to Biochemistry and Molecular Biology (1982) 2nd ed., Freifelder D, W.H. Freeman and Company (New York), ISBN:0-7167-1315-2 /ISBN:0-7167-1444-2.
4. Principles of Instrumental Analysis (2018) 7th ed., Douglous A. Skoog, F. James Holler, Stanley R Crouch, Singapore: Cengage Learning Asia Pte Ltd.

SEMESTER –I

Course title: Protein Biochemistry **Credit: 4**
Course code: SIAS BC 11 04 C 3104 **Lecture: 60**

Course Objectives:
The objective is to offer detailed knowledge about proteins, the dynamic biomolecules that sustain life through innumerable diverse functions, providing basic concepts of structures of proteins, their mechanism of folding and methods to engineer them for various applications.

Learning outcomes:
Upon completion of this course, the student will be able to:

- Acquire insight into levels of protein structures – their basic constituents, forces that stabilize protein structures, their various modules and arrangements.
- Learn how proteins fold during and following translation and consequences of improper folding.
- Acquire insight into protein structure-function relationship learning the significance of protein structures in their ability to perform various functions.
- Learn about the types, methods and strategies of protein engineering and examples of successful protein engineering in various applications.

Unit I:
Introduction: Importance and Significance of proteins; Functional diversity, Classes and Dynamism; Structure-function relationship; Key Features. Amino acids as constituents: Ways of representation, Classification, Stereochemistry, Chemical and structural features. Physico-chemical interactions in biological systems: Covalent & non-covalent interactions, Importance of weak interactions in protein structures.

Unit II:
Levels of protein structure: *Primary structure*: Flexibility and conformational restrictions, Characteristics of peptide bond, Ramachandran plot. *Secondary structure*: Diversity in alpha-helices, Helix capping, Beta-stand and sheet, Turns and loops, Importance of loops. *Super secondary structure*: Domains and motifs. *Tertiary structure*: General properties and characteristics. *Quaternary structure*: Concept of subunits and promoters and their association, Importance of quaternary structure, various examples, Myoglobin and Haemoglobin structures and their relation to cooperativity and allostery.

Unit III:

Protein Folding and its biotechnological applications: problems in protein folding; Anfinsen's classical experiment; Folding curves and transitions; Assisted protein folding (Chaperones), Misfolding and diseases, Mechanism of sickle-cell disease, Industrial and medical applications.

Unit IV:
Fibrous and Globular proteins, Structural Features of Membrane proteins, Basics of Mass Spectrometry, Ionization mechanisms. Protein Engineering: Basic principles, Types and Methods, Applications and case studies. Sequencing and amino acid composition of peptides and proteins, artificial peptide synthesis and their applications.

Suggested Readings:

1. Introduction to Protein Structure (2nd Ed.), C. Branden, T. Tooze. 1999, Garland Science, Taylor and Francis Group, New York, USA. ISBN: 978-0-8153-2305-1.
2. Proteins: Structures and Molecular Properties (3rd Ed.), T.E. Creighton. 2002, W.H. Freeman and Company, New York, USA. ISBN 978-0716770305.
3. Mechanisms of Protein Folding, R. H. Pain. 2000. Oxford University Press, Oxford, England. ISBN 978-0716770305.
4. Protein Engineering Handbook, S. Lutz, U. T. Bornscheuer. 2008. Wiley-VCH, Weinheim, Germany. ISBN: 978-3-527-31850-6.
5. Protein Misfolding, Aggregation and Conformational Diseases: Part A: Protein Aggregation and Conformational Diseases (Protein Reviews), V. N. Uversky, A.L. Fink. 2006. Springer, New York, USA. ISBN: 978-1-4419-3851-0.

SEMESTER -I

Course Title: Practical Skills in Basic Biochemistry **Credit: 5**
Course Code: SIAL BC 1 1 02C 00105 **Lecture: 150**

Course Objectives: To analyse and estimate biomolecules
Learning outcomes:
Upon completion of this course, the student will be able to:

- Students will learn about various good lab practices, working in labs and use of Instruments
- The course will provide better understanding of the art of design, execution and analysis of experiments
- Learn how to standardize various biomolecules
- Quantify and identify different biomolecules like amino acid, sugar, lipid based on their physiochemical properties

1. Introduction to laboratory safety precautions, personal hygiene, Glass wares, pipetting & weighing, Instruments (Centrifuge, pH meter, Colorimeter, Spectrophotometer, UV & VIS Spectrophotometer, Ultra Centrifuge, Electronic Balance)
2. Preparation of buffers and measurement of pH, Determination/calculation of normality and molarity of solutions.
3. Qualitative estimation of carbohydrates by Molish test
4. Qualitative estimation of reducing sugars by Fehling solutions.
5. To determine presence of starch by Iodine test.
6. Qualitative estimation of aromatic amino acids by Xanthoproteic test
7. To detect the presence of Tyrosine by Millon's test
8. Detection of glycerol by Acrolein test for detection of

9. Estimation of total protein content by Lowry's method
10. Fractionation of serum on gel filtration chromatography

Suggested readings:

1. An introduction to practical Biochemistry, 3rd Edition (2017), David T. Plummer, Tata Mc Graw Hill Co. Ltd., Bombay. ISBN- 9780070994874
2. Introductory Practical Biochemistry (2001). 2nd Edition. S.K. Sawhney and Randhir Singh. Narosa Publishing House, ISBN- 8173193029
3. Practical Biochemistry, 3rd Edition, 2018, Sadasivam and Manickam. New Age International Pvt Ltd Publishers; Third edition, ISBN- 8122421407
4. Practical Biochemistry, Principles and Techniques (1995). 8th Edition. Keith Wilson and John Walker. Cambridge University Press, ISBN- 131661476X

SEMESTER -I

Course title: Fundamentals of Biochemistry **Credit: 4**

Course code: SIAS BC 1 1 01 GEC 4004 **Lecture: 60**

Course Objectives: To understand the structure and functions of biomolecules.

Learning outcomes:

- Appreciate the hierarchical organization of various biomolecules.
- Evaluate the structure of carbohydrates and their functions
- Acquire knowledge on the building blocks of lipids, classification and properties as well as lipoprotein and composition of membranes.
- Understand the various orders of protein structure, classification, properties and biological importance of proteins.
- Evaluate the structure and hierarchical organization of nucleic acids with their biological functions.

Unit I

Carbohydrates: Brief review of configurational and conformational aspects of carbohydrates. Structure, properties and importance of structural (cellulose and chitin) and storage polysaccharides (starch and glycogen), glycosaminoglycans, cardioglycosides and bacterial cell wall polysaccharides. Structure elucidation of polysaccharides (starch, glycogen and cellulose). Glycoproteins-structure and functions. Lipoproteins.

Unit II

Lipids: Building blocks of lipids - fatty acids, glycerol, ceramide. Storage lipids - triacyl glycerol and waxes. Structural lipids in membranes- Phospholipids, glycerophospholipids, galactolipids, sulpholipids, sphingolipids and sterols.

UNIT III

Amino acids and Proteins: Review of classification and structure of amino acids, acid – base properties of amino acids. Non – standard, non–protein and biologically active amino acids. Ionic properties of peptides and proteins. Naturally occurring peptides. Primary structure: Elucidation of primary structure of proteins – Determination of amino acid composition, end group analysis, cleavage by enzymes and chemicals. Secondary structure: Peptide bond – structure and conformation, Ramachandran plot. α – helix, β – pleated sheet, loops and triple helical structures. Tertiary structure: Forces stabilizing tertiary structure of proteins. Protein denaturation and renaturation. Quaternary structure and symmetry: Structure and function of myoglobin and hemoglobin.

Unit IV

Nucleic acids: Nomenclature, classification and structure of Nucleotides and Nucleic Acids, structure of nitrogenous bases, nucleosides and nucleotide, The Chemical Structures of DNA and RNA, Double Helical DNA, The Watson– Crick Structure: B-DNA, Denaturation and Renaturation, Ionization of the bases, effect of chemicals and radiations, detection of nucleic acids.

Suggested readings:

1. Lehninger: Principles of Biochemistry (2013) 6th ed., Nelson, D.L. and Cox, M.M., W.H. Freeman and Company (New York), ISBN:13: 978-1-4641-0962-1 / ISBN:10:1-4292- 3414-8.
2. Textbook of Biochemistry with Clinical Correlations (2011) 7th ed., Devlin, T.M., John Wiley & Sons, Inc. (New York), ISBN:978-0-470-28173-4.

3. Biochemistry (2012) 7th ed., Berg, J.M., Tymoczko, J.L. and Stryer, L., W.H Freeman and Company (New York), ISBN: 13:978-1-4292-7635-1.

SEMESTER -I

Course title: Biochemical and Environmental Toxicology **Credit: 4**
Course code: SIAL BC 1 1 02 GEC 4004 **Lectures: 60**

Course objective: To study the fundamental concepts, methods, approaches of Biochemical and environmental toxicology.

Learning outcomes:

- Identifying a variety of environmental toxicants in terms of their occurrence and toxic effects
- Understanding the fate and transport of toxicants in the environment and how these processes affect their toxicity
- Understanding the toxicological effects of biochemical and environmental toxicants on humans

Unit –I

Definition and scope of toxicology**,** eco-toxicology and its environmental significance. Toxic effect: Basis for general classification & nature. Dose – Response relationship: synergism and antagonism, determination of ED_{50}&LC_{50}/$LD_{50,}$ minimum effective dose (MED), minimum tolerance dose (MTD). Acute and chronic exposures. Factors influencing toxicity.

Unit-II

Xenobiotic metabolism: absorption & distribution. Phase I reaction. Oxidation, reduction, hydrolysis and hydration. Phase II reaction/conjugation: methylation, glutathione, glucouronic acid and amino acid conjugation. Detoxification. Biochemical basis of toxicity: distribution of Excitable membrane function. Altered calcium homeostasis. Covalent binding to cellular macromolecules & genotoxicity. Tissue specificity of toxicity. Toxicity testing: in-vitro test systems- bacterial mutation test: reversion test, Ames test, fluctuation tests. Comet assay. Chromosome damage tests.

Unit-III

Food Toxicology: role of diet in cardio-vascular disease and cancer. Toxicology of food additives. Metal toxicity: Toxicology of arsenic, mercury, lead and calcium. Environmental factors affecting metal toxicity – effect of light, temperature and pH.

Unit-IV

Diagnosis of toxic changes in liver and kidneys: metabolism of haloalkanes, haloalkenes and paracetamol with their toxic effects on tissues. Air pollution: common air pollutant & their sources. Air pollution and ozone. Air pollution due to chlorofluorocarbons (CFCS) and asbestos. Water pollution; major water pollutants. Effects of selected pollutions on fresh water flora & fauna. Effect of UV radiation on human health.

Suggested readings:

1. Introduction to Environmental Toxicology: Molecular Substructures to Ecological Landscapes (2017) 5th ed., Landis WG, Sofield RM and Yu MH, CRC Press, ISBN: 978- 1498750424.
2. Environmental Toxicology: Biological and Health Effects of Pollutants (2011) 3rd ed., Yu MH, Tsunoda H and Tsunoda M, CRC Press, ISBN: 978-1439840382.
3. Environmental Toxicology Current Developments (2014) 1st ed., Rose J, Taylor and Francis, ISBN: 0203-30551-5.
4. An Introduction to Environmental Toxicology (2018) 4th ed., Dong MH, Create space Independent Publishing platform, ISBN: 1979904510.
5. Foodborne Microbial Pathogens: Mechanisms and Pathogenesis (2018) 2nd ed., Bhunia AK, Springer Nature, ISBN: 978-1493973477.

SEMESTER-II

SEMESTER-II

Course title: Enzymology and Enzyme technology **Credit: 4**
Course code: SIAS BC 12 01 C 3104 **Lectures: 60**

Course objective: To provide a deeper insight into the fundamentals of enzyme structure and function and kinetics of soluble and immobilized enzymes.

Learning outcomes:
Upon successful completion of this course, students should be able to:

- Distinguish the fundamentals of enzyme properties, nomenclatures, characteristics and mechanisms.
- Understanding how enzymes are able to increase speed of a biochemical reaction in sense of thermodynamics, kinetics and molecular interactions
- Interpreting and explaining significant mechanisms of regulation of enzymatic action
- Analyzing options for applying enzymes and their inhibitors in medicine and various industries

Unit-I

Enzymes; general characteristics, Classification and Nomenclature, Coenzymes and Cofactors, metallo-enzymes, isozymes, ribozymes, Criteria of purity of enzymes; Specific activity, Enzyme units-Katal and IU, proximity, orientation effect, Strain & distortion theory. Factors affecting rate of chemical reactions, collision theory, activation energy and transition state theory, determination of activation energy. Fischer's lock and key hypothesis, Koshland's induced fit hypothesis.

Unit-II

Initial velocity and substrate concentration relationship, derivation of Michaelis- Menten equation, Significance of Km, Vmax, Kcat, and Kcat/Km. Different plots (Lineweaver-Burk plot, Eadie-Hofstee and Hanes plot). Effect of pH, temperature and metal ions on enzyme activity. Reversible inhibition (competitive, uncompetitive, non- competitive, Mixed), Suicide inhibitor.

Unit-III

Mechanism of enzyme catalysis-General acid-base catalysis, electrostatic catalysis, covalent catalysis. Enzyme regulation; reversible (glutamine synthase & phosphorylase) and Irreversible (proteases), covalent modifications of enzymes, Feedback inhibition and feed forward stimulation, Allosteric enzymes, co-operatively, and sigmoidal kinetics: MWC and KNF models. Significance of sigmoidal behavior, Study of ATCase and pyruvate dehydrogenase allosteric enzyme.

Unit-IV

Application of enzyme in diagnostics (SGPT, SGOT, Creatine kinase, alkaline and acid phosphatases, LDH, glucose-6-phosphate dehydrogenase (G6PD)), enzyme therapy (Streptokinase, Angiotensin-converting enzyme (ACE) inhibitor), immobilized enzymes, Biotransformation, Scope of enzymes in industries.

Suggested readings:

1. Enzymes: Biochemistry, Biotechnology, Clinical Chemistry (2007) 2nd Edition. Palmer T, and Bonner PL, Woodhead Publishing, ISBN: 978-1904275275.
2. Fundamentals of Enzyme Kinetics (2017) 3rd Edition. Bowden AC, Medtech, ISBN:978-9385998508.
3. Lehninger: Principles of Biochemistry (2017) 7th Edition. Nelson DL and Cox MM, WH Freeman and Company (New York), ISBN:978-1319108243.
4. Essentials of Enzymology (2016) 1st Edition. Herald J, Syrawood Publishing House, ISBN:978-16182862285.
5. Biochemistry (2015) 8th Edition. Berg JM, Stryer L and Tymoczko JL, WH Freeman and Company (New York), ISBN: 9781464126109.
6. Enzymes: A Practical Introduction to Structure, Mechanism, and Data Analysis (2000). Robert A. Copeland, 2nd ed., Wiley-VCH, Inc. ISBNs: 0-471-35929-7 (Hardback); 0-471-22063-9.

SEMESTER-II

Course title: Immunology **Credit: 4**
Course code: SIAS BC 12 02 C 3104 **Lectures: 60**

Course Objective

This course is designed to teach basic and advanced concepts of immunology. This course includes various case studies that help the learner to understand and identify the appropriate immunogenic situation.

Learning Outcome:

Upon completion of this course, the student will be able to:

- Develop broad core knowledge in immunology
- Develop a working knowledge of innate and adaptive immune responses, how these responses can be protective, and how they contribute to disease
- Develop skills in analytical and critical thinking related to immunological research
- Discuss the classification of immunity, cell mediated immune response, humoral immune response.

Unit-I

Immune system and the cell types involved in defense mechanisms of the body. Gross features, functions, development and histogenesis of various primary and secondary lymphoid organs in the body. Immunity in invertebrates and vertebrates. Cells, receptors, molecules and other components of innate immunity. Development, characteristics and function of innate immune cells. Antigens and haptens, factors that dictate immunogenicity. Case Study/Applied Aspect: Pathogens (Microbes, Viruses), Infections and disease development (Microbial and Viral Infections0, Immunity Breakdown.

Unit-II

B cell development and function, antibody formation, structure and effector function. T cell development and function, cytokines and their essential functions, and effects on the immune system. Connections between Innate and Adaptive Immunity. B and T cell epitopes. Structure and distribution of classes and subclasses of immunoglobulins (Ig), Ig fold, effector functions of antibody, antigenic determinants on Ig and Ig super family. Multigene organization of Ig locus, mechanism of VDJ genomic rearrangement, ways of antibody diversification.

Case Study/ Applied Aspect: Use of antibodies in immunological techniques and the principle for a few common immunological techniques- Immunohistochemistry, Immunocytochemistry and privileged sites.

Unit-III

Complement activation by classical, alternate and MB lectin pathway. General organization and inheritance of MHC, structure, distribution and role of MHC class I and class II proteins, pathways of

antigen processing and presentation. Structure and role of T cell receptor, and co receptor, T cell development, generation of receptor diversity, selection and differentiation. General properties of effector T cells, cytotoxic T cells (Tc), natural killer cells; NKT cells and antibody dependent cellular cytotoxicity (ADCC).
Case Study/Applied Aspect: Immunological basis of graft rejection, clinical manifestations, immunosuppressive therapy.

Unit-IV
Mechanism of tolerance, Organ specific and systemic autoimmune diseases, possible mechanisms of induction of autoimmunity, IgE mediated (Type I) hypersensitivity, antibody mediated cytotoxic (Type II) hypersensitivity, immune complex mediated (type III) hypersensitivity and delayed type (Type IV) hypersensitivity.
Case Study/Applied Aspect: Vaccines, Importance and Types of vaccines, active and passive immunization, and Vaccine Development. Strategies in Vaccine development.

Suggested readings:

1. Kuby immunology, Eighth edition.: Punt, Jenni; Owen, Judith A.; Stranford, Sharon A.; Jones, Patricia P.; Kuby, Janis. New York: W.H. Freeman/Macmillan Learning, 2019.
2. Janeway's Immunobiology (2017) 9th ed., Murphy KM and Beaver C, WW Norton and Company, ISBN: 978-0815345510.
3. Roitt's Essential Immunology (2017) 13th ed., Delvis PJ, Martin SJ, Burton DR and Roitt, IM, Wiley-Blackwell, ISBN: 978-1118415771.
4. Textbook of Immunology, 2nd Edition, Mohanty Sunil Kumar, Jaypee Brothers Medical Publishers.

SEMESTER-II

Course title: Recombinant DNA Technology and Applications in Biotechnology Credit: 4
Course code: SIAS BC 13 01 C 3104 Lectures: 60

Course Objective:
The Genetic Engineering helps the students to understand about the cloning strategies, expression pattern, and various techniques involved and their applications in the advancement of Biotechnology

Learning outcomes:

Upon completion of this course, the student will be able to:

- To understand the concept of recombinant DNA technology
- Biology of plasmids, and phages and their uses in different cloning systems
- Different types of DNA libraries and their application to isolate genes
- Designing expression vectors for prokaryotic expression and fundamentals of eukaryotic expression systems

Unit-I
Restriction and Modification systems in *E. coli* and their use in recombinant library constructions-Basic techniques for RDT including Agarose gel electrophoresis, PAGE, Pulse field electrophoresis-Basic Biology of plasmids including their replication, copy number, Incompatibility of Plasmids, and development of Plasmid Vectors. Development of phage and phagemid vectors-Biology of bacteriophage lambda, phage assembly and *in vitro* packaging and development of vectors for different types of Libraries.

Unit-II

Vectors for cloning large fragments of DNA, (Cosmid, PAC, YAC and BAC) and strategies for cloning large DNA Fragments. PCR and its application including cloning of PCR amplified fragments, mutagenesis and construction of Libraries. Basic DNA sequencing methods, Maxam and Gilbert's chemical and Sanger's chain termination methods, and automated DNA sequencing, Introduction to next generation sequencing (NGS)-Polymerase chain reaction and its application in research. Oligonucleotide synthesis, purification, and its application in screening of libraries, cloning and mutagenesis. Real time/quantitative PCR and its applications

Unit-III

Strategies for constructing cDNA libraries and screening using Nucleic acid and antibody probes. Subtractive Libraries, Expression based strategies for cloning of functional genes, Differential mRNA Display-Strategies for constructing Genomic libraries and screening using nucleic acid probes, Gene Expression analysis by Microarray.

Unit-IV

Understanding of Operons Lac, Trp, Arabinose, Tetracycline and their applications in studying biological processes and development of Vectors. Use of Tags to aid solubility and Purification-Vectors and strategies for expressing heterogeneous proteins in *E. coli*, Yeast and mammalian Cells.

Suggested readings:

1. Molecular cloning, A Laboratory Manual Vol. I-III. (Fourth edition), M.R.Green and J. Sambrook (2012) Cold Spring Harbor Laboratory Press.
2. Current Protocols in Molecular Biology. Fred M. Ausubel*et al.* (2015), John Wiley and Sons, Inc.
3. Recombinant DNA: Genes and Genomes: A Short Course. (Third edition), J.D.Watson, (2007) W.H.Freeman and Company.
4. Recombinant DNA, Genes and Genomes – A Short Course (3rd edition). James D. Watson, Richard M. Myers, Amy A. Caudy and Jan Witkowski. (2007). Cold Spring Harbor Laboratory Press.
5. Principles of Genome Analysis and Genomics. (7th edition) S.B. Primrose and R.M. Twyman. (2006) Blackwell Publishing.
6. Gene Cloning and DNA Analysis. T.A. Brown. (2010) Wiley-Blackwell publishing (Oxford, UK).

SEMESTER-II

Course title: Bioinformatics **Credit: 4**

Course code: SIAS BC 12 04 C 3104 **Lectures: 60**

Course objective:

The aim of the course is to enable students to get familiar with a significant number of bioinformatics tools and databases, understand the computational methods behind them, be able to exploit in-depth the capabilities of the tools, implement and competently interpret and present the results of a wide range of bioinformatics analyses, critically discuss the current limitations and design the next generation of tools.

Learning Outcomes

Upon completion of this course, the student will be able to:

- Understand and choose appropriate bioinformatics tools and databases for their investigation
- Perform sequence/structural/functional analysis of biomolecules
- Analyze and interpret omics data
- Get familiar with modelling and simulations in Biology

Unit-1
Introduction to Bioinformatics: Bioinformatics Overview, Bioinformatics Concepts: - Functional Genomics, Comparative genomics, Structural biology, classification of protein structure, Medical information, Objectives of Bioinformatics. Applications, Challenges in Molecular biology, Careers in Bioinformatics, Major databases & tools.

Unit-2
Genomics: Data Mining –ORF, Pubmed, Phylogenetic Analysis, MSA, Gen BANK, COG Cluster, OMIM, Gene Mapping, Sequence Assembly & Expression, Alignment of MS. Proteomics: Visualization & prediction of Protein Structure, Methods used in protein structure prediction, PROSITE, DNA Micro array (DNA chip).

Unit-3
Tools in Bioinformatics: Web based Bioinformatics Applications, Desktop based software, Online Analysis Tools & Servers, PDB, SWISS-PROT, CATH, Annotation Systems-DAS, Homology Tools – BLAST, FASTA, Multiple Alignment-CLUSTALW, Molecular visualization software-Swiss pdb viewer, Rasmol Gene Prediction Software: Genescan, Protein Modelling software-SWISSMODEL.

Unit-4
Computational Biology: Genetic Algorithms, HMMR, Dynamic Programming Algorithm. Local & Global Alignment Algorithm, Needleman- Wunsch Algorithm, Heuristic Algorithm like BLAST, FASTA-Multiple Segment Alignment Algorithm, Protein secondary structure prediction Algorithm.

Suggested Readings:

1. Essential Bioinformatics (2006) 1st ed., Xiong J, Cambridge University Press, ISBN 13: 978-0521600828.
2. Fundamental concepts of Bioinformatics (2003) Krane DE and Raymer ML Pearson, ISBN:978-8177587579.
3. An Introduction to Bioinformatics (2017)1sted., KnightR, Larsen and Keller Education, ISBN:978-635490459.
4. Concepts of Bioinformatics and Genomics (2016) 1st ed., Momand J, McCardy A, Heubah, S and Warter-Perez N, Oxford University Press, ISBN:978-0199936991
5. Introduction to MATLAB for biologists (2019)., Webb, Cerian Ruth, Domijan, Mirela. Springer. ISBN-978-3-030-21337-4

SEMESTER-II

Course title: Practical Skills in Biochemical Techniques **Credit: 5**
Course code: SIAS BC 12 05 SEC 00105 **Lectures: 150**

Course objective: To train students a variety of experimental concept designed to complement the lectures different courses of the semester.

Learning Outcomes

Upon completion of this course, the student will be able to:
- Get hands on training for bacterial cell culture
- learn polyacrylamide gel electrophoresis for detection of proteins, their visualization by different staining methods
- Separate amino acids by paper and thin layer chromatography

- Get hand on training on plant tissue culture technology

Experiments:

1. Determination of K_m and V_{max} using Lineweaver-Burk graph.
2. Separation of amino acids/ protein by column/ paper chromatography.
3. Ammonium sulphate fractionation and enzymatic assay of purified enzyme.
4. SDS-PAGE analysis of proteins.
5. Western blot / ELISA analysis of the proteins using antibodies
6. To prepare bacterial competent cells using $CaCl_2$ method.
7. To isolate pure colony of bacteria from soil sample by serial dilution and spreading method.
8. Determine the Gram stain of bacterial sample.
9. Preparation of MS (Murashige& Skoog) medium and inoculation of explant.
10. Live and dead cell assay by trypan blue method.
11. Here we should include plasmid isolation and expression of proteins in E.coli.

Suggested readings:

1. An Introduction to Practical Biochemistry (2017) 3rd ed., Plummer D, Tata McGraw Hill Education ISBN:978-0070994874.
2. WilsonandWalker'sPrinciplesandTechniquesofBiochemistryandMolecularBiology (2018) 8th ed., Hoffmann A and Clokie S, Cambridge University Press, ISBN: 978- 1108716987.
3. Physical Biochemistry: Principles and Applications (2016) 2nded., Sheehan, D, Wiley India, ISBN:978-8126564842.
4. Physical Biochemistry: Applications to Biochemistry and Molecular Biology (1983)2nd ed., Freifelder D, WH Freeman and Company (New York), ISBN: 978-0716714446.
5. Biophysical Chemistry: Principles and Techniques (2016) 4thed., Upadhyay A Upadhyay K and Nath N, Himalaya Publishing House, ISBN:978-9351422273.

SEMESTER –II

Course title: Cell Culture Technology **Credit: 4**
Course code: SIAS BC 12 01 DCEC 3104 **Lecture: 60**

Course objectives: Objective of this course is to familiarize the student with concepts of cell and tissue culture technology in both animals and plants.

Learning outcomes:

Upon completion of this course, the student will be able to:

- Understand the basics of plant and animal cell culture
- Get an in-depth knowledge about growing the animal cells *in vitro* to get cell mass, tissues, and their applicability examples
- learn the mass propagate the plants *in vitro* and how to raise virus free, pest resistance, new variety of plants etc.
- Understand application of cell culture in industries and research labs

Unit-I

Animal cell culture: History, biology of cultured cells, culture media-composition, preparation and development, cell isolation, establishment and evaluation of cell culture, sterilization techniques for ATC lab. Animal cell lines: Establishment, properties and use of cell lines, cultures of tumor cells; Cryopreservation of animal cells.
Culture and scale up: Monolayer culture-surface requirements, gas phase requirements, capillary culture units, suspension culture scale up. Somatic cell fusion: Methods of somatic cell fusion, selection, properties of cell hybrids and their applications.

Unit- II
Animal cloning and embryo transfer: Superovulation, *in vitro* fertilization, embryo transfer technology in animals; Concepts and techniques of cloning.
Applications: Industrial applications of animal cell culture; Stem cell culture and its applications.

Unit- III
Plant tissue culture: History of plant cell culture, culture media-composition, preparation and development, cellular totipotency, cryopreservation. Callus and cell culture: Isolation of cells, growth of single isolated cells. Suspension culture: Regeneration and maintenance of callus, organogenesis and embryogenesis.

Unit-IV
Organ culture: Meristem culture, embryo culture and embryo rescue, anther culture, virus free plant production and haploid plant production, production of synthetic seed, micropropagation. Protoplast culture and fusion: Isolation of protoplasts, culture and regeneration; fusion ofprotoplasts, selection of fusion products of protoplasts; Cybrids. Somaclonal variation, plant transformation-*Agrobacterium* mediated and particle gun mediated, secondary plant metabolites and application of plant biotechnology in crop improvement.

Suggested readings:

1. Culture of animal cells: A manual of Basic Technique, 5th edition (2005). Freshney R. Ian, Willey-Liss Publisher.
2. Tissue Engineering: Essential for Daily Laboratory Works, Minuth W.W., Strehl R., Schumacher K., Willey Publisher (2005).
3. Plant Biotechnology, H. S. Chawla, Oxford and IBH, 2009
4. Plants, Genes and Crop Biotechnology 2nd Edition, Chrispeels, M.J. &Sadava D.E. American Society of Plant Biologists, Jones and Bartlett Publishers, USA (2003).
5. Plant Biotechnology, B D Singh. Kalyani publisher, 2003
6. Agricultural Biotechnology, Arie Altman. Marcel Dekker, Inc. (2001).
7. Biochemistry and Molecular Biology of Plants, Buchanan B.B., Gruissem W, and Jones RL (2000)

SEMESTER –II

Course title: Biochemical Toxicology **Credit: 3**
Course code: SIAS BC 12 02 DCEC 4004 **Lecture: 35**

Course Objective: To acquire knowledge, understand and develop an understanding of the kinds of toxicant interactions, their impact on human health.

Learning outcome:
Upon completion of this course, the student will be able to:

- Understand different types of toxins their biological process and effects on various organs/ systems

of the human body

- Be aware of dose absorption, excretion of the toxic components
- Understand impact of toxin on renal, liver, neural systems
- Identify underlying susceptibility factors which contribute to the ability of chemicals to elicit bio effects which contribute to human disease.

Unit I

Definition and scope of toxicology and Biochemical toxicology, Sources and classes of toxicants; air, water and soil pollutants, food additives and contaminants, Toxic effects of Persistent organic pollutants (POPs), dioxins, drugs and Pesticides and their biochemical mode,

Unit II

Toxicokinetics; absorption, distribution, excretion, and biotransformation of toxicants, Metabolism of toxicants; xenobiotic metabolism and biological consequences of Phase I and Phase II reactions, role of cytochrome P450 in Phase I monooxygenations and types of Phase II metabolic conjugations,

Unit III

Factors affecting metabolism of toxicants; Chemical, physiological and environmental, Different routes of elimination of toxication; exhalation (lung), renal and hepatic routes. Hepato and renal toxicology; basic principles and specific examples.

Unit IV

Genetic poisons; DNA damage agents, chemical carcinogenesis and trace element toxicity and their toxic mechanism, Bone marrow toxicity: benzene as a case study, Neurotoxicology, Metal toxicology: mercury, cadmium, Nanoparticle toxicology.

Suggested Readings:

1. Molecular and Biochemical Toxicology. Robert C. Smart, Ernest Hodgson (2018) Wiley publications.
2. Introduction to toxicology. John A. Timbrell (1889) Taylor and Francis.
3. Principles of Biochemical Toxicology. John A. Timbrell (4th Edition) CRC Press.
4. Introduction to Biochemical Toxicology. Ernest Hodgson, Robert C. Smart (3rd Edition) Wiley inter-science.

SEMESTER –II

Course title: Biostatistics **Credit: 4**
Course code: SIAS BC 12 03 DCEC 3104 **Lecture: 60**

Course Objective:
To introduces selected important topics in biostatistical concepts and reasoning. Specific topics include tools for describing central tendency and variability in data; methods for performing inference on population means and proportions via sample data; statistical hypothesis testing and its application to group comparisons.

Learning outcome:
Upon completion of this course, the student will be able to:

- Recognize and give examples of different types of data arising in public health and clinical studies.
- Interpret differences in data distributions via visual displays.

- Calculate and interpret confidence intervals for population means and proportions.
- Understand and interpret results from Analysis of Variance (ANOVA), a technique used to compare means amongst more than two independent populations

Unit-1

Looking at your data, Types of Data, Tables & Graphs, Central tendency & dispersion Probability, Bayes Theorem, Sensitivity &Specificity, Odds Ratio & Relative Risk

Unit-2

Distributions: Binomial distribution, Poisson distribution, Normal distribution, Central Limit Theorem, Standard scores/z-scores, Statistical inference: Samples and populations, Power, Confidence intervals, p-values, Type I & II error, One and two groups (continuous outcomes): One-sample population mean, Paired sample t-test, Independent samples t-test

Unit-3

Contingency Tables, comparing more than two groups (continuous outcomes): One-way ANOVA, Two-way ANOVA, Comparing two groups (categorical outcomes): Chi-square test, McNemar'stest.

Unit-4

Correlation, Linear Regression, Multiple predictor variables, multiple regression, Logistic regression, Non-parametric Tests, Sign test, Wilcoxon test, Kruskal-Wallis test, Rank correlation, Survival Analysis: Common terms, Cox regression analysis, Tree-structure models

Suggested Readings:

1. Understanding advanced statistical methods. Westfall, P., & Henning, K. S. (2013). CRC Press.
2. Biostatistics for the biological and health sciences. Triola, M. M., &Triola, M. F. (2006). Boston: Pearson Addison-Wesley.
3. The analysis of biological data. Whitlock, M. C., & Schluter, D. (2009). Greenwood Village, CO: Roberts and Company Publishers.
4. Applied Biostatistics for Health Sciences, Rossi R.J. (2010). Wiley.
5. Medical Statistics-Principles & Methods, Sundaram, K.R. (2010) BI Publications, New Delhi.

SEMESTER-III

Course title: **Genomics and Proteomics** **Credit: 4**
Course Code: SIAS BC 13 01 C 3104 **Lectures: 60**

Course Objective
This course is designed

- To introduce and teach basic concepts and advanced techniques employed in genomics and proteomics.
- To introduce genomic and proteomics techniques employed in understanding cellular function and also in Industrial application for producing therapeutic molecules.
-

Learning Outcome:

- Upon completion of this course, the student will be able to:
- Understand basic concepts of high throughput genomics and proteomics techniques
- Understand the genomic manipulation techniques and designing recombinant molecules
- Understand different platforms employed in next generation genome sequencing and acquire the ability to perform nucleic acid and peptide sequencing
- Understand the strategies employed for studying protein-protein interactions, protein expression including antibody gene cloning and protein engineering

Unit-I
Concept of Genomics-Mutagenesis, Regulated vectors for controlled expression of multiple genes to study gene function in different hosts. Recombinant DNA strategies to study protein interactions. (Yeast 2-hybrid system, Phage display, Protein fragment complementation). Determining the Function of Individual genes (Gene deletion, over-expression and complementation, Genome-wide insertional mutagenesis).

Unit-II
Fundamentals of Whole-Genome Sequencing. Sequencing of Phage, Viral and Bacterial Genomes, Human Genome sequencing, and comparative genomics. High throughput genome-wide cloning and protein expression strategies and applications. Antibody gene cloning and engineering, humanization and Human antibodies.

Unit-III
Introduction to proteome, proteomics technology, types and kinds of proteomics investigation, importance of proteomics. Principles and applications of the separation technology (Electrophoresis, Centrifugation, Chromatography) in proteomics. Mass spectrometry (Ionizers, analyzers and detectors) technology and its application in proteomics.

General workflow for the 2-D Gel Electrophoreses, sample preparation, evolution of 2D PAGE, experimental details for the 2-D gel and high throughput 2-D PAGE. Application of two-dimension gel electrophoreses in proteomics and biomarker discovery. Importance of 2-D fluorescence difference gel electrophoresis for comparative proteomics.

Unit-IV
Proteomic profiling for host-pathogen interaction. Sample treatment for labeling, 2D LC-MS/MS analysis, database search and relative quantification, analysis and interpretation, quantitative proteomics. Protein-Protein Interaction (PPI) and its application in proteomics. Methods to study PPI. Application of proteomics for drug discovery. Biomarkers and drug targets identification. Validation of drug targets and assessment of its toxicology.

Case Studies /Tutorials:

(i) Strategies for large-scale expression of recombinant proteins in heterogonous hosts. Purification and downstream processing to produce Therapeutic grade recombinant proteins and regulatory aspects.
(ii) Microarray techniques for DNA, Proteins and Antibodies. Global expression profiling
(iii) Cellular Engineering.

Suggested Readings:

1. Molecular Biotechnology: Principles and Applications of Recombinant DNA (2010) 4th ed., Glick B.R., Pasternak, J.J. and Patten, C.L., ASM Press (Washington DC).
2. Protein-Protein Interactions: A Molecular Cloning Manual. Erica Golemis and Peter D. Adams (2005) Cold Spring Harbor Laboratory Press,
3. Molecular cloning, A Laboratory Manual Vol. I-III. (Fourth edition), M.R.Green and J. Sambrook (2012) Cold Spring Harbor Laboratory Press.
4. Current Protocols in Molecular Biology. Fred M. Ausubel*et al.* (2015) John Wiley and Sons, Inc.
5. Recombinant DNA, Genes and Genomes – A Short Course (3rd edition). James D. Watson, Richard M. Myers, Amy A. Caudy and Jan Witkowski. (2007). Cold Spring Harbor Laboratory Press.
6. Principles of Genome Analysis and Genomics. (7th edition), S.B. Primrose and R.M. Twyman. (2006) Blackwell Publishing.

SEMESTER-III

Course title: Clinical Biochemistry **Credit: 4**
Course code: SIAS BC 13 02 C 3104 **Lectures: 60**

Course objective: The objectives of this course are to demonstrate how basic biochemistry and analytical chemistry can be applied to medical diagnosis, treatment and management.

Learning outcomes:

Upon completion of this course, the student will be able to:

- Clinically assess the laboratory indicators of physiologic conditions and diseases
- Understand the etiology, findings and management of diabetes, phenylketonuria.
- Understanding the biochemical and molecular tools needed to accomplish diagnostic, and therapeutic intervention on hereditary and acquired disorders
- Describe and explain the diseases of the major organs and systems, organ functional tests for diagnosis and management

Unit-I

Introduction to laboratory principles and instrumentation in Clinical Biochemistry. Biological samples - types, collection, processing, stability and storage; phlebotomy; serum and serum separator devices; chemical composition of biological fluids - blood, urine and cerebrospinal fluid; reference ranges. Quality assurance; accuracy and precision; factors influencing the accuracy of results

Unit-II

Disorders of Metabolism: Diabetes mellitus; Ketone bodies; Glycogen storage diseases; Galactosemia. Diagnostic tests for apolipoproteins, HDL cholesterol, LDL-cholesterol and triglycerides disorders. Phenylketonuria, homocystineuria, tyrosinemia and related disorders, aminoacidurias.

Unit-III

Electrolytes, Blood Gases and Acid Base Balance: Electrolytes, blood gases, respiration, acid-base balance and acid-base disorders, respiratory and renal mechanism of acid balance disorders. Disorders of Mineral Metabolism: Hypercalcemia, hypocalcemia, normocalcemia, hypophosphatemia, hyperphosphatemia.

Unit-IV

Organ function tests clinical presentation and diagnosis of the diseases of the liver and kidney; bilirubin metabolism; acid base disorders; Genetic Information about diseases - Oncogenes

and cancer, inborn errors of metabolism.

Suggested readings:

1. Clinical Biochemistry (2018) 6th Edition. Murphy M, Srivastava R and Deans K, Elsevier, ISBN:978-0702072987.
2. Clinical Biochemistry: Metabolic and Clinical Aspects (2014) 3rd Edition. Marshall WJ, Churchill Livingstone, ISBN: 978-0702051401.
3. Clinical Biochemistry (Lecture Notes) (2017) 10th Edition. Rae P, Crane M and Pattenden R, Wiley-Blackwell, ISBN:111924868X.
4. Lecture Notes: Clinical Biochemistry (2010) 8th Edition. Becket G, Walker SW, Race Pand Ashby P, Wiley-Blackwell, ISBN: 978-1405193054.
5. Principles of Medical Biochemistry (2016) 4th Edition. Meisenberg G and Simmons WH, Elsevier, ISBN: 978-03232 96168.
6. Tietz Fundamentals of Clinical chemistry and Molecular diagnostics. (2014) 7th Edition. Burtis CA and Bruns DE, Elsevier, ISBN: 978-8131238851.

SEMESTER-III

Course title: Plant Biochemistry **Credit: 4**
Course code: SIAL BC 1 3 08 C 4004 **Lectures: 60**

Course objective: The course is intended for students in the plant sciences. This course will provide students with fundamental knowledge of biochemistry and specific knowledge of compounds and biochemical pathways that occur in plants.

Learning outcomes:
Upon completion of this course, the student will be able to:

- Understand plant cell structure, organization, and apply specific biochemical functions to all compartments of the plant cell
- Learning the structure, function and biosynthetic pathways of essential biochemical molecules including their key chemical and physical properties
- Describe the biochemistry of plant growth and development
- Understand stress metabolism mechanisms that operate in plants in various stress conditions

Unit-I
Photosynthesis &Carbon Assimilation-Photosynthesis – Light and dark reactions, Emerson effect. Photo systems – mechanism of pigment excitation, types of pigments, Photophosphorylation – Calvin-Benson Cycle, Hatch and Slack pathway, Calvin cycle and regulation; C4 cycle and crassulacean acid metabolism (CAM), photorespiration.

Unit-II
Nitrogen metabolism-Biological nitrogen fixation by free living and in symbiotic association, structure and function of enzyme nitrogenase. Nitrate assimilation: nitrate and nitrite reductase. Primary and secondary ammonia assimilation in plants; ammonia assimilation by glutamine synthetase-glutamine oxoglutarate amino transferase (GS-GOGAT) pathway.

Unit-III
Secondary metabolites-Representative alkaloid group and their amino acid precursors, function of alkaloids, Examples of major phenolic groups; simple phenylpropanoids, coumarins, benzoic acid

derivatives, flavonoids, tannins and lignin, biological role of plant phenolics, classification of terpenoids and representative examples from each class, biological functions of terpenoids.

Unit-IV

Stress physiology-Reactive oxygen species and their generation, enzymic and non-enzymic components of antioxidative defence mechanism. Genetic basis of pathogen resistance, Responses of plants to biotic (pathogen and insect) and abiotic (water, temperature and salt) stresses; mechanism of resistance to abiotic stress.

Suggested readings:

1. Plant Biochemistry: Concepts and Applications (2018), Granger TC, ISBN: 9781632399878.
2. Biochemistry and Molecular Biology of Plant (2015) 2nd ed., Buchanan BB, Gruissem W and RusseL LJ, Wiley-Blackwell. ISBN: 978-0470714218.
3. Plant Biochemistry (2013) 3rd ed., Walter HH, cbspd, ISBN-13: 978-8131200032.
4. Outlines of Biochemistry (2006) 5th ed., Conn EE, Stumpf PK, Bruening G and Roy HD, Wiley, ISBN: 978-8126509300.
5. Fundamentals of Plant Physiology (2018) 6th ed., Taiz L, Zeiger E, Møller IM and Murphy A, Sinauer Associates Inc, ISBN: 978-1605357904.

SEMESTER-III

Course title: Practical Skills in Advanced Biochemistry **Credit: 5**
Course code: SIAS BC 13 05 SEC 00105 **Lectures: 150**

Course objectives: To train students a variety of experimental concept designed to complement the lectures different courses of the semester.

Learning outcomes:

Upon completion of this course, the student will be able to:

- Isolate DNA from various sources – viz plant, microbes and animals
- Quantify RNA and DNA using spectrophotometry
- Isolate and quantify the clinically important molecules like glucose, triglycerides, bilirubin from blood
- Understand the optimal conditions essential for protein/nucleic acid separation and purification

Experiments:

1. Genomic DNA isolation from plant/bacteria/animal
2. Qualitative and quantitative analysis of DNA.
3. Preparation of culture media
4. Bacterial culture: establishing a pure culture; identification of bacteria; staining techniques; antibiotic sensitivity of bacteria
5. Isolation of plasmid DNA
6. Restriction digestion of plasmid by restriction endonucleases and separation of restriction fragments by agarose gel electrophoresis
7. Isolation of RNA and separation on agarose gel
8. Quantitative estimation of RNA.

9. Polymerase chain reaction.
10. Estimation of blood glucose.
12. Estimation of triglycerides, bilirubin and urea in blood serum

Suggested readings:

1. An Introduction to Practical Biochemistry (2017) 3rd ed., Plummer, D, Tata McGraw Hill Education ISBN 13: 978-0070994874.
2. Wilson and Walker's Principles and Techniques of Biochemistry and Molecular Biology (2018) 8th ed., Hoffmann, A and Clokie, S, Cambridge University Press, ISBN 13: 978-1108716987.
3. Physical Biochemistry: Principles and Applications (2016) 2nd ed., Sheehan, D, Wiley India, ISBN 13; 978-8126564842.
4. Physical Biochemistry: Applications to Biochemistry and Molecular Biology (1983) 2nd ed., Freifelder, D, WH Freeman and Company (New York), ISBN 13; 978-0716714446.
5. Biophysical Chemistry: Principles and Techniques (2016) 4th ed., Upadhyay, A Upadhyay, K and Nath N, Himalaya Publishing House, ISBN 13: 978-9351422273

SEMESTER-III

Course title: Cancer Biology **Credit: 4**
Course code: SIAS BC 13 01 DCEC 3104 **Lecture: 60**

Course objectives: To provide an understanding of basic knowledge of cancer

Learning outcome

Upon completion of this course, the student will be able to:

- Have an in depth understanding of the molecular and cellular mechanisms that lead to cancer
- Describe the fundamental mechanistic principles behind cancer diagnosis and prevention
- Know the basic principles behind personalized medicine and therapeutic cancer management
- Have an overview of advanced methodologies used in cancer research

Unit I

Normal vs Cancer cell. Characteristics of cancer and cancer cells. Sign and symptoms of cancers. Risk factors of cancer - Life style and dietary factors. Benign and malignant tumors. Types of cancers. Epidemiology of breast, cervical, oral and lung cancers.

Unit II

Carcinogenesis: Carcinogens and carcinogenesis. Environmental carcinogens. Oxidative stress and Cancer. Concept of tumor suppressor and oncogenes. Pathology: Tumor formation - Initiation, promotion, and progression. Spread of cancer cells. Biology of cell death. Common myths and misconceptions of cancer.

Unit III

Prediction and Diagnosis: Clinical examination - Blood Tests, Pap smear test and Biopsy. Radiological examination - Xrays, CT scan, MRI and Mammography. Applications of Computational tools in cancer prediction.

Unit IV

Prevention and therapy: General principles of cancer therapy. Biomedical applications of nanotechnology

in cancer prevention. Concept of cancer vaccine. Antioxidants and dietary fiber in cancer prevention. Complementary therapy – Yoga and meditation.

Suggested Readings:

1. Molecular Pathology and Diagnostics of Cancer (Cancer Growth and Progression), Domenico Coppola, Springer.
2. An Introduction to Cellular and Molecular Biology of Cancer, Oxford Medical publications.
3. The Biology of Cancer, 2nd Ed. Janice Gabriel, John Wiley & Sons Ltd.,
4. Cancer Biology, 4th Ed. Raymond W. Ruddon, Oxford University Press, Inc.,
5. Introduction to Cancer Biology, Momna Hejmadi, Ventus Publishers.
6. Molecular Biology of Human Cancers, Wolfgang Arthur Schulz, Springer Science, Business Media, Inc.

SEMESTER-III

Course title: Molecular Diagnostics **Credit: 4**
Course code: SIAS BC 13 04 DCEC 3104 **Lectures: 60**

Course Objectives

This course is designed

- To introduce principles and concepts of various equipment's and instruments utilized in molecular diagnosis of various human diseases.
- To teach techniques that improve the ability to diagnose a number of diseases by enabling identification of many human pathogens that had previously been difficult to detect due to their low concentration.

Learning Outcome:

Upon completion of this course, the student will be able to:

- Understand the basic principles and get familiarise with the equipment, instruments commonly used in molecular diagnostics
- Understand basic of macromolecules and techniques employed to detect the levels of nucleic acids and proteins
- Understand the overview of non-infectious diseases like life-style disorders and tumorigenesis and the molecular diagnostic techniques employed to detect and analyze them
- Understand the overview of various infectious diseases caused by bacteria and virus and the molecular diagnostic techniques employed to detect and analyze them

Unit -I

Serological and Molecular diagnostics: Lab management, handling of spectrophotometer, water baths, pipettes, calculation of optimum pH, Temperature, Preparation and handling of reagents for enzyme assay, Overview of serological tests, commonly used serological diagnosis/ and tests, Diagnosis of Blood and Urine samples, Enzyme assays, Benefits of molecular diagnostics over serological diagnostics tests.

Unit -II

Role of molecular diagnostics in present diagnostic area: Basic techniques used in molecular diagnostics, future of molecular diagnostics, Overview of Macromolecules, Polyacrylamide gel electrophoresis (PAGE) and SDS- PAGE, Qualitative and quantitative determination of RNA and DNA, Standard curve preparation of DNA & RNA, Isolation of DNA, Agarose gel electrophoresis, Polymerase chain reaction. Antigen Antibody assay, ELISA tests, Immuno- electrophoresis.

Unit -III

Diagnosis of Non-infectious Diseases: Diagnosis of Lifestyle disorder- Causes, types, symptoms, complications, diagnosis and prevention of Diabetes (Type I and Type II), Hypertension (Primary and secondary), Testing of blood glucose using Glucometer/Kit

Diagnosis of Tumours-Types (Benign/Malignant), Detection and metastasis; Medical imaging: X-Ray, PET, MRI and CT scan (using photographs). Molecular diagnosis of tumorigenesis types of tumor.

Unit -IV

Diagnosis of Infectious Diseases: Causes, types, symptoms, diagnosis and prevention of Tuberculosis and Hepatitis Molecular diagnostics of bacterial infections-*Mycobacterium tuberculosis*, Staphylococci, *Schwenella typhus*, Pathogenic *E.coli*, sample preparation and pathogen detection. Prenatal diagnostics of various genetic disorders.

Molecular diagnostic of various viral diseases- HIV type -1, HIV type –II, HPV, Various hepatitis strains, Influenza (H1N1), sample preparation, various steps required for viral infection analysis and Viral load monitoring,

Suggested readings:

1. Preventive and Social Medicine, Park, K. (2007), B.B. Publishers
2. Textbook of Medical Laboratory Technology, II Godkar P.B. and Godkar D.P. Edition, Bhalani Publishing House
3. A Laboratory Manual for Rural Tropical Hospitals, A Basis for Training Courses, Cheesbrough M.,
4. Textbook of Medical Physiology, Guyton A.C. and Hall J.E. Saunders
5. Pathologic Basis of Disease, VIII Edition, Robbins and Cortan, Saunders
6. Lab Manual on Blood Analysis and Medical Diagnostics, Prakash, G. (2012), S. Chand and Co. Ltd.

SEMESTER-III

Course title: Human Health and Diseases **Credit:4**

Course code: SIAS BC 13 04 DCEC 3104 **Lectures:60**

Course objective: To acquire knowledge on different diseases of humans and their management.

Learning outcomes:

Upon completion of this course, the student will be able to:

- Be aware of energy requirements for humans, malnutrition disorders in children and role of vitamins and minerals in maintaining health
- Understanding basic concept of life style disease, hormonal imbalance, autoimmune disease and viral diseases
- Assess pathophysiology, risk factors and clinical manifestation of diseases related to nutrition
- Gain insights about the current lifestyle as a consequence of industrialization

Unit I

Inborn errors of metabolism, Nutritional deficiency based diseases: Alkaptonuria, Phenylketonuria, SCID, Clotting disorders. Kwashiorkar, Marasmus, Beri-beri, Scurvy, Pellagra, Anaemia, Night blindedness, Rickets, Osteomalacia, Osteoporosis, Wilson's disease.

Unit II

Life style diseases, Hormonal Imbalances: Obesity, Cardiovascular diseases, Atherosclerosis, Diabetes mellitus-II. Inflammatory Bowel Disease (IBD). Outline of hormone action and imbalances leading to disease – precociouspuberty, hyper and hypopituitarism. Hyper and hypothyroidism.

Unit III

Autoimmune diseases, Diseases caused due to misfolded proteins: Concepts in immune recognition - self and non-self-discrimination, organ specific autoimmune diseases – Hashimoto's thyroiditis, Grave's disease, Myasthenia Gravis; Systemic diseases - SLE, rheumatoid arthritis; Diabetes Mellitus-I. Alzheimer's, Huntington's disease, Kuru, Creutzfeldt-Jakob disease, Sickle cell anemia, Thalassemia.

Unit IV

Infectious diseases: Viral infection (polio, measles, mumps, influenza, HIV); Bacterial infections (tetanus, diphtheria, tuberculosis, typhoid, cholera); Protozoan (*Plasmodium* and *Trypanosoma*) and parasitic infections. Vaccines against diseases. General strategies in the design and development of vaccines.

Suggested readings:

1. Textbook of Biochemistry with Clinical Correlations (2011) Devlin, T.M. John Wiley & Sons, Inc. (New York), ISBN: 978-0-4710-28173-4.
2. Immunology: A Short Course (2009) 6th ed., Coico, R and Sunshine, G., John Wiley& sons, Inc (New Jersey), ISBN: 978-0-470-08158-7
3. Biochemistry (2012) 7th ed., Berg, J.M., Tymoczko, J.L. and Stryer, L., W.H Freeman and Company (New York), ISBN: 13:978-1-4292-7635-1.
4. Genetics (2012) 6th ed., Snustad, D.P. and Simmons, M.J., John Wiley & Sons. (Singapore), ISBN: 978-1-118-09242-2.

SEMESTER-III

Course title: Clinical Biochemistry **Credit:4**
Course code: SIAL BC 1 3 01 GEC 4004 **Lectures: 60**

Course objective: The objectives of this course are to demonstrate how basic biochemistry and analytical chemistry can be applied to medical diagnosis, treatment and management.

Learning outcomes:

Upon completion of this course, the student will be able to:

- Clinically assess the laboratory indicators of physiologic conditions and diseases
- Understanding the biochemical and molecular tools needed to accomplish diagnostic, and therapeutic intervention on hereditary and acquired disorders
- Understanding the importance of quality control and assurance to diagnostic work
- Illustrate, compare and appreciate functions and biochemical attributes of Liver and Implications in Clinical Biochemistry

Unit-I

Clinical Biochemistry - concept, definition and scope; biological samples - types, collection, processing, stability and storage; phlebotomy; chemical composition of biological fluids and its importance - blood, urine and cerebrospinal fluid; reference ranges.

Unit-II

Quality assurance; accuracy and precision; factors influencing the accuracy of results; Levy-Jennings's chart; reliability of a laboratory method; interferents.

Unit-III

Biochemical tests in clinical practice–characteristics and uses of a biochemical test; Investigation of disorders of carbohydrate metabolism- Hypoglycemia, Hyperglycemia. Diabetes mellitus; enzymes as diagnostic tool; advantages and disadvantages of enzyme assays; isozymes and their diagnostic importance; methods for the detection of isoenzymes.

Unit-IV

Organ function tests clinical presentation and diagnosis of the diseases of the liver and kidney; bilirubin metabolism; acid base disorders; Genetic Information about diseases - Oncogenes and cancer, inborn errors of metabolism.

Suggested readings:

1. Clinical Biochemistry (2018) 6thed., Murphy M, Srivastava R and Deans K, Elsevier, ISBN:978-0702072987.
2. Clinical Biochemistry: Metabolic and Clinical Aspects (2014) 3rded., Marshall WJ, Churchill Livingstone, ISBN: 978-0702051401.
3. Clinical Biochemistry (Lecture Notes) (2017) 10thed., Rae P, Crane M and Pattenden R, Wiley-Blackwell, ISBN:111924868X.
4. Lecture Notes: Clinical Biochemistry (2010) 8thed., Becket G, Walker SW, Race PandAshby P, Wiley-Blackwell, ISBN: 978-1405193054.
5. Principles of Medical Biochemistry (2016) 4thed., Meisenberg G and Simmons WH, Elsevier, ISBN: 978-03232 96168.
6. Tietz Fundamentals of Clinical chemistry and Molecular diagnostics. (2014) 7thed.,Burtis CA and Bruns DE, Elsevier, ISBN: 978-813123885
7. Textbook of Biochemistry with Clinical Correlation. Thomas M. Devlin. Wiley, 2019

Course title: Analytical Techniques **Credit: 4**
Course code: SIAL BC 1 3 02 GEC 4004 **Lecture: 60**

Course objective: To provide an advanced understanding of the core principles of various techniques used in biological experiments.

Learning outcomes:
Upon completion of this course, the student will be able to:

- Demonstrate principles of various basic and advanced techniques used in biological experiments

- Critically analyses and interpret the results obtained from biological experiments
- Learn basics and application of many types of microscopy and its application in research
- Acquire knowledge about the basics and latest developments in the instrumentation techniques of Centrifugation, Electrophoresis (IEF, 2D PAGE), Chromatography, NMR and Mass spectrometry along with their applications in various research fields

Unit-I

Microscopy; principle, resolving, magnification power and application of compound microscopy, Fluorescence microscopy, phase contrast microscopy, fixation and staining, freeze fracture/etch techniques.

Unit-II

Agarose gel electrophoresis, polyacrylamide gel electrophoresis (native and SDS-PAGE), iso-electric focusing (IEF), 2-Dimensional gel electrophoresis, principle and applications of centrifugation, differential centrifugation, density gradient centrifugation, and ultracentrifugation.

Unit-III

Principle and types of Chromatography; paper chromatography, thin layer chromatography (TLC), column chromatography, principle and applications, High performance liquid chromatography (HPLC) and gas liquid chromatography (GLC). Radioactivity, autoradiography, Safety measures of radioisotope handling.

Unit-IV

Beer-Lambert's Law, principle and instrumentation of UV-visible, NMR spectroscopy, X-ray diffraction spectroscopy,mass spectrometry (MS), electrospray ionization mass spectrometry (ESI-MS), MALDI, tandem MS for protein identification, Circular Dichroism (CD), N-terminal sequencing and peptide synthesis, EMSA, foot printing, ELISA.

Suggested readings:

1. Principles and Techniques of Biochemistry and Molecular Biology (2018) 8th ed. Wilson K and Walker J, Cambridge University Press, ISBN No. 131661476X.
2. Physical Biochemistry: Principles and Applications (2010) 2nd ed., Sheehan, D., Wiley Blackwell (West Sussex), ISBN: 978-0-470-85602-4 / ISBN: 978-0-470-85603-1.
3. Physical Biochemistry: Applications to Biochemistry and Molecular Biology (1982) 2nd ed., Freifelder D, W.H. Freeman and Company (New York), ISBN:0-7167-1315-2 /ISBN:0-7167-1444-2.
4. Principles of Instrumental Analysis (2018) 7th ed., Douglous A. Skoog, F. James Holler, Stanley R Crouch, Singapore: Cengage Learning Asia Pte Ltd.

SEMESTER-IV

SEMESTER-IV

Course title: Presentation and Research Skills **Credit: 3**
Course code: SIAS BC 1 4 01 SEC 0003 **Lectures: 45**

Course objectives:

- To provide knowledge about tools and techniques related with scientific communication and research methodology.
- To impart knowledge on scientific writing skills

Learning outcomes:

- Understanding the existence of scientific knowledge in ancient times
- Acquiring the skills of scientific reading, writing and presentations
- Appreciating the scientific ethics through case studies

This course is aimed for interactive group discussion on presentation and research skills. Seminar will be of 45-minute duration during which the presentation will be followed by questions session by the audience comprising of faculty and students. Every student shall be required to submit the topic of his/her seminar in consultation with the Head of the Department/Faculty members/student advisors well in advance so that the same may be displayed on the notice board. The presenter has to write an Abstract to be distributed during Seminar in addition to two copies of write-up giving relevant details of the background of the subject, methods used and references/List of sources from where the material for presentation has been collected.

SEMESTER-IV

Course title: Dissertation **Credit: 22**
Course code: SIAL BC 1 4 01 SEC 0022

Learning outcomes:

Upon completion of this course, the student will be able to:

- Nurture their scientific capabilities
- Define their own research questions; simultaneously experiencing the process of producing knowledge
- Identify own areas of interest with in depth exploration
- consolidate communication, information-seeking and intellectual skills

Guidelines for Project File

Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation.

Research is genuine exploration of the unknown that leads to new knowledge which often

warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student.

Sufficient time should be allowed for satisfactory completion of reports, taking into account that initial drafts should be critiqued by the faculty guide and corrected by the student at each stage.

The file is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation.

In general, the File should be comprehensive and include

- A short account of the activities that were undertaken as part of the project;
- A statement about the extent to which the project has achieved its stated goals.
- A statement about the outcomes of the evaluation and dissemination processes engaged in as part of the project;
- Any activities planned but not yet completed as part of the project, or as a future initiative directly resulting from the project;
- Any problems that have arisen that may be useful to document for future reference.
- The guidelines and format for dissertation is given below:
  .

Dissertation Guidelines

1. GENERAL:

The manual is intended to provide broad guidelines to the M.Sc. candidates in the preparation of the dissertation report. In general, the project report shall report in an organized and scholarly fashion an account of original research work of the candidate leading to the discovery of new facts or techniques or correlation of facts already known.

2. NUMBER OF COPIES TO BE SUBMITTED:

Students should submit three copies to the Head of the Department concerned on or before the specified date.

3. ARRANGEMENT OF CONTENTS OF DISSERTATION:

Dissertation material should be arranged as follows:

1. Cover Page &Title page
2. Declaration
3. Certificate
4. Abstract (Hindi and English)
5. Acknowledgements
6. Table of Contents
7. List of Tables
8. List of Figures
9. List of Symbols, Abbreviations and Nomenclature (Optional)
10. Chapters
11. References
12. Appendices
13. One page CV

The Tables and Figures shall be introduced in the appropriate places.

4. PAGE DIMENSIONS ANDMARGIN:

The dimensions of the dissertation should be standard A4 size paper may be used for preparing the copies, **standard margin** with 1.5 line spacing.

5. MANUSCRIPTPREPARATION:

The general text of thesis shall be typed in font style Times New Roman and font size 12. Same quality of paper should be used for the preparation of the entire report/thesis; except figure, photos are shown.

Cover Page & Title Page - A specimen copy of the Cover page & Title page for report/thesis are given in Annexure I.

Certificate-The Bonafide Certificate as per the format shown in Annexure II

Abstract: Abstract should be an essay type (HINDI and ENGLISH) of narration not exceeding 500 words outlining the research problem, the methodology used for tackling it and a summary of the findings, typed in 1.5linespacing.

Acknowledgements: The acknowledgements shall be brief and should not exceed one page. The student's signature shall be made at the right bottom above his / her name typed in capitals.

Table of contents - The table of contents should list all material following it as well as any material which precedes it. The title page, Bonafide Certificate and Acknowledgment will not find a place among the items listed in the Table of Contents but the page numbers in lower case Roman letters are to be accounted for them. One and a half spacing should be adopted for typing the matter ender this head. A specimen copy of the Table of Contents for report / thesis is given in Annexure III.

List of Table-The list should use exactly the same captions as they appear above the tables in the text and the caption shall follow 'sentence case'. One and a half spacing should be adopted for typing the matter under this head.

List of Figures - The list should use the same captions as they appear below the figures in the text and the caption shall follow 'sentence case'. One and a half spacing should be adopted for typing the matter under this head

List of Symbols, Abbreviations and Nomenclature - One and a half spacing should be adopted for typing the matter under this head. Standard symbols, abbreviations etc. should be used.

Chapters - The chapters may include

Chapter I –

Introduction Chapter II

- Literature Review

Chapter III –Materials and Methods

Chapter IV- Results and Discussion

Research output/outcome if any published or presented in conference/seminar/symposium may be included.

List of References - Any works of other researchers, if used either directly or indirectly, should be indicated at appropriate places in the report/thesis. The citation may assume any one of the following forms**. APA Style.**

APA in-text citation style uses the author's last name and the year of publication, for example: (Field, 2005).

Example:

Derwing, T. M., Rossiter, M. J., & Munro, M. J. (2002). Teaching native speakers to listen to foreign-accented speech. *Journal of Multilingual and Multicultural Development*, 23(4), 245- 259.

Thomas, H. K. (2004). *Training strategies for improving listeners' comprehension of foreign- accented speech* (Doctoral dissertation). University of Colorado, Boulder.

6. TYPINGINSTRUCTIONS

General

This section includes additional information for final typing of the thesis. Some information given earlier under 'Manuscript preparation' shall also be referred. The impressions on the typed/duplicated/printed copies should be black in colour. Corrections, interlineations and crossing out of letters or words will not be permitted in any of the copies of the report/thesis intended for submission. Erasures, if made, should be neatly carried out in all copies. A sub- heading at the bottom of a page must have at least two full lines below it or else it should be carried over to the next page. The last word of any page should not be split using a hyphen. One and a half spacing should be used for typing the general text. The general text shall be typed in Font Style Times New Roman and Font Size 12.

Single spacing should be used for typing:

(i) Long Tables

(ii) Long quotations

(iii) Foot notes

(iv) Multilane captions
(v) References

Chapters: The format for typing chapter headings, division headings and subdivision headings shall be same as given in Table of Contents.

7. BINDING SPECIFICATIONS

Thesis should be spiral or soft cover book bound, the cover of thesis should be of dark green color, printed with golden ink and the text for printing should be identical as prescribed for the title page.

APPENDIX I A:(A typical Specimen of Cover Page & Title Page–**DISSERTATION**)

<Font Style Times New Roman - Bold>

TITLE OF DISSERTATION

<Font Size 18><1.5 line spacing>

DISSERTATION

<Font Size 14>

Submitted by

<Font Size 14><Italic>

NAME OF THE CANDIDATE

<Font Size 16>

Under the Supervision of

NAME OF THE SUPERVISOR

in partial fulfillment for the award of the degree of

<Font Size 14><1.5 line spacing>

MASTER OF SCIENCE IN

NAME OF THE PROGRAMME

<Font Size 16>

DEPARTMENT OF

SCHOOL OF ……..

CENTRAL UNIVERSITY OF HARYANA MAHENDERGARH-HARYANA

<Font Size 14><1.5 line spacing>

MONTH AND YEAR

DECLARATION

I ……, student of the School of Interdisciplinary and Life Sciences, Central University of Haryana, Mahendergarh hereby declare and certify with my signature that my thesis entitled

…… submitted to the Department of.....,Central University of Haryana, India in partial fulfillment of the requirements for the award of the Degree of Masters of Science is a record of original research work done by me and the dissertation has not been the basis for the award of any degree/diploma/associateship/fellowship or similar title of any candidate of any University. I have faithfully and accurately cited all my sources, including books, journals, handouts and unpublished manuscripts, as well as any other media, such as the Internet, letters or significant personal communications.

I understand the concept of "plagiarism" and declare that while drafting this dissertation I have refrained from plagiarism. I know that plagiarism not only includes direct copying, but also the extensive use of other's ideas without proper referencing or acknowledgement (which includes the proper use of references and quotation marks).

If my dissertation found to be plagiarized at any point of time, I'll be solely responsible and will be ready to accept any decision taken by the competent authority including rejection of my dissertation.

(Supervisor) (Signature of student)

For example

(A typical Specimen of Table of Contents)

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ANNEXURE II

Curriculum vitae

<Font Style Times New Roman, Font Size 14>

Personal Details

Name:

Date of birth: DD Month, YYYY

Place of birth:

Nationality: Indian

Permanent Address:

Email Id:

Mobile No. :

Education

M.Sc. (Subject): YYYY Central University of Haryana, India

B.Sc. (Subject). : YYYY (Name of the University) with …. % of marks Higher Secondary:

YYYY (Name of the board) with …. % of marks Secondary: YYYY, (Name of the board)

with …. % of marks

9. Teaching Learning Process

While Teaching is a process of imparting knowledge and information, learning is a process of receiving them and display a long-term positive or negative change in them. Teaching-Learning Process is carried out through the teaching in an environment set-up within which the learners (students) can interact and study how to learn. Effective teaching help to engage and motivate learners to get involved in the process of learning. Learning activities are designed by the teacher to result in learning.

Components of the learning process includes:

- Focus/Attention
- Recall/Memory
- Language
- Processing and composing/organizing
- Writing
- Higher Order thinking

It helps the teacher to assess, evaluate and improvise their instructional techniques and in setting-up, modifying the teaching methods to fulfil the teaching-learning objectives that include:

- To transfer knowledge
- To Impart skills
- To inculcate values, attitudes and behavior

Following teaching, four phases of learning includes

- Preparation
- Presentation
- Practice
- Performance

As learners are unique and different in different ways, there is no single teaching method that can meet the objectives. In the present era, a good teacher needs to have the following skills to bring about the learning process;

- Communication skills
- Creativity
- Abreast and updated knowledge
- Information literacy
- Media Literacy

- Technology literacy
- Flexibility
- Collaboration and team spirit
- Analytical skills
- Critical thinking

To bring about best Teaching -Learning process, the biochemistry course is designed with the following combination of teaching activities:

1. Lectures
2. Discussion/Debates
3. Simulation
4. Role playing
5. Participative Learning
6. Interactive sessions
7. Hands-On trainings
8. Seminars
9. Research based learning/Dissertation/Project Work
10. Technology -embedded learning
11. Building Models

10. Blended Learning

The efforts rendered to improve the critical thinking skills and student learning activities in biochemistry course, Department of Biochemistry is adopted to implement problem based learning model under the blended learning. The blended learning in biochemistry will be implemented by applying both the Computer aided learning (40%) and face to face learning (60%). The face to face learning is accomplished in the class room and Computer aided learning is done by utilizing the internet for accessing the software, online education forum, online discussion forum, online visual education forum etc. The computer aided learning requires access to adequate hardware and software, and the development of knowledge and abilities which students are not often explored in the face-face learning method. The development of a new educational strategy, such as these blended lessons and activities, must be accompanied with a broad discussion and analysis of the specific context of their application,

considering not only the nature, structure, and educational objectives, but also the profile and expectations of the students involved in the biochemistry. The outcomes of both learning activities are monitored by using different evaluation that appear and determine the criteria. In conclusion the problem-based learning that is applied by using the blended learning method can improve the students learning activities, and critical thinking skills of students.

12. Assessment and Evaluation

- Continuous Comprehensive Evaluation at regular after achievement of each Course-level learning outcome
- Formative Assessment on the basis of activities of a learner throughout the programme instead of one-time assessment
- Oral Examinations to test presentation and communication skills
- Open Book Examination for better understanding and application of the knowledge acquired
- Group Examinations on Problem solving exercises
- Seminar Presentations
- Review of Literature
- Collaborative Assignments

13. Key words

- Biochemistry
- LOCF
- NEP-2020
- Blended Learning
- Face to face (F to F) Learning
- Programme Outcomes
- Programme Specific Outcomes
- Course-level Learning Outcomes
- Postgraduate Attributes

- Learning Outcome Index
- Formative Assessment and Evaluation
- Comprehensive and Continuous Evaluation

14. References

- National Education Policy-2020. https://www.education.gov.in/sites/upload_files/mhrd/files/NEP_Final_English_0.pdf
- The draft subject specific LOCF templates available on UGC website. https://www.ugc.ac.in/ugc_notices.aspx?id=MjY5OQ==
- Draft Blended Mode of Teaching and Learning: Concept Note available on UGC website. https://www.ugc.ac.in/pdfnews/6100340_Concept-Note-Blended-Mode-of-Teaching-and-Learning.pdf

15. Appendices

- Curricular Reforms— Extracts from National Education Policy-2020

Central University of Haryana
School of Interdisciplinary and Applied Sciences
Department of Biochemistry

Ph.D. Biochemistry
SCHEME AND CURRICULUM (2020-21)

Semester	Core/Elective	Course code	Title of the paper	Credit
I	Core	SIAS BC 02 01 01 C 4004	Research Methodology	4
	Core	SIAS BC 02 01 02 C 4004	Advanced Analytical Techniques	4
	Core	SIAS BC 02 01 03 C 2002	Research and Publication Ethics (RPE)	2
	Elective	SIAS BC 02 01 01 E 4004	Advanced Biochemistry	4
	Elective	SIAS BC 02 01 02 E 4004	Advanced Immunology	4
	Total			**14**

Course title: Research Methodology **Credit: 4**

Course code: SIAS BC 02 01 01 C 4004 **Lectures: 60**

Course objective: To provide knowledge about tools and techniques related with scientific communication, research methodology and biosafety in biological experiments.

Learning outcomes:

- Understanding the existence of scientific knowledge
- Acquiring the skills of scientific reading, writing and presentations
- Appreciating the scientific ethics through case studies
- Understand the importance and level of biosafety
-

Unit 1. Identification and defining of the research problem:

Familiarization of research areas; Review of literature using appropriate resources – reviews, research papers, books and patents; Use of tools for searching literature through electronic databases; Defining a research problem.

Unit 2. Experimental approaches and methodology

Experimental designs to address the research problem; Pros and cons of different experimental strategies; Finalization of experimental design; Tools and techniques to execute experiments; Means to validate and analyze data; Use of statistical tools for analyzing the significance and interpretation of the data; Methods of recording observations and documentation

Unit 3. Presentation and publication

Skills for scientific writing and research presentation – Term paper, Research project, Research report, Thesis, Research article and Review; Organization of the research document in to different sections (Introduction, Methodology, Results, Discussion, and Summary and Conclusions, Bibliography); Oral presentation skills. Use of electronic tools for bibliographic formatting and checking Plagiarism.

Unit 4. Protection of Research Data.

Patents and Intellectual property rights. Patent filing Indian & abroad. Patent search.

Suggested readings

1. Rumsey DJ. Statistics essentials for dummies for dummies; 1 edition. 2019
2. Blokdyk G. Biosafety level A Complete Guide. 5STARCooks. 2019
3. Nambisan P. An Introduction to ethical, safety and intellectual property rights issues in Biotechnology. Academic Press; 1 edition. 2017
4. Gastel, Barbara, and Robert A. Day. How to write and publish a scientific paper. ABC-CLIO, 2016
5. Ruxton DG, Colegrave N. Experimental design for the life sciences. Oxford University Press; 4 edition. 2017

Course title: Advanced Analytical Techniques **Credit: 4**

Course code: SIAS BC 02 01 02 C 4004 **Lectures: 60**

Course objective: To provide an advanced understanding of the core principles of various techniques used in biological experiments.

Learning outcomes:

- Demonstrate principles of various basic and advanced techniques used in biological experiments
- Critically analyze and interpret the results obtained from biological experiments

Unit 1. Recombinant DNA techniques and genomics

Use of Restriction and modification enzymes in cloning; Plasmid vector; Transformation and Plasmid isolation; DNA sequencing (Sanger's chain termination method, and automated DNA sequencing); Next generation sequencing (NGS); Real time PCR and Microarrays, Electrophoretic Mobility Shift Assay (EMSA).

Unit 2. Proteomics

UV and fluorescence spectroscopy; Circular Dichroism; Mass spectrometry, Chromatography; Gel filtration, Ion exchange and Affinity chromatography. 2D gel electrophoresis; Immunochemical detection of proteins, HPLC, ELISA.

Unit 3. Microbial and cellular techniques

Microscopic techniques; Compound, Phase-contrast, Confocal and Electron Microscopy, Cell disruption and fractionation of organelles; Isolation and purification of membrane proteins; cell-cell and cell-virus fusion methods; Flow cytometry, Atomic Force Microscopy; Types of Biosafety cabinets.

Unit 4. Animal models in biology

Handling and maintenance of animals, Ventilated cages, Different routes of injections and collection of various biological components, Formulation of feed and design of experiment.

Suggested readings

1. Blokdyk G. Analytics Techniques: A Complete Guide.5STARCooks. 2019
2. Rune M. Mass Spectrometry Data Analysis in Proteomics.Humana; 3rd ed. 2020
3. Hofmann A, Clokie S.Wilson and Walker's Principles and Techniques of Biochemistry and Molecular Biology.Cambridge University Press; 8 edition. 2018
4. Freshney, R.I. Culture of Animal cells: A Manual of Basic Technique and specialized applications. 7th edition. Wiley-Blackwell. 2016
5. Brown TA. Gene cloning and DNA analysis: An introduction.Wiley-Blackwell; 7th edition. 2016

Course title: Research and Publication Ethics **Credit: 2**

Course code: SIAS BC 02 01 03 C 2002 **Lectures: 30**

Course objective: To learn philosophy of science, research misconduct and integrity, publication plagiarism and ethics.

Learning Outcomes:

- Learn to identify the FFP in research and ethics of publication.
- Hands on session help to find research misconduct, predatory publication, publications metrics and plagiarism.
- To learn database citation and indexing of publication.

Part A: THEORY

Unit1 Philosophy & ethics

Introduction of Philosophy; definition, nature and scope, concept, branches. Ethics; definition, moral philosophy, nature of moral judgments and reactions.

Unit II Scientific conduct

Ethics with respect to science and research, Intellectual honesty and research integrity, Scientific Misconduct; falsification, fabrication and Plagiarism (FFP), Redundant publications; duplicate and overlapping publications, salami slicing.

Unit III Publication ethics

Publication ethics; definition, introduction and importance. Best Practices/ standards setting initiatives and guidelines: COPE, WAME etc., Conflict of Interest, Publication misconduct: definition, concept, problems lead to unethical behavior and vice-versa, types, Violation of publication ethics, authorship and contributor-ship, Identification of publication misconduct, complaint and appeals, Predatory publications and journals.

Part B: PRACTICE

Unit IV Open access publishing

Open access publications and initiatives, SHERPA/RoMEO online resource to check publisher copyright and self-achieving policies, Software tools to identify predatory publications developed by SPPU, Journal finder Journal suggestion tools vis. JANE, Elsevier journal finder, Springer journal suggested etc.

Unit V Publication misconduct

Group discussion; Subject specific ethical issues, FFP, Authorship, Conflict of interest, Complaint and appeals; example and fraud from India and abroad. Software tools; turnitin, urkund and other open source plagiarism tools.

Unit VI Database and research metrics

Database: Indexing citation database; Web of Science and Scopus etc., Research metrics; Impact factor of journal as per journal citation report, SNIP, SJR, IPP, Cite score, Metrics; h index, g index, i10, altmetrics.

Suggested readings

1. Bird A. Philosophy of science. Routledge. 2006. ISBN 9781138705579.
2. MacIntyre A. A short history of ethics: A history of moral philosophy from the homeric age to the twentieth century. London. 1967. ISBN: 9780268161286.
3. Chaddhah P. Ethics in competitive research, do not get scooped; do not get plagiarized. 2018. ISBN-10: 9387480860
4. On being a scientist, a guide to responsible conduct in research. National Academy of Science, National Academy of Engineering and Institute of Medicine. 2009. ISBN-10: 0309119707
5. Muralidhar K. Ghosh A. Singhvi A. Ethics in science education, research and governance. Indian National Science Academy. 2019. ISBN: 9788193948217

Course title: Advanced Biochemistry **Credit: 4**

Course code: SIAS BC 02 01 01 E 4004 **Hour: 60 hour**

Course objective: To understand the biochemistry of biomolecules and their role in research

Learning Outcome

- Understanding of basic principles of Biochemistry
- Understanding proteins, proteomics and enzymes, computational biochemistry and cell culture

Unit I: Biological macromolecules

Carbohydrates-Structure, reactions and functions of monosaccharides, disaccharides, polysaccharides and complex carbohydrates; amino sugars, proteoglycans and glycoproteins. Glycolysis, TCA Cycle. Lipids - Classification, structure, properties and functions of fatty acids, essential fatty acids, fats, phospholipids, sphingolipids, cerebrosides, steroids, bile acids and lipoproteins. Fatty acid oxidation and synthesis. Nucleic acids - Structure and function of nucleotides. Primary, secondary and tertiary structure of nucleic acids, DNA forms and conformations.

Unit II Protein, proteomics and enzymes

Protein Structure, stabilizing forces of protein, Protein Isolation, Proteomics- 2D gel electrophoresis, 2DIGE, free flow electrophoresis, blue native gel electrophoresis, Mass spectrometry in proteomics, tagging methods for MS proteomics, isotope coded affinity tagging, tagging for tandem MS, Enzyme- working mechanism, Enzyme kinetics– Michaelis-Menten, Briggs and Haldane theory (rapid equilibrium and steady state theory). Pre-steady state kinetics, Enzyme Inhibition: Types of reversible inhibitors, Partial inhibition, substrate inhibition and allosteric inhibition. Industrial Enzymes.

Unit III: Computational biochemistry

Properties of amino acids and peptide bonds, Ramachandran Plot. Motifs and Folds; Protein structure related databases, Protein Data Bank format, Structure visualization of proteins. Protein Fold Classification, Protein structure comparison, CATH and SCOP Databases. Protein structure prediction methods. Homology modeling. Molecular Docking and Drug design (Basic concepts).

Unit IV Immunology and cell culture

Host Defense systems; Hematopoiesis, cells of the immune system; Components and connections between Innate and Adaptive Immunity; Immunoglobulins (Ig) and their organization; Complement system; Structure Function and Organization of MHC. Cell and tissue culture types and techniques, organ, callus, cell suspension and protoplast culture. Organogenesis, somatic

embryogenesis and somoclonal variation. Transfection techniques, applications of animal culture. Stem cells-basis and differentiation.

Suggested readings

1. Palmer T. Enzymes. East – West Press Pvt. Ltd., Delhi. 2004
2. Colowick SP., et al., Methods in Enzymology; Vol. 152, Academic Press. 1987
3. Nicholas C. Price and Lewis Stevens. Fundamentals of Enzymology; 3rd Edn. Oxford University Press. 2012
4. Voet D. Fundamentals of Biochemistry John Wiley & Sons. 2016
5. Bourne PE, Gu J. Structural Bioinformatics (2nd edition), John Wiley & Sons, New York. 2009

Course title: Advanced Immunology **Credit: 4**

Course code: SIAS BC 02 01 02 E 4004 **Hour: 60 hour**

Course objective:

To understand the cellular components of the immune system and their corresponding immune responses in normal and deregulated systems

Learning Outcome

- Review basic principles of Immunology
- Understanding molecular mechanism of dysregulation and disorders associated when immune system fails
- Understand mechanisms by which the immune system and cells interact to affect nervous system and tumor growth
- Explore therapies and various strategies being developed and employed to manipulate cell-cell interactions in immune-pathological situations.

Unit-I: **Introductory immunology: molecules and mediators**

Host Defense systems; Hematopoiesis, cells of the immune system; Components and connections between Innate and Adaptive Immunity; Immunoglobulins (Ig) and their organization; Complement system; Structure Function and Organization of MHC.

Unit-II: **Breaking tolerance: autoimmunity & dysregulation**

Deficiencies/Defects of Immune Cells; Central & Peripheral Tolerance; Mucosal Immunity & Immunopathology; Regulation of Immunity & the Microbiome; Epigenetics & Modulation of Immunity; Hypersensitivity; Inflammation and autoinflammation; T cell mediated autoimmune diseases; Antibody-mediated autoimmune diseases; Infectious Diseases; Transplantation; Immune Regulation in Pregnancy.

Unit-III: System immunology: Stem cell/cancer and neuro immunology

Stem Cell and Cancer Immunology; Tumor Origination and Progression; Tumor Antigens; Immunosurveillance; Immune Cell Trafficking; Immune response during Metastasis and Invasion Neuroimmunology Blood-Brain Barrier; Brain tumours; Acute, Persistent and latent neurotropic viral infections; Bacterial and parasitic infections; Myasthenia Gravis and Guillain-Barre; Alzheimers; Transmissible spongiform encephalopathies.

Unit-IV: Applications and immunotherapy

Cytokines and their Therapeutic uses; Antibody and Vaccine development strategies (Recombinant, Combined and polyvalent vaccines); DC Vaccines; Methods to evaluate immune responses; Recent techniques in Immuno-disorder diagnostics; Current topics in Immunotherapy: Success and failures.

Suggested Reading

1. Punt J, Stranford S, Jones P and Owen JA, W.H Freeman and Company. Kuby Immunology. 8th ed. 2018. ISBN: 978-1319114701.
2. Murphy KM and Beaver C, WW Norton and Company. Janeway's Immunobiology 9th ed. 2017. ISBN: 978-0815345510.
3. Delvis PJ, Martin SJ, Burton DR and Roitt, IM. Roitt's Essential Immunology. 13th ed., Wiley-Blackwell. 2017. ISBN: 978-1118415771.
4. Cancer Immunotherapy (Second edition), edited by Prendergast and Jaffee
5. Robert Weinberg. The Biology of Cancer (2nd edition). Garland Science

Annexure-L

Department of Biotechnology
Central University of Haryana, Mahendergarh

Minutes of the Meeting

Minutes of the Board of Studies Meeting of the Department of Biotechnology held on 24 July, 2020 at 10:00 AM online (via Skype)

The following were present:

1. Prof. Satish Kumar, CUH, Mahendergarh, Haryana - Chairperson
2. Prof. S.K Gahlawat, CDLU, Sirsa - External Expert
3. Prof. Rakesh Tuli, JC Bose Fellow UIET, PU Chandigarh - External Expert
4. Dr.Kashyap Kumar Dubey - Member
5. Dr.Inderjeet Kaur - Member
6. Dr Bijender Singh - Special Invitee
7. Dr Namrata Dhaka - Special Invitee
8. Dr Ram Gopal Nitharwal - Special Invitee
9. Dr Ravi Kumar - Special Invitee

Agenda were discussed and the followings were resolved unanimously:

1. The Name of the paper setters (External), for the End Term Examinations of M.Sc. Biotechnology for Odd and Even Semesters (session 2020-2021) were discussed at length and accordingly the subject wise list of external experts was prepared as given in Annexure-IA and Annexure IB.

2. The name of question paper moderator for Odd Semester and Even Semesters (2020-2021) were recommended as under:
   a. Prof. Rup Lal
      NASI Senior Scientist
      TERI, New Delhi
   b. Prof. T. Satyanarayana
      Professor
      NSIT, Dwarka New Delhi
   c. Prof. M.V. Rajam
      Deptt of Genetics
      University of Delhi South Campus, New Delhi
   d. Prof. Ashok Chaudhury
      Deptt of Biotech
      GJU Science and Tech Hissar
   e. Prof.Jitender Sharma
      Deptt of Biotech
      Kurukhetra University Kurukhetra
   f. Prof. A.K. Mohanti
      Deptt of Biotech
      NDRI, Karnal
   g. Prof. Prince Sharma
      Deptt of Microbiology
      Punjab University Chandigarh
   h. Prof. R.K. Salar
      Department of Biotechnology,
      CH. Devi Lal University, Sirsa

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3. Revised scheme and syllabus of Ph.D. Biotechnology was discussed at length and the experts suggested to make certain changes in Research Methodology syllabus and the same were incorporated in the final version. As per the UGC directions, a new course i.e. Research Publication and Ethics was added. New course on "Omics Technologies" was also added as Department Centric Elective Course. The final version of PhD scheme and syllabus got approvedby the Board of Studies are included in Annexure-II.
4. Board of Studies approved a panel of experts for Department Research Committee (DRC) of Department of Biotechnology. (See Annexure-III)
5. Committee discussed the matter of ongoing PhD students of Dr.Kashyap Kumar Dubey, who has recently offered a position of Associate Professor by SBT-JNU and would like to maintain his lien at CUH. Committee recommended that the Dr. Dubey can supervise the ongoing PhD students till his confirmation, afterwards he may continue to be Co-supervisors of Ph.D. students working under his supervision.

Meeting ended with the thanks to chair.

Bijender Singh
24/07/2020

Nawal
24/07/2020

24/7/2020

Ram Gopal
24/7/2020

Bijender Singh
08/9/2020

Head Incharge
Dept. of Biotechnology
Central University of Haryana
Jant-Pali Mahendergarh 123029

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From: Prof. Satish Kumar <satishk@cuh.ac.in>
Sent: Monday, August 3, 2020 12:44 PM
To: skgcdlu@gmail.com <skgcdlu@gmail.com>; Rakesh Tuli <rakeshtuli@hotmail.com>
Cc: kashyap dubey <kashyapdubey@cuh.ac.in>
Subject: BoS draft minutes and Annexures

Dear Prof. Tuli and Prof. Gahlot,

Please find enclosed draft minutes with annexures fir your kind perusal. We shall be happy to incorporate changes/ additions/ deletion.

I shall be grateful if we have your thoughts on this for finalisation.

Regards ,

Satish Kumar

Bijender Singh 8/9/2020

Head Incharge
Dept of Biotechnology
Central University of Haryana
Jant-Pali Mahendergarh 123029

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---------- Forwarded message ---------
From: **Prof. Satish Kumar** <satishk@cuh.ac.in>
Date: Fri, Aug 21, 2020 at 3:51 PM
Subject: Re: BoS draft minutes and Annexures
To: Rakesh Tuli <rakeshtuli@hotmail.com>
Cc: Prof. S.K. Gahlawat <skgcdlu@gmail.com>, kashyap dubey <kashyapdubey@cuh.ac.in>

Thanks very much for your comments
We are looking forward to your guidance in coming years.

With best regards.

Satish

On Fri, 21 Aug 2020, 15:28 Rakesh Tuli, <rakeshtuli@hotmail.com> wrote:
Dear Dr Satish Kumar,

It was pleasure learning about the young Department of Biotechnology at CUH and to interact with very ambitious faculty, willing to make rapid progress in teaching and learning. We had good discussions in the BOS meeting. The Minutes have been drafted well, and I agree with its contents.

Though I do not see Annexure III related to the panel of experts, I feel an open guideline to invite and consult any expert from among Fellows of the national science academies could be helpful, as also discussed during the meeting.

I also suggest that the Department may consider constituting a Committee to discuss what changes they may like to bring in the teaching and learning strategies in view of the New National Education Policy 2020. This is important, specially wherever the Department participates in Graduation programmes. This may require thinking how to make the curriculum more creative for customized problem solving, innovative and collaborative. We may examine need to introduce a more diverse basket of electives and make admissions broad based for critical thinking to innovatively address societal issue.

I am sorry for delay in my response.

With best wishes to all the faculty,

Sincerely,

Rakesh Tuli

~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~

Dr Rakesh Tuli, **FNA, FASc, FNASc, FAAS**
(Former Director National Botanical Research Institute, Lucknow &
National Agri-Food Biotechnology Institute, Mohali)
J C Bose National Fellow &
Sr Research Advisor,
University Institute of Engineering & Technology (UIET),
Sector 25, Panjab University,
Chandigarh 160014
Res: 765, Sector 12, Panchkula, Haryana 134115

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directornabi@gmail.com

Head Incharge
Dept. of Biotechnology
Central University of Haryana
Jant-Pali Mahendergarh 123029

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---------- Forwarded message ---------
From: **Prof. S.K. Gahlawat** <skgcdlu@gmail.com>
Date: Wed, Aug 5, 2020 at 10:12 AM
Subject: Re: BoS draft minutes and Annexures
To: Prof. Satish Kumar <satishk@cuh.ac.in>

Dear Prof. Satish,

Thank you for sending draft minutes of the BoS held recently.

I have suggested a few names for consideration and incorporation in the list attached, if deems fit. These names are highlighted in yellow colour. As far as Research Methodology course is concerned, thank you for incorporating my suggestions. Still you can swap MS word, Excel etc. in the first unit and Bioinformatics part in the 3rd unit.

With Warm Regards,
Suresh

--

Dr. S.K.Gahlawat, PhD (KUK), Post-Doc. (UK)
Professor (Biotechnology) & Director, IQAC
Formerly Dean Faculty of Life Sciences, Dean Research, Dean of Colleges, DSW & Chairman, Deptt. of Biotechnology,
Ch. Devi Lal University, Sirsa-125055, India
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08/09/2020

Head Incharge
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CENTRAL UNIVERSITY OF HARYANA

DEPARTMENT OF BIOTECHNOLOGY

Subject: Approval of M.Sc. Biotechnology course curriculum as per NEP-2020

M.Sc. Biotechnology syllabus was sent to all the members of Board of Studies in Biotechnology via email. All members approved and recommended the course curriculum for implementation. One of the outside subject experts, Prof. S.K. Gahlawat suggested some changes in the course curriculum, which were incorporated and further approval was received from the expert. Approval and recommendations of all the members are attached with this letter.

Bijander Singh
09/09/2024

Chairman, BOS

Head Incharge
Dept. of Biotechnology
Central University of Haryana
Jant-Pali Mahendergarh 123029

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M.Sc. Biotechnology Syllabus as per NEP-2020

7 messages

Bio- Technology <hodbiotechnology@cuh.ac.in> 1 September 2021 at 13:56
To: "Prof. S.K. Gahlawat" <skgcdlu@gmail.com>, Rakesh Tuli <rakeshtuli@hotmail.com>, rtuli@pu.ac.in
Cc: Inderjeet Kaur <inderjeet@cuh.ac.in>, Bijender Singh <ohlanbs@cuh.ac.in>

Dear Esteemed Members
Please find attached the course curriculum of M.Sc. Biotechnology as per NEP-2020 dully approved by the Department Council and School level Workshop with outside experts. Therefore, the same is sent to all the members of the Board of Studies in Biotechnology. You are requested to provide your inputs, comments and suggestions to improve it further. We will finalize a suitable date for the meeting after your inputs.
with best regards
Dr. Bijender Singh
विभागाध्यक्ष जैव.प्रौद्योगिकी विभाग/ Head, Department of Biotechnology
हरियाणा केंद्रीय विश्वविद्यालय/Central University of Haryana
जांट.पाली, महेंद्रगढ/ Jant-Pali, Mahendergarh
हरियाणा-123031 (भारत) /Haryana-123031 (India)

M.Sc. Biotechnology CUH syllabus.docx
250K

Prof. S.K. Gahlawat <skgcdlu@gmail.com> 4 September 2021 at 10:28
To: Bio- Technology <hodbiotechnology@cuh.ac.in>
Cc: Rakesh Tuli <rakeshtuli@hotmail.com>, rtuli@pu.ac.in, Inderjeet Kaur <inderjeet@cuh.ac.in>, Bijender Singh <ohlanbs@cuh.ac.in>

Dear Dr. Bijender,
Thank you for sharing your syllabi for suggestions before conducting the meeting. I have gone through the contents and it seems that you and your team have put a lot of effort into the development of this curriculum. By and large, I agree with the scheme and contents, however, I have few suggestions which are given below:
1. We can add a course **Introductory Biotechnology** of two credits in the first semester to give an overview and to make up their mind. Students admitted in biotechnology are of different backgrounds, I suppose. The department of biotechnology, CDLU has recently introduced this course after a long debate. I will share the course contents if all members agree.
2. As far as Biostatistics and Bioinformatics paper is concerned, we should add Biostatics in the practical and in theory we should concentrate on Bioinformatics only. The paper setter as well as students face difficulties.
3. We can add **Recent advances and applications** in most of the papers in UNIT-IV.
3. You can include our books in the references if all members agree. The list is given below:
   i) Gahlawat, Suresh Kumar and Maan, Sushila. 2021. Advances in Animal Disease Diagnosis. CRC Press. ISBN 9780367530518 pp. 1-306.
   ii) Gahlawat, S.K., Duhan, J. S., Salar, R.K., Siwach, P. and Kumar, S. and Kaur, P. 2018. Advances in Animal Biotechnology and its Applications. Springer, Germany. pp. 1-401. ISBN978-981-10-4701-5
   iii) Gahlawat, S.K., Salar, R.K., Siwach, P. and Duhan, J. S., Kumar, S. and Kaur, P. 2017. Plant Biotechnology: Recent Advancements and Developments. Springer, Germany. pp.1-390. ISBN 978-981-10-4732-9.
   iv) Salar, R.K., Gahlawat, S.K., Siwach, P. and Duhan, J. S. 2013. Biotechnology: Prospects and Applications. Springer, Germany. pp.1-315. ISBN 978-81-322-1682-7.

[Quoted text hidden]

Rakesh Tuli <rakeshtuli@hotmail.com>
To: Bio- Technology <hodbiotechnology@cuh.ac.in>, "Prof. S.K. Gahlawat" <skgcdlu@gmail.com>, "rtuli@pu.ac.in" <rtuli@pu.ac.in> 5 September 2021 at 23:06
Cc: Inderjeet Kaur <inderjeet@cuh.ac.in>, Bijender Singh <ohlanbs@cuh.ac.in>

Dear Dr Bijender Singh,

Bijender Singh
Head Incharge
Dept. of Biotechnology
Central University of Haryana
Jant-Pali Mahendergarh 123029

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1. The attached course curriculum for MSc Biotechnology as approved by DC, is quite intensive and meets with the learning objectives as per NEP2020. This may be implemented accordingly.
2. As you know, the NEP envisages that Imaginative and flexible curricular structures be developed, to promote creative combinations of disciplines for study, that offer multiple entry and exit points at institutes of higher learning. At some stage, CUH may consider offering Post graduate Certificate courses of 6 months to 1 year as part of continuous learning opportunities, as envisaged in NEP.

These could be run as offline as well as on-line courses in specific areas to facilitate learning in advanced biotechnology at different career points. Such short duration courses, followed by formal evaluation, may lead to the award of CUH Certificate of Special Merit in Biotechnology (with advanced exposure in ----------) or CUH Executive Courses etc. with an aim to give powerful leadership knowledge in specific domain areas of applications.

It will be desirable that CUH shows leadership in promoting excellence through such initiative. If the University feels it is ready to offer courses of this kind, the Departmental Council may design a very flexible basket of a dozed such courses of multi-disciplinary nature. The aspirants may select, say 2 core and 2 elective courses, to gain practical advanced knowledge of applied nature relevant to them. The opting students may be from industry or academia, with bachelor's degree and beyond in biological sciences or engineering.

Examples of advanced areas for teaching can be several. A dozen of such courses may be offered as a new initiative in the spirit of continuing education in biotechnology & bioengineering. Some representative examples are given below as food for thought.

1. Recombinant protein expression & scale up
2. Drug designing & evaluation
3. Medical devices & IOT
4. Recombinant DNA regulatory research
5. Orthopedic modelling & reconstruction
6. Regenerative medicine ,Tissue engineering & printing, etc..

I hope, the above suggestion can be a food for thought in line with NEP 2020.

Best wishes on Teacher's Day.

Rakesh Tuli

From: Bio- Technology <hodbiotechnology@cuh.ac.in>
Sent: Wednesday, September 1, 2021 1:56 PM
To: Prof. S.K. Gahlawat <skgcdlu@gmail.com>; Rakesh Tuli <rakeshtuli@hotmail.com>; rtuli@pu.ac.in <rtuli@pu.ac.in>
Cc: Inderjeet Kaur <inderjeet@cuh.ac.in>; Bijender Singh <ohlanbs@cuh.ac.in>
Subject: M.Sc. Biotechnology Syllabus as per NEP-2020

[Quoted text hidden]

Inderjeet Kaur <inderjeet@cuh.ac.in>
To: Bio- Technology <hodbiotechnology@cuh.ac.in>

7 September 2021 at 09:49

Dear Sir,
The attached syllabus looks appropriate to be implemented.
best regards
Inderjeet

Bijender Singh
Head Incharge
Dept. of Biotechnology
Central University of Haryana
Jant-Pali Mahendergarh 123029

Scanned with CamScanner

On Wed, Sep 1, 2021 at 1:56 PM Bio- Technology <hodbiotechnology@cuh.ac.in> wrote:
[Quoted text hidden]

Bio- Technology <hodbiotechnology@cuh.ac.in> 8 September 2021 at 11:05
To: "Prof. S.K. Gahlawat" <skgcdlu@gmail.com>

Dear Sir
Thank you very much for your suggestions for improving the syllabus. We have modified the syllabus as per your suggestions and comments as below:
1. Introduction to Biotechnology paper has been added in the revised course curriculum.
2. Only basic information related to biostatistics are added in the theory paper and more emphasis is on bioinformatics.
3. We have added in almost all the papers Recent advances and applications in the field in unit IV.
4. We have added all the recent books as references in the relevant courses.
The revised syllabus is attached for your suggestions and approval.
with best regards
Dr. Bijender Singh

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--
सादर/ Regards
[Quoted text hidden]

Final M.Sc. Biotechnology CUH as per suggestions of BOS.docx
262K

Prof. S.K. Gahlawat <skgcdlu@gmail.com> 8 September 2021 at 14:02
To: Bio- Technology <hodbiotechnology@cuh.ac.in>

Dear Dr. Bijender,

Thank you very much for incorporating the suggested changes in the LOCF curriculum. I hereby give my approval for the scheme and syllabi you have sent in this mail. Good luck for your admissions and new Academic Session.

[Quoted text hidden]

Dr. Bijender Singh <ohlanbs@cuh.ac.in> 9 September 2021 at 09:19
To: Bio- Technology <hodbiotechnology@cuh.ac.in>

Dear Sir
The attached course curriculum for MSc Biotechnology is suitable for implementation as per NEP2020.
Thanks and regards
Dr. Bijender Singh

On Wed, Sep 1, 2021 at 1:56 PM Bio- Technology <hodbiotechnology@cuh.ac.in> wrote:
[Quoted text hidden]

--
Dr. Bijender Singh, Ph.D.
Associate Professor
Department of Biotechnology
Central University of Haryana
Jant-Pali-123031, Mahendergarh, Haryana
Mob.: 91-9996983652

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Head Incharge
Dept. of Biotechnology
Central University of Haryana
Jant-Pali Mahendergarh 123029

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Learning Outcomes based Curriculum Framework (LOCF)

as per NEP 2020

For M.Sc. Biotechnology

Department of Biotechnology

School of Interdisciplinary and Applied Sciences

Central University of Haryana

Jant-Pali, Mahendergarh-123031, Haryana

Session 2021-2023

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Background

Considering the curricular reforms as instrumental for desired learning outcomes, all the academic departments of Central University of Haryana made a rigorous attempt to revise the curriculum of undergraduate and postgraduate programmes in alignment with National Education Policy-2020 and UGC Quality Mandate for Higher Education Institutions-2021. The process of revising the curriculum could be prompted with the adoption of "Comprehensive Roadmap for Implementation of NEP-2020" in 32nd meeting of the Academic Council of the University held on April 23, 2021. The Roadmap identified the key features of the Policy and elucidated the Action Plan with well-defined responsibilities and indicative timeline for major academic reforms.

The process of revamping the curriculum started with the series of webinars and discussions conducted by the University to orient the teachers about the key features of the Policy, enabling them to revise the curriculum in sync with the Policy. Proper orientation of the faculty about the vision and provisions of NEP-2020 made it easier for them to appreciate and incorporate the vital aspects of the Policy in the revised curriculum focused on 'creating holistic, thoughtful, creative and well-rounded individuals equipped with the key 21st century skills' for the 'development of an enlightened, socially conscious, knowledgeable, and skilled nation'.

With NEP-2020 in background, the revised curricula articulate the spirit of the policy by emphasising upon— integrated approach to learning; innovative pedagogies and assessment strategies; multidisciplinary and cross-disciplinary education; creative and critical thinking; ethical and Constitutional values through value-based courses; 21st century capabilities across the range of disciplines through life skills, entrepreneurial and professional skills; community and constructive public engagement; social, moral and environmental awareness; Organic Living and Global Citizenship Education (GCED); holistic, inquiry-based, discovery-based, discussion-based, and analysis-based learning; exposure to Indian knowledge system, cultural traditions and classical literature through relevant courses offering 'Knowledge of India'; fine blend of modern pedagogies with indigenous and traditional ways of learning; flexibility in course choices; student-centric participatory learning; imaginative and flexible curricular structures to enable creative combination of disciplines for study; offering multiple entry and exit points initially in undergraduate programmes; alignment of Vocational courses with the International Standard

Classification of Occupations maintained by the International Labour Organization; breaking the silos of disciplines; integration of extra-curricular and curricular aspects; exploring internships with local industry, businesses, artists and crafts persons; closer collaborations between industry and higher education institutions for technical , vocational and science programmes; and formative assessment tools to be aligned with the learning outcomes, capabilities, and dispositions as specified for each course. In case of UG programmes in Engineering and Vocational Studies, it was decided that the departments shall incorporate pertinent NEP recommendations while complying with AICTE, NBA, NSQF, International Standard Classification of Occupations, Sector Skill Council and other relevant agencies/sources. The University has also developed consensus on adoption of Blended Learning with 40% component of online teaching and 60% face to face classes for each programme.

The revised curricula of various programmes could be devised with concerted efforts of the faculty, Heads of the Departments and Deans of Schools of Study. The draft prepared by each department was discussed in series of discussion sessions conducted at Department, School and the University level. The leadership of the University has been a driving force behind the entire exercise of developing the uniform template and structure for the revised curriculum. The Vice Chancellor of the University conducted series of meetings with Heads and Deans to deliberate upon the vital parameters of the revised curriculum to formulate a uniform template featuring Background, Programme Outcomes, Programme Specific Outcomes, Postgraduate Attributes, Structure of Masters Course, Learning Outcome Index, Semester-wise Courses and Credit Distribution, Course-level Learning Outcomes, Teaching-Learning Process, Blended Learning, Assessment and Evaluation, Keywords, References and Appendices. The experts of various Boards of Studies and School Boards contributed to a large extent in giving the final shape to the revised curriculum of each programme.

To ensure the implementation of curricular reforms envisioned in NEP-2020, the University has decided to implement various provisions in a phased manner. Accordingly, the curriculum may be reviewed annually.

Introduction of the Department

The Department of Biotechnology at CUH was established in 2015 under the umbrella of School of Interdisciplinary and Applied Life Sciences (SIAL) with an aim for providing quality education and performing cutting edge technological research. Currently the Department of Biotechnology is kept under the School of Interdisciplinary and Applied Sciences. With faculties form different backgrounds and skillset in modern technologies, the department is aimed at training students in the field of biotechnology and related subjects by encouraging interdisciplinary and multidisciplinary approaches. The focus of the department is also to develop technologies that seek solutions to real life problems related to society. Therefore, the department provides an opportunity for students seeking training in an advanced course in Biotechnology in the form of MSc Biotechnology. The programme is of two years duration (four semesters) and the curriculum is designed to cater the needs of modern research and development all over the world.

Learning Outcome based Curriculum Framework

The M.Sc. Biotechnology course at the Department of Biotechnology, CUH has been designed on the basis of learning outcome based curriculum framework (LOCF) motto. The course covers the fundamental and advanced areas of Biotechnology with a range of core subjects in each semester. Along with providing the traditional biotechnology knowledge, the course also has enough scope for inter- and multi-disciplinary subjects in the form of departmental electives. This course also caters the skill enhancement needs of the students as well as provides opportunity for collaboration and learning from other disciplines in the form of general elective courses, and thus enabling the students to broaden their horizon in complementary subjects. Every semester has a practical course for strengthening their skills in designing and conducting experiments in the field of Biotechnology. The six-month dissertation in the last semester orients and prepares the students for research and development in academia and industry.

Nature and extent of the Programme

The M.Sc. Biotechnology programme is of two years duration. Each year is divided into two semesters. Each semester will be of sixteen weeks duration. The teaching and learning in the M.Sc. Biotechnology programme will involve theory classes (lectures), tutorials, practical and

dissertation. The curriculum will be taught through formal lectures with the aid of ICT tools like power-point presentations, audio and video tools and other teaching aids can be used as and when required. The specialized subjects could be augmented by special lectures from the eminent experts in the relevant fields, which can be incorporated along with regular teaching. The latest developments in the field involving emerging technologies could be incorporated in the form of seminars, workshops, training, conferences etc.

Postgraduate Attributes

On completion of the course, the students are expected to be proficient in the fundamental, applied and modern areas of =Biotechnology. They are expected to have acquired the skills of theoretical and practical aspects of different branches of biotechnology; to be able to develop rationale thinking skills, logical interpretation and analytical skills. Effective communication of scientific developments to the society at large is very critical attribute expected from the students of this course. The attributes expected from the post-graduates of M.Sc. Biotechnology programme are:

PA1- Fundamental and advanced knowledge of biotechnology and its different branches

PA2- Orientation and specialization in at least one specific branch of biotechnology and related fields

PA3- Proficiency in theoretical and practical aspects of traditional as well as modern tools and techniques in the fields of biotechnology

PA4- Awareness and sensitization about various societal problems related to biotechnology

PA-5- Effective communication of scientific knowledge and recent developments with the society

PA-6-Acquiring skills of writing, editing and publication of research findings in reputed journals and magazines.

PA-7- Acquire skills and training in scientific communications and presentation

PA-8- Ability to design and undertake research projects to solve societal problems

PA-9-Proficiency in ICT technologies for personal, academic and professional purposes

Aims of Masters Degree Programme in Biotechnology

The objective of this course is to provide fundamental and advanced knowledge of biotechnology and its related subjects.

- To generate competent human resources skilled to contribute towards the sustainable development of industry, teaching, and research in different areas of Biotechnology.
- To develop a set of interdisciplinary professional skills that will enable the students in research and development in Biotechnology.
- To bring social, ethical, and professional awareness among the students about various issues of contemporary practices in biotechnology and related fields.

Qualification Descriptors

Upon successful completion of the course, the students receive a M.Sc. degree in Biotechnology. Biotechnology postgraduates of this department are expected to branch out into different paths of seeking advanced research based knowledge, professional employment, or entrepreneurship that they find fulfilling. They will be able to demonstrate knowledge as well as skills in diverse fields of Biotechnology. This will provide a foundation, which shall help them to embark on research careers by attaining doctoral positions in coveted institutions, as well as securing employment in research projects in industry or institutes. Besides research, they can get suitable teaching positions in Colleges and Universities as an Assistant Professor after qualifying National Eligibility Test (NET). It is expected that besides the skills specific to the discipline, the wider life skills of analysis, logical reasoning, scientific aptitude, communication skills, research and life ethics, and moral values will be inculcated in the students. The list below provides a synoptic overview of possible career paths provided by a postgraduate training in Biotechnology:

1. Research

2. Industry

3. Teaching

4. Biotechnology entrepreneurship

5. Administration and Policy Making

6. Scientific Communication

7. Patents and Law

8. Scientific Writing and Editing

9. Document preparation and publication

Programme learning outcomes M.Sc. Biotechnology

After completion of the programme, the students will be able

PLO 1 – To apply the knowledge of basic biotechnology to solve complex problems in the society

PLO 2 – To identify, formulate, review research literature, analyse, and design experiments and identify solutions for complex problems using modern tools

PLO 3 – To apply reasoning informed by contextual knowledge to assess societal, health, safety and the consequent responsibilities relevant to the professional biotechnology practices.

PLO 4 – To apply ethical principles and commit to professional ethics and responsibilities and norms of the biotechnology practices.

PLO 5 – To function effectively as an individual and as a member or leader in diverse teams and in inter- and multi-disciplinary settings.

PLO – 6 To communicate effectively on complex biotechnology activities with the biology community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PLO – 7 To recognize the need for, and have the preparation and ability to engage inindependent and lifelong learning in the broadest context of technological change.

Programme Outcomes

- **Basic and applied knowledge:** Interdisciplinary knowledge to find solution for the complex biological problems
- **Problem analysis:** Ability to analyse society related/ applied research problem, design and execute experiments to find relevant solutions
- **Advanced Usage of Technology**: Apply advanced instrumentation tools, online resources with an understanding of the troubleshooting and limitations
- **Ethics:** Commitment towards professional ethics and responsibilities as a social endeavour to bring harmony with nature
- **Lifelong learning:** Scientific skills for industrial applications and entrepreneurship

Programme Specific Outcomes

After completion of M.Sc. Biotechnology, the students will be able:

PSO – 1 To understand the basic principles and applications of biotechnology.

PSO – 2 To understand the principles of microbiology, cell biology, biochemistry, molecular biology, genetics, and molecular biology involved in biotechnology to identify crucial biological problems.

PSO – 3 To realize the importance of laws and ethics in biotechnological practices and be able topractice good laboratory practices.

PSO – 4 To handle basic, sophisticated advanced instruments needed in a research laboratory with ability to design and execute experiments with precision in a logical manner.

PSO – 5 To understand theoretical as well as practical aspects of gene cloning, expression of recombinant proteins, tissue culture, and transgenic development.

PSO – 6 To understand the basics of statistics and computational methods used in biological processes.

PSO – 7 To understand the principles and applications of genomics, transcriptomics, and proteomics, and integrate the knowledge of omics and genetic engineering to address problemsof healthcare, crop improvement, energy and environment.

PSO – 8 To understand the principles and applications of bioprocess designing, pharmaceutical biotechnology, and nanotechnology for solving problems of biology and other related sciences.

PSO-9- To launch start-ups and become entrepreneurs for novel biotechnology products and processes in various industries.

PSO-10-To understand Biosafety measures, Ethical issues and regulatory compliances in the field of Biotechnologyand effective scientific communication.

Course Structure semester wise

Semester-I (Total credits - 26)

Course code	Course title	L	T	P	Type of course	Credit
SIAS BT 1 1 01 C 2002	Introduction to Biotechnology	2	0	0	Core	2
SIAS BT 1 1 02 C 4004	Principles of Biochemistry	4	0	0	Core	4
SIAS BT 1 1 03 C 4004	Introduction to Microbiology	4	0	0	Core	4
SIAS BT 1 1 04 C 4004	Genetics	4	0	0	Core	4
SIAS BT 1 1 05 C 4004	Analytical Techniques	4	0	0	Core	4
SIAS BT 1 1 06 C 0084	Practical-I	0	0	8	Core	4
	Generic Elective Course (to be opted from other Departments of CUH or from SWAYAM/NPTEL MOOC courses)	4	0	0	GEC	4

Semester-II (Total credits - 27)

Course code	Course title	L	T	P	Type of course	Credit
SIAS BT 1 2 01 C 4004	Cell and Molecular Biology	4	0	0	Core	4
SIAS BT 1 2 02 C 4004	Immunology	4	0	0	Core	4
SIAS BT 1 2 03 C 3003	Biosafety, Bioethics and IPR	3	0	0	Core	3
SIAS BT 1 2 04 C 3003	Genetic Engineering	3	0	0	Core	3
SIAS BT 1 2 05 C 2002	Seminar	1	1	0	Core	2
SIAS BT 1 2 06 C 4004	Omics in Biotechnology	4	0	0	Core	4
SIAS BT 1 2 07 C 0084	Practical-II	0	0	8	Core	4
SIAS BT 1 2 01 DCEC 3003	Pharmaceutical Biotechnology[#]	3	0	0	DCEC	3
SIAS BT 1 2 02 DCEC 3003	Microbial Biotechnology[#]	3	0	0	DCEC	3
SIAS BT 1 2 03 DCEC 3003	Environmental Biotechnology[#]	3	0	0	DCEC	3

[#] One of the courses will be opted by the student.

Semester-III (Total credits – 27)

Course code	Course title	L	T	P	Type of course	Credit
SIAS BT 1 3 01 C 4004	Biostatistics and Bioinformatics	4	0	0	Core	4
SIAS BT 1 3 02 C 4004	Biophysics and Nano sciences	4	0	0	Core	4
SIAS BT 1 3 03 C 4004	Medical Biotechnology and Diagnostics	4	0	0	Core	4
SIAS BT 1 3 04 C 4004	Fermentation and Bioprocess Technology	4	0	0	Core	4
SIAS BT 1 3 05 C 00084	Practical-III	0	0	8	Core	4
SIAS BT 1 3 01 DCEC 3003	Animal Biotechnology[#]	3	0	0	DCEC	3
SIAS BT 1 3 02 DCEC 3003	Agricultural Biotechnology[#]	3	0	0	DCEC	3
	Generic Elective Course (to be opted from other Departments of CUH or from SWAYAM/NPTEL MOOC courses)	4	0	0	GEC	4

[#] One of the courses will be opted by the student.

Semester-IV (Total credits - 20)

Course code	Course title	Type of course	Credit
SIAS BT 1 4 01 SEC 2002	Review Writing, Editing and Presentation Skills	Core	2
SIAS BT 1 4 02 SEC 0018	Dissertation	Core	18
	Total credits of the Program		**100**

L- Lecture , T- Tutorial P-Practical; C- Core; DCEC - Discipline Centric Elective Course - to be opted by the student; SEC- Skill Enhancement Course; GEC- Generic Elective Course.

Learning Outcome Index (Core courses*)

PSO	CC -1	CC -2	CC -3	CC -4	CC -5	CC -6	CC -7	CC -8	CC -9	CC -10	CC -11	CC -12	CC -13	CC -14	CC -15	CC -16	CC -17	CC -18
PSO-1	√					√			√	√	√	√	√		√	√	√	√
PSO-2	√	√	√	√	√	√	√	√		√	√	√	√			√		√
PSO-3	√				√	√			√	√			√				√	√
PSO-4					√	√				√			√	√			√	√
PSO-5	√	√	√	√	√	√	√			√	√		√			√	√	√
PSO-6						√							√	√			√	√
PSO-7								√		√	√	√				√		
PSO-8	√		√					√			√				√	√	√	
PSO-9	√								√	√			√			√		
PSO-10			√			√		√	√	√			√					√

*Core courses details

	Course code	Course title
CC1	SIAS BT 1 1 01 C 2002	Introduction to Biotechnology
CC2	SIAS BT 1 1 02 C 4004	Principles of Biochemistry
CC3	SIAS BT 1 1 03 C 4004	Introduction to Microbiology
CC4	SIAS BT 1 1 04 C 4004	Genetics
CC5	SIAS BT 1 1 05 C 4004	Analytical Techniques
CC6	SIAS BT 1 1 06 C 00105	Practical-I
CC7	SIAS BT 1 2 01 C 4004	Cell and Molecular Biology
CC8	SIAS BT 1 2 01 C 4004	Immunology
CC9	SIAS BT 1 2 02 C 3003	Biosafety, Bioethics and IPR
CC10	SIAS BT 1 2 03 C 4004	Genetic Engineering
CC11	SIAS BT 1 2 04 C 2002	Seminar
CC12	SIAS BT 1 2 05 C 4004	Omics in Biotechnology
CC13	SIAS BT 1 2 06 C 00105	Practical-II
CC14	SIAS BT 1 3 01 C 4004	Biostatistics and Bioinformatics
CC15	SIAS BT 1 3 02 C 4004	Biophysics and Nano sciences

CC16	SIAS BT 1 3 03 C 4004	Medical Biotechnology and Diagnostics
CC17	SIAS BT 1 3 05 C 0202	Fermentation and Bioprocess Technology
CC18	SIAS BT 1 3 04 C 00105	Practical-III

Learning outcome index (elective and skill enhancement courses)*

PSO	EC-1	EC-2	EC-3	EC-4	EC-5	SEC-1	SEC-2
PSO-1	√	√	√	√	√	√	√
PSO-2	√	√	√	√	√	√	√
PSO-3	√	√	√	√	√	√	
PSO-4				√	√	√	
PSO-5	√	√	√	√	√	√	
PSO-6						√	
PSO-7	√	√	√	√	√	√	
PSO-8	√	√	√				
PSO-9	√	√	√	√	√		
PSO-10						√	√

***Details of elective and skill enhancement courses**

EC1	SIAS BT 1 2 01 DCEC 4004	Pharmaceutical Biotechnology
EC2	SIAS BT 1 2 02 DCEC 4004	Microbial Biotechnology
EC3	SIAS BT 1 2 03 DCEC 4004	Environmental Biotechnology
EC4	SIAS BT 1 3 01 DCEC 4004	Animal Biotechnology
EC5	SIAS BT 1 3 02 DCEC 4004	Agricultural Biotechnology
SEC1	SIAS BT 1 4 01 SEC 2002	Review Writing, Editing and Presentation Skills
SEC2	SIAS BT 1 4 02 SEC 0018	Dissertation

Teaching Learning Processes

- Lectures
- Discussions
- Simulations
- Role Playing
- Participative Learning
- Interactive Sessions
- Seminars
- Practical based learning
- Research-based Learning/Dissertation or Project Work
- Technology-embedded Learning
- Reverse classroom based learning

Blended Learning

Blended Learning is a pedagogical approach that combines face to-face classroom methods with computer-mediated activities in the process of teaching and learning. It implies nice blend of face-to-face and online activities to make the learning processes more interesting and engaging. It focuses on integration of traditional classroom activities and innovative ICT-enabled strategies. It emphasizes student-centric learning environment where the teacher is the facilitator for productive and measurable learning outcomes. It optimizes and compliments the face to face learning, giving ample freedom and flexibility to the students and teachers to access and explore the wide range of open-access sources such as video lectures, podcasts, recordings and articles through digital platforms. It gives freedom and autonomy to the teachers in selection of appropriate digital platforms, resources and time-slots to complement and supplement face to face learning. The Blended Learning doesn't undermine the role of the teacher, rather it gives him/her an opportunity to explore the unexplored in accordance with the requirements of the curriculum. Each course will be taught as 60 % offline and 40 % online mode.

Assessment and Evaluation

- Continuous Comprehensive Evaluation at regular after achievement of each Course-level learning outcome
- Formative Assessment on the basis of activities of a learner throughout the programme instead of one-time assessment
- Oral Examinations to test presentation and communication skills
- Online examination and evaluation
- Open Book Examination for better understanding and application of the knowledge acquired
- Group Examinations on Problem solving exercises
- Seminar Presentations
- Review of Literature
- Collaborative Assignments
- Practical examination

Continuous assessment of all papers will be broadly carried out in two forms:

1) **Continuous Internal Evaluation (CIE):** The theoretical courses will be assessed based on any or all of the following-written tests, assignments, presentations and regularity in the class. Assessment of the practical courses will be based on any or all of the following- regularity, practical records, experiments performance, viva etc. The dissertation will be assessed based on the regular interaction with the supervisor, regular presentation of work, completion of assigned tasks, thesis submission, viva etc. The internal evaluation will be carried out throughout the term and will comprise 30% of the final grade. Participation of students in quiz, seminar, workshop, games, yoga and other extra-curricular activities will be promoted and facilitated by the department.

2) Term End Assessment/Evaluation (TEE): The theoretical courses will be assessed based on written exam, which may be subjective, objective for both. This will cover the entire syllabus. Assessment of the practical courses will be based on performing and/or description of experiments, maintaining of the practical records, viva etc. The dissertation will be assessed

based on the thesis reported, viva etc. The end of semester examination comprises 70% of the final grade. Both internal and Term end evaluations will be in blended mode.

Keywords

- LOCF
- NEP-2020
- Blended Learning
- Face to face (F to F) Learning
- Online Learning
- Programme Outcomes
- Programme Specific Outcomes
- Course-level Learning Outcomes
- Postgraduate Attributes
- Learning Outcome Index
- Formative Assessment and Evaluation
- Comprehensive and Continuous Evaluation

References

- National Education Policy-2020. https://www.education.gov.in/sites/upload_files/mhrd/files/NEP_Final_English_0.pdf
- The draft subject specific LOCF templates available on UGC website. https://www.ugc.ac.in/ugc_notices.aspx?id=MjY5OQ==
- Draft Blended Mode of Teaching and Learning: Concept Note available on UGC website. https://www.ugc.ac.in/pdfnews/6100340_Concept-Note-Blended-Mode-of-Teaching-and-Learning.pdf

Department of Biotechnology

Master of Science in Biotechnology (Semester - wise Scheme 2021-2023)

Semester-I (Total credits - 26)

Course code	Course title	L	T	P	Type of course	Credit
SIAS BT 1 1 01 C 2002	Introduction to Biotechnology	2	0	0	Core	2
SIAS BT 1 1 02 C 4004	Principles of Biochemistry	4	0	0	Core	4
SIAS BT 1 1 03 C 4004	Introduction to Microbiology	4	0	0	Core	4
SIAS BT 1 1 04 C 4004	Genetics	4	0	0	Core	4
SIAS BT 1 1 05 C 4004	Analytical Techniques	4	0	0	Core	4
SIAS BT 1 1 06 C 0084	Practical-I	0	0	8	Core	4
	Generic Elective Course (to be opted from other Departments of CUH or from SWAYAM/NPTEL MOOC courses)	4	0	0	GEC	4

Semester-II (Total credits - 27)

Course code	Course title	L	T	P	Type of course	Credit
SIAS BT 1 2 01 C 4004	Cell and Molecular Biology	4	0	0	Core	4
SIAS BT 1 2 02 C 4004	Immunology	4	0	0	Core	4
SIAS BT 1 2 03 C 3003	Biosafety, Bioethics and IPR	3	0	0	Core	3
SIAS BT 1 2 04 C 3003	Genetic Engineering	3	0	0	Core	3
SIAS BT 1 2 05 C 2002	Seminar	1	1	0	Core	2
SIAS BT 1 2 06 C 4004	Omics in Biotechnology	4	0	0	Core	4
SIAS BT 1 2 07 C 0084	Practical-II	0	0	8	Core	4
SIAS BT 1 2 01 DCEC 3003	Pharmaceutical Biotechnology[#]	3	0	0	DCEC	3
SIAS BT 1 2 02 DCEC 3003	Microbial Biotechnology[#]	3	0	0	DCEC	3
SIAS BT 1 2 03 DCEC 3003	Environmental Biotechnology[#]	3	0	0	DCEC	3

[#] One of the courses will be opted by the student.

Semester-III (Total credits – 27)

Course code	Course title	L	T	P	Type of course	Credit
SIAS BT 1 3 01 C 4004	Biostatistics and Bioinformatics	4	0	0	Core	4
SIAS BT 1 3 02 C 4004	Biophysics and Nano sciences	4	0	0	Core	4
SIAS BT 1 3 03 C 4004	Medical Biotechnology and Diagnostics	4	0	0	Core	4
SIAS BT 1 3 04 C 4004	Fermentation and Bioprocess Technology	4	0	0	Core	4
SIAS BT 1 3 05 C 00084	Practical-III	0	0	8	Core	4
SIAS BT 1 3 01 DCEC 3003	Animal Biotechnology[#]	3	0	0	DCEC	3
SIAS BT 1 3 02 DCEC 3003	Agricultural Biotechnology[#]	3	0	0	DCEC	3
	Generic Elective Course (to be opted from other Departments of CUH or from SWAYAM/NPTEL MOOC courses)	4	0	0	GEC	4

[#] One of the courses will be opted by the student.

Semester-IV (Total credits - 20)

Course code	Course title	Type of course	Credit
SIAS BT 1 4 01 SEC 2002	Review Writing, Editing and Presentation Skills	Core	2
SIAS BT 1 4 02 SEC 0018	Dissertation	Core	18
	Total credits of the Program		**100**

L- Lecture , T- Tutorial P-Practical; C- Core; DCEC - Discipline Centric Elective Course - to be opted by the student; SEC- Skill Enhancement Course; GEC- Generic Elective Course.

Credit Summary of Courses Offered by Department of Biotechnology

(Academic Session 2019-21)

Total Credits: 100

Semester	Credits				Total credits
	Core courses	Skill enhancement course	Elective courses		
			DCEC (For Department of Biotechnology students)	GEC (For other Department students)	
I	18	4	-	4	**26**
II	20	4	3	-	**27**
III	16	4	3	4	**27**
IV	-	20	-	-	**20**
Total	**44**	**32**	**6**	**8**	**100**

Generic Elective Course: Offered by Department of Biotechnology to students from other Departments of University.

Semester	Type of course	Course code	Course title	Credit
I	GEC	SIAS BT 1 1 01 GE 4004	Principles of Biotechnology	4
III	GEC	SIAS BT 1 3 01 GE 4004	Basics of Bioinformatics	4

Course Name: Introduction to Biotechnology					Course Code: SIAS BT 1 1 01 C 2002		
Batch:	**Programme:**	**Semester : I**	**L**	**T**	**P**	**Credits**	**Contact Hrs. per Week: 02**
2021-2023	M.Sc. Biotechnology		2	0	0	2	**Total Hrs.: 30**
Total Evaluation Marks: 50 **CIE: 15** Marks **TEE: 35** Marks		**Examination Duration:** 2 Hrs.					
Course Objectives	To provide basic understanding of biotechnology; it's scope, different branches and applications in the agriculture, medicine, industrial, environment and advancement of biology.						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1:** Knowledge in the field of basic biotechnology and career opportunities. **CO2:** Understanding of major concepts and disciplines related to biotechnology **CO3:** Understanding about the scope and applications of biotechnology in different fields.						

COURSE SYLLABUS

NOTE:
i)Question no. 1 is compulsory and to be set from the entire syllabus. It will have four sub-parts and students need to answer any two. Each part carries three and half marks.
ii) Question nos. 2 to 5 are to be set from all four units one from each. Every question will have three sub-parts and students need to answer any two sub-parts of each question. Each part carries three and half marks.

Unit No.	Contents	Contact Hrs.
I	An overview-: Definition, scope and importance of old and new biotechnology, Historical development and major breakthrough research in Biotechnology; societal implications and ethical issues in biotechnology. Concepts of recombinant DNA technology and Gene Cloning.	8
II	An overview of different fields of biotechnology and their applications- plant biotechnology, animal biotechnology, microbial biotechnology, medical biotechnology, environmental biotechnology, food biotechnology, pharmaceutical biotechnology, industrial biotechnology and bioinformatics;	7
III	Career options for biotechnology students in India and abroad; formulation and implementation of strategy for a desired career path; list of leading biotechnology research institutes/universities/industries in India and abroad;	8
IV	An overview of Nanobiotechnology Indian biotechnology industry: status, opportunities and challenges; bio-entrepreneurship and start-ups; funding agencies for research and developments. Role of biotechnology in pollution control	7

Suggested Readings:

1. Elements of Biotechnology (4th reprint), P. K. Gupta, Rastogi Publications, 2019-20.
2. Biotechnology-Expanding Horizons, B. D. Singh, Kalyani Publishers, 2015.
3. Biotechnology: Prospects and Applications (2013). Salar, R.K., Gahlawat, S.K., Siwach, P. and Duhan, J. S., Springer, Germany. ISBN 978-81-322-1682-7.
4. Textbook of Biotechnology, H.K. Das, John Wiley & Sons 2004.
5. Introduction to Biotechnology (4^{th} edition), W. J. Thieman & M. A. Palladino, Pearson Publications, 2018.
6. History of Modern Biotechnology, A. Fiechter (Ed.), Springer Publishing House, 2000.

Course Name: Principles of Biochemistry					Course Code: SIAS BT 1 1 02 C 4004		
Batch:	**Programme:**	**Semester : I**	**L**	**T**	**P**	**Credits**	**Contact Hrs. per Week: 04**
2021-2023	M.Sc. Biotechnology		4	0	0	4	**Total Hrs.: 60**
Total Evaluation Marks: 100 **CIE:** **30** Marks **TEE:** **70** Marks		**Examination Duration:** 3 Hrs.					
Course Objectives	• To understand structures and functions of bio-molecules • To provide in depth knowledge of metabolic pathways in the living systems						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1:** Comprehensive knowledge of biochemical pathways operating in living systems **CO2:** Advanced knowledge of synthesis and catabolism of major biomolecules						

COURSE SYLLABUS

NOTE:
i)Question no. 1 is compulsory and to be set from the entire syllabus. It will have seven sub-parts and students need to answer any four. Each part carries three and half marks.
ii) Question nos. 2 to 5 are to be set from all four units one from each. Every question will have three sub-parts and students need to answer any two sub-parts of each question. Each part carries seven marks.

Unit No.	Contents	Contact Hrs.
I	Monosaccharides-structure of aldoses and ketoses, ring structure of sugars, conformations of sugars, mutarotation, anomers, epimers and enantiomers. Disaccharides: maltose, lactose and sucrose. Polysaccharides: homo and hetero-polysaccharides, structural and storage polysaccharides. Glycolysis - a universal pathway, reactions of glycolysis, production of acetyl CoA, reactions of citric acid cycle. Gluconeogenesis, glycogenesis and glycogenolysis.	15
II	Building blocks of lipids - fatty acids, glycerol, ceramide. Storage lipids - triacyl glycerol and waxes. Structural lipids in membranes-phospholipids, glycerophospholipids, galactolipids, sulpholipids, sphingolipids and sterols. β-oxidation of fatty acids. Fatty acid synthase complex. Synthesis of fatty acids.	15
III	Amino acids and peptides- classification (essential and non-essential amino acids), chemical reactions and physical properties. Introduction to protein structure and function. Enzymes: classification, kinetics (significance of k_m, k_{cat} and V_{max}), inhibition; amino acid metabolism-amino acid deamination and transamination, urea cycle. Synthesis and utilization of ketone bodies. Biosynthesis and breakdown of nutritionally non-essential amino acids. Synthesis of other amino acid derivatives such as neurotransmitters.	15

IV	Nucleotides - structure and properties. Nucleic acid structure-Watson - Crick Model of DNA. Structure of major species of RNA - mRNA, tRNA and rRNA. De novo synthesis of purine and pyrimidine nucleotides. Catabolism of purine and pyrimidine. Disorders of purine and pyrimidine metabolism. Recent advances and applications in the field.	15

Suggested Readings:

1. Lehninger: Principles of Biochemistry (2017) 7th ed., Nelson, DL and Cox, MM, WH Freeman and Company (New York), ISBN: 978-1319108243.
2. Biochemistry (2017) 6th ed., Garrett RH and Grisham CM, Brooks/Cole, ISBN: 9781305577206.
3. Harper's Illustrated Biochemistry (2018) 7th ed., Rodwell VW, Bender DA, Botham KM, Kennelly, PJ and Weil PA, McGraw-Hill, ISBN: 9781259837937.
4. Lippincott's Illustrated Reviews Biochemistry (2017) 7th ed., Ferrier, Wolters Kluwer India Pvt. Ltd., ISBN: 978-9351297949.
5. Biochemistry (2019) 9th ed., Stryer L, Berg JM, Tymoczko JL, Gatto Jr. GJ, W.H. Freeman and Company, New York, USA. ISBN-10: 1-319-11467-9.

Course Name: Introduction to Microbiology					Course Code: SIAS BT 1 1 02 C 4004		
Batch:	**Programme:**	**Semester : I**	**L**	**T**	**P**	**Credits**	**Contact Hrs. per Week: 04**
2021-2023	M.Sc. Biotechnology		4	0	0	4	**Total Hrs.: 60**
Total Evaluation Marks: 100 **CIE:** **30** Marks **TEE:** **70** Marks		**Examination Duration:** 3 Hrs.					
Course Objectives	**To provide an understanding of basic concepts and techniques in the field of Microbiology.**						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1: Demonstrate the practical skills in basic microbiological techniques.** **CO2: Designate the role of microorganisms in different ecosystems and in various industries.** **CO3: Acquiring knowledge on peculiar features of different microorganisms.**						

COURSE SYLLABUS

NOTE:
i)Question no. 1 is compulsory and to be set from the entire syllabus. It will have seven sub-parts and students need to answer any four. Each part carries three and half marks.
ii) Question nos. 2 to 5 are to be set from all four units one from each. Every question will have three sub-parts and students need to answer any two sub-parts of each question. Each part carries seven marks.

Unit No.	Contents	Contact Hrs.
I	History of development of Microbiology in 20th century; Golden era of Microbiology, Major scientists and their discoveries, The spontaneous generation theory and its controversy; Germ theory of disease; Methods in microbiology: Physical and chemical methods of sterilization; Pure culture techniques, Staining techniques, maintenance and preservation of microbial cultures.	15
II	Binomial nomenclature; Haeckel's three kingdom classification; Organization of archae, bacteria and eukaryotic cell; Use of DNA and r-RNA sequencing in classification of microorganisms; Woese's three kingdom classification system and its utility - archaea, eubacteria, eukarya; Different groups of acellular microorganisms - viruses, viriods and prions.	15
III	General features of microorganisms - bacteria, algae, fungi and protozoa; Bacterial growth and metabolism; Microbes in different environment: extreme environment, deep ocean, space and air. Special features of the thermophilic, methanogenic and halophilic bacteria; Photosynthetic bacteria, Cyanobacteria.	15

IV	Scope of Microbiology - Cycle of matter in nature; Microbial interactions – Symbiosis and parasitism; Biodegradation and Bioremediation; Biofilms; Microbes in composting; Biofertilizers and Biopesticides; Microbes and Industry - SCP, microbial enzymes and fermented foods, Vaccines and antibiotics. Recent advances and applications in the field.	15

Suggested Readings:

1. An Introduction to Microbiology (2019), 3rded., Tauro P, Kapoor KK, Yadav KS, and Sequeira MG. New Age International Publishers. ISBN: 0852268785.
2. Brock Biology of Microorganisms (2018), 15thed., Madigan MT, Martinko JM, Bender KS, Buckley DH, Stahl DA Pearson Education, ISBN 9781292235103.
3. Prescott's Microbiology (2017). 10th ed. Sherwood LM, Woolverton C.J McGraw-Hill Education. ISBN 9781259281594.
4. A text book of Microbiology (2013), 3rd ed. Dubey, R.C. and Maheswari, D.K. Revised S. Chand and Company Ltd, New Delhi. ISBN: 9788121926201.
5. Microbiology (2001) 5th ed., Pelczar Jr. M, McGraw Hill Education ISBN: 9780074623206.

Course Name: Genetics					Course Code: SIAS BT 1 1 04 C 4004		
Batch:	**Programme:**	**Semester : I**	**L**	**T**	**P**	**Credits**	**Contact Hrs. per Week: 04**
2021-2023	M.Sc. Biotechnology		4	0	0	4	**Total Hrs.: 60**
Total Evaluation Marks: 100 **CIE:** **30** Marks **TEE:** **70** Marks		**Examination Duration:** 3 Hrs.					
Course Objectives	To study the fundamental concepts of genetics and its role in unification of different disciplines of biology.						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1:** Understanding of basic concepts of classical genetics and genetic analysis of eukaryotes. **CO2:** Acquiring knowledge about the genetic differences in prokaryotes and eukaryotes **CO3:** Understanding the effect of different environmental factors on gene expression						

COURSE SYLLABUS

NOTE:
i)Question no. 1 is compulsory and to be set from the entire syllabus. It will have seven sub-parts and students need to answer any four. Each part carries three and half marks.
ii) Question nos. 2 to 5 are to be set from all four units one from each. Every question will have three sub-parts and students need to answer any two sub-parts of each question. Each part carries seven marks.

Unit No.	Contents	Contact Hrs.
I	Historical background, Principles of Mendelian inheritance, detailed discussion on Mendel's findings, molecular basis of single gene inheritance, codominance, incomplete dominance, Gene interactions, interactions of genes in genetic pathways, pleiotropy, Extra chromosomal inheritance: Maternal inheritance (mitochondria and chloroplast), Sex linked inheritance, Sex influenced and Sex limited traits, lethal genes, and multiple alleles, polygenic inheritance, complementation test. Numericals based on Mendelian inheritance and gene interactions.	15
II	Linkage: complete and incomplete linkage, linkage analysis and genetic maps, Linkage and recombination of gene, Mechanism of crossing over, Genetic analysis: calculating recombination frequencies, Linkage maps, types of molecular markers, mapping with molecular markers, Gene mapping by three point test cross, Tetrad analysis, Sex determination and Dosage compensation in Mammals and Drosophila, Quantitative Genetics: Multilocus control; QTL analysis; Quantitative inheritance in plants and human. Population Genetics and Hardy-Weinberg equilibrium. Genetic maps, Physical maps. Numericals based on linkage analysis and population genetics.	15

III	Mutations: concept and types, Mechanism of spontaneous mutations, Physical and chemical mutagenesis, Selection and enrichment of mutants, Molecular mechanism of induced and spontaneous mutations, importance of mutation; detection of mutation and directed mutagenesis, types of mutations: insertion, deletion, duplication, translocation, transposition, frame-shift, mis-sense, non-sense, regulatory region mutations. Consequences of mutations. Replica plating experiment, Luria and Delbruck test, Numerical alterations of chromosomes: Ploidy and their genetic implications.	15
IV	Structure and organization of prokaryotic and eukaryotic and organellar genomes, Chromatin structure and organisation: nucleosomes, Structure of centromere and telomere, Euchromatin and heterochromatin, Polytene and lamp brush chromosomes, Chromatin remodelling, histone modifications, epigenetic inheritance. Gene transfer in prokaryotes: Transformation, Conjugation and Transduction, Transposons: types, structures and role in gene regulation, Natural and artificial competence, Operon concept in bacteria, positive and negative gene regulation, Lytic and lysogenic cell cycles in Phages, genetic switch in lambda phage. Recent advances and applications in the field.	15

Suggested Readings:

1. Principles of Genetics (2006) 8th ed. Gardner EJ, Simmons, MJ and Snustad DP, John Wiley & Sons Inc, ISBN: 8126510439.
2. Essentials of Genetics (2015) 9th ed. William S, Michael K, Cummings R, Spencer, CA and Palladino MA, Prentice Hall Internationals, ISBN-10: 0134047796
3. Genetics (2017) 9th ed. Daniel L. Hartal&B. Cochrane, ISBN: 128412293X
4. Introduction to Quantitative Genetics (1995) Falconer DS, and Mackay TFC, ISBN: 0582243025.
5. An Introduction to Population Genetics Theory and applications (2013) Nielsen R and Slatkin M, Oxford University Press, ISBN: 1605351539.
6. Evolution 4th ed. (2017) D. Futuma and M. Kirkpatrick, ISBN: 9781605356051
7. An Introduction to Genetic Analysis (2015) Griffith AJFJ, Wessler SR, Carroll SV and Doebley J, ISBN: 0-7167-3520-2.

Course Name: Analytical Techniques					Course Code: SIAS BT 1 1 05 C 4004		
Batch:	**Programme:**	**Semester : I**	**L**	**T**	**P**	**Credits**	**Contact Hrs. per Week: 04**
2021-2023	M.Sc. Biotechnology		4	0	0	4	**Total Hrs.: 60**
Total Evaluation Marks: 100 **CIE:** **30** Marks **TEE:** **70** Marks		**Examination Duration:** 3 Hrs.					
Course Objectives	To provide an advanced understanding of the core principles and applications of various techniques used in biology/biotechnology.						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1:** Demonstrate principles of various basic and advanced techniques used in biological experiments. **CO2:** Critically analyze and interpret the results obtained from biological experiments. **CO3:** Understanding of solving biological problems using various techniques						

COURSE SYLLABUS

NOTE:
i)Question no. 1 is compulsory and to be set from the entire syllabus. It will have seven sub-parts and students need to answer any four. Each part carries three and half marks.
ii) Question nos. 2 to 5 are to be set from all four units one from each. Every question will have three sub-parts and students need to answer any two sub-parts of each question. Each part carries seven marks.

Unit No.	Contents	Contact Hrs.
I	Principle of microscopy: resolving powers of different microscopes, magnification; different types of microscopes, principle and applications of compound microscopy, dark microscopy, fluorescence microscopy, phase contrast microscopy, confocal microscopy, atomic force microscopy and electron microscopy (SEM, TEM, STEM); fixation and staining, freeze fracture/etch techniques.	15
II	Agarose gel electrophoresis, polyacrylamide gel electrophoresis (native PAGE and SDS-PAGE); Western transfer technique, iso-electric focusing (IEF), 2-Dimensional gel electrophoresis, pulse field electrophoresis; principle and applications of centrifugation, differential centrifugation, density gradient centrifugation and ultracentrifugation; principle and applications of flow cytometry.	15
III	Paper chromatography: types, principles and applications; principle and applications of thin layer chromatography (TLC), column chromatography (gel filtration, ion exchange and affinity chromatography); Adsorption and hydrophobic interaction chromatography, metal chelate chromatography, Structure, principle and applications of high performance liquid chromatography (HPLC), fast protein liquid chromatography (FPLC) and gas chromatography (GC).	15

IV	Principle and instrumentation of UV-visible, infrared spectroscopy, atomic absorption spectrophotometery, NMR spectroscopy, X-ray diffraction spectroscopy, N-terminal sequencing and peptide synthesis, introduction to proteomics, Yeast 2- hybrid and 3-hybrid systems, EMSA, CHIP, foot printing, phage display, principle of mass spectrometry, electrospray ionization MS, MALDI, tandem MS for protein identification. Recent advances and applications in the field.	15

Suggested Readings:

1. Principles and Techniques of Biochemistry and Molecular Biology (2018) 8th ed. Wilson K and Walker J, Cambridge University Press, ISBN No. 131661476X.
2. Physical Biochemistry: Principles and Applications (2010) 2nd ed., Sheehan, D., Wiley Blackwell (West Sussex), ISBN: 978-0-470-85602-4 / ISBN: 978-0-470-85603-1.
3. Physical Biochemistry: Applications to Biochemistry and Molecular Biology (1982) 2nd ed., Freifelder D, W.H. Freeman and Company (New York), ISBN:0-7167-1315-2 / ISBN:0-7167-1444-2.

Course Name: Practical-I					Course Code: SIAS BT 1 1 06 C 0084		
Batch:	**Programme:**	**Semester : I**	**L**	**T**	**P**	**Credits**	**Contact Hrs. per Week:8**
2021-2023	M.Sc. Biotechnology		0	0	8	4	**Total Hrs.:120**
Total Evaluation Marks: 100 **CIE:** **30** Marks **TEE:** **70** Marks		**Examination Duration:** 3 Hrs.					
Course Objectives	• To inculcate/impart skills to perform various tests/assays and experiments. • To impart skills of experiment designing, practical execution and report writing.						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1:** Improved skills to perform various tests/assays and experiments. **CO2:** Improved skills of experiment designing, practical execution and report writing. **CO3:** Ability to check the presence of adulterants in various food/feed samples						

COURSE SYLLABUS

NOTE:
i)Question no. 1 is compulsory and to be set from the entire syllabus. It will have seven sub-parts and students need to answer any four. Each part carries three and half marks.
ii) Question nos. 2 to 5 are to be set from all four units one from each. Every question will have three sub-parts and students need to answer any two sub-parts of each question. Each part carries seven marks.

Unit No.	Contents	Contact Hrs.
I	1. Laboratory orientation, calibration, and demonstration of equipments. 2. Preparation of solutions, pH and buffers 3. Determination of pKa of acetic acid and glycine 4. Qualitative tests for carbohydrates, lipids, amino acids, and proteins in food samples 5. Metaphase chromosome preparation with G banding and C banding from blood sample 6. Preparation of standard curve for quantitative analysis of protein/sugar samples using calorimetric methods	30
II	1. Inheritance patterns in man – numerical on pedigree analysis- autosomal patterns, X–linked patterns, Y–linked patterns, mitochondrial inheritance patterns 2. To study numerical based problems on Hardy-Weinberg equilibrium 3. To study numerical problems on linkage mapping 4. To study microscopic examination of bacteria, actinomycetes, algae, fungi and protozoa with or without staining 5. To study cell counting and cell viability assay	30

III	1. Preparation of specific media for isolation of bacteria, and fungi from natural sources 2. Production and analysis of microbial enzymes 3. Separation and purification of microbial enzymes/metabolites using various techniques 4. Biochemical characterization of microbial enzymes/metabolites. 5. To study the thermal denaturation/renaturation profile of DNA sample	30
IV	1. Separation of carbohydrates, amino acids and plant pigments using paper/thin layer chromatography 2. Isolation of genomic DNA from microbial/plants/other sources 3. Agarose gel electrophoresis for given DNA samples 4. Separation of proteins using native- and SDS-polyacrylamide gel electrophoresis 5. Analysis of protein/DNA samples using UV-VIS spectrophotometer	30

Suggested Readings:

1. An Introduction to Practical Biochemistry (2017) 3rd ed., Plummer, D.T., McGraw Hill Education, ISBN: 978-0070994874.
2. Principles and Techniques of Biochemistry and Molecular Biology (2018) 8th ed. Wilson K, and Walker J, Cambridge University Press. ISBN: 131661476X.
3. Microbes in Action: A Laboratory Manual of Microbiology (1990) 4th Addition, Harry W, Seeley, Paul JV, John J, W. H. Freeman ISBN: 978-0716721000.
4. Genetics: A Laboratory Manual, (2009) 2nd ed., American Society of Agronomy; Lab Manual edition, ISBN: 978-0891185611.
5. Infant, Child and Adolescent Nutrition: A Practical Handbook (2013) 1st ed., More J, CRC Press, ISBN: 9781444111859.
6. Laboratory Manual of Microbiology and Biotechnology (2014) 1sted.Aneja KR, Scientific International Pvt., Ltd. ISBN: 9789381714553.
7. Microbiology: A Laboratory Manual (2020), 12th ed., Cappuccino, JH, Welsh CT., Pearson Education Inc, ISBN: 9780135203996.
8. An introduction to Practical Biochemistry (2017) 3rd ed., Plummer, DT, McGraw Hill Education, ISBN: 978-0070994874.

Course Name: Principles of Biotechnology					Course Code: SIAS BT 1 1 01 GEC 4004		
Batch:	**Programme:**	**Semester : I**	**L**	**T**	**P**	**Credits**	**Contact Hrs. per Week: 04**
2021-2023	M.Sc. Biotechnology		4	0	0	4	**Total Hrs.: 60**
Total Evaluation Marks: 100 **CIE:** **30** Marks **TEE:** **70** Marks		**Examination Duration:** 3 Hrs.					
Course Objectives	To provide basic understanding of biotechnology; it's scope and applications in the agriculture, medicine, industrial, environment and advancement of biology.						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1:** Knowledge in the field of basic biotechnology. **CO2:** Understanding of major concepts in the field of biotechnology **CO3:** Understanding about the scope and applications of biotechnology in different fields.						

COURSE SYLLABUS

NOTE:
i)Question no. 1 is compulsory and to be set from the entire syllabus. It will have seven sub-parts and students need to answer any four. Each part carries three and half marks.
ii) Question nos. 2 to 5 are to be set from all four units one from each. Every question will have three sub-parts and students need to answer any two sub-parts of each question. Each part carries seven marks.

Unit No.	Contents	Contact Hrs.
I	An overview-definition, Scope and importance of biotechnology, Concepts of recombinant DNA technology and Gene Cloning. A brief account of microbes in industry and agriculture, Metabolic engineering for over production of metabolites.	15
II	Introduction to plant tissue culture and its applications, Gene transfer methods in plants, Transgenic plants (A brief introduction). *In-vitro* fertilization and embryo transfer in humans and livestock. Transfection techniques and transgenic and genome edited animals, Animal Cloning.	15
III	(A brief account) Biotechnology in medicine, Vaccines, Molecular diagnostics, Forensic, Gene therapy, Nano Medicine & Drug Delivery Cell & Tissue Engineering, Stem Cell therapy. (A brief account) Role of biotechnology in pollution control, Sewage treatment, Energy management, Bioremediation, Restoration of degraded lands and Conservation of biodiversity.	15
IV	An Overview, Insights and intervention into the Nano world, Important Developments, Societal implications & Ethical issues in Nanotechnology, applications of Nano-biotechnology in different areas. Biotechnology for developing countries and IPR	15

Suggested Readings:

1. Lehninger Principles of Biochemistry (2017) 7th ed., D.L. Nelson, M.M. Cox.. W.H. Freeman and Company, New York, USA, ISBN: 1-4641-2611-9.
2. Microbiology- Concepts and Applications, (1993) 6th ed., Pelczar MJ et. al., McGraw-Hill Inc, US, ISBN: 0070492581.
3. Plant Biotechnology – The genetic manipulation of plants (2017) 3rd ed., Slater A, Scott N and Fowler M, Oxford University Press, ISBN: 1138407674.
4. Animal Cell Culture Methods In: Methods in Cell Biology, (1998) Volume 57, 1st ed., Jenni P.M. and David B., Academic Press, eBook ISBN: 9780080859552.
5. Genome-4, (2017) Brown TA, Garland science, Taylor & Francis, NewYork, ISBN: 9780815345084.
6. Diagnostic and Therapeutic Antibodies (Methods in Molecular Medicine) George AJT, and Catherine EU, Humana Press, ISBN: 978-0-89603-798-4.

Course Name: Cell and Molecular Biology					Course Code: SIAS BT 1 2 01 C 4004		
Batch:	**Programme:**	**Semester : II**	**L**	**T**	**P**	**Credits**	**Contact Hrs. per Week: 04**
2021-2023	M.Sc. Biotechnology		4	0	0	4	**Total Hrs.: 60**
Total Evaluation Marks: 100 **CIE:** **30** Marks **TEE:** **70** Marks		**Examination Duration:** 3 Hrs.					
Course Objectives	• To understand cellular organization and function at molecular level. • To provide understanding of key cellular processes of replication, transcription and translation.						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1:** Advanced understanding of fundamental concepts of cellular and sub-cellular organization. **CO2:** Improved understanding of molecular basis of genetic information and function.						

COURSE SYLLABUS

NOTE:
i)Question no. 1 is compulsory and to be set from the entire syllabus. It will have seven sub-parts and students need to answer any four. Each part carries three and half marks.
ii) Question nos. 2 to 5 are to be set from all four units one from each. Every question will have three sub-parts and students need to answer any two sub-parts of each question. Each part carries seven marks.

Unit No.	Contents	Contact Hrs.
I	Archea, prokaryotic and eukaryotic cell (animal and plant cells); Theory of origin of eukaryotic cells; Structure and function of nucleus - nuclear envelope, nuclear pore complex; Nuclear protein-import and export, regulation of nuclear protein import and export; Organization of golgi, lysosome, structure and functions of ER, lysosome, mitochondria, chloroplasts and peroxisomes; Fluid mosaic model, membrane proteins, membrane lipids and membrane fluidity; Transport across cell membrane, passive transport, active transport-primary (P-type, F-type, V-type ATPases, ABC transporters), co-transport-symport and antiport; Ion channels, aquaporins, pinocytosis and phagocytosis; Cells as experimental models.	15
II	Introduction to cytoskeletal proteins; Organization of cytoskeletal protein and smooth muscle and skeletal muscles, movement of vesicles-role of actin and myosin; Structure of cilia and flagella; Prokaryotic and eukaryotic cell wall, cell matrix proteins; Cell-matrix interactions and cell-cell interactions; Adherence junctions, tight junctions, gap junctions, desmosomes, hemi-desmosomes, focal adhesions and plasmodesmata; Signalling molecules, receptors and their functions – G protein	15

	coupled receptors- Cyclic-AMP, Cyclic-GMP, IP3, Calcium, Receptor tyrosine kinases - EGF, insulin.	
III	DNA as genetic material, detailed mechanisms of DNA replication in viruses, bacteria and eukaryotes, semi-conservative mode of DNA replication, theta model and rolling circle model of DNA replication, trombone model of replication. DNA polymerases and other enzymes involved in replication and proof reading function and fidelity of DNA replication. Detailed mechanisms of DNA repair (base excision repair, nucleotide excision repair, mismatch repair etc), Mechanisms of recombination (homologous, non-homologous and site specific), gene conversion.	15
IV	Prokaryotic and eukaryotic gene structure: transcription-RNA polymerase, inhibitors of transcription, detailed mechanisms of transcription in prokaryotes and eukaryotes, regulatory region and transcriptional unit of gene, transcription factors, RNA polymerases, activators and repressors, enhancers etc. Reverse transcriptase, post transcriptional processing of RNA: splicing, cap addition and polyadenylation, polynucleotide phosphorylase. Regulatory RNAs (non-coding RNAs, siRNAs, miRNAs etc), Translation: detailed mechanisms of translation in prokaryotes and eukaryotes, post -translational modifications, protein turn over and degradation. Mechanisms of gene regulation at transcriptional, post-transcriptional, translational and post-translational level. Recent advances and applications in the field.	15

Suggested Readings:

1. The Cell: A Molecular Approach (2018) 8th ed., Cooper, GM, Sinauer Associates is an imprint of Oxford University Press, ISBN: 1605357073.
2. Molecular Cell Biology (2016) 8th ed., Lodish H, Berk A, Zipursky SL, Matsudaira P, Baltimore D and Darnell J, W.H. Freeman &Company (New York), ISBN: 978-1-4641-0981-2 / ISBN:10: 1464183392.
3. Molecular Biology of the Cell (2008) 6th ed., Alberts B, Johnson A. Lewis J and Enlarge M, Garland Science (Princeton), ISBN: 0-8153-1619-4 / ISBN:0-8153-1620-8.
4. Lehninger Principles of Biochemistry (2017) 7th ed., Nelson DL, Cox MM, W.H. Freeman and Company, New York, USA. ISBN-10: 1-4641-2611-9.
5. Biochemistry (2019) 9th ed., Stryer L, Berg JM, Tymoczko JL, Gatto, Jr. GJ, W.H. Freeman and Company, New York, USA. ISBN-10: 1-319-11467-9
6. Genes XII, (2017) 12th Revised edition ed., Lewin B, Krebs J, Kilpatrick ST, Goldstein ES, Jones and Bartlett Publishers, Inc. Sudbury, Massachusetts, USA. ISBN No. 9781284104493.
7. Molecular Biology of the Gene (2013) 7th ed., Watson JD, Baker TA, Bell SP, Gann A, M, Levin RL and Cumming B, San Francisco, ISBN: 0321905377.

Course Name: Immunology					Course Code: SIAS BT 1 2 02 C 4004		
Batch:	**Programme:**	**Semester : II**	**L**	**T**	**P**	**Credits**	**Contact Hrs. per Week: 04**
2021-2023	M.Sc. Biotechnology		4	0	0	4	**Total Hrs.: 60**
Total Evaluation Marks: 100 **CIE:** **30** Marks **TEE:** **70** Marks		**Examination Duration:** 3 Hrs.					
Course Objectives	To understand overall organization of the immune system and to comprehend the cellular and molecular basis of immune responsiveness.						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1:** Advanced understanding of the working mechanisms of the immune system. **CO2:** Understanding of antibody, MHC, complement system, cytokines, hypersensitivity and immunobiology of organ transplant. **CO3:** Understanding the role of antibody/antigen in disease diagnosis						

COURSE SYLLABUS

NOTE:
i)Question no. 1 is compulsory and to be set from the entire syllabus. It will have seven sub-parts and students need to answer any four. Each part carries three and half marks.
ii) Question nos. 2 to 5 are to be set from all four units one from each. Every question will have three sub-parts and students need to answer any two sub-parts of each question. Each part carries seven marks.

Unit No.	Contents	Contact Hrs.
I	Host-defenses, hematopoiesis, cells of the immune system, primary and secondary lymphoid organs and tissues (MALT). Anatomical barriers, cell types of innate immunity, soluble molecules and membrane associated receptors (PRR), connections between innate and adaptive immunity, chemokines and cytokines. Antigens and haptens, factors that dictate immunogenicity, B and T cell epitopes.	15
II	Structure and distribution of classes and subclasses of immunoglobulins (Ig), Ig fold, effector functions of antibody, antigenic determinants on Ig and Ig super family**.** Multigene organization of Ig locus, mechanism of V region DNA rearrangement, ways of antibody diversification. Antigen independent phase of B cell maturation and selection, humoral response – T-dependent and T-independent response. ELISA, Western blot, Immunohistochemistry, Immunocytochemistry.	15

III	Complement activation by classical, alternate and MB lectin pathway, biological consequences of complement activation, regulation and complement deficiencies. General organization and inheritance of MHC, structure, distribution and role of MHC class I and class II proteins, pathways of antigen processing and presentation. Structure and role of T cell receptor, and co-receptor, T cell development, generation of receptor diversity, selection and differentiation. General properties of effector T cells, cytotoxic T cells (Tc), natural killer cells; NKT cells and antibody dependent cellular cytotoxicity (ADCC).	15
IV	Mechanism of tolerance and privileged sites, Organ specific and systemic autoimmune diseases, possible mechanisms of induction of autoimmunity, IgE mediated (Type I) hypersensitivity, antibody mediated cytotoxic (Type II) hypersensitivity, immune complex mediated (type III) hypersensitivity and delayed type (Type IV) hypersensitivity. Immunological basis of graft rejection, clinical manifestations, immunosuppressive therapy. Vaccines - active and passive immunization, types of vaccines. Recent advances and applications in the field.	15

Suggested Readings:

1. Kuby Immunology (2018) 8th ed., Punt J, Stranford S, Jones P and Owen JA, W.H Freeman and Company, ISBN: 978-1319114701.
2. Janeway's Immunobiology (2017) 9th ed., Murphy KM and Beaver C, WW Norton and Company, ISBN: 978-0815345510.
3. Roitt's Essential Immunology (2017) 13th ed., Delvis PJ, Martin SJ, Burton DR and Roitt, IM, Wiley-Blackwell, ISBN: 978-1118415771.
4. Lehninger: Principles of Biochemistry (2017) 7th ed., Nelson, DL and Cox, MM, WH Freeman and Company (New York), ISBN: 978-1319108243.
5. Lippincott's illustrated Reviews Immunology (2012) 2nd ed., Doan T, Melvold R, Viselli S and Waltenbaugh, C, Wolters Kluwer India Pvt, Ltd, ISBN: 978-8184737639.

Course Name: Biosafety, Bioethics and IPR					**Course Code: SIAS BT 1 2 03 C 3003**		
Batch:	**Programme:**	**Semester : II**	**L**	**T**	**P**	**Credits**	**Contact Hrs. per Week: 03**
2021-2023	M.Sc. Biotechnology		3	0	0	3	**Total Hrs.: 45**
Total Evaluation Marks: 100 **CIE:** **30** Marks **TEE:** **70** Marks		**Examination Duration:** 3 Hrs.					
Course Objectives	To introduce the concept of intellectual property rights, patenting and emphasis on biosafety and bioethics.						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1:** Understanding the basics of intellectual property rights. **CO2**: Understanding the importance and level of biosafety at laboratory and industrial levels. **CO3:** Understanding the ethical practices and concepts appropriate to the discipline.						

COURSE SYLLABUS

NOTE:
i)Question no. 1 is compulsory and to be set from the entire syllabus. It will have seven sub-parts and students need to answer any four. Each part carries three and half marks.
ii) Question nos. 2 to 5 are to be set from all four units one from each. Every question will have three sub-parts and students need to answer any two sub-parts of each question. Each part carries seven marks.

Unit No.	Contents	Contact Hrs.
I	Biosafety: introduction; historical background; introduction to biological safety cabinets; primary containment for biohazards; biosafety levels; GRAS organisms, biosafety levels of specific microorganisms; recommended biosafety levels for infectious agents and infected animals; definition of GMOs & LMOs; principles of safety assessment of transgenic plants – sequential steps in risk assessment; concepts of familiarity and substantial equivalence; risk – environmental risk assessment and food and feed safety assessment; problem formulation – protection goals, compilation of relevant information, risk characterization and development of analysis plan; risk assessment of transgenic crops vs cisgenic plants or products derived from RNAi, genome editing tools. Regulations: International regulations-Cartagena protocol, OECD consensus documents and Codex Alimentarius; Indian regulations-EPA act and rules, guidance documents, regulatory framework-RCGM, GEAC, IBSC and other regulatory bodies.	12
II	Bioethics: Introduction, ethical conflicts in biological sciences-interference with nature, bioethics in health care - patient confidentiality, informed consent, euthanasia, artificial reproductive technologies, prenatal diagnosis, genetic screening, gene	12

	therapy, transplantation. Bioethics in research - cloning and stem cell research, Human and animal experimentation, animal rights/welfare, Agricultural biotechnology-Genetically engineered food, environmental risk, labeling and public opinion. Sharing benefits and protecting future generations - Protection of environment and biodiversity - biopiracy.	
III	Patenting: Basics of patents: types of patents; Indian Patent Act 1970; recent amendments; WIPO Treaties; Budapest Treaty; Patent Cooperation Treaty (PCT) and implications; procedure for filing a PCT application; role of a Country Patent Office; filing of a patent application; precautions before patenting-disclosure/non-disclosure - patent application forms and guidelines including those of National Bio-diversity Authority (NBA) and other regulatory bodies, fee structure, time frames; types of patent applications: provisional and complete specifications, PCT and conventional patent applications.	10
IV	International patenting-requirement, procedures and costs; financial assistance for patenting, introduction to existing schemes; publication of patents-gazette of India, status in Europe and US; patent infringement- meaning, scope, litigation, case studies and examples; commercialization of patented innovations; licensing-outright sale, licensing, royalty; patenting by research students and scientists-university/organizational rules in India and abroad, collaborative research-backward and forward IP; benefit/Credits sharing among parties/community, commercial (financial) and non-commercial incentives. Recent advances and applications in the field.	11

Suggested Readings:

1. Office of the Controller General of Patents, Design & Trademarks; Department of Industrial Policy & Promotion; Ministry of Commerce & Industry; Government of India. http://www.ipindia.nic.in/
2. World Trade Organisation. http://www.wto.org
3. World Intellectual Property Organisation. http://www.wipo.int
4. International Union for the Protection of New Varieties of Plants. http://www.upov.int
5. National Portal of India. http://www.archive.india.gov.in
6. IPR, Biosafety and Bioethics (2013) Parashar S, Goel D, Pearson Publishing India, ISBN: 9788131774700.
7. An Introduction to Ethical, Safety and Intellectual Property Rights Issues in Biotechnology (2017) Nambisan P, Academic Press, ISBN: 9780128092316.
8. http://dbtindia.gov.in/guidelines-biosafety

Course Name: Genetic Engineering					Course Code: SIAS BT 1 2 04 C 3003		
Batch:	**Programme:**	**Semester : II**	**L**	**T**	**P**	**Credits**	**Contact Hrs. per Week: 03**
2021-2023	M.Sc. Biotechnology		3	0	0	3	**Total Hrs.: 45**
Total Evaluation Marks: 100 **CIE:** **30** Marks **TEE:** **70** Marks		**Examination Duration:** 3 Hrs.					
Course Objectives	To provide basic and high throughput techniques in the areas of genomics and genetic engineering.						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1:** Understanding of high throughput techniques used in genomics and transcriptomics. **CO2:** To understand the concept of genetic engineering including the techniques, applications and limitations. **CO3:** Demonstrate the ability of designing recombinant molecules and conducting experiments involving genetic manipulation.						

COURSE SYLLABUS

NOTE:
i)Question no. 1 is compulsory and to be set from the entire syllabus. It will have seven sub-parts and students need to answer any four. Each part carries three and half marks.
ii) Question nos. 2 to 5 are to be set from all four units one from each. Every question will have three sub-parts and students need to answer any two sub-parts of each question. Each part carries seven marks.

Unit No.	Contents	Contact Hrs.
I	Isolation and purification of DNA (genomic and plasmid) and RNA. Various methods of separation and quantification of nucleic acids, Southern and Northern hybridizations, PCR and its types; hot start, gradient, RT-PCR, qPCR etc. Generation of genomic and cDNA libraries. Methods for analysis of gene expression at RNA and protein level, large scale expression.	10
II	Recombinant DNA Technology: Plasmids- biology and applications in molecular cloning, phage, cosmid, BAC and YAC vectors. Features of cloning and expression vectors. Enzymes used in Recombinant DNA technology (Restriction endonucleases, DNA modifying enzymes, other nucleases, Polymerases, Ligase, kinases and phosphatases), Molecular cloning of DNA or RNA fragments in bacterial and eukaryotic systems. Expression of recombinant proteins using bacterial, animal and plant vectors and their purification.	12

III	Methods of gene delivery (transformation, transfection, electroporation, micro-injection, biolistics, etc), Gene knock out in bacterial and eukaryotic organisms, generation of knock-out and knock-in mice, cre/lox, FLP/FRP, In-vitro mutagenesis and deletion techniques, Site-directed Mutagenesis, protein engineering. Genome editing: CRISPR-CAS9	11
IV	Applications of genetic engineering in gene therapy, diagnostics, therapeutics, vaccines, bio-pharma, crop improvement. DNA fingerprinting and its applications in forensics. Applications of transgenic animals and plants. Regulatory guidelines about transgenic organisms and their use. Recent advances and applications in the field.	12

Suggested Readings:

1. Principles of Gene Manipulation and Genomics (2016) 8th ed., Primrose, SB and Twyman, R, Wiley Blackwell, ISBN: 978-1405156660.
2. Gene Cloning and DNA Analysis: An Introduction (201978-6) 7th ed., Brown, TA, Wiley Blackwell, ISBN: 978-1119072560.
3. Genome 4 (2017) 4th Brown, TA, Garland science, ISBN 13: 978-0815345084.
4. Introduction to Genomics (2015) 2nd ed., Lesk, AM, Oxford university Press India, ISBN: 978-0198745891.
5. Genomics and Personalized Medicine: What Everyone needs to Know (2016) 1st ed., Snyder, M, OUP-USA, ISBN: 978-0190234768.

Course Name: Seminar					Course Code: SIAS BT 1 2 05 C 2002		
Batch:	**Programme:**	**Semester : II**	**L**	**T**	**P**	**Credits**	**Contact Hrs. per Week: 02**
2021-2023	M.Sc. Biotechnology		2	0	0	2	**Total Hrs.: 30**
Total Evaluation Marks: 50 **CIE:** **15** Marks **TEE:** **35** Marks		**Examination Duration:** 1.5 Hrs.					
Course Objectives	To develop communication and presentation skills in the students						
Course Outcomes:	**CO1:** Students will be able to improve their presentations skills. **CO2:** Understanding of scientific papers and their presentations in their own way.						

COURSE SYLLABUS

Students will be evaluated by all the faculty members including Head of the Department based on their presentation followed by viva-voce examination

Unit No.	Contents	Contact Hrs.
I	Seminar will be of 45-minute duration during which the presentation will be followed by questions session by the audience comprising of faculty and students. Every student shall be required to submit the topic of his/her seminar in consultation with the Head of the Department/Faculty members/student advisors well in advance so that the same may be displayed on the notice board. The presenter has to write an Abstract to be distributed during Seminar in addition to two copies of write-up giving relevant details of the background of the subject, methods used and references/List of sources from where the material for presentation has been collected.	30

Suggested Readings:

1. www.pubmed.com
2. www.google.com
3. www.sciencedirect.com
4. www.tandfonline.com

Course Name: Omics in Biotechnology					**Course Code:** SIAS BT 1 2 06 C 4004		
Batch:	**Programme:**	**Semester : II**	**L**	**T**	**P**	**Credits**	**Contact Hrs. per Week: 04**
2021-2023	M.Sc. Biotechnology		4	0	0	4	**Total Hrs.: 60**
Total Evaluation Marks: 100 **CIE:** **30** Marks **TEE:** **70** Marks		**Examination Duration:** 3 Hrs.					

Course Objectives	• To provide detailed understanding of major Omics technologies such as genomics, transcriptomics, proteomics and metabolomics etc. • To provide knowledge about the data analysis of next generation sequencing. • To provide understanding of applications of the Omics technologies.
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1:** Understanding of modern Omics technologies in the field of biotechnology. **CO2:** Understanding of data analysis generated through next generation sequencing. **CO3:** Better understanding of the applications of the Omics technologies in different industries.

COURSE SYLLABUS

NOTE:
i)Question no. 1 is compulsory and to be set from the entire syllabus. It will have seven sub-parts and students need to answer any four. Each part carries three and half marks.
ii) Question nos. 2 to 5 are to be set from all four units one from each. Every question will have three sub-parts and students need to answer any two sub-parts of each question. Each part carries seven marks.

Unit No.	**Contents**	**Contact Hrs.**
I	Introduction to omics techniques, Applications of omics in medical, agriculture, and other branches of Biotechnology, History of DNA sequencing, Early methods of DNA sequencing, Genome sequencing projects (Haemophilus, Drosophila, Yeast, Human etc.), Next Generation Sequencing, Comparative features of different sequencing platforms (Sanger, Illumina, Nanopore, PacBio etc.), Use of NGS techniques in genomics and transcriptomics, Basic steps in library preparation and analysis of genomics and transcriptomics data. Comparative and genomics, transcriptomics, Functional genomics.	15
II	Introduction to file formats used in NGS analysis, Types of genomics data e.g. WGS, WES, RNAseq, DNA-methylation, single cell sequencing data etc., Concepts of sequencing depth, coverage, phred score, N50, L50, and other metrics used in omics, Introduction to tools and databases used for omics analysis (FastQC, Bowtie, Stringtie, Tophat, Deseq etc.), Various pipelines for genomics data, Differential	15

	expression analysis, Gene Ontology, Pathway Mapping, Types of non-coding RNAs and use of high throughput sequencing methods for the analysis of non-coding RNAs, Applications of genomics and transcriptomics in marker development and candidate gene discovery.	
III	Introduction to proteomics, Discovery vs targeted proteomics, Basic techniques for protein separation and analysis (Chromatography, Gel-based, Spectroscopic), Gel-based and gel-free techniques in proteomics, Basic workflows and analysis pipelines (identification, quantification, post-translational modifications etc.), Introduction to tools used in proteomic analysis (Mascot, Proteome discoverer, MaxQuant etc.), Applications of proteomics in drug discovery, biomarker discovery, agriculture biotechnology etc.	15
IV	Introduction to metabolomics and lipidomics, Targeted vs non-targeted metabolomics, Basics tools and techniques used for metabolome and lipidome characterization and analysis, Introduction to databases and software used for analysis of metabolomics data, methods of metabolite identification and fingerprinting, Applications of metabolomics in medical and agriculture biotechnology, Integration of different omic techniques for various applications in biotechnology. Recent advances and applications in the field.	15

Suggested Readings:

1. Bioinformatics for omics data: methods and protocols (2011), Mayer, B., New York: Humana Press. ISBN 978-1617790270
2. Omics: Applications in Biomedical, Agricultural, and Environmental Sciences (2013), Barh D., Zambare V., Azevedo V. CRC Press. Taylor and Francis Group. ISBN 9781138074750
3. Applications of Advances Omics Technologies: from Genes to Metabolites (2014), Wilson and Wilsons. Elsevier. ISBN: 9780444626509
4. Genomics, Proteomics and Metabolomics in Nutraceuticals and Functional Foods (2015), Bagchi D., Swaroop A., Bagchi M. Wiley Blackwell. ISBN:9781118930427
5. Principles of Proteomics (2013), Twyman, R., Garland Science, ISBN: 978-0815344728

Course Name: Practical-II					Course Code: SIAS BT 1 2 07 C 0084		
Batch:	**Programme:**	**Semester : II**	**L**	**T**	**P**	**Credits**	**Contact Hrs. per Week: 8**
2021-2023	M.Sc. Biotechnology		0	0	8	4	**Total Hrs.:120**
Total Evaluation Marks: 100 **CIE:** **30** Marks **TEE:** **70** Marks		**Examination Duration:** 3 Hrs.					
Course Objectives	• To inculcate/impart skills to perform various tests/assays and experiments. • To impart skills of experiment designing, practical execution and report writing.						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1:** Improved skills to perform various tests/assays and experiments. **CO2:** Improved skills of experiment designing, practical execution and report writing.						

COURSE SYLLABUS

NOTE:
i)Question no. 1 is compulsory and to be set from the entire syllabus. It will have seven sub-parts and students need to answer any four. Each part carries three and half marks.
ii) Question nos. 2 to 5 are to be set from all four units one from each. Every question will have three sub-parts and students need to answer any two sub-parts of each question. Each part carries seven marks.

Unit No.	Contents	Contact Hrs.
I	1. Determination of A, B, O and Rh blood groups in human beings 2. Detection of antigen/antibody in a given sample using Enzyme Linked Immunosorbent Assay (ELISA) 3. Polyclonal antibody production in mice/rabbit and detection using antigen. 4. DNA extraction and amplification of desired gene using RT-PCR technique. 5. To study the separtation and analysis of antigen/antibody from a mixture	30
II	1. Restriction analysis and DNA finger printing methods, RAPD, SSR etc. 2. To study the extraction of RNA from given sample 3. To study introduction to basic linux commands used in omics analyses. 4. To demonstration of NGS pipeline using publically available data for transcriptome analysis. 5. Identification of non-coding RNAs – a demonstration of pipeline.	30

III	1. To study the preparation of competent cell using chemical method 2. To study the transformation efficiency of competent cells 3. To study the isolation of plasmid DNA from recombinant cell and its analysis 4. To study PCR reactions with plasmid and genomic DNA 5. To study restriction digestion analysis of a given DNA sample	
IV	1. To study market analysis of biopharmaceutical industries in India 2. To study the demonstration of LC-MS and other proteomics tools and techniques 3. To study the demonstration of data acquisition in LC-MS techniques 4. To study data analysis using MASCOT or any other software 5. To study dye decolorization using microbial/plant biomass or metabolites	30

Suggested Readings:

1. Physical Biochemistry: Principles and Applications (2010) 2nd ed., Sheehan, D, Wiley Blackwell (West Sussex), ISBN: 978-0-470-85602-4 / ISBN: 978-0-470-85603-1.
2. An Introduction to Practical Biochemistry (2017) 3rd ed., Plummer, D.T., McGraw Hill Education, ISBN: 978-0070994874.
3. Principles and Techniques of Biochemistry and Molecular Biology (2018) 8th ed. Wilson K, and Walker J, Cambridge University Press. ISBN: 131661476X.
4. Microbes in Action: A Laboratory Manual of Microbiology (1990) 4th Addition, Harry W, Seeley, Paul JV, John J, W. H. Freeman ISBN: 978-0716721000.
5. Genetics: A Laboratory Manual, (2009) 2nd ed., American Society of Agronomy; Lab Manual edition, ISBN: 978-0891185611.

Course Name: Pharmaceutical Biotechnology					Course Code: SIAS BT 1 2 01 DCEC 3003		
Batch:	**Programme:**	**Semester :**	**L**	**T**	**P**	**Credits**	**Contact Hrs. per Week: 03**
2021-2023	M.Sc. Biotechnology	II	3	0	0	3	**Total Hrs.: 45**
Total Evaluation Marks: 100 **CIE:** **30** Marks **TEE:** **70** Marks		**Examination Duration:** 3 Hrs.					

Course Objectives	• To gain insights into the process of drug discovery. • To provide understanding on the mechanisms of various biopharmaceutical products. • To gain knowledge on the approval process of biopharmaceuticals. • To provide knowledge on the market of biopharmaceuticals.
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1:** Improved understanding on the roles of biopharmaceuticals in the treatment of diseases. **CO2:** Understanding of the regulatory mechanism for the approval of biopharmaceuticals. **CO3:** Improved insights into the products and market of biopharmaceuticals.

COURSE SYLLABUS

NOTE:
i)Question no. 1 is compulsory and to be set from the entire syllabus. It will have seven sub-parts and students need to answer any four. Each part carries three and half marks.
ii) Question nos. 2 to 5 are to be set from all four units one from each. Every question will have three sub-parts and students need to answer any two sub-parts of each question. Each part carries seven marks.

Unit No.	Contents	Contact Hrs.
I	Biotechnology in pharmaceutical perspective: Biology in drug discovery; Traditional drug discovery vs. rational drug discovery, rational drug discovery pipeline, concept of target based drug design and target discovery, role of plant biotechnology in edible vaccine development. Definition: Generics and its advantages; Biogenerics and Biosimilars; Why biosimilars are not (bio) generics; The advent of Biosimilars; Protein-based biopharmaceuticals; Manufacturing processes; Global market; International Non-proprietary Names (INN) nomenclature system biosimilars regulation (EU position, US pathways, Government initiatives).	12
II	Biotechnology in pharmaceutical industry: Major areas for biotechnology in the pharmaceutical industry such as antibiotics, vaccines, diagnostics, antibodies,	11

	biopharmaceuticals (insulin, interferon, GSF, CSF & therapeutic proteins etc.); Commercial aspects, priorities for future biotechnological research	
III	Industrial enzymes in drug development: Penicillin amidase, lipase, oxidoreductase, nitrilase, protease etc. Use of all these enzymes for enantioselective synthesis of pharmaceutically important drugs / drug intermediates, future directions. Approved follow-on proteins/Biosimilars; Characteristics of high-selling peptides and proteins; Products with expired patents; Challenging originator‟s patents; Target products for FOB (follow-on biologicals)/ Biosimilars development peptides; Recombinant nonglycosylated proteins; Recombinant glycosylated proteins; Industries dealing with biogenerics and its market value; World scenario; Indian scenario.	11
IV	Genomics in target discovery: Concept of genome, genes and gene expression, genome sequencing and sequence comparison methods (e.g. BLAST), gene expression comparison methods (microarray). Comparative genomics and expression genomics for target discovery of communicable diseases and lifestyle disease. Recent advances and applications in the field.	11

Suggested Readings:

1. Pharmaceutical Biotechnology (2016) Helmer E, Syrawood Publishing House, ISBN: 978-1682861066.
2. Pharmaceutical Biotechnology (2014) Sreenivasulu V, Jayaveera KN and Adinarayana K, S Chand & Company, ISBN: 978-8121942478.
3. Pharmaceutical Biotechnology Fundamentals and Application (2013) Kokare C, Nirali Prakashan, Educational Publishers, ISBN: 978-8185790688.
4. Pharmaceutical Biotechnology: Concepts and Applications (2011) Walsh G, Wiley India Pvt Ltd, ISBN: 978-8126530250.
5. Pharmaceutical Biotechnology (2002) 2nd ed. Cromelin DJA and Sindelar RD, Taylor and Francis Group, ISBN: 978-3-527-65125-2.

Course Name: Microbial Biotechnology					Course Code: SIAS BT 1 2 02 DCEC 3003		
Batch:	**Programme:**	**Semester:**	**L**	**T**	**P**	**Credits**	**Contact Hrs. per Week: 03**
2021-2023	M.Sc. Biotechnology	II	3	0	0	3	**Total Hrs.: 45**
Total Evaluation Marks: 100 **CIE:** **30** Marks **TEE:** **70** Marks		**Examination Duration:** 3 Hrs.					
Course Objectives	To introduce students to basic and advanced knowledge in the field of microbial technology and fermentation for use in human welfare.						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1:** Understanding microbial fermentation for the production of useful products **CO2:** Understanding basic techniques related to downstream processing of alcohols, enzymes and organic acids **CO3:** Understanding basic techniques related to downstream processing of alcohols, enzymes and organic acids.						

COURSE SYLLABUS

NOTE:
i)Question no. 1 is compulsory and to be set from the entire syllabus. It will have seven sub-parts and students need to answer any four. Each part carries three and half marks.
ii) Question nos. 2 to 5 are to be set from all four units one from each. Every question will have three sub-parts and students need to answer any two sub-parts of each question. Each part carries seven marks.

Unit No.	Contents	Contact Hrs.
I	Fermentative production of industrial alcohol, uses, raw materials, microorganisms, inoculums preparation, preparation of wort, fermentation and recovery. Fermentative production of beer – Medium components, malt, malt adjuncts, hops, water. Preparation of wort, mashing, wort boiling, microorganism, inoculum preparation, fermentation, cold storage maturation, carbonation, packing and preservation. Principles of wine making – Fruit selection, picking, crushing, sulphite addition, processing, fermentation, aging and bottling.	12
II	Fermentative production of citric acid, uses, microorganism, inoculum preparation, medium preparation, fermentation, recovery and mechanism of citric acid production. Fermentative production of vitamin B12 – Uses, structure of vit-B12, microorganisms, inoculums preparation, medium preparation, fermentation and recovery. Fermentative production of glutamic acid – Uses, microorganism, inoculum preparation, production medium, fermentation and downstream processing	11

III	Antibiotics – Commercial production of benzyl penicillin, uses, microorganism, inoculums preparation, production medium, fermentation, recovery and semi-synthetic penicillins. Fermentative production of tetracyclines-uses, chlortetracycline, oxy-tetracycline, tetracycline and semisynthetic tetracyclines, structures, microorganisms, inoculum preparation, production medium, fermentation and recovery methods.	11
IV	Production and application of microbial enzymes. – Amylases and proteases, uses, microorganisms, inoculum preparation, production medium, fermentation and recovery, steroid transformations-substrates, typical structures, microorganisms, inoculum preparation,11-hydroxylation, process and recovery. Principles of vaccine production and types of vaccines, Microbial biopesticides, microbial products from genetically modified organisms eg. insulin. Recent advances and applications in the field.	11

Suggested Readings:

1. Microbial Biotechnology: Progress and Trends (2017) 1st ed., Harzevili FD and Chen H, CRC Press; ISBN: 978-1138748699.
2. Microbial Biotechnology (2016) Cooper E, Syrawood Publishing House, ISBN: 978-1682860977.
3. Encyclopedia of Metagenomics. Genes, Genomes and Metagenomes: Basics, Methods, Databases and Tools (2015). Nelson, KE Boston, MA, Springer US, ISBN: 978-1-4899-7479-2.
4. Microbial Biotechnology: Principles and Applications. Hackensack, (2013). 2nd ed. Lee, YK, World Scientific. ISBN: 978-981-256-676-8.
5. Comprehensive Biotechnology (2011) 3rd ed., Moo-Young, M, Elsevier, ISBN: 9780444640468.

Course Name: Environmental Biotechnology					Course Code: SIAS BT 1 2 03 DCEC 3003		
Batch:	**Programme:**	**Semester :**	**L**	**T**	**P**	**Credits**	**Contact Hrs. per Week: 03**
2021-2023	M.Sc. Biotechnology	II	3	0	0	3	**Total Hrs.: 45**
Total Evaluation Marks: 100 **CIE:** **30** Marks **TEE:** **70** Marks		**Examination Duration:** 3 Hrs.					
Course Objectives	To provide information about various factors responsible for environmental pollution and its mitigation using biotechnology.						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1:** Understanding the source and mechanism of environmental pollution. **CO2:** Understanding the role of microbes and plants in remediation and management of environmental pollution. **CO3:** Understanding the replacement/options available for non-degradable pollutants.						

COURSE SYLLABUS

NOTE:

i)Question no. 1 is compulsory and to be set from the entire syllabus. It will have seven sub-parts and students need to answer any four. Each part carries three and half marks.

ii) Question nos. 2 to 5 are to be set from all four units one from each. Every question will have three sub-parts and students need to answer any two sub-parts of each question. Each part carries seven marks.

Unit No.	Contents	Contact Hrs.
I	Water, Soil and Air pollutants: their sources and effects. Major pollutants and their effects on flora and fauna, Bioremediation-mechanism and process, Factors affecting the bioremediation process, Natural and engineered bioremediation, concepts of bioaugmentation, biostimulation, biodegradation, biosorption and biofilms in the bioremediation of pollutants, In-situ and ex-situ bioremediation strategies. Phytoremediation, microbial systems for heavy metal accumulation, biosorption & detoxification mechanisms.	12
II	Primary, secondary and tertiary treatment of waste water, naerobic and aerobic process of treatment; biochemistry and microbiology of aerobic and anaerobic treatment, use of genetically engineered organisms. Emerging biotechnological processes in wastewater treatment, Bioremediation of contaminated ground water; Membrane technology in waste water treatment, Bioreactors for waste water treatment, treatment of typical industrial effluents: dairy, distillery, dye, and pharmaceutical industries.	11

III	Solid waste treatment, characteristics of municipal, industrial and biomedical wastes; Aerobic and anaerobic methods, Physical and chemical treatment of solid waste, Composting and vermicomposting. Use of bacteria, fungi, plants, enzymes and genetically engineered organisms; Bioremediation of contaminated soils and waste land. Phytoremediation of soil metals; Concept of stubble burning and pollution, Wealth generation from solid agricultural residues in terms of biofuels and other value-added products. production of biogas from solid waste.	11
IV	Xenobiotic compounds: Degradation of aliphatic, aromatics, polyaromatic hydrocarbons, polycyclic aromatic compounds, pesticides, microbial treatment of oil pollution. Enzymes-types and role in biodegradation of pollutants, advantages & disadvantages of biocatalysts - isolated enzymes versus whole cell systemsImmobilized biocatalysts in bioremediation. Use of solar radiation in industrial effluent treatment; Environment friendly technologies and products: biosurfactants, biofertilizers, biopesticides, integrated waste management. Recent advances and applications in the field.	11

Suggested Readings:

1. Environmental Science and Technology, (2019) 9th ed., Stankey EM, Lewis Publishers, New York. ISBN: 1420059203.
2. Enviornmental Biotechnology: Principles and Applications (2017) 1st ed., Rittmann B and Mccarty P, McGraw Hill Education; ISBN: 978-1259002885.
3. Environmental Biotechnology: Biodegradation, Bioremediation, and Bioconversion of Xenobiotics for Sustainable Development (2016) 1st ed., Sangeetha J, Thangadurai D, David M and Abdullah MA, Apple Academic Press; ISBN: 978-1771883627.
4. Environmental Biotechnology: Basic Concepts and Applications (2011) 2nd ed., Thakur IS, I K International Publishing House Pvt. Ltd; ISBN: 978-9380578477.
5. Biodegradation and Bioremediation: (2004), Singh A. and Ward O.P., Soil Biology, Springer, ISBN: 978-3-540-21101-3.

Course Name: Biostatistics and Bioinformatics					Course Code: SIAS BT 1 3 01 C 4004		
Batch:	**Programme:**	**Semester :**	**L**	**T**	**P**	**Credits**	**Contact Hrs. per Week: 04**
2021-2023	M.Sc. Biotechnology	III	4	0	0	4	**Total Hrs.: 60**
Total Evaluation Marks: 100 **CIE:** **30** Marks **TEE:** **70** Marks		**Examination Duration:** 3 Hrs.					
Course Objectives	To introduce the students in the field of bioinformatics and enables them to understand the concepts of statistics in biology.						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1:** Understanding the statistical analysis of biological data **CO2:** Understanding the role of computer science in predicting structure and function of biomolecules **CO3:** Understanding similarities and differences among living organisms on the basis of genetic information						

COURSE SYLLABUS

NOTE:
i)Question no. 1 is compulsory and to be set from the entire syllabus. It will have seven sub-parts and students need to answer any four. Each part carries three and half marks.
ii) Question nos. 2 to 5 are to be set from all four units one from each. Every question will have three sub-parts and students need to answer any two sub-parts of each question. Each part carries seven marks.

Unit No.	Contents	Contact Hrs.
I	Definition of selected terms scale of measurements related to statistics; Methods of collecting data, Presentation of data statistical Tables, need for reduction of data measures of averages and location, Measures of dispersion: Range, quartile deviation, mean deviation and relative deviation. Probability: basic concepts; basic theorems of probability addition and multiplication theorems; conditional probability of Bayes Theorems. Probability mass function, probability density function, cumulative distribution function.	15
II	Probability distribution definition and applications; Binominal distribution, Poisson distribution, Normal distribution, logic of statistical standard error estimation testing of hypothesis. Tests of significance: Null hypothesis, alternative hypothesis, type I error, type II error, level of significance, and power of test. Tests for mean based on normal distribution, one sample t-test, two-sample t-test, paired-sample t-test, Chi-Squared test, and Tests for variance based on normal distribution – one sample and two-sample problem. One-way and Two-way analysis of variance (ANOVA) techniques. Correlation concept and applications, Spearman's rank correlation	15

	coefficient, regression concept and applications.	
III	Historical background. Scope of bioinformatics - genomics, proteomics, computer aided drug design (structure based and ligand based approaches), Applications of bioinformatics. Introduction to biological databases - primary, secondary and composite databases, Different formats of molecular biology data. NCBI, nucleic acid databases (GenBank, EMBL, DDBJ, NDB), protein databases (PIR, Swiss-Prot, TrEMBL, PDB)	15
IV	Similarity, identity and homology. Alignment-local and global alignment, pairwise and multiple sequence alignments, alignment algorithms, amino acid substitution matrices (PAM and BLOSUM), BLAST and CLUSTAL omega. Identification of open reading frames (ORF), Concept of orthology, paralogy and homology in gene and protein sequences. Methods and tools for phylogenetic analysis, maximum parsimony, maximum likelihood and distance methods; creation, evaluation and interpretation of evolutionary trees phylogenetic tree. Human Genome Project, Genome sequencing platforms, Format & Types of genomic data, Software & pipelines for NGS data analysis. Recent advances and applications in the field.	15

Suggested Readings:

1. Fundamentals of Statistics (2016) Goon, AM, Gupta, MK and Dasgupta, B. Vol. I & II. World Press, ASIN: B01LB7MH74.
2. Statistical Methods (2012) 1st ed., Das, NG. Vol I & II. Tata McGraw Hill, ISBN: 9780070263512.
3. Probability and Statistics for Engineers and Scientists (2013) 9th ed., Walpole, RE, Myers, RH, Myers, SL and Ye, Pearson Education India KE ISBN: 978-9332519084
4. Biostatistics: A Foundation. for Analysis in the Health Sciences (2012) 10th ed., Daniel, WW and Cross, CL. John Wiley & Sons, ISBN: 978-1118302798
5. Essential Bioinformatics (2006) 1st ed., Xiong J, Cambridge University Press, ISBN 13: 978-0521600828.
6. Fundamental concepts of Bioinformatics (2003) Krane DE and Raymer ML Pearson, ISBN: 978-8177587579.
7. An Introduction to Bioinformatics (2017) 1st ed., Knight R, Larsen and Keller Education, ISBN: 978-1635490459.
8. Concepts of Bioinformatics and Genomics (2016) 1st ed., Momand J, McCardy A, Heubah, S and Warter-Perez N, Oxford University Press, ISBN: 978-0199936991

Course Name: Biophysics and Nanosciences					Course Code: SIAS BT 1 3 02 C 4004		
Batch:	**Programme:**	**Semester :**	**L**	**T**	**P**	**Credits**	**Contact Hrs. per Week: 04**
2021-2023	M.Sc. Biotechnology	III	4	0	0	4	**Total Hrs.: 60**
Total Evaluation Marks: 100 **CIE:** **30** Marks **TEE:** **70** Marks		**Examination Duration:** 3 Hrs.					

Course Objectives	• To explore the complexity of living systems with a quantitative physical approach, fundamentals of nanoscale structured materials and also discuss various biomedical & agricultural applications of different nanomaterials. • To provide understanding of the key biophysical techniques and their applications in research and diagnosis.
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1:** Improved understanding of the core concepts of biology, chemistry and physics and how they interconnect in biophysical systems. **CO2:** Expansion of knowledge of standard molecular and biophysical techniques to design experiments in a specific research area. **CO3:** Improved understanding of fundamental principles of nanotechnology and synthesis of different nanomaterials. **CO4:** Improved insights on the emerging need of nanotechnology in environment, health; and safety.

COURSE SYLLABUS

NOTE:
i)Question no. 1 is compulsory and to be set from the entire syllabus. It will have seven sub-parts and students need to answer any four. Each part carries three and half marks.
ii) Question nos. 2 to 5 are to be set from all four units one from each. Every question will have three sub-parts and students need to answer any two sub-parts of each question. Each part carries seven marks.

Unit No.	Contents	Contact Hrs.
I	Introduction to Biophysics and history of Biophysics, main features of quantum theory, Elementary particles and their interactions, mechanism of molecular energy transfer, Distribution of molecular energy and velocity at equilibrium, Energy of activation, Different types of forces and stereo-chemical factors responsible for molecular conformation, defining conformation of a macromolecular chain, complex array of biomolecular structures found in DNA and proteins due to interactions. Main methods of studying the structure of proteins and DNA, protein folding pathways, Levinthal's paradox, Molten globule, Anfinsen's experiment, Methods for investigating folding: Fluorescence spectroscopy, Circular dichroism.	15

	Macromolecular interactions, Biophysical methods of interactions: Microcalorimetry (Isothermal Titration Calorimetry (ITC), Surface Plasmon Resonance (SPR).	
II	Basic concepts and laws of thermodynamics, Gibbs free energy, Enthalpy and Entropy, Energetic processes in living organism, Information and Entropy, coupling of fluxes, Coupling of Chemical Reactions, Redox potential in biological system, ATP production. Introduction to membrane Biophysics, fundamental role of biomembranes, interfacial phenomena and membranes, surface and interfacial tensions, self-assembly of membranes, molecular structure of membranes, Structure & function of membranes, Nernst equation (based on membrane permeable for a single kind of ions), Resting membrane potential, Action potential, Biophysics of synapse, patch clamping/voltage clamp and their applications to the study of biomacromolecules.	15
III	Overview of Nanotechnology - Historical perspective of integration of biology, chemistry, and material science. Opportunities and promises of Nanobiotechnology. Top down and bottom up approaches of synthesis of nanoparticles, synthesis of nanoparticles by physical, chemical and biological methods; nucleation and growth of nanosystems, factors affecting synthesis of nanoparticles, Debye-Scherrer method, particle size determination using UV absorption spectra peaks and photoluminescence peaks, dynamic light scattering (DLS), SEM. Nanomaterials used in biotechnology-nanoparticles, carbon nanotubes, quantum dots and nanofibres.	15
IV	Miniaturized Devices-nanotechnology and biomedical devices: Overview of smart devices for medical field, lab on chip concept, epipen, intelligent pill, wobbling gels. Nanotechnology and diagnostics and therapy-Nano-Biosensing-biosensors and nanobiosensors -basics, DNA aptamers for nano-biosensing. Use of nanotechnology in diagnosis of chronic diseases like diabetes and coronary heart diseases; parasitic disease like malaria. Nanotechnology in agriculture, food technology & environment: Insecticides development using nanotechnology and Nanofertilizers, nanotechnology in food processing, safety & smart packaging, applications of nanotechnology in water purification and oil spill removal. Recent advances and applications in the field.	15

Suggested Readings:

1. An introduction to Biophysics (2018), 1st ed., Burns, D, Forgotten Books, ISBN: 978-1330860212.
2. Biophysics - An Introduction (2014) 1st ed., Cotterill, R, Wiley, ISBN: 978-8126551606.
3. Biophysics: An Introduction (2012) 2nd ed., Glazer, Springer, ISBN**:** 978-3642252112.
4. Nanobiotechnology: Concepts, Applications and Perspectives (2012) 1st ed., Niemeyer, CM and Mirkin, CA, Wiley India Pvt Ltd., ISBN 13: 978-8126538409.
5. A Textbook of Nanoscience and Nanotechnology (2017) 1st ed., Pradeep T, McGraw Hill Education, ISBN: 978-1259007323.

Course Name: Medical Biotechnology and Diagnostics					Course Code: SIAS BT 1 3 03 C 4004		
Batch:	**Programme:**	**Semester :**	**L**	**T**	**P**	**Credits**	**Contact Hrs. per Week: 04**
2021-2023	M.Sc. Biotechnology	III	4	0	0	4	**Total Hrs.: 60**
Total Evaluation Marks: 100 **CIE:** **30** Marks **TEE:** **70** Marks		**Examination Duration:** 3 Hrs.					
Course Objectives	To provide an overview about the genetic diseases and the diagnostic techniques used in the medical field.						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1:** Understanding the basics of genetic information responsible for disease development **CO2:** Understanding the classical and advanced methods used for the diagnosis of various diseases						

COURSE SYLLABUS

NOTE:
i)Question no. 1 is compulsory and to be set from the entire syllabus. It will have seven sub-parts and students need to answer any four. Each part carries three and half marks.
ii) Question nos. 2 to 5 are to be set from all four units one from each. Every question will have three sub-parts and students need to answer any two sub-parts of each question. Each part carries seven marks.

Unit No.	Contents	Contact Hrs.
I	Chromosomal disorders- Numerical disorders e.g. trisomies & monosomies, structural disorders e.g. deletions, duplications, translocations & inversions, Chromosomal instability syndromes. Gene controlled diseases – autosomal and X- linked disorders, mitochondrial disorders. Pathogenic mutations. Gain of function mutations: oncogenes, Huntingtons disease, Pittsburg variant of alpha 1 antitrypsin. Loss of function -tumour suppressor, genomic, dynamic mutations - Fragile- X syndrome, myotonic dystrophy, mitochondrial diseases.	15
II	Invasive techniques - amniocentesis, fetoscopy, chorionic villi sampling (cvs), noninvasive techniques- ultrasonography, X-ray, TIFA, maternal serum and fetal cells in maternal blood, diagnosis using protein and enzyme markers, monoclonalantibodies, DNA/RNA based diagnosis, microarray technology- genomic and cDNA arrays, application to diseases.	15
III	Overview of molecular diagnostics, molecular diagnostics: past, present, and future, History & scope, definition, principle of biosensors: classification of biosensors based on transducer & recognition element. Components & basic designing of Biosensors, different types of biosensors, nanotechnology and biosensors: carbon nanotubes, Gold nanoparticles. Latex agglutination test, enzyme linked immunosorbant assay, dot and	15

	slot blot assay.	
IV	PCR in molecular diagnostics; multiplex-PCR, quantitative real time PCR (qRT-PCR) and their applications for diagnosis of disease applications, DNA diagnostic system: molecular beacons and its variants for their applications in detection, molecular diagnostics in bacterial detection, rolling circle amplification, application of padlock and selector probes in molecular medicine, DNA aptamers for nano-biosensing, diagnostics for point-of-care and resource limited settings, smartphones in medical diagnostics, rapid diagnostic tests (lateral flow assays), concepts of microfluidics, BioMEMs in diagnostics. Recent advances and applications in the field.	15

Suggested Readings:

1. Human Molecular Genetics (2018) Strachan T and Read A, Garland Science publisher, ISBN: 9780815345893.
2. Medical Biotechnology (2013) Glick BR, Patton CL and Delovitch TL, ASM Press, ISBN: 155581705X.
3. Advances in Animal Disease Diagnosis (2021). Gahlawat, SK and Maan, S. CRC Press. ISBN 9780367530518 pp. 1-306.
4. Biotechnology in Medical Sciences (2017) Khan FA, CRC Press; ISBN: 978-1138076792
5. Biomedical Nanotechnology (2005) 1st ed., Malsch, N, CRC Press, ISBN: 978-0824725792.
6. Biosensors and Nanotechnology: Applications in Health Care Diagnostics (2018) 1st ed., Altintas Z, Wiley-Blackwell, ISBN: 978-1119065012.
7. Biosensors: Essentials (2016) 1st ed., Evtugyn, G, Springer, ISBN: 978-3662509388
8. Nucleic Acids as Molecular Diagnostics (2014) 1st ed., Keller, A, Wiley VCH, ISBN: 978-3527335565.
9. Lateral Flow Immunoassay (2009) Raphael C. Wong, Harley YT, Humana Press, ISBN: 978-1-58829-908-6.
10. Medical Biotechnology (2013) Glick BR, Patton CL and Delovitch TL, ASM Press. ISBN10 155581705X.
11. Molecular Diagnosis of Infectious Diseases (Methods in Molecular Medicine) (2004) Decker J, Reischl U, Humana Press, ISBN: 978-1-59259-679-9.
12. Pharmaceutical Biotechnology: Drug Discovery and Clinical Applications, (2006) Kayser O and Warzecha H, Wiley-Blackwell, ISBN: 978-3-527-60552.
13. Human Molecular Genetics (2018) Strachan T and Read A, Garland Science publisher, ISBN: 9780815345893.

Course Name: Fermentation and Bioprocess Technology					Course Code: SIAS BT 1 3 04 C 4004		
Batch:	**Programme:**	**Semester :**	**L**	**T**	**P**	**Credits**	**Contact Hrs. per Week: 04**
2021-2023	M.Sc. Biotechnology	III	4	0	0	4	**Total Hrs.: 60**
Total Evaluation Marks: 100 **CIE:** **30** Marks **TEE:** **70** Marks		**Examination Duration:** 3 Hrs.					
Course Objectives	To provide fundamental concepts of different fermentation strategies and to overcome the challenges of the new and emerging areas of biotechnology industry.						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1:** Understanding basic concept of fermentation strategies **CO2:** Understanding of design and operations of a process for bio-based products **CO3:** Understanding the structure, operation and functions of various bioreactors **CO4:** Critical analysis and improvement in any bioprocess from market point of view.						

COURSE SYLLABUS

NOTE:
i)Question no. 1 is compulsory and to be set from the entire syllabus. It will have seven sub-parts and students need to answer any four. Each part carries three and half marks.
ii) Question nos. 2 to 5 are to be set from all four units one from each. Every question will have three sub-parts and students need to answer any two sub-parts of each question. Each part carries seven marks.

Unit No.	Contents	Contact Hrs.
I	Concept of Fermentation, Different types of fermentations-Batch, Fed-batch and continuous fermentation, An overview of submerged and solid state fermentations. Factors affecting fermentation; Bioreactor- structure and applications of a laboratory bioreactor; Different types of bioreactors like - Stirred tank reactor, air-lift, packed bed, fluidized and bubble column- their structure and applications; Multiphase bioreactor system.	15
II	Sterilization (medium and air)-thermal death kinetics of microorganisms; aeration, agitation and heat transfer in bioprocess. Microbial substrates, Media formulation and optimization; Microbial growth and kinetics. Monitoring of Bioprocesses: On line data analysis for measurement and control of important physicochemical and biochemical parameters, Computer based data acquisition, Techno-economic feasibility of bioprocess.	15

III	Isolation and characterization of industrially important Microorganisms; Generation of mutant strains for fermentation. Different approaches for strain improvement for fermentation. Concept of primary and secondary metabolites, Yield coefficient and efficiency. An overview of important products like antibiotic, biofuel, enzymes, An overview of recombinant proteins.	15
IV	Biological mixture-composition and separation of different components of biological mixture-filtration, centrifugation, sedimentation, flocculation; Cell disruption; separation of soluble products: liquid-liquid extraction, precipitation, chromatographic techniques, reverse osmosis, ultra and micro filtration; Purification of wild and recombinant proteins, Product polishing-drying; crystallization; storage and packaging. Recent advances and applications in the field.	15

Suggested Readings:

1. Bioprocess Engineering: Basic Concepts (2017) 3rd ed. Shuler, ML, and Kargi, F. Pearson Prentice Hall, ISBN: 0137062702.
2. Principles of Fermentation Technology (2016) 3rd ed. Stanbury P, Allan Whitaker, Stephen Hall. Imprint (Butterworth-Heinemann), ISBN: 9780080999531.
3. Biochemical Engineering Fundamentals (2013) 5th reprint J. E. Bailey and Ollis, D. F. McGraw-Hill Education (India) Pvt Ltd., ISBN: 0070701237.
4. Bioprocess Engineering Principles (2013) 2nd ed. Doran, P.M, Academic Press, ISBN: 978-0-12-220851-5.
5. Bioreactors Analysis and Design (2011) Panda T, Tata McGraw Hill, ISBN: 978-0-07-070424-4.

Course Name: Practical-III					Course Code: SIAS BT 1 3 04 C 0084		
Batch:	**Programme:**	**Semester :**	**L**	**T**	**P**	**Credits**	**Contact Hrs. per Week: 8**
2021-2023	M.Sc. Biotechnology	III	0	0	8	4	**Total Hrs.: 120**
Total Evaluation Marks: 100 **CIE:** **30** Marks **TEE:** **70** Marks		**Examination Duration:** 3 Hrs.					
Course Objectives	To inculcate/impart skills on experiment designing, practical execution and report writing.						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1:** Improved skills on experiment designing, practical execution and report writing. **CO2:** Acquiring skills to get information and possible practical solution to a research problem						

COURSE SYLLABUS

NOTE:
i)Question no. 1 is compulsory and to be set from the entire syllabus. It will have seven sub-parts and students need to answer any four. Each part carries three and half marks.
ii) Question nos. 2 to 5 are to be set from all four units one from each. Every question will have three sub-parts and students need to answer any two sub-parts of each question. Each part carries seven marks.

Unit No.	Contents	Contact Hrs.
I	1. To study the laboratory organization and aseptic manipulations in plant and animal cell culture lab. 2. To study the isolation and culturing of animal cells from primary tissue explant. 3. To study the sub-culturing of monolayer confluent cells. 4. To study the staining of monolayer confluent cells using geimsa and crystal violet. 5. To discriminate between viable and non-viable animal cells using trypan blue. 6. To study screening of different genotypes in crops using PCR based SSR markers. 7. To study the preparation of various stock solutions of Murashige and Skoog medium.	30

	8. To study clonal multiplication of tobacco by shoot tip culture technique. 9. To study induction of embryogenic callus from rice plants.	
II	1. To study database search (GenBank, PDB) using BLAST and Sequence submission protocols. 2. To study the sequence alignments (Pair wise and Multiple), Sequence and structure prediction 3. To study the construction of phylogenetic tree and prediction 4. To study designing of SSR and SNP markers using *in silico* tools. 5. To study protein structure modelling and docking 6. To study the next generation sequencing data analysis: using freely available software & pipelines.To study the denaturation kinetics study of biomolecules using UV-VIS spectrophotometry	27
III	1. To study the structure and functions of a stirred tank bioreactor. 2. To study the production of metabolites in submerged and solid state fermentations 3. To determine Volumetric Oxygen Transfer Coefficient (kLa) in fermentation system by dynamic method/sulphite method. 4. Comparative studies on the kinetics of free and immobilized enzymes/cells. 5. To study the production of biofuel/enzyme using lignocellulosic biomass. 6. Comparative study of batch, fed-batch and continuous fermentations.	33
IV	1. To demonstrate a aptamer based diagnostic test for a disease 2. To study the use of real time PCR in the diagnosis of a disease 3. To study the western blot analysis of the proteins using antibodie**s** 4. To study the calculation of mean, median and mode of the given biological data 5. To determine the significance (p-value) of given biological data set 6. To study the synthesis, characterization and applications of nanoparticles	30

Suggested Readings:

1. An Introduction to Practical Biochemistry (2017) 3rd ed., Plummer D. T., Tata McGraw Hill Education Pvt. Ltd. (New Delhi), ISBN: 978-0070994874.
2. Principles and Techniques of Biochemistry and Molecular Biology (2018) 8th ed. Keith Wilson & John Walker, Cambridge University Press. ISBN: 131661476X.
3. Molecular cloning, A Laboratory Manual Vol. I-III. (2012) 4th ed., Green MR and Sambrook J, Cold Spring Harbor Laboratory Press.
4. Gene Cloning and DNA Analysis (2010) Brown TA, Wiley-Blackwell publishing.
5. Physical Biochemistry: Principles and Applications (2010) 2nd ed., Sheehan D, Wiley Blackwell (West Sussex), ISBN: 978-0-470-85602-4 / ISBN:978-0-470-85603-1.
6. A laboratory Course in Nanoscience and Nanotechnology (2014) Poinern GEJ, CRC press, ISBN: 978-1482231038.

Course Name: Animal Biotechnology					Course Code: SIAS BT 1 3 01 DCEC 3003		
Batch:	**Programme:**	**Semester :**	**L**	**T**	**P**	**Credits**	**Contact Hrs. per Week: 03**
2021-2023	M.Sc. Biotechnology	III	3	0	0	3	**Total Hrs.: 45**
Total Evaluation Marks: 100 **CIE:** **30** Marks **TEE:** **70** Marks		**Examination Duration:** 3 Hrs.					
Course Objectives	This course is an introduction to the theory, standard practices, and methodologies of animal biotechnology.						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1**: Improved understanding of animal tissue culture experiments. **CO2**: Understanding of gene transfer and gene manipulation methods. **CO3:** Improved understanding oftransgenic animal technology.						

COURSE SYLLABUS

NOTE:
i)Question no. 1 is compulsory and to be set from the entire syllabus. It will have seven sub-parts and students need to answer any four. Each part carries three and half marks.
ii) Question nos. 2 to 5 are to be set from all four units one from each. Every question will have three sub-parts and students need to answer any two sub-parts of each question. Each part carries seven marks.

Unit No.	Contents	Contact Hrs.
I	Biology and characterization of cultured cells- cell adhesion, proliferation, differentiation, morphology of cells and identification. Basic technique of mammalian cell culture *in vitro*, Measuring parameters of growth in cultured cells, cell viability and cytotoxicity. Germplasm conservation and establishment of gene banks. Large-scale culture of cell lines- monolayer, suspension and immobilized cultures.	12
II	Organ and histotypic culture- technique, advantages, limitations, applications. Biotransformation - Induction of cell line mutants and mutations. 3D cultures. Whole embryo culture. Somatic cell hybridization. Stem cells: types (embryonic, adult), isolation, identification, expansion, differentiation and uses, stem cell engineering, ethical issues. Commercial applications of animal tissue culture. Hazards and safety aspects of tissue culture.	11

III	Manipulation of animal reproduction and characterization of animal genes Manipulation of reproduction in animals. Artificial insemination, embryo transfer, in-vitro fertilization. Embryo transfer in cattle and applications. Somatic cell cloning - cloning of Dolly. Ethical issues. Production of recombinant vaccines. Probiotics for disease control.	11
IV	Vectors for gene transfer in animals: retrovirus. Gene constructs- promoter/enhancer sequences for transgene expression in animals. Selectable markers for animal cells- thymidine kinase, dihydrofolatereductase, CAT. Transfection of animal cells- calcium phosphate coprecipitation, electroporation, lipofection, peptides, direct DNA transfer, viral vectors, microinjection. Methods for producing transgenic animals- retroviral, microinjection, engineered stem cell. Targeted gene transfer. Transgene integration and identification methods. Transgenic and genome edited animals. Ethical issues in transgenesis. Recent advances and applications in the field.	11

Suggested Readings:

1. Principles and Techniques of Biochemistry and Molecular Biology (2018) 8th ed. Keith Wilson & John Walker, Cambridge University Press, ISBN No: 131661476X.
2. Advances in Animal Biotechnology and its Applications. (2018). Gahlawat, S.K., Duhan, J. S., Salar, R.K., Siwach, P. and Kumar, S. and Kaur, P. Springer, Germany. pp. 1-401. ISBN978-981-10-4701-5
3. Principles of gene manipulation (2016), 8th ed. Primrose Twyman and Old. Blackwell Science, ISBN: 1405135441.
4. Animal Biotechnology (2013) Verma A and Singh A, Elsevier, ISBN: 9780124160026.
5. Molecular Biotechnology (2009), 4th ed. Glick and Pasternak, ASM Press, ISBN10: 1555814980.
6. Recombinant DNA (2006) 3rd ed., Watson JD, Richard M. Meyers, Amy AC, Jan AW, Cold Spring Harbor Laboratory Press, ISBN: 0716728664

Course Name: Agricultural Biotechnology					Course Code: SIAS BT 1 3 02 DCEC 3003		
Batch:	**Programme:**	**Semester :**	**L**	**T**	**P**	**Credits**	**Contact Hrs. per Week: 03**
2021-2023	M.Sc. Biotechnology	III	3	0	0	3	**Total Hrs.: 45**
Total Evaluation Marks: 100 **CIE:** **30** Marks **TEE:** **70** Marks		**Examination Duration:** 3 Hrs.					
Course Objectives	To provide knowledge of standard practices, methodologies and applications of biotechnology in agriculture.						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1:** Understanding the classical and modern approaches of plant/crop breeding **CO2:** Understanding the manipulation of plants for improved traits responsible for stress tolerance and nutrition fortification. **CO3:** Understanding of preservation and protection of plants/crops.						

COURSE SYLLABUS

NOTE:
i)Question no. 1 is compulsory and to be set from the entire syllabus. It will have seven sub-parts and students need to answer any four. Each part carries three and half marks.
ii) Question nos. 2 to 5 are to be set from all four units one from each. Every question will have three sub-parts and students need to answer any two sub-parts of each question. Each part carries seven marks.

Unit No.	Contents	Contact Hrs.
I	Plant reproduction, breeding of self-pollinated and cross-pollinated crops, Conventional methods for crop improvement, in-breeding, heterosis, heritability, gene actions. Molecular markers: definition, properties, types of molecular markers: restriction based and PCR based, RFLP, AFLP, SCAR, SSR, CAPS, SNP etc. Marker Assisted Selection (MAS), screening and validation, trait related markers. Applications of NGS in plant breeding. Quantitative traits, QTL mapping, association mapping.	12
II	Plant growth regulators; mode of action, effects on *in vitro* culture and regeneration; callus culture, suspension culture- batch and continuous culture, Protoplast culture, somatic hybridization. micropropagation, Meristem culture, shoot tip culture and production of virus free plants, somaclonal variations, in-vitro production of haploid plants – androgenesis and gynogenesis, doubled haploid production through distant hybridization, *in-vitro* and *in-vivo* pollination and fertilization, embryo culture, embryo rescue, somatic embryogenesis, artificial seeds, germplasm conservation and cryopreservation.	11

III	Development of transgenic plants: Agrobacterium mediated transformation, other methods of gene delivery, development of constructs, reporter genes, selectable markers etc. Gene pyramiding, development of knock outs, RNAi based gene silencing, CRISPR-CAS9 technology, biopesticides in agriculture (botanicals and microbials), integrated pest management, Production and applications of biofertilizers (bacterial, fungal and algal); Plant secondary metabolites: Control mechanisms and manipulation of alkaloids and industrial enzymes (Shikimate and PHA pathway), importance of secondary metabolites in agriculture.	11
IV	Genetic engineering for increasing crop productivity by manipulation of photosynthesis, nitrogen fixation and nutrient uptake, Genetic engineering for biotic stress tolerance (Insects, fungi, bacteria, viruses, weeds). genetic engineering for abiotic stress tolerance (drought, flooding, salt and temperature). genetic engineering for quality improvement of protein, lipids, carbohydrates, vitamins (e.g. Golden Rice) & mineral nutrients, production of antibody in plants; Plant genetic resources, GATT & TRIPS, Patenting of biological material, patenting of transgenic organisms and genes, Plant breeders rights (PBRs) and farmers rights, Concerns about GM crops – environmental, biosafety and ethics. Recent advances and applications in the field.	11

Suggested Readings:

1. Introduction to plant Biotechnology (2018) 3rd ed., Chawla HS, CRC Press, ASIN: B07LH5S4P3.
2. Applied Biotechnology in Genetic Engineering, Pharmaceuticals and Agriculture (2016) Adam J,Syrawood Publishing House, ISBN: 978-1682862766.
3. Plant Biotechnology: Recent Advancements and Developments (2017). Gahlawat, S.K., Salar, R.K., Siwach, P. and Duhan, J. S., Kumar, S. and Kaur, P. Springer, Germany. pp.1-390. ISBN 978-981-10-4732-9.
4. Molecular Markers in Plants (2012), Henry RJ, Wiley-Blackwell. ISBN: 978-0-470-95951-0.
5. Genetic Transformation of Plants-Series: Molecular Methods of Plant Analysis (2013) Vol. 23, Jackson JF and Linskens HF, Springer, ASIN: B000PY3TJ0.
6. Plant Biotechnology – The genetic manipulation of plants (2017) 3rd ed., Slater A, Scott N and Fowler M, Oxford University Press. ISBN: 1138407674.
7. Plant Transformation Technologies (2011), 1st ed., Stewart CN and Touraev, A Wiley-Blackwell. ISBN: 9780813821955

Course Name: Course title: Basics of Bioinformatics					**Course Code: SIAS BT 1 3 01 GEC 4004**		
Batch:	**Programme:**	**Semester :**	**L**	**T**	**P**	**Credits**	**Contact Hrs. per Week: 04**
2021-2023	M.Sc. Biotechnology	III	4	0	0	4	**Total Hrs.: 60**
Total Evaluation Marks: 100 **CIE:** **30** Marks **TEE:** **70** Marks		**Examination Duration:** 3 Hrs.					
Course Objectives	• To provide detailed understanding of Bioinformatics such as genomics, transcriptomic etc. • To provide knowledge about the data analysis of next generation sequencing.						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1:** Understanding bioinformatics analysis of biological data. **CO2:** Improved insights into data analysis of next generation sequencing **CO3:** Better understanding of the applications of Bioinformatics in biotechnology industry.						

COURSE SYLLABUS

NOTE:
i) Question no. 1 is compulsory and to be set from the entire syllabus. It will have seven sub-parts and students need to answer any four. Each part carries three and half marks.
ii) Question nos. 2 to 5 are to be set from all four units one from each. Every question will have three sub-parts and students need to answer any two sub-parts of each question. Each part carries seven marks.

Unit No.	**Contents**	**Contact Hrs.**
I	Historical background. Scope of bioinformatics - genomics, proteomics, computer aided drug design (structure based and ligand based approaches), Applications of bioinformatics. Introduction to biological databases - primary, secondary and composite databases, Different formats of molecular biology data. NCBI, nucleic acid databases (GenBank, EMBL, DDBJ, NDB), protein databases (PIR, Swiss-Prot, TrEMBL, PDB).	15
II	Alignment-local and global alignment, pairwise and multiple sequence alignments, alignment algorithms, amino acid substitution matrices (PAM and BLOSUM), BLAST and CLUSTAL omega. Identification of open reading frames (ORF), Concept of orthology, paralogy and homology in gene and protein sequences. Methods and tools for phylogenetic analysis, maximum parsimony, maximum likelihood and distance methods; creation, evaluation and interpretation of evolutionary trees phylogenetic tree.	15

III	Next Generation Sequencing, Comparative features of different sequencing platforms (Sanger, Illumina, Nanopore, PacBio etc.), Use of NGS techniques in genomics and transcriptomics, Basic steps in library preparation and analysis of genomics and transcriptomics data. Comparative and genomics, transcriptomics, Functional genomics.	15
IV	Introduction to file formats used in NGS analysis, Types of genomics data *e.g*. WGS, WES, RNAseq, DNA-methylation, single cell sequencing data etc., Concepts of sequencing depth, coverage, phred score, N50, L50, and other metrics used in omics, Introduction to tools and databases used for omics analysis (FastQC, Bowtie, Stringtie, Tophat, Deseq etc.), Various pipelines for genomics data.	15

Suggested Readings:

1. Fundamentals of Statistics (2016) Goon, AM, Gupta, MK and Dasgupta, B. Vol. I & II. World Press, ASIN: B01LB7MH74.
2. Statistical Methods (2012) 1st ed., Das, NG. Vol I & II. Tata McGraw Hill, ISBN: 9780070263512.
3. Probability and Statistics for Engineers and Scientists (2013) 9th ed., Walpole, RE, Myers, RH, Myers, SL and Ye, Pearson Education India KE ISBN: 978-9332519084
4. Biostatistics: A Foundation. for Analysis in the Health Sciences (2012) 10th ed., Daniel, WW and Cross, CL. John Wiley & Sons, ISBN: 978-1118302798
5. Essential Bioinformatics (2006) 1st ed., Xiong J, Cambridge University Press, ISBN 13: 978-0521600828.
6. Fundamental concepts of Bioinformatics (2003) Krane DE and Raymer ML Pearson, ISBN: 978-8177587579.
7. An Introduction to Bioinformatics (2017) 1st ed., Knight R, Larsen and Keller Education, ISBN: 978-1635490459.
8. Concepts of Bioinformatics and Genomics (2016) 1st ed., Momand J, McCardy A, Heubah, S and Warter-Perez N, Oxford University Press, ISBN: 978-0199936991

Course Name: Review Writing and Presentation skills					Course Code: SIAS BT 1 4 01 SEC 2002		
Batch:	**Programme:**	**Semester :**	**L**	**T**	**P**	**Credits**	**Contact Hrs. per Week: 02**
2021-2023	M.Sc. Biotechnology	IV	2	0	0	2	**Total Hrs.: 30**
Total Evaluation Marks: 50 **CIE:** **15** Marks **TEE:** **35** Marks		**Examination Duration:** 1.5 Hrs.					
Course Objectives	To inculcate/impart the writing and presentation skills.						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1**: Improved skills on review writing and presentation skills. CO2: Acquiring skills on collecting literature information to identify a research problem						

Unit No.	Contents	Contact Hrs.
I	This is the compulsory and core course for M.Sc. Biotechnology students. Students will be trained in writing review and/or research paper in this course. Supervisor allotted to each student will train him/her to get literature information on a particular topic that may be or may not be related to his/her dissertation. Every student will be asked to give two presentations on a topic related to his/her dissertation in a month in the presence of all faculty members of the department. The faculty members will assess the skills acquired by the student in each presentation and provide suitable suggestions and comments to improve it further. If a student fails to improve in his/her skills of presentation, one extra chance should be given to the student.	30

Course Name: Dissertation					Course Code: SIAS BT 1 4 02 SEC 0018		
Batch:	**Programme:**	**Semester :**	**L**	**T**	**P**	**Credits**	**Contact Hrs. per Week: 36**
2021-2023	M.Sc. Biotechnology	IV	0	0	18	18	**Total Hrs.: 500**
Total Evaluation Marks: 450 **CIE:** **135** Marks **TEE:** **315** Marks		**Examination Duration:** 3 Hrs.					
Course Objectives	• To inculcate/impart skills on experiment designing, experiment execution and research reporting. • To provide skills on writing thesis dissertation.						
Course Outcomes:	After completing this course, student is expected to learn the following: **CO1**: Improved skills to design, perform, report and present research outcomes. **CO2:** Improved skills in writing the research outcomes in the form of thesis dissertation. **CO3:** Acquiring skills to work independently as well as in group in order to solve a research based problem						

No.	Contents	Contact Hrs.
I	**Guidelines for Project File** Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation. Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student. Sufficient time should be allowed for satisfactory completion of reports, taking into account that initial drafts should be critiqued by the faculty guide and corrected by the student at each stage. The file is the principal means by which the work carried out will be assessed and therefore, great care should be taken in its preparation. **In general, the File should be comprehensive and include** • A short account of the activities that were undertaken as part of the project; • A statement about the extent to which the project has achieved its stated goals. • A statement about the outcomes of the evaluation and dissemination processes engaged in as part of the project; • Any activities planned but not yet completed as part of the project, or as a future initiative directly resulting from the project; • Any problems that have arisen that may be useful to document for future reference.	500

	• The guidelines and format for dissertation is given below:	
II	**Dissertation Guidelines** 1. **GENERAL:** The manual is intended to provide broad guidelines to the M.Sc. candidates in the preparation of the dissertation report. In general, the project report shall report, in an organized and scholarly fashion an account of original research work of the candidate leading to the discovery of new facts or techniques or correlation of facts already known. **2. NUMBER OF COPIES TO BE SUBMITTED:** Students should submit three copies to the Head of the Department concerned on or before the specified date. **ARRANGEMENT OF CONTENTS OF DISSERTATION:** Dissertation material should be arranged as follows: 1. Cover Page & Title page 2. Declaration (See format below) 3. Certificate 4. Abstract (Hindi and English) 5. Acknowledgements 6. Table of Contents 7. List of Tables (optional) 8. List of Figures (optional) 9. List of Symbols, Abbreviations and Nomenclature (Optional) 10. Chapters 11. References 12. Appendices 13. One page CV The Tables and Figures shall be introduced in the appropriate places. **PAGE DIMENSIONS AND MARGIN:** The dimensions of the dissertation should be standard A4 size paper may be used for preparing the copies, **standard margin** with 1.5 line spacing. **5. DISSERTATION PREPARATION:** The general text of thesis shall be typed in font style Times New Roman and font size 12 with 1.5 spacing. Same quality of paper should be used for the preparation	

of the entire report/thesis; except figure, photos are shown.

5.1 **Cover Page & Title Page** - A specimen copy of the Cover page & Title page for report/thesis are given in Annexure I.

5.2 **Certificate**-The Bonafide Certificate as per the format shown in Annexure II

5.3 **Abstract**: Abstract should be an essay type (HINDI and ENGLISH) of narration not exceeding 500 words outlining the research problem, the methodology used for tackling it and a summary of the findings, typed in 1.5 line spacing.

5.4 **Acknowledgements:** The acknowledgements shall be brief and should not exceed one page. The student's signature shall be made at the right bottom above his / her name typed in capitals.

5.5 **Table of contents** - The table of contents should list all material following it as well as any material which precedes it. The title page, Bonafide Certificate and Acknowledgment will not find a place among the items listed in the Table of Contents but the page numbers in lower case Roman letters are to be accounted for them. One and a half spacing should be adopted for typing the matter under this head. A specimen copy of the Table of Contents for report / thesis is given in Annexure III.

5.6 **List of Table** - The list should use exactly the same captions as they appear above the tables in the text and the caption shall follow 'sentence case'. One and a half spacing should be adopted for typing the matter under this head.

5.7 **List of Figures** - The list should use exactly the same captions as they appear below the figures in the text and the caption shall follow 'sentence case'. One and a half spacing should be adopted for typing the matter under this head

5.8 **List of Symbols, Abbreviations and Nomenclature** - One and a half spacing should be adopted for typing the matter under this head. Standard symbols, abbreviations etc. should be used.

5.9 **Chapters** - The chapters may include

Chapter I – Introduction

Chapter II – Review of Literature

Chapter III –Materials and Methods

Chapter IV- Results and Discussion

Chapter V-Summary and Conclusions

1.10. Research output/outcome if any published or presented in conference/seminar/symposium may be included.

1.11. List of References - Any works of other researchers, if used either directly or indirectly, should be indicated at appropriate places in the report/thesis. The citation may assume any one of the following forms**. APA Style.**

APA in-text citation style uses the author's last name and the year of publication, for example: (Field, 2005).

Example:

Derwing, T. M., Rossiter, M. J., & Munro, M. J. (2002). Teaching native speakers to listen to foreign-accented speech. *Journal of Multilingual and Multicultural Development*, 23(4): 245-259.

Thomas, H. K. (2004). *Training strategies for improving listeners' comprehension of foreign-accented speech* (Doctoral dissertation). University of Colorado, Boulder.

TYPING INSTRUCTIONS

6.1 General

This section includes additional information for final typing of the thesis. Some information given earlier under 'Manuscript preparation' shall also be referred. The impressions on the typed/duplicated/printed copies should be black in colour. Corrections, interlineations and crossing out of letters or words will not be permitted in any of the copies of the report/thesis intended for submission. Erasures, if made, should be neatly carried out in all copies. A sub-heading at the bottom of a page must have at least two full lines below it or else it should be carried over to the next page. The last word of any page should not be split using a hyphen. One and a half spacing should be used for typing the general text. The general text shall be typed in Font Style Times New Roman and Font Size 12 with 1.5 spacing.

Single spacing should be used for typing:

(i) Long Tables

(ii) Long quotations
(iii) Foot notes

(iv) Multilane captions
(v) References

6.2 Chapters The format for typing chapter headings, division headings and sub division headings shall be same as given in Table of Contents.

7**. Binding specification-** Thesis should be spiral or soft cover book bound, the cover of the thesis should be of blue color printed with golden ink and the text for printing should be identical as prescribed for the title page.

Format for Declaration by the candidate

DECLARATION

I ……, student of the School of Interdisciplinary and Applied Sciences, Central University of Haryana, Mahendergarh hereby declare and certify with my signature that my thesis entitled **…….** submitted to the Department of Biotechnology, Central University of Haryana, India in partial fulfillment of the requirements for the award of the Degree of Masters of Science is a record of original research work done by me and the dissertation has not been the basis for the award of any degree/diploma/associateship/fellowship or similar title of any candidate of any University. I have faithfully and accurately cited all my sources, including books, journals, handouts and unpublished manuscripts, as well as any other media, such as the Internet, letters or significant personal communications.

I understand the concept of "plagiarism" and declare that while drafting this dissertation I have refrained from plagiarism. I know that plagiarism not only includes direct copying, but also the extensive use of other's ideas without proper referencing or acknowledgement (which includes the proper use of references and quotation marks).

If my dissertation found to be plagiarized at any point of time, I'll be solely responsible and will be ready to accept any decision taken by the competent authority including rejection of my dissertation.

Signature of student

Annexure-LI

Course Curriculum and Scheme of Examination

Under Choice Based Credit System

For Ph.D. Biotechnology

Course Work

Department of Biotechnology

School of Interdisciplinary and Applied Sciences

Central University of Haryana

Jant-Pali, Mahendergarh-123031, Haryana

Session 2021-2022

Course work of Ph. D in Biotechnology

Scheme and Syllabus (w.e.f. Session 2021-22)

Semester-I

Course code	Course title	L	T	P	Type of course	Credit
SIAS BT 2 1 01 C 4105	**Research Methodology**	4	1	0	Core	5
SIAS BT 2 1 02 C 3003	**Biosafety and IPRs**	3	0	0	Core	3
SIAS BT 2 1 03 C 2002	**Research and Publication Ethics**	2	0	0	Core	2
SIAS BT 2 1 01 DCEC 4004	**Omics Technologies***	4	0	0	DCEC	4
SIAS BT 2 1 02 DCEC 4004	**Advances in Genetic Engineering***	4	0	0	DCEC	4
Total Credit						**14**

***One course to be selected by the student**

Course Title: Research Methodology **Credit: 5**

Course Code: SIAS BT 2 1 01 C 4105 **Contact hours: 75**

Course objective:

- To identify a research problem based on literature data and collecting data related to the problem, its analysis and presentation

Learning Outcomes: After completion of this course, the students will be able:

1. To identify a research problem from literature survey using various tools and softwares
2. To know different ways for representation of data and its analysis
3. To present a research problem in the form of a research proposal and its presentation

Unit-I

Identification and defining of the research problem: Familiarization of research areas; review of literature using appropriate resources – reviews, research papers, books and patents; Use of tools for searching literature through electronic databases, Role of Bioinformatics and its various methods/tools- Similarity search methods (BLAST, FASTA etc), Databases (NCBI, UniProt, PDB etc), Protein Structure Prediction methods, Phylogenetic Tree analysis methods, Various file formats etc. Use of electronic tools for bibliographic formatting and checking plagiarism.

Unit- II

Basic definitions and applications. Data collection and representation. Measurement of central tendencies (Mean, Median, Mode, Quartiles and percentiles). Measurement of variability (standard deviation, standard error of mean, range, mean deviation, coefficient of variation). Probability distributions (Binomial, Poisson and Normal); sampling distribution.Use of inbuilt statistical functions for the computations of mean, median, mode, SD, SE, correlation, regression coefficients etc.

Unit- III

Use of bar diagram, histogram, scatter plots, etc. Graphical tools in excel for presentation of data. Introduction to other statistical software like Graphpad Prism, Sigma Plots etc. Introduction to MSWORD word processor editing, copying moving formation, table insertion, drawing flow charts, etc.

Difference between parametric and non-parametric statistics; confidence interval; errors; levels of significance; regression and correlation; t-test (paired and unpaired); analysis of variance; chi square test. Introduction of multivariate statistics.

Unit- IV

Journal Club and Seminar [#]

Writing & Presentation of Research Proposal*

[#]Every student will have to participate in weekly Journal Club to be conducted by the Department and will be required to present recent research papers from reputed scientific journals along with a detailed background and a critique on the research findings. Every student shall have to deliver two Seminars on Recent Topics as per the interest of student. Seminar will be of 45 minutes during which presentation will be followed by the question season comprising of faculty and students. Every student shall be required to submit the topic of his/her seminar in consultation with the supervisor/ faculty members well in advance so that the same may be displayed on the notice board. Speaker will have to write an abstract to be distributed during the Seminar in addition to two copies

of write-up giving relevant details of the background of the subject, methods used, and references/ list of sources from where the material for presentation has been collected.

*The student will prepare a detailed project grant application in a format of typical funding agency (except financial details), present and defend the proposal in a meeting of the faculty and students of the Department.

Suggested readings:

1. Biostatistics: Basic Concepts and Methodology for the Health Sciences (2014) 10th edi., Cross CL and Wayne WD.Wiley, ISBN: 978-8126551897.
2. Writing the doctoral dissertation (2012) 3rd edi., Davis GB and Straub DW. Barron's Educational series, ISBN: 978-0764147876.
3. Research Methodology: A Step-by-Step Guide for Beginners (2005) 2nd edi., Kumar R. Pearson Education. ISBN:978-1446269978.
4. How to write and publish a scientific paper (2011) Gastel B and Robert AD. 7 edi., Greenwood, ISBN: 978-0313391972

Course title: Biosafety and IPRs **Credit: 3**
Course code: SIAS BT 2 1 02 C 3003 **Contact hours: 45**

Course objective:

- To study various biosafety measures involved in a proposed research work/study and protecting its rights through IPR

Learning Outcomes: After completion of this course, the students will be able:

4. To identify the safety risks associated with a proposed research work based on the involvement of microbes, plants and animals
5. To understand the role of different regulatory bodies in a proposed research work
6. To get information about the novelty of a research work followed by its protection by IPR

Unit-I

Biosafety: Microbes and Plants

Orientation of bio-risk management, Introduction of bio-risk, biosafety, biosecurity, bioterrorism, contaminant. Bio-risk characterization and evaluation; likelihood and consequences of risk. Bio-risk mitigation strategies; bio-risk management methodology and its implementation: Certification of equipment, Institutional Biosafety Committee, Good Laboratory Practices, Principal of Biosafety: Biosafety equipment (Primary Barriers and personal protection equipment), facility design and construction (secondary barriers). Biosafety cabinets: Class I, II (A1, A2, B1, B2) and III, biosafety level lab practices: Level 1,2,3,4, labs. Sterilization and decontamination of hazardous biological agents, GMO hazards. Development, evaluation and validation of SOPs (Standard Operating Procedures). Biological waste segregation and disposal.

Unit-II

Biosafety: Animal and Human

Safety in research (handling of bio-hazardous substances, disposal of bio-hazardous waste; Biosafety issues- Chemical, radiation, recombinant DNA, biological material), Risk groups and their categorization. Different biosafety levels, research ethics, information & significance of regulatory bodies in research

Unit-III

Intellectual Property Right (IPR)

Introduction, patent, requirement of patentability, ownership of tangible and intellectual property, foreign patent; special issues pertaining to Biotechnology patents: Disclosure requirements, ethical issues, Plant Biotechnology –UPOV and Plant Breeder's rights, IPR issues in the Indian context, Copyright vs patents; International Treaties and Conventions; Business Software patents.Procedure for filing of Indian and Foreign patents.

Unit-IV

Regulatory bodies in research: Institutional Permissions and adherence to community guidelines / standards (Institutional Ethics Committee, Institutional Biosafety committee, Institutional Animal Ethics Committee). Ethics in human research: guideline and codes of best practice (Numbering code, Declaration of Helsinki, etc).

Suggested readings:

1. IPR, Biosafety and Bioethics (2013) 1st edi., Goel D and Parashar S. Pearson Education. ISBN: 978-8131774700
2. Office of the Controller General of Patents, Design & Trademarks; Department of Industrial Policy & Promotion; Ministry of Commerce & Industry; Government of India. http://www.ipindia.nic.in/
3. World Trade Organisation. http://www.wto.org
4. World Intellectual Property Organisation. http://www.wipo.int
5. International Union for the Protection of New Varieties of Plants. http://www.upov.int
6. IPR, Biosafety and Bioethics (2013) Parashar S, Goel D, Pearson Publishing India, ISBN: 9788131774700.
7. An Introduction to Ethical, Safety and Intellectual Property Rights Issues in Biotechnology (2017) Nambisan P, Academic Press, ISBN: 9780128092316.
8. http://dbtindia.gov.in/guidelines-biosafety

Course title: Research and Publication Ethics **Credit: 2**
Course code: SIAS BT 2 1 03 C 2002 **Contact hours: 30**

Course objective: To get knowledge about the ethical issues in research and publication

Learning Outcomes: After completion of this course, the students will be able:

1. To get information about ethics, intellectual honesty and scientific conduct during a research work
2. To know the concept of plagiarism and its significance in scientific writing and publication

Theory

Unit –I

Philosophy and ethics

Introduction to philosophy: definition, nature and scope, concept, branches; Ethics: definition, moral philosophy, nature of moral judgement and reactions.

Unit –II

Scientific conduct

Ethics with respect to science and research, intellectual honesty and research integrity, scientific misconducts: falsification, fabrication, and plagiarism, redundant publications, duplicate and overlapping publications, salami slicing, selective reporting and misrepresentation of data

Unit –III

Publication ethics

Definition, introduction, and importance, best practices/standard settings, initiatives and guidelines: COPE, WAME etc. conflicts of interest, publication misconduct: definition, concept, problems that lead to unethical behaviour and vice versa, types, violation of publication ethics, authorship, and contributorship, identification of publication misconduct, complaints, and appeals, predatory publishers and journals

Practice

Unit –IV

Open access publishing

Open access publications and initiatives: SHERPA/RoMEO online resources to check publisher copyrights and self-archiving policies, software tool to identify predatory publications developed by SPPO, journal finder/journal suggestion tools viz GANE, Elsevier journal finder, Springer journal suggester etc.

Unit –V

Publication misconduct

A. Group discussion – subject specific ethical issues, FFP, authorship, conflict of interest, complaint and appeals: example and fraud from India and abroad. B. Software tools – Use of plagiarism software like turnitin, urkund, and other open source software tools

Unit –VI

Databases and research matrices

A. Database – Indexing databases, citation databases: web of science, scopus, etc. B. Research matrix, impact factor of journal as per journal citation report, impact factor of journal as per journal citation report, SNIP, SJAR, IPP, Citescore, matrices, h-index, g-index, i10-index, almatrices

Suggested readings:

1. Philosophy of science, (2006), Bird, A., Routledge, ISBN 9781138705579.
2. A short history of ethics: A history of moral philosophy from the homeric age to the twentieth century (1967), MacIntyre, A., London, ISBN: 9780268161286.
3. Ethics in competitive research, do not get scooped; do not get plagiarized (2018), Chaddhah, P., ISBN-10: 9387480860
4. On being a scientist, a guide to responsible conduct in research (2009), National Academy of Science, National Academy of Engineering and Institute of Medicine, ISBN-10: 0309119707
5. Ethics in science education, research and governance (2019), Muralidhar K., Ghosh A., Singhvi A., Indian National Science Academy, ISBN: 9788193948217

Department Centric Elective Courses

Course Title: Omics Technologies **Credit: 4**
Course Code: SIAS BT 2 1 01 DCEC 4004 **Contact hours: 60**

Course objectives:

- To provide detailed understanding and applications of major Omics technologies such as genomics, transcriptomics, proteomics and metabolomics etc.
- To provide knowledge about the data analysis of next generation sequencing.

Learning outcomes:

- Understanding of modern Omics technologies in the field of biotechnology.
- Understanding of data analysis generated through next generation sequencing.
- Better understanding of the applications of the Omics technologies in different industries.

Unit-I

Genomics: Major genome sequencing projects, Next Generation Sequencing technologies, File formats, Basic pipeline for data analysis – quality check, adaptor trimming, Genome assembly, Genome annotation, Concepts of sequencing coverage and sequencing depth, phred score, N50, Introduction to different tools and algorithms, Data repositories and databases, Choice of sequencing platforms, Applications of genomics using case studies

Unit-II

Transcriptomics: Introduction to typical wet lab workflow, library preparation, and analysis pipeline, Choice of sequencing methods and tools for read mapping, assembly, identification of splicing variants and differential expression analysis, Tools available for pathways analysis, Gene Ontology, Hypergeometric enrichment analysis, Biogenesis, characteristics and analysis of small RNA like microRNAs and phasiRNAs, Analysis of long non-coding RNAs, Target prediction and functional prediction for small RNAs and lncRNAs, Applications of transcriptomics using case studies

Unit-III

Proteomics: Basic tools and techniques for protein separation and analysis, Mass spectrometry based proteomics: basic workflow and analysis pipeline, Quantitative proteomics and multiplexing, large scale analysis of protein modifications. Software packages and available tools for proteomics data analysis. Applications of mass spectrometry and proteomics using case studies.

Unit-IV

Metabolomics: Tools and techniques available for metabolomics analysis, targeted vs non-targeted metabolomics, experimental design and sample preparation, workflow,

data analysis tools and repositories, data formats and key challenges, metabolite identification, metabolic fingerprinting, applications of metabolomics.

Suggested Readings:

1. Bioinformatics for omics data: methods and protocols (2011), Mayer, B., New York: Humana Press. ISBN 978-1617790270
2. Omics: Applications in Biomedical, Agricultural, and Environmental Sciences (2013), Barh D., Zambare V., Azevedo V. CRC Press. Taylor and Francis Group. ISBN 9781138074750
3. Applications of Advances Omics Technologies: from Genes to Metabolites (2014), Wilson and Wilsons. Elsevier. ISBN: 9780444626509
4. Genomics, Proteomics and Metabolomics in Nutraceuticals and Functional Foods (2015), Bagchi D., Swaroop A., Bagchi M. Wiley Blackwell. ISBN:9781118930427
5. Principles of Proteomics (2013), Twyman, R., Garland Science, ISBN: 978-0815344728

Course Title: Advances in Genetic Engineering **Credit: 4**

Course Code: SIAS BT 2 1 02 DCEC 4004 **Contact hours: 60**

Course objective: To provide basic and high throughput techniques in the areas of genomics and genetic engineering.

Learning outcomes:

- Understanding of various model organisms used in Biotechnology
- Understand concept of genetic engineering including the techniques, applications and limitations
- Demonstrate the ability of designing recombinant molecules and conducting experiments involving genetic manipulation

Unit-I

Different model organisms used in biology and applied sciences research- *E. Coli*, *Saccharomyces crevices*, *Pichia pastoris*, Drosophila, *Arabidopsis*, Mice, Rat, etc; tools and techniques used in manipulation of their genome.

Unit-II

Genetic engineering and genome editing of agricultural crops – target traits such as yield, disease resistance, biotic and abiotic stress tolerance; phytoremediation using genetically modified plants; economic and environmental impact of genetically modified crops using real-time examples from already released varieties in different countries and current literature.

Unit-III

Genetic engineering of livestock including fish & poultry- target traits such as yield, disease resistance, biotic and abiotic stress tolerance; gene introgression through genome editing; bioremediation using genetically modified microbes & animals; transgenic animals and xeno-transplantation; economic and environmental impact using real time examples from current literature; ethical, moral and legal issues.

Unit-IV

Over expression of genes in heterologous systems; advantages and disadvantages of different heterologous systems for production of proteins, enzymes, monoclonal antibodies, vaccines; gene pharming and human pharmaceutical proteins.

Suggested readings:

1. Genome editing in animals, Methods and protocols (2017) Hatada I. Springer Nature, ISBN: 978-1-4939-7128-2.
2. CRISPER- methods and protocols (2015) Lundgren M, Charpentier E and Fineran P. Springer Nature, ISBN: 978-1-4939-2687-9.
3. Mammalian and avian transgenesis new approaches (2006) Pease S and Lois C. Springer Nature, ISBN: 978-3-540-28489-5.
4. Principal of cloning 2nd edition, Jose C, Keith HS Campbell JG, Ian W, Robert L. Academic Press, ISBN 978-0-12-386541-0.
5. Transgenic Plants Methods and Protocol (2012) Dunwell JM, WettenAC.Springer Nature**,** ISBN 978-1-61779-558-9**.**
6. Transgenic plants: a production system for industrial and pharmaceutical proteins Meran RL, Owen and Jan P. 1st ed., Wiley, ISBN: 978-0471964438.

7. Transgenic plant technology for remediation of toxic metals and metalloids (2019) Majeti N, Vara P, Academic press, ISBN: 978-0-12-814389-6.
8. Chen Z, Robert W and Han Z (2016) Genetically modified food: A critical review of their promise and problems. Food Science and Human Wellness, 5(3), 116-123.
9. Kamle M, Kumar P, Patra JK, Bajpai VK (2017) Current perspective on genetically modified crops and detection methods, 3 Biotech. 7(3): 219,
10. Ruchir R (2017) The Impact of genetically modified crops in modern agriculture-A review GM Crops Food. 8(4): 195–208.

हरियाणा केन्द्रीय विश्वविद्यालय
CENTRAL UNIVERSITY OF HARYANA
(संसद अधिनियम 25 (2009) के तहत स्थापित)
(Established vide Act No. 25 (2009) of Parliament)
गांव: जांट–पाली, जिला–महेन्द्रगढ (हरियाणा) . १२३०३१
Village: Jant-Pali, Distt: Mahendergarh (Haryana)-123031

Date 14.09.2021

Department of Environmental Studies

Minutes of Meeting of Board of Studies

An online meeting of the Board of studies of the Department of Environmental Studies was held on September 14, 2021 at 10:00 am in online mode (Google Meet Platform) to discuss the agenda and following members were present during the meeting:

1. Prof. Krishan Kumar, Professor, School of Environmental Sciences, Jawaharlal Nehru University, Delhi
2. Prof. N.C. Gupta, Professor, University School of Environmental Management (USEM) Guru Gobind Singh Indraprastha University, Delhi.
3. Prof. Neelam Sangwan, Professor, HOD, Environmental Studies and Dean. School of Interdisciplinary and Applied Sciences, Central University of Haryana
4. Dr. Manoj Kumar. Assistant Professor, Department of Environmental Studies Central University of Haryana
5. Ms. Manisha Bhati. Assistant Professor, Department of Environmental Studies Central University of Haryana

The members of the Board of studies were welcome by the Chairman

The member discussed the matter mentioned below for the Department at length

1. The syllabus of M.Sc. Environmental Sciences was approved in the light of NEP-2020. The suggestions including introduction of few new courses, modification of all the courses according to the learning outcome basis. New reference books were also suggested.

Meeting ended with the vote of thanks to the chair

14/9/2021

Prof. Neelam Sangwan
Dean
School of Interdisciplinary
and Applied Sciences
Central University of Haryana
Mahendergarh (Haryana) 123031

Dr. Manoj Kumar

Manisha Bhati

Ms. Manisha Bhati

Scanned with CamScanner

REVISED COURSE STRUCTURE

(NEP-2020)

M.Sc.

(Environmental Sciences)

(w.e.f. from the session 2021-22)

DEPARTMENT OF ENVIRONMENTAL STUDIES

SCHOOL OF INTERDISCIPLINARY AND APPLIED SCIENCES

CENTRAL UNIVERSITY OF HARYANA

MAHENDERGARH (HARYANA) - 123031

June 2021

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1. Background

Considering the curricular reforms as instrumental for desired learning outcomes, all the academic departments of the Central University of Haryana made a rigorous attempt to revise the curriculum of undergraduate and postgraduate programmes in alignment with National Education Policy-2020 and UGC Quality Mandate for Higher Education Institutions-2021. The process of revising the curriculum could be prompted with the adoption of "Comprehensive Roadmap for Implementation of NEP-2020" in 32nd meeting of the Academic Council of the University held on April 23, 2021. The Roadmap identified the key features of the Policy and elucidated the Action Plan with well-defined responsibilities and indicative timeline for major academic reforms.

The process of revamping the curriculum started with the series of webinars and discussions conducted by the University to orient the teachers about the key features of the Policy, enabling them to revise the curriculum in sync with the Policy. Proper orientation of the faculty about the vision and provisions of NEP-2020 made it easier for them to appreciate and incorporate the vital aspects of the Policy in the revised curriculum focused on 'creating holistic, thoughtful, creative and well-rounded individuals equipped with the key 21st century skills' for the 'development of an enlightened, socially conscious, knowledgeable, and skilled nation'.

With NEP-2020 in background, the revised curricula articulate the spirit of the policy by emphasising upon– integrated approach to learning; innovative pedagogies and assessment strategies; multidisciplinary and cross-disciplinary education; creative and critical thinking; ethical and Constitutional values through value-based courses; 21st century capabilities across the range of disciplines through life skills, entrepreneurial and professional skills; community and constructive public engagement; social, moral and environmental awareness; Organic Living and Global Citizenship Education (GCED); holistic, inquiry-based, discovery-based, discussion-based, and analysis-based learning; exposure to Indian knowledge system, cultural traditions and classical literature through relevant courses offering 'Knowledge of India'; fine blend of modern pedagogies with indigenous and traditional ways of learning; flexibility in course choices; student-centric participatory learning; imaginative and flexible curricular structures to enable creative combination of disciplines for study; offering multiple entry and exit points initially in undergraduate programmes; alignment of Vocational courses with the International Standard Classification of Occupations maintained by the International Labor Organization; breaking the silos of disciplines; integration of extra-curricular and curricular aspects; exploring internships with local industry, businesses, artists and crafts persons; closer collaborations between industry and higher education institutions for technical , vocational and science programmes; and formative assessment tools to be aligned with the learning outcomes, capabilities, and dispositions as specified for each course. In

case of UG programmes in Engineering and Vocational Studies, it was decided that the departments shall incorporate pertinent NEP recommendations while complying with AICTE, NBA, NSQF, International Standard Classification of Occupations, Sector Skill Council and other relevant agencies/sources. The University has also developed consensus on adoption of Blended Learning with 40% component of online teaching and 60% face to face classes for each programme.

The revised curricula of various programmes could be devised with concerted efforts of the faculty, Heads of the Departments and Deans of Schools of Study. The draft prepared by each department was discussed in series of discussion sessions conducted at Department, School and the University level. The leadership of the University has been a driving force behind the entire exercise of developing the uniform template and structure for the revised curriculum. The Vice Chancellor of the University conducted series of meetings with Heads and Deans to deliberate upon the vital parameters of the revised curriculum to formulate a uniform template featuring Background, Programme Outcomes, Programme Specific Outcomes, Postgraduate Attributes, Structure of Masters Course, Learning Outcome Index, Semester-wise Courses and Credit Distribution, Course-level Learning Outcomes, Teaching-Learning Process, Blended Learning, Assessment and Evaluation, Keywords, References and Appendices. The experts of various Boards of Studies and School Boards contributed to a large extent in giving the final shape to the revised curriculum of each programme.

To ensure the implementation of curricular reforms envisioned in NEP-2020, the University has decided to implement various provisions in a phased manner. Accordingly, the curriculum may be reviewed annually.

About the Department

Department of Environmental Studies formerly known as the Department of Environmental Sciences under School of Earth, Environment & Space Studies was established from the academic year 2014-15 by offering two years Master's Degree programme in Environmental Science with an intake capacity of 30 students. Currently, the Department has been shifted to the School of Interdisciplinary and Applied Sciences. Now the intake capacity of the department has been increased to 38 students. Major aim of the department is to furnish the students with a comprehensive understanding of key environmental issues, and use of a wide range of environmental tools and methods so that they can play leading role in development and application of environmental policies and management. The Department plans to focus its research activities in diverse thrust areas during the coming years. Besides meeting its academic objectives, the Department aimed at providing leadership in the area of conservation of environment, rational utilization of natural resources and creation of public awareness. The academic programme of the

Department has been extensively reviewed, revised and updated, keeping in mind the need for sharper focusing, the available expertise at any given time, and committed to changes desired in curriculum of individual courses or specific programmes. The department has trained and experienced faculty having diverse background of Environmental Sciences. The department is also involved in extension activities in the adopted villages of CUH for the development of the community/society/nation by imparting environmental education with the involvement of students.

Programs Offered

Currently the Department is offering M.Sc. programme in Environmental Science and shortly going to start M.Phil./Ph.D. programme in same subject.

Objectives of the Department:

- To provide quality education and training in Environmental Sciences
- To pursue and facilitate research and development activities
- To establish working linkages with industry and undertake collaborative projects which offer long-term interaction opportunities with academia and industry
- To foster environmental awareness and promote the principles and practices of sustainable development.

Thrust Areas of Research

- Wastewater Treatment
- Carbon Sequestration
- Water Resources Management
- Paleoclimate studies
- Phytoremediation and Bioremediation
- Biofuels
- Solid Waste Management
- Environmental Pollution Monitoring and Analysis

2. Programme Outcomes (PO)

- **Basic and applied knowledge:** Interdisciplinary knowledge to find solution for the complex environmental problems
- **Problem analysis:** Ability to analyze society related/ applied research problem, design and execute experiments to find relevant solutions

- **Advanced Usage of Technology**: Apply advanced instrumentation tools, online resources with an understanding of the troubleshooting and limitations.
- **Ethics:** Commitment towards professional ethics and responsibilities as a social endeavor to bring harmony with nature
- **Lifelong learning:** Scientific skills for industrial applications and entrepreneurship

3. Programme Specific Outcomes

On completing M.Sc. Programme, the students shall be able to realize following outcomes:

- **PSO-1:** Knowledge about the natural resources, their status, importance and need for conservation.
- **PSO-2:** Knowledge of biodiversity, forest and wildlife ecology for their conservation and management.
- **PSO-3:** Enhancement of creative and critical thinking, aesthetic sensibility, and analytical skills.
- **PSO-4:** Understanding of the chemical processes that governs the natural and disturbed environments.
- **PSO-5:** Waste management practices for the betterment of environment and well beings.
- **PSO-6:** Understanding of the emerging regional and global environmental issues and their mitigations.
- **PSO-7:** Understating the EIA and its methodologies for Industries and Regulators. .
- **PSO-8:** Fundamental knowledge of instrumental methods employed in analysis of environmental samples.
- **PSO-9:** Understandings of natural disasters and their management approaches
- **PSO-10:** Knowledge of environmental laws, acts, and standard for environmental compliance

4. Postgraduate Attributes

On completion of the post graduate programme in Environmental Studies, students are expected to equip with the skills of creative, critical and rational thinking associated with Environmental Studies and its use for human society. The following attributes are expected from the students of M.Sc. Environmental Studies:

- Disciplinary Knowledge
- Creative and Critical Thinking
- Reflective Thinking

- Problem Solving
- Analytical Reasoning
- Communication Skills
- Research Skills
- Life Skills
- Multicultural Competence
- Moral and Ethical Values
- Life-long Learning
- Global Competency

5. Structure of Programme (M.Sc. Environmental Science)

Total Credits: 100

SEMESTER – I						**Credits: 25**
Sr. No.	**COURSE CODE**	**COURSE TITLE**	**L**	**T**	**P**	**C**
1.	**SIAS EVS 01 01 01 C 4004**	**Fundamentals of Ecology**	**4**	**0**	**0**	**4**
3.	**SIAS EVS 01 01 02 C 4004**	**Biodiversity Conservation**	**4**	**0**	**0**	**4**
2.	**SIAS EVS 01 01 03 C 4004**	**Natural Resource Conservation & Management**	**4**	**0**	**0**	**4**
4.	**SIAS EVS 01 01 04 C 2002**	**Environmental Statistics**	**2**	**0**	**0**	**2**
5.	**SIAS EVS 01 01 05 C 0202**	**Seminar**	**0**	**2**	**0**	**2**
6.	**SIAS EVS 01 01 06 C 0055**	**Practical I (Ecology & Biodiversity)**	**0**	**0**	**10**	**5**
7.	**GE**	**To be taken from other department**	**4**	**0**	**0**	**4**
	GEC ***(offered to students of other department only)/ MOOC***					
8.	**SIAS EVS 01 01 01 GE 4004**	**Foundation Course in Ecology and Environment**	**4**	**0**	**0**	**4**
9.	**SIAS EVS 01 01 02 GE 4004**	**Regional and Global Environmental Issues**	**4**	**0**	**0**	**4**

SEMESTER – II						**Credits: 25**
1	**SIAS EVS 01 02 07 C 4004**	**Environmental Chemistry**	**4**	**0**	**0**	**4**
2	**SIAS EVS 01 02 08 C 4004**	**Environmental Pollution and Control**	**4**	**0**	**0**	**4**
3	**SIAS EVS 01 02 09 C 4004**	**Environmental Management and Impact Assessment**	**4**	**0**	**0**	**4**
4	**SIAS EVS 01 02 10 C 4004**	**Instrumental Techniques for Environmental Analysis**	**4**	**0**	**0**	**4**
5	**SIAS EVS 01 02 11 C 0055**	**Practical-II (Environmental Management)**	**0**	**0**	**10**	**5**

6	*Choose any one of the following two DCEC courses:*					
	SIAS EVS 01 02 01 DCEC 4004	Solid and Hazardous Waste Management	4	0	0	4
	SIAS EVS 01 02 02 DCEC 4004	Forest and Wildlife Ecology	4	0	0	4
	SIAS EVS 01 02 03 DCEC 4004	Environmental Biotechnology	4	0	0	4
	GEC *(offered to students of other department only)/ MOOC*					
7	SIAS EVS 01 02 03 GE 4004	Environmental Pollution and Health	4	0	0	4
8	SIAS EVS 01 02 04 GE 4004	Biodiversity Conservation and Wildlife Management	4	0	0	4

SEMESTER – III						Credits: 26
1	SIAS EVS 01 03 12 C 4004	Physical Environment	4	0	0	4
2	SIAS EVS 01 03 13 C 4004	Environmental Policy and Law	4	0	0	4
3	SIAS EVS 01 03 14 C 4004	Environmental Health and Toxicology	4	0	0	4
4.	SIAS EVS 01 03 15 C 0055	Practical III *(Environmental Monitoring & Analysis)*	0	0	10	5
5.	SIAS EVS 01 03 16 C 0001	Summer Training (Report and Presentation)	0	0	0	1
6.	GE	To be taken from other department	4	0	0	4
7.	*Choose any one of the following two DCEC courses*:					
	SIAS EVS 01 03 04 DCEC 4004	Water Quality Management	4	0	0	4
	SIAS EVS 01 03 05 DCEC 4004	Natural Disaster Management	4	0	0	4
	SIAS EVS 01 03 06 DCEC 4004	Environmental Microbiology	4	0	0	4
	GEC *(offered to students of other department only)/ MOOC*					

8.	**SIAS EVS 01 03 05 GE 4004**	**Sustainable Development and Resource Management**	**4**	**0**	**0**	**4**
9.	**SIAS EVS 01 03 06 GE 4004**	**Agriculture and Environment**	**4**	**0**	**0**	**4**

SEMESTER – IV						**Credits: 24**
1.	**SIAS EVS 01 04 01 SEEC 002020**	**Dissertation (Research work, Seminar, Report and Viva voce)**	**0**	**0**	**40**	**20**
2.	**SIAS EVS 01 04 17 C 4004**	**Research Methodology and Writing Skills**	**4**	**0**	**0**	**4**

L: Lecture; T: Theory; P: Practical; S: Seminar; GEC- General Elective Course: DCEC: Discipline Centric Elective Course; C: Credits

SEEC: Skill Enhancement Elective Course (Compulsory and exclusively for M.Sc. (Environmental Science) students)

****Blue text courses will be taught in online mode.***

SEMESTER- I

FUNDAMENTALS OF ECOLOGY

(SIAS EVS 01 01 01 C 4004)

Course title: Fundamentals of Ecology

Course objective: To provide an understanding of the impacts of various environmental factors on the living being and vice-versa.

Learning outcomes:

• It will give knowledge of the environmental factors affecting animals and plants.

• A sense of the energy flow and nutrient cycling in the environment.

• A sense of the application of the population ecology.

Course content:

Unit-I: **Introduction to Ecology**

Definition, subdivision and scope, Basic concepts in ecology, Autecology and Synecology, Level of organization in Ecology, Environmental heterogenicity, Applied ecology, Environmental complexes, Interaction of ecological factors,

Unit-II: Ecological Factors

Light, temperature, precipitation (rainfall), humidity. Atmosphere: gases and wind, atmospheric gases, wind factor and fire factor, topographic and edaphic factors. Different environmental laws and limiting factors (Liebig's law of minimum, Shelford's law of Tolerance, Combined concept of limiting Factors). Biotic community, Interdependence in a community and community metabolism, Community ecology: structure, composition and development of community, species diversity in communities, Ecotones, Concept of edge effect, Ecological niche, Gause's Principle.

Unit-III: **Ecosystem**

Introduction, kinds of ecosystem, structure and functions, abiotic and biotic component, Ecological energetics, Energy flow models, Food chain and Food web, Concepts of productivity and standing crops, Ecological Pyramids-types, Ecological succession, Ecological indicators, Ecological efficiencies, Biogeochemical cycles in ecosystems.

Unit-IV: Population Ecology

Population characteristics; density, natality, mortality, biotic potential, survivorship curves, age distribution, growth curves and models, r & k selection. Population interaction, Prey-Predator Relationship, Ecological Model.

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1. Cunningham W P, Cunningham M A (2008) Principles of Environment Science. Enquiry and Applications. 5th Edition. Tata McGraw Hill, New Delhi
2. Dash M C, Dash S P (2009) Fundamentals of Ecology. 3rd McGraw Hill Education.
3. Odum E P (2017) Fundamentals of Ecology, 5th Edition, Cengage Learning Publication
4. Raven P H, Berg L R, Hassenzahl D M (2018) Environment. 10th Edition. John Wiley & Sons., USA
5. Sharma P D (2017) Ecology & Environment, 13th Edition, Rastogi Publications, Meerut
6. Singh J S, Singh S P, Gupta S R (2008) Ecology, Environment and Resource Conservation. Anamaya Publishers, New Delhi, India
7. Smith (2014) Elements of Ecology. 8th edition, Pearson Education India
8. Santra S C (2010) Fundamentals of Ecology and Environmental Biology. New Central Book Agency
9. Juniper T (2019) The Ecology Book: Big Ideas Simply Explained. DK

BIODIVERSITY CONSERVATION
(SIAS EVS 01 01 02 C 4004)

Course title: Biodiversity Conservation

Course objective: To aware the students about the biological diversity, its importance, status and need of worldwide efforts in its preservation.

Learning outcomes:

- It will be helpful for students to understand the species diversity and associated issues.
- They will be able to understand the threat at biodiversity, causal factors and mitigation measures.
- The students will get the knowledge about trends of biological diversity and conservation strategies and thereafter be able to create awareness for its preservation and development.

Course content:

Unit-I: Introduction

Concepts and components of biodiversity, types of diversity (Microbial, Plant, Soil, Agro-biodiversity), Importance of biodiversity: aesthetic, cultural and ecosystem services, biodiversity informatics, biodiversity values, biodiversity indices, biodiversity losses, Human population growth implications on biodiversity.

Unit-II: Strategies for Biodiversity Conservation

In-situ conservation: sanctuaries, biospheres reserves, national parks, preservation plots. Ex-situ conservation: captive breeding, botanical gardens, zoos, aquaria, homestead garden, herbarium; In-vitro conservation of plant tissue culture: Gene bank, pollen bank, spore bank, DNA bank. Wildlife corridors, Resource partitioning, Pressure of firewood collection, non-wood forest produce collection, livestock grazing and fire on protected area and habitat management. National and international programmes for biodiversity conservation.

Unit-III: Megadiversity Zones and Biodiversity Hotspots

Concepts, distribution and importance of megadiversity zones, Biogeographic regions Biodiversity hotspots, National and global red data lists, Categories of species and their management, Restoration of biodiversity, Acceleration of ecological succession, Reintroduction of biota. Methods for

inventorying and monitoring biodiversity trends, Habitat evaluation, IPRs and protection: Patent protection, TRIPs, Biopiracy and Bioprospecting.

Unit-IV: Planning and Implementation of Conservation Programmes

Indigenous knowledge, biodiversity and sustainable development, Sacred groves. Wildlife values and eco-tourism, wildlife distribution in India, problem in wildlife protection, role of WWF, WCU, CITES, IUCN, UNEP, WCPA, TRAFFIC in wildlife protection. Institutions and their role in conservation: Zoos, Natural history museums & collections, Zoological survey of India, Botanical survey of India, Forest research Institute, Survey of India. People and conservation. Role of NGOs in conservation.

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2. Gibbs J, Malcolm L, Sterling J (2008) Problem-Solving in Conservation Biology and Wildlife Management. 2nd ed. Wiley-Blackwell
3. Laladhas K, Oommen V, Nilayangode P (2018) Biodiversity for Sustainable Development. Springer International Publishing, pp 79-86
4. Matthews T, Triantis K, Whittaker R (2021) The Species–Area Relationship: Theory and Application (Ecology, Biodiversity and Conservation). Cambridge: Cambridge University Press
5. Odum E P, Barrett W, (2005) Fundamentals of Ecology. 5th ed. Cengage Learning.
6. Raven P, Berg L, Hassenzahl D (2008) Environment. 6th ed. John Wiley & Sons., USA
7. Sharma P D (2017) Ecology and Environment. 13th ed. Rastogi Publications
8. Sondhi S (2012) Protected Animals of India. The Energy and Resources Institute, TERI
9. Thangadurai D, Ching G, Jeyabalan S, Islam S (2019) Biodiversity and Conservation: Characterization and Utilization of Plants, Microbes and Natural Resources for Sustainable Development and Ecosystem Management. United States: Apple Academic Press

NATURAL RESOURCE CONSERVATION AND MANAGEMENT
(SIAS EVS 01 01 03 C 4004)

Course title: Natural Resource Conservation and Management

Course objective: To create awareness among the students about the natural resources, their status, importance and need of preservation.

Learning outcomes:

- It will be helpful for students to understand different types of natural resources and their status in the present context.
- The understanding of issues concerning different natural resources will be helpful to find scientific solution based on participatory approach.
- To achieve their sustainable use as well as proper management.
- Participate in sustainable development

Course content:

Unit-I: **Natural Resources: An Introduction**

Natural Resources: Concept and Classification of Natural Resources; Factors influencing resource availability, distribution and uses; Mineral Resources***:*** Mineral Resources and Reserve; Mineral exploration and exploitation, Environmental impacts of mineral extraction; Oceanic Minerals: Exploration prospective and Impacts

Unit-II: Physical Resources

Soil Resource: Soil Characteristics and Classification; Soil Development, Soil Profile; Degradation of Soil: Soil Erosion, Desertification and Salinization; Soil and Land Management: Soil Conservation and Management Strategies; Water Resources: Water Composition and Quality: Rainwater, Rivers, Lakes, Groundwater, Seawater; Impacts of Exploitation of Surface & Ground Water, Environmental Issues of Water Resource Projects; Rain Water Harvesting and Ground Water Recharge.

Unit-III: Energy Resources

Fossil Fuels: Classification, Composition, Characteristics of Coal, Petroleum and Natural Gas; Renewable Energy Resources: Overview and Principal of generation and Environmental Implications of renewable Energy: Hydropower, Tidal Energy, Ocean Thermal Energy Conversion (OTEC), Wind Energy, Geothermal Energy, Solar Energy (Solar Collector, Photo-voltaic Modules,

Solar Ponds), Nuclear Energy (Fusion & Fission), Bioenergy; Energy use pattern in India and the World.

Unit-IV: Forest Resources

Forest Resources: Classification and Forest Types in India; Importance, Use and Over Exploitation; Human Interaction with Forests: Causes and Effects of Deforestation; Purposes and Techniques of Forest Management; Urban Forestry

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ENVIRONMENTAL STATISTICS

(SIAS EVS 01 01 04 C 2002)

Course title: Environmental Statistics

Course objective: To enhance students' ability in collection, understanding and interpretation of the environment data or the information related thereto**.**

Learning outcomes:

- The students will be benefitted in shorting and managing of data to reach at the final conclusion.
- It will be helpful in the assessment and understanding of the environmental components.
- Finally, it will be helpful to predict, sort out and provide solutions of the environmental problems.

Course content:

Unit-I: Understanding and Representation of Data

Importance of statistics in Environmental Sciences, Attributes and Variables: types of variables, scales of measurement, tabulation of data, concept of frequency distribution, Graphical representation of Data – Line chart, Pie chart, Bar chart, Box plot

Unit-II: Descriptive Statistics

Measures of Central Tendency - mean, mode and median, Measures of Dispersion - range, quartile deviation, mean deviation, standard deviation, coefficient of variation, Moments, Skewness and Kurtosis.

Unit-III: Probability Theory

Basic concepts of probability theory: Mutually Exclusive Events and Independent Events, Probability Laws, Conditional Probability, Discrete and Continuous Random Variables, Theoretical Probability Distributions - Binomial, Poisson, Normal and Log-Normal distributions,

Unit-IV: Relationship and Testing of Parameters

Correlation, Regression, Concept of Sample and Population, Sampling Types, Concepts of Sampling Distribution, Standard Error and Significance Levels and Confidence Limits. Hypothesis Testing: Null Hypothesis, Type I and Type II errors, t-test, Chi-square test, F-test, Principles of Experimental Design, ANOVA: one-way and two-way

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SEMINAR

(SIAS EVS 01 01 05 C 0202)

Course title: Seminar

Course objective: The main objective of this course is to eliminate the hesitation of students by presenting in front of the Faculties and other students.

Learning outcomes:

- To learn how to make a presentation
- To learn how to present on a formal platform
- To learn how to take questions from faculty as well as students.

Every student, who has been enrolled in M.Sc. (Environmental Sciences) programme, shall have to deliver a Seminar on a recent topic related to Environmental Science, as per the programme of the School of Earth, Environment and Space Studies. The seminar will be of 30-40 minutes duration during which the presentation will be followed by a questions session by the audience comprising of faculty and students. Every student shall be required to submit the topic of his/her seminar in consultation with the Head of the Department/Faculty members well in advance so that the same may be displayed on the notice board. The speaker has to submit an abstract to be distributed during the Seminar in addition to a review paper giving relevant details of the background of the subject, various aspects of the topic and references.

PRACTICAL-I (ECOLOGY & BIODIVERSITY)
(SIAS EVS 01 01 06 C 0055)

Course title: Practical-I (Ecology & Biodiversity)

Course objective: To provide practical knowledge of the structure of an ecosystem concerning its biodiversity and various factors affecting them.

Learning outcomes:

• Practical knowledge to study the biodiversity of an ecosystem.
• Examine water quality of an aquatic water body
• Field knowledge of an ecosystem structure and its parameters.

Course content:

Unit-I: Parameters of grassland vegetation (Two exercises to be done in examination)
Minimum size and number of quadrat, Frequency of plant species, Density of plant species, Abundance of plant species, Importance Value Index (IVI)

Unit-II: Primary Productivity determination (One exercise to be given)
Harvest method, Light and dark bottle method.

Unit-III: Parameters of aquatic bodies determination
Hardness, Transparency, Turbidity, Conductivity, Chlorophyll content estimation

Unit-IV: Water quality parameters determination (Any two exercises)

Dissolved oxygen (DO), Biological oxygen demand (BOD), Chemical oxygen demand (COD), Alkalinity, Total dissolved solid (TDS), visiting aquatic ecosystem and learn methods of water and plankton collection

FOUNDATION COURSE IN ECOLOGY AND ENVIRONMENT
(SIAS EVS 01 01 01 GE 4004)

Course title: Foundation Course in Ecology and Environment

Course objective: To give students an understanding of basic concepts of ecology and how ecosystem functions.

Learning outcomes:

- The physical aspects of the environment
- Relationship between organisms and their environment
- The structure and functions of ecosystem
- Ability to interpret population characteristics

Course content:

Unit-I: **Fundamentals of Ecology**

Definition and Basic concept of Ecology; Scope of ecology; Subdivision of Ecology: Autecology and Synecology; Organizational Level of Ecological Systems.

Unit-II: Environmental Factors

Definition and Types of Environmental Factors; Abiotic factors: Temperature, light, water, precipitation and wind; Biotic factors. Shelford's Law of Tolerance, Liebig's Law of Minimum, Concept of Limiting Factors.

Unit-III: Ecosystem Ecology

Definition and Types of Ecosystem; Terrestrial Ecosystem: Forest and Grassland; Aquatic Ecosystem: Lentic and Lotic; Structure and Function of an Ecosystem; Food Chain: Grazing and Detritus; Trophic Levels, Energy Flow Models; Ecological Pyramids: Number, Biomass and Energy.

Unit-IV: **Population and Community Dynamics**

Population Characteristics: Natality, Mortality, Age Distribution, Dispersion, Migration. Age Structure of Population; Ecological Niche; Ecotone and Edge effect; Interactions between Populations, Life History Strategies (r and k Species); Key-stone Species; Flagship Species;

Ecological Succession: Characteristics of Succession, General process, Significance, Types of Succession: Xerosere and Hydrosere, Concept of Climax.

REFERENCES

1. Botkin D, Edward K (2007) Environmental Science: Earth as a Living Planet. 6th ed. John Wiley & Sons, New York
2. Cunningham W P, Cunningham M A (2008) Principles of Environment Science Enquiry and Applications. 5th ed. Tata McGraw Hill, New Delhi
3. Dash M C, Dash S P (2009) Fundamentals of Ecology. 3rd ed. McGraw Hill Education
4. Juniper T (2019) The Ecology Book: Big Ideas Simply Explained. DK
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9. Singh J S, Singh S P, Gupta S R (2008) Ecology, Environment and Resource Conservation. Anamaya Publishers, New Delhi, India
10. Smith (2014) Elements of Ecology. 8th edition. Pearson Education India

REGIONAL AND GLOBAL ENVIRONMENTAL ISSUES
(SIAS EVS 01 01 02 GE 4004)

Corse title: Regional and Global Environmental Issues

Course objective: The objective of this course is to aware students regarding the emerging regional and global environmental issues.

Learning outcomes:

• To know about the local environmental issues and movements
• How these issues may impact at the global level
• How we can play an important role to minimize the impact of these aspects

Course content:

Unit-I: Global and National Environmental Issues

Sea-level Change- primary and secondary impacts- Adapting to Sea level changes. Global Warming and Greenhouse gases- Global and national scenario, Deforestation, . National Action Plan on Climate Change (NAPCC), Intergovernmental Panel for Climate Change (IPCC), Climate Change and Biodiversity loss, Climate change and food security, Ozone depletion.

Unit-II: Environmental Disasters

Nuclear issues, Nuclear power, Nuclear weapons, Nuclear and radiation accidents, Bhopal gas disaster 1984, Three Mile Island accident (1979), Kyshtym Nuclear Disaster (1957), Wind Scale Fire Nuclear Disaster (1957), Love canal tragedy, Chernobyl disaster 1986, Fukushima Daiichi nuclear disaster 2011, Nuclear safety, High-level radioactive waste management.

Unit-III: Environmental Issues and Movements

Global and national movements of Significance impact: Green Belt movement, Green Peace, Chipko movement, Narmada Bachao Andolan, Tehri dam, Urja gram, Beej Bachao Andolan, Silent valley-Doon valley and related issues/case studies

Unit-IV: Contemporary Issues

Green Buildings, GRIHA rating norms, Genetic pollution, Genetically modified food controversies, Intensive farming Monoculture, Swachh Bharat Abhiyan. Water conservation- development of watersheds, Rainwater harvesting and groundwater recharge, Namami Gange and Yamuna action

plan, SDGs , NAPCC- National Water Mission (NWM), National Mission for Sustaining Himalayan Ecosystem (NMSHE) and National Mission for Strategic Knowledge on Climate Change (NMSKCC), National Solar Mission (NSM), National Mission for Enhanced Energy Efficiency (NMEEE), National Mission on Sustainable Habitat (NMSH), National Mission for Sustainable Agriculture (NMSA) and Green India Mission (GIM).

REFERENCES

1. Abel D C, McConnell R L (2012) Environmental Issues: Looking Towards a Sustainable Future (4th Edition) 4th Edition. Pearson Learning Solutions
2. Asthana D K, Asthana M (2007) Environment: Problems and Solutions, S. Chand & Co., New Delhi
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SEMESTER-II

ENVIRONMENTAL CHEMISTRY
(SIAS EVS 01 02 07 C 4004)

Course title: Environmental Chemistry

Course objective: To understand the chemistry that governs natural and polluted environments by utilizing and building on the tools acquired in general chemistry, chemical kinetics, and thermodynamics. The chemistry of species in the atmosphere, hydrosphere, lithosphere, and their interactions will be examined. Additionally, concepts of ecotoxicology will be introduced.

Learning outcomes:

- A sense of water chemistry and various physical properties involving in the chemical processes.
- A sense of the atmospheric chemistry and processes involved in the troposphere.
- Knowledge of soil properties and toxicological compound emerging into the environment.

Course content:

Unit-I: Chemistry of Water and Aquatic System

Stoichiometry, Gibb's energy, chemical potential, chemical equilibria, acid-base reactions, solubility product, the solubility of gases in water. The carbonate system; Chemistry of water, Properties of water and their significance, types, sources and consequences of water pollution, Physicochemical and bacteriological sampling and analysis of water quality. Redox potential, alkalinity, acidity, calcium and other metals in water, organic pollutants in sewage, soaps, oil and detergents, radionuclide in water

Unit-II: Atmospheric Chemistry

Particles, ions and radicals in the atmosphere. Natural and anthropogenic sources of pollution. Primary and Secondary pollutants. Transport and diffusion of pollutants. Oxygen and ozone chemistry. Chemistry of air pollutants, Photochemical smog. Methods of monitoring and control of air pollution- SO_2, NOx, CO, SPM. Effects of pollutants on human beings, plants, animals and materials. Air Quality Standards

Unit-III: Soil and Sediment Geochemistry

Inorganic and organic components of soil, Weathering of rocks, rock-forming minerals, Soil properties, acid-base and ion-exchange reaction in soil, Macro and micronutrients in soil, Nitrogen pathways and NPK in soils.

Unit-IV: Toxic Chemicals in the Environment

Organic compounds: Hydrocarbons, Chemistry of hydrocarbons, phenols, chlorofluorocarbons, pesticides, chemical fertilizers, environmental effects, effects on macro and microorganisms. Gasoline lubricants and greases, Pesticides**:** Classification, degradation, analysis, pollution due to pesticides and heavy metals, Principles of green chemistry.

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2. Field F W, Haines P J (2000) Environmental Analytical Chemistry, Blackwell Science Ltd. USA
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5. O' Neill P (1998) Environmental Chemistry. 3rd edition., CRC Press
6. Rao C S (2018) Environmental Pollution Control Engineering. Third edition, New Age International Publishers
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8. Sodhi G S (2008) Fundamental concepts of Environmental Chemistry, Narosa Publishing House, New Delhi

ENVIRONMENTAL POLLUTION AND CONTROL
(SIAS EVS 01 02 08 C 4004)

Course title: Environmental Pollution and Control

Course objective: To get knowledge about the technologies available to control the pollution which has been emerged to the environment already by various human activities.

Learning outcomes:

- A sense of the technologies and methods available to control the water pollution
- A sense about the methods and technologies which have been used until now for the control and purification of the polluted air.
- Knowledge about the noise pollution abatement and soil pollution control

Course content:

Unit-I: Water Pollution

Primary treatment methods – screening, grit removal, primary sedimentation, secondary treatment methods, Activated sludge process, Trickling filters, Rotating biological contactors, Oxidation ponds and Lagoons. Advanced wastewater treatment, removal of nutrients and solids. Wastewater reuse and sludge disposal.

Unit-II: Air Pollution

Control methods for particulates-gravitational settling chambers, Centrifugal Collectors, Wet Collectors, Fabric filters, electrostatic precipitators. Control methods for gaseous pollutants-adsorption, absorption, condensation, combustion. Air pollutants Sampling, Major air pollutants in India.

Unit-III: Noise Pollution

Basics of sound, Sound propagation, Measurement of noise and indices, Effect of meteorological parameters on noise propagation. Noise control and abatement measures, Noise exposure levels and standards, Impact of noise on human health.

Unit-IV: Soil Pollution

Soil Pollution control. Phytoremediation process: Phytostimulation, Phytostabilization, Phytoextraction, Phytovolatilization, Phytodegradation, Industrial effluents and their interactions

with soil components. Soil micro-organisms and their functions - degradation of pesticides and synthetic fertilizers. The land-use plan, soil surveys in relation to land use planning, methods of site selection and evaluation.

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1. Bell L H, Bell D H (1993) Industrial Noise Control: Fundamentals and Applications, Second Edition (Mechanical Engineering) 2nd Edition Marcel Dekker, Inc; New York
2. De A K (2016) Environmental Chemistry,. 8th Edition, Wiley Eastern Ltd, New Delhi
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ENVIRONMENTAL MANAGEMENT AND IMPACT ASSESSMENT
(SIAS EVS 01 02 09 C 4004)

Course title: Environmental Management and Impact Assessment

Course objectives: Understating the environmental laws, acts, standard for environmental compliance. Understating the EIA and its methodologies for Industries and Regulators.

Learning outcomes:

- Understand critical theories of environmental impact assessment
- Be able to critique environmental impact statements effectively
- Be able to apply knowledge to Indian situations/cases

Course content:

Unit-I: Introduction to EIA and Environmental Planning

Origin, aims and needs of EIA, EIA guidelines 1994, EIA notification and amendments; Environmental Impact Assessment (EIA) as a tool in environmental management, EMS and QMS, ISO 14000 Series, Corporate Social Responsibility (CSR) 26000. Baseline information and predictions (Land, water, atmosphere, energy etc.), Restoration and rehabilitation technologies. Concept and strategies of sustainable development, Environmental priorities in India and Sustainable Development.

Unit-II: EIA Methodology

Types of Projects requiring Environmental Clearance, Types of EIA, Project screening, Scoping, Base-line study, Impact identification, Prediction and assessment of impacts, Mitigation measures. Public participation, Review and decision making, Generic structure of EIA Document, Composition of Expert Appraisal Committee (EAC), State Level Expert Appraisal Committee (SEAC), Life Cycle Assessment (LCA) in EIA: principles and practical implications for industrial projects, Benefits and future of EIA.

Unit-III: Environmental Audit

Introduction, Concepts, Steps, Methodology and Types of Environmental audit, . Environmental Auditing: Procedure, quantitative methods of environmental auditing (Leopold Matrix method and Battelle method) Cost-Benefit analysis, National Environmental Policies and guidelines for

environmental audit in India Main areas covered by the auditor in the case of environment audit in an Industrial unit, Environmental impact statement (EIS).

Unit-IV: Case Studies

Environmental Impact Assessment of major developmental projects – river valley projects, mining projects, thermal power plants, transport (rail, road highway), oil refineries and petrochemicals. Prediction and assessment of impacts on the biological, cultural and socio- economic environments.

REFERENCES

1. Barthwal R R (2012) Environmental Impact Assessment. New Age International Private Limited
2. Glasson J, Therivel R, Chadwick A (2012) Introduction to Environmental Impact Assessment. London: Routledge
3. Guinee J B (2002) Handbook on Life Cycle Assessment: Operational Guide to ISO Standards. Springer
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8. Singh P P, Sharma S (2004) Environment and Pollution Education. Deep and Deep Publication Pvt. Ltd, New Delhi

INSTRUMENTAL TECHNIQUES FOR ENVIRONMENTAL ANALYSIS
(SIAS EVS 01 02 10 C 4004)

Course title: Instrumental Techniques for Environmental Analysis

Course objectives: To provide a fundamental understanding of the design, operational principles and practical applications of modern instrumental methods employed in chemical analysis of environmental samples.

Learning outcomes:

- Students will be able to use adequate equipment and determine the state of pollution in the environment
- They will be able to correctly perform sampling and prepare the samples
- To adequately use instrumental methods of chemical analysis and interpret the results.

Course content:

Unit-I: Basics of Analytical Approach

Defining of Problem and Designing of Analytical Method; Sampling: Types and Methods for Solid, Liquid and Gaseous Matrix; Sample Storage; Sample Preparation; Measurement and Assessing of Data; Method Validation and Documentation; Titrimetry; Gravimetry; Colourimetry

Unit-II: Spectroscopic Analytical Techniques

Spectrophotometry (UV-Visible Spectrophotometry, Atomic Absorption Spectrophotometry, Flame Photometry); Plasma Emission Spectroscopy (Induced Coupled Plasma Mass Spectrometer, Induced Coupled Plasma Atomic Emission Spectroscopy); Fourier-Transform Infrared Spectroscopy; Nuclear Magnetic Resonance Spectroscopy; X-Ray Spectroscopy (X-Ray Fluorescence, X-Ray Diffraction); Nephalometry and Turbidimetry

Unit-III: Chromatographic Techniques

Chromatographic Techniques (Paper Chromatography, Thin Layer Chromatography, Gas Liquid Chromatography, High Pressure Liquid Chromatography, Ion-exchange Chromatography); Electrophoresis

Unit-IV: Microscopy Techniques

Optical Microscopy (Brightfield, Darkfield, Phase Contrast, Fluorescence, Confocal); Electron Microscopy (Scanning and Transmission Electron Microscopy); Flow Cytometry

REFERENCES

1. Baird R B, Eaton A D, Rice E W (2017) Standards Methods for the examination of water and Waste water. 23rd ed., American Water Works Association, (AWWA, WEF and APHA)
2. Barbooti M (2015) Environmental Applications of Instrumental Chemical Analysis. Apple Academic Press, New York
3. Down D R, Lehr H J (2004) Environmental Instrumentation and Analysis Handbook. Wiley-Interscience
4. Horvai G, Pungor E (2020) A Practical Guide to Instrumental Analysis. 7th ed. United States: CRC Press
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8. Willard H H, Merritt L L, Deen J A, Settle F A (2004) Instrumental Methods of Analysis. 7th ed. CBS Publishers and Distributers, New Delhi

PRACTICAL-II
(ENVIRONMENTAL MANAGEMENT)
(SIAS EVS 01 02 11 C 0055)

Course title: Practical-II (Environmental Management)

Course objective: To make the students capable in monitoring and analysis of the physical and chemical parameters to know various changes, which may be harmful for the living beings as well as the environment.

Learning outcomes:

- The students will acquire the knowledge of various physiochemical parameters in the environment (air, water, soil, etc.) and methods of their analysis via different means.
- Besides, they will also gain the information about different laboratory equipment and instruments, etc.
- The students will able participate in solving so many environmental problems related with the analyzed parameters.

Course content:

Unit-I: Recording of Meteorological Parameters (select any two parameters)
Atmospheric pressure, rainfall, ambient temperature, wind speed and direction, Wind Chill and temperature, humidity and dew point.

Unit-II: Heavy Metals Analysis Using Atomic Absorption Spectrophotometer
Analysis of Aluminium (Al), Cadmium (Cd), Chromium (Cr), Copper (Cu), Iron (Fe), Mercury (Hg), Nickel (Ni) and Lead (Pb) from wastewater.

Unit-III: Soil Samples Collection and Analysis
Sampling and Collection of soil sample, Determination of physical and chemical properties of soil: CEC, pH, moisture content, Soil water holding capacity, organic matter content, Nitrogen, Phosphate phosphorus, Calcium Carbonate content

Unit-IV: Field Visits and Data Collection
Make Field visits to river/lake and/or wastewater treatment plants, measurement of noise form industrial, residential and commercial zones within the university premises.

REFERENCES

1. Baird R B, Eaton A D, Rice E W (2017) Standards Methods for the examination of water and Waste water. 23rd ed. American Water Works Association, (AWWA, WEF and APHA)
2. Carter M R (2008) Soil Sampling and Methods of Analysis. United States: CRC Press
3. Chhonkar P K, Dwivedi B S, Singh D (2007) Manual on Soil, Plant and Water Analysis. India: Westville Publishing House
4. Tahir A (2016) Manual of Soil Plant and Water Analysis. India: Daya Publishing House

SOLID AND HAZARDOUS WASTE MANAGEMENT
(SIAS EVS 01 02 01 DCEC 4004)

Course title: Solid and Hazardous Waste Management

Course Objective- to provide brief knowledge about the origin of different categories of waste generated, their disposal and to concentrate on 3R that is reduce, reuse and recycle of waste

Learning objectives:

- Develop understanding on various technological applications for processing of waste and their disposals in various ways.
- Acquire knowledge on waste to energy productions in the perspectives of sustainable development.
- Apply basic concepts in hazardous waste management and integrated waste management for urban areas.

Course content:

Unit-I: Basics of Solid Waste

Solid Waste: Types and Classification; Sources and Generation Rate; Factors Influencing Waste Generation; Waste Composition, Collection and Characterization, Waste Processing, Waste Minimization; Waste Recycling

Unit-II: Solid Waste Management

Solid Waste Management: Traditional Methods of Waste Management; Plastic Waste Management; Waste Management Options: Sanitary Landfill, Composting, Incineration, Energy Recovery options; Waste Legislations: Overview of Waste Management Legislations: The Plastic Waste Management Rules, 2016; The Construction and Demolition Waste Management Rules, 2016; The Solid Waste Management Rules, 2016

Unit-III: Hazardous Waste Management

Hazardous Waste: Definition, Sources and Classification, Hazard communication, Hazardous Waste Control, Treatment and Management; Radioactive Waste Management; Biomedical Waste Management, E-Waste Management

Unit-IV: Legislations Related to Hazardous Waste Management

The Hazardous and Other Waste (Management and Transboundary Movement) Rules, 2016; The Bio-Medical Waste Management Rules, 2016; The e-waste (Management) Rules 2016; The Manufacture, Storage and Import of Hazardous Chemical (Amendment) Rules, 2000; The Batteries (Management and Handling) Rules, 2010 with Amendments.

REFERENCES

1. Blackman Jr, WC (2016) Basic hazardous waste management. CRC Press
2. Chandrappa R, Das D B (2012) Solid waste management: Principles and practice. Springer Science and Business Media
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8. Van-Guilder C (2018) Hazardous Waste Management: An Introduction. 2nd ed. United Kingdom: Mercury Learning and Information, pp 292

FOREST AND WILDLIFE ECOLOGY

(SIAS EVS 01 02 02 DCEC 4004)

Course title: Forest and Wildlife Ecology

Course objective: Knowledge about the importance and existence of forest and wildlife

Learning outcomes:

- Knowledge about the forest composition and techniques to grow a forest in a sustainable manner
- Knowledge of value aspects of the wildlife on the earth ecosystem
- Knowledge of various protected areas and role of various bodies in the protection of wildlife

Course content:

Unit-I: Forest

Types and composition of forests of India, Structural organization of forest ecosystems, Primary production in different ecosystems and methods of measurement of primary production, Social forestry: Objectives, scope and necessity, Agroforestry, Extension forestry, Eucalyptus dilemma, people's participation, Roles on NGOs.

Unit-II: Silvicultural Practices

Silvicultural principles and practices, Impact of deforestation and shifting cultivation on forest ecosystems. Forest management: Objectives and principles, Techniques, Sustainable yield relation, Biodiversity and Forest.

Unit-III: Values of Wildlife

Concept of wildlife, Role of wildlife in nature, Factors influencing wildlife management such as habitats, population, behavior, food-habits, health, etc., Common flora and fauna of India. Tools for data collection and analysis. Preservation of Breeding Stock; Artificial stocking; Habitat Improvement, Game Farming.

Unit-IV: Wildlife Protection:

Indian wildlife IUCN Categories, National Parks, Wildlife Sanctuaries, Biosphere Reserves and Zoos in India, Ecological basis of wild life conservation and management, Special projects for endangered species (Project tiger, Gir lion Sanctuary Project, Crocodile breeding project, sea turtle

conservation), International trade of wildlife, Animal cruelty: causes and prevention, Wildlife and range management, Management of Fire, Role of NGO's in wildlife and forest life and range management, Role of local communities in wildlife management.

REFERENCES

1. Balakrishnan M (2016) Wildlife Ecology and Conservation (21st Century Biology and Agriculture: Textbook Series). Scientific Publishers
2. Chiras D, Reganold J (2009) Natural Resource Conservation: Management for a Sustainable Future. 10th edition, Pearson, USA
3. David R, Patton (2019) Forest Wildlife Ecology and Habitat Management. 1st edition. CRC Press
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ENVIRONMENTAL BIOTECHNOLOGY

(SIAS EVS 01 02 03 DCEC 4004)

Course title: Environmental Biotechnology

Course objective: To provide basic understanding of the role of biotechnology in the field of environment

Learning outcomes:

- Explain the technologies, tools and techniques in the field of environmental biotechnology.
- To know about the role of microorganisms as biotechnological agents.
- Knowledge about the basic terminology of molecular biology and genetics.
- Study of bioreactors for environmental application.

Course content:

Unit-I: Basic Techniques in Genetic Engineering

Brief account of the structure and functions of DNA and RNA, Recombinant DNA Technology: Enzymes (restriction endonucleases, DNA ligase, exonucleases and DNA polymerases), cloning vectors. Gene identification and isolation; genomic library, cDNA library, environmental genomics/metagenomics. Introduction of genes into new hosts using plasmid and phage vector. Gene transfer methods in bacteria and plants.

Unit-II: Biogeotechnology and Waste Gas Treatment

Xenobiotics compound: persistence and biomagnification. Bioleaching of metals: characteristics of commercially important microbes, mechanisms of bioleaching and current biomining processes. Biobeneficiation of gold ores. Biodesulfurization of coal. Biological treatment of waste gas (polluted air), Genetically Modified Organism (GMOs) and their impact on the environment.

Unit-III: Fermentation Technology

Bioreactor: basics, types and application. Use of natural and genetically engineered microorganisms from extreme environment like thermophiles, alkalophiles, acidophiles and halophiles in industrial applications. Production of enzymes like cellulase, proteases, and amylases for acetic acid production, Production of renewable and alternative sources of energy: bio-hydrogen, biodiesel and bioethanol.

Unit-IV: Biofertilizers and Biopesticides

Nitrogen fixation mechanism (biochemistry of nitrogenase, genetics of nitrogen fixation and regulation of nif genes expression), Bio-fertilizers: types, benefits, application and future prospects, Biopesticides: concept, categories, development and utilization in pest management. Bioremediation: concept, types of bioremediation technology, application of bioremediation in agricultural and industrial waste treatment.

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1. Alexander M (1999) Biodegradation and Bioremediation, 2nd edition, Academic Press
2. Brown T A (2012) Gene Cloning and DNA Analysis: An Introduction 6th Edition, Wiley
3. Fulekar M H (2010) Environmental Biotechnology - Theory and Application. CRC Press. Science Publisher, USA
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5. Jordening H, Winter J (2005) Environmental Biotechnology: Concepts and Applications. 1st Edition. Wiley-VCH Verlag GmbH, Germany
6. Manahan S E (1997) Environmental Science and Technology. Boca Raton. FL: Lewis Publishers, New York
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8. Rittman B, McCarty P L (2000) Environmental Biotechnology: Principles and Applications. 2nd Edition. Tata McGraw-Hill, USA
9. Thakur I S (2006) Environmental Biotechnology: Basic Concepts and Applications. I. K International Publishing House Pvt Ltd

ENVIRONMENTAL POLLUTION AND HEALTH

(SIAS EVS 01 02 03 GE 4004)

Course title: Environmental Pollution and Health

Course objective: To provide deep knowledge of the effect of environmental pollution on human health

Learning outcomes:

- It will be helpful for student to analyze types of pollution, sources, their effects on human health and protective measures taken to mitigate the pollution
- Develop understanding regarding different diseases caused due to environmental (air, water, soil etc.) pollution
- Examine the correlation between environmental pollution and human health

Course content:

Unit-I: Air Pollution

Air pollution: types and major sources of air pollution, physico-chemical and biological effects of air pollutants on surrounding atmosphere, air borne diseases and their effects on human health, Indoor air quality and its effect on human health, Ventilation: standards, methods and health hazards. National and International ambient air quality standards for air quality monitoring, Air pollution control techniques

Unit-II: Water Pollution

Water pollution- types and major sources of water pollutants, physico-chemical and biological effect of water pollutants on water bodies, water borne diseases and infections, national and international water quality standards for drinking purpose and domestic use. Methods used for water purification

Unit-III: Noise Pollution

Noise pollution: basics of sound, concept of sound pressure level and decibel scale, sources of noise, concept of equal loudness contours and frequency weighting networks, percentile indices of noise and the concept of Equivalent Continuous Sound Level (Leq), noise measurement: sound level meter, direct and indirect effects of noise on human health, national and international standards for noise exposure levels, noise control methods.

Unit-IV: Radiation, Soil pollution and Environmental Health

Radiation pollution: sources, effect on human health and protection, Soil pollution- sources, effects, Uptake, bioaccumulation, bio-transformation and excretion of xenobiotic, Vector-borne diseases: transmission and control, impact of fleas, ticks and mites on human health, Environmental Health Management, Pollution control in India in the context of human health

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BIODIVERSITY CONSERVATION AND WILDLIFE MANAGEMENT

(SIAS EVS 01 02 04 GE 4004)

Course title: Biodiversity Conservation and Wildlife Management

Course objective: To aware the students about the biodiversity and wildlife, its importance, status and need of worldwide efforts in its conservation.

Learning outcomes:

- The students will get the knowledge about trends of biological diversity and conservation strategies and thereafter be able to create awareness for its conservation and development.
- Knowledge of value aspects of the wildlife on the earth ecosystem
- Knowledge of various protected areas and role of various bodies in the protection of wildlife

Unit-I: Introduction

Concepts and components of biodiversity, types of diversity, Importance of biodiversity: aesthetic, cultural and ecosystem services, biodiversity informatics, biodiversity values, biodiversity losses, In-situ conservation: sanctuaries, biospheres reserves, national parks, preservation plots. Ex-situ conservation: captive breeding, botanical gardens, zoos, aquaria, homestead garden, herbarium;

Unit-II: Mega Diversity Zones and Biodiversity Hotspots

Concepts, distribution and importance of mega-diversity zones, Biogeographic regions Biodiversity hotspots, National and global red data lists, Categories of species and their management, Restoration of biodiversity, Acceleration of ecological succession, Reintroduction of biota. Methods for inventorying and monitoring biodiversity trends, Habitat evaluation.

Unit-III: Values of Wildlife

Concept of wildlife, Importance of wildlife in nature, Factors influencing wildlife management such as habitats, population, behavior, food-habits, health, etc., Common flora and fauna of India. Tools for data collection and analysis. Preservation of Breeding Stock; Artificial stocking; Habitat Improvement, Game Farming.

Unit-IV: Planning and Implementation of Conservation Programmes

Indian wildlife IUCN Categories, National Parks, Wildlife Sanctuaries, Biosphere Reserves and Zoos in India, Ecological basis of wild life conservation and management, Special projects for

endangered species (Project tiger, Gir lion Sanctuary Project, Crocodile breeding project, sea turtle conservation), International trade of wildlife, Animal cruelty: causes and prevention, Role of local communities in wildlife management, National and international programmes for biodiversity conservation.

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SEMESTER-III

PHYSICAL ENVIRONMENT

(SIAS EVS 01 03 12 C 4004)

Course title: Physical Environment

Course objective: To make the students familiar with the physical environment that includes air, water, soil, mountains, climate, humidity, temperature, sunlight, etc., and problems concerned and mitigation measures.

Learning outcomes:

- It will increase students' knowledge related to aquatic and terrestrial environment, earth processes, different resources and climate change related issues.
- It will be helpful for the students to enhance knowledge of remote sensing and GIS and their use for the coverage, identification and interpretation of environmental components and associated information.
- They will able to understand different climate change related issues

Course content:

Unit-I: Atmospheric Environment

Atmosphere: composition and vertical distribution of temperature, earth and sun relationship, Insolation and heat budget of earth, Scales of meteorology, hydrostatic equilibrium, Hypsometric equation, Potential temperature, lapse rates, water vapor in the air, Humidity, relative humidity, specific humidity, absolute humidity, mixing ratio, and vertical stability of atmosphere, clouds (classification and formation), circulation in the atmosphere, winds, wind roses, air masses and classification, Coriolis force, global pressure belt system and monsoons, Cyclone, El Nino and La Nino, Impacts of El Nino on Indian monsoon.

Unit-II: Aquatic and Terrestrial Environment

Global water balance. Ice sheets and fluctuations of sea levels. Origin and composition of sea water. Hydrological cycle. Inland water bodies (lakes, streams, rivers, estuaries and wetlands). Rocks; Igneous, sedimentary and metamorphic rocks, weathering, erosion, transportation and deposition of earth`s material through running water, wind, glaciers. Interior of the earth- minerals and rocks- earth processes- plate tectonics, sea-floor spreading, mountain building, rock deformation.

Unit-III: Introduction to Remote Sensing and GIS

Introduction, Types of Remote Sensing, Fundamental concepts of Remote Sensing and GIS, EMR spectrum, Radiation laws, Elements of photographic systems, Types of sensors, Image classification, Image processing, Aerial photo interpretation. Normalized difference vegetation index (NDVI), Basic principles of photogrammetry, Multispectral, Thermal, and Hyperspectral Sensing, Spectral reflectance, Vegetation, Soil and Water. Transmittance, Absorbance. Application of Remote Sensing and GIS in environmental management (Land use; Wastelands; Forest, Water resources, Wildlife habitat)

Unit-IV: Global Climate Change

History of Climate Change, Causes of Climate Change, Milankovitch's theory of Climate Change, Greenhouse gases and their effects, Role of humans on Climate Change, Urban climatology, Climatic -Feedback Mechanisms and Possible Impacts of global Climate Change, World Climate, Koppen Classification of Climate.

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ENVIRONMENTAL POLICY AND LAW
(SIAS EVS 01 03 13 C 4004)

Course title: Environmental Policy and Law

Course objective: To acquaint the students with the environmental issues and the measures taken for its protection along with the norms prevailing at international and national level.

Learning outcomes:

- Students will be able to get basic knowledge of environment, pollution and various principles.
- Students will be able to get the knowledge about constitutional provisions for the protection of environment.
- Students will get the knowledge about the Environment (protection) Act, powers of central government and state government to make laws and Environment Tribunals.

Course contents:

Unit-I: Introduction to Environmental Legislations

Environment protection: Issues and Problems; International and National efforts for Environment Protection; General Principles in Environmental Law: Precautionary Principle; Polluter Pays Principle; Sustainable Development, Constitutional provisions of Constitution of India regarding Environment (Article 48A, 51A(g) and 253).

Unit-II: National & Global Environmental Initiatives

International Initiatives towards Environmental Protection: Stockholm Conference, Earth Summit, World Summit on Sustainable Development, Rio+20, Ramsar Convention, Vienna Convention, Montreal Protocol, Kyoto Protocol; Sustainable Development Goals; Eco-mark scheme, Creation of UNEP and its role, UNFCCC, Convention on Climate Change, CoPs, CDM, Convention on Conservation of Antarctic Marine Living Resource.

Unit-III: Environmental Laws & Legislations

The Water (Preventions and Control of Pollution) Act, 1974; National Water Policy, 2002; Air (Prevention and Control of Pollution) Act, 1981; Environmental (Protection) Act, 1986; National

Environmental Policy, 2006; Motor Vehicle Act, 1988 (Environmental Aspects Only); Public Liability Insurance Act, 1991; Coastal Regulation Zone (CRZ) Notification, 1991; Noise Pollution (Regulation and Control) Rules, 2000

Unit-IV: Legislation Related to Biodiversity

National Forest Policy, 1988; Wildlife Protection Act, 1972 and Amendments; Forest Conservation Act, 1980; Indian Forest Act, Revised 1982; Biological Diversity Act, 2002;

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ENVIRONMENTAL HEALTH AND TOXICOLOGY

(SIAS EVS 01 03 14 C 4004)

Course title: Environmental Health and Toxicology

Course objective: To aware students about the need of suitable environmental conditions essential for survival otherwise may create harmful impact in the forms of diseases and disorders.

Learning outcomes:

- It will be helpful for students to understand different types of toxicants in the environment and how they could be reached to human being and cause different diseases.
- Instead, the students will know about biotransformation of xenobiotics compounds.
- Information related to genetic disorders produced due to certain toxic substances that may be present in the environment.

Course contents:

Unit-I: Principles of Toxicology

Environmental Toxicology: Definition and Its Importance; Occurrence of Toxicants and their Effects; Exposure, Uptake, Transportation, Storage, Metabolism and Excretion of Toxicants

Unit-II: Pollution and Human Health

Trace Element Deficiency and Disorders; Occupational Health Hazards; Biogeochemical Factors in Environmental Health; LD50, LC50; Epidemiological Issues: Goiter, Fluorosis, Itai-itai, Acute and chronic Arsenic toxicity, Blackfoot disease, Arsenicosis, Minamata.

Unit-III: Biotransformation: Metabolism of Xenobiotics

Biotransformation: Types and Mechanism; Characteristics of Biotransformation; Consequence of Biotransformation; Biotransformation of Endogenous Substances; Activation of Xenobiotic; Factors Affecting Biotransformation; Induction; Genetic Polymorphisms.

Unit-IV: Genetic Toxicology

Carcinogenesis: Carcinogens, Chemical Carcinogenicity, Mechanism of Carcinogenicity; Oncogenes and Tumor Suppressor Genes; Mutagenicity: Mutagens, Concept of Bioassay;

Environmental Mutagen Testing: Bacterial Mutagenesis Assays, Gene Mutation Chromosome Damage Assays, DNA Damage and Repair Assays.

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PRACTICAL – III
ENVIRONMENTAL MONITORING & ANALYSIS
(SIAS EVS 01 03 15 C 0055)

Course title: Practical-III (Environmental Monitoring & Analysis)

Course objective: To make the students capable in monitoring and analysis of the physical and chemical parameters to know various changes, which may be harmful for the living beings as well as the environment.

Learning outcomes:

- The students will acquire the knowledge of various physiochemical parameters in the environment (air, water, soil, etc.).
- They will also gain the information about different laboratory equipment and instruments, etc., and
- Participating in solving many environmental problems related to the analyzed parameters.

Course contents:

Unit-I: Determine Air Pollutants (Two exercises to be given)

1. PM_{10}; 2. $PM_{2.5}$; 3. NO_x; 4. SO_2; 5. CO; 6. O_3; 7. NH_3

Unit-II: Use of Flame Photometer and Spectrophotometer

Estimation of alkali metals in various samples by flame-photometry, calculate the lambda max of the given compound by UV-Vis spectrophotometer.

Unit-III: Microbial Studies (Two exercise to be given)

Media preparation, Sterilization, inoculation, Cultivation, Preparation of nutrient broth, Isolation and enumeration of soil bacteria and fungi, Grams staining of Lacto bacilli

Unit-IV: Microbes in Water Samples

Inoculation of polluted water sample, Standard Plate Count, Standard Coliform Test, MPN Test, Fecal Coliform test, Enumeration of Fecal Streptococci, Membrane Filtration Technique

SUMMER TRAINING (REPORT AND PRESENTATION)
(SIAS EVS 01 03 16 C 0001)

Course title: Summer Training (Report and Presentation)

Course objective: To get exposure to science laboratories and the working strategies and writing skills outside the campus

Learning outcomes:

- Knowledge about the science which is going on in the science laboratories in the interesting field
- Learning of writing skills
- Learning of presentation skills

Every student, who has been enrolled in M.Sc. (Environmental Science) programme, shall have to attend summer training for 04-06 weeks in different organizations related to the environment and prepare a report and also deliver a presentation of summer training work as per the master degree programme. The presentation will be of 20-25 minutes duration during which the presentation will be followed by a questions session by the audience comprising of faculty and students of the departments. Every student shall be required to submit the topic of his/her training to the Head of the Department/Faculty members well in advance so that the same may be displayed on the notice board.

WATER QUALITY MANAGEMENT
(SIAS EVS 01 03 04 DCEC 4004)

Course title: Water Quality Management

Course objective: To provide basic understanding of the usage of technical and non-technical measures and activities, to maintain and improve the water quality according to the requirement

Learning objectives:

- Select and apply appropriate methods to assess water quality in natural waters in relation to their anticipated use
- Design and evaluate water quality monitoring networks for different types of surface and groundwater in relation to set objectives.

Unit I: Introduction

Linking water quality & health; impurities in water, their significance and estimation techniques; water borne diseases; standards of potable water. Impact of water pollutants on environment; self-purification of waste in streams; zones of purification; eutrophication.

Unit-II: Water Treatment

Aeration and types of aerators; purpose and mechanism of flocculation; coagulants used in water treatment; factors influencing coagulation; estimation of coagulant dose; types of flash mixers and flocculators; sedimentation; sedimentation tanks; filtration; types and design of filters; operational issues in filtration; chemical and non-chemical methods of disinfection; factors effecting efficiency of filtration; chick's law, tertiary treatment methods for removal of color, salinity, hardness, fluorides, Arsenic, iron and manganese (using adsorption, RO; Electro-dialysis; ion-exchange; chemical; and distillation techniques).

Unit-III: Wastewater Treatment

Physical treatment methods-screen chamber; grit separators; primary and secondary settling tanks. Biological treatment: Biology of sewage treatment; BOD growth curve and analysis; estimation of BOD rate constant; types of biological treatment processes; process description and design principals; removal of nitrogen and phosphorus. Sludge stabilization and dewatering systems; Low cost sewage treatment technologies-septic tanks; reed bed; oxidation ponds and lagoons.

Unit-IV: Water Resources and Quality Management in India

Water availability; water stress index; status and trend of surface and groundwater; issues and policy interventions; pollution of rivers, lakes and groundwater; GAP and National River Action Programme; role of national and international agencies in water health and sanitation.

REFERENCES

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NATURAL DISASTER MANAGEMENT

(SIAS EVS 01 03 05 DCEC 4004)

Course title: Natural Disaster Management

Learning objectives: To provide basic conceptual understanding of disasters and its relationships with development. To understand approaches of Disaster Risk Reduction (DRR) and the relationship between vulnerability, disasters, disaster prevention and risk reduction.

Learning outcomes:

- Students can analyze and evaluate the environmental, social, cultural, economic, legal aspects influencing the vulnerabilities and capacities to face disasters.
- To enhance awareness of Disaster Risk in relation to Indian scenario.
- Students have the knowledge of earthquake distribution, early warning systems, seismic structural awareness and hazard mitigation.

Course contents:

Unit-I: Introduction to Hazards

Hazard Classification – Natural hazards and Technological hazards; Effects of Hazards; Vulnerability and Susceptibility of Hazards; Hazards and Risk Assessment; Hazard Prediction and Warning; Biological Hazards: Biological Warfare, Anthrax;

Unit–II: Earthquakes and Landslides and Volcanoes

Earthquakes: Types and Distribution of Earthquakes, Prediction and Control of Earthquakes, Tsunami, Mass Movements: Types, Factor affecting, Prevention & Control; Volcanoes: Distribution, Types, Eruption Processes and Products.

Unit-III: Water Related Hazards

Flood: Types, Leading Factors and Associated Hazards, Flood Control Measures, Prediction of Floods; Drought: Leading factors, Consequences and Strategies for Drought Mitigation; Desertification: Causative agents, effect and associate hazards; Famine; El Nino and La-Nina, Impact on global economy and Climate, Environmental disasters: Minamata disaster, Love canal disaster.

Unit-IV: Weather Related Hazards

Tropical Cyclone: Introduction, Anatomy, Life cycle, patterns of tropical cyclones, Effects and Forecasting, Cyclone Risk and Mitigation Strategies; Storm Surge, Tornadoes; Thunderstorms; Lightening.

REFERENCES

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ENVIRONMENTAL MICROBIOLOGY
(SIAS EVS 01 03 06 DCEC 4004)

Course title: Environmental Microbiology

Course objective: Understand the role of microbes in biogeochemical processes in different ecosystems

Learning outcomes:

- Basic microbiological principles, the methods in microbial ecology
- Theoretical and practical application in the field of environment.
- Learning of different experimental techniques

Unit-I: General and Aquatic Microbiology

Classification, characteristics, occurrence and distribution of microorganisms. Microbial cultivation and growth. Role of Microorganisms in Wastewater and Water Treatment: Microbial mats, Bio-films; Bioassay tests for toxicity evaluation, Pathogens and Indicator microorganisms; Eutrophication of water bodies.

Unit-II: Soil Microbiology

General characteristics and activities of microorganisms in surface soil, Mineralization and Immobilization of soil nutrients, Microbial degradation of cellulose, hemicelluloses and lignin. Microbes in Agriculture- Biological nitrogen fixation, bio-fertilizers, Mycorrhiza and their environmental significance. Microbe mediated C, N and S transformations.

Unit-III: Food Microbiology

Foodborne infections: bacterial (Clostridium, Salmonella, Shigella, Staphylococcus), Mycotoxins in food with reference to Aspergillus species. Genetically modified foods. Microbes in food production. Applications of microbial enzymes in food industry

Unit-IV: Applied Environmental Microbiology:

Bioremediation: principle and mechanisms, types and environmental applications. Specific Processes: Biodegradation of pesticides and hydrocarbons, Bio-hydrometallurgy, Microbial Enhanced Oil Recovery, Biodegradable Plastics, Biosurfactants. Release of genetically engineered microbes and environmental risk.

REFERENCES

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SUSTAINABLE DEVELOPMENT AND RESOURCE MANAGEMENT
(SIAS EVS 01 03 05 GE 4004)

Course title: Sustainable Development and Resource Management

Course objective: Resource management strategies and a critical insight of the major sustainability issues It aims to provide fundamental knowledge about the natural resources, their importance, and need of preservation, effective.

Learning outcomes:

- Engages students with sustainability-related issues as described in the SDGs, individuals becomes sustainability change-makers.
- The understanding of issues concerning different natural resources will be helpful to find scientific solution based on participatory approach to achieve their sustainable use as well as proper management.
- Develop a future-oriented perspective that highlights the significance of their decisions, choices and actions on the quality of life of present and future generations.

Unit-I: Introduction to Sustainable Development

Principles of Sustainable Development: History and emergence of the concept of Sustainable Development, Environmental issues and crisis: greenhouse gases, desertification, etc. International Contribution: International Summits, Conventions, Agreements, Action plan for implementing sustainable development.

Unit-II: Natural Resources and Conservation

Natural Resources: Concept and Classification of Natural Resources; Factors influencing resource availability, distribution and uses; Mineral Resources***:*** Mineral Resources and Reserve; Mineral exploration and exploitation, Environmental impacts of mineral extraction; Oceanic Minerals: Exploration prospective and Impacts: forest management strategies, strategies of water conservation; rain water harvesting; soil resources: importance of soil, soil conservation strategies; food resources: world food problem, green revolution.

Unit-III: Non-renewable and Renewable Energy Resources

Fossil Fuels: Classification, Composition, Characteristics of Coal, Petroleum and Natural Gas; Renewable Energy Resources: Overview and Principal of generation and Environmental

Implications of renewable Energy: Hydropower, Tidal Energy, Ocean Thermal Energy Conversion (OTEC), Wind Energy, Geothermal Energy, Solar Energy (Solar Collector, Photo-voltaic Modules, Solar Ponds), pros and cons of Nuclear Energy (Fusion & Fission), Bioenergy; Energy use pattern in India and the World.

Unit-IV: Sustainable Resource Management

Approaches in resource management: ecological approach; economic approach; ethnological approach; implications of the approaches; integrated resource management strategies; concept of sustainability science: different approaches towards sustainable development and its different constituents; sustainability of society, resources and framework; sustainable energy strategy; principles of energy conservation; Energy use pattern in India and the World.

REFERENCES

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AGRICULTURE AND ENVIRONMENT

(SIAS EVS 01 03 06 GE 4004)

Course title: Agriculture and Environment

Course objective: To learn about the basic concept of agriculture and environment and how to correlate these two for the sustainable use of natural resources

Learning objectives:

- Develop understanding about, how the environment influences the agricultural sector
- To prevent, control and contain diseases, vectors and pests in order to enhance agricultural production and productivity
- The students will be informed about the impact of climate change on agriculture

Course content:

Unit-I: Agricultural Practices

Sustainable Agriculture, Organic Farming, Hydroponic Greenhouse/Glasshouse agriculture practices, Dry-land Farming, Zero Tillage, Agro-forestry, Social Forestry Irrigation Practices, Water Logging and Secondary Salinization, Environmental Impacts of Irrigation Projects.

Unit-II: Crop Protection

Pesticides: Classification, Pesticide Resistance; Biological and Ecological Pest Control, Integrated Pest Management, Pesticide Safety. Biopesticides, characteristic of Bacillus Thuringiensis, Plant Incorporated Protectants (PIPs)

Unit-III: Crop Production

Bio-fertilizers, applications and future prospects, Integrated nutrient management, NPK Fertilizers and Their Environmental Effects, Vermicomposting, Allelopathy, Biotechnological Innovations in Crop Protection.

Unit-IV: Sustainable Agriculture

Agriculture and Food Security; Green-Revolution: Environmental Implications, Impact of climate change and modernization in agriculture, genetically modified crops, participatory approach of modern agriculture, Organic farming, Role of microorganisms in sustainable agriculture and environment

REFERENCES

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SEMESTER-IV

DISSERTATION (RESEARCH WORK, SEMINAR, REPORT AND VIVA-VOCE)

(SIAS EVS 01 04 01 SEEC 002020)

Course title: Dissertation (Research work, Seminar, Report and Viva voce)

Course objective: Skill Enhancement Elective Course (Compulsory and exclusively for M.Sc. (Environmental Science) students). To get exposure to science laboratories and the working strategies and writing skills in or beyond the campus

Learning outcomes:

- Knowledge about the science which is going on in the science laboratories in the interesting field
- Experience to work in laboratory on a local environmental problem
- Learning of writing skills

Every student will be required to undertake a research project based on any of the areas of Environmental Sciences. The project report will be submitted in the form of dissertation duly certified by the Head of the Department. The project will be presented for evaluation at the end of semester by the internal and external examiners.

RESEARCH METHODOLOGY AND WRITING SKILLS

(SIAS EVS 01 04 17 C 4004)

Course title: Research Methodology and Writing Skills

Course objective: To provide an understanding of methods of research and writing of the report

Learning outcomes:

- It will improve research knowledge of the students
- They will able to identify different environmental problems
- Help to understand publication of the data

Course content:

Unit-I: Introduction of research

Meaning and objective of research, types of research, research problems, review of literature, methodology, primary and secondary data, discussion, references, significance of research, selection of research topic, abstract and key words.

Unit-II: Steps in research

Defining a problem, sampling types and design, preparation for the survey and field visit, questionnaire, probability and non-probability sampling, samples storage, standard preparation, digestions of samples, analysis of the samples

Unit-III: Data interpretation

Arrangement of the data, measurement of the central tendency, standard deviation, linear regression, correlation, ratio and percentage, t-test and chi-square test, use of excel formulae, diagrammatic and graphical representation of the data.

Unit-IV: Report writing

Steps of report writing, major findings, conclusions, suggestions, copyright issues, plagiarism, citations, references, bibliography, writing and publication of report.

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6. Learning Outcome Index, Core Courses

PSO	CC-1	CC-2	CC-3	CC-4	CC-5	CC-6	CC-7	CC-8	CC-9	CC-10	CC-11	CC-12	CC-13	CC-14	CC-15	CC-16	CC-17
PSO-1		X	X	X	X	X			X		X	X	X				
PSO-2		X	X	X	X	X					X		X				
PSO-3	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		
PSO-4							X	X	X	X	X	X			X		x
PSO-5					X			X					X			X	
PSO-6			X	X	X		X	X	X				X			X	
PSO-7					X				X				X			X	x
PSO-8	X	X				X	X	X	X	X	X			X	X	X	
PSO-9			X		X							X					x
PSO-10			X		X		X		X				X			X	

Learning Outcome Index, Elective Courses

PSO	CC-1	CC-2	CC-3	CC-4	CC-5	CC-6	CC-7	CC-8	CC-9	CC-10	CC-11	CC-12	CC-13
PSO-1		X	X	X		X		X	X		X	X	X
PSO-2		X			X	X	X	X	X		X	X	X
PSO-3	X	X	X	X	X	X	X	X	X	X	X	X	
PSO-4	X		X	X	X	X			X	X			
PSO-5	X				X		X			X		X	X
PSO-6	X	X		X	X	X	X		X	X	X	X	
PSO-7											X		
PSO-8			X		X	X				X			
PSO-9			X	X					X		X		
PSO-10	X					X							

7. Semester-wise Courses and Credit Distribution

Percentage of Core Subject, Elective Subject and Practical/Dissertation

Semester	Total Credit (Semester)	Department Offering	Core Subject		Elective Subject	
	Credits	Credits	Credit	(%)	Credit	(%)
I	25	33	21	64	12	36
II	25	33	21	64	12	36
III	26	34	22	65	12	35
IV	24	24	20	83	4	17

Online Classes of all Courses Offered by Our Department Including GEC, DCEC, Excluding GEC taken from other Departments

Semester	Total Credit	Credit F-F Mode	Credits Online Mode	Online Mode Credit (%)
I	33	21	12	36
II	33	21	12	36
III	34	22	12	35
IV	24	20	4	17

8. Course-level Learning Outcomes

The course level learning outcomes have been given in the scheme of syllabus. Depending upon the nature of the course, every course has planned with different learning outcomes.

9. Teaching-Learning Process

1. Lectures

2. PowerPoint slides

3. Classroom Discussions

4. Laboratory Practical

5.Anthropometric measurements and nutritional deficiency Problem Solving

6. Project Work

7. Presentations/Seminars

10. Blended Learning

Blended Learning is a pedagogical approach that combines face to-face classroom methods with computer-mediated activities in the process of teaching and learning. It implies nice blend of face-to-face and online activities to make the learning processes more interesting and engaging. It focuses on integration of traditional classroom activities and innovative ICT-enabled strategies. It emphasises student-centric learning environment where the teacher is the facilitator for productive and measurable learning outcomes. It optimises and compliments the face to face learning, giving ample freedom and flexibility to the students and teachers to access and explore the wide range of open-access sources such as video lectures, podcasts, recordings and articles through digital platforms. It gives freedom and autonomy to the teachers in selection of appropriate digital platforms, resources and time-slots to complement and supplement face to face learning. The Blended Learning doesn't undermine the role of the teacher, rather it gives him/her an opportunity to explore the unexplored in accordance with the requirements of the curriculum.

11. Assessment and Evaluation

- Continuous Comprehensive Evaluation at regular after achievement of each Course-level learning outcome
- Formative Assessment on the basis of activities of a learner throughout the programme instead of one-time assessment
- Oral Examinations to test presentation and communication skills

- Group Examinations on Problem solving exercises
- Seminar Presentations
- Multiple Choice Questions (MCQ)
- Surprise Quizzes
- Problem Solving Tasks

12. Keywords

- LOCF
- NEP-2020
- Blended Learning
- Face to face (F to F) Learning
- Programme Outcomes
- Programme Specific Outcomes
- Course-level Learning Outcomes
- Postgraduate Attributes
- Learning Outcome Index
- Formative Assessment and Evaluation
- Comprehensive and Continuous Evaluation

13. Appendices

1. Curricular Reforms— Extracts from National Education Policy-2020

14. References

2. National Education Policy-2020. https://www.education.gov.in/sites/upload_files/mhrd/files/NEP_Final_English_0.pdf
3. The draft subject specific LOCF templates available on UGC website. https://www.ugc.ac.in/ugc_notices.aspx?id=MjY5OQ==
4. Draft Blended Mode of Teaching and Learning: Concept Note available on UGC website. https://www.ugc.ac.in/pdfnews/6100340_Concept-Note-Blended-Mode-of-Teaching-and-Learning.pdf

MINUTES OF MEETING

An online meeting of the Board of Studies of the Department of Library and Information Science held on Friday, 3rd September 2021 at 4:00 PM through Google meet application.

The following members were presented online:

1. Prof. Dinesh Kumar Gupta, Head, Department of Library and Information Science, Central University of Haryana.
2. Prof. Harinder Pal Singh Kalra, Department of Library and Information Science, Punjabi University, Patiala.
3. Mr. Amit, Assistant Professor, Department of Library and Information Science, Central University of Haryana.

The members of the Board of Studies were welcome by the Chairman.

The member discussed various activities for the Department at length.

Item No.1: The syllabus of M.Lib.I.Sc. was approved with the suggestion that the course on Indian Knowledge System be restructured and started from the next academic session.

Item No.2: The syllabus of Ph.D. Coursework from 2021-22 onwards was approved.

Item No.3: The members discussed the names of the examiners, DRC and moderators as per annexure and to be sent to the AR (Examination) through the Department under the confidential cover.

Annexure:

1. Panel of Examiners for December 2021 Exam (Third Semester).
2. Panel of Examiners for May/June 2022 Exam (Fourth Semester)
3. List of External moderators December 2021 and May/June 2022.
4. List of Examiners for the Dissertation, June 2022.
5. Member for DRC 2021-22.

The meeting ended with a vote of thanks to the chair.

(Dinesh Kumar Gupta) (Harinder Pal Singh Kalra) (Amit Kumar)

DEPARTMENT OF LIBRARY AND INFORMATION SCIENCE

MASTER OF LIBRARY AND INFORMATION SCIENCE (M.LIB.I.Sc)

Learning Outcomes based Curriculum Framework (LOCF)

M.LIB.I.Sc. (Two-Year) Programme

Syllabus (2021-22)

Progressive from Semester-1

(As per National Education Policy 2020)

SCHOOL OF INTERDICIPLINARY AND APPLIED SCIENCES

CENTRAL UNIVERSITY OF HARYANA, MAHENDERGARH

विध्याधनम् सर्वधनंप्रधानम्

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1. Background

Considering the curricular reforms as instrumental for desired learning outcomes, all the academic departments of Central University of Haryana made a rigorous attempt to revise the curriculum of undergraduate and postgraduate programmes in alignment with National Education Policy-2020 and UGC Quality Mandate for Higher Education Institutions-2021. The process of revising the curriculum could be prompted with the adoption of "Comprehensive Roadmap for Implementation of NEP-2020" in 32nd meeting of the Academic Council of the University held on April 23, 2021. The roadmap identified the key features of the Policy and elucidated the Action Plan with well-defined responsibilities and indicative timeline for major academic reforms.

The process of revamping the curriculum started with the series of webinars and discussions conducted by the University to orient the teachers about the key features of the Policy, enabling them to revise the curriculum in sync with the Policy. Proper orientation of the faculty about the vision and provisions of NEP-2020 made it easier for them to appreciate and incorporate the vital aspects of the Policy in the revised curriculum focused on 'creating holistic, thoughtful, creative and well-rounded individuals equipped with the key 21st century skills' for the 'development of an enlightened, socially conscious, knowledgeable, and skilled nation'.

With NEP-2020 in background, the revised curricula articulate the spirit of the policy by emphasizing upon— integrated approach to learning; innovative pedagogies and assessment strategies; multidisciplinary and cross-disciplinary education; creative and critical thinking; ethical and Constitutional values through value-based courses; 21st century capabilities across the range of disciplines through life skills, entrepreneurial and professional skills; community and constructive public engagement; social, moral and environmental awareness; Organic Living and Global Citizenship Education (GCED); holistic, inquiry-based, discovery-based, discussion-based, and analysis-based learning; exposure to Indian knowledge system, cultural traditions and classical literature through relevant courses offering 'Knowledge of India'; fine blend of modern pedagogies with indigenous and traditional ways of learning; flexibility in course choices; student-centric participatory learning; imaginative and flexible curricular structures to enable creative combination of disciplines for study; offering multiple entry and exit points initially in undergraduate programmes; alignment of Vocational courses with the International Standard Classification of Occupations maintained by the International Labor Organization; breaking the silos of disciplines; integration of extra-curricular and curricular aspects; exploring internships with local industry, businesses, artists and crafts persons; closer collaborations between industry and higher education institutions for technical , vocational and science programmes; and formative assessment tools to be aligned with the learning outcomes, capabilities, and dispositions as specified for each course. In case of UG programmes in Engineering and Vocational Studies, it was decided that the departments shall incorporate pertinent NEP recommendations while

complying with AICTE, NBA, NSQF, International Standard Classification of Occupations, Sector Skill Council and other relevant agencies/sources. The University has also developed consensus on adoption of Blended Learning with 40% component of online teaching and 60% face to face classes for each programme.

The revised curricula of various programmes could be devised with concerted efforts of the faculty, Heads of the Departments and Deans of Schools of Study. The draft prepared by each department was discussed in series of discussion sessions conducted at Department, School and the University level. The leadership of the University has been a driving force behind the entire exercise of developing the uniform template and structure for the revised curriculum. The Vice Chancellor of the University conducted series of meetings with Heads and Deans to deliberate upon the vital parameters of the revised curriculum to formulate a uniform template featuring Background, Programme Outcomes, Programme Specific Outcomes, Postgraduate Attributes, Structure of Masters Course, Learning Outcome Index, Semester-wise Courses and Credit Distribution, Course-level Learning Outcomes, Teaching-Learning Process, Blended Learning, Assessment and Evaluation, Keywords, References and Appendices. The experts of various Boards of Studies and School Boards contributed to a large extent in giving the final shape to the revised curriculum of each programme.

To ensure the implementation of curricular reforms envisioned in NEP-2020, the University has decided to implement various provisions in a phased manner. Accordingly, the curriculum may be reviewed annually.

The Guiding Principles adopted/adapted from the NEP 2020 to develop the Curriculum Framework for Master of Library and Information Science Programme are:

G-1: Education must build character, enable learners to be ethical, rational, compassionate, and caring, while at the same time prepare them for gainful, fulfilling employment

G-2: Indian culture and values…Rich legacies to world heritage must not only be nurtured and preserved for posterity but also researched, enhanced, and put to new uses through our education system

G-3: The rise of big data, machine learning, and artificial intelligence, many unskilled jobs worldwide may be taken over by machines, while the need for a skilled workforce, particularly involving mathematics, computer science, and data science, in conjunction with multidisciplinary abilities across the sciences, social sciences, and humanities, will be increasingly in greater demand

G-4: With the quickly changing employment landscape and global ecosystem, it is becoming increasingly critical that children not only learn, but more importantly learn how to learn.

G-5: There must also be seamless integration and coordination across institutions and across all stages of education

G-6: Facing and addressing these challenges will require high-quality interdisciplinary research across fields that must be done in India and cannot simply be imported; the ability to conduct one's own research also enables a country to much more easily import and adapt relevant research from abroad much of the very best research in the world has occurred in multidisciplinary university settings.

2. Programme Outcomes

The programme aims at preparing the skilled workforce to work in the rapidly changing information environment to meet the user requirements following the professional values and principles, innovative practices and preparing them to be life-long learners and active service leaders.

The pass out students of M.Lib.&Inf.Sc. Programme is expected to get equipped with:

PO-1: Attitude based in library philosophy, principles, ethics and approaches to manage libraries and information centers

PO-2: Knowledge of the processes of collection development, representation, organization, preservation, curtain, access Knowledge and dissemination in accordance with physical, virtual, and technical infrastructure and needs

PO-3: Apply appropriate technological supported services in teaching, learning that contribute towards an information- and technology-literate society.

PO-4: Skills to respect, engage, and collaborate with a diverse community of users and patrons in order to advocate for and construct inclusive, meaningful, and participatory library services, programs, and resources.

PO-5: Knowledge and exposure to research-based practices through the application of information literacy, research literacy and data literacy.

3. Program Specific Outcomes (PSOs)

On completing Master of Library and Information Science Programme, students shall be able to realize following outcomes:

PSO-1: Demonstrate knowledge of the information profession by relating foundational principles, philosophy, and ethics to contemporary issues, by identifying key, on-going interdisciplinary developments in the field, and by analysing current practices for future implications of the profession.

PSO-2: Create, select, acquire, manage, and maintain the information environment by analysing how users seek out information.

PSO-3: Demonstrate and be able to explain the principles of organizing recorded information by exploring both past and present theories of organizing and representing recorded information and by understanding and applying the standards of organizing recorded information in libraries and information centres.

PSO-4: Identify, explain, use and critically evaluate both current and emerging information technologies in libraries and information centres.

PSO-5: Provide information services to a diverse community by analysing, synthesizing, and disseminating traditional and emerging information resources, by developing communication and interpersonal skills for determining the information needs of all users, by creatively utilizing techniques and tools to address information needs, and by advocating for underserved audiences.

PSO-6: Demonstrate an understanding of research by identifying the fundamental characteristics of quantitative and qualitative research and by analysing the value of research literature in the library and information field.

PSO-7: Develop a commitment to continuous learning by participating in local, regional, and national professional development opportunities.

PSO-8: Use Indian knowledge and principles to analyze and evaluate ideas and theories in modern disciplines.

4. Programme Structure

The programme is contenting of four semesters and required achieve 100 credits are to be achieved through the various core, departmental electives, school level electives and open generic courses, demonstrated as below:

Master of Library and Information Science: 100 Credits					
Courses/Sem	**Sem-1 (Credits)**	**Sem-2 (Credits)**	**Sem-3 (Credits)**	**Sem-4 (Credits)**	**Total**
Discipline Specific Courses Core (including practical training/dissertation)	15	21	17	24	77
Discipline Specific Elective Courses	5	5	5		15
Open Choice Courses/ GEC:	4		4		08
Common Course(s) for Community Service/ Remembrance of University Kulgeet, National Anthem, National Song/ National Integration/Games and Sports/Campus Development					To be shown in the award list separately as per the University Guidelines
Total	**24**	**26**	**26**	**24**	**100**

Mapping of understanding, Knowledge and Skill in courses offered in various semesters					
Courses/ Subject related Courses in Semesters	Sem-1 (20/24 Credits)	Sem-2 (22/26) Credits)	Sem-3 (22/26 Credits)	Sem-4 (20/24 Credits)	Total Credits
Understanding	5	10	12	04	31
Knowledge	10	6	04	-	22
Skill	5	6	06	20	35
Total Credits	**20**	**26**	**22**	**24**	**92**

EXIT Option and Award of Degree/Diploma

A student who successfully completes first and second semesters and intend to exist just after both the semesters; or even after that during the course of study during the next semesters for any reasons shall get Bachelor of Library and Information Science

5. Post-graduate Attribute:

The learner of M.Lib.&Inf.Sc. Programme should have the following attributes:

(a) ***Disciplinary knowledge***: Capable of demonstrating comprehensive knowledge and understanding of major concepts, principles, theories and laws of various subjects in Library and Information Science and other related fields of study, including broader interdisciplinary subfields such as Management, Economics, Information and Communication Technologies, Indology, Statistics, Journalism and Mass Communication, Printing and Packaging, etc.

(b) ***Professional and Managerial skills:*** Ability to classify simple, compound and complex documents using standard classification schemes; capability to catalogue all types of documents using standard catalogue codes and metadata standards; ability to create database of records and search information from OPAC, Internet and electronic databases; ability to carry out housekeeping operations and to provide library and information services by using information and communication technologies and addressing managerial challenges,

(c) ***Skilled communicator:*** Ability to communicate effectively in oral and written forms with users, colleagues and authorities in an effective manner. Further ability to create information products such as announcements, information leaflets, bibliographies, e-publications.

(d) ***Critical thinker:*** Capability to critically analyze subjects of documents to classify them properly and to derive subject headings for subject cataloguing, indexing purposes and ability to think critically for solving various problems pertaining to the management of Libraries and Information Centers. Further, abilities to judge for the use of ICT support for effective and efficient management of information and sources, resources.

(e) ***Problem solver:*** Apply problem solving skills while providing support services for teaching, learning and research and for formulating appropriate strategies to use technologies, databases, platforms, resources. The acquired knowledge and skill would be tested through support to the activities of the School of Biological and Applied Sciences.

(f) ***Team player/worker:*** Capable of working effectively in diverse teams in classrooms, in computer laboratory, in finding technological solutions, resource-based activities and in Libraries and Information Centers.

(g) ***Digitally literate:*** Capable of using digital technology for communication purpose, for library housekeeping operations, and for searching information from OPAC, Internet and online databases and e-resources. Further, ability to work comfortably with the Learning Management System, Content Management System, Digital Library software, and explore possibilities of applying technologies associated with Internet of Things, Artificial Intelligence and Big data for finding ways to improve services.

(h) ***Moral and Ethical Values:*** Capable of demonstrating the ability to understand professional ethics along with moral values based on the Indian ethos. Also well versed with the issue related with Intellectual Property Rights, copyright, open access, etc. while providing library services.

(i) ***Lifelong learners:*** Capable of self-paced and self-directed learning aimed at personal development; for improving knowledge and skills and for reskilling through continuing educational opportunities. Further, capable of providing support to individuals, institutions and the societal groups towards attaining objectives of lifelong learning.

6. Learning Outcomes Index

Core Courses	C-1	C-2	C-3	C-4	C-5	C-6	C-7	C-8	C-9	C-10	C-11	C-12	C-13	C-14
Disciplinary knowledge	Y			Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Professional and Managerial skills				Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Skilled communicator				Y			Y			Y	Y	Y	Y	Y
Critical thinker		Y	Y	Y		Y		Y	Y	Y		Y	Y	Y
Problem solver			Y		Y	Y	Y	Y	Y	Y		Y	Y	Y
Team player/worker		Y	Y	Y	Y	Y	Y	Y	Y	Y				
Digitally literate		Y	Y			Y		Y	Y	Y	Y		Y	Y
Moral and Ethical Values	Y		Y	Y									Y	Y
Lifelong learners	Y							Y	Y		Y		Y	Y

Elective Courses	E-1	E-2	E-3	E-4	E-5	E-6	E-7	E-8
Disciplinary knowledge	Y	Y	Y	Y	Y	Y	Y	
Professional and Managerial skills	Y	Y	Y	Y	Y	Y		Y
Skilled communicator							Y	
Critical thinker	Y	Y	Y			Y	Y	
Problem solver				Y	Y			Y
Team player/worker				Y	Y			Y
Digitally literate								Y
Moral and Ethical Values						Y	Y	
Lifelong learners								Y

7. Semester-wise Courses

Abbreviation/ Acronyms	Description
C	Core course
DE	Discipline Elective
GEC	Generic Elective Course
SEC	Skill Enhancement Course
SEEC	Skill Enhancement Elective Course
SGEC	School Based Generic Elective Course
L	Lecture
T	Tutorial/Presentation
P	Practical

Semester – I

S. No.	Course code	Course title	Course Type	L	T	P	Total Credits
1	SIAS LIS 01 01 C 4105	Foundations of Library and Information Science	Core	4	1	0	05
2	SIAS LIS 01 02 C 4105	Information Communication Technology and Libraries (Theory)	Core	4	1	0	05
3	SIAS LIS 01 03 C 00105	Information Communication Technology and Libraries (Practice)	Core	0	0	10	05
4	SIAS LIS 01 01 DE 3205	Academic Library Systems	DE	3	2	0	05
5	SIAS LIS 01 02 DE 3205	Public Library Systems	DE	3	2	0	05
6	SIAS LIS 01 03 DE 3205	Special Library Systems	DE	3	2	0	05
7	SIAS LIS 01 01 GEC 3104	Indian Knowledge Systems+	GEC	3	1	0	04
8	SIAS LIS 01 02 GEC 3104	Learning Skills	GEG	3	1	0	04
9	SIAS LIS 01 03 GEC 3104	Media and Information Literacy*	GEC	3	1	0	04
Credits		**C=15, DE=5, GEC=04**	**Total Credits = 24**				

NOTE:. Student will take GEC of 4 Credit offered by other Department

+ Jointly with Department of Sanskrit, course would be available only with the approval of BOS of Sanskrit Department and readiness of joint offering of the course.
* With Department of Journalism and Mass Communication, course would be available only with the approval of BOS of JMS Department and readiness of joint offering of the course.

Semester – II

S. No.	Course code	Course title	Course Type	L	T	P	Total Credits
1	SIAS LIS 02 01 C 3104	Indian Ethos and Ethics for Information Professionals	Core	3	1	0	04
2	SIAS LIS 02 02 C 2065	Knowledge Organization and Processing: Library Classification (Theory and Practice)	Core (SEC)	2	0	6	05
3	SIAS LIS 02 03 C 2065	Knowledge Organization and Processing: Library Cataloguing (Theory and Practice)	Core (SEC)	2	0	6	05
4	SIAS LIS 02 04 C 3104	Management of Libraries and Information Centers	Core	3	1	0	04
5	SIAS LIS 02 05 C 2103	E-Resource Management	Core	2	1	0	03
6	SIAS LIS 02 01 DE 3115	Collection Development	DE	3	1	1	05
7	SIAS LIS 02 02 DE 3115	Preservation and Conservation of Library Material	DE	3	1	1	05
8	SIAS LIS 02 03 DE 4105	Life and Works of S R Ranganathan	DE	4	1	0	05
9	SIAS LIS 02 01 SEEC 4105	Library Internship (Online; or Offline in a Library)	SEEC	-	-	-	-
Credits		**C=21, DE=5**	**Total Credits = 26**				

Semester – III

S. No.	Course code	Course title	Course Type	L	T	P	Total Credits
1	SIAS LIS 03 01 C 3104	Digital Libraries, Content Management and Learning Management Systems (Theory)	Core	3	1	0	04
2	SIAS LIS 03 02 C 00105	Digital Libraries, Content Management and Learning Management Systems (Practice)	Core	0	0	10	05
3	SIAS LIS 03 03 C 1144	Informetric and Scientometrics	Core	1	1	4	04
4	SIAS LIS 03 04 C 2124	Advances in ICT and Libraries	Core	2	1	2	04
5	SIAS LIS 03 01 DE 3205	Ranganathan and Modern Library Management	DE	3	2	0	05
6	SIAS LIS 03 02 DE 3205	Ranganathan and Modern Techniques of Knowledge Organization	DE	3	2	0	05
7	SIAS LIS 03 01 GEC 2124	Information Sources, Systems and Services in Biological and Applied Sciences	GEC	2	1	2	04
8	SIAS LIS 03 02 GEC 2124	Social Science Information Sources, Systems and Services	GEC	2	1	2	04
Credits		**C=17, DE=05, GEC=04**	**Total Credits = 26**				

NOTE:. Student will take GEC of 4 Credit offered by other Department

Semester – IV

S. No.	Course code	Course title	Course Type	L	T	P	Total Credits
1	SIAS LIS 04 01 C 3104	Research Methodology (Online)	Core	3	1	0	04
2	SIAS LIS 04 02 C 0020	Dissertation/Industrial Training*	Core	-	-	-	20
3	SIAS LIS 04 01 SEEC	Research Data Literacy (Online)	SEEC	-	-		-
Credits		**C=24**	**Total Credits = 24**				

*NOTE: Training in a Library or Institution or Corporate House or an Industry

One Credit= 15 Lectures
Two Credits = 30 Lectures
Three Credits: 45 Lectures
Four Credits= 60 lectures

9. Teaching Learning Process

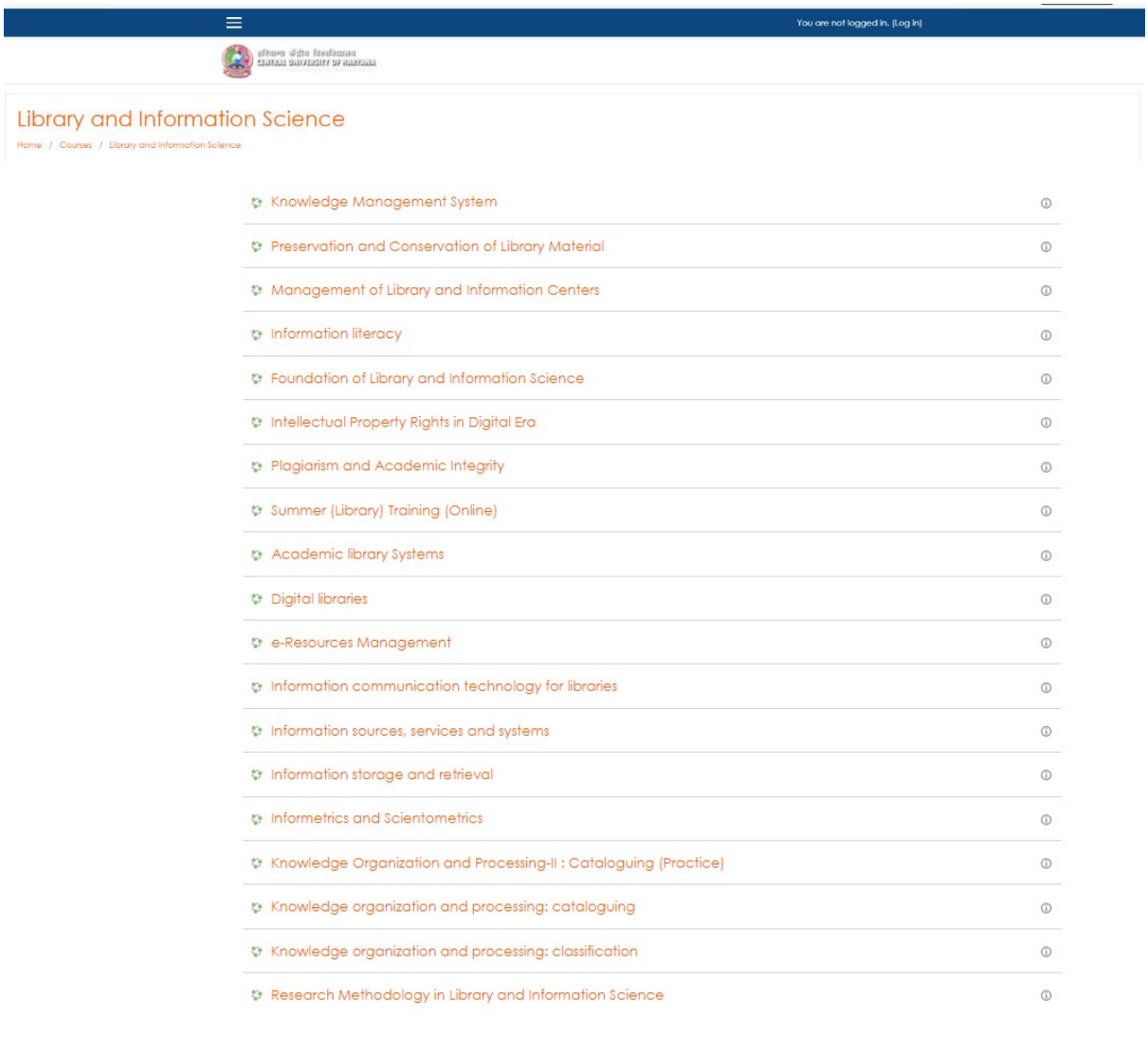
The M.Lib.I.Sc. Programme is designed to encourage the acquisition of disciplinary knowledge, understanding, skills, attitudes and ethical values required for library and information-based professions and jobs. Keeping this in mind the teaching learning experiences should be designed and implemented to enable active/participative learning of the students. Librarianship being a practice-oriented service profession, development of practical skills constitutes an important aspect of the Programme's teaching-learning process. In order to provide knowledge, develop understanding and impart required skills in the students, a variety of teaching learning approaches would be adopted. These include

- Expert Lectures from eminent LIS Professionals
- Seminars, Discussions and debates
- Brainstorming sessions
- Case studies
- Demonstrations
- Practical
- Tutorials
- Group/ Peer teaching and learning
- Project-based learning
- Field-based learning
- Open-ended project work
- Quiz and games
- Technology-enabled learning, etc.

Teaching-learning process suitable to impart problem solving, reasoning and analytical skills may also be adopted. Internship and/or industrial training in school, college, university, research, corporate libraries and other information organizations will be a value adding teaching-learning opportunity. Modes of study are flexible, being offered on both, the student's traditional face-to-face experience is enriched with the support of e-learning portal, i.e. CUH LMS.

10. Blended Learning

Blended learning **is** a combination of face-to-face and online learning in a way that the one compliments the other. It provides individuals with the opportunity to enjoy the best of both worlds. For example, a student might attend classes in a real-world classroom setting and then supplement the lesson plan, activities, resource-based learning can take place online. The students can use the course of the CUH LMS portal using log in and password.



The department employs blended approach in teaching all the courses some way or the other but, the broad metrics of the blended learning is presented in the following table:

Courses	Mode	Face to face	Online	Total
Core Courses /Practical/Dissertation	Blended	53	24	77
Discipline Based Electives	Blended	07	08	15
Open Electives/GEC	Online only		08	
Total		60	40	100

While actual delivery of knowledge the use of ICT enabled teaching learning may slightly vary according to the knowledge and exposure of the individual faculty.

Integration of MOOCs with the Courses:

The students are encouraged to take up the MOOCs from the following list as suggested semester wise during the programme (It is a dynamic list and the courses offered may keep changing with the availability of the course during July/January Cycle:

SN	**MOOC**	**Host Institution**	**Name of The Faculty (Prof.)**	**July/January Cycle**
Related to: **Soft Skills and Personality Development**				
1	Soft Skills	IIT Roorkee	Binod Mishra	July
2	Body Language: Key to Professional Success	IIT Roorkee	Rashmi Gaur	July
3	Managerial Skills for Interpersonal Dynamics	IIT Roorkee	Santosh Rangnekar	January
Related to: **Library Management/ Ranganathan and Library Management (Sem-2)**				
1	Managing Change in Organization	IIT Khadagpur	KBL Srivastava	January
2	Services Marketing: A Practical Approach	IIT Khadagpur	Biplav Datta	January
3	Customer Relationship Management	IIT Khadagpur	Swagato Chatterjee	July
4	Services Marketing: A Practical Approach	IIT Khadagpur	Biplav Datta	July
5	Managing Services	IIT Kanpur	Jayanta Chatarjee	July
6	Innovation, Business Models and Entrepreneurship	IIT Roorkee	Rajat Agrawal and Rajat Sharma	July
7	Integrated Marketing Management	IISc Bangalore	R Srinivasan	July
8	Digital Marketing	Punjab University	Tejinderpal Singh	July

Related to: **Ranganathan and Knowledge Management (Sem-2)**				
1	Knowledge Management	IIT Khadagpur	KBL Srivastava	July
Related to: **ICT Applications/ Advances in Library and Information Technologies (Sem-1/ 3)**				
1	Introduction to Internet of Things	IIT Khadagpur	Sudeep Mishra	July
2	Cloud Computing	IIT Khadagpur	Soumya Kanti Ghosh	July
3	Learning Analytics	IIT Bombay	Ramkumar Rajendran	July
4	Data Base Management System	IIT Khadagpur	ParthaPratim Das and Samiran Chattopadhyay	July
5	Computer Networks and Internet Protocol	IIT Khadagpur	Soumya Kanti Ghosh and Sandip Chakraborty	July
6	Cloud Computing	IIT Khadagpur	Soumya Kanti Ghosh	July
7	Database and Content Organisation	IGNOU	V. V. Subrahmanyam	July

These courses may support better understanding of the core/elective courses and/ or may further lead to take up the area of dissertation to enhance the learning on the basis of understanding acquired. The faculty would encourage the students to identify and take up such courses as and when needed for the students. It would further help the students to understand the newer trends both in the area of the MOOC/ Study and also teaching learning pedagogies. These courses may be described as self-study courses to attain some skills but will not be required to be passed/ qualified.

It's solely up to the student how much of the content they would use, complete the course or not, and attain the certificate or not from the SWAYAM course after examination.

11. Assessment and Evaluation

Assessment is within each unit, including the dissertation. Assessment methods vary according to the nature of the content and material. Individual written assignments and exercises are the norm, but some units may use other methods, including individual practical exercises, group work projects and unseen examination papers or compiling resources and bibliographies. Most assessments have an element of choice, allowing you to focus on aspects of interest. Assessment Criteria are descriptions, based on the intended learning outcomes, of the skills, knowledge or attitudes that you need to demonstrate in order to complete an assessment successfully, providing a mechanism by which the quality of an assessment can be measured. Grade- Related Criteria are descriptions of the level of skills, knowledge or attributes that you need to demonstrate in order achieve a certain grade or mark in an assessment, providing a mechanism by which the quality of an assessment can be measured and placed within the overall set of marks. Assessment Criteria and Grade-Related Criteria will be made available to you to support you in completing assessments. These may be provided in programme Statutes and Ordinances, unit specifications, on the virtual learning environment or attached to a specific assessment task.

The assessment activities may broadly be categorised as below:

- Continuous Comprehensive Evaluation (online or otherwise) at regular after achievement of each Course-level Learning Outcomes
- Formative Assessment on the basis of activities of a learner throughout the programme instead of one-time assessment
- Oral Examinations to test presentation and communication skills
- Open Book Examination for better understanding and application of the knowledge acquired
- Group Examinations on Problem solving exercises
- Seminar Presentations
- Review of Literature
- Collaborative Assignments
- Practical examination
- Evaluation of dissertation and project report

Students are encouraged to exchange thoughts, develop ideas and learn from one another. Assessment is by individual or group assignments aimed at developing self-reliance and autonomy and foster the capacity for lifelong continuing self-development and learning. The dissertation is a substantial component of the degree offering an opportunity to demonstrate comprehensive understanding of a particular specialism and a systematic and professional approach to research. It is a substantive task that requires to investigate a relevant chosen area under the supervision of a faculty.

Key Features

- NEP-2020 based Syllabus
- Wide range of core and elective courses
- Multi-disciplinary academic subject knowledge
- Properly spelled out measurable outcomes for each course
- Latest ICT tools and techniques incorporation in courses
- Opportunities for sustained Professional Growth
- Incorporation of professional values and Indian ethos
- Research-based practices through information, data and research literacies
- Technology enabled teaching learning practices
- Focus on Indian Knowledge System
- Revival of library philosophy and furthering education and research on the newer parameters

12. Key Words

- Assessment Methods
- Basics of Information and Communication Technology (Practice)
- Basics of Information and Communication Technology (Theory)
- Foundations of Library and Information Science
- Graduate Attributes
- Information Sources, Systems and Services
- Knowledge Organization: Cataloguing (Practice)
- Knowledge Organization: Cataloguing (Theory)
- Knowledge Organization: Classification (Practice)
- Knowledge Organization: Classification (Theory)
- Learning Outcomes-based Approach to Curriculum Planning
- Library Management
- Degree Programme
- Learning Outcomes related to the M.Lib.I.Sc Programme
- Public Library and Information System
- Qualification Descriptors
- School Library and Media Centre Structure of M.Lib.I.Sc. Programme
- Learning Skills
- Ranganathan's Approach to Management
- Teaching-Learning Process

References:

- Blended Mode of Teaching and Learning: Concept Note available on UGC website (Draft), available at: https://www.ugc.ac.in/pdfnews/6100340_Concept-Note-Blended-Mode-of-Teaching-and-Learning.pdf
- European Curriculum Reflections on Library and Information Science Education, available at: http://www.euclid-lis.eu/wp-content/uploads/2014/02/european-curriculum-reflections.pdf
- IFLA Guidelines for Professional Library and Information Science (LIS) Education Programmes (Draft)– February 3, 2021, available at: https://lisedu.files.wordpress.com/2021/02/lisepguidelines-consult-draft.pdf
- Learning Outcomes based Curriculum Framework (LOCF) for Bachelor of Library & Information Science Programme 2019, available at: https://ugc.ac.in/pdfnews/8052496_LOCF-Library-Science.pdf
- National Education Policy-2020. https://www.education.gov.in/sites/upload_files/mhrd/files/NEP_Final_English_0.pdf

Semester – I

S. No.	Course code	Course title	Course Type	L	T	P	Total Credits
1	SIAS LIS 01 01 C 4105	Foundations of Library and Information Science	C	4	1	0	05
2	SIAS LIS 01 02 C 4105	Information Communication Technology and Libraries (Theory)	C	4	1	0	05
3	SIAS LIS 01 03 C 00105	Information Communication Technology and Libraries (Practice)	C	0	0	10	05
4	SIAS LIS 01 01 DE 3205	Academic Library Systems	DE	3	2	0	05
5	SIAS LIS 01 02 DE 3205	Public Library Systems	DE	3	2	0	05
6	SIAS LIS 01 03 DE 3205	Special Library Systems	DE	3	2	0	05
7	SIAS LIS 01 01 GEC 3104	Indian Knowledge Systems+	GEC	3	1	0	04
8	SIAS LIS 01 02 GEC 3104	Learning Skills	GEG	3	1	0	04
9	SIAS LIS 01 03 GEC 3104	Media and Information Literacy*	GEC	3	1	0	04
Credits		**C=15, DE=5, GEC=04**	**Total Credits = 24**				

NOTE: Student will take GEC of 4 Credit offered by other Department
+ In Course in Progress

Course Title: Foundations of Library and Information Science

Course Objective: To provide basic understanding of the core concepts of data, information, knowledge and the philosophy, values of various types of libraries and librarianship and institutions involved in their developments.

Learning Outcomes

On studying this course, students shall be able to:

1. Comprehend the concept of information, data and information; and the knowledge society and increasing role of digital information in the present-day life;
2. Understand the role of libraries in the development of the society, philosophical foundations and the development of libraries and objectives and functions of different types of libraries;
3. Aware about the concept of open access to the library and information with the related legal and related issues; and
4. Assess the role of national and international library associations and agencies and networks work for the development and promotion of libraries and library professionals.

Unit 1: Information, Knowledge and Society

- Meaning and Characteristics of Data, Information, Knowledge, Wisdom and their inter-relationship; Data, Information and Knowledge as Service
- Knowledge Society; Role of digital information and data in everyday life
- Information Cycle: Generation, Storage and Dissemination, Use, Sharing and Publishing of information
- Sustainable Development Goals (SDGs) and Role of Information as Key Resource

Unit 2: Librarianship and Libraries

- Philosophical Foundations, Five Laws of Library Science, professional Ethics
- Historical Development of Libraries, Librarianship as profession and emergence of Library and Information Science as discipline
- Role of Libraries in Socio-economic, Cultural, Educational, Scientific and Technological Developments
- Types of Libraries and Information Centers: Objectives, Features, Functions

Unit 3: Access to Libraries and Information and Legal Issues

- Access to Library Sources and Resources
- Open Access movement, OERs, Open Data, Open Science and Open Knowledge
- The Press and Registration of Books Act; The Delivery of Books and Newspapers (Public Libraries) Act; Copyright Act
- Right to Information Act; IPR & Legal Issues; Information Technology Act

Unit 4: Role of Professional Associations, Agencies, Networks and Information Systems

- Role of Professional Associations: IFLA, ALA, CILIP, ASLIB and SLA

- Role of National Professional Associations: ILA, IASLIC, IATLIS
- Role of UNESCO, UGC and RRRLF, NIC in the promotion and development of libraries
- Role of Library Networks and Consortia: INFLIBNET, DELNET, OCLC, e-ShodhSindhu, and Information Systems: INIS, AGRIS, ENVIS

Recommended Reading

1. Bala, H. (2010). *Towards building a knowledge Society*. USA: Author press.
2. Bala, Harsha. 2010. Towards building a knowledge society. USA: Author press.
3. Bawden, David & Robinson, Lyn (2012). *Introduction to information science*. London: Facet.
4. Buckland, M. (2017). *Information and society*. MIT Press.
5. Connaway, L. S. &Faniel, I. M. (2014). *Reordering Ranganathan: Shifting User Behaviors, Shifting Priorities*. Ohio: OCLC Research
6. Cribb, J., & Sari, T. (2010). *Open science: sharing knowledge in the global century*. Csiro Publishing.
7. Crowley, Bill (Ed). (2012). *Defending professionalism: a resource for librarians, information specialists, knowledge managers, and archivists*. Santa Barbara: Libraries Unlimited.
8. Dhavan, S.M. (2010). *Public Libraries in the Knowledge Society*. New Delhi: Serial
9. Dhavan, S.M. 2010.Public Libraries in the Knowledge Society. New Delhi: Serial
10. DuBois, P Z (2021). Reading and the Art of Librarianship: Selected essays of John B Nicholson, Routledge
11. Duff, A. (2001). *Information Society Studies*. London: Routledge.
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13. Fitzgerald, N. (2012). The Information: A history, a Theory, a Flood, Taylor and Francis
14. Green, Roger C., Grover, Robert J., Fowler, Susan J. (2013). *Introduction to library and information professions*. Santa Barbara: Libraries Unlimited.
15. Harris, M. H., Harris, P. C.& Hannah, S. A. (1998). *Into the Future: The Foundations of Library and Information Services in the Post-Industrial Era.*(2nd ed.). Greenwich: Ablex Publishing.
16. Harris, Michael H., Harris, Pamela C and Hannah, Stan A.1998. Into the Future: The Foundations of Library and Information Services in the Post-Industrial Era. 2nd ed. Greenwich, Conn.: Ablex Publishing
17. India. Ministry of Human Resource Development. (2020). National Education Policy 2020.
18. Jafferson, G. 1997. Library Cooperation. London: Andre Deutsch
19. Kent, Allen.1994. Encyclopedia of Library and Information Science. NY: Marcel Dekker
20. National Knowledge Commission. (2009). National Knowledge Commission. Report to the Nation 2006-2009.
21. Pasek, J. E. (2015). Defining information policy: Relating issues to the information cycle. *New Review of Academic Librarianship*, *21*(3), 286-303.
22. Ranganathan, S R. 1957. Five Laws of Library Science. 2nd ed. Mumbai: Asia.
23. Ranganathan, S. R. (2006). *The five laws of Library science.* Bangalore: Sarada Ranganathan Endowment.

24. Ranganathan, S. R. 1988. The Five Laws of Library Science. Bangalore: Sarada Ranganathan Endowment for Library Science. 3
25. Rubin, Richard E. (2010). *Foundations of library and information science*. 3rd ed. New York: Neal Schuman.
26. Shera, J. H. (1970). *Sociological foundations of librarianship*. Bombay: Asia Publishing House.
27. United Nations (2015). Sustainable development goals. *SDGs Transform Our World*, *2030*.
28. Wiegand, Wayne A. et al.(eds.).1994. Encyclopedia of Library History. NY: Garland Publishing.
29. Willinsky, J. (2005). *The Access Principle: The Case for Open Access to Research andScholarship*. (Digital Libraries and Electronic Publishing). Cambridge: MIT Press.
30. Willinsky, John. 2005. The Access Principle: The Case for Open Access to Research and Scholarship. (Digital Libraries and Electronic Publishing). Cambridge: MIT Press.

Course Title: Information Communication Technology and Libraries (Theory)

Course Objective: To provide basics of information communication technologies and their application in libraries and information centers and their use in everyday operations of libraries.

Learning Outcomes:

On studying this course, students shall be able to:

1. Understand the structure of computer and functions of its various units and familiarities use of computer in office work
2. Realize the process of planning and automating the library housekeeping operations and services; and familiarizing with the library management software
3. Have an understanding of the concept of data structure, algorithm and database
4. Know about the computer networking and Internet; search engines, data and network security issues applicable in libraries and the functionalities of the library networks

Unit 1: Fundamentals of Computers

- Concept, Generations, Types, Hardware
- Units of Computers: Arithmetic and Logic Unit, Control unit, Input and Output Unit, Memory Unit
- Software: System Software, Operating Systems-MS-Windows, UNIX and LINUX;
- Software: Application Software - MS-Word, MS-Excel and MS-Power point; Open Office

Unit 2: Library Automation

- Meaning, Purpose, Historical Development
- Planning and Implementation of Automation in Housekeeping Operations, Retrospective Conversion
- Library Management Software: Proprietary, Free and Open-Source Software (FOSS); Evaluation
- Standards for Library Automation: MARC, 39.50 protocols

Unit 3: Data Structure, Algorithm and Databases

- Data structure: Array, Linked list, Tree, Graph, Map
- Algorithm: Search, Sort,
- Database: Relational Database, Field, Dimension, Tables, Queries, Indexing
- Languages: SQL, Python

Unit 4: Computer Networks and Library Networks

- Computer Networks: Concept, Need, Topologies, Types: LAN, MAN, WAN; Client-server
- Wireless Communication: Media, Wi-fi, Li-fi, Satellite Communication, Mobile

- Internet: Web Browsers, WWW, E-mail; Search Engines (Meta & Entity); Internet Protocols and Standards: HTTP, SHTTP, FTP, SMTP, TCP/IP, URI, URL; Search Strategies
- Data Security and Network Security: Firewalls, Cryptographic Techniques, Anti-virus software, Anti- spyware, Intrusion Detection System

Recommended Readings

1. Bilal, D. (2014). Library Automation: Core Concepts and Practical Systems Analysis: Core Concepts and Practical Systems Analysis. ABC-CLIO.
2. Boardman, M. (2005). The language of websites. London: Routledge.
3. Bolan, K., &Cullin, R. (2009). Technology made simple: An improvement guide for small and medium libraries. New Delhi: Indiana Publishing House.
4. Bolic, Miodrag, David Simplot-Ryl, & Ivan Stojmenovic. 2010. RFID systems: research trends and challenges. Chichester, West Sussex: Wiley.
5. Bradley, P. (2017). Expert Internet Searching, London, Facet
6. Chowdhury, G. G., & Chowdhury, S. (2001). Information sources and searching on the World Wide Web. London: Facet Publishing.
7. Cohen, S. M. (2003). Keeping current: Advanced internet strategies to meet librarian and patron needs. American Library Association.
8. Ingersoll, P.& Culshaw, J. (2004). Managing information technology: A handbook for systems librarians. Westport CT: Libraries Unlimited.
9. Kochar, R. S. (2008). Library automation: Issues and systems. New Delhi: A P H Publishing.
10. Mishra, V.K. (2016), Basics of Library Automation, Koha Library Management Software: Challenges with Case Studies, EssEss Publications.
11. Osborne, L. N., & Nakamura, M. (2000). Systems analysis for librarians and information professionals. 2nd ed. Englewood: Libraries Unlimited.
12. Tramullas, J., & In Garrido, P. (2013). Library automation and OPAC 2.0: Information access and services in the 2.0 landscape. Hershey, Pa: Information Science Reference.

Course Title: Information Communication Technology and Libraries (Practice)

Course Objective: To give a practical exposure to the software, database concepts and expose to use library management software and offer web-based services to the users.

Learning Outcomes

On studying this course, students shall be able to:

1. Install and use system software and application software and setting up of desktop
2. Know about data storage techniques, data formats, database searching and data migration
3. Carry out library housekeeping operations using library management software, like SOUL 3.0, KOHA
4. Work for planning and designing and maintaining of a library website

Unit 1: Basics of Computer

- Setting up Desktop : Screen Resolution, Adjusting the Desktop icons, Power and Sleep mode, Remote Desktop connection
- Installation and Use of Operating System: Windows and Linux
- Installation and Use of Application software: Word Processing Software, Spread Sheet Management Software and Power Point Presentation Software,
- Desktop publishing (Page maker, Coral Draw, LaTex)

Unit-2: Storage and Search Strategies

- Data Storage: On Premise and Cloud
- Data Migration: Storage Migration, Application Migration
- File formats for Data Migration: CSV, EXE, MARC
- Search Strategies**:** Adopting various Search Strategies and Filters

Unit 3:Library Management Software

- Installation/Setting up of Library Management Software: KOHA , SOUL
- Setting up a Library and Familiarity with Library Management System Software Modules
- Generation of Various Reports
- Barcode, RFID, NFC (Near Field Communication), QR Code, Biometric, Smartcard: Features and Applications.

Unit-4: Web Hosting

- Web hosting (domain)
- Application Architecture
- Website Designing (HTML, JavaScript,) Server Side (PHP, SQL)
- Website Designing Tools: Bootstrap, Webflow, Google Web Designer); Wix

Recommended Readings

1. Celebic, G. And Rendulic, D. I. (2011): Handbook: Basic Concepts of ICT. Open Society for Idea Exchange, Zagreb
2. Haley, C. K., &Robkin, S. (2007). Radio frequency identification handbook for librarians. Libraries Unlimited.
3. Haravu, L. J. (2004). Library automation: Design principles and practice (with CD-ROM). New Delhi: Allied Publishers
4. Rice-Lively, M.L. & Chen, H. L. (2006). Scenarios and information design: A user-oriented practical guide. London: Chandos Publishing.
5. Richardson, W. W. H. (2010). Blogs, Wikis, Podcasts, and Other Powerful Web Tools for Classrooms. Thousand Oaks: SAGE Publications.
6. Satyanarayana, N. R., & Khan, A. M. (2014). A manual of library automation and networking. New Delhi :EssEss Publications

Course Title: Academic Library Systems

Course Objective: To offer an understanding of the working of academic libraries and the various aspects related to managing the academic libraries.

Learning Outcomes

On studying this course, students shall be able to:

1. Understand basic knowledge of academic libraries and their changing roles, key recommendations of various committees and commissions and their role in accreditation
2. Know the administrative and routine functions of the academic libraries
3. Learn about the resources sharing and consortia practices available in academic libraries

UNTI I: Role of Academic Libraries

- Concept, Need, Purpose, Functions, and Present set up of different types of Academic Libraries in India
- Role of academic libraries in online, blended and lifelong learning
- Role of statutory bodies/Institutions like UGC, AICTE, MCI/NMC, PCI, CoA and others in the growth and development of Academic Libraries of higher education in India; Committees and Commissions: Report of the Kothari Commission, Radhakrishnan Commission, Mudaliar Commission, Ranganathan Committee
- Accreditation and Ranking Agencies: Accreditation: NBA, NAAC; Ranking: NIRF, QS World University Ranking, The World University Ranking and others; Finding key features of the top ranked institutional libraries

UNTI II: Effective Resources Management

- Manpower Development: Requirement, Qualifications, Recruitment, Job description, job analysis, staff manual with reference to policies of UGC, AICTE and other bodies; Skills and Competencies, Training and Development
- Library Finance: Sources Type of Budgets, Methods of financial estimation and budget preparation; resources mobilization
- Collection Development: Print and Non-Print including Electronic Documents, using and supporting Development of OERs and MOOCs
- Library Buildings: Planning and Standards. Risk and disaster management guidelines, Green Library Building, Building Learning Commons/ Learning Spaces for users and local community

UNTI III: Library Organization and Management

- Library authority and leadership role
- Centralized v/s Decentralized System: Departmental Libraries;
- Organization of Various Sections: Acquisition, Book section, Periodical, Technical, Reference or Help desk, Circulation and Library Management Section, ICT or Digital Learning Centre
- Library Furniture, Equipment and Stationaries, Branding and Social Media Presence

UNTI IV: Resource Sharing, Networking, Consortium and Policies

- Concept, Need and Purpose of Resource Sharing, Networking and consortium
- National Networks and Consortia: INFLIBNET, e-Shodh Sindhu,
- Institutional Repositories (IR): Concept, Need, National and International Academic IRs/ eTDs/Digital Repositories
- National Education Policy 2020 and Role of Libraries; Integration of the Library with the Institutional ERP like Samarth, Learning Management System (LMS), SWAYAM MOOCs, IRINS, etc.

Recommended Readings

1. Dearie, T. N., Meth, M., & Westbrooks, E. L. (Eds.). (2017). Academic library management: Case studies. American Library Association.
2. Arch, X., & Gilman, I. (2020). Academic Library Services for First-generation Students. ABC-CLIO.
3. Appleton, L. (Ed.). (2021). Positioning the Academic Library within the University: Structures and Challenges. Routledge.
4. Chigwada, J. P. (2021). Examining the Impact of Industry 4.0 on Academic Libraries. N. M. Nwaohiri (Ed.). Emerald Publishing Limited.
5. Bhatt, R.K. Srivastava, G.G. and Sharma, S K., Eds. Academic Libraries. (2021). K.K. Publications.
6. Brophy, Peter. (2006). The academic library. London: Facet.
7. Budd, J. (2012). The changing academic library: Operations, culture, environments. 2nd ed. Chicago: Association of College and Research Libraries.
8. Chapman, L. (2008). Managing acquisitions in library and information services. London: Facet Pub.
9. Connor, E. (2008). An introduction to instructional services in academic libraries. New York and London: Routledge.
10. Frederick, D. E. (2016). Managing eBook metadata in academic libraries: Taming the tiger. Amsterdam :Chandos Publishing
11. Higgins, S. E., &Derakhshan, M. (2017). Managing academic libraries: Principles and practice. Amsterdam: Chandos Publishing.
12. Jordan, P. (2017). The academic library and its users. Oxon : Routledge
13. Mack, D. C., & Gibson, C. (2012). Interdisciplinarty and academic libraries. Chicago : Association of College and Research Libraries
14. Munde, G., & Marks, K. (2009). Surviving the future: Academic libraries, quality, and assessment. Oxford: Chandos.

Course Title: Public Library Systems

Course Objective: To offer an understanding of the working of public libraries and the various aspects related to managing the public libraries.

Learning Outcomes

On studying this course, students shall be able to:

1. Understand the nature and role of Public Libraries and Information Systems and explain the role of Government and other Agencies in the development of libraries
2. Perceive the role of Public Library in the promotion of formal and informal education and appropriate policies and legislations
3. Select, acquire, organize and manage public library collection in both print and digital media
4. Understand the requirement for resource sharing and offer extension and outreach services to different categories of users

UNIT I: Public Libraries

- Meaning, Importance, Objectives and Functions; Public Library Movement in India: Recommendation by S.R. Ranganathan
- Agencies for Development of Public Libraries: UNESCO, IFLA; Role of Raja Ram Mohan Roy Library Foundation (RRRLF) and National Library (Kolkata), Ministry of Culture GOI, National Missions- National Mission on Libraries, National Mission for Manuscripts, National Literacy Mission, NPTEL
- Public Library System: National; Regional and State; Library Governance and Role of Public Library in lifelong learning

UNTI II: Organization and Administration

- Collection Development: Print, Non-print and Online Database
- Manpower Development: Qualification, Requirement, Job description, Job Analysis and Staff Manual
- Public Libraries Finance: Source, Budgeting, Accounting and auditing; Library Building: Planning, concept of modular building and Library Furniture

UNTI III: Automation, Resources Sharing and Services

- Library Automation: Automating the house-keeping services in various sections in the public libraries
- Resource Sharing and Networking, Integrated public library system
- Community Information Service; Library Services to Special Group of people including physically handicapped, mentally challenged, visually impaired, prisoners and children

UNTI IV: Policies and Legislation

- Library & Information Policy: Library & Information Policy at National and International level in India, Advisory Committee for Libraries, National Knowledge Commission, National Education Policy 2020 and Public Library
- Library Legislation: Need, Purpose, Objectives and Model Library Act
- Library Legislation in India: Structure and Salient Features

Recommended Readings

1. Abbott-Halpin, E., & Rankin, C. (Eds.). (2020). Public Library Governance: International Perspectives (Vol. 176). Walter de Gruyter GmbH & Co KG.
2. Barua, B P. (1992). National policy on library and information systems and services for India: Perspectives and projections. Bombay: Popular.
3. Bhatt, R K. (2004). UNESCO: Development of libraries and documentation centres in developing countries. New Delhi: K. K. Publications.
4. Cassell, K.A. (2021). Public libraries and their communities: An introduction, Rowman & Littlefield\
5. Downey, J., & LaRue, J. (2017). Public library collections in the balance: Censorship, inclusivity, and truth. California: Libraries Unlimited.
6. Goulding, A. N. N. E. (2017). Public libraries in the 21st century: defining services and debating the future. S.l. : Garland Science.
7. Hage, Christine Lind. (2004). The public library start-up guide. Chicago: American Library Association.
8. Higgins, S E. (2007). Youth services and public libraries. Oxford: Chandos Publishing.
9. Jaeger, P. T. (2019). Introduction to Public Librarianship.
10. Mckeown, A. (2016). Overcoming information poverty: investigating the role of public libraries in the twenty-first century. Chandos Publishing.
11. Neville, K. (2009). Popular, practical text on children's library services: Managing children's services in the public library. By Adele M. Fasick and Leslie E. Holt. Westport, CT: Libraries Unlimited, 2008
12. Patel, J. & Kumar, K. (2001). Libraries and librarianship in India. Westport: Greenwood Press.
13. Shaffer, G. L. (2018). Creating the sustainable public library: The triple bottom line approach. ABC-CLIO.
14. Thomas, V K. (1997). Public libraries in India: Development and finance.New Delhi: Vikas Publication.
15. Totterdell, Anne. (2005). An Introduction to library and information work. London: Facet.
16. Weingand, D. E. (2013). Administration of the small public library. New Delhi: Indiana Publishing House.

Course Title: Special Library Systems

Course Objective: To offer an understanding of the working of special libraries and information centers and the various aspects related to managing the special libraries and information centers.

Learning Outcomes

On studying this course, students shall be able to:

1. Understand the role and functions of special libraries and become well versed with the special libraries' development in the USA, UK and India
2. Know about the organizational and administrative aspects of special libraries
3. Make provisions for information services and products in special library
4. Understand the need for resource sharing and work for marketing of library and information services

UNTI I: Special Libraries

- Concept, Role, Characteristics and Functions of Special Libraries
- Development of special libraries in USA, UK and India
- Role of Special Libraries Association of India, UK and USA
- Changing Role of Special Libraries: Case Studies

UNTI II: Effective Resources Management

- Manpower Development and Recruitment: Qualifications, Job Description and Staff Manual
- Collection Development and Management of Government Documents, Maps, Manuscripts, Newspaper Clippings, Serials, specifications (patents and standards) Technical Reports and Theses
- Financial Management and Auditing: Sources of Finance and Budgeting Techniques, Accounting, Auditing
- Library Building: Library Building: Principles, Planning and Features

UNTI III: Information Services

- Support for the Intelligent Organization, Self-Support Services
- Information Services: Bibliographic, Current Awareness (CAS), Alerts, Digest, Documentary Delivery, Indexing, Abstracting, Referral, Selective Dissemination (SDI), Translations, Consultancy
- Information and Content Analysis, Consolidation and Repackaging, Trend Reports
- Excellence in special library services and products

UNTI IV: Resource Sharing and Marketing of Information

- Resource Sharing Concept, Areas, and Factors, elements and process

- Resources Sharing Networks: RLIN, OCLC, etc
- Marketing of Information: Concept, marketing plan, Marketing Strategies, Social Media Strategies
- Value of Information, User Benefits, ROI, Evidence Based Librarianship

Recommended Readings

1. Burton, P. F. and Patic J. H. (1991). Information Management Technology: A Librarian's Guide.London: Chapman and Hall.
2. Clapp, V. W. (2010). Features of the research library. Urbana: University of Illinois.
3. Dhawan, K.S.(1997). Multi-media Library. New Delhi: Commonwealth Publishers.
4. Matarazzo, J. M., & Connolly, S. D. (2016). Knowledge and special libraries. London: Routledge.
5. Mount, E, Ed. (2019. Creative Planning of Special Library Facilities. United Kingdom: Taylor & Francis.
6. Mount, E. Serving End-Users in Sci-Tech Libraries. (2019). United Kingdom: Taylor & Francis.
7. Robertson, G. (2020). Disaster Planning for Special Libraries. United Kingdom: Elsevier Science.
8. Scammell, A. (2008). Handbook of special librarianship and information work. London: Routledge.
9. Semertzaki, E. (2011). Special libraries as knowledge management centres. Oxford: Chandos Publishing.
10. Wilkie, Chris. (2009). Managing film and video collections. London: Aslib
11. Yap, J. M., et al. (2016). Special library administration, standardization and technological integration.Hershey, PA: Information Science Reference

Course Title: Learning Skills

Course Objective: To make aware about the importance of learning in everyday life including student days and promote to actively participate in learning activities on sustainable basis.

Learning Outcomes

On studying the course, students shall be able to:

1. Have conceptual clarity of the meaning and importance of learning in one's life
2. Understand about his own learning disability and would attempt to overcome them
3. Involve themselves in the self-learning skills as a means to continuous improvement in the way to learn
4. Have a map of the learning skills required in the present time and adapt according to future needs.

Unit-1: Introduction to Learning

- Meaning of learning, Nature of Learning, Sequence of Learning, Teaching learning process, its relationships (with studying, teaching, education),
- Learning Process, Learning Trajectories
- Different types of learning (Enquiry-based learning, Activity-based learning, experiential learning, Resource Based Learning, Outcome Based Learning, Guided Learning, Work Based Learning, Individual and Collaborative Learning)
- Learning Behaviour: Perceptions and Reality; Human Behaviour

Unit-2: Learning Opportunities and Resources:

- Understanding Learners, Learning Needs, Art of Learning and Unlearning
- Learning as Life Skill, Learning to Learn, Lifelong learning,
- Avenues for Learning: Class, Sports complex, Laboratories, Clubs and cells,
- Learning Resources: Media and information management, Online education, Web-based resources, OERs, Libraries, Practical training, Dissertations and reports

Unit-3: Twenty First Century Learning Skills

- Critical thinking and Creative thinking
- Communicating and collaborating
- Learning as career
- Mapping learning requirements for the present time and future

Unit- 4-Improving Learning Skills

- Identify weak areas; Practice better habits in your daily life;

- Take an appropriate course; Participate in volunteer opportunities, finding meaning within the opportunity one gets
- Adhering to datelines, working in teams, adapting to environmental changes, highlighting learning skills in the resume, interview
- Assess yourself in the group, with the seniors, evidences of practice of learning

Recommended Readings

1. Bardi, U. (2019). Sustainability on University Campuses: Learning, Skills Building and Best Practices. Germany: Springer International Publishing.
2. Chipman, S. F., Segal, J. W., & Glaser, R. (Eds.). (2013). Thinking and learning skills: Volume 2: Research and open questions. Routledge.
3. India (2020). National Education Policy 2020. Ministry of Education.
4. James, N., Busher, H. (2018). Improving Opportunities to Engage in Learning: A Study of the Access to Higher Education Diploma. United Kingdom: Taylor & Francis.
5. Knapper, C., &Cropley, A. J. (2000). Lifelong learning in higher education. Psychology Press.
6. McDaniel, M. A., Brown, P. C., & Roediger III, H. L. (2014). Make It Stick The Science of Successful Learning. Cambridge, MA Harvard Univ Pr.
7. Nilson, L. (2013). Creating self-regulated learners: Strategies to strengthen students? self-awareness and learning skills. Stylus Publishing, LLC..
8. Northup, J,,Peno, K. and Mangiante, E. M. S., Eds. (2021). Teaching and Learning for Adult Skill Acquisition: Applying the Dreyfus and Dreyfus Model in Different Fields. (2021). United States: Information Age Publishing, Incorporated.
9. Segal, J. W., Chipman, S. F., & Glaser, R. (Eds.). (2014). Thinking and learning skills: Volume 1: relating instruction to research. Routledge.
10. Wang, V. C. (Ed.). (2015). Handbook of research on learning outcomes and opportunities in the digital age. IGI Global.
11. Westerberg, C., McBride, T. (2020). Acquiring Learning Skills with Digital Technology. United States: Information Science Reference.
12. Zima, B. (2021). Mindsets and Skill Sets for Learning: A Framework for Building Student Agency. United States: Marzano Resources.

Course Title: Media and Information Literacy

Course Objective: To provide knowledge of the media and information literacy and their channels and various issues involved.

Learning Outcomes

On studying this course, students shall be able to:

1. Know the various kind of literacies relevant in the present age and the need for information and media literacy in particular.
2. Understand the media messages and their creators, and recognise bias, spin, misinformation, false information.
3. To know various channels of information and media and know various types of information sources and evaluate information and media sources.
4. Understand the legal rights in relation to information and media structures of media ownership, legal, ethical, and societal issues in Media and Information

Unit-1: Introduction

- Definition of Media, Information, Technology
- Digital Literacy; Media and Information literacy
- Meaning and Development of Traditional and New Media
- Types and Characteristics of Traditional and New Media, Fusion between Traditional and New media

Unit-2: Information Sources/ Resources

- Sources of Information; Mass Media, Libraries, Archives, Internet, etc.
- Role of various Information Source/Providers
- Locating the Sources; Retrieve sources from a Variety of Information Systems
- Evaluate / Analyse / Relate/Interpret Sources, Messages and Information; Select Appropriate Sources; Evaluating Sources; Sharing and Publishing Avenues

Unit-3: Media and Information Literacy

- Knowledge of available Communication and Information Resources, Media Communication, Information Chain
- Basic Principles such as Freedom of Expression and Information
- Reflections on Learning, Metacognition
- Enquiring and Engaging in Research Skills and Processes, Critical Thinking, Pluralism of Ideas/Respect of others' Opinions, Tolerance, Respect of Authorship, Social Responsibility, Wise use of Information

Unit-4: Legal, Ethical, and Societal Issues in Media and Information

- Copyright, plagiarism, computer addiction
- Cyber bullying, dangers of internet use, 'Fake news'
- Information overload

- Obsession of information, media and social issues

Recommended Readings:

1. Agosto, D. E. (Ed.). (2018). *Information literacy and libraries in the age of fake news*. ABC-CLIO.
2. Christian, S. E. (2019). *Everyday media literacy: an analog guide for your digital life*. Routledge.
3. Frau-Meigs, D., Velez, I., & Michel, J. F. (Eds.). (2017). *Public policies in media and information literacy in Europe: Cross-country comparisons*. Taylor & Francis.
4. Hobbs, R. (2021). *Media literacy in action: Questioning the media*. Rowman & Littlefield Publishers.
5. Kellner, D., & Share, J. (2019). *The critical media literacy guide: Engaging media and transforming education*. Brill.
6. Leaning, M. (2017). *Media and information literacy: An integrated approach for the 21st century*. Chandos Publishing.
7. Lloyd, A. (2021). The Qualitative Landscape of Information Literacy Research: Perspectives, Methods and Techniques, Facet Publishing
8. Oberg, D., &Ingvaldsen, S. (Eds.). (2016). *Media and information literacy in higher education: Educating the educators*. Chandos Publishing.
9. American Association of School Librarians and Associations for Educational Communications and Technology. (1998).Information Standards for Student Learning. Chicago: American Library Association.
10. Armstrong, S. (2008). Information Literacy: Navigating & evaluating today's Media. California: Shell Education.
11. Blanchett, H., Powis, C. & Webb, J. (2012). A Guide to Teaching Information Literacy: 101 Practical Tips. London: Facet Publishing.
12. Ercegovac, Z. (2008). Information literacy: Search strategies, tools & resources for high school students and college freshmen (2nd ed.). Ohio: Linworth.
13. Herring, J. (2011). Improving Students' web use and information literacy: A guide for teachers and teacher librarians. London: Facet Publishing.
14. Koltay, T., Špiranec, S. &Karvalics, L. Z. (2016). Research 2.0 and the Future of Information Literacy. London: Chandos Publishing.
15. Neely, T. Y. (2006). Information Literacy Assessment: Standards-Based Tools and Assignments. Chicago: American Library Association.
16. Radcliff, C. J., et. al. (2007). A Practical Guide to Information Literacy Assessment for Academic Librarians. Westport: Libraries Unlimited.
17. Sales, D. & Pinto, M. (Eds.) (2017) Pathways into Information Literacy and Communities of Practice: Teaching Approaches and Case Studies. London: Chandos Publishing.

Semester – II

S. No.	Course code	Course title	Course Type	L	T	P	Total Credits
1	SIAS LIS 02 01 C 3104	Indian Ethos and Ethics for Information Professionals	Core	3	1	0	04
2	SIAS LIS 02 02 C 2065	Knowledge Organization and Processing: Library Classification (Theory and Practice)	Core (SEC)	2	0	6	05
3	SIAS LIS 02 03 C 2065	Knowledge Organization and Processing: Library Cataloguing (Theory and Practice)	Core (SEC)	2	0	6	05
4	SIAS LIS 02 04 C 3104	Management of Libraries and Information Centers	Core	3	1	0	04
5	SIAS LIS 02 05 C 2103	E-Resource Management	Core	2	1	0	03
6	SIAS LIS 02 01 DE 3115	Collection Development	DE	3	1	1	05
7	SIAS LIS 02 02 DE 3115	Preservation and Conservation of Library Material	DE	3	1	1	05
8	SIAS LIS 02 03 DE 4105	Life and Works of S R Ranganathan	DE	4	1	0	05
9	SIAS LIS 02 01 SEEC 4105	Library Internship (Online /Offline in a library)	SEEC	-	-	-	-
Credits		**C=21, DE=5**	**Total Credits = 26**				

Course Title: Indian Ethos and Ethics for Information Professionals

Course Objective: To give an understanding of the ethical issue involved in managing libraries and information centers and the Indian value system to manage in a better way abiding moral values.

Learning Outcomes

On studying of the course, students will be able to:

1. Develop and communicate a personal understanding of the moral significance and ethical responsibilities of being a library professional.
2. Develop and communicate an understanding of the goals of librarianship, including the influence of culture and diversity on library services practices.
3. Develop the knowledge and skills necessary to make ethically responsible decisions, including the development of deliberative capacities in which communication, listening, reflection, and reasoning are part of moral deliberation and conflict resolution.
4. Assess their abilities in contexts with respect to critical reasoning, effective communication, and ethical decision-making in context of values residing in Indian value system
5. Examine role of Indian ancient texts for self-development in order to work in cross-cultural environment.

Unit-1: Professional Ethics

- Introduction to professional ethics and values
- Code of professional ethics: National and International
- Librarianship as a service profession
- Library philosophy as guide for values and ethics

Unit-2: Ethical dilemma

- Ethical values towards institution/society and the library
- Ethical values towards staff and users
- Ethical values towards other libraries, associations and profession
- Ethical values towards the issue of plagiarism, computer/internet filtering, user privacy, copyright, censorship, free and open access

Unit-3: Self-management as Ethical Practices in Indian Ethos

(For self-discipline and personal development, the following lessons from ancient Indian sources and leaders for motivation to be ethical)

Unit-4: Indian value system and professional ethics for librarianship

- Ethics for LIS managers
- Ethical Philosophy- Indian perspective
- Need for Spiritual Values in LIS Management

- Holistic approach to ethics for Library and Information Professionals

Recommended Readings

1. Chakraborty, S. K. (1985). Human response in organizations: Towards the Indian ethos. Vivekananda Nidhi.
2. Nair, S. N. (2008). Echoes of Ancient Indian Wisdom: The Universal Hindu Vision and Its Edifice. India: Pustak Mahal.
3. Pandey, K. C. (2011). Ethics & Epics: Reflections on Indian Ethos. Readworthy.
4. Panigrahy, D. How To Develop A New Work Culture: Exploring The Indian Ethos. (1994). India: Kanishka Publishers.
5. Pérez Pulido, M. (2017). Ethics Management in Libraries and Other Information Services. United Kingdom: Elsevier Science.
6. Pfister, J. (2009). Coda. The Indian Ethos of Service. In The Yale Indian (pp. 161-174). Duke University Press.
7. Ranganathan, S. R. (1931). The five laws of library science. Madras Library Association (Madras, India) and Edward Goldston (London, UK).
8. Ranganathan, S. R. (1951). Documentation Genesis and Development. Vikas Publishing House (Delhi, India).
9. Ranganathan, S. R. (1961). Reference service. Asia Publishing House (Bombay).
10. Ranganathan, S. R. (1963). Documentation and its Facets: Being a Symposium of Seventy Papers by thirty-two Authors. Asia Publishing House (Bombay).
11. Shrimad Bhagwad Gita
12. Valmiki Ramayan

Course Title: Knowledge Organization and Retrieval-I: Library Classification (Theory and Practice)

Course Objective: To provide basic knowledge of the organization of knowledge in libraries specially awareness of the library classification systems to effectively organize the collections and libraries.

Learning Outcomes

On studying of the course, students will be able to:

1. Understand the concept of library classification, call number, universe of knowledge, Modes of formation of subjects, etc.
2. Acquaint with the classification schemes and their salient features with modern techniques of knowledge organization
3. Construct class numbers for documents with simple, compound and complex subjects
4. Synthesize class numbers by using the standard subdivisions/common isolates/ auxiliary tables

Unit 1: Library Classification

- Introduction to Library Classification: Concept, Objectives & Functions
- Call Number: Class number, Book Number and Collection Number
- Modes of Formation of Subject
- Notation & Five Fundamental Categories

Unit 2: Library Classification Scheme & Current Trends

- Types of Classification Schemes: Enumerative, Faceted and Analytico-Synthetic
- Normative Principles of Library Classification
- Modern Knowledge Origination Tools: Thesauri, Taxonomies and Folksonomies
- Semantic Web: SKOS and OWL, Reclassification

PART I: Construction of Class Numbers for documents of different disciplines / subjects using Colon Classification 6th Revised edition

- Dealing with Basic Subjects, complex subjects, complex isolates and complex array isolates
- Use of Anteriorising and Posteriorising Common isolates, Language isolates, Space isolates & Time isolates
- Use of different Devices

PART II: Construction of Class Numbers for documents of different disciplines / subjects using Dewey decimal classification 22nd/23rd edition

- Analysis of a work; direct approach; Main classes, Divisions and Sections
- Using synthetic features: Add from schedules

- Use of Table 1 'Standard Subdivisions'; Table 2 'Area'; Table 3 'Subdivisions of individual literature'; Table 4 'Subdivisions of individual languages'; Table 5 'Racial, Ethnic, National Groups', and Table 6 'Languages'.

Recommended Readings

1. British Standards Institution. (2005). UDC: Universal Decimal Classification. London: British Standards Institution.
2. Broughton, Vanda (2015). Essential classification. 2nd ed. London: Facet.
3. Dewey, M. (2003). Dewey Decimal classification (22nd ed., Vols. 1-4). Ohio: OCLC.
4. Dewey, M. (2011). Dewey decimal classification and relative index (23rd ed., Vols. 1-4). Ohio: OCLC.
5. Joudrey, D. N., & Taylor, A. G. (2017). The organization of information. ABC-CLIO.
6. Krishan Kumar. (2000). Theory of classification. 4th rev ed. New Delhi: Vikas Publications.
7. Kumbhar, R. (2011). Library Classification Trends in the 21st Century. London: Chandos Publishing.
8. Kumbhar, R. (2011). Library classification trends in the 21st century. Elsevier.
9. Oggier, D. (2010). Harnessing Folksonomies with a Web Crawler. Germany: Verlag
10. Peters, I. (2009). Folksanomies, Indexing and Retrieval in Web 2.0. Germany: Saur
11. Ranganathan, S R. (1963). Colon Classification (6th ed.).(With amendments). Bombay: Asia.
12. Ranganathan, S. R. (1962). Elements of Library Classification. (3rd ed). Bombay: Asia
13. Ranganathan, S. R. (1987). Colon Classification (7th ed.). Revised and edited by M.A. Gopinath. Bangalore: SaradaRanganathan Endowment for Library Science.
14. Ranganathan, S. R. (1989). Prolegomena to Library Classification. (3rd ed.) Bangalore: SRELS.
15. Ranganathan, S. R. (2006). Colon classification (6th ed.). New Delhi: EssEss Publications.
16. Satija, M. P. (2002). Manual of practical colon classification.4th rev ed. New Delhi: Concept.
17. Satija, M. P. (2007). The theory and practice of the Dewey Decimal Classification system. Oxford: Chandos.
18. Satija, M. P. (2011). A guide to the theory and practice of colon classification. New Delhi: EssEss Publications.
19. Satija, M. P. (2013). The theory and practice of the Dewey decimal classification system. Elsevier.
20. Stuart, David (2016). Practical ontologies for information professionals. London: Facet

Course Title : Knowledge Organization and Retrieval-II: Library Classification (Theory and Practice)

Course Objective: To provide basic knowledge of the organization of knowledge in libraries specially awareness of the searching and accessing through effective cataloging systems in libraries.

Learning Outcomes

On studying this course, students shall be able to:

1. Understand the concept of Library Catalogue & its Forms
2. Acquaint the catalogue codes and RDA for knowledge processing and bibliographic description and controlled vocabulary
3. Understand the title, analyze the entry elements and understand different parts of catalogue entries
4. Prepare catalogue cards for various types of books and non-book material

Unit 1: Library Catalogue & Codes

- Introduction to Library Catalogue: Concept, Objectives & Functions
- Forms (Kinds): Physical and inner form of Library Catalogue
- Classified Catalogue Code with additional Rules for Dictionary catalogue code (CCC)
- Anglo-American Cataloguing Rules -2(AACR-2) & Resource Description and Access (RDA)

Unit 2: Bibliographic Description & Controlled Vocabulary

- Standards for Bibliographic Description: ISBDs, FRBR, CCF
- Bibliographic Record Format: MARC, UNIMARC
- Vocabulary Control – Concept, Design
- Subject Cataloguing: Techniques for Deriving Subject Headings

PART 3: Preparing Catalogue Entries (Main, Added and Reference Entries) for Books (Monographs) using Anglo American Cataloguing Rules -2 revised edition and Assigning Subject Headings to all entries (Using at least one Standard Subject Heading)

- Single Personal Authorship; Joint Authorship; Works of more than three Authors
- Collaborative Works; Series; Multivolume Works; Pseudonymous Authors
- Composite Works
- Corporate Authorship
- Organizations, Institutions, Societies
- Uniform Titles; Sacred Scripture; Anonymous Works

PART 4: Preparing Catalogue Entries (Main, Added and Reference Entries) for Non-Book Materials using Anglo American Cataloguing Rules -2 revised edition. Also Assigning Subject Headings (Using at least one Standard Subject Heading)

- Serials
- Cartographic Materials

- Manuscripts
- Graphic Materials
- Printed Music
- Sound Recordings, Motion Pictures & Video Recordings

Recommended Readings

1. American library association. (1968*). ALA Rules for filing catalog cards*. Chicago: ALA.
2. Bakewell, K. G. B. (2014). *A Manual of Cataloguing Practice: International Series of Monographs In library and Information Science* (Vol. 14). Elsevier. *catalogue code*. 5th ed. Bombay: Asia.
3. Chambers, Sally (ed.) (2013). *Catalogue 2.0: The future of library catalogue*. London: Facet.
4. Chaudhary, G. G. & Chaudhary, Sudatta (2007). *Organizing information: From the shelf to the web*. London: Facet .
5. Cutter, Charles A. (1949). *Rules for a Dictionary Catalogue*. London: Library Grafton & Co.
6. Domanovszky, Á. (2017). *Functions and objects of author and title cataloguing*. De Gruyter.
7. El-Sherbini, M. (2013). *RDA: Strategies for implementation*. American Library Association.Englewood: Libraries Unlimited.
8. Foskett, A. C. (1996). *Subject Approach to Information*. 5th ed. London: Library Association.
9. Girja Kumar, &Krishan Kumar. (1988). *Theory of cataloguing.* 5th ed. New Delhi: Vikas.
10. International Federation of Library Associations and Institutions.,& International Federation of Library Associations and Institutions. (2011). *ISBD: International Standard Bibliographic Description*. Berlin: De Gruyter Saur.
11. Joint Steering Committee for Revision of AACR, & American Library Association. *(2005). Anglo American cataloguing rules.* (2nd ed). (1988). Chicago: American Library Association.
12. Lazinger, S. S. (2005). *Digital preservation and metadata: History, theory and practice*. Libraries Unlimited.
13. Library of Congress. (2000). *MARC 21 concise format for bibliographic data*. Washington D.C.: Library of Congress, Network Development and MARC Standards Office.
14. Maxwell, Robert L. (2014). *Maxwell's handbook for RDA: Explaining and illustrating RDA: resource description and access using MARC 21*. London: Facet.
15. Miller, J. (2011). *Sear's list of subject headings*. 21st ed. New York: H.W. Wilson.
16. Oliver, C. (2010). *Introducing RDA: a guide to the basics*. American Library Association.
17. Olson, H. A. & Boll, J. J. (2005). *Subject analysis in online catalogues.* 2nd ed. Englewood:
18. Ranganathan, S. R. (1964). *Classified Catalogue Code with additional rules for Dictionary*
19. Ranganathan, S. R. (1974). *Cataloguing practice*. 2nd ed. Bombay: Asia.
20. Richard, Gartner (2016). *Metadata: knowledge from antiquity to the semantic web*. London: Springer.
21. Welsh, A., &Batley, S. (2012). *Practical Cataloguing: AACR, RDA and MARC 21*. Facet Publishing.
22. Zeng, Marcia & Qin, Jian (2016). *Metadata*. 2nd ed. London: Facet.

Course Title: Management of Libraries and Information Centers

Course Objective: To make aware of the effective management theories and use integrated library management system for efficient management and better staff performances in libraries and information centers.

Learning Outcomes

On studying this course, students shall be able to:

1. Understand the modern concept of management and application of management concept and principles of management in libraries and information centers
2. Comprehend the concept of ILMS and perform various tasks involved in ILMS
3. Plan for effective resource management and bring strategic focus in the planning process.
4. Understand the role of library staff in performing in a team leading for improved work culture

Unit 1: Principles and Functions of Management

- Concept, Definition, Functions and Principles of Management, and Schools of Management Thoughts
- Change Management and Total Quality Management
- Marketing as Philosophy approach
- Scope and Application of Management Approaches and in L& Centers

Unit 2: Integrated Library Management System

- Acquisition Management: Selection, Acquisition, Vendor's Communication, Billing and Processing
- User Services Management: Membership Services, Circulation, Alerts, Document delivery, customized products and services, Remote Access, Discovery Based Services
- Access Management: Shelving, Stock Verification, Security issues, Barcode, RFID, Smart cards,
- Stock Management: Stock verification, Maintenance and preservation,
- Information Management: Library Statistics and Library Analytics, Annual report

Unit 3: Planning Perspectives

- Strategic Planning: Goal Setting, Policy making, Forecasting
- Operational Planning Techniques (Use of planning tools like Gantt chart, PERT/CPM)
- Financial Planning (sources and generation of income) and Financial Management (Budgeting, Accounting, Auditing)
- Space Planning and Disaster Planning for library and information Centre
- Event Planning and management

Unit 4: People Management

- Team Management in library and information Centre, Library Managers and their roles

- Analyzing performances of staff
- Motivating employees and users, Self-management for library managers
- Human resource development, Outsourcing and hiring of staff

Recommended Readings

1. Bold Minds: Library Leadership in a Time of Disruption. (2020). Romania: Facet Publishing.
2. Bryson, J. (2018). Effective Library and Information Centre Management. United Kingdom: Routledge.
3. Byrson, J. (2017). Effective Library and Information Centre ManagementS.l.: Routledge.
4. Evans, G. E.&Alire, C. (2014). Management Basics for Information Professionals. 3rd ed. Chicago: American Library Association.
5. Greenwell, S., Evans, G. E. (2020). Management Basics for Information Professionals. United States: American Library Association.
6. Griffin, R. W. (2016). Fundamentals of Management. Boston, MA: Cengage Learning.
7. Hayss, Robert M. (2001). Models for Library Management, Decision-Making and Planning. New York: Academic Press.
8. Information Professionals. 2nd ed. Englewood Cliffs: Libraries Unlimited.
9. Laves, A. Management Skills for the Information Manager. (2018). United Kingdom: Taylor & Francis.
10. Lesneski, T. E. (2018). Library Design for the 21st Century: Collaborative Strategies to Ensure Success. Germany: De Gruyter.
11. Madeleine, C., Sahavirta, H and Hauke, P., Eds Going Green: Implementing Sustainable Strategies in Libraries Around the World: Buildings, Management, Programmes and Services. (2018). Germany: De Gruyter.
12. Matthews, J. R. (2018). The evaluation and measurement of library services. CA: Libraries Unlimited.
13. Moran, B. B. &Morner, C. J. (2018). Library and information center management. California: Libraries Unlimited.
14. Moran, B. B., Morner, C. J. (2017). Library and Information Center Management, 9th Edition. United States: ABC-CLIO.
15. Osborne, Larry N & Nakamura, Margaret. (2000). Systems Analysis for Librarians and
16. Osuigwe, N E. Managing and Adapting Library Information Services for Future Users. (2019). United States: IGI Global.
17. Ranganathan, S. R. (2006). Library Administration. India: EssEss Publications.
18. Sannwald, W.W. (2018). Financial management for libraries. American Library Association.
19. Simmons-Welburn, J.& McNeil, B. (2004). Human resource management in today's academic library: Meeting challenges and creating opportunities. Westport, Conn: Libraries Unlimited.
20. Stueart, R. D. & Moran, B. B. (2013). Libraries and information center management. 8th ed. London: Libraries Unlimited.
21. Wilkins-Jordan, M. E. (2020). Essential Management Skills for Library and Information Professionals. United States: American Library Association.

Course Title: E-Resource Management

Course Objective: To give an understanding of the various types of e-resources, policy, access and use related issues in a modern library and information center.

Learning Outcomes

On studying this course, students shall be able to:

1. Understand the basic concept, types, and process of collection building of e-Resources
2. Grasp the issues related to licensing, negotiation, access and use.
3. Promote to work in collaborative environment for better resources access and delivery with examples from leading consortia in India
4. Understand the user requirements and offering user-centric services and further analyzing for meeting and satisfying these demands

UNIT I: Electronic Resources Collection Development

- Concept, Need, Characteristics, Benefits and Drawbacks of e-resources
- Types of e-Resources: E-databases, E-journals, E-books, Linking Technologies, etc. Preservation of e-Resources
- Collection Building Process - Formulating Policy
- Budgeting, Pricing, Licensing, Ordering and Receiving, Evaluation of e-Resources

UNIT II: e-Resources: Negotiations, Licensing, and Access

- Model Licenses and Guidelines for Collection Building
- Negotiation –Concept and Need
- Copyright in the Digital Environment and User Training
- Delivery of e-Resources & Access Management and Authentication

UNIT III: Consortia

- Concept, Need and Purpose of Consortia
- Growth, development of Consortia and steps followed in formation a Consortia
- Collection Building of e-Resources through Consortia
- National and International Consortia: E-ShodhSindhu, IIMs, CSIR and OCLC. ETDs: Shodhganga

UNIT IV: Usage of Electronic Resources

- Management of Information Needs: with alert, document delivery, ask-a-librarian services
- Usage Statistics, e-Resource Usage Analysis
- Standards and Guidelines (COUNTER); Processing, Analysis and Presentation of Data
- Discovery based services

Recommended Readings

1. W Pattie, L. Y., Cox, B. J. (2020). Electronic Resources: Selection and Bibliographic Control. United States: CRC Press.
2. Patra, N. K. (2017). Digital Disruption and Electronic Resource Management in Libraries. United Kingdom: Elsevier Science.
3. Halaychik, C. S., Reagan, B. (2018). Licensing Electronic Resources in Academic Libraries: A Practical Handbook. United Kingdom: Elsevier Science.
4. Stachokas, G. (2019). The Role of the Electronic Resources Librarian. United Kingdom: Elsevier Science.
5. Lal, J., Tripathi, A. (2016). Library Consortia: Practical Guide for Library Managers. Netherlands: Elsevier Science.
6. Talbott, H., Zmau, A. (2018). Electronic Resources Librarianship: A Practical Guide for Librarians. United States: Rowman & Littlefield Publishers.
7. Conger, J. E. (2004). Collaborative Electronic Resource Management: From Acquisitions to Assessment. Westport: Libraries Unlimited.
8. Curtis, D., &Scheschy, V. M. (2005). E-journals: A how-to-do-it manual for building, managing, and supporting electronic journal collections. New York: Neal-Schuman Publishers.
9. Fenner, A. (2014). Managing digital resources in libraries. New York: Routledge.
10. Fowler, D. C. (2004). E-serials collection management: Transitions, trends, atechnicalities.
11. New York: Haworth Information Press.
12. Garibyan, M., McLeish, S., &Paschoud, J. (2017). Access and identity management for
13. libraries: Controlling access to online information. London: Facet Publishing.
14. Hanson, A., & Levin, B. L. (2003). Building a virtual library. Hershey: Information Science Pub.
15. Jones, W. (2014). E-journals access and management. New York: Routledge.
16. Katz, L. S. (2003). Collection Development Policies: New Dimension for Changing
17. Collections. London: Routledge.
18. Kemp, R. (2008). E-resource evaluation & usage statistics: Selector's choices. Saarbrücken: VDM Verlag Dr. Müller.
19. Lee, S. D. (2004). Building an electronic resource collection: A practical guide. London: Facet Publishing.
20. Lee, S. H. (2012). Electronic Resources and Collection Development. Hoboken: Taylor and Francis
21. Webster, P. M. (2008). Managing electronic resources: New and changing roles for libraries. Oxford: Chandos.
22. Verminski, A., &Blanchat, K. M. (2017). Fundamentals of electronic resources management.Chicago : Neal-Schuman
23. Lee, Sul H. (2003). Electronic Resources and Collection Development. London: Routledge
24. Yu, H., &Breivold, S. (2008). Electronic resource management in libraries: Research and practice. Hershey: Information Science Reference

Course Title: Collection Development

Course Objective: To make familiar with the concept of collection development and collection management programme, policies, and evaluation strategies.

Learning Outcomes

On studying this course, students shall be able to:

1. Be familiar with concepts of collection development along with the theories and principles, tools and selection criteria components etc.
2. Understand the collection development programme and process
3. Plan and evaluate strategies for collection development practices
4. Analyze and review the collection for effective management

UNIT I: Collection Development

- Collection Development – Concept; Goals and Methods
- Components of Collection Development
- Theories and principles of Selection by Ranganathan; Drury; Dewey; Library of Congress and American Library Association
- Selecting Materials/Basic Tools and Criteria for Selection

UNIT III: Collection Development Programme and Process

- Collection Development Program
- Universe of Published Materials
- Collection Development Policy/Weeding out Policy
- Budgeting & Finance

UNIT II: Collection Analysis and Review

- Collection Analysis as a Management Tool
- Approaches to Collection Analysis
- Methods of Collection Based Analysis
- Outreach, Liaison Activities & Marketing

UNIT IV: Collection Management

- Collaborative Collection Development
- Vendor Relations, Negotiation & Contracts
- Trends and the Future of Collection Development
- Ethical & Legal Issues of Collection Development

Recommended Readings

1. Lee, S. H. (2020). Access, Resource Sharing and Collection Development. United States: CRC Press.
2. Gregory, V. L. (2019). Collection Development and Management for 21st Century Library Collections: An Introduction. United States: American Library Association.
3. Lee, S. Ed. Collection Development in the Electronic Environment: Shifting Priorities. (2019). United Kingdom: Taylor & Francis.
4. Bartlett, W. K. (2014). Floating Collections: A Collection Development Model for Long-term Success. United States: ABC-CLIO, LLC.
5. Johnson, P. (2018). Fundamentals of collection development and management. American Library Association.

Course Title: Preservation and Conservation

Course Objective: To familiarize with the concept and theories of preservation and conservation of library material including non-book material.

Learning Outcomes

On studying this course, students shall be able to:

1. Understand the basic concept of Preservation and Conservation.
2. Familiarize students with issue and challenges in Preservation and Conservation of archival materials.
3. Understand on preservation the Non -print Materials and Conservation.
4. Familiarize with security issues in Preservation and Conservation.

UNIT I: Understanding Preservation

- Preservation: Concept, Need, advantages and challenges
- Types of Preservation – Physical & Digital preservation
- Type Materials to be preserved
- Basic Preservation Management Techniques

UNTI II: Preservation Theory

- Preservation Principles
- Preservation Theoretical Model
- Open Archival Information System (OAIS)
- Concept of rarity and intrinsic value

UNTI III: Preservation Planning

- Protective enclosures/measures, Selection, Review of materials for conservation or replacement
- Setting priority for conservation and preservation.
- Indoor and outdoor Security challenges
- User awareness and staff training and evaluating material

UNIT IV: Preservation of Digital Material

- Digitization, Formats, Reformatting (copying and imaging) and preservation replacement.
- Digitization Project (Project Proposal: budgets, personnel, funding, project plan and output, benefits to the institute / organization)
- Technological Tools for Digital Preservation
- Case studies

Recommended Readings

1. Alire, C. (2000). Library disaster planning and recovery handbook. New York: Nean-Schuman.
2. Baird, B. J. (2018). Practical Preservation and Conservation Strategies for Libraries. United States: Rowman & Littlefield Publishers.
3. Balasubramanian, P. (2021). Preservation and Conservation of Library Resources. India: EssEss Publications.
4. Balloffet, N., Hille, J., & Reed, J. A. (2005). Preservation and conservation for libraries and archives. Chicago: American Library Association.
5. Brown, Adrian. (2017). Practical digital preservation: A how-to guide for organizations of any size. S.l.: Facet Publishing
6. Corrado, E. M., Moulaison Sandy, H. (2017). Digital Preservation for Libraries, Archives, and Museums. United States: Rowman & Littlefield Publishers.
7. Deegan, M., & Tanner, S. (2013). Digital preservation. London: Facet Publishing
8. Kahn, M. (2004). Protecting Your Library's Digital Sources: The Essential Guide to Planning and Preservation. American Library Association.
9. Mahapatra, P. K. & Chakrabarti, B. (2002). Preservation in Libraries perspectives principles and practice. Delhi: EssEss.
10. Millar, L. (2017). Archives: Principles and practices. London: Facet Publishing
11. Myntti, J and Zoom, J Digital Preservation in Libraries: Preparing for a Sustainable Future. (2018). United States: American Library Association.
12. Varlamoff, M., Kremp, V. (1998). IFLA Principles for the Care and Handling of Library Material. Netherlands: International Federation of Library Associations and Institutions, Core Programme on Preservation and Conservation.
13. Williams, C. (2006). Managing archives: Foundations, principles and practice. Oxford: Chandos Publishing

Course Title: Life and Works of S R Ranganathan

Course Objective: To make aware about the life of S R Ranganathan, Father of Library Science in India and promote an understanding of his philosophy through his works

Learning Outcomes

On studying this course, students will be able to:

1. Know about S R Rangnathan (SRR), his approach to life and philosophy of Librarianship
2. Acquaint with the SRR's basic works related to library administration and management
3. Familiar about the SRR's works related to reference service and documentation
4. Know SRRS's work regarding knowledge organisation and processing (classification and cataloguing)

Unit-1: Life and Philosophy of SRR

- Early childhood, education and values, Making of Ranganathan (Indian scriptures and individuals),
- SRRs approach to subjects-multi-disciplinary, transdisciplinary
- Ranganathan's seminal works Five Laws of Library Science and other works in various themes of Library and Information Science
- Biographies and autobiography of Ranganathan

Unit-2: SRR's Works-Administration and Routine Work

- Key ideas from Library Administration
- Library Manual, Organization of Libraries
- Library Book Selection
- Other related works

Unit-3: SRR's Works- Knowledge Organisation and Processing

- Key ideas from Elements of Library Classification, Organisation of Libraries
- Philosophy of Library Classification, Prolegomena to Library Classification, Depth Classification, Hidden Roots of Classification, Classification and Communication,
- Classified Catalogue Code, Cataloguing Practice
- Heading and Canons, Subject Headings and Facet Analysis, and other related works.

Unit-4: SRR's Works- Reference Service, Documentation

- Key ideas from Reference Service
- Documentation: Genesis and Development, Documentation and its facets,
- Social Science Research and Libraries, Social Bibliography,
- Physical Bibliography for Librarians, and other related works

Recommended Readings

1. ConnawaySilipigni, L. (2018). Reordering Ranganathan: Shifting User Behaviors, Shifting Priorities. Ireland: OCLC.
2. Dudley, E., Ed. S. R. (1974). Ranganathan, 1892-1972: Papers Given at a Memorial Meeting on Thursday 25th January 1973. United Kingdom: Library Association.
3. Garfield, E. Tribute to S.R. Ranganathan, the Father of Indian Library Science: Part One, Life and Works. (n.d.). (n.p.): (n.p.).
4. Kaula, P. N. (1965). Ranganathan Festschrift: Papers Contributed on the 71st Birthday of Dr. Ranganathan, S..R. (12 August 1962) : Library Science Today. India: Asia Publishing House.
5. Kaula, P. N. (1967). Ranganathan Festschrift: Papers Contributed on the 71st Birthday of Dr. Ranganathan, S..R. (12 August 1962) : An Essay in Personal Bibliography. (n.p.): (n.p.)
6. Kaula, P. N. , Ed. (1992). Ranganathan, S. R: A Librarian Looks Back: An Autobiography of Dr. S.R. Ranganathan. India: ABC Pub. House
7. Kendadamath, G. C. (2003). S.R. Ranganathan: The Doyen of Indian Librarianship. India: Ganga Kaveri Publishing House.
8. Kumar, G. (1991). Ranganathan, Dewey and C.V. Raman: A Study in the Arrogance of Intellectual Power. India: Har-Anand Publications.
9. Kumar, G. (1992). S.R. Ranganathan, an Intellectual Biography. India: Har-Anand Publications.
10. Ranganathan, S..R. (1993). A Tribute : on the Occasion of His Centenary Celebrations. (1993). India: National Library.
11. Satija, M. P. Ed, Petits Petales: A Tribute to S.R. Ranganathan. (1993). India: ABC Publishing House.
12. Satija, M. P., Sharma, R. N. (1987). S.R. Ranganathan: The Crusader. United Kingdom: (n.p.).
13. Satyanarayana, N. R.Ranganathanism and Knowledge Society: Relevance of Dr. S. R. Ranganathan in the Present Day Knowledge Society and Other Essays. (2011). India: EssEss Publications.
14. Sharma, R. N. (1986). Indian Academic Libraries and Dr. S.R. Ranganathan: A Critical Study. India: Sterling Publishers.
15. Sharma, R. N. (1992). S.R. Ranganathan and the West. India: Sterling Publishers.
16. Singh, S. (1995). S R Ranganathan Birth Centenary Literature. India: EssEss Publications.
17. Yogeshwar, R. (2001). S.R. Ranganathan, Pragmatic Philosopher of Information Science: A Personal Biography. India: Bharatiya Vidya Bhavan.

Course: Library Internship

About the Internship

An internship is an individualized training program for the students that combines learning new library and information skills outside the classroom and the demonstration of those skills according to a planned schedule of activities. It may take place in a library/ library; or organized by the Department in online or offline mode. An intern works with an advisor/supervisor selected for the purpose to develop a practical training program on particular aspect(s) of librarianship. The duration of the internship would be four weeks.

Objectives of the Course

- To provide the students some knowledge and skills of the working of the library and information centers or any information unit;
- To upgrade their skills in a specific area of information service, resources and user requirements;
- To train them in order to boost their understanding of library services with the ICT applications
- To train them to adopt to the existing working conditions in the library and future prospects having sharing of experiences with senior LIS professionals

Semester – III

S. No.	Course code	Course title	Course Type	L	T	P	Total Credits
1	SIAS LIS 03 01 C 3104	Digital Libraries, Content Management and Learning Management Systems (Theory)	Core	3	1	0	04
2	SIAS LIS 03 02 C 00105	Digital Libraries, Content Management and Learning Management Systems (Practice)	Core	0	0	10	05
3	SIAS LIS 03 03 C 1144	Informetric and Scientometrics	Core	1	1	4	04
4	SIAS LIS 03 04 C 2124	Advances in ICT and Libraries	Core	2	1	2	04
5	SIAS LIS 03 01 DE 3205	Ranganathan and Modern Library Management	DE	3	2	0	05
6	SIAS LIS 03 02 DE 3205	Ranganathan and Modern Techniques of Knowledge Organization	DE	3	2	0	05
7	SIAS LIS 03 01 GEC 2124	Information Sources, Systems and Services in Biological and Applied Sciences	GEC	2	1	2	04
8	SIAS LIS 03 02 GEC 2124	Social Science Information Sources, Systems and Services	GEC	2	1	2	04
9	SIAS LIS 03 03 GEC 2124	Science and Technology Information Sources, Systems and Services	GEC	2	1	2	04
Credits		**C=17, DE=05, GEC=04**	**Total Credits = 26**				

NOTE: Student will take GEC of 4 Credit offered by other Department

Course Title: Digital Libraries, Content Management and e-Learning Platforms (Theory)

Course Objective: To popularize the concept of digital libraries, content management and e-learning and make aware of the technologies related to these in order to have effective integration of technologies and better information and knowledge management.

Learning Outcomes

On studying this course, students shall be able to:

1. Understand the concept of digital library, digital resources, design and organization of digital library
2. Understand the technologies involve in the building of digital libraries
3. Familiarize with the concept of e-Content, content creation and its hosting platforms including Learning Management Systems and MOOCs
4. Acquaint the file format, metadata standards, interoperability, and legal issues

UNIT I: DIGITAL LIBRARIES

- Digital libraries: Definition, Objectives, Scope of Digital libraries
- Digital Resources: Nature, Characteristics and types
- Design and Organization of Digital Libraries - Architecture, Interoperability, Compatibility
- Digital library initiatives: National and International

UNIT II: CONTENT MANAGEMENT SYSTEM

- Content Management System (CMS): Concept, Definition and Scope
- CMS Tools
- Features and functionalities of its stakeholders
- Theoretical Framework of CMS
- Evaluation and selection criteria for CMS

UNIT III: E-LEARNING PLATFORMs (LMS & MOOCs)

- Learning Management System: Concept, need, features and functionalities
- LMS Tools
- Stakeholders and their role & responsibilities Modules / plugin of LMS
- MOOCs: Concept, features and functionalities
- Popular MOOCs platforms

UNIT IV: STANDARD, PROTOCOL AND LEGAL ISSUES

- File Formats and Character Encoding Standards: ASCII, ISCII, Unicode
- Interoperability Standards: OAI-PMH , OAI-ORE

- Metadata: Concept, Types, Metadata Standards: Dublin core, METS, MODS
- Legal Issues – Intellectual Property Rights (IPR), Copyright, Licensing

Recommended Readings

1. Alemu, G., Stevens, B. (2015). An Emergent Theory of Digital Library Metadata: Enrich Then Filter. Netherlands: Elsevier Science.
2. Andrews, J. (2017). Digital Libraries: Policy, Planning and Practice. United Kingdom: Taylor & Francis.
3. Banerjee, K., Reese, T. (2018). Building Digital Libraries: Second Edition. United States: American Library Association.
4. Blaney, J., Milligan, S., Steer, M., & Winters, J. (2021). Doing digital history: A beginner's guide to working with text as data. Manchester University Press.
5. Boczkowski, P. J. and Mitchelstein, E. (2021). The digital environment: How we live, learn, work and play now, MIT Press
6. Chowdhury, G.G. & Foo, Schubert. (2012). Digital Libraries and Information Access: Research Perspectives. London: facet publishing
7. Evans, W. & David B. (2013). A Handbook of Digital Library Economics: Operations
8. Frazier, A. (Eds.) (2017). Managing Digital Cultural Objects: Analysis, Discovery and Retrieval.
9. Fritz, A. I. (2021). Sustainable Enterprise Strategies for Optimizing Digital Stewardship: A Guide for Libraries, Archives, and Museums. Rowman & Littlefield.
10. Hughes, L. M. (2004).Digitizing Collections: strategic issues for the information manager. New York: Neal Schuman.
11. Lawson, N. (2018). Digital Library Preservation Strategies. United Kingdom: EDTECH.
12. Miller, S. J. (2014). Metadata for digital collections: A how-to-do-it manual. New York: Neal-Schuman
13. Oleck, J. (2012). Creating the digital library. New York: Primary Research Group, Inc.
14. Papy, Fabrice. (2016). Digital Libraries. London: ISTE Press
15. Pedley, P. (2009). Digital Copyright. 2nded. London: Facet Publishing.
16. Pomerantz, J. (2015). Metadata. Massachusetts: MIT Press
17. Purcell, A. D. (2016). Digital library programs for libraries and archives: Developing, managing, and sustaining unique digital collections. Massachusetts: MIT Press
18. Tabakova, V. (2020). E-learning in medical physics and engineering: building educational modules with Moodle. CRC Press.
19. Tom Dieck, M. C. (2021). Augmented Reality and Virtual Reality: New Trends in Immersive Technology. Springer Nature.

Course Title: Digital Libraries, Content Management and Learning Management Systems (Practice)

Course Objective: To give practical exposure to the software/ platforms for digital libraries, content management and e-learning in order to prepare the learners to work with such technologies.

Learning Outcomes

On studying this course, students shall be able to:

1. Familiarize with process of design, development and implementation of digital libraries as pilot studies.
2. Expose with working of digital library software and create a digital library and an institutional repository.
3. Install DL, LMS and CMS with familiarity of the admin interface and work on the platforms and

UNIT I: BASIC SYSTEM REQUIREMENT OF SOFTWARE

- Commonalities and Uniqueness of DL, CMS and LMS software
- Digital library software
- Content Management Software
- Learning Management Software

UNIT II: DIGITAL LIBRARY SOFTWARE

- Installation and use of Dspace
- Installation and use of GSDL
- Digitization Process
- Creating Digital Library/ Institutional Repository and Case Studies

UNIT III: CONTENT MANAGEMENT SOFTWARE

- Installing of open-source CMS
- Customisation of CMS
- Content population using CMS interface
- Case Studies

UNIT IV: LEARNING MANAGEMENT SOFTWARE

- Installation of open source LMS and Customisation of LMS
- Course creation and Uploading
- Modules: Assessment, Assignment, announcement, Discussion Forum, chat and Enrol User
- Case Studies

Recommended Readings

1. Aberdour, M. (2013). Moodle for mobile learning. Packt Publishing Ltd.
2. Bhandari, M. (2020). Comparison of Wordpress, Joomla and Drupal.
3. Bhardwaj, Raj Kumar (Eds.). (2018). Digitizing the Modern Library and the Transition From Print to Electronic. Hershey, PA: IGI Global
4. Bishop, A. P., Van, H. N. A., &Buttenfield, B. P. (2010). Digital Library Use: Social Practice in Design and Evaluation. Cambridge: MIT Press.
5. Jones, Richard et al. (2006). The institutional repository. Oxford: Chandos Publishing.
6. Todaro, J. B. (2014). Library management for the digital age: A new paradigm. Lanham: Rowman & Littlefield.
7. Witten, I. H., Bainbridge, D., & Nichols, D. M. (2010). How to build a digital library. Burlington, MA: Morgan Kaufmann Publishers.
8. Zhang, Allison & Gourley, Don. (2009). Creating Digital Collections: A Practical Guide. Oxford: Chandos Publishing.

Course Title: Informetrics and Scientometrics

Course Objective: To expose with the growing importance of informetric and scientometric studies in order to understand the process of bringing out such products using various resources and tools.

Learning Outcomes

On studying this course,students shall be able to:

1. Become familiar with the fundamentals of Bibliometrics, Scientometrics, Informetrics and Webometrics
2. Know about the basic bibliometric laws and their applications in the present time
3. Know about various data sources including citation indexes, like Web of Science, SCOPUS, Google Scholar and search and retrieve useful information for conducting studies
4. Understand the indicators of the publication productivity- country-wise, institution wise, subject/theme wise, journal wise and author wise.
5. Use of tools and software for scientometric analysis

UNIT I: Introduction to Bibliometrics, Scientometrics, and Informetrics and related Laws

- Concept and Definition of Librametrics, Bibliometrics, Scientometrics, Informetrics, Webometrics and Altmetrics.
- Theoretical foundation of Bibliometrics and Scientometrics; Limitations of Bibliometrics, Scientometrics, Informetrics and Webometrics
- Classical laws of Bibliometrics - Broadford's Law, Zipf s Law, Lotka's Law, Brookes, Leimkhler, Bookstein Formulation, Bradford-Zipf Distribution; Price Theory, Ortega Hypothesis.
- Garfield’s Law of Concentration, Mathew effect, Other models of Scientific Communications

UNIT II: Evaluative Bibliometrics

- Theoretical foundations of Citation Analysis – Merton’s Normative Frameworks, Social Constructivist Theory, Cronin’s Micro-sociological view and other views.
- Historical Perspectives of Evaluative Bibliometrics
- Publication productivity dynamics - Journal level, Institutional level, Regional level, National level, Global level, Discipline level publication
- Research Collaboration Dynamics-Individual, Institution, Regional, National and Global level.

UNIT III: Bibliometrics/ Scientometrics Indicators and Emerging Trends

- Bibliometric data sources: Scopus, Web of Science, Google Scholar; Crossref; Microsoft academic
- Bibliometric Data Collection: Citation counting methods.

- Journal citation measures - Journal impact factor, Journal Citation Indicator, Immediacy index, CiteScore, SNIP, Weighted Impact -Eigenfactor, SJR; Half-life; Normalized Impact Indicators
- Individual Impact measures-H-Index, g-index, etc; Co-Citation Analysis, Bibliographic coupling.

UNIT IV: Advanced learning in Bibliometrics/ Scientometrics

- Scientometrics Analysis Tools- R Software -Bibliometrix, Publish or Perish, Bibexcel, etc.;
- Network Visualization Software – Vosviewer; Pajek, Sci^{2}Tools, CiteSpace, etc
- Altmetrics and Webometric data source and Analysis
- Responsible Research Metrics – DORA declaration, Leiden Manifesto, etc.

Recommended Readings

1. Bornmann, L., & Daniel, H. D. (2008). What do citation counts measure? a review of studies on citing behavior. *Journal of Documentation,* 64(1), 45 – 80.
2. Cronin, B. & Sugimoto, C. (Eds). (2014) Beyond Bibliometrics : Harnessing Multidimensional Indicators of Scholarly Impact. Massaschussets, MIT Press
3. Cronin, B. (1984). The citation process: the role and significance of citations in scientific communication: Taylor Graham.
4. Cronin, B., & Atkins, H.B. (Eds.). (2000). The Web of Knowledge: A Festschrift in Honor of Eugene Garfield: Information Today Inc.
5. De Bellis, N. (2009). Bibliometrics and Citation Analysis: From the Science Citation Index to Cybermetrics. Lanham: Scarecrow Press.
6. Egghe, L. (2005). Power Laws in the Information Production Process: LotkaianInformetrics: Emerald Group Publishing Limited.
7. Glänzel**,** W., Moed, H.F**.,** Schmoch**,** U., Thelwall**,** M. (Eds.) (2019) Springer Handbook of Science and Technology Indicators. Cham, Switzerland: Springer Nature
8. Haustein, S. (2012). *Multidimensional journal evaluation: Analyzing scientific periodicals beyond the Impact Factor*. Berlin : De Gruyter.
9. Moed, H. F. (2005). *Citation analysis in research evaluation*. Dordrecht,:Springer.
10. Sugimoto, C. R. (Ed.)(2016), *Theories of Informetrics and Scholarly Communication*: *A festschrift in honor of Blaise Cronin*
11. Thelwall, M. (2016). Web indicators for research evaluation: A practical guide. Synthesis Lectures on Information Concepts, Retrieval, and Services. San Rafael, CA: Morgan & Claypool Publishers.
12. Vinkler, P. (2010). The Evaluation of Research by Scientometric Indicators. Oxford: Chandos.
13. Waltman, L. (2016). A review of the literature on citation impact indicators. *Journal of Informetrics*, 10(2), 365–391. https://doi.org/10.1016/j.joi.2016.02.007.
14. Wilsdon, J. (2016), Towards Metric Tide: Independent Review of the Role of Metrics in Research Assessment and Management, Sage publication/ HEFCE, UK

Course Title: Advances in ICT and Libraries

Course Objectives: To make familiar with the concept of artificial intelligence, big data, machine learning, global information system particularly their application in libraries and information centers for better access, utilization and user centered services.

Learning Outcomes

On studying this course, students shall be able to:

1. Know the possibilities of application of artificial intelligence and machine learning in libraries in order to better utilizing technologies to offer customized and user support resources and services
2. Familiarize with the concept of library carpentry and about the important information technologies used in manipulating, storing, and analyzing data in libraries and information centers.
3. Understand the use of research data management in preserving and utilizing open research data for the researches and academic purposes and using the tools and techniques for storage and preservation of research data for the future generations
4. Understand the geographic information systems (GIS) concepts, prominent GIS software, the role of libraries in providing GIS services and support and resources

Unit-1: Artificial Intelligence

- The Conceptual Framework, A Basic Understanding of how AI and ML work,their underlying Logic and their Limitations;
- Understanding the potential societal impacts of AI, especially in the area of Education and Libraries
- Scope of AI inLibrary Functions, Resources and Services
- Examples of AI Application in Libraries

Unit-2: Library Carpentry

- Impact of big data on the business, society and libraries, need for managing data for the benefit of the stakeholders
- The Concept of Data Carpentry and Library Carpentry; Skill requirements (Core- regex, shell scripting, Openrefine; standards- SQL, NoSQL, Python; and advanced(MARCEdit, data reconciliation, named entity extraction, sentiment analysis, etc.
- Tools & services related to data discovery (Kaggle, Google Data search, Zenodo, re3data); data repositories (Dataverse, Dryad, Zenodo); and governmental data portals including data.gov.in. and Data
- Data wrangling processes through REST/API based data fetching and GREL based data extraction in the open-source data wrangling software called Openrefine.

Unit-3: Research Data Management

- Concept of Research Data, Quality of ResearchData, Research Cycle and generation of research Data

- Presentation of research data, Research Data Storage and Preservation,
- Metadata practices and key elements, Citing Research data,
- Research Data Management Technologies and Tools: Cloud based and Machine hosted

Unit-4: Application of GIS in Libraries

- Introduction to Geographical Information System; Geographical Data in Libraries, GIS Data Standards
- Accessibility (Critical GIS, Ontologies, and Semantics),
- GIS and Managing collection and services, GIS and LIS education
- Understanding how to store, manipulate and analyze GIS data

Recommended Readings

1. Bishop, L., Van den Eynden, V., Corti, L., Woollard, M. (2019). Managing and Sharing Research Data: A Guide to Good Practice. United Kingdom: SAGE Publications.
2. Cox, A., &Verbaan, E. (2018). *Exploring research data management*. Facet publishing.
3. Griffey, J. (2019). AI and Machine Learning: The challenges of artificial intelligence in libraries. *American Libraries*, *50*(3), 4.
4. Khan, H. R., Du, Y. (2020). Data Science for Librarians. United States: ABC-CLIO.
5. Kruse, F., &Thestrup, J. B. (Eds.). (2017). *Research data management-A European perspective*. Walter de Gruyter GmbH & Co KG.
6. Kumar, K. (2018). Identification of library location through Arc GIS software: Geographical information system. *IJ Agri. L. Inf. Serv*, *34*(3), 227.
7. Singh, A., Rai, P., & Singh, S. (2019). Scaling Bots in Libraries: Trending Aptness of Artificial Intelligence in Information System. *Available at SSRN 3861818*.
8. Slayton, E., & Benner, J. (2020). The Role of Libraries in Geography and GIS Education: Report on a series of conversations about libraries, geography, GIS, and education in 2020.
9. Soares, L. (2020). Artificial Intelligence in Canadian Law Libraries. *Can. L. Libr. Rev.*, *45*, 16.
10. Stoddart, R., & Godfrey, B. (2020). Gathering Evidence of Learning in Library Curriculum Center Spaces with Web GIS. *Evidence Based Library and Information Practice*, *15*(3), 21-35.
11. Strasser, C. A., Krier, L. (2014). Data Management for Libraries: A LITA Guide. United States: American Library Association.
12. Tian, Z. (2021, June). Application of Artificial Intelligence System in Libraries through Data Mining and Content Filtering Methods. In *Journal of Physics: Conference Series* (Vol. 1952, No. 4, p. 042091). IOP Publishing.
13. Wheatley, A., & Hervieux, S. (2019). Artificial intelligence in academic libraries: An environmental scan. *Information Services & Use*, *39*(4), 347-356.\

Course Title: Ranganathan and Modern Library Management

Course Objectives: To make aware of the newer concepts in management in relationship with the Ranganathan's approaches in regard to quality management, people management, marketing and such other customer centered practices in a services set up.

Learning Outcomes

On studying this course, students shall be able to:

1. Understand modern approaches to management vis-à-vis Ranganathan's approach to managing libraries.
2. Consider quality as journey towards achieving objectives of libraries and familiar with the service quality management approaches and relate them with Ranganathan's approach to quality management
3. Know the need for effective people management in a service setup, and take up Ranganathan's approach to people management into the analysis.
4. Adopt marketing approach to libraries and relate Ranganathan's ideas to modern marketing approach.

Unit-1: Ranganathan as Leader in managerial excellence

- Areas of modern management for service organization
- Modern management thinkers and S R Ranganathan
- Worldview on Ranganathan's approach to library management.
- Modern Management approaches via-a-vis Ranganathan's approach

Unit-2: Quality Library Services

- Service quality approach in libraries
- User Centredness
- Process improvement, Standardization,
- Other Ranganathan's key ideas from the LIS literature

Unit-3: People Management

- Place of staff in the library's Trinity, Staffing,
- Team work, Motivation,
- Self-management
- Other Ranganathan's key ideas from the LIS literature. .

Unit-4: Marketing of Services

- Attributes of grocery stores: then and now
- Shop analogy in Ranganathan's Literature
- Salesmanship, Public Relations and Promotion
- An account of literature on modern marketing vis-à-vis Ranganathan's approach to marketing

Recommended Readings

1. Ranganathan, S. R. (1988). Library Manual: For Library Authorities, Librarians and Library Workers. India: Sarada Ranganathan Endowment for Library Science.
2. Ranganathan, S. R. (2006). Documentation: Genesis and Development. India: EssEss Publications.
3. Ranganathan, S. R. (2006). Library Administration. India: EssEss Publications.
4. Ranganathan, S. R. (2006). The Five Laws of Library Science. India: EssEss Publications.
5. Ranganathan, S. R. (2007). Suggestions for the Organization of Libraries in India. United Kingdom: Read Books.
6. Ranganathan, S. R., Gopinath, M. A. (2006). Library Book Selection. India: EssEss Publications.
7. Ranganathan, S. R., Sivaraman, K. M. (1951). Library Manual, by S.R. Ranganathan and K.M. Sivaraman. India: Indian library Association.

Course Title: Ranganathan and Modern Knowledge Organization and Management

Course Objective: To make aware of the newer concepts in knowledge organization and management in relationship with the Ranganathan's approaches.

Learning Outcomes

On studying this course, students shall be able to:

1. Be familiar with Ranganathan's approach to faceted classification, normative principles and responses from experts on his approach to information organization and management
2. Analyze Ranganathan's faceted classification representing in Simple Knowledge Organization System (SKOS)
3. Use of Ranganathan's approach in developing ontologies and taxonomy, and create ontological structure using Colon Classification
4. Relate Ranganathan**'s** layers of classification theory with the semantic web and datamanagement

Unit-1: Foundation

- Facet analysis
- Normative principles
- Layers of classification
- World view on Ranganathan's role in Knowledge Organisation and management

Unit-2: Faceted Classification in ISKO

- Core concepts
- Processes
- Methods, Approaches and Philosophies
- Context and Applications

Unit-3: Ontologies and Taxonomies and Colon ontology

- Hierarchies
- Domain Conceptualization
- Examples from different domain

Unit-4: Modern applications

- Semantic web
- Linked data
- Big data

Recommended Readings

1. (1997). S. R. Ranganathan's Postulates and Normative Principles: Applications in Specialized Databases Design, Indexing and Retrieval. India: Sarada Ranganathan Endowment for Library Science.
2. Blokdyk, G. (2018). Knowledge Organization System a Complete Guide. (n.p.): Emereo Pty Limited.
3. Classification, Coding, and Machinery for Search. By S.R. Ranganathan. (1950). France: (n.p.).
4. Conceptual Modeling: Foundations and Applications: Essays in Honor of John Mylopoulos. (2009). Germany: Springer Berlin Heidelberg.
5. ConnawaySilipigni, L. (2018). Reordering Ranganathan: Shifting User Behaviors, Shifting Priorities. Ireland: OCLC.
6. Gnoli, C. (2020). Introduction to Knowledge Organization. United Kingdom: Facet Publishing.
7. Gopinath, M. A. (2004). Subject Classification Practice S.R. Ranganathan S. India: EssEss Publications.
8. Hodge, G. M. (2000). Systems of Knowledge Organization for Digital Libraries: Beyond Traditional Authority Files. United States: Digital Library Federation, Council on Library and Information Resources.
9. Mangai, M. A. A. M., Gopinath, M. A. (2004). Subject Classification Practice: S.R. Ranganathan's PostulationalApproach : Worked Out Examples Using CC, DDC and UDC Schemes. India: EssEss Publications for Sarada Ranganathan Endowment for Library Science.
10. ParthasarthyRanganathan, S. R. (1991). Elements of Library Classification: Based on Lectures Delivered at the University of Bombay in December 1944 and in the Schools of Librarianship in Great Britain in December 1956. India: Sarada Ranganathan Endowment for Library Science.
11. Powell, J. (2015). A Librarian's Guide to Graphs, Data and the Semantic Web. Netherlands: Elsevier Science.
12. Ranganathan, S. R. (1948). Classification and International Documentation, by S.R. Ranganathan .... Netherlands: Fédération internationale de documentation.
13. Ranganathan, S. R. (1959). Elements of Library Classification: Based on Lectures Delivered at the University of Bombay in December 1944 and in the Schools of Librarianship in Great Britain in December 1956. India: Association of Assistant Librarians.
14. Ranganathan, S. R. (1967). Prolegomena to Library Classification. 3rd Ed., by S.R. Ranganathan Assisted by M.A. Gopinath.. India: Asia Publishing House.
15. Ranganathan, S. R. (2006). Classification and Communication. India: EssEss Publications.
16. Ranganathan, S. R. (2006). Philosophy of Library Classification. India: EssEss Publications.
17. Ranganathan, S. R. (2007). Colon Classification. India: EssEss Publications.
18. Ranganathanism and Knowledge Society: Relevance of Dr. S. R. Ranganathan in the Present Day Knowledge Society and Other Essays. (2011). India: EssEss Publications.
19. Williamson, N., Beghtol, C. (2013). Knowledge Organization and Classification in International Information Retrieval. United Kingdom: Taylor & Francis.

Course Title: Information Sources, Resources, Systems and Services in Biological and Applied Sciences

Course Objective: To give details of the information sources, resources, systems and services in the field of biological and applied sciences so that their use becomes easier.

Learning Outcomes

On studying this course, students shall be able to:

1. Know the various types of information sources and resources available in Biological and Applied Sciences
2. Understand the role and types of information systems in the field of Biological and Applied Sciences
3. Use Information Services available for users from different service providers
4. Understand different branches of knowledge in the field of Biological and Applied Sciences and the information resources and services available therein

Unit-1: Information Resources

- Literatures and resources related to Biological and Applied Sciences
- Type of Information Resources of Biological and Applied Sciences
- Database of Biological and Applied Sciences; Free and Open Resources of Information Resources of Biology, Biotechnology and Bioinformatics
- Network Libraries Based on Biological Science and Applied Sciences ;Resource Sharing and Consortium of Life Sciences, Biotechnology and Medical Sciences

Unit-2: Information Systems

- Types of Information System; Infrastructures
- Searching and Finding Tools; Literatures Search Tools and Techniques
- Evaluation Process of Databases & Research Materials for Biological
- Indexing Databases Scopus, WOS; Impact Factor & Citation Analysis

Unit-3: Information Services

- Reference and Referral Services Under Biological Sciences & Applied Sciences
- Impact Factor / Citation Analysis / Google Scholar / Orchid / Altmetrics
- Index Services and basic knowledge about h-index, g-index, i10-index
- Please review the above sub-titles, which I added 5-7 topics in each unit

Unit-4: Information Sources in the Branches of Biological and Applied Sciences

- Information Sources on Biological and Applied Sciences
- Information Sources on Biology / Biotechnology / Bioinformatics
- Information Sources for Life Sciences
- Exploring Sources for Veterinary Sciences, Plant & Agriculture Sciences, and Health & Medical Sciences

Recommended Readings

1. *Cummings, S. M. H. (2021). Management Information Systems for the Information Age . Irwin/McGraw-Hill.*

2. *Parker, C. C. (2014). Information Sources in Science and Technology: A Practical Guide to Traditional and Online Use. Butterworth-Heinemann.*

3. *Marks, R. J., II, Sanford, J. C., Behe, M. J., Dembski, W. A., & Gordon, B. L. (2013). Biological Information: New Perspectives - Proceedings of the Symposium (1st ed.). World Scientific Publishing Company.*

4. *Niiranen, S., & Ribeiro, A. (2013). Information Processing and Biological Systems (Intelligent Systems Reference Library, 11) (2011th ed.). Springer.*

5. *UNESCO. (1978). Handbook of Information Systems. PARIS: UNESCO*

6. *Atlan, H. (1977). Sources of Information in Biological Systems. IFAC Proceedings Volumes, 10(12), 177–184. https://doi.org/10.1016/s1474-6670(17)66575-3*

Course Title: Social Science Information Sources, Resources, Systems and Services

Course Objective: To give details of the information sources, resources, systems and services in the field of social sciences so that their use becomes easier.

Learning Outcomes:

On studying this course, students shall be able to:

1. Understand the scope. Landmarks and research trends of the subjects covered in Social Sciences
2. Have knowledge of the various institutions involved in Social Sciences research in India
3. Acquaint with the students about the Information systems, associations and Network in the field of Social Sciences at the international level
4. Know about the aggregators, databases and repositories in the field of Social Science

Unit – I: Structure and Development of Social Sciences: Social Sciences

- Development of Social Sciences disciplines and their relationship with other disciplines
- Definition, scope, landmarks and research trends in Political Science, Public Administration, Economics
- Definition, scope, landmarks and research trends in Psychology, Sociology,
- Definition, scope, landmarks and research trends in History and Law

Unit – II: Social Science Institutions engaged in Information generation and dissemination: Role of Social Science Institutions

- Centre for Policy Research.
- Indian Council of Social Science Research.
- Indian Council of World Affairs.
- Indian Institute of Public Administration.
- National Council for Applied Economic Research.
- National Institute of Public Finance and Policy.
- Tata Institute of Social Sciences.
- Indian Council of Historical Research.
- Institute of Economic Growth.
- United Nation Educational Scientific and Cultural Organisation (UNESCO).

Unit – III: Social Science Information System, Associations and Networks

- Information System: Concept and evaluation
- Information Associations in Social Sciences
- International Political Science Association
- International Sociological Association
- SocioSite;Social Science Research Network (SSRN)

- Social Science Council and Committee
- International Social Science Council (ISSC)
- International Committee for Social Science Information and (ICSSD)

Unit – IV: Social Science Aggregators, Databases and Repositories

- ProQuest, J-STOR, EBSCOhost, J-Gate, Population Information Online (POPLINE), Project Muse,
- UNESDOC Digital Library, Shodhganga, Networked Digit Library of Theses and Dissertations (NDLTD),
- IndiaStat, UN Data, India Government Data
- Open DOAR (Directory of Open Access Repositories), DOAJ (Directory of Open Access Journals)

Recommended Readings

1. Adams, Bert N. (2002). Sociological Theory. New Delhi: Visitor Publications.
2. Case, D. (2006). Looking for Information: A Survey of Research on Information Seeking, Needs, and Behavior. (2nded.)London: Emerald Publishing
3. Coser, Lewis A. (2008). Masters of Soiciological Thoughts: Ideas in Historical and Social Context (2nd ed.).
4. Gordon, S. R., & Gordon, J. R. (2010). *Information systems: A management approach*. Hoboken, NJ: Wiley.
5. Hevner, A. & Chatterjee, S. (2010). *Design Research in Information Systems: Theory and Practice*. New York: Springer.
6. Irani, Z. & Lover, P. (2008). *Evaluating Information Systems: Public and Private Sector*. London: Butterworth-Heneman.
7. Kelkar, S A. (2009). *Information Systems: A Concise Study*. New Delhi: PHI.
8. Leckie, G. J. & et. al. (2010). *Critical Theory for Library and Information Science: Exploring the Social from Across the Disciplines.*Colarado: Libraries Unlimited.
9. Rajaraman, V. (2011). Analysis and design of Information Systems. New Delhi: PHI.

Semester – IV

S. No.	Course code	Course title	Course Type	L	T	P	Total Credits
1	SIAS LIS 04 01 C 3104	Research Methodology (Online)	Core	3	1	0	04
2	SIAS LIS 04 02 C 0020	Dissertation/Industrial Training	Core	-	-	-	20
3	SIAS LIS 04 01 SEEC	Research Data Literacy (Online)	SEEC	-	-		-
Credits		**C=24**	**Total Credits = 24**				

Course Title: Research Methodology

Course Objective: To make aware about the research and research methods, and other aspects of conducting successful research.

Learning Outcomes

On studying this course, students shall be able to:

1. Know the concept of the Research, understand use of appropriate method as per the requirement of the research work
2. Develop research proposal, identify and use the appropriate literature for the review
3. Understand the various methods of data collection and able to decide the appropriate method of data collection
4. Organize, analyze and interpret research data and develop the research report.

UNIT I: Basics of Research

- Research: definition, concept, objectives and types
- Hypothesis: definition and types;
- Review of Literature; Literature Search: Print and e-Resources
- Writing Research Proposals

UNIT II: Research Methods

- Historical Method and Descriptive Method
- Survey Method and Case Study Method
- Experimental Method
- Ethnography

UNIT III: Data Collection Methods and Techniques

- Questionnaire Method
- Observation Method
- Interview Method
- Population and Sample: concept, meaning and sampling techniques

UNIT IV: Data Analysis and Research Reporting

- Descriptive statistics : Measurement of Central Tendency and Standard Deviation
- Inferential statistic: Parametric and Non-Parametric
- Statistical tool: SPSS (Statistical Package of Social Sciences)
- Research Report – Concept, Structure & style, guidelines and Evaluation

Recommended Readings

1. Alasuutari, P., Bickman, L. & Brannen, J. (Eds.) (2008). *The SAGE Handbook of Social Research Methods*. London: Sage Publication.
2. Atkinson, P & Delamont, S. (Ed.) (2011) *Sage Qualitative Research Methods.* (Vols. 1-4). New Delhi: Sage Publication.
3. Bedi, S., & Webb, J. (Eds.). (2020). *Visual Research Methods: An Introduction for Library and Information Studies*. Facet Publishing.
4. Berger, A. A. (2018). *Media and communication research methods: An introduction to qualitative and quantitative approaches*. Sage Publications.
5. Burton, D. & Bartlett, S. (2009). *Key Issues for Education Researchers*. California: Sage Publication
6. Connaway, L. S., & Radford, M. L. (2016). *Research methods in library and information science*. ABC-CLIO.
7. Cooper, H. M. (2006). *Synthesizing research: A guide for literature reviews*. Thousand Oaks, Calif: Sage.
8. Creswell, J. W. (2014). *Research design: Qualitative, quantitative, and mixed methods approach*. (4th ed.). California: Sage Publication
9. Fetterman, D. M. (2010). *Ethnography: step-by-step* (3rd Ed). (Applied social research methods series; v. 17). California: Sage Publication
10. Goon, A M. (2000). *Fundamental of Statistics.* Calcutta: World Press.
11. Julie McLeod, J. & Thomson, R. (2009). *Researching Social Change: Qualitative Approaches*. London: Sage Publication.
12. Leo, E. and Rousseau, R. (2001). *Elementary Statistics for Effective Library and Information Service Management*. London: Aslib.
13. Oliver, P. (2010). *Understanding the Research Process*. New Delhi: Sage Publication.
14. Powell, R. R.&Connaway, L. S. (2010). *Basic Research methods for Librarians*. 5th ed. Westport: Libraries Unlimited.
15. Powell, R. R., &Connaway, L. S. (2010). *Basic research methods for librarians*. Santa Barbara California: Libraries Unlimited
16. Wildemuth, B. M. (Ed.). (2016). *Applications of social research methods to questions in information and library science*. ABC-CLIO.

Course Title: INDUSTRIAL/LIBRARY/ INSTITUTIONAL TRAINING

OR

DISSERTATION

Industrial/ Library/ Institutional Training

This is new area which has been added in the course of studies in the Master's degree in Library and Information Science. A student has to undergo for becoming acquaintance with any library or institution or industry (service or professional or otherwise) for the full semester and learn the practices being followed there in regard to information management, dissemination and use. The students will have to take up the required course to earn the required credits from the University as per the guidance from the Department of Library and Information Science, CUH. The student will have to submit certificate of completion along with the report about what he learnt along with the skills acquired during the training. Upto 50 percent of the students can undergo summer training.

Dissertation

Theoretical and methodological preparation for this course begins in the 3rd Semester with Course on: Informetrics and Scientometrics. Also, a course on Research Methodology is offered during the present semester. These two courses would help to understand about the methodological aspects of research. Allocation of Supervisors for undertaking dissertation is done during the beginning of the 4th semester and the students are given necessary guidance. Students are required to give seminars on their chosen topics for continuous/internal assessment. The students will require to write a dissertation on the following themes: 1. Literature review of any current topic in library and information science 2. Conducting case studies and surveys of libraries 3. Designing a prototype website or portal using various software prescribed in the syllabus 4. Studies related to information retrieval themesthrough the various e-resources or databases 5. Any other studies related to library and information science.

Course Title: Research Data Literacy

Course Objectives: To make understand out the concept of research data literacy, its usefulness in research and about the research data life cycle.

Learning Outcomes

On studying this course, students shall be able to:

1. Understand about the research data that may be extracted from the processes leading to research outputs
2. Aware of the importance of the research data, need for sharing and value for research data sharing for researchers
3. Know the research data lifecycle so that at every stage identification of research data generation is known
4. Adopt creation and management of research data into practice, maintaining the quality of research data and effective integration practices.

Unit-1: Introduction to Research Data

- Importance of Research Data world around us
- Importance of Research Data literacy
- Research Data Lifecycle
- Cases of Research Data Management

Unit-2: Research Data Lifecycle and Sharing of Research Data

- Research Data Sharing Within the Research Lifecycle
- Value of Research Data Sharing
- Concerns About Research Data Sharing
- Methods for Making Research Data Sharable

Unit-3: Research data Practices

- Best Practices for Creating Research Data Files
- Research Data Entry Options
- Research Data Integration Best Practices

Unit-4: Creating and Maintaining Research Data

- Research Data Manipulation Options
- Define Research Data Quality Control and Research Data Quality Assurance
- Perform Quality Control and Assurance on Research Data at all stages of the Research Cycle

Recommended Readings

1. Jones, B. (2020). Data Literacy Fundamentals: Understanding the Power & Value of Data (The Data Literacy Series). Data Literacy Press.
2. Jones, B. (2020b). Learning to See Data: How to Interpret the Visual Language of Charts (The Data Literacy Series). Data Literacy Press.
3. Herzog, D. (2016). Data literacy: A user's guide. SAGE Publications.
4. Mandinach, E. B., Gummer, E. S., & Schneider, B. (2016). *Data Literacy for Educators: Making It Count in Teacher Preparation and Practice (Technology, Education--Connections (The TEC Series))*. Teachers College Press.
5. Johnston, L. R., & Carlson, J. (2015). *Data Information Literacy: Librarians, Data and the Education of a New Generation of Researchers (Purdue Information Literacy Handbooks)*. Purdue University Press.
6. Bowen, M., & Bartley, A. (2013). *The Basics of Data Literacy: Helping Your Students (And You!) Make Sense of Data - PB343X*. National Science Teachers Association - NSTA Press.
7. Love, N. (2013). *Data Literacy for Teachers*. National Professional Resources Inc. / Dude Publishing.

DEPARTMENT OF LIBRARY AND INFORMATION SCIENCE

Ph.D. Course Work

Scheme and Syllabus (2021-22 onwards)

SCHOOL OF INTERDICIPLINARY AND APPLIED SCIENCES

CENTRAL UNIVERSITY OF HARYANA

MAHENDERGARH

2021

About the Ph. D. Programme

CUH DLIS Ph.D. Programme in Library and Information Science is available for the students who have a master's degree in Library and Information Science or related discipline who seeks to undergo advance study in a specialised branch of knowledge.

The Programme Objectives

The aim of the programme is to train highly-skilled scholars to succeed in higher education with academic specializations. The programme applies a practical approach, offering both quantitative and qualitative research methods, as well as developing practical skills for scholarship and research relevant in the field of Library and Information Science. The programme is designed to prepare scholars to work in the professional sphere with the research background and trains them in new approaches and methodologies for managing information and effective uses to achieve the goals of new education policy and sustainable development goals.

Course Work

As per the ordinances of the University, there shall be a compulsory Course Work of minimum one-semester duration as a pre-requisite for the confirmation of registration of students admitted provisionally. Through a combination of required and elective courses, independent study, workshops, and guided experiences, the Ph.D. course work focuses on library and information science prepares students for foundational activities in research, scholarship, teaching, and service.

The Course Structure

S. No.	Course Title	Course Code	Credits
1	Research Methodology in Library and Information Science	SIAS LIS 101 C 4004	04
2	ICT for Research	SIAS LIS 102 C 4004	04
3	Research and Publication Ethics	SIAS LIS 103 C 2002	02
4 (Any one course from A/ B)	(A)Advances in the area of Library and Information Science (Thematic)	SIAS LIS 104 E 2002	02
	(B)Advances in Library and Information Science (Preparation of Annotated Bibliography and Giving Seminar Presentations)	SIAS LIS 105 E 2002	
	(C)SDGs and Information Management	SIAS LIS 106 C 2002	02

Total Credit: 14

Course-1: Research Methodology in Library and Information Science

Course Objectives: To make aware about the methodologies, research process, effective analysis, presentation and outcome of library and information science research.

Learning Outcome

On studying this course, scholars shall be able to:

1. Develop the basic understanding of research methods as applied in disciplinary advancement of knowledge;
2. Gain understanding of the research process, its designs and ethical issues involved both in quantitative and qualitative research;
3. Critically examine researches in LIS, documentation and articulation of ideas.
4. Sharpen abilities in analysing and interpreting information and developing writing and presentation skills

Unit-1: Foundations of Research

- Philosophy of Library and Information Science Research (Rangnathan's approach to research)
- Relevant sources for LIS Research (Databases for Research synopsis and thesis, Institutional repositories, Key journals)
- Studies on Library and Information Science Researches: National and International
- Research problem and research design, formulating of hypothesis and developing of synopsis

Unit-2: Research Methods

- Methods of Research in Library and Information Science (Qualitative Vs Quantitative, Mixed)
- Quantitative Methods: Meaning, Measurement, Collection of data using sampling, Statistical analysis, presentation, ethical issues and integrity, case studies
- Qualitative methods: Meaning, Aims, Uses, Ethical issues, Collection of data, Management of data and analysis, case studies
- Mixed Research: Meaning, fundamentals principles, strengths and weaknesses, case studies

Unit-3: Data Analysis, Visualization and Interpretation

- Data Analysis: Statistical Methods
- Data Analysis: Software based analysis
- Data visualisation: Software based visualisation
- Interpretation and Discussions

Unit-4: Report Writing

- Working on word processing (MS Office/Open Office) and Latex
- Using Reference Management Tools
- Bringing out research publications and developing presentations
- Writing of Report

Recommended Reading

1. Connaway, L. S., & Radford, M. L. (2021). Research methods in library and information science (7th ed.). ABC-CLIO.
2. Connaway, L. S. & Powell (R R). (2010). Basic Research Methods for Librarians (5th ed.). California: Libraries Unlimited.
3. Glootenberg, A. (2013). Research Methodology in Library and Information Science, Uxbridge: Koros.
4. Goode, W. & Hatt, P. K. (1982). Methods in Social Research. New York: Mcgraw-Hill.
5. Kothari, C. R. (2006). Research Methodology: Methods & Techniques (Rev. Ed.). New Delhi :New Age International..
6. Vaughan, L. (2004). Statistical Methods For The Information Professional: A Practical, Painless Approach To Understanding, Using And Interpreting Statistics (2nd ed.). Medford : Information Today.
7. Willemese I. (2009). Statistical Methods and Calculation Skills (3rd ed.), Juta. Cape Town.
8. Babbie, Earl R. (2010). The Practice of Social Research. (12th ed.). Belmont, Ca: Wadsworth Cengage.
9. Muijs, Daniel. (2010). Doing Quantitative Research in Education with SPSS, (2nd ed). London: Sage Publications.
10. Creswell, J. W. (2013). Research Design: Qualitative, Quantitative, and Mixed Methods Approaches. London: Sage Publications.

Course-2: Using ICT for Research

Course Objectives: To make aware and give exposure to the ICT tools and techniques useful at various stages of research from using resources, organisation; analysis, presentation and visualisation of data and publishing and sharing of library and information science researches.

Learning Outcomes

On studying this course, scholars shall be able to**:**

1. Understand the applications of different technologies in Research process in order to better organization and outcomes;
2. Familiar with different resources, services, tools useful for carrying out research; and
3. Acquaint with the knowledge and skill towards the applications of the new ways of conducting research.

Unit-1: Finding and Using e-resources

- Search engines, directories and gateways, abstracting and indexing databases
- Online full text databases, online-journals, Open Access Journals (DOAJ),
- OERs and MOOCs on research methods and other related areas
- Citation index databases (SCOPUS, SCI), Google Scholar etc.

Unit-2: Using the Online services

- Databases of electronic theses (like Shodh Ganga), institutional repositories,
- Open e-archives, web-scale discovery services
- Digital libraries, video archives, etc.
- Tagging and micro-blogging, RSS Feeds

Unit-3: Integrating the tools

- Online questionnaires (using google forms, question pro, survey monkey, etc.)
- Research data management, statistical analysis (SPSS)
- Grammar and summary making/ paraphrasing
- Data sharing and collaborative writing (Google drive & drop box)

Unit-4: Communicating the researches

- Researcher's webpage/Blog
- Researchers' networks
- Academic identity
- Social networking tools

Recommended Reading

1. Cox, A., & Verbaan, E. (2018). Exploring research data management. Facet Publishing.
2. Smith, J., Rattray, J., Peseta, T., & Loads, D. (2015). Identity work in the contemporary University: Exploring an uneasy profession. Springer.
3. Evans, L., & Nixon, J. (2015). Academic identities in higher education: The changing European landscape. Bloomsbury Publishing.
4. Ray, J. M. (2014). Research data management: Practical strategies for information professionals. Purdue University Press.
5. Richardson, W. W. H. (2010). Blogs, Wikis, Podcasts, and Other Powerful Web Tools for Classrooms. Thousand Oaks: SAGE Publications.
6. Chowdhury, G. G., & Chowdhury, S. (2001). Information sources and searching on the World Wide Web. London: Facet Publishing.
7. Ingersoll, P. & Culshaw, J. (2004). Managing information technology: A handbook for systems librarians. Westport CT: Libraries Unlimited.

Course -3: Research and Publication Ethics

Course Objectives: To offer theoretical and practical knowledge about the research and publication ethics while conducting research in Library and Information Science covering issues related to scientific conduct, publication ethics, etc.

Learning Outcomes

On studying this course, scholars shall be able to**:**

1. To know on basics of philosophy of science and ethics, research integrity, publication ethics.
2. To identify research misconduct and predatory publication.
3. To acquaint the students with indexing and citation databases, open access publication, research metrics (citations, h-index, Impact Factor, etc.) and plagiarism tools will be introduced in this course.

Unit I: Philosophy and Ethics

- Introduction to Philosophy: Definition, nature and scope, concept, branches
- Ethics: Definition, moral philosophy, nature of moral judgments and reactions

Scientific Conduct

- Ethics with respect to science and research
- Intellectual honesty and research integrity
- Scientific misconducts: Falsification, fabrication, and plagiarism (FFP)
- Redundant publications: Duplicate and overlapping publications, salami slicing
- Selective reporting and misrepresentation of data

Publication Ethics

- Publication ethics: Definition, introduction and importance
- Best practices/ standards setting initiatives and guidelines: COPE, WAME, etc.
- Conflicts of interest
- Publication misconduct: Definition, concept, problems that lead to unethical behaviour and vice versa, types
- Violation of publication ethics, authorship and contributor ship
- Identification of publication misconduct, complaints and appeals
- Predatory publishers and journals

Unit II: Practice

Open Access Publishing

- Open access publications and initiatives
- SHERPA/RoMEO online resource to check publisher copyright & self-archiving policies
- Software tool to identify predatory publications developed by SPPU
- Journal finder/ journal suggestion tools viz. JANE, Elsevier Finder, Springer Journal Suggested, etc

Publication Misconduct Group Discussions

- Subject specific ethical issues, FFP, authorship
- Conflicts of interest
- Complaints and appeals: examples and fraud from India and abroad Software tools Use of plagiarism software like Turnitin, Urkund and other open source software tools

Unit III: Databases and Research Metrics

Databases

- Indexing databases
- Citation databases: Web of Science, Scopus, etc.

Research Metrics

- Impact Factor of Journal as per Journal Citation Report. SNIP, SJR, IPP, Cite Score
- Metrics: h-index, g index, i10 index, altmetrics

Recommended Reading

1. Bird, A. (2006). Philosophy of Science. Routledge.
2. Mac Intyre, Alasdair (1967). A short history of ethics. London.
3. P. Chaddah (2018). Ethics in competitive research: Do not get scooped; do not get plagiarized, ISBN:9789387480865
4. National Academy of Science, National Academy of Engineering and Institute of Medicine (2009). On being a scientist: A guide to responsible conduct in research: Third edition. National Academies Press.
5. Resnik, D.B. (2011). What is ethics in research & why is it important. National Institute of Environmental Health Science, 1-10. Retrieved from htt://www.niehs.nih.gov/research/resources/bioethics/whatis/index.cfm Bell, J. (2012). Predatory Publishers are corrupting open access. Nature, 489(7415), 179-179. http//doi.org/10.1038/489179a
6. Indian National Science Academy (INSA), (2019). Ethics in Science Education, Research and Governance. ISBN: 978-81-939482-1-7. http://www.insaindia.in /pdf/Ethics_Book.pdf

Course-4 (A): Advances in the area of Library and Information Science

Course Objectives: To offer broad knowledge of the subject /area the student intend to undertake for research in a manner that he is having knowledge of the newer developments, trends, scope of the subject/area.

Learning Outcomes

On studying this course, scholars shall be able to:

1. Know the key publication outlets of the area chosen for study
2. Understand the boundaries and scope of the area chosen for the study
3. Familiar with the developments and recent researches in the chosen area of the study.

(The individual teacher(s) would identify the area and would employ the tentative outline for developing the syllabus)

Unit-1: Growth and development in the research area

- Genesis of the research area
- Publications in the research area
- Contributors of the research area
- Institutions in the research area

Unit-2: Trends in the research area

- Changing perspectives in the research area
- Current state in the research area
- Key themes of the research area
- Trends in the research area

Unit-3: World literature in the research area

- Printed resources
- Electronic resources and e-journals
- Open Access Resources
- Identifying useful information sources and resources

Unit-4: Scope of the research area

- Organising the researches
- Scope of the research area identified
- Developing assumptions and prepositions about the research area
- Inter-relationships with other areas of research

(Note: concerned Teacher(s) may help the students to develop the List of Reference sources on the chosen area).

Recommended Reading

1. Fink, A. (2019). Conducting research literature reviews: From the internet to paper. SAGE Publications.
2. Hempel, S. (2019). Conducting your literature review. American Psychological Association.
3. Botyriute, K. (2018). Access to online resources: A guide for the modern librarian. Springer.
4. Ridley, D. (2012). The literature review: A step-by-step guide for students. SAGE.
5. Suber, P. (2012). Open access. MIT Press.
6. Bailey, C. W. (2010). Transforming scholarly publishing through open access: A bibliography. Charles W Bailey Jr.
7. Willinsky, J. (2006). The access principle: The case for open access to research and scholarship. Digital Libraries and Electron.
8. Robinson-Pant, A. (2005). Cross cultural perspectives in educational research. McGraw-Hill Education (UK).

Course-4 (B): Annotated Bibliography and Presentation

Course Objectives: To provide theoretical and practical knowledge of various aspects of knowledge of compiling annotated bibliography and making presentations on an area.

Learning Outcomes

On studying this course, students shall be able to:

1. Know the basic need, objectives and types of bibliographies.
2. Understand steps involved in compiling a bibliography
3. Prepare an annotated bibliography on the chosen subject of research
4. Collect information and make presentations on the subject

Unit-1: Basics of Annotated Bibliography

- Introduction to annotation, annotation vs abstracts,
- Annotated bibliography: concept and examples
- Purpose and types of annotated bibliographies,
- Ordinary bibliography Vs Annotated Bibliography

Unit-2: The Process of Developing Annotated Bibliography

- Identifying the theme, locating the resources
- Examining and reviewing the resources
- Selecting the sources
- Critically appraising the sources, choosing the citation style

Unit-3: Using Reference Management Tools for preparing Annotated Bibliography

- Reference management tools- general information, selecting the reference management tool, installations and readiness for use
- Creating library and collection, selecting items, importing item, incorporating the appropriate information, bringing out the annotated bibliography
- Describing the area, scope, process, team, content page, arrangements, index
- Layout and design, and inserting the text of the items selected in the annotated bibliography and presentation

Unit-4: Preparing presentation

- Choosing the topic, reasons for giving presentation, knowing the target audiences,
- Gathering the information, describing the main points, make the content interesting but easy to understand
- Choose the appropriate template,
- Collecting feedback, practice for delivery

Seminar Presentations on Recent Trends in LIS

Preparing Annotated Bibliographies on Topics of Recent Development

Recommended Reading

1. Baba, Abdul Majid; Bhardwaj, Raj Kumar; Dhaka, S.S.; Ashraf, Tariq & Hasan, Nabi (Eds.). (2018). Developing Smart Libraries: Changes, Challenges, Issues & Strategies: Proceedings of the 3rd International Conference of Asian Libraries (ICAL-2018). (pp. xix, 688). New Delhi: Asian Library Association.

2. Hussain, A., & Fatima , N. (2017). Emerging Trends in Information Technology in Modern Libraries. Manakin Press.

3. Joiner, I. A. (2018). Emerging Library Technologies: It's Not Just for Geeks. Chandos Publishing.

4. Jones, W. (2008). EJournals Access and Management. New York: Routledge.

5. Kaushik, A. (2018). Library and Information Science in the Age of MOOCs. USA: IGI Global. doi:10.4018/978-1-5225-5146-1

6. Kataria, Sanjay et al. (Ed.) (2018). Proceedings of 5th International Symposium on Emerging Trends and Technologies in Libraries and Information Services. Available at https://ieeexplore.ieee.org/xpl/mostRecentIssue.jsp?punumber=8467458

7. Kataria, Sanjay et al. (Ed.). (2012). Future of Libraries in Digital Age. New Delhi: KBD Publication 2012.

8. Kataria, Sanjay, John Paul Anbu K, Shri Ram (Ed.) (2010). Emerging Technologies and Changing Dimensions of Libraries and Information Services. New Delhi: KBD Publication.

9. Kataria, Sanjay Nigam BS and Shukla, RK (Ed.) (2008). Emerging Trends and Technologies in Libraries and Information Services. New Delhi: KBD Publication.

Course-4 (C): Sustainable Development Goals and Information Management

Course Objectives: To familiarise about the SDGs and the areas of SDGs on which some understanding is developed in order to choose society/community-centred problems of research in Library and Information Science.

Learning Outcomes

On studying this course, scholars shall be able to:

1. Understand the emergence and development of the SDGs
2. Understand how the different SDGs are interrelated and the overall structure
3. Acquire an understanding of how the SDGs relate to addressing global challenges such as inequality, climate change, poverty, unsustainable consumption and production, and peace and security
4. Acquire an understanding of the institutional infrastructure, acquire resources and employ tools in place that aims to realize SDG goals so that evidence-based information management is achieved.

Unit-1: Background knowledge of SDGs

- History and origins of the SGDs
- Concept and aims of the SGDs
- Methodology and perspectives of the SGDs.
- Relationship of SGD with Millennium Development Goals

Unit-2: SDGs and Society

- Goals related to p**overty**, hunger, health & well-being and education
- Goals related to gender equality, affordable and clean energy, sustainable cities & communities, and peace, justice & strong institutions
- Goals related to work & economic growth, industry, innovation & infrastructure, inequalities, responsible production & consumption
- In-depth discussion and analysis of goals related to clean water, climate, life below water and life on land

Unit- 3: SDGs and information requirement

- SDGs and their inter-relationships and the key areas for interventions for LIS professionals
- Understanding the information requirement and role of information units in achieving SGDs
- Various information management agencies, institutions, associations involving in advocating for Information role in SDGs
- Advocacy materials for information role in SDGs

Unit-4: Information Management

- Information support through appropriate resources, materials, approach and mindset
- Employing technologies for innovative practices in supporting various projects
- Key information management projects related to smart cities, new business models for healthcare, sustainable energy, climate and disaster management, poverty alleviation, expanding education, social entrepreneurship, etc.
- Best Practices in information management in achieving SDGs

- **Recommended Reading**

1. Filho, W. L., Salvia, A. L., Brandli, L., Azeiteiro, U. M., & Pretorius, R. (2021). *Universities, sustainability and society: Supporting the implementation of the sustainable development goals*. Springer Nature.
2. Hazra, S., & Bhukta, A. (2021). *Sustainable development goals: An Indian perspective*. Springer.
3. Nocenzi, M., & Sannella, A. (2020). *Perspectives for a new social theory of sustainability*. Springer Nature.
4. Leicht, A., Heiss, J., & Byun, W. J. (2018). *Issues and trends in education for sustainable development*. UNESCO Publishing.
5. Marolla, C. (2018). *Information and communication technology for sustainable development*. CRC Press.
6. Hinton, M. (2006). *Introducing information management*. Routledge.

Annexure-LV

Revision in PG and PhD syllabi of Microbiology

Kamla Chaudhary <chaudharykamla@gmail.com> Tue, Sep 7, 2021 at 8:55 PM
To: Microbiology Department <hodmicrobiology@cuh.ac.in>
Cc: Virdi JS <virdi_dusc@rediffmail.com>, virdi_dusc@south.du.ac.in, "Dr. Surender Singh" <surendersingh@cuh.ac.in>, avijit pramanik <avijit@cuh.ac.in>, puja yadav <pujayadav@cuh.ac.in>, vinodyadav <vinodyadav@cuh.ac.in>, jitendra saini <jitendrasaini@cuh.ac.in>, Gunjan Goyal <ggoel@cuh.ac.in>

Thanks for the mail. I have gone through the revised syllabus. Both the syllabi have been updated accordingly as per the UGC norms.
Approved as proposed by you.
With regards,

Kamla Chaudhary

On Wed, Sep 1, 2021, 18:09 Microbiology Department <hodmicrobiology@cuh.ac.in> wrote:

> Dear Sir and Mam,
>
> As per the NEP 2020, we have been trying to revise and update our syllabus of M.Sc. Microbiology including LOCF based curriculum with,multidisciplinary, interdisciplinary and skill oriented course curriculum. Also, we have updated our syllabus for the Ph.D. program.
>
> As a BoS (Board of Studies) member, I request you to please review, suggest any modifications required thereof. .
>
> With kind regards
> Gunjan
> Gunjan Goel, PhD
> Head and Associate Professor
> Department of Microbiology
> School of Interdisciplinary and Applied Sciences (SIAL)
> Central university of Haryana
> Mahendergarh, Haryana
> Phone: 9882125930
> Email: hodmicrobiology@cuh.ac.in
> web: www.cuh.ac.in

Reply: Revision in PG and PhD syllabi of Microbiology

1 message

Virdi JS <virdi_dusc@rediffmail.com> Thu, Sep 9, 2021 at 12:42 PM
To: Microbiology Department <hodmicrobiology@cuh.ac.in>

Dear Dr. Gunjan
Thank you very much for confirming change of Course title 'Advanced Immunology' to 'Immunology' for PhD students as suggested by me.
I have carefully gone through the revised syllabi for both M.Sc. and PhD students of Microbiology as per the guidelines of the NEP 2020 and LOCF.
Both the syllabi are approved.
Best wishes.
(J.S.Virdi)

J. S. Virdi, Formerly Prof., Department of Microbiology, University of Delhi South Campus, Benito Juarez Marg, New Delhi-110 021, India. virdi_dusc@rediffmail.com / virdi.dusc@gmail.com; Mobile 98187 67164

2019: Deptt. Website (http://microbio.du.ac.in/web3/index.php?page=faculty-profiles)
2019: Formerly, President, Association of Microbiologists of India (AMI) (http://amiindia.info/office_bearer.php)
2016: Discovery Award, UK (https://longitudeprize.org/teams/university-delhi-south-campus-amr-team)
2016: Lab Mentor Award, US (https://drive.google.com/file/d/0B54__Hd4jW2dLXhCSEVkeHVvOWs/view)
2015:BIRAC AMR Idea-thon Prize, India (https://www.facebook.com/jugsharan.virdi)
2006: ICMR Award, India (https://twitter.com/JugsharanVirdi)

From: Microbiology Department <hodmicrobiology@cuh.ac.in>
Sent: Thu, 09 Sep 2021 12:34:24
To: Virdi JS <virdi_dusc@rediffmail.com>
Subject: Re: Revision in PG and PhD syllabi of Microbiology

Dear Sir

Thanks for your suggestions. We will change the course to Immunology, in Ph.D. Syllabus.

Looking forward to hearing from you for further suggestions and approval of both M.Sc, and Ph.D. syllabi

With regards
Gunjan
Gunjan Goel, PhD
Head and Associate Professor
Department of Microbiology
School of Interdisciplinary and Applied Sciences (SIAL)
Central university of Haryana
Mahendergarh, Haryana
Phone: 9882125930
Email: hodmicrobiology@cuh.ac.in
web: www.cuh.ac.in

On Tue, Sep 7, 2021 at 11:18 PM Virdi JS <virdi_dusc@rediffmail.com> wrote:

> Dear Gunjan
> The contents incorporated in the 'Advanced Immunology' for PhD students cannot be really called as advanced. This is 'Immunology'. Better change it to that. You may discuss it with me tomorrow morning.
> Regards.
> (j.s.virdi)
>
> J. S. Virdi, Formerly Prof., Department of Microbiology, University of Delhi South Campus, Benito Juarez Marg, New Delhi-110 021, India. virdi_dusc@rediffmail.com / virdi.dusc@gmail.com; Mobile 98187 67164
>
> 2019: Deptt. Website (http://microbio.du.ac.in/web3/index.php?page=faculty-profiles)
> 2019: Formerly, President, Association of Microbiologists of India (AMI) (http://amiindia.info/office_bearer.php)
> 2016: Discovery Award, UK (https://longitudeprize.org/teams/university-delhi-south-campus-amr-team)
> 2016: Lab Mentor Award, US (https://drive.google.com/file/d/0B54__Hd4jW2dLXhCSEVkeHVvOWs/view)

2015:BIRAC AMR Idea-thon Prize, India (https://www.facebook.com/jugsharan.virdi)
2006: ICMR Award, India (https://twitter.com/JugsharanVirdi)

From: Microbiology Department <hodmicrobiology@cuh.ac.in>
Sent: Wed, 01 Sep 2021 18:09:57
To: Virdi JS <virdi_dusc@rediffmail.com>, virdi_dusc@south.du.ac.in, Kamla Chaudhary <chaudharykamla@gmail.com>
Cc: "Dr. Surender Singh" <surendersingh@cuh.ac.in>, avijit pramanik <avijit@cuh.ac.in>, puja yadav <pujayadav@cuh.ac.in>, vinodyadav <vinodyadav@cuh.ac.in>, jitendra saini <jitendrasaini@cuh.ac.in>, Gunjan Goyal <ggoel@cuh.ac.in>
Subject: Revision in PG and PhD syllabi of Microbiology

Dear Sir and Mam,

As per the NEP 2020, we have been trying to revise and update our syllabus of M.Sc. Microbiology including LOCF based curriculum with,multidisciplinary, interdisciplinary and skill oriented course curriculum. Also, we have updated our syllabus for the Ph.D. program.

As a BoS (Board of Studies) member, I request you to please review, suggest any modifications required thereof. .

With kind regards
Gunjan
Gunjan Goel, PhD
Head and Associate Professor
Department of Microbiology
School of Interdisciplinary and Applied Sciences (SIAL)
Central university of Haryana
Mahendergarh, Haryana
Phone: 9882125930
Email: hodmicrobiology@cuh.ac.in
web: www.cuh.ac.in

Learning Outcomes based Curriculum Framework (LOCF) for M.Sc. Microbiology

New Education Policy-2020



CHOICE BASED CREDIT SYSTEM COURSE (CBCS- 2021 COURSE)

DEPARTMENT OF MICROBIOLOGY
SCHOOL OF INTERDISCIPLINARY AND APPLIED SCIENCES
CENTRAL UNIVERSITY OF HARYANA

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1. Background

1.1 Introduction to the Microbiology and the Department

The M.Sc. Microbiology programme provides a platform to inculcate the basic understanding of microbes and to develop skills related to different areas of Microbiology. Microbiology is a core subject of life sciences and is required as a platform course in all the areas of biological sciences. Public private sector entities look for skilled microbiology workforce preferably at post graduate level. Keeping that in mind this M.Sc. Microbiology scheme and syllabi is designed to provide thorough and updated knowledge of the subject, to enable easy entry for the students in public private sector workforce and to prepare researchers for carrying out research in cutting edge areas of Microbiology. In this course there are practicals in each semester to train the students with hands on laboratory skills. One core course on seminar presentation has been added which will help in developing public speaking skills and critical thinking in the students. For hands on training in different core areas of Microbiology, there is one full semester dissertation work in this programme. In the dissertation work student is given a research problem and experimental path seeking the solution to the selected problem. Student will be collecting data, analyse it and present it both orally and in writing. All these rigorous paths will produce a skilled human resource for the changing societal need.

The Department of Microbiology was established in June 2015 with the vision of bridging the gap between classical microbiology and applied aspects of microbiology with research on infectious diseases, Immunology, Food and agriculture, biofuels and bioenergy. The main objective of the Department is to impart quality education in the field of Microbiology and to create trained microbiologist to contribute to the fields of food production, pharmaceuticals, agrochemicals, environment, agriculture and public health research. The Department of Microbiology aims at using Microbial research as a tool for the benefit of mankind.

The Department offers M.Sc and Ph.D. program in Microbiology where the students are working in the areas of Immunology, Medical Microbiology, Molecular Biology, Food Microbiology Environmental Microbiology Soil & Agricultural Microbiology and Industrial Microbiology. The department also organizes various workshops, seminar, guest lectures in subject specific domains to enrich our students with recent developments in the field of Microbiology.

Research in the department seeks to meet challenges and provide information to us to eliminate pathogens, prevent newly emerging infectious diseases, and sustainable solutions of agricultural and environmental issues. The faculty members of the department are trained and have research expertise in different field of microbiology and are engaged in several research projects funded by various organizations such as UGC, DBT, DST, AISTDF and industry. The vision of our department is to become an internationally renowned and ideal department through highest teaching standards and performing quality research. The department houses several pieces of high end equipments. More than 100 papers have been published by the faculty of the Department in journals of National and International repute.

1.2 Introduction to the programme

The **M.Sc. Microbiology Programme** offered by Central University of Haryana is of two years duration and is divided into four semesters. The various courses of the programme are designed to include lectures, laboratory work, project training, viva, seminars, assignments and field trips. At the end of the programme, the student will be well-versed in basic as well as the advanced microbiology techniques and will gain hands-on experience in microbiology, including fermentation technology and molecular biology techniques.

Four categories of courses will be offered:

Core Courses: Include theoretical as well as practical courses

Elective courses: Include theoretical as well as practical Department specific courses, Student must opt for two out of four courses offered by the Department)

Open Elective: in 1st and 3rd semester student may opt for any one open elective offered by other departments of the university/ through swayam portal.

Skill Enhancement Elective Course: A separate project training-based course that leads to a dissertation worth twenty credits is also one of the Core Courses

The courses have also been designed in terms of skill enhancement in the students such as Industrial Microbiology, Biostatistics and Bioinformatics, Food and Dairy Microbiology, Advanced analytical techniques.

A student is required to accumulate a total of 100 credits to fulfill the requirements for a Master of Science degree in Microbiology.

1.3 Vision of the Department

The Department serves to be in the frontline of the field of Microbiology, aiming to be recognized as amongst the best for education and research in Microbiology.

1.4 Mission of the Department

- To equip the young minds with fundamental & applied knowledge in Microbiology
- To promoting all round personality development through multi-dimensional education
- To produce skilled human resource who can choose research areas or professional career as Microbiologists in industries and institutes.

2. PROGRAMME EDUCATIONAL OBJECTIVES (PEOS)

PEO-1 To inculcate scientific knowledge and professional ethics for the overall development of students

PEO-2 To equip the students with advanced microbiological analytical skills

PEO-3 To impart the students with entrepreneurial skills in microbiology to make them ready to contribute to society as responsible individuals

3. PROGRAMME OUTCOMES (PO):

- **Basic and applied knowledge:** Interdisciplinary knowledge to find solution for the complex biological problems
- **Problem analysis:** Ability to analyse society related/ applied research problem, design and execute experiments to find relevant solutions
- **Advanced Usage of Technology**: Apply advanced instrumentation tools, online resources with an understanding of the troubleshooting and limitations
- **Ethics:** Commitment towards professional ethics and responsibilities as a social endeavor to bring harmony with nature
- **Lifelong learning:** Scientific skills for industrial applications and entrepreneurship

4. PROGRAMME SPECIFIC OUTCOMES (PSOS)

PSO-1 Comprehensive theoretical and advanced knowledge on importance of microbes in diverse sphere of life

PSO-2: Familiarized with advanced tools and techniques of microbiological sciences.

PSO-3: Capacity to develop, employ and integrate technical and professional skills as a member of team withholding the essence of collaboration, cooperation and integrity

PSO-4 Entrepreneurial skill development through critical analysis of problems and hands on training for providing their sustainable solutions

PSO-5 Analysis of scientific or societal issues across the spectrum of related discipline.

PSO-6 Ability to upgrade knowledge independently and act upon means of improvement for life long learning.

PSO-7 Uphold the responsibility as a global citizen maintaining professional and ethical values

5. About Post Graduate attributes

The Masters course is designed to develop the current skills and abilities in the students in basic as well as advanced areas of Microbiology. A special emphasis is laid on the practical aspects of different areas of Microbiology as well as skill development. A course on Scientific communication skill development and seminar presentations will enhance of communication skills, socialistic approach and leadership qualities in the students. The course will provide highly skilled and knowledgeable manpower for different industrial sectors such as agriculture, food and dairy, medical and paramedical field as well as pursuing higher studies in reputed research institutes. A major component of the course is a skill enhancement elective course comprising complete semester for a research project. The student is guided throughout the semester for executing experiments related to a research problem and presenting the results in the form of an oral presentation as well as a thesis. The research work is evaluated through oral presentation alongwith a viva-voce. This activity will foster self-confidence and self-reliance in the student as he/she learns to work and think independently.

6. Structure of Master Course

6.1 Credit Summary Total Credits: 100

Semester	Credits				Total credits
	Core courses	Skill enhancement course	Elective courses		
			DCEC (Department specific elective)	GEC (Open Elective For other Department students)	
I	21	-	-	4	**25**
II	23	-	4	-	**27**
III	21	-	4	4	**29**
IV	3	16	-	-	**19**
Total	**68**	**16**	**8**	**8**	**100**

Credit distribution:

Core Theory courses: 68%
Core Practical/ Skill oriented courses: 30%
Multidisciplinary integrated courses: 17%

Semester wise Course Curriculum and Credit distribution Total credits: 100

Semester-I (Total credits - 25)

Course code	Course title	L	T	P	Type of course	Credit
SIAS MB 1 1 01 C 3003	Cell and Molecular Biology	3	0	0	Core	3
SIAS MB 1 1 02 C 3003	Principles of Biochemistry	3	0	0	Core	3
SIAS MB 1 1 03 C 3003	Essentials of Microbiology	3	0	0	Core	3
SIAS MB 1 1 04 C 4004	Microbial Diversity	4	0	0	Core	4
SIAS MB 1 1 05 C 3003	Virology	3	0	0	Core	3
SIAS MB 1 1 06 C 00105	**Practical-I**	0	0	10	Core	5
	Generic Elective Course (to be opted from other Department)	4	0	0	GEC	4

Semester-II (Total credits - 27)

Course code	Course title	L	T	P	Type of course	Credit
SIAS MB 1 2 01 C 4004	Advanced Analytical Techniques	4	0	0	Core	4
SIAS MB 1 2 02 C 4004	Microbial Genetics	4	0	0	Core	4
SIAS MB 1 2 03 C 2002	Biosafety, Bioethics and IPR	2	0	0	Core	2
SIAS MB 1 2 04 C 4004	Microbial Physiology and Metabolism	4	0	0	Core	4
SIAS MB 1 2 05 C 4004	Food and Dairy Microbiology	4	0	0	Core	4
SIAS MB 1 2 06 C 00105	Practical-II	0	0	10	Core	5

SIAS MB 1 2 01 DCEC 4004	Soil and Agriculture Microbiology [#]	4	0	0	DCEC	4
SIAS MB 1 2 02 DCEC 4004	Environmental Microbiology[#]	4	0	0	DCEC	4
SIAS MB 1 2 03 DCEC 4004	The Microbiome[#]	4	0	0	DCEC	4

*One of the courses will be opted by the student.

Semester-III (Total credits – 29)

Course Code	Course Title	L	T	P	Type of Course	Credit
SIAS MB 1 3 01 C 3003	Biostatistics and Bioinformatics	3	0	0	Core	3
SIAS MB 1 3 02 C 4004	Microbial Genomics, Proteomics and Metabolomics	4	0	0	Core	4
SIAS MB 1 3 03 C 4004	Industrial Microbiology	4	0	0	Core	4
SIAS MB 1 3 04 C 4004	Medical Microbiology and Immunology	4	0	0	Core	4
SIAS MB 1 3 05 C 0084	Practical-III	0	0	8	Core	4
SIAL MB 1 3 06 C 0202	Seminar	0	2	0	Core	2
SIAS MB 1 3 04 DCEC 4004	Biofertilizer and Compost Technology	4	0	0	DCEC	4
SIAS MB 1 3 05 DCEC 4004	Plant Pathology[#]	4	0	0	DCEC	4
SIAS MB 1 3 06 DCEC 4004	Biofuels and Bioenergy[#]	4	0	0	DCEC	4
	Generic Elective Course (to be opted from other Department)	4	0	0	GEC	4

[#]One of the course will be opted by the student**.**

Semester-IV (Total credits - 19)

Skill Enhancement Course

Course Code	Course Title	Type of Course	Credit
SIAS MB 1 4 01 C 3003	Research Methodology and Scientific Communication skills (online)	Core	3
SIAS MB 1 4 01 SEEC 0016	Dissertation	Core	16
	Total credits of the Program		**100**

Generic Elective Course (GEC): Offered by Department of Microbiology to students from other Departments of University.

Semester	Core/ Elective	Paper Code	Title of the Paper	Credit
I	GEC	SIAS MB 1 1 01 GEC 4004	Techniques in Microbiology	4
III	GEC	SIAS MB 1 3 03 GEC 4004	Applied Microbiology	4
	GEC	SIAS MB 1 3 04 GEC 4004	Microbes and Diseases	

SEMESTER-I

Course title: Cell and Molecular Biology **Credit: 3**
Course code: SIAS MB 1 1 01 C 3003 **Lectures: 45**

Course objectives:

- Detailed knowledge on fine structure and function of the cell.
- Familiarity with molecular biology pathways as cellular processes

Course Learning outcomes

- Understanding the organization of cell.
- Understanding the mechanisms of cell-to-cell communication.
- Knowledge on structure and function of DNA as genetic material.
- Molecular basis of genetic information and function

Unit-I

Archea, prokaryotic and eukaryotic cell (animal and plant cells); Theory of origin of eukaryotic cells; Structure and function of nucleus - nuclear envelope, nuclear pore complex; Nuclear protein-import and export, regulation of nuclear protein import and export; Organization of golgi, lysosome, structure and functions of ER, lysosome, mitochondria, chloroplasts and peroxisomes; Fluid mosaic model, membrane proteins, membrane lipids and membrane fluidity; Transport across cell membrane, passive transport, active transport-primary (P-type, F-type, V-type ATPases, ABC transporters), co-transport-symport and antiport; Ion channels, aquaporins, pinocytosis and phagocytosis; Cells as experimental models.

Unit-II

Introduction to cytoskeletal proteins; Organization of cytoskeletal protein and smooth muscle and skeletal muscles, movement of vesicles-role of actin and myosin; Structure of cilia and flagella; Prokaryotic and eukaryotic cell wall, cell matrix proteins; Cell-matrix interactions and cell-cell interactions; Adherence junctions, tight junctions, gap junctions, desmosomes, hemi-desmosomes, focal adhesions and plasmodesmata; Signalling molecules, receptors and their functions – G protein coupled receptors- Cyclic-AMP, Cyclic-GMP, IP3, Calcium, Receptor tyrosine kinases - EGF, insulin.

Unit-III

DNA as genetic material, forms of DNA; structure of various type of DNA; chromatin structure; super coiling; polytene and lamp brush chromosomes; properties of DNA in solution; denaturation and renaturation; reassociation reactions; COT curves; types of RNAs and their structures; role of RNA; Unusual bases in RNA; central dogma of molecular biology; DNA polymerases and other enzymes involved in replication; mutagenesis.

Unit-IV

Prokaryotic and eukaryotic gene structure: transcription-RNA polymerase, inhibitors of transcription; proof reading function and fidelity of DNA replication; possible modes of DNA

replication; theta model and rolling circle model of DNA replication; replication of DNA in eukaryotes; role of methylation; replication of viral RNA; reverse transcriptase, regulatory region and transcriptional unit of gene; post transcriptional processing of RNA: splicing, cap addition and polyadenylation, polynucleotide phosphorylase.

Suggested readings:

1. Cooper, GM, (2018) The Cell: A Molecular Approach 8th ed., Sinauer Associates is an imprint of Oxford University Press, ISBN: 1605357073.
2. Lodish H, Berk A, Zipursky SL, Matsudaira P, Baltimore D and Darnell J, WH (2016) Molecular Cell Biology 8th ed., Freeman & Company (New York), ISBN: 978-1-4641-0981-2 / ISBN:10: 1464183392.
3. Alberts B, Johnson A. Lewis J and Enlarge M (2008) Molecular Biology of the Cell 6th ed., Garland Science (Princeton), ISBN: 0-8153-1619-4 / ISBN:0-8153-1620-8.
4. Nelson DL, Cox MM, (2017) 7th ed., Lehninger Principles of Biochemistry. W.H. Freeman and Company, New York, USA. ISBN-10: 1-4641-2611-9.
5. Stryer L, Berg JM, Tymoczko JL, Gatto, Jr. GJ (2019) Biochemistry 9th ed., W.H. Freeman and Company, New York, USA. ISBN-10: 1-319-11467-9
6. Lewin B, Krebs J, Kilpatrick ST, Goldstein ES, (2017) Genes XII 12th Revised ed., Jones and Bartlett Publishers, Inc. Sudbury, Massachusetts, USA. ISBN No. 9781284104493.
7. Watson JD, Baker TA, Bell SP, Gann A, M, Levin RL and Cumming B (2013) Molecular Biology of the Gene 7th ed., San Francisco, ISBN: 0321905377.

SEMESTER-I

Course title: Principles of Biochemistry **Credit: 3**
Course code: SIAS MB 1 1 02 C 3003 **Lectures: 45**

Course Objectives

- To provide students with an understanding of biomolecules, the basic building blocks of living organisms
- To impart knowledge on metabolic and synthetic pathways of major biomolecules.

Course Learning Outcomes:

- Acquainted with chemical and molecular structures of biomolecules
- Able to determine the significance, role of biomolecules
- Able to determine the metabolic pathways in synthesis of biomolecules

Unit-I

Monosaccharides-structure of aldoses and ketoses, ring structure of sugars, conformations of sugars, mutarotation, anomers, epimers and enantiomers. Disaccharides: maltose, lactose and sucrose. Polysaccharides: homo and hetero-polysaccharides, structural and storage polysaccharides. Glycolysis - a universal pathway, reactions of glycolysis, production of acetyl CoA, reactions of citric acid cycle. Gluconeogenesis, glycogenesis and glycogenolysis.

Unit-II

Building blocks of lipids - fatty acids, glycerol, ceramide. Storage lipids - triacyl glycerol and waxes. Structural lipids in membranes-phospholipids, glycerophospholipids, galactolipids, sulpholipids, sphingolipids and sterols. β-oxidation of fatty acids. Fatty acid synthase complex. Synthesis of fatty acids.

Unit-III

Amino acids and peptides- classification (essential and non-essential amino acids), chemical reactions and physical properties. Introduction to protein structure and function. Enzymes: classification, kinetics (significance of k_m, k_{cat} and V_{max}), inhibition; amino acid metabolism-amino acid deamination and transamination, urea cycle. Synthesis and utilization of ketone bodies. Biosynthesis and breakdown of nutritionally non-essential amino acids. Synthesis of other amino acid derivatives such as neurotransmitters.

Unit-IV

Nucleotides - structure and properties. Nucleic acid structure-Watson - Crick Model of DNA. Structure of major species of RNA - mRNA, tRNA and rRNA. De novo synthesis of purine and pyrimidine nucleotides. Catabolism of purine and pyrimidine. Disorders of purine and pyrimidine metabolism.

Suggested readings:

1. Nelson, DL and Cox, MM (2017) Lehninger: Principles of Biochemistry 7th ed., WH Freeman and Company (New York), ISBN: 978-1319108243.
2. Garrett RH and Grisham CM (2017) Biochemistry 6th ed., , Brooks/Cole, ISBN: 9781305577206.
3. Rodwell VW, Bender DA, Botham KM, Kennelly, PJ and Weil PA (2018) Harper's Illustrated Biochemistry 7th ed., McGraw-Hill, ISBN: 9781259837937.
4. Ferrier, DR (2017) Lippincott's Illustrated Reviews Biochemistry 7th ed., Wolters Kluwer India Pvt. Ltd., ISBN: 978-9351297949.
5. Stryer L, Berg JM, Tymoczko JL, Gatto Jr. GJ (2019) Biochemistry 9th ed., W.H. Freeman and Company, New York, USA. ISBN-10: 1-319-11467-9.

SEMESTER-I

Course title: Essentials of Microbiology **Credit: 3**
Course code: SIAS MB 1 1 03 C 3003 **Lecture: 45**

Course objectives:

- To impart knowledge of historical discoveries in domain of Microbiology
- To make students familiar with organization of cellular components and their functions

Course Learning outcomes:

- Demonstrate the practical skills in basic microbiological techniques
- Designate the role of microorganisms in different ecosystems

- Retrieve and use contemporary information on different microbial groups

Unit-I

History and scope of Microbiology in 20th century; The spontaneous generation controversy; Germ theory of disease; Methods in microbiology: Preparation of microbiological media, Physical and chemical methods of sterilization; Pure culture techniques, maintenance and preservation of microbial cultures.

Unit-II

Bacterial Classification - Basis of bacterial classification and Archaea according to the Bergey's Manual of Systematic Bacteriology, Haeckel's three kingdom concept, Whittaker's five kingdom concept, three domain concept of Carl Woese, conventional, molecular and recent approaches to polyphasic bacterial taxonomy; evolutionary chronometers.

Unit-III

Organization of Bacterial Cell : Gram-positive and Gram-negative bacteria; Extracellular appendages: flagella- arrangement, basic structure and locomotive function; pili- different types, their distribution among bacteria & related functions; fimbriae- occurrence, function and features distinguishing pili and fimbriae; glycocalyx- composition and role in bacteria; and capsule-microcapsule and slime, General characteristics of archaea; differences between eubacteria and archaebacteria. key features of model archaeal organisms: Halobacterium; Pyrococcus; Sulfolobus; and Methanococcus.

Unit-IV

Bacterial Quorum sensing and role of biofilms and quorum sensing in microbial pathogenicity. Antimicrobial resistance, Methodologies for testing of antimicrobial activity (broth-dilution methods and agar diffusion methods), Introduction to two component system and its role in regulation of virulence determinants. horizontal gene transfer (HGT) and pathogenicity islands (PAI).

Suggested readings:

1. Tauro P, Kapoor KK, Yadav KS, and Sequeira MG (2019) An Introduction to Microbiology 3rded., New Age International Publishers. ISBN: 0852268785.
2. Madigan MT, Martinko JM, Bender KS, Buckley DH, Stahl DA (2018) Brock Biology of Microorganisms, 15thed., Pearson Education, ISBN 9781292235103.
3. Sherwood LM, Woolverton C.J (2017) Prescott's Microbiology, 10th ed., McGraw-Hill Education. ISBN 9781259281594.
4. Dubey, R.C. and Maheswari, D.K (2013) A text book of Microbiology 3rd ed.. Revised S. Chand and Company Ltd, New Delhi. ISBN: 9788121926201.
5. Pelczar Jr. M (2001) Microbiology 5th ed., McGraw Hill Education ISBN: 9780074623206.

SEMESTER-I

Course title: Microbial Diversity **Credit: 4**
Course code: SIAS MB 1 1 04 C 4004 **Lectures: 60**

Course objectives:

- To impart through knowledge on different groups of microorganisms
- To make students aware of significance of each group

Course Learning outcomes:

- Understanding the diversity of microbial world and their implications
- Understanding the basic structure, classification and importance of different microbial groups.
- Understanding of other microbial groups
- Understanding the characteristics and significances of different microbial groups

Unit-I

Morphology and fine structure of Bacteria: Morphological types – size, shape and arrangements; cell walls of archaea, Gram negative, Gram positive eubacteria. Structure and function of cell appendages and inclusions: capsule types, composition and function; flagella, fimbrae, pili, cilia, gas vesicles, chromosomes, carboxysomes, magnetosomes, phycobillisomes, nucleoid, plasmids (types of plasmids and function); Bacterial spores. Photosynthetic bacteria and cyanobacteria.

Unit-II

Introduction of algae: Occurrence and distribution, thallus structure, characteristics, nutrition, classification and reproduction. cell structure, pigmentation, thallus organization, nutrition, reproduction, alternation of generations. Algae as pollution indicators and eutrophication agent.

Unit-III

Introduction of fungi: Occurrence and distribution, somatic structure, hyphal growth, nutrition, heterothallism, fungi and ecosystem; saprophytic parasitic, mutualistic and symbiotic relationship with plants and animals. Classification of fungi. Reproduction in fungi: asexual, sexual and parasexual. Economic importance and applications of fungi. Symbiotic associations of algae with fungi.

Unit-IV

Introduction of protozoa: Protozoan general characteristics and classification based on flagellate or mastigophora, rhizopoda, ciliophora, and sporozoa; detailed study of euglena, monocystis, entameoba, paramecium and trypanosoma; role of protozoan in environment and health implication.

Suggested readings:

1. Tauro P, Kapoor KK, Yadav KS and Sequeira MG (2019) An Introduction to Microbiology 3rd ed., New Age International Publishers. ISBN: 0852268785.
2. Brown JW, (2015) Principles of Microbial Diversity ASM Press, Washington DC, ISBN-10: 9781555814427.

3. Das S and Dash H (2018) Microbial Diversity in the Genomic Era. 1st ed., , Academic Press, ISBN: 9780128148501.
4. Carter J and Saunders V, (2013) Virology: Principles and Applications. 2nd ed, John Wiley & Sons, ISBN: 9781119991434.
5. Willey J, Sherwood L, and Woolverton CJ (2017) Prescott's Microbiology 10th ed.,. McGraw-Hill Education, ISBN-1259281590.
6. Watkinson S, Boddy L and Nicholas M (2015) The Fungi 3rd ed., Academic Press. ISBN: 978012382035.
7. Barsanti L,Gualtieri P (2014). Algae: Anatomy, Biochemistry, and Biotechnology 2nd ed., CRC Press, ISBN: 1439867321.

SEMESTER-I

Course title: Virology **Credit: 3**
Course code: SIAS MB 1 1 05 C 3003 **Lectures: 45**

Course objectives:

- To impart an advanced understanding and applied knowledge on viruses
- To make the students familiar with pathogenesis of viruses

Course Learning outcomes:

- Description of physiology and types of viruses
- Knowledge on mechanisms of transmission and pathogenesis of viruses.
- Description of unusual viral outbreaks

Unit-I

Classification, Morphology and Chemistry of Viruses: Virus evolution and classification, properties of viruses, virus structure Working with viruses: Techniques for visualisation and enumeration of viral particles, measuring biological activity of animal viruses, assays for virus estimation and manipulation, characterization of viral products expressed in infected cells, Diagnostic virology, Physical and chemical manipulation of viruses.

Unit-II

History and development of plant virology, cryptograms, and classification of plant viruses and viroids: Brief history of virology highlighting the significant contributions of scientists to the development of plant virology; significance of plant virology and modern classification of plant viruses and viroids according to ICTV; and cryptograms of various plant viruses and virus groups

Unit-III

Concept of early and late proteins; regulation of transcription in lambda phage; salient features of viral nucleic acid - unusual bases (TMV, T4 phage), overlapping genes (ϕX174, Hepatitis B virus), alternate splicing (HIV), terminal redundancy (T4 phage), terminal cohesive ends (Lambda phage), partial double stranded genomes (Hepatitis B), long terminal repeats (Retrovirus), segmented genomes (Influenza virus), non-segmented genomes (Picornavirus), capping and tailing (TMV); modes of transmission of plant and animal viruses; viral multiplication and replication strategies:

interaction of viruses with cellular receptors an entry of viruses; replication of viruses as per baltimore classification - assembly, maturation and release of virions.

Unit-IV

Causative agents, symptoms, mode of transmission and control of disease caused by human, animal and plant viruses – polio, influenza, rabies, common cold, aids, hepatitis, chikungunya, dengue, ebola, foot and mouth disease, blue tongue disease, mad cow disease, bud necrosis, tobacco mosaic disease and cauliflower mosaic disease; introduction to oncogenic viruses; types of oncogenic DNA and RNA viruses; mechanism of disease causation by plant viruses; antiviral compounds and their mode of action; interferon and their mode of action; use of viral vectors in cloning, expression, and gene therapy.

Suggested Reading:

- Patrick R, Murray, Ken S, Rosenthal P (2015) Medical Microbiology. 8th ed., Elsevier Press, ISBN: 9780323299565.
- Carrol KC, Morse SA, Mietzner T and Miller S. Jawetz, Melnick, & Adelberg's (2016) Medical Microbiology 27th ed.. McGraw-Hill Education, ISBN: 9780071824989
- Ryan K, Ahmad N, Alspaugh JA, Drew JL, Lagunoff M, Pottinger P, Reller LB, Reller M, Sterling and Weissman S. (2018) Sherris Medical Microbiology. 7th ed. McGraw-Hill Education, ISBN: 9781259859809.
- Carter J, Saunders V (2013) Virology: Principles and Applications. 2nd ed., Wiley & sons, ISBN: 9781119991427.
- Vegad J L Katiyar A K, (2015) A Textbook of Veterinary Special Pathology Infectious Diseases of Livestock and Poultry. 1st ed. CBS Publisher ISBN: 9788123927886.

SEMESTER – I

Course Title: Practical-I **Credit: 5**
Course Code: SIAS MB 1 1 06 C 00105

Course Learning outcome:

- Able to prepare biochemical solutions
- Skill development in pure culture techniques
- Able to demonstrate the quantification of different biomolecules
- Understanding the bacterial growth kinetics

List of practicals

1. Laboratory orientation, calibration, and demonstration of equipment.
2. Solutions, pH and buffers
3. Determination of pKa of acetic acid and glycine
4. Qualitative tests for carbohydrates, lipids, amino acids, and proteins in food samples
5. Metaphase chromosome preparation with G banding and C banding from blood sample

6. RNA *in-situ* hybridization to study gene expression in tissue section
7. Different staining methods and microscopic examination of bacteria, actinomycetes, algae, fungi and protozoa
8. Preparation of specific media for isolation of bacteria, and fungi from natural sources
9. Cell counting and cell viability assay
10. Determination of bacterial growth by turbidity measurements (Bacterial growth curve);
11. To study the types of growth (synchronous/ diauxic, batch);
12. To study the effect of incubation temperature, pH, salts on the growth of microorganisms
13. Production of microbial enzymes (amylase, phosphatase) and their separation using chromatographic techniques
14. Biochemical characterization of microbial enzymes.
15. Separation of carbohydrates, amino acids and plant pigments using paper/thin layer chromatography

Suggested readings:

1. Sheehan, D, Wiley Blackwell (West Sussex) (2010) Physical Biochemistry: Principles and Applications. 2nd ed., , ISBN: 978-0-470-85602-4 / ISBN: 978-0-470-85603-1.
2. Plummer, DT., (2017) An Introduction to Practical Biochemistry 3rd ed., McGraw Hill Education, ISBN: 978-0070994874.
3. Wilson K, and Walker J (2018) Principles and Techniques of Biochemistry and Molecular Biology 8th ed., Cambridge University Press. ISBN: 131661476X.
4. Harry W, Seeley, Paul JV, John J, (1990) Microbes in Action: A Laboratory Manual of Microbiology 4th Addition, W. H. Freeman ISBN: 978-0716721000.
5. American Society of Agronomy; Lab Manual edition (2009) Genetics: A Laboratory Manual 2nd ed., , ISBN: 978-0891185611.
6. Aneja KR (2014) Laboratory Manual of Microbiology and Biotechnology 1sted., Scientific International Pvt., Ltd. ISBN: 9789381714553.
7. Cappuccino, JH, Sherman, N., (2017) Microbiology: A Laboratory Manual. 11th ed., Pearson Education Inc, ISBN: 9780134298597

SEMESTER – I

Course title: Techniques in Microbiology **Credit: 4**

Course title: Techniques in Microbiology **Credit: 4**
Course code: SIAS MB 1 1 01 GEC 4004 **Lectures: 60**

Course objectives:

- To introduce the students to different methods of isolation, enumeration, maintenance and preservation of microorganisms

- To make students familiar with methods of identification of different groups of microorganisms

Course Learning outcomes:

- Know-how of the basic microbiological tools and techniques
- Understanding of applications of techniques for exploitation of microbes
- Ability to grow and identify specific microorganisms

Unit-I

Maintenance of asepsis - Autoclave, Hot air oven, Filtration, Laminar air flow; Isolation and cultivation of pure cultures- microbiological culture media; Isolation of bacteria (streak plate, spread plate, pour plate, serial dilution methods) screening and enrichment techniques; preservation and maintenance of microbial cultures, general setup of microbiological laboratory.

Unit-II

Simple staining, differential staining, acid fast staining, staining for visualization of specific microbial cell structures; Principle and applications of bright field and dark field microscopy; Phase contrast, Interference, Differential Interference Contrast Microscopy; Fluorescence, and Confocal Microscopy; SEM, TEM, and STEM; Specimen preparation in Light and Electron Microscopy

Unit-III

Factors affecting microbial growth, Estimation of microbial growth - direct and indirect methods for determination of numbers - viable (plate) count and total (Haemocytometer) count, Estimation of microbial biomass, determination of bacterial growth rate and generation time by turbidometry method, estimation of microbial protein and enzyme activities.

Unit-IV

Tools and techniques for microbial identification and characterization – morphological characterization of microbial cells and colonies, phenotypic methods (biochemical and physiological properties); molecular biology tools for identification and characterization of microbes, measurement of microbial metabolism; detection of non-culturable microbes and metagenomics.

Suggested readings:

1. Plummer, DT., (2017) An Introduction to Practical Biochemistry 3rd ed., McGraw Hill Education, ISBN: 978-0070994874.
2. Wilson K, and Walker J (2018) Principles and Techniques of Biochemistry and Molecular Biology 8th ed., Cambridge University Press. ISBN: 131661476X
3. Aneja KR (2014) Laboratory Manual of Microbiology and Biotechnology 1sted., Scientific International Pvt., Ltd. ISBN: 9789381714553.
4. Cappuccino, JH, Sherman, N., (2017) Microbiology: A Laboratory Manual. 11th ed., Pearson Education Inc, ISBN: 9780134298597

Semester-II

Course title: Advanced Analytical Techniques **Credit: 4**
Course code: SIAS MB 1 2 01 C 4004 **Lecture: 60**

Course objectives:

- To provide an advanced understanding of the core principles of various techniques used in biological experiments.
- To impart technical skills on use of advanced equipments

Course Learning outcomes:

- Demonstrate principles of various basic and advanced techniques used in biological experiments
- Critically analyze and interpret the results obtained from biological experiments
- Utilization of advanced techniques in determination of structures of biomolecules

Unit-I

Principle of microscopy: resolving powers of different microscopes, magnification; different types of microscopes, principle and applications of compound microscopy, dark microscopy, fluorescence microscopy, phase contrast microscopy, confocal microscopy, atomic force microscopy and electron microscopy (SEM, TEM, STEM); fixation and staining, freeze fracture/etch techniques.

Unit-II

Agarose gel electrophoresis, polyacrylamide gel electrophoresis (native PAGE and SDS-PAGE); Western transfer, iso-electric focusing (IEF), 2-Dimensional gel electrophoresis, pulse field electrophoresis; principle and applications of centrifugation, differential centrifugation, density gradient centrifugation and ultracentrifugation; cell separation by flow cytometry.

Unit-III

Paper chromatography (ascending and descending, 2-Dimensional); principle and applications of thin layer chromatography (TLC), column chromatography (gel filtration, ion exchange and affinity chromatography); methods of ligand immobilization, immuno-adsorption-hydrophobic interaction chromatography, metal chelate chromatography, covalent chromatography, high performance liquid chromatography (HPLC) and gas liquid chromatography (GLC).

Unit-IV

Principle and instrumentation of UV-visible, infrared spectroscopy, atomic absorption spectrophotometery, NMR spectroscopy, X-ray diffraction spectroscopy, N-terminal sequencing and peptide synthesis, introduction to proteomics, Yeast 2- hybrid and 3-hybrid systems, EMSA, foot printing, phage display, principle of mass spectrometry, electrospray ionization MS, MALDI, tandem MS for protein identification, ICAT-MS.

Suggested readings:

1. Sheehan, D, Wiley Blackwell (West Sussex) (2010) Physical Biochemistry: Principles and Applications. 2nd ed., , ISBN: 978-0-470-85602-4 / ISBN: 978-0-470-85603-1.
2. Plummer, DT., (2017) An Introduction to Practical Biochemistry 3rd ed., McGraw Hill Education, ISBN: 978-0070994874.
3. Wilson K, and Walker J (2018) Principles and Techniques of Biochemistry and Molecular Biology 8th ed., Cambridge University Press. ISBN: 131661476X
4. Freifelder D (1982) Physical Biochemistry: Applications to Biochemistry and Molecular Biology 2nd ed., , W.H. Freeman and Company (New York), ISBN:0-7167-1315-2 / ISBN:0-7167-1444-2.

Semester II

Course title: Microbial Genetics **Credit: 4**
Course code: SIAS MB 1 2 02 C 4004 **Lectures: 60**

Course objectives:

- To provide a comprehensive detail on microbial genomes
- To impart thorough knowledge on gene regulation and transfer mechanisms.

Learning outcomes:

- Understanding the structure and functions of genomes of different microbial groups
- Understanding the processes behind mutations and other genetic changes
- Identifying and distinguishing genetic regulatory mechanisms at different levels
- Basic understanding of bacterial genomics

Unit-I

Molecular basis of mutations - induced *versus* spontaneous mutations; gene mapping by recombination and complementation; fine gene structure analysis; cloning genes by complementation and marker rescue; DNA repair mechanisms; mutation and microbial evolution.

Unit-II

Gene transfer in bacteria - conjugation, transformation and transduction; Regulation of gene transfer by conjugation; Mapping the bacterial genomes using Hfr strains; transfer systems in gram positive bacteria; Ti plasmid and applications; transformation - molecular basis of natural transformation; transduction- generalized *versus* specialized transduction; mapping bacterial genes by transduction; tetrad analysis in fungi; positive and negative gene regulation and attenuation in different operons; riboswitches.

Unit-III

Genes involved in the lytic and lysogenic cycle of lambda phage; Replication and packaging of filamentous phages M13; Benzer's experiments to construct phage genetic linkage maps; Transposons and gene regulation; Yeast Ty -1 transposon; methods of gene cloning and sequencing; genome transplantation (Synthetic genome).

Unit-IV

Sequencing of microbial genomes; database of microbial genomes; understanding microbial genomes; house keeping genes, essential genes; cluster of orthologous genes; minimal genome; microbiome analysis through genetic tools; metagenome and advances of metagenomics; application of crispr-cas9 system based genome editing.

Suggested readings:

1. Krebs JE, Elliott S and Goldstein (2017) Lewin's GENES XII 12th ed.. Jones and Bartlett Publishers. ISBN: 9781284104493.
2. Klug, Cummings and Spencer (2016) Concepts of Genetics 10th ed.. Pearson Education India. ISBN: 9332577463.
3. Snyder L, Peters, Henkin and Champness (2013) Molecular Genetics of Bacteria 4th ed. ASM Press; ISBN: 9781555816278.
4. Gardner, Simmons and Snustad (2010) Principles of Genetics 8thed., Wiley India Pvt Ltd ISBN: 9788126510436.
5. Kalia VC, Shouche Y, Purohit HJ and Rahi P (2017) Mining of Microbial Wealth and MetaGenomics 1st ed.. Springer Nature Singapore Pte Ltd. ISBN: 9789811057076.
6. Das S and Dash HR (2018) Microbial Diversity in the Genomic Era 1st ed.. Academic Press, ISBN: 9780128148495.

SEMESTER-II

Course title: Biosafety, Bioethics and IPR **Credit: 2**
Course code: SIAL MB 1 2 03 C 2002 **Lecture: 30**

Course objectives:

- To impart knowledge of biosafety issues on microbes and genetically modified organisms
- To introduce the concept of intellectual property rights, patenting.

Course learning outcomes

- Learning of importance of Personnel Protective Equipment (PPE), general biosafety rules and different biosafety levels
- Understanding the role of regulatory agencies for working products derived from biotechnology
- Awareness on ethical issues involving biological material
- Knowledge on intellectual property rights and their implications in biological research and product development.

Unit-I

Biosafety: introduction; historical background; introduction to biological safety cabinets; primary containment for biohazards; biosafety levels; PPE, GRAS organisms, biosafety levels of specific microorganisms; recommended biosafety levels for infectious agents and infected animals; definition of GMOs & LMOs; principles of safety assessment of transgenic plants –Regulations: International regulations-Cartagena protocol, OECD consensus documents and Codex

Alimentarius; Indian regulations-EPA act and rules, guidance documents, regulatory framework-RCGM, GEAC, IBSC and other regulatory bodies.

Unit-II

Bioethics: Introduction, ethical conflicts in biological sciences-interference with nature, bioethics in health care - patient confidentiality, informed consent, euthanasia, artificial reproductive technologies, prenatal diagnosis, genetic screening, gene therapy, transplantation. Bioethics in research - cloning and stem cell research, Human and animal experimentation, animal rights/welfare, Protection of environment and biodiversity - biopiracy.

Unit-III

Patenting: Basics of patents: types of patents; Indian Patent Act 1970; recent amendments; WIPO Treaties; Budapest Treaty; Patent Cooperation Treaty (PCT) and implications; procedure for filing a PCT application; patent application forms and guidelines including those of National Bio-diversity Authority (NBA) and other regulatory bodies.

Unit- IV

Patent infringement- meaning, scope, litigation, case studies and examples; commercialization of patented innovations; licensing-outright sale, licensing, royalty; patenting by research students and scientists-university/organizational rules in India and abroad

Suggested readings:

1. Office of the Controller General of Patents, Design & Trademarks; Department of Industrial Policy & Promotion; Ministry of Commerce & Industry; Government of India. http://www.ipindia.nic.in/
2. World Trade Organisation. http://www.wto.org
3. World Intellectual Property Organisation. http://www.wipo.int
4. International Union for the Protection of New Varieties of Plants. http://www.upov.int
5. National Portal of India. http://www.archive.india.gov.in
6. Parashar S, Goel D (2013) IPR, Biosafety and Bioethics Pearson Publishing India, ISBN: 9788131774700.
7. Nambisan P (2017) An Introduction to Ethical, Safety and Intellectual Property Rights Issues in Biotechnology. Academic Press, ISBN: 9780128092316.
8. http://dbtindia.gov.in/guidelines-biosafety

SEMESTER-II

Course title: Microbial Physiology and Metabolism **Credit: 4**
Course code: SIAL MB 1 2 04 C 4004 **Lectures: 60**

Course objectives:

- To describe metabolic and physiological diversity among prokaryotes.
- To impart knowledge on metabolic cycles of prokaryotic microorganisms

Course learning outcomes:

- Learning of principles of microbial catabolic and anabolic pathways
- Understanding the transport systems and the mechanisms of energy conservation in microbial metabolism
- Identifying various physiological groups of bacteria with their special features
- Understanding of biosynthesis of basic biomolecules.

Unit-I

Nutritional categories of microorganisms based on carbon and energy sources; Metabolite transport - passive and facilitated, primary and secondary active transport, group translocation (phosphotransferase system), symport, antiport and uniport, electrogenic and electroneutral transport, transport of iron; Microbial Growth - Definition balanced and unbalanced growth, growth curve, the mathematics of growth, generation time, specific growth rate, batch and continuous culture, synchronous growth, diauxic growth curve; Effect of physical and chemical factors on growth.

Unit-II

Brief account of photosynthetic and accessory pigments - chlorophyll, bacteriochlorophyll, rhodopsin, carotenoids, phycobiliproteins; Autotrophy - oxygenic, anoxygenic photosynthesis; Autotrophic generation of ATP; Fixation of CO_2; Calvin cycle pathway. Chemolithotrophy - Sulphur, iron, hydrogen, nitrogen oxidations, methanogenesis, Bioluminescence.

Unit-III

Respiratory metabolism - Embden-Mayer Hoff pathway, Entner Doudroff pathway, Pentose phosphate pathway, Krebs cycle, Branched TCA cycle, Reverse TCA cycle, glyoxalate pathway, oxidative and substrate level phosphorylation, gluconeogenesis, pasteur effect; fermentation of carbohydrates - homo and heterolactic fermentations; halophiles and ATP synthesis.

Unit-IV

Biosynthesis of peptidoglycan, polysaccharides, major amino acids, polyamines, lipids, nucleotides - purines and pyrimidines; assimilation of nitrogen; dormancy and germination; microbial differentiation, sporulation and morphogenesis, cell division cycle in *E. coli* and yeast.

Suggested readings:

1. Tauro P, Kapoor KK, Yadav KS, and Sequeira MG (2019), An Introduction to Microbiology 3rd ed., , New Age International Publishers. ISBN: 0852268785
2. Cohen GN (2014) Microbial Biochemistry. 3rd edition. Springer Netherlands. ISBN 978-90-481-9437-7
3. White D, Dummond J and Fuqua, C. (2011) The Physiology and Biochemistry of Prokaryotes. 4th edition. Oxford University Press. ISBN: 9780195393040
4. Willey J, Sherwood L and Woolverton CJ (2017) Prescott's Microbiology. 10th ed.. McGraw-Hill Education, ISBN: 1259281590
5. Dubey RC and Maheswari, DK (2013) A text book of Microbiology (Revised) S. Chand and Company Ltd, New Delhi. ISBN: 9788121926201

SEMESTER-II

Course title: Food and Dairy Microbiology **Credit: 4**
Course code: SIAS MB 1 2 05 C 4004 **Lecture: 60**

Course Objectives:

- To provide the knowledge about food associated microorganisms and microbial spoilage and preservation of foods
- To provide insights on producing dairy and non-dairy fermented foods, and role of probiotics and prebiotics in improving human health

Course Learning outcomes:

- Understanding about the interactions between microorganisms and the food environment
- Knowledge of the various food fermentations, and methods for preservation of foods
- Understanding about the detection, preventive measures and sources of food infections and intoxications caused by various microorganisms

Unit-I

Food associated microorganisms; Natural flora and sources of contamination of foods; intrinsic and extrinsic factors affecting growth and survival of microbes in foods; microbial spoilage of cereals, vegetables and fruits, meat products and sea foods, eggs, milk and milk products, and canned foods; microbial succession during food spoilage

Unit-II

Principles of food preservation; various methods of food preservation - physical, chemical and biological methods; hurdle technology; recent developments in food preservation methods including predictive microbiology, and modified atmospheric packaging; food sanitation - HACCP, indices and regulations of food quality and safety

Unit-III

Fermentation process for producing dairy foods - (yogurt, acidophilus milk, curd, kefir, kumiss, cheese) and non-dairy foods (plant based- sauerkraut, soy sauce and tempeh; and animal based, distilled and non-distilled alcoholic beverages); industrial considerations of dairy starter cultures; probiotics - health benefits, mechanisms of action, types and availability; prebiotics

Unit-IV

Gut microbiome and human health; food-borne infections of bacterial, fungal and viral origin (causative agents, foods involved, symptoms and preventive measures); Food intoxications of microbial origin; methods for detection of food-borne pathogens.

Suggested readings:

1. Ray, B, and Bhunia, A (2014) Fundamental Food Microbiology. 5th ed. CRC Press, Taylor and Francis Group. ISBN 9781466564435.

2. Erkman, O, and Bozoglu, TF (2016). Food Microbiology: Principles into Practice. Microorganisms related to foods, foodborne diseases and food spoilage, Volume 1 and 2, John Wiley & Sons, Inc. ISBN: 9781119237761.
3. Adams MR, Moss M, and McClure P (2016) Food Microbiology. 4th ed., Royal Society of Chemistry. ISBN: 978-1849739603.
4. Poltronieri P (2017) Microbiology in Dairy Processing: Challenges and Opportunities, John Wiley & Sons Ltd and the Institute of Food Technologists ISBN: 1119114802.
5. Frazier WC, and Westhoff DC (2013) Food Microbiology 5th ed., Tata McGraw-Hill Publishing Company Ltd, New Delhi, India.
6. Jay JM, Loessner MJ, and Golden, DA (2006) Modern Food Microbiology. 7th edition. Springer.
7. Rayand B, and Bhunia A (2013) Fundamental Food Microbiology. 5th edition. CRC press.
8. Doyle MP, and Beuchat LR (2007) Food Microbiology: Fundamentals and Frontiers. 3rd edition. ASM press.
9. Montville T, Matthews K, and Kniel K (2017) Food Microbiology: An Introduction. 4th edition. ASM press.

SEMESTER-II

Course title: Practical-II **Credit: 5**

Course code: SIAS MB 1 2 06 C 00105

Learning course outcomes:

- Able to analyze diversity of different microbes in different ecological niches
- Skill development in analysis of soil microorganisms
- Able to determine the microbial quality of food products
- Understanding the concepts of bacterial genetics

List of practivals

1. Morphological, physiological and biochemical characterization of bacterial cultures.
2. Isolation and identification of fungi and algae from different environmental samples;
3. Study of virus architecture using electron microphotographs of TMV, poliovirus and adenovirus;
4. Discussion on cultivation and cytopathic effects of animal viruses;
5. Bacteriophage assay using the plaque technique
6. Isolation of nucleic acid and characterization by gel Electrophoresis
7. Recombination in bacteria – Preparation of competent cells and transformation of plasmid DNA in E. coli.
8. Conjugation in bacteria.
9. Plasmid curing using different agents
10. Determination of mutation rate – natural and induced

11. Isolation of different bacterial and fungal organisms important in recycling of C, N, P in soil;
12. Measurement of CO_2 evolution rate to study decomposition in soil,
13. Estimation of different Soil enzymes- (dehydrogenase/ FDA hydrolase/ β-glucosidase)
14. Determination of Microbial biomass carbon
15. Determination of RS ratio of soil
16. Determination of quality of milk by methylene blue reductase test (MBRT) and SPC;
17. Microbiological examination of different food samples;
18. Determination of antibacterial activity of lactic acid bacteria
19. Screening of microorganisms from soils and industrial effluents for bioremediation applications
20. Microbiological quality control tests for water;

Suggested readings:

1. Aneja KR (2014) Laboratory Manual of Microbiology and Biotechnology 1st ed., Scientific International Pvt., Ltd. ISBN: 9789381714553.
2. Cappuccino, JH, Sherman, N., (2017) Microbiology: A Laboratory Manual. 11th ed., Pearson Education Inc, ISBN: 9780134298597

SEMESTER-II

Course title: Soil and Agriculture Microbiology **Credit: 4**
Course code: SIAL MB 1 2 01 DCEC 4004 **Lectures: 60**

Course objectives:

- To make understand the students about role of soil microbes in biogeochemical cycle of nutrients and organic matter degradation
- To make students familiar with PGPR and other microbial inoculants, and their role in maintaining soil fertility

Learning outcome:

- Understanding the role of microorganisms in the biogeochemical cycles of nutrients
- Understanding the role of microbes in degradation of solid organic waste and other organic pollutants.
- Understanding the different types of interactions between plants and microbes

Unit-I

History of development of soil microbiology; soil microorganisms: major groups, their diversity, abundance, characteristics; direct and indirect methods of studying soil microorganisms and their activities; influence of soil and environmental factors on microflora; soil health-major microbial indicators and their significance

Unit-II

Microorganisms in biogeochemical cycles of carbon, nitrogen, phosphorus, sulphur, iron and manganese; biodegradation of starch, cellulose, hemicellulose, pectin and lignin in soil; biodegradation of pesticides and other xenobiotics; production of biogas; composting-microbiology, types and factors affecting composting; vermicomposting, green manuring

Unit-III

Plant-microbe interactions, Concepts of Rhizosphere, R:S ratio, Rhizoplane, spermosphere, phyllosphere microorganisms; PGPR, Biological Nitrogen fixation - symbiotic, non-symbiotic, associative symbiotic and endophytic organisms, process of nitrogen fixation; Molecular biology of Nitrogen fixation

Unit-IV

Biofertilizers – Types (Bacterial, fungal and algal), mass production and quality assurance; Microbial Biocontrol agents for insects and diseases- development and their significance. Mycorrhizae, Types of mycorrhizae and their interactions with plants

Suggested readings:

- Mehnaz S, Springer (2017) Rhizotrophs: Plant Growth Promotion to Bioremediation vol 2., ISBN: 9789811048616.
- Hakeem KR, Akhtar MS and Abdullah SNA (2016) Plant, Soil and Microbes Vol-1 Implications in Crop Science 1st ed., Springer Cham, ISBN: 9783319274539.
- Lugtenberg B (2016) Principles of plant-microbe interactions. Springer Cham, ISBN 3319381857.
- Paul EA (2017) Soil Microbiology, Ecology and Biochemistry 4th ed., Academic Press, New York, USA. ISBN: 9780124159556.
- Sylvia D, Fuhrmann J, Hartel P and Zuberer D (2005) Principles and Applications of Soil Microbiology 2nd ed., Pearson Education, USA. ISBN: 9780130941176.
- Alexander M (1985) Introduction to Soil Microbiology 3rd ed., , Wiley Eastern, New Delhi. ISBN: 9780894645129.

SEMESTER-II

Course title: Environmental Microbiology **Credit: 4**
Course code: SIAS MB 1 2 02 DCEC 4004 **Lectures: 60**

Course objectives:

- To understand the role of microorganisms in environmental processes
- To learn principles and applications of microbiology in bioremediation of pollutants and wastewater treatment.

Learning outcomes:

- Know-how of the effect of environmental condition on microbes
- Understanding the interactions between microorganisms and their environment
- Understanding of applications of microorganisms in solving environmental problems

Unit-I

Historical developments and contributions of scientists in environmental microbiology; introduction and scope of environmental microbiology; environmental factors affecting microbial growth; impacts of GMOs on environment; role of microorganisms in mitigating global climate change; tools and techniques for studying microbial interactions with their environment.

Unit-II

Microbiology of natural environments: terrestrial environments; rhizosphere; aquatic environments (freshwater, marine and estuarine habitats); ground water; aeromicroflora and dispersal of microbes; human microbiomics; microbial interactions in rumen.

Unit-III

Microbiology of extreme environments: microbial growth and survival under hot environments, cold environments, alkaline environments, acidic environments, saline environments, environments rich in heavy metal, low nutrient environments, environments with high hydrostatic pressure, organic solvents and radiation; polyextremophiles. Space microbiology.

Unit-IV

Microbial indicators of environmental pollution; bioremediation of recalcitrant organic pollutants; microbial technology for waste management and treatment- solid waste management, landfills, utilization of solid wastes for production of food and feed, fuel and fertilizer; wastewater microbiology: microbiology of sewage and industrial effluents (paper and pulp, distillery etc.) - aerobic (trickling filters, activated sludge, oxidation ponds etc.) and anaerobic processes in wastewater treatment; enhanced recovery of metals, petroleum and bioenergy from natural resources. Biodegradation and biodeterioration.

Suggested readings:

1. Manual of Environmental Microbiology (2016), 4th ed., Yates, MV, Nakatsu CH, Miller RV and Pillai RV, ASM Press (USA), Print ISBN: 9781555816025, e-ISBN : 9781555818821.
2. Environmental Microbiology for Engineers (2016), 1st ed., Ivanov V, ISBN: 9780429109003.
3. Environmental Microbiology: From Genomes to Biogeochemistry (2015), 2nd ed., Madsen EL, John Wiley & Sons, Inc., ISBN: 978-1-118-43963-0.
4. Environmental Microbiology: Fundamentals and Applications (2015), 1st ed., Bertrand JC, Caumette P, Lebaron, P, Matheron R, Normand P and Sime-Ngando T, Springer Netherlands, eBook ISBN: 978-94-017-9118-2, Hardcover ISBN: 978-94-017-9117-5.
5. Environmental Microbiology (2016-17), 1st ed., Sharma, PD, Rastogi Publications (India), ISBN: 978-93-5078-140-1.

Semester-II

Course Title: The Microbiome **Credit: 4**
Course Code: SIAS MB 1 02 03 DCEC 4004 **Lectures: 60**

Course objectives:

- To define the microbiome of human, animal and plants
- To know the techniques used in studying the microbiomes

Course Learning outcomes

- Understanding the use of omics technologies in studying the microbiomes
- Understanding of changes of microbiome on health

Unit-I

History of the study of the microbiome; methods to study microbiome- DNA-based analysis of microbial communities, 16S rRNA gene amplicon sequencing and shotgun metagenomics sequencing methods; Functional analysis of the microbiome from DNA sequences.

Unit-II

Techniques used to analyse microbiome data- assignment of taxonomy; generating OTU tables, quality control: Describing the complexity of the microbiome eg. alpha and beta-diversity; comparing microbial communities, phylogenetic trees, UniFrac, principal coordinate analyses, Venn diagrams, heat maps; development of new bioinformatics methods for microbiome studies.

Unit-III

Functional studies of the Microbiome- Measurement of microbial products (the metabolome, proteome and glycome; role of microbiome and its products, nutrition, metabolism, the gut brain axis, and in immune- inflammatory processing. Introduction to the Human Microbiome; The Human Microbiome Project (HMP); Diversity of the Human Microbiome

Unit-IV

Gut microbiome changes in various diseases including liver diseases, obesity, diabetes, and other disorders; the mycome and virome in health and disease. Direct health effects of gut microbiome; Use of the microbiome in screening, diagnosis and monitoring diseases.

Suggested readings:

1. Unravelling the Soil Microbiome: Perspectives for Environmental Sustainability (2020) 1st edi., Dubey RK, Tripathi V, Prabha R, Chaurasia R, Singh DP, Rao CS, El-Keblawy A and Abhilash PC, Springer Cham, ISBN: 978330155155.
2. Microbiome and Metabolome in Diagnosis, Therapy and other strategic Applications (2019) 1st edi., Faintuch J and Faintuch S. Academic Press (New York) ISBN: 9780128152492.
3. Diet, Microbiome and Health (2018) 1st ed., Holban AM, Grumezescu AM. Academic Press (New York), ISBN: 9780128114407.
4. Functional importance of the plant microbiome: Implications for agriculture, forestry and bioenergy (2017) 1st ed., Doty SL. Springer Cham. ISBN: 978-3-319-65896-4.
5. Microbiome Analysis: Methods and Protocols. (2018) 1st ed., Beiko RG, Hsiao W and Parkinson J. Springer New York. ISBN: 9781493987269.
6. The Gut Microbiome in Health and Disease (2018). 1st ed., Haller D. Springer International Publishing. ISBN 978-3-319-90544-0.

SEMESTER-III

Course title: Biostatistics and Bioinformatics **Credit: 3**
Course code: SIAS MB 1 3 01 C 3003 **Lectures: 45**

Course objectives:

- To introduce the students in the field of bioinformatics

- To enables them to understand the concepts of statistics in biology.

Course Learning outcomes:

- Handling commonly used bioinformatics tools and understand their pros and cons
- Statistically analyse the data in a biologically relevant manner
- Understanding the role of computer science in predicting structure and function of biomolecules
- Understanding basic computer skills necessary for the conduct of research

Unit-I

Definition of selected terms scale of measurements related to statistics; Methods of collecting data, Presentation of data statistical Tables, Need for reduction of data measures of averages and location, Measures of dispersion: Range, quartile deviation, mean deviation and relative deviation. Probability: basic concepts; basic theorems of probability addition and multiplication theorems; conditional probability of Bayes Theorems. Probability mass function, probability density function, cumulative distribution function.

Unit-II

Probability distribution definition and applications; Binominal distribution, Poisson distribution, Normal distribution, logic of statistical standard error estimation testing of hypothesis.Tests of significance: Null hypothesis, alternative hypothesis, type I error, type II error, level of significance, and power of test. Tests for mean based on normal distribution, one sample t-test, two-sample t-test, paired-sample t-test, Chi-Squared test, and Tests for variance based on normal distribution – one sample and two-sample problem. One-way and Two-way analysis of variance (ANOVA) techniques. Correlation concept and applications, Spearman's rank correlation coefficient, regression concept and applications.

Unit-III

Historical background. Scope of bioinformatics - genomics, proteomics, computer aided drug design (structure based and ligand based approaches), Applications of bioinformatics. Introduction to biological databases - primary, secondary and composite databases, Different formats of molecular biology data. NCBI, nucleic acid databases (GenBank, EMBL, DDBJ, NDB), protein databases (PIR, Swiss-Prot, TrEMBL, PDB)

Unit-IV

Similarity, identity and homology. Alignment-local and global alignment, pairwise and multiple sequence alignments, alignment algorithms, amino acid substitution matrices (PAM and BLOSUM), BLAST and CLUSTAL omega. Identification of open reading frames (ORF), Concept of orthology, paralogy and homology in gene and protein sequences. Methods and tools for phylogenetic analysis, maximum parsimony, maximum likelihood and distance methods; creation, evaluation and interpretation of evolutionary trees phylogenetic tree.

Suggested Readings:

1. Fundamentals of Statistics (2016) Goon, AM, Gupta, MK and Dasgupta, B. Vol. I & II. World Press, ASIN: B01LB7MH74.
2. Statistical Methods (2012) 1st ed., Das, NG. Vol I & II. Tata McGraw Hill, ISBN: 9780070263512.

3. Probability and Statistics for Engineers and Scientists (2013) 9th ed., Walpole, RE, Myers, RH, Myers, SL and Ye, Pearson Education India KE ISBN: 978-9332519084.
4. Biostatistics: A Foundation. for Analysis in the Health Sciences (2012) 10th ed., Daniel, WW and Cross, CL. John Wiley & Sons, ISBN: 978-1118302798.
5. Essential Bioinformatics (2006) 1st ed., Xiong J, Cambridge University Press, ISBN: 978-0521600828.
6. Fundamental concepts of Bioinformatics (2003) Krane DE and Raymer ML Pearson, ISBN: 978-8177587579.
7. An Introduction to Bioinformatics (2017) 1st ed., Knight R, Larsen and Keller Education, ISBN: 978-1635490459.
8. Concepts of Bioinformatics and Genomics (2016) 1st ed., Momand J, McCardy A, Heubah, S and Warter-Perez N, Oxford University Press, ISBN: 978-0199936991.

SEMESTER - III

Course title: Microbial genomics, proteomics and metabolomics **Credit: 4**
Course code: SIAS MB 1 3 02 C 4004 **Lectures: 60**

Course objectives:

- To obtain a fundamental knowledge and insights on microbial genomics,
- To understand the comparative and functional genomics, proteomics and metabolomics

Learning Outcomes

- Understanding of high throughput techniques including genomics, proteomics and metabolomics for microbiological research
- Ability of data mining for genomics and proteomics from different databases and its interpretation
- Applications of different microbial omics techniques in different areas of life sciences

Unit-I

Introductions of omics technologies and their applications in microbiology. Principles of microbial genomics such as sequencing, assembly, annotation of microbial genomes and its application to study microbial community. Metagenomics, comparative and functional genomics

Unit II

Major bioinformatics tools and databases and their application in Microbial Genomics; Search and retrieval of biological information and databases sequence for Microbial Genomics; Microbial genome projects, Human Microbiome Project. Genome annotation, Genome editing, tools involved in genome editing such as CRISPR/Cas9.

Unit III

Introduction to Proteomics; Bridging Genomics and Proteomics; Analysis of proteomes – Extraction of microbial proteome and sample preparation. Two-dimensional polyacrylamide gel

electrophoresis; Mass spectrometry based methods for proteome analysis; Quantitative proteomics; Metaproteomics; Application of proteomics in microbiology

Unit-IV

Metabolomics-Targeted and untargeted approaches; Intracellular and exometabolomes-Polar metabolites and lipid profiling-Mass spectrometry based techniques-Processing and analysis of metabolome data sets-Metabolite identification; Topics of current interest in microbial metabolomics

Suggested Readings

1. Head, Steven R., Ordoukhanian, Phillip, Salomon, Daniel R (2018) Next Generation Sequencing Methods and Protocol. Springer
2. Izard, Jacques., Rivera, Maria. (2014) Metagenomics for Microbiology. Elsevier
3. Kaufmann, Michael., Klinger, Claudia., Savelsbergh, Andreas. (2017) Functional Genomics Methods and Protocols. Springer
4. Integrative Approaches For Understanding OMICS Data (2018) 1st ed., Springer Singapore ISBN:978-981-13-2924-1

SEMESTER-III

Course title: Industrial Microbiology **Credit: 4**

Course code: SIAS MB 1 3 03 C 4004 **Lecture: 60**

Course Objectives:

- To provide the knowledge of features of industrially important microorganisms, their screening and selection from natural resources
- To provide insights on design and types of fermenter, their modes of operations for achieving maximum product output and various strategies for product recovery after fermentation

Learning outcomes:

- Understand the role of microorganisms in industrial processes for the benefit humankind
- Be familiarized about principles of industrial fermentation process and equipment
- Learn microbial strain improvement strategies, large-scale applications of microbes for commercial production of valuable products

Unit I

Historical perspectives and recent developments in Industrial Microbiology; Scope of Industrial Microbiology; Fermentation processes and types of microbial products; Sources of Industrially important microorganisms and their screening (including high throughput techniques) and selection; Characteristics of industrially relevant microbes, their maintenance and preservation; Characteristics of solid substrate and submerged fermentations.

Unit II

Fermentation media- characteristics of substrates and nutrients (carbon and nitrogen) balance during fermentation, stoichiometric principles; formulation and optimization of media using one-factor and statistical approaches; methods and principles of media sterilization (batch and continuous methods); Inoculum development; Batch, continuous and fed-batch cultivation of microorganisms; Kinetics of microbial growth, substrate utilisation and product formation during fermentation bioprocess

Unit III

Basic components of fermenters (impellers, seal, baffles and spargers, sampler, foam control), construction material and designing; Fermenter types - Stirred tank, bubble column, airlift, packed and fluidized bed, photobioreactors, solid state reactors; Instrumentation and control of bioprocesses. Scale-up and scale-down principles. Downstream processes for product recovery - cell disruption, precipitation, filtration, centrifugation, extraction, chromatography, membrane process, drying, crystallization, packaging).

Unit IV

Concept of primary and secondary metabolites; microbial applications for production of alcohols, organic acids, industrial enzymes, antibiotics, health products (hormones and recombinant vaccines), bioenergy; Microbial transformations; Microbial Strain Improvement using recombinant DNA technology and metabolic engineering; Fermentation process economics.

Suggested Readings:

1. Glazer, A.N., and Nikaido, H. 2007. Microbial Biotechnology: Fundamentals of Applied Microbiology. 2nd edition. Cambridge University Press.
2. Casida, L.E.J.R. 2016. Industrial Microbiology. Second Edition. New Age International (P) Ltd., Publishers. New Delhi, India.
3. Crueger, W., and Crueger, A. 2000. Biotechnology: A Test Book of Industrial Microbiology, Second Edition, Panima Publishing corporation, New Delhi.
4. El-Mansi, E.M.T., Bryce, C.F., Demain, A.L., and Allman A.R. 2012. Fermentation Microbiology and Biotechnology edited. 3rd edition. CRC Press.
5. Flickinger, M.C., and Drew, S.W. 1999. Encyclopaedia of Bioprocess Technology Fermentation, Biocatalysis and Bioseperation Vil. V., John Wiley and Sons Publications.
6. Crommelin, J.A.D., Sindelar, R.D., and Meibohm, B. 2013. Pharmaceutical Biotechnology: Fundamentals and Applications. 4th Edition. Springer.
7. Joe, M.M., Sivakumar, P.K. and Sukesh, K. 2010. An Introduction to Industrial Microbiology. S. Chand Publishing, New Delhi.
8. Kalaichelvan, P.T., and Arul Pandi, I. 2007. Bioprocess Technology, MJP publishers, Chennai.
9. M. L. Shuler, and F. Kargi. 2015. Bioprocess Engineering: Basic Concepts by 2nd edition. Pearson Education India.
10. N. Okafor. 2020. Modern Industrial Microbiology & Biotechnology. 2nd edition. CRC Press, USA.

11. Patel A.H. 2016. Industrial Microbiology. 2nd Edition. Laxmi Publications (P) Ltd. New Delhi, India
12. Peppler, H., and Pearman, D. 1979. Microbial Technology, Vol. I, Academic Press, New York.
13. Prescott, L.M., Harley, J.P., and Helin, D.A. 2008. Microbiology, 5th Edition, McGraw Hill, New Delhi.
14. Stanbury, P.F, Whitaker, A., and Hall, S.J. 2016. Principles of Fermentation Technology, 3rd edition, Butterworth-Heinemann.
15. Waites, M.J., Morgan, N.L., Rockey, J.S., and Higton, G. 2001. Industrial Microbiology: An Introduction, Blackwell Science, London.

SEMESTER-III

Course title: Medical Microbiology and Immunology **Credit: 4**
Course code: SIAS MB 1 3 04 C 4004 **Lecture: 60**
Course Objectives:

- To understand the various components of the host immune system, their structure and organization, and functions to serve as the defense system of the body.
- To understand the operational mechanisms which underlie the host defense system, allergy and organ transplantation.

Course Learning Outcomes:

- Able to describe normal human microflora, and role of microbes in causing diseases
- Able to understand the fundamental bases of immune system and immune response
- Will gather information about the structure and organization of various components of the immune system
- Able to understand the genetic organization of the genes meant for expression of immune cell receptors and the bases of the generation of their diversity
- Able to understand the operation and the mechanisms which underlie the immune response
- CO5: Will be able to apply the knowledge gained to understand the phenomena like host defense, hypersensitivity (allergy), organ transplantation and certain immunological diseases

Unit-I

Normal microflora of the human body and its importance: normal microflora of skin, throat and gastrointestinal tract; Collection, transport and culturing of clinical samples (sputum, urine, blood, stools) for microbiological analysis; Human microbiome. Causative agents, symptoms, mode of transmission and control of diseases caused by staphylococcus aureus, streptococcus pyogenes, Haemophilus influenzae, Mycobacterium tuberculosis, Escherichia coli, Salmonella typhi, Vibrio cholerae, Helicobacter pylori, Bacillus anthracis, Clostridium tetani, Treponema pallidum and torch group of pathogens; causative agents, symptoms, mode of transmission and control of diseases dermatomycoses, histoplasmosis, candidiasis, malaria and kala-azar; mechanism of action of various antimicrobial agents - inhibitors of nucleic acid synthesis, cell wall synthesis, cell membrane function and protein synthesis.

Unit-II

Host-defenses, hematopoiesis, cells of the immune system, primary and secondary lymphoid organs and tissues (MALT).Anatomical barriers, cell types of innate immunity, soluble molecules and membrane associated receptors (PRR), connections between innate and adaptive immunity, chemokines. Antigens and haptens, factors that dictate immunogenicity, B and T cell epitopes. Structure and distribution of classes and subclasses of immunoglobulins (Ig), Ig fold, effector functions of antibody, antigenic determinants on Ig and Ig super family**.** Multigene organization of Ig locus, mechanism of V region DNA rearrangement, ways of antibody diversification. Antigen independent phase of B cell maturation and selection, humoral response – T-dependent and T-independent response.

Unit-III

Complement activation by classical, alternate and MB lectin pathway, biological consequences of complement activation, regulation and complement deficiencies. General organization and inheritance of MHC, structure, distribution and role of MHC class I and class II proteins, pathways of antigen processing and presentation. Structure and role of T cell receptor, and co-receptor, T cell development, generation of receptor diversity, selection and differentiation. General properties of effector T cells, cytotoxic T cells (Tc), natural killer cells; NKT cells and antibody dependent cellular cytotoxicity (ADCC).

Unit-IV

Mechanism of tolerance, Organ specific and systemic autoimmune diseases, possible mechanisms of induction of autoimmunity, IgE mediated (Type I) hypersensitivity, antibody mediated cytotoxic (Type II) hypersensitivity, immune complex mediated (type III) hypersensitivity and delayed type (Type IV) hypersensitivity. Immunological basis of graft rejection, clinical manifestations, immunosuppressive therapy, Immunohistochemistry, Immunocytochemistry and privileged sites. Vaccines - active and passive immunization, types of vaccines.

Suggested readings:

1. Kuby Immunology (2018) 8th ed., Punt J, Stranford S, Jones P and Owen JA, W.H Freeman and Company, ISBN: 978-1319114701.
2. Janeway's Immunobiology (2017) 9th ed., Murphy KM and Beaver C, WW Norton and Company, ISBN: 978-0815345510.
3. Roitt's Essential Immunology (2017) 13th ed., Delvis PJ, Martin SJ, Burton DR and Roitt, IM, Wiley-Blackwell, ISBN: 978-1118415771.
4. Lehninger: Principles of Biochemistry (2017) 7th ed., Nelson, DL and Cox, MM, WH Freeman and Company (New York), ISBN: 978-1319108243.
5. Lippincott's illustrated Reviews Immunology (2012) 2nd ed., Doan T, Melvold R, Viselli S and Waltenbaugh, C, Wolters Kluwer India Pvt, Ltd, ISBN: 978-8184737639.

SEMESTER-III

Course title: Practical-III **Credit: 4**
Course code: SIAS MB 1 3 05 C 0084

Course Learning outcomes

- Able to analyze diversity of different microbes in different ecological niches
- Skill development in analysis of microbial ecology
- Able to conduct the techniques related to microbial genomics and proteomics
- Understanding the concepts of immunological reactions

List of practicals

1. Study of resident microflora of the skin;
2. Identification of pathogens using biochemical assays
3. Identification of specific pathogens using kits (eg. Widal Test);
4. Antibiotic susceptibility testing using Kirby-Bauer method;
5. Determination of minimal inhibitory concentration (MIC) of an antibiotic using double dilution technique or E-test strips.
6. Isolation of industrially important microorganism from different sources
7. Determination of yield coefficient of *Saccharomyces cerevisiae* on various substrates
8. To study the design of fermenter and its working;
9. Production of ethanol using different substrates by yeast
10. Production of extracellular enzymes submerged and solid state conditions;
11. Isolation of genomic DNA and RNA from bacteria;
12. Isolation of plasmid DNA from bacterial culture;
13. Isolation of metagenome from different sample
14. Isolation of metaproteome from soil and its 2 D gel electrophoresis analysis
15. Data mining for whole genome analysis and its annotation
16. Metabolomic analysis of a representative bacteria
17. Transformation experiment in *E.coli* by chemical method and electroporation and determination of transformation efficiency;
18. Designing and amplification of gene of interest by Polymerase Chain Reaction
19. Isolation, characterization of bacteria fungi present in cultivated and diseased plants
20. To study occurrence of disease by inoculation with bacterial or fungal pathogens
21. Measuring plant disease intensity under controlled conditions;
22. Biochemical and physiological tests for detection of pathogens in fruits and vegetables;
23. Determination of microbial interactions such as antagonism and symbiosis
24. Calculations on the diversity indices to determine microbial diversity,
25. Demonstrations on phylogenetic analysis of microorganisms
21. Agglutination and Precipitation based assays
22. Immunodiffusion assays by Ouchterlony method;
23. Demonstration of Immunoelectrophoresis; Dot-ELISA and Western blotting

Suggested Readings:

1. Microbiology: A laboratory Manual. (2017) 11th ed. Cappuccino JG, Welsh C. Pearson Education, Inc. ISBN: 9780134098630.
2. Laboratory Manual of Microbiology and Biotechnology (2014) 1st ed. Aneja KR, Scientific International Pvt. Ltd., ISBN: 9789381714553.

3. Laboratory Manual and Workbook in Microbiology: Applications to Patient Care (2003) 7th ed. Morello JA, Helen PA and Mizer E, McGraw Hill Publications ISBN: 0072463546.

SEMESTER - III

Course title: Seminar **Credit: 2**

Course code: SIAL MB 1 3 06 C 0202

Seminar will be of 45-minute duration during which the presentation will be followed by questions session by the audience comprising of faculty and students. Every student shall be required to submit the topic of his/her seminar in consultation with the Head of the Department/Faculty members/student advisors well in advance so that the same may be displayed on the notice board. The presenter has to write an Abstract to be distributed during Seminar in addition to two copies of write-up giving relevant details of the background of the subject, methods used and references/List of sources from where the material for presentation has been collected.

SEMESTER - III

Course title: Biofertilizer and Compost Technology **Credit: 4**
Course code: SIAS MB 1 3 04 DCEC 4004 **Lectures: 60**

Course objective:

- To familiarize the students with the basic concepts regarding the use of microorganisms as biofertilizers and compost inoculants, their mass production
- To familiar students with the quality assurance of bioinoculants.

Learning outcomes:

- Understanding the use of microorganisms as biofertilizer and compost inoculant
- Understanding various applications of microbial inoculants in agriculture and solid waste management
- Skill development in biofertilizer and compost technology

Unit-I

Principles of crop inoculation with microbial agents, organic farming-role of biofertilizers and organic manures; overview of microbial inoculants-types and their mode of application, types of formulation- advantages and disadvantages.

Unit-II

Carriers for inoculants: types and their characteristics, strain selection of bacteria and cyanobacteria for biofertilizer production and quality control, mass multiplication: methodology and constraints/benefits, bulk production (small scale and commercial scale), setting up of pilot scale inoculant production plants.

Unit-III

Rhizobium: Isolation, characterization and formulation; *Azotobacter*: isolation, characterization and formulation; phosphate solubilizing microorganisms: isolation, characterization and formulation; am fungi- types, multiplication methods and formulations; ecology of inoculants/ microorganisms in soil, cyanobacteria as biofertilizer for paddy cultivation.

Unit-IV

Composting- microbiology, types and quality testing; vermi-compost: types of earthworms, production technology and its evaluation; biocontrol agents: evaluation and formulations; biogas production technology; silage production.

Suggested Readings:

1. Sustainable Green Technologies for Environmental Management (2019). 1st ed. Shachi SV and Venkatramanan, RP, Springer (Singapore) ISBN 9789811327711.
2. Solid Waste as a Renewable Resource: Methodologies (2015) 1st ed. Albanese, JAF and Ruiz, MP CRC Press. ISBN 9781771882439.
3. Biofertilizer Technology (2013) 1st ed., Kannaiyan, S, Kumar, K and Govindarajan K Scientific Publisher. ISBN 9789386102485.
4. Compost Science and Technology, Vol 8. (2011) 1st ed. Diaz LF, De Bertoldi M and Bidlingmaier W, Elsevier, ISBN 9780080439600
5. Microbes for Sustainable Agriculture (2010) Tilak, KVBR, Pal, KK and De, R. I.K. International Publishing House Private Ltd. (New Delhi) ISBN 9789380026886

SEMESTER - III

Course title: Plant Pathology **Credit: 4**
Course code: SIAS MB 1 3 05 DCEC 4004 **Lectures: 60**

Course objective:

- To appraise the students about principles plant pathology and diseases of agricultural crops.
- To upraise the students about disease resistance and various methods of controlling diseases

Learning Outcomes:

- Understanding of factors responsible for diseases in the crops
- Determining the mechanisms of pathogens for causing diseases in plants
- Demonstrating the techniques for management of crop diseases

Unit-I

Introduction and history of plant pathology; definitions and concepts of plant diseases; biotic and abiotic factors responsible for plant diseases; Interaction of microorganisms with plants and their effect on plant growth. Modern detection methods

Unit-II

Host-pathogen interactions - recognition and infection, symptomatology, disease development- role of enzymes, toxins, growth regulators; defense strategies,; hypersensitivity responses including oxidative burst, phenolics, phytoalexins, PR proteins, elicitors and their effects on host plants.

Unit-III

Growth, reproduction, survival and dispersal of important plant pathogens; Role of environment and host nutrition on disease development; diseases of some important cereals (Rice, wheat), vegetables (Tomato, Potato), commercial crops (Cotton, Sugarcane) and fruit crops (Mango, Citrus, Grapes).

Unit-IV

Plant disease resistance – pathogen associated molecular patterns, pattern recognition receptors, PTI, effectors, ETI, disease control in plants - physical, chemical methods; use of biocontrol agents - bacteria and fungi; Molecular approaches for plant protection - applications and constraints.

Suggested readings:

1. Introduction to Principles of Plant Pathology (2018) 5thed. Singh RS, Scientific International Pvt. Ltd. ISBN: 9739386479488.
2. Plant Pathology (2018) 1sted., Burchett, S and Burchett S CRC Press, ISBN: 9780815344834.
3. Principles of Plant Pathology (2014) Jagtap G, Dhutraj D and Dey U. Agrobios (India), ISBN-978-8177544916.
4. Plant Pathology, (2005) 5thed., Agrios GN, Academic Press (New York) ISBN: 9780120445653.
5. Molecular Plant Pathology (2003) 1st ed., Dickinson M, Sheffield Annual Plant Reviews, CRC Press. ISBN: 9781841271088.

SEMESTER-III

Course title: Biofuels and Bioenergy **Credit: 4**
Course code: SIAS MB 1 3 06 DCEC 4004 **Lectures: 60**

Course objectives:

- To provide a thorough understanding of various renewable feedstocks for production of biofuels
- To provide students with knowledge on different technologies used in biofuel facility operations.

Course Learning outcomes:

- Understand the situation of utilization of biomass for energy resources
- Learn the developments in different generations of biofuels
- Understand the technologies related to life cycle assessment

Unit I

Bioenergy/Biofuel concept, advantages and disadvantages, types and generations of biofuels, biomass resources/feedstocks for bioenergy production: types (agricultural residues, energy crops, foresrty waste and municipal wastes and others), production, availability, and characteristics. General principles of the carbon cycle, greenhouse effect and global climate change. Bioeconomy, circular bioeconomy, biorefinery concept.

Unit II

Structure and function of lignocellulosic biopolymers, various types of pretreatment technologies (Mechanical, Physical, chemical, physicochemical, biochemical, ionic liquids, etc.) general scheme for bioconversion of biomass to biofuel; biomass characterization techniques, concept of pseudo-lignin and inhibitors, biodiesel production; environmental impacts of biofuel production

Unit III:
Lignocellulolytic enzymes (LCEs) such as cellulase, hemicellulase, etc.; accessory enzymes (swolenin; LPMOs and AAs); submerged and solid-state fermentation technology for enzyme production, recent developments and commercialization aspects of LCE enzyme; enzymatic hydrolysis process; saccharification yield and efficiencies; enzyme cocktail preparations for achieving higher saccharification yield; factors affecting biomass hydrolysis

Unit IV
Recent trends and advancements in biofuels production (ethanol, biodiesel from oil crops, microbial fuel cells, biohydrogen, biogas and other value-added product generation in an integrated approach), role of microbes, types and characterization, Effect of pH, temperature, nutrients, etc.; Life cycle assessment of biofuels and biofuel technologies, India's energy demand and supply management,

Suggested Readings
1. Mahesh & Dayal (1992). Renewable Energy Environment and Development, Konark Publishers (P) Ltd.
2. Rao S & Parulakar BB (1994). Energy Technology, Khanna Publishers, New Delhi.
3. David N-S Hon DNS & Nobuo Shiraishi N (2000). Wood and Cellulosic Chemistry, CRC Press.
4. Sorensen B (2010) Renewable Energy, Academic Press.
5. Kasthurirangan G, van Leeuwen J, Robert C (2012). Sustainable Bioenergy and Bioproducts, Springer.

SEMESTER - III

Course title: Applied Microbiology **Credit: 4**
Course code: SIAS MB 1 3 03 GEC 4004 **Lectures: 60**

Course objective:

- To understand the role of microorganisms and microbial processes in welfare of humankind
- To correlate the traditional microbiological techniques to microbial applications and their control.

Learning outcomes:

- Understanding of basic applications of microorganisms
- Know-how of the beneficial and harmful roles played by microbes
- Understanding of the roles of microbes in medical, environmental, industrial and food processes

Unit-I

History, applications and scope of microbiology- introduction to microscopic and pure culture techniques, microbial cell structure and functions, Microbial Growth and Control, balanced and unbalanced growth, growth curve.

Unit-II

Microbial Interactions with humans –normal microflora of human body, nosocomial infections, some common examples of food, air, water borne diseases, and their causative agents, antibiotics and Vaccines; Introduction to immunodiagnostics – RIA, ELISA.

Unit-III

Role of microorganisms in environment and agriculture, biogeochemical cycles (N, C, P), plant growth promoting bacteria, beneficial associations and interactions of microbes with microbe themselves, plant and animals, biodegradation, biodeterioration, biomineralization, bioremediation.

Unit-IV

Industrial and food applications of microbes, food fermentations (sauerkraut, tofu, tempeh, cheese, fermented milk), starter cultures, probiotics and prebiotics, industrial production of microbial biomass (baker yeast and SCP), primary (alcohol, vitamins and enzymes) and secondary metabolites (antibiotics).

Suggested readings:

1. Kuby Immunology (2018) 8th ed., Punt J, Stranford S, Jones P and Owen JA, W.H Freeman and Company, ISBN: 978-1319114701.
2. Manual of Environmental Microbiology (2016), 4th ed., Yates MV, Nakatsu CH, Miller, RV and Pillai RV, ASM Press (USA), Print ISBN: 9781555816025, e-ISBN : 9781555818821
3. Environmental Microbiology: Fundamentals and Applications (2015), 1st ed., Bertrand, JC, Caumette P, Lebaron P, Matheron R, Normand P and Sime-Ngando T, Springer Netherlands, eBook ISBN: 978-94-017-9118-2, Hardcover ISBN: 978-94-017-9117-5.
4. Environmental Microbiology (2016-17), 1st ed., Sharma, PD, Rastogi Publications (India), ISBN: 978-93-5078-140-1
5. Industrial Microbiology (2016), 2nd ed., Casida LEJR, New Age International (P) Ltd., New Delhi, India., ISBN: 9788122438024
6. Modern Industrial Microbiology and Biotechnology (2017), 2nd ed., Okafor N and Okeke, BC, CRC Press, ISBN: 9781138550186
7. Biotechnology: A Test Book of Industrial Microbiology (2017) 2nd ed., Crueger W, Crueger A and Aneja KR., Panima Publishing corporation (New Delhi), ISBN: 9789385998638

SEMESTER - III

Course title: Microbes and Diseases **Credit: 4**
Course code: SIAS MB 1 3 04 GEC 4004 **Lectures: 60**

Course objectives:

- To provide a comprehensive detail on different infectious agents and their implications.
- To update the students with newer infectious microbes

Course Learning outcomes:

- Fundamental understanding of ecological factors that affect the transmission of infectious diseases
- Understanding the virulent determinants and social implications of infectious agents
- Understanding the concepts of emerging and re-emerging pathogens

Unit-I

Bacterial Pathogenesis: Types of Bacterial Pathogens (Primary Pathogens; Opportunistic Pathogens); Pathogen Classification (BSL-1-4); Pathogenicity; Virulence factor; Transmission of Pathogens (Aerosol, Oral, Direct contact, Fomite, Vector-borne, Zoonoses); Koch's Postulates (Modified).

Unit-II

Penetration of Host Defenses: Capsules; Cell Wall Components; Enzymes, (Exoenzymes, Coagulases, Kinases, Hyaluronidase, Collagenase, IgA proteases); Antigenic Variation. Penetration into Host Cytoskeleton: Invasins, Cadherin Damage to Host Cells: Using Hosts Nutrients, Direct Damage to Colonized Area, Production of Toxins (Exotoxins, Endotoxins) Bacterial Secretion System.

Unit-III

Regulation of Virulence Factors: Sigma Factors, Two Component System, Evolution of Bacterial Pathogens: Horizontal Gene Transfer, Pathogenicity Island, Antibiotic Resistance, Plasmids, Lysogeny and Pathogenicity, Pathogenic Properties of Virus, Eukaryotic Pathogens (Fungi; Protozoa; Algae).

Unit-IV

Microbes and Human Life: Medical and Pharmaceutical benefits of Microbes; Emerging and Reemerging Infectious Diseases; Bioterrorism.

Suggested readings:

1. Murray PR. (2017) Basic Medical Microbiology 1st ed. Elsevier. ISBN: 978032347676
2. Carrol KC, Morse SA, Mietzner T and Miller S. Jawetz, Melnick, & Adelberg's (2016) Medical Microbiology 27th ed... McGraw-Hill Education. ISBN: 9780071824989
3. Ryan K, Ahmad N, Alspaugh JA, Drew JL, Lagunoff M, Pottinger P, Reller LB, Reller M, Sterling C, Weissman S (2018) Sherris Medical Microbiology 7th ed.. McGraw-Hill Education. ISBN: 9781259859809
4. Punt J, Stranford S,Jones P, Owen J (2019) Kuby Immunology 6th ed.. W.H. Freeman and Co. Publishers.
5. Ananthanaryan and Paniker (2017) Textbook of Microbiology 10th ed., Universities Press, ISBN: 9789386235251

Semester-IV

Course title: Research Methodology and Scientific Communication Skills **Credit: 3**
Course code: SIAS MB 1 4 01 C 3003 **Lectures: 45**

Course objectives:

- To provide knowledge about tools and techniques related with scientific communication and research methodology.
- To impart knowledge on scientific writing skills

Learning outcomes:

- Understanding the existence of scientific knowledge in ancient times
- Acquiring the skills of scientific reading, writing and presentations
- Appreciating the scientific ethics through case studies

Unit-I

Empirical science; scientific method; manipulative experiments and controls; deductive and inductive reasoning; descriptive science; reductionist vs holistic biology.

Unit-II

Choosing a mentor, lab and research question; maintaining a lab notebook. Concept of effective communication- setting clear goals for communication; determining outcomes and results; initiating communication; avoiding breakdowns while communicating; creating value in conversation; barriers to effective communication; non-verbal communication-interpreting non-verbal cues; importance of body language, power of effective listening; recognizing cultural differences.

Unit-III

Presentation skills - formal presentation skills; preparing and presenting using over-head projector, PowerPoint; defending interrogation; scientific poster preparation & presentation; participating in group discussions; Computing skills for scientific research - web browsing for information search; search engines and their mechanism of searching; hidden Web and its importance in scientific research; internet as a medium of interaction between scientists; effective email strategy using the right tone and conciseness.

Unit-IV

Technical writing skills - types of reports; layout of a formal report; scientific writing skills - importance of communicating science; problems while writing a scientific document; plagiarism, software for plagiarism; scientific publication writing: elements of a scientific paper including abstract, introduction, materials & methods, results, discussion, references; drafting titles and framing abstracts; publishing scientific papers - peer review process and problems, recent developments such as open access and non-blind review; plagiarism; characteristics of effective technical communication; scientific presentations; ethical issues; scientific misconduct.

Suggested readings:

1. Research Methodology: Methods And Techniques (2019) 4th ed., Kothari CR and Garg G, New Age International Publishers, ISBN: 978-9386649225.
2. Communicate Science Papers, Presentations, and Posters Effectively (2015) Patience GS, Boffito DC, Patience P, Academic Press, ISBN: 978-0128015001.
3. Successful Scientific Writing: A Step-by-Step Guide for the Biological and Medical Sciences (2014) 4th ed., Matthews JR and Matthews RW, Cambridge University Press ISBN: 978-1107691933.

4. Doing Science: Design, Analysis, and Communication of Scientific Research. (2001) Valiela I, Oxford: Oxford University Press, ISBN 10:019538573X.
5. On Being a Scientist: a Guide to Responsible Conduct in Research. (2009) 3rd ed., Washington DC, National Academies Press.

SEMESTER-IV

Course title: Dissertation **Credit: 16**
Course code: SIAS MB 1 4 01 SEEC 0016

Course Learning outcomes:

- Identifying appropriate research question and applying suitable research designs
- Execution of independent research experiments
- Application of knowledge and skills previously gained for selected research problem
- Establishing links between theory and methods in selected area of research
- Understand and apply ethical standards of conduct in the collection and evaluation of data and other resources

Guidelines for Project File

Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation.

Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student.

Sufficient time should be allowed for satisfactory completion of reports, taking into account that initial drafts should be critiqued by the faculty guide and corrected by the student at each stage.

The file is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation.

In general, the File should be comprehensive and include

- A short account of the activities that were undertaken as part of the project;
- A statement about the extent to which the project has achieved its stated goals.
- A statement about the outcomes of the evaluation and dissemination processes engaged in as part of the project;
- Any activities planned but not yet completed as part of the project, or as a future initiative directly resulting from the project;
- Any problems that have arisen that may be useful to document for future reference.
- The guidelines and format for dissertation is given below:

.

Dissertation Guidelines

1. **GENERAL :**

The manual is intended to provide broad guidelines to the M.Sc. candidates in the preparation of the dissertation report. In general, the project report shall report, in an organised and scholarly fashion an account of original research work of the candidate leading to the discovery of new facts or techniques or correlation of facts already known.

2. NUMBER OF COPIES TO BE SUBMITTED:

Students should submit three copies to the Head of the Department concerned on or before the specified date.

3. ARRANGEMENT OF CONTENTS OF DISSERTATION:

Dissertation material should be arranged as follows:

1. Cover Page & Title page
2. Declaration
3. Certificate
4. Abstract (Hindi and English)
5. Acknowledgements
6. Table of Contents
7. List of Tables
8. List of Figures
9. List of Symbols, Abbreviations and Nomenclature (Optional)
10. Chapters
11. References
12. Appendices
13. One page CV

The Tables and Figures shall be introduced in the appropriate places.

4. PAGE DIMENSIONS AND MARGIN:

The dimensions of the dissertation should be standard A4 size paper may be used for preparing the copies, **standard margin** with 1.5 line spacing.

5. MANUSCRIPT PREPARATION:

The general text of thesis shall be typed in font style Times New Roman and font size 12. Same quality of paper should be used for the preparation of the entire report/thesis; except figure, photos are shown.

5.1 **Cover Page & Title Page** - A specimen copy of the Cover page & Title page for report/thesis are given in Annexure I.

5.2 **Certificate**-The Bonafide Certificate as per the format shown in Annexure II

5.3 **Abstract**: Abstract should be an essay type (HINDI and ENGLISH) of narration not exceeding 500 words outlining the research problem, the methodology used for tackling it and a summary of the findings, typed in 1.5line spacing.

5.4 **Acknowledgements:** The acknowledgements shall be brief and should not exceed onepage. The student's signature shall be made at the right bottom above his / her name typed in capitals.

5.5 **Table of contents** - The table of contents should list all material following it as wellas any material which precedes it. The title page, Bonafide Certificate and Acknowledgment will not find a place among the items listed in the Table of Contents but the page numbers in lower case Roman letters are to be accounted for them. One and a half spacing should be adopted for typing the matter under this head. A specimen copy of the Table of Contents for report / thesis is given in Annexure III.

5.6 **List of Table** - The list should use exactly the same captions as they appear above thetables in the text and the caption shall follow 'sentence case'. One and a half spacing should be adopted for typing the matter under this head.

5.7 **List of Figures** - The list should use exactly the same captions as they appear belowthe figures in the text and the caption shall follow 'sentence case'. One and a half spacing should be adopted for typing the matter under this head

5.8 **List of Symbols, Abbreviations and Nomenclature** - One and a half spacing shouldbe adopted for typing the matter under this head. Standard symbols, abbreviations etc. should be used.

5.9 **Chapters** - The chapters may include

Chapter I – Introduction

Chapter II - Literature Review

Chapter III –Materials and Methods

Chapter IV- Results and Discussion

1.10. Research output/outcome if any published or presented in conference/seminar/symposium may be included.

1.11. List of References - Any works of other researchers, if used either directly orindirectly, should be indicated at appropriate places in the report/thesis. The citation may assume any one of the following forms**. APA Style.**

APA in-text citation style uses the author's last name and the year of publication, for example: (Field, 2005).

Example:

Derwing, T. M., Rossiter, M. J., & Munro, M. J. (2002). Teaching native speakers to listen to foreign-accented speech. *Journal of Multilingual and Multicultural Development*, 23(4), 245-259.

Thomas, H. K. (2004). *Training strategies for improving listeners' comprehension of foreign-accented speech* (Doctoral dissertation). University of Colorado, Boulder.

6. TYPING INSTRUCTIONS

6.1 General

This section includes additional information for final typing of the thesis. Some information given earlier under 'Manuscript preparation' shall also be referred. The impressions on the typed/duplicated/printed copies should be black in colour. Corrections, interlineations and crossing out of letters or words will not be permitted in any of the copies of the report/thesis intended for submission. Erasures, if made, should be neatly carried out in all copies. A sub-heading at the bottom of a page must have at least two full lines below it or else it should be carried over to the next page. The last word of any page should not be split using a hyphen. One and a half spacing should be used for typing the general text. The general text shall be typed in Font Style Times New Roman and Font Size 12.

Single spacing should be used for typing:

(i) Long Tables

(ii) Long quotations
(iii) Foot notes

(iv) Multilane captions
(v) References

6.2 Chapters The format for typing chapter headings, division headings and sub division headings shall be same as given in Table of Contents.

7. BINDING SPECIFICATIONS

Thesis should be spiral or soft cover book bound, the cover of thesis should be of dark greencolor, printed with golden ink and the text for printing should be identical as prescribed for the title page.

APPENDIX I A:(A typical Specimen of Cover Page & Title Page–**DISSERTATION**)

<Font Style Times New Roman - Bold>

TITLE OF DISSERTATION

<Font Size 18><1.5 line spacing>

DISSERTATION

<Font Size 14>

Submitted by

<Font Size 14><Italic>

NAME OF THE CANDIDATE

<Font Size 16>

Under the Supervision of

NAME OF THE SUPERVISOR

in partial fulfillment for the award of the degree of

<Font Size 14><1.5 line spacing>

MASTER OF SCIENCE IN

NAME OF THE PROGRAMME

<Font Size 16>

DEPARTMENT OF

SCHOOL OF ……..

CENTRAL UNIVERSITY OF HARYANA

MAHENDERGARH-HARYANA

<Font Size 14><1.5 line spacing>

MONTH AND YEAR

DECLARATION

I ……, student of the School of Interdisciplinary and Life Sciences, Central University of Haryana, Mahendergarh hereby declare and certify with my signature that my thesis entitled

…… submitted to the Department of ……., Central University of Haryana, India in partial fulfillment of the requirements for the award of the Degree of Master of Science is a record of original research work done by me and the dissertation has not been the basis for the award of any degree/diploma/associateship/fellowship or similar title of any candidate of any University. I have faithfully and accurately cited all my sources, including books, journals, handouts and unpublished manuscripts, as well as any other media, such as the Internet, letters or significant personal communications.

I understand the concept of "plagiarism" and declare that while drafting this dissertation I have refrained from plagiarism. I know that plagiarism not only includes direct copying, but also the extensive use of other's ideas without proper referencing or acknowledgement (which includes the proper use of references and quotation marks).

If my dissertation found to be plagiarized at any point of time, I'll be solely responsible and will be ready to accept any decision taken by the competent authority including rejection of my dissertation.

(Supervisor) (Signature of student)

For example

(A typical Specimen of Table of Contents)

<Font Style Times New Roman, Font Size 14>

TABLE OF CONTENTS

CHAPTER NO.	TITLE	PAGE NO.
	ABSTRACT	iii
	LIST OF TABLES	xvi
	LIST OF FIGURES	xviii
	LIST OF SYMBOLS, ABBREVIATIONS	xxvii
1	**INTRODUCTION**	1
	1.1 GENERAL	1
	1.2 NEED FOR THE STUDY	2
	1.3 OBJECTIVES OF THE STUDY	3
2	**REVIEW OF LITERATURE**	4
	2.1 INTRODUCTION	4
	2.2 ……..	4
	2.2.1 Product ……	6
	2.2.2 Product….	6

ANNEXURE II

Curriculum vitae

<Font Style Times New Roman, Font Size 14>

Personal Details

Name :

Date of birth : DD Month, YYYY

Place of birth :

Nationality : Indian

Permanent Address :

Email Id :

Mobile No. :

Education

M.Sc. (Subject) : YYYY Central University of Haryana, India

B.Sc. (Subject). : YYYY (Name of the University) with …. % of marks

Higher Secondary : YYYY (Name of the board) with …. % of marks

Secondary : YYYY, (Name of the board) with …. % of marks

9. Teaching Learning Process

- Classroom Lectures
- Interactive sessions
- Animation and videos demonstration
- Quizzes
- Flipped classroom
- Group discussions
- Seminars
- Electronic learning
- Tutorials
- Laboratory demonstrations
- Collaborative Learning
- Self-assessed or peer-assessed assignments

10. Blended Learning

Blended learning mode will be adopted in teaching the courses. This mode of learning uses direct as well as indirect mode of instructions through application of ICT. Students gets individualized computer assisted learning. This will also include live discussion on the topic in the theory classroom. This provides more flexible teaching learning environment.

1. Assessment and Evaluation

- Continuous Comprehensive Evaluation at regular after achievement of each Course-level learning outcome
- Formative Assessment on the basis of activities of a learner throughout the programme instead of one-time assessment
- Oral Examinations to test presentation and communication skills
- Open Book Examination for better understanding and application of the knowledge acquired
- Group Examinations on Problem solving exercises
- Seminar Presentations
- Review of Literature
- Collaborative Assignments

2. Key words

- Microbiology
- LOCF
- NEP-2020
- Blended Learning
- Face to face (F to F) Learning
- Programme Outcomes
- Programme Specific Outcomes
- Course-level Learning Outcomes
- Postgraduate Attributes
- Learning Outcome Index
- Formative Assessment and Evaluation
- Comprehensive and Continuous Evaluation

3. References

- National Education Policy-2020. https://www.education.gov.in/sites/upload_files/mhrd/files/NEP_Final_English_0.pdf
- The draft subject specific LOCF templates available on UGC website. https://www.ugc.ac.in/ugc_notices.aspx?id=MjY5OQ==
- Draft Blended Mode of Teaching and Learning: Concept Note available on UGC website. https://www.ugc.ac.in/pdfnews/6100340_Concept-Note-Blended-Mode-of-Teaching-and-Learning.pdf

4. Appendices

- Curricular Reforms— Extracts from National Education Policy-2020

Central University of Haryana
School of Interdisciplinary and Applied Sciences
Department of Microbiology

SCHEME AND CURRICULUM

Ph.D. Microbiology
(w.e.f. 2021)

Department of Microbiology

CENTRAL UNIVERSITY OF HARYANA,
MAHENDERGARH, HARYANA

SCHEME AND CURRICULUM

Semester	Core /Elective	Paper Code	Title of the Paper	Credit
I	CC	SIAS MB 02 01 01 C	Research Methodology	4
	CC	SIAS MB 02 01 02 C	Advanced Analytical Techniques	4
	CC	SIAS MB 02 01 03 C 2002	Research and Publication Ethics (RPE)	2
	GEC		To be opted by students from any department of School	4
	Total			**14**

List of GEC offered by the Department of Microbiology:

1. Immunology
2. Microbial Metabolism
3. The Microbiome

Course: Research Methodology

Course code: SIAS MB 02 01 01 C

Credit: 4

Lectures: 60

Course objective: To provide knowledge about tools and techniques related with scientific communication, research methodology and biosafety in biological experiments.

Learning outcomes:

- Understanding the existence of scientific knowledge in ancient times
- Acquiring the skills of scientific reading, writing and presentations
- Appreciating the scientific ethics through case studies
- Understand the importance and level of biosafety at laboratory and industrial levels

Unit 1. Identification and defining of the Research Problem:

Familiarization of research areas; Review of literature using appropriate resources – reviews, research papers, books and patents; Use of tools for searching literature through electronic databases; Defining a research problem.

Unit 2. Experimental Approaches and Methodology

Experimental designs to address the research problem; Pros and cons of different experimental strategies; Finalization of experimental design; Tools and techniques to execute experiments; Means to validate and analyze data; Use of statistical tools for analyzing the significance and interpretation of the data; Methods of recording observations and documentation

Unit 3. Ethics and Safety in Biological Research

Guidelines for Biosafety and Bioethics; Institutional Biosafety Committee – Handling of Genetically modified organisms, Institutional Human and Animal Ethics Committee - compliance, concerns and approval; Safety practices and disposal of Bio-waste in the laboratory; Radioactivity and safety precautions; Handling and disposal of flammable and hazardous chemicals.

Unit 4. Presentation, Publication and Protection of Research Data

Development of skills for scientific writing and research presentation – Term paper, Research project, Research report, Thesis, Research article and Review; Organization of the research document in to different sections (Introduction, Methodology, Results, Discussion, and Summary and Conclusions,

Bibliography); Use of electronic tools for bibliographic formatting and checking Plagiarism; Development of Oral presentation skills; Patents and Intellectual property rights

Students are expected to undertake the following assignments, exercises for evaluation.

1. Identification and selection of the broad area of research

2. Review of literature, formulation of research plan and submission of term paper along with references

3. Oral presentation of research plan and experimental design

Evaluation will be based on term paper and oral presentation

Suggested Readings

1. Research Methodology: Methods And Techniques (2019) 4th ed., Kothari CR and Garg G, New Age International Publishers, ISBN: 978-9386649225.
2. Communicate Science Papers, Presentations, and Posters Effectively (2015) Patience GS, Boffito DC, Patience P, Academic Press, ISBN: 978-0128015001.
3. Successful Scientific Writing: A Step-by-Step Guide for the Biological and Medical Sciences (2014) 4th ed., Matthews JR and Matthews RW, Cambridge University Press ISBN: 978-1107691933.
4. Doing Science: Design, Analysis, and Communication of Scientific Research. (2001) Valiela I, Oxford: Oxford University Press, ISBN 10:019538573X.
5. Beauchamp T.L., Walters L., Kahn J.P. & Anna C. *Contemporary issues in Bioethics.* Wardsworth Publishers. Co. 2013. Print
6. Cross C.L. and Wayne W.D. *Biostatistics: Basic Concepts and Methodology for the Health Sciences.* 10th edition, Wiley. 2014. Print
7. Davis, G.B. and Straub D.W. *Writing the doctoral dissertation.* 3rd edition. Barron's Educational series. 2012. Print
8. Deepa Goel. *IPR, Biosafety and Bioethics*.1st edition. Pearson Education. 2013. Print
9. Krishnaswamy, K.N., Mathiranjan M., and Sivakumar, A.I. *Management Research Methodology; Integration of Principles, Methods and Techniques.* Pearson Education. 2011. Print
10. Montgomery, Douglas C. *Design and Analysis of Experiments*. 8th edition. Wiley. 2013. Print
11. Rao S and Richard J. *Introduction to Biostatistics and Research Methods*. 5th edition. Prentice Hall India Learning Private Limited. 2012. Print
12. IPR, Biosafety and Bioethics (2013) Parashar S, Goel D, Pearson Publishing India, ISBN: 9788131774700.
13. An Introduction to Ethical, Safety and Intellectual Property Rights Issues in Biotechnology (2017) Nambisan P, Academic Press, ISBN: 9780128092316.

14. http://dbtindia.gov.in/guidelines-biosafety

Course: Advanced Analytical Techniques

Course code: SIAS MB 02 01 02 C

Credit: 4

Lectures: 60

Unit 1. Recombinant DNA techniques and Genomics

Use of Restriction and modification enzymes in cloning; Plasmid vector; Transformation and Plasmid isolation; PCR; DNA sequencing methods (Sanger's chain termination method, and automated DNA sequencing); Next generation sequencing (NGS); Global expression profiling; Whole genome analysis of mRNA and protein expression; Real time PCR and Microarrays and their applications

Unit 2. Proteomics

UV and fluorescence spectroscopy; Circular Dichroism; Mass spectrometry - Principles and their applications; Protein separation techniques and instrumentation (Gel filtration, Ion exchange and Affinity chromatography, 1D and 2D Polyacrylamide gel electrophoresis); Immunochemical detection of proteins

Unit 3. Microbial and Cellular Techniques

Microscopic techniques; Microbial growth and kinetics (synchronous culture, continuous and batch and fed-batch cultures, chemostat and turbidostat); Methods for identifying microbes (polyphasic approach); Cell disruption and fractionation of organelles; Isolation and purification of membrane proteins; Various methods to study cell-cell and cell-virus fusion; Flow cytometry techniques; Confocal and Atomic Force Microscopy; Types of Biosafety cabinets

Unit 4. Experimental Models in Biology

Rodent and non-rodent models, worms as model of studying human-microbe interactions, Handling and maintenance of animals, Ventilated cages, Different routes of injections and collection of various biological components, Formulation of feed and design of experiment

SUGGESTED READINGS

1. Ausubel FW. Current Protocols in Molecular Biology. Wiley-Blackwell. 2011. Print
2. Burgess R. and Deutcher MP. Guide to Protein Purification. Academic Press, San Diego, USA. 2009. Print
3. Butler, M. Animal Cell Culture & Technology. 1st edition. Tailor & Francis Publishers (UK). 2004. Print
4. Freshney, R.I. Culture of Animal cells: A Manual of Basic Technique and specialized applications. 7th edition. Wiley-Blackwell. 2016. Print
5. Green M.R. and Sambrook J. Molecular Cloning: A Laboratory Manual. Vol. I, II, III. 4th edition. Cold spring harbor laboratory press. 2013. Print

6. Principles and Techniques of Biochemistry and Molecular Biology (2018) 8th ed. Wilson K and Walker J, Cambridge University Press, ISBN No. 131661476X.
7. Physical Biochemistry: Principles and Applications (2010) 2nd ed., Sheehan, D., Wiley Blackwell (West Sussex), ISBN: 978-0-470-85602-4 / ISBN: 978-0-470-85603-1.
8. Physical Biochemistry: Applications to Biochemistry and Molecular Biology (1982) 2nd ed., Freifelder D, W.H. Freeman and Company (New York), ISBN:0-7167-1315-2 / ISBN:0-7167-1444-2.

Course title: Research and Publication Ethics (as per UGC guidelines)

Course code: SIAS MB 02 01 03 C 2002

Credit: 2

Lectures: 30

Course objective: To learn philosophy of science, research misconduct and integrity, publication plagiarism and ethics.

Learning Outcomes:

- Learn to identify the FFP in research and ethics of publication.
- Hands on session help to find research misconduct, predatory publication, publications metrics and plagiarism.
- To learn database citation and indexing of publication.

Part A: THEORY

Unit1 Philosophy & ethics (3 hrs)

Introduction of Philosophy; definition, nature and scope, concept, branches. Ethics; definition, moral philosophy, nature of moral judgments and reactions.

Unit II Scientific Conduct (5 hrs)

Ethics with respect to science and research, Intellectual honesty and research integrity, Scientific Misconduct; falsification, fabrication and Plagiarism (FFP), Redundant publications; duplicate and overlapping publications, salami slicing.

Unit III Publication Ethics (7 hrs)

Publication ethics; definition, introduction and importance. Best Practices/ standards setting initiatives and guidelines: COPE, WAME etc., Conflict of Interest, Publication misconduct: definition, concept, problems lead to unethical behavior and vice-versa, types, Violation of publication ethics, authorship and contributor-ship, Identification of publication misconduct, complaint and appeals, Predatory publications and journals.

Part B: PRACTICE

Unit IV Open Access publishing (4 hrs)

Open access publications and initiatives, SHERPA/RoMEO online resource to check publisher copyright and self-achieving policies, Software tools to identify predatory publications developed by SPPU, Journal finder Journal suggestion tools vis. JANE, Elsevier journal finder, Springer journal suggester etc.

Unit V Publication Misconduct (4 hrs)

Group discussion; Subject specific ethical issues, FFP, Authorship, Conflict of interest, Complaint and appeals; example and fraud from India and abroad. Software tools; turnitin, urkund and other open source plagiarism tools.

Unit VI Database and Research Metrics (7 hrs)

Database: Indexing citation database; Web of Science and Scopus etc., Research metrics; Impact factor of journal as per journal citation report, SNIP, SJR, IPP, Cite score, Metrics; h index, g index, i10, altmetrics.

Course: Immunology

Course code: SIAS MB 02 01 01 GEC

Credit: 4

Lectures: 60

Course objective: To understand overall organization of the immune system and to identify the cellular and molecular basis of immune responsiveness.

Learning outcomes:

- Understanding the working mechanism of the immune system
- Understanding of antibody, MHC, complement system, cytokines, cancer, and organ transplant hypersensitivity

Unit 1. Receptors of the immune cells

Detailed structure of B and T cell receptors, co-receptors and accessory proteins; Structural features of CD4, CD8 receptors and; Cellular adhesion molecules *viz.* ICAM, VCAM, MadCAM, selectins and integrins; Structure and distribution of Major Histocompatibility Complex I and II and their interaction with antigens; Markers of suppressor / regulatory cells *eg.* $CD4^+$ $CD25^+$ $Foxp3^+$ T_{reg}; Natural killer T cells (NKT)

Unit 2. Genetic organization of the receptor genes:

Genetic organization of B and T cell receptors coding genes; Genetic organization of MHC-I and MHC-II complex (both HLA and H-2); Mechanisms responsible for generating antibody diversity and diversity of T cell receptor specificities

Unit 3. Mechanisms of Immune recognition and response:

Detailed mechanisms of humoral and cell-mediated immune responses; Antigen presentation by MHC-I and MHC-II molecules; Major cytokines and their role in immune mechanisms: TNF, IFN, IL-1, IL-2, IL-4, 1L-6, 1L-10, 1L-12, IL-17, TGFβ; Complement System; Pattern recognition receptors (PRRs) and Toll-like receptors (TLR); Cell signaling through NF-κB; Natural Killer - Dendritic cells (NK-DC) interactions; CD-1 restricted T cells;

Unit 4. Applied Topics in Immunology:

Autoimmune diseases induced by microbes; Deficiencies / defects of T cells and B cells; Mucosal immunology; Comparative analysis of type I-IV hypersensitivities; Alloreactive T cells; Graft rejection and GVHD; Sequence based HLA-matching; Immunodiagnostics; CRISPR-Cas9 system and transgenic animals for xenotransplantation; Immunotherapy for tumors in humans

Suggested Readings

1. Kuby Immunology (2018) 8th ed., Punt J, Stranford S, Jones P and Owen JA, W.H Freeman and Company, ISBN: 978-1319114701.

2. Janeway's Immunobiology (2017) 9th ed., Murphy KM and Beaver C, WW Norton and Company, ISBN: 978-0815345510.
3. Roitt's Essential Immunology (2017) 13th ed., Delvis PJ, Martin SJ, Burton DR and Roitt, IM, Wiley-Blackwell, ISBN: 978-1118415771.
4. Lehninger: Principles of Biochemistry (2017) 7th ed., Nelson, DL and Cox, MM, WH Freeman and Company (New York), ISBN: 978-1319108243.
5. Lippincott's illustrated Reviews Immunology (2012) 2nd ed., Doan T, Melvold R, Viselli S and Waltenbaugh, C, Wolters Kluwer India Pvt, Ltd, ISBN: 978-8184737639.

Course: Microbial Metabolism

Course code: SIAS MB 02 01 02 GEC

Credit: 4

Lectures: 60

Course objective: The course is designed to describe metabolic and physiological diversity among prokaryotes.

Learning outcome:

- Learning of principles of microbial catabolic and anabolic pathways
- Understanding the transport systems and the mechanisms of energy conservation in microbial metabolism
- Identifying various physiological groups of bacteria with their special features

Unit 1. Microbial growth and growth kinetics:

Bacterial growth curve, generation time, measurement of microbial growth, growth kinetics, synchronous culture, continuous and batch culture, chemostat and turbidostat, environmental factors that affect growth, nutritional diversity in bacteria; Nutrient transport in microbes - Active and passive transport, Primary and secondary transport, Transport kinetics, ABC transporter, PEP-PTS system

Unit 2. Diversity and regulation of glucose metabolism in microbes:

Embden-Meyerhof-Parnas pathway; Variations of EMP pathway in different groups of bacteria; Overall energy balance sheet; Regulation of the EMP pathway; Modes of NAD regeneration; Pentose phosphate pathway – HMP pathway and its link with glycolysis; Fermentative mode of glucose oxidation - Entner-Doudoroff pathway; Variations of ED pathway in different groups of microbes and its implications; Fates of pyruvate; Alcoholic and lactic acid fermentation; Citric acid pathway – Stoichiometry and energy gain; Regulation; Alternate forms of TCA - Reductive TCA, Branched TCA; Glyoxylate cycle

Unit 3. Nitrogen metabolism:

Nitrogen assimilation; GS-GOGAT pathway and its regulation; Utilization of other modes of nitrogen, nitrate and nitrite utilization; amino acid biosynthetic pathways and their regulation; Amino acid utilization – reductive amination and deamination, decarboxylation; Stickland reaction; Amino acid oxidases, Polyamine biosynthesis and utilization

Unit 4. Metabolic engineering:

Introduction to primary and secondary metabolism; Classification of secondary metabolites; Introduction to metabolic engineering – strain development and pathway engineering; Case studies on primary metabolites *viz.* citric acid, succinic acid, lactic acid, ethanol fermentation, amino acid

pathways (glutamate, lysine, shikimic acid); Case studies on secondary metabolites viz. polyhydroxyalkanoates, polyketides and antibiotics

Suggested Readings

1. Albert G. Moat, John W. Foster, Michael P. Spector. *Microbial Physiology*. 4th edition. John Wiley & Sons. 2002. Print
2. Michael M. Madigan, Kelly S. Bender, Daniel H. Buckley, W Matthew Sattley, David A. Stahl, 15th edition, 2018, ISBN-13: 9780134261928 Pearson publications
3. Stanier RY, Adelberg EA, Ingraham JL. *General Microbiology*. 4th edition. Macmillan Press, London. 1976. Print
4. An Introduction to Microbiology (2019), 3rd ed., Tauro P, Kapoor KK, Yadav KS, and Sequeira MG, New Age International Publishers. ISBN: 0852268785
5. Microbial Biochemistry (2014) Cohen GN, 3rd edition. Springer Netherlands. ISBN 978-90-481-9437-7
6. The Physiology and Biochemistry of Prokaryotes. (2011) White D, Dummond J and Fuqua, C, 4th edition. Oxford University Press. ISBN: 9780195393040
7. Prescott's Microbiology (2017) 10th ed., Willey J, Sherwood L and Woolverton CJ. McGraw-Hill Education, ISBN: 1259281590
8. A text book of Microbiology (2013), Dubey RC and Maheswari, DK Revised S. Chand and Company Ltd, New Delhi. ISBN: 9788121926201

Course Title: The Microbiome **Credit: 4**

Course Code: SIAL MB 02 01 03 GEC 4004 **Lectures: 60**

Course objectives: To define and know the function of the microbiome of human, animal and plants

Course Learning outcomes

- Understanding the use of omics technologies in studying the microbiomes
- Understanding of changes of microbiome on health

Unit-I: Basics of Microbiome

History of the study of the microbiome; designing a microbiome study (hypotheses, methods, technologies); methods to study microbiome- DNA-based analysis of microbial communities, 16S rRNA gene amplicon sequencing and shotgun metagenomics sequencing methods; Functional analysis of the microbiome from DNA sequence functional analysis, metatranscriptome, metabolome, proteome, and glycome.

Unit-II: Techniques used in Microbiome

Techniques used to analyse microbiome data- assignment of taxonomy; generating OTU tables, quality control: Describing the complexity of the microbiome eg. alpha and beta-diversity; comparing microbial communities, phylogenetic trees, UniFrac, principal coordinate analyses, Venn diagrams, heat maps; development of new bioinformatics methods for microbiome studies. Functional studies of the Microbiome- Measurement of microbial products (the metabolome, proteome and glycome; role of microbiome and its products, nutrition, metabolism, the gut brain axis, and in immune- inflammatory processing.

Unit-III: Human Microbiome

Introduction to the Human Microbiome; The Human Microbiome Project (HMP); Diversity of the Human Microbiome- Oral microbiome, Gut microbiome, Skin microbiome, Vaginal microbiome; Gut microbiome changes in various diseases including liver diseases, obesity, diabetes, and other disorders; the mycome and virome in health and disease. Direct health effects of gut microbiome; modification of the microbiome- Effects of antibiotics, probiotics and prebiotics. Faecal transplant; microbiome in treatment of diseases: The dysbiosis concept of disease and strategies to shift a dysbiotic flora to one compatible with health; Designing an effective probiotic, eg., spores, encapsulation; Selecting and testing prebiotics that foster a healthy microbiome. Use of the microbiome in screening, diagnosis and monitoring diseases

Unit-IV: Microbiomes of other ecological niches

The plant microbiome: structure and function: above and below ground plant microbiome. Plant microbiome engineering to improve plant health. Soil microbiome- Structure, functions and its manipulation for better soil health. Rumen microbiome: composition, abundance and diversity. Animal behavior and the microbiome. Environmental microbiome; Insect gut microbiome- structure and ecological importance. Microbiomes of the built environments; Human health and microbiomes of the built environment.

Suggested readings:

1. Unravelling the Soil Microbiome: Perspectives for Environmental Sustainability (2020) 1st ed., Dubey RK, Tripathi V, Prabha R, Chaurasia R, Singh DP, Rao CS, El-Keblawy A and Abhilash PC, Springer Cham, ISBN: 978330155155.
2. Microbiome and Metabolome in Diagnosis, Therapy and other strategic Applications (2019) 1st ed., Faintuch J and Faintuch S. Academic Press (New York) ISBN: 9780128152492.
3. Diet, Microbiome and Health (2018) 1st ed., Holban AM, Grumezescu AM. Academic Press (New York), ISBN: 9780128114407.
4. Functional importance of the plant microbiome: Implications for agriculture, forestry and bioenergy (2017) 1st ed., Doty SL. Springer Cham. ISBN: 978-3-319-65896-4.
5. Microbiome Analysis: Methods and Protocols. (2018) 1st ed., Beiko RG, Hsiao W and Parkinson J. Springer New York. ISBN: 9781493987269.
6. The Gut Microbiome in Health and Disease (2018). 1st ed., Haller D. Springer International Publishing. ISBN 978-3-319-90544-0.

Annexure-LVII

Regarding revision in PG and PhD syllabi of Nutrition Biology

7 messages

Nutrition Biology <hodnutrition@cuh.ac.in> Thu, Sep 2, 2021 at 3:18 PM
To: nsangwan@cuh.ac.in, Neerja <neerja.hajela@yakult.co.in>, asha kawatra <ashakawatra@gmail.com>, savita dahiya <savitadahiya69@gmail.com>, "Dr. Savita Dahiya" <savitadahiya@cuh.ac.in>

Dear BoS Members,

As per the NEP 2020, we have been trying to revise and update our syllabus of M.Sc. Nutrition Biology including LOCF based curriculum with multidisciplinary, interdisciplinary and skill oriented course curriculum. Also, we have updated our syllabus for the Ph.D. program.

As a BoS (Board of Studies) member, I request you to please review, suggest any modifications required thereof.

Thanks and regards

2 attachments

Draft of syllabus of Nutrition Biology as per LOCF and NEP.docx
349K

PhD Nutrition Biology Syllabi 2021.doc
363K

Neerja <neerja.hajela@yakult.co.in> Fri, Sep 3, 2021 at 12:57 PM
To: Nutrition Biology <hodnutrition@cuh.ac.in>

Dear Sir,

The syllabus is perfectly fine.

Regards,

Neerja

[Quoted text hidden]

Nutrition Biology <hodnutrition@cuh.ac.in> Tue, Sep 7, 2021 at 6:23 PM
To: asha kawatra <ashakawatra@gmail.com>

---------- Forwarded message ---------
From: **Nutrition Biology** <hodnutrition@cuh.ac.in>
Date: Thu, Sep 2, 2021, 15:18
Subject: Regarding revision in PG and PhD syllabi of Nutrition Biology
[Quoted text hidden]
[Quoted text hidden]

Approval for BOS member.
14/9/2021.

2 attachments

Draft of syllabus of Nutrition Biology as per LOCF and NEP.docx
349K

PhD Nutrition Biology Syllabi 2021.doc
363K

asha kawatra <ashakawatra@gmail.com> Thu, Sep 9, 2021 at 11:00 AM
To: Nutrition Biology <hodnutrition@cuh.ac.in>

Approved
[Quoted text hidden]

Nutrition Biology <hodnutrition@cuh.ac.in> Sat, Sep 11, 2021 at 7:25 AM
To: savita dahiya <savitadahiya69@gmail.com>, "Dr. Savita Dahiya" <savitadahiya@cuh.ac.in>

Gentle Reminder
---------- Forwarded message ---------
From: **Nutrition Biology** <hodnutrition@cuh.ac.in>
Date: Thu, Sep 2, 2021 at 3:18 PM
Subject: Regarding revision in PG and PhD syllabi of Nutrition Biology
To: <nsangwan@cuh.ac.in>, Neerja <neerja.hajela@yakult.co.in>, asha kawatra <ashakawatra@gmail.com>, savita dahiya <savitadahiya69@gmail.com>, Dr. Savita Dahiya <savitadahiya@cuh.ac.in>

[Quoted text hidden]

2 attachments

Draft of syllabus of Nutrition Biology as per LOCF and NEP.docx
349K

PhD Nutrition Biology Syllabi 2021.doc
363K

Nutrition Biology <hodnutrition@cuh.ac.in> Mon, Sep 13, 2021 at 12:18 PM
To: savita dahiya <savitadahiya69@gmail.com>, "Dr. Savita Dahiya" <savitadahiya@cuh.ac.in>
Cc: nsangwan@cuh.ac.in

Gentle Reminder_II
[Quoted text hidden]

2 attachments

Draft of syllabus of Nutrition Biology as per LOCF and NEP.docx
349K

PhD Nutrition Biology Syllabi 2021.doc
363K

Dr. Savita Dahiya <savitadahiya@cuh.ac.in> Tue, Sep 14, 2021 at 11:52 AM
To: Nutrition Biology <hodnutrition@cuh.ac.in>

Respected Madam,

Reference to the trailing mail, I've reviewed the syllabus and the following modifications have been introduced in the "Sports Nutrition Subject".

Unit 1. Introduction to Sports Nutrition – History, organizations working for sports nutrition, Importance of Nutrition in sports.
Unit 4. Meal replacement products (MRP), World Anti Doping Agency (WADA)

Thanks and regards.
Dr. Savita Budhwar
Assistant Professor
Department of Nutrition Biology
Central University of Haryana
(M). 9996363764

[Quoted text hidden]

Draft of syllabus of Nutrition Biology as per LOCF and NEP.docx
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Learning Outcome-based Curriculum Framework for M.Sc. Nutrition Biology

New Education Policy-2020



CHOICE BASED CREDIT SYSTEM COURSE (CBCS- 2021 COURSE)

Department of Nutrition Biology
School of Interdisciplinary and Applied Sciences
Central University of Haryana
Mahenderagrh, Haryana

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Background

The Department of Nutrition Biology has been commenced in the year 2015 under the umbrella of School of Interdisciplinary and Applied Life Sciences with the aim to impart high quality education to the students in the field of Nutrition Biology. The thrust area of research includes assessment of nutritional status of different vulnerable groups, management of nutritional deficiency diseases, nutrition counselling, nutrition in special conditions, nutrient evaluation, development of functional food products and their nutrient estimation, chemical and biochemical assessment of various deficiency disorders, biosafety assessment of fermented foods and nutrigenomics. The department has trained and experienced faculty having diverse background of Nutrition Biology. The Department got externally funded research project from SERB/DST (Govt. of India), New Delhi. The department is also involved in extension activities in the adopted villages of CUH for the development of the community/society/nation by imparting nutrition education with the involvement of students. To enhance the knowledge of the students, department is covering all aspects of nutritional science. The department is offering courses on fundamentals of food and nutrition science, therapeutic nutrition, nutritional biochemistry, human physiology, food microbiology, food biotechnology, bioinformatics, human nutritional requirements, nutrition in metabolic disorders and many more. By considering NEP, 2020 department has also offered skill enhancement courses for better understanding of the students. The structure of scheme has been given in detail also. To ensure the implementation of curricular reforms envisioned in NEP-2020, the University has decided to implement various provisions in a phased manner. Accordingly, the curriculum may be reviewed annually.

Program Objectives:

- To become a landmark institute for qualitative nutritional studies, covering but not limited to study of various foods and food components on human body.
- To build empowered individuals who can be catalysts to change in dietary habits of various age groups.
- To reach out to communities in general and vulnerable groups in particular, educating, monitoring and correcting the food habits to lead a healthy life.

Programme Outcomes (POs)

- **Basic and applied knowledge:** Interdisciplinary knowledge to find solution for the complex biological problems
- **Problem analysis:** Ability to analyse society related/ applied research problem, design and execute experiments to find relevant solutions
- **Advanced Usage of Technology**: Apply advanced instrumentation tools, online resources with an understanding of the troubleshooting and limitations
- **Ethics:** Commitment towards professional ethics and responsibilities as a social endeavour to bring harmony with nature
- **Lifelong learning:** Scientific skills for industrial applications and entrepreneurship

Programme Specific Outcomes (PSOs)

- **PSO-1**: Development of an understanding between food, nutrition, health and diseases
- **PSO-2**: Development of critical thinking of role of macro and micro nutrients in diet
- **PSO-3**: Development of an understanding of role of nutrients in terms of metabolism as well as nutrient-gene interaction
- **PSO-4:** Development of an understanding of food spoilage and safety
- **PSO-5:** Development of critical thinking for meal planning and role of diet therapy in management of diseases
- **PSO-6:** Development of an understanding of physiological mechanisms of the human body and Patho-physiological processes of diseases and its management
- **PSO-7:** Development of an understanding of food laws, national healthcare delivery system, national and international agencies in the management of diseases
- **PSO-8:** Development of an understanding to assess and manage nutritional deficiency diseases at individual and community level

Postgraduate Attributes

On completion of the post graduate programme in Nutrition Biology, students are expected to equip with the skills of creative, critical and rational thinking associated with Nutrition and its use for human society. The following attributes are expected from the students of M.Sc. Nutrition Biology:

- Disciplinary Knowledge: Be able to demonstrate advanced knowledge and skills in the interdisciplinary field of Nutrition Biology

- Creative and Critical Thinking: Ability to critically think, analyse, evaluate and create new skills in the chosen discipline and across other field.
- Scientific Knowledge: Apply the knowledge of Food Science and nutrition to solve the complex problems for promotion of health, to increase the nutritional status of individual and community.

- Problem Solving: Develop an understanding of problem solving and research methodologies and demonstrate personal accountability by applying solutions to diverse challenges facing food production, supply, food and nutritional security.
- Communication Skills: Ability to participate in public discourse on varied themes and topics.
- Research Skills: Ability to design and carry out independent research, to update oneself with advance research trends and contemporary inputs in the discipline of food science, and to evaluate research contributions.
- Life Skills: Develop the cognitive, technical and creative skills necessary to support understanding of recent innovations in food science
- Modern tool usage: Create, select and apply appropriate techniques, resources, and modern technology and IT tools to complex food science and technological activities.
- Life-long Learning: Ability to learn and relearn knowledge and skills in the emerging area of Nutrition and Food science.

Structure of master Course

Department of Nutrition Biology
Master of Science in Nutrition Biology (Semester-wise Scheme 2021-2022)

Semester-I (Total credits - 25)

Course code	**Course title**	**L**	**T**	**P**	**Type of course**	**Credit**
SIAS NB 1 1 01 C 4004	Fundamentals of Food and Nutrition Science	4	0	0	Core	4
SIAS NB 1 1 02 C 4004	Nutritional Biochemistry-I	4	0	0	Core	4
SIAS NB 1 1 03 C 4004	Human Nutritional Requirements	4	0	0	Core	4
SIAS NB 1 1 04 C 4004	Human Physiology	4	0	0	Core	4
SIAS NB 1 1 05 C 4004	Practical-I	0	0	10	Core	5
	Generic Elective Course (to be opted from another Department)	4	0	0	GEC	4

Semester-II (Total credits - 25)

Course code	Course title	L	T	P	Type of course	Credit
SIAS NB 1 2 06 C 4004	Nutritional Biochemistry-II	4	0	0	Core	4
SIAS NB 1 2 07 C 4004	Functional Foods and Nutraceuticals	4	0	0	Core	4
SIAS NB 1 2 08 C 4004	Food Microbiology and Food Safety	4	0	0	Core	4
SIAS NB 1 2 09 C 4004	Therapeutic Nutrition	4	0	0	Core	4
SIAS NB 1 2 10 C 4004	Practical-II	0	0	10	Core	5
SIAS NB 1 2 01 DCEC 4004	Nutritional Toxicology*	4	0	0	DCEC	4
SIAS NB 1 2 02 DCEC 4004	Public Health Nutrition*	4	0	0	DCEC	4

* One of the courses will be opted by student.

Semester-III (Total credits - 26)

Course code	Course title	L	T	P	Type of Course	Credit
SIAS NB 1 3 11 C 4004	Nutrient Deficiencies and Assessment	4	0	0	Core	4
SIAS NB 1 3 12 C 4004	Nutrition in Metabolic Disorders	4	0	0	Core	4
SIAS NB 1 3 13 C 4004	Bioinformatics and Nutrigenomics	4	0	0	Core	4
SIAS NB 1 3 14 C 4004	Practical-III	0	0	8	Core	4
SIAS NB 1 3 145C 0202	Seminar	0	2	0	Core	2
SIAS NB 1 3 03 DCEC 4004	Nutrition and Immunity*	4	0	0	DCEC	4
SIAS NB 1 3 04 DCEC 4004	Food and Nutritional Biotechnology*	4	0	0	DCEC	4
SIAS NB 1 3 05 DCEC 4004	Sports Nutrition*	4	0	0	DCEC	4
	Generic Elective Course (to be opted from another Department)	4	0	0	GEC	4

*One of the courses will be opted by student**.**

Semester-IV (Total credits - 24)

Skill Enhancement Course

Course code	Course title	Type of course	Credit
SIAS NB 1 4 01 SEEC 0024	Dissertation	Core	24
	Total credits of the Program		**100**

L- Lecture; T- Tutorial P-Practical; C- Core course; DCEC - Discipline Centric Elective Course –opted by the student; SEEC- Skill Enhancement Elective Course; GEC- Generic Elective Course

Note: 40% of the courses of Nutrition Biology in each semester will be offered through online mode.

Credit Summary of Courses Offered by Department of Nutrition Biology

(Academic Session 2021-22)

Total Credits: 100

Semester	Credits				Total credits
	Core courses	Skill enhancement course	Elective courses		
			DCEC (For Department of Nutrition Biology students)	GEC (For other Department students)	
I	21	-	-	4	**25**
II	21	-	4	-	**25**
III	18	-	4	4	**26**
IV	-	24	-	-	**24**
Total	**60**	**24**	**8**	**8**	**100**

Generic Elective Course: Offered by Department of Nutrition Biology to students from other Departments of University.

Semester	Type of course	Course code	Course title	Credit
I	GEC	SIAS NB 1 1 01 GEC 4004	Hospital Food Service Administration	4
		SIAS NB 1 1 02 GEC 4004	Community Nutrition	
III	GEC	SIAS NB 1 3 03 GEC 4004	Work Physiology, Physical Fitness and Health	4
		SIAS NB 1 3 04 GEC 4004	Nutritional Counselling	

Learning Outcome Index

Learning Outcome Index for Core Courses

PSO	CC1	CC-2	CC-3	CC-4	CC-5	CC-6	CC-7	CC-8	CC-9	CC-10	CC-11
PSO-1	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	X
PSO-2	✓	✓	✓	X	✓	✓	✓	✓	✓	✓	✓
PSO-3	✓	✓	✓	X	✓	✓	✓	✓	✓	✓	✓
PSO-4	✓	X	✓	X	✓	X	✓	✓	✓	✓	✓
PSO-5	✓	✓	X	✓	✓	X	X	✓	✓	✓	X
PSO-6	✓	✓	X	✓	✓	X	X	✓	✓	✓	X
PSO-7	✓	X	✓	X	X	X	X	✓	✓	X	X
PSO-8	X	X	✓	✓	X	✓	✓	✓	✓	✓	X

(✓) Indicates meeting the PSOs
(X) indicates not meeting the PSOs

Learning Outcome Index for GEC

PSO	GEC-1	GEC-2	GEC-3	GEC-4
PSO-1	✓	✓	✓	✓
PSO-2	✓	✓	✓	✓
PSO-3	✓	✓	✓	✓
PSO-4	✓	✓	✓	✓
PSO-5	✓	✓	X	✓
PSO-6	✓	✓	X	✓
PSO-7	✓	✓	X	✓
PSO-8	✓	✓	✓	✓

(✓) Indicates meeting the PSOs
(X) indicates not meeting the PSOs

Learning Outcome Index for DCEC

PSO	DCEC-1	DCEC-2	DCEC-3	DCEC-4	DCEC-5
PSO-1	✓	✓	✓	✓	✓
PSO-2	X	✓	✓	✓	✓
PSO-3	X	✓	✓	✓	✓
PSO-4	✓	✓	X	✓	✓
PSO-5	X	✓	✓	X	✓
PSO-6	X	✓	✓	X	✓
PSO-7	✓	✓	X	X	✓
PSO-8	X	✓	✓	X	✓

(✓) Indicates meeting the PSOs
(X) indicates not meeting the PSOs

Semester-wise Courses and Credit Distribution

SEMESTER-I

Course title: Fundamentals of Food and Nutrition Science **Credit: 4**
Course code: SIAS NB 1 1 01 C 4004 **Lectures: 60**

Course objectives: This course will enable the student to learn about various food groups, balanced diet, digestion, absorption and function of various nutrients and their sources.

Learning outcomes:

- Understand about energy expenditure
- Critical analysis of meal planning
- Understand the relationship between food, nutrition and health

UNIT I

Basic terminologies related to food and nutrition, reference man, reference woman, food groups, functions of food-physiological, psychological and social, balanced diet, food pyramid, dietary guidelines for Indians, healthy eating habits, nutrient losses during cooking and processing, methods of conserving nutrients and enhancing nutritive value of foods, relationship between food, nutrition, health and disease.

UNIT II

Classification, functions, dietary sources, RDA, clinical manifestations of deficiency and excess and digestion and absorption of the following in brief: Energy, Carbohydrates, lipids and proteins, Fat soluble vitamins, Water soluble vitamins, Minerals.

UNIT III

Energy- definition, BMR, Factors affecting BMR, energy value of foods, energy requirement, energy expenditure, measurement of energy expenditure. Methods of nutritional assessment, nutritional labelling in India. Major nutritional deficiency diseases in India and programmes for combating nutritional deficiency diseases.

UNIT IV

Meal planning, factors affecting meal planning, concept of exchange food list, understanding specific considerations for planning meal for different groups of people. Methods of cooking: Dry, moist, frying and microwave cooking, advantages, disadvantages and the effect of various methods of cooking on foods.

Recommended Readings:

1. Bamji MS, Krishnaswamy K, Brahmam GNV (2009). Textbook of Human Nutrition, 3rd Edition. Oxford and IBH Publishing Co. Pvt. Ltd.
2. Srilakshmi (2007). Food Science, 4th Edition. New Age International Ltd.
3. Srilakshmi (2005), Dietetics, Revised 5th edition. New Age International Ltd.
4. Wardlaw MG, Paul M Insel Mosby (1996). Perspectives in Nutrition, Third Edition.
5. Codex Guidelines on Nutrition Labelling (CAC/GL 2_1985) (Rev.1_1993). Rome, Food and Agriculture Organisation of the United Nations / World Health Organisation, 1993.
6. Food Safety and Standards Authority of India portal, Government of India
7. Gopalan, C (1990). NIN, ICMR. Nutritive Value of Indian Foods.
8. Seth V, Singh K (2005). Diet planning through the Life Cycle: Part 1. Normal Nutrition. A Practical Manual, Fourth edition, Elite Publishing House Pvt Ltd.

Course title: Nutritional Biochemistry-I **Credit: 4**
Course code: SIAS NB 1 1 02 C 4004 **Lectures: 60**

Course objectives: To understand the basic of enzymes, carbohydrates, lipids and amino acid metabolism

Learning outcomes:

- Having coherent and systematic knowledge on carbohydrate, lipid and amino acid metabolism.
- Understanding the mechanism adopted by the human body for regulation of metabolic pathways.
- Understand the properties and role of macronutrients.

UNIT I

Energy value of foods, measurement of energy content of food. Thermogenesis, energy utilization by cells, Energy balance - BMR, physical activity, Mechanism of control- hunger, appetite, Mechanism of action of enzymes and co-enzymes involved in biological oxidation and reduction, enzyme inhibition, Respiratory chain, Role and mechanism of phosphorylation in biologic oxidation and energy capture

UNIT II

Carbohydrates: Basic Structures and Nomenclature, Sources, functions , properties, Reducing Sugars – Chemical and Biochemical Significance. Digestion and absorption. Glycolysis, Glycogenolysis, Gluconeogenesis, TCA cycle, HMP shunt, bioenergetics, Hormonal Regulation of Carbohydrate Metabolism, Diabetes

UNIT III

Lipids : Structure and functions, Classification and properties of lipids, essential fatty acids
Digestion and absorption, utilization and storage, Effects of deficiency and excess of fat
Fatty acid oxidation and biosynthesis Cholesterol: Properties, Biosynthesis, Functions, Lipoproteins Structure, Properties and their significance.

UNIT IV

Amino acids and Proteins: Types and structure of amino acids, properties, nutritional classification of amino acids, Amino acid balance, imbalance and toxicity, amino acid pool.
Protein – Introduction to general properties, structure, sources, functions, digestion, absorption, utilization and storage, denaturation, protein quality evaluation. Nitrogen metabolism, urea cycle Inter Relationship Between Carbohydrate, Fat and Protein

Recommended Readings:

1. Nelson DL and Cox MM (2005) Lehninger Principles of Biochemistry, W.H. Freeman & Com.
2. Victor W Rodwell (2015)Harpers Illustrated Biochemistry 30th Edition. Lange.
3. Devlin DT (2010)Text book of Biochemistry with Clinical Correlations. 7th edition. New York, John Wiley and Sons.

Course title: Human Nutritional Requirements **Credit: 4**
Course code: SIAS NB 1 1 03 C 4004 **Lectures: 60**

Course objectives: The aim of this course is to provide knowledge on fundamental concepts nutritional requirements for different age groups.

Learning outcomes:

- Comprehensive knowledge about nutritional considerations changes with age and physiological group.
- Understanding of body composition changes through the lifecycle.
- Understanding the ways for improving nutritional quality of diets.

Unit -I

Historical perspective of nutrient requirements and definitions (recommended nutrient intakes, minimum requirements, subsistence requirements, dietary reference intakes, optimum nutrient intake), recommended dietary allowances of macronutrients for all age groups, food pyramid, dietary guidelines for Indians, dietary guidelines for physical activity (national and international).

Unit-II

Aspects of growth- cellular to physical, determinants of growth and development in children, impact of altered nutrition on growth and development of children, maternal malnutrition and pregnancy outcome, malnutrition and cognitive development, body composition changes through the lifecycle and its consequences.

Unit-III

Physiological changes and altered nutritional requirements in: Extreme temperatures - low and high, high altitude, space nutrition and food systems and sports nutrition. Nutrition during infancy, childhood, adulthood and old age

Unit-IV

Ongoing nutrition transition and its implications, ways of improving nutritional quality of diets, assessment of protein quality, dietary diversification, bioavailability of nutrients, nutrient losses during cooking and processing, emerging concepts in human nutrition-nutrigenomics, nutraceuticals, functional foods and bioactive compounds.

Suggested readings:

1. Chadha R and Mathur P. (2015) Nutrition: A Lifecycle Approach. 1st Edition., Orient Blackswan, New Delhi.
2. Narasinga Rao BS, Sivakumar B (2010) Nutrient Requirements & Recommended Dietary Allowances for Indians. 2nd Edition. ICMR, National Institute of Nutrition, Hyderabad., ASIN: B06XKXGF58
3. Bamji MS, Rao NP, Reddy V (2009) Textbook of Human Nutrition. 3rd Edition. Eds Oxford and IBH publishing Co Pvt Ltd New Delhi, ISBN:81-204-1109-9
4. Nutrition in Developmental Transition. (2006)., NFI, NFI-WHO (SEARO) Symposium.
5. Kathleen Mahan L, MS, RD, CDE and Janice L Raymond, MS, RD, C (2017) Krause's Food and Nutrition care process. 14th DSt. Louis, Missouri: Elsevier, USA., ISBN:9780323340755

Course title: Human Physiology **Credit: 4**
Course code: SIAS NB 1 1 04 C 4004 **Lectures: 60**

Course objectives: To introduce the physiological concepts of homeostasis and control mechanisms and to study the functions of body systems with emphasis on clinical relevance.

Learning outcomes:

- Understanding of all aspects of general and systemic physiology.
- Understanding of physiological mechanisms of the human body and Patho-physiological processes of diseases.

Unit-I

Cell as the living unit of the body, Homeostasis and Control systems, Transport across cell membranes, Functional systems in the cells, Hematology**,** Erythropoiesis, Destruction and fate of RBCs, Classification and functions of each type of WBC, Blood Groups, blood disorders-Anemias, Polycythemias, Leucopenia, Leukemias, Thalassemia.

Unit-II

Body fluid compartments, water balance-regulation of fluid balance, Urine formation, Regulation of extra cellular sodium and osmolarity, Renal mechanisms for the control of blood volume, blood pressure and ionic composition and regulation of acid-base balance, Micturition, Diuretics, Renal failure and Kidney function tests.

Unit-III

Properties of cardiac muscle and specialized tissues, Cardiac cycle, Cardiac output, Blood pressure (factors & regulation), Cardiac failure, Atherosclerosis, Ischemia, Myocardial Infarction, Hypertension, Gastro-intestinal Physiology, General principles of GI function, Digestion and absorption, Pathophysiology of peptic ulcer and diarrheal disease.

Unit-IV

Classification of hormones and mechanism of hormone action, Endocrine function of the hypothalamus, Pituitary, Thyroid, Adrenals, Endocrine pancreas, Pathophysiology of diabetes, Male and female sex hormones, Hyper and hypogonadism.

Suggested readings:

1. Fox and Stuart Ira (2016) Human Physiology, 14th edition New York, NY, Mcgraw Hill.

2. John E. Hall, Guyton and Hall (2015) Textbook of Medical Physiology (Guyton Physiology), 13th edition, Saunders.

3. Gerad J, Tortora and Sandra R (2003) Grabowski. Principles of Anatomy and Physiology, control systems of human body, 10th edition, Wiley and Sons.

4. Anne Waugh and Allison Grant, Ross and Wilson (2018) Anatomy and Physiology, 13th edition, Elsevier.

5. Cole, Peter and R Kramer (2017) Human Physiology, Biochemistry and Basic Medicine by Laurence A. Academic Press, Elsevier ISBN 978-0-12-803689-0

SEMESTER – I

Course Title: Practical-I **Credit: 5**
Course Code: SIAS NB 1 1 05 C 4004 **Lecture: 150**

1. Preparation of standard solutions.
2. Qualitative analysis - Reaction of pentoses, hexoses, dextrin, starch, glycogen.
3. Determination of moisture and ash content in a food sample
4. Estimation of fat and fibre in a food sample
5. Estimation of Total protein
6. Estimation of carbohydrates in a food sample
7. Estimation of antinutrients in a food sample
8. Estimation of Creatinine in urine
9. Estimation of Blood glucose
10. Measurement of energy value of foods by using Bomb calorimeter
11. Identification of food sources which are rich in Energy, Proteins, Fat, Calcium, Iron, Vitamin A, Thiamine, Riboflavin, Niacin, Vitamin C.
12. Development of food exchange list
13. Planning of diet for all vulnerable group of the society
14. Assessment of protein quality of dishes and meals by NDpCal%
15. Familiarisation with the working of instruments used in analytical work

Recommended Reading:

1. FAO/WHO/UNU. (2004) Human Energy Requirements. Report of a Joint Expert Consultation.
2. Gopalan C et al (1990). Nutritive Value of Indian Foods. National Institute of Nutrition, Hyderabad.
3. WHO (2007). Protein and Amino acid Requirements in Human Nutrition. Report of a joint WHO/FAO/UNU expert consultation. WHO Technical Report Series 935.
4. ICMR. (2010) Nutrient Requirements and Recommended Dietary Allowances for Indians. National Institute of Nutrition, Hyderabad.
5. Raghuramulu N, Nair M.K. and Kalyansundaram S (eds) (2003). A manual of laboratory techniques. 2nd edition. National Institute of Nutrition, ICMR.
6. Sundararaj P and Siddhu A. (2002) Qualitative Tests and Quantitative Procedures in Biochemistry : A Practical Manual. Phoenix Publishers, Revised Edition.
7. Ranganna S. 2007. Handbook of analysis and quality control for fruits and vegetables products. 3rdedition. Tata Mcgraw – Hills: 25-45

SEMESTER-II

Course title: Nutritional Biochemistry- II **Credit: 4**
Course code: SIAS NB 1 2 06 C 4004
Lectures: 60

Course objectives: To learn about physiological role of electrolytes, vitamins, minerals and hormones in the body

Learning outcomes:
1. Understanding of systematic knowledge on electrolyte, vitamins, minerals and hormones
2. Understanding the mechanism adopted by the human body for regulation of metabolic pathways. 3. Understand the physiological role of micronutrients.

UNIT I

Electrolytes : Electrolyte content of fluid compartments, Functions of electrolyte- Sodium, Potassium and Chloride, Absorption, Transport and balance, Factors affective electrolyte balance and hydrogen ion balance.

UNIT II

Vitamins : Vitamins A,D,E, K, Thiamine, Riboflavin, Niacin, Folic acid, Pyridoxine, Cyanocobalamin, Pantothenic acid, Biotin, Ascorbic acid– Chemistry, Functions, Physiological action, Digestion, Absorption, Utilization, Transport, Storage, Excretion, Sources, Deficiency, Diagnosis of deficiency

UNIT III

Minerals : Calcium, phosphorus, iron, iodine, fluoride, zinc, selenium, manganese, chromium- Distribution in the body, Physiological Functions, Digestion, Absorption, Utilization, Transport, Excretion, Factors affecting absorption, Balance, Deficiency, Toxicity, Sources, Regulation of serum calcium concentration, Calcium: Phosphorus ratio

UNIT IV

Hormones : Overview of endocrine glands, hormones as chemical messengers, stimulus for hormone release: change in homeostasis , sensory stimulus and others. Structures, Receptor type, Regulation of biosynthesis and release (including feed back mechanism). Physiological and Biochemical actions

Recommended Reading:

1. Nelson, D.L. and Cox, M.M.(2005). Lehninger Principles of Biochemistry, W.H. Freeman & Com
2. Victor W. Rodwell. (2015)Harpers Illustrated Biochemistry 30th Edition. Lange.
3. Devlin D.T. (2010)Text book of Biochemistry with Clinical Correlations. 7th edition. New York, John Wiley and Sons.
4. Plummer D.T. (1997). An Introduction to Practical Biochemistry. New Delhi, Tata McGraw Hill Publishing Company.
5. Widmaier, E.P.,Raff, H. and Strang, K.T.(2008).Vander,Sherman,Luciano's Human Physiology, McGraw- Hill Higher Education.
6. Darnell, J.,Lodish, H. and Baltimore, D.(2008). Molecular Cell Biology, Scientific American Books.
7. Eccles R. (1993). Electrolytes , Body fluids and Acid Base balance, London, Edward Arnold - A division of Hodder and Stoughton

Course title: Functional Foods and Nutraceuticals **Credit: 4**
Course code: SIAS NB 1 2 07 C 4004 **Lectures: 60**

Course objective: To provide enormous knowledge on role of nutraceutical and functional foods in human diet. The course will also provide an understanding of recent advancements in formulation and processing of functional foods.

Learning outcomes:

- Understanding fundamental concepts and knowledge related to functional foods
- Critically evaluation of the mechanism of action and health benefits of different types of nutraceuticals
- Understanding national and international regulations regarding nutraceuticals

Unit-I

Definition and examples of nutraceuticals, functional foods, dietary supplements, fortified foods (scope and relevance), Classification of nutraceuticals, according to source of origin: phyto-nutraceuticals, animal origin, microbial, algal, Nutrient andnon-nutrient, Probiotic, prebiotic and synbiotic. Extraction and isolation of nutraceuticals, Perspective for food applications.

Unit-II

Recent advancements in formulation and processing of functional foods, Nanotechnology and functional food. Cellular and molecular mechanisms of action of different types of nutraceuticals relative to their Bioavailability and bio-accessibility, Absorption, disposition, metabolism and elimination of nutraceuticals, Functional foods and nutraceuticals for chronic disease prevention, Adverse effects and toxicity, Gut microbiota, metagenomics.

Unit-III

Probiotics: Important features of probiotic micro-organisms, Conventional and non-conventional probiotics; Designer probiotics; Health effects including mechanism of action, use in various foods: fermented milk products, non-milk products etc., Prebiotics: Meaning, Chemical Nature, sources & mechanism of production, metabolism, Importance of Prebiotics in Functional Foods, effects on human health and potential applications in risk reduction of diseases, Perspective for food applications for the following: Non-digestible CHO/Oligosaccharides: Dietary fibre (soluble and insoluble), resistant starch (types and functions),gums; role of short-chain fatty acids; Bio-active proteins and peptides; omega fatty acids in health, Synbiotics: Important features of synbiotics, Health effects including mechanism of action, use in various foods, effects on human health and potential applications in risk reduction of diseases, Perspective for food applications.

UNIT-IV

Important regulatory authorities/bodies and Regulations on functional foods/nutraceuticals: FAO, EFSA and FSSAI; Indian regulations for nutraceuticals/functionalfoods, Quality assurance of probiotics and safety, ICMR Guidelines on Probiotics, Consumer acceptance –issues for the future. Regulatory compliance, health claims and labelling

Suggested readings:

1. Rotimi EA (2012) Functional foods and Nutraceuticals. 1st Edition, Springer Publications.
2. Day RL, Harper AJ, Woods RM, Davies OG and Heaney LM (2019) Probiotics: current landscape and future horizons. Future Sci OA. May 3,5 (4):FSO391. doi: 10.4155/fsoa-2019-0004. Review.
3. Sarao LK and Arora M (2017) Probiotics, prebiotics, and microencapsulation: A review.

Crit Rev Food Sci Nutr. Jan 22;57 (2):344-371.

4. Ghosh D, Das S, Bagchi D, Smarta RB (2016) Innovation in Healthy and Functional Foods (2016) 1st edition, CRC Press, London, DOI https://doi.org/10.1201/b13022.
5. Galankis C (2017) Nutraceuticals and Functional Food Components , 1st edition, Academic press.
6. Debsis Bagchi, Francis Lau, Manashi Bagchi (2010) Genomics, Proteomics, and Metabolomics in Nutraceuticals and Functional Foods. Wiley-Blackwell Publishers.
7. Gopinanadhan P, Bakovic M and Shetty K, Wiley-Blackwell (2011) Functional Foods, Nutraceuticals and Degenerative disease prevention 1st edition, ISBN: 0812824532, 978081324536, 9780470960844
8. Saarela M (2011) Functional Foods: Concept to Product. 1st edition, Woodhead Publishing. ISBN: 1845696905, 9781845696900
9. Liong MT (2015) Beneficial Microorganisms in Food and Nutraceuticals. First Edition, Springer International Publishing Switzerland, ISBN: 3319231766.

Course title: Food Microbiology and Food Safety **Credit: 4**
Course code: SIAS NB 1 3 04 C 4004 **Lectures: 60**

Course objective:

1. The major learning objectives of this course will be to study the scope of food microbiology and food safety

2. To gain the essential knowledge and applications of various techniques (traditional to advanced) for preserving food.

Learning outcomes:

- Understanding techniques (traditional to advanced) for preserving food
- Understanding the role of microorganisms in food spoilage, food fermentation and foodborne diseases
- Understanding microbiological quality control and foodborne illnesses investigation procedures for ensuring food safety and hygiene
- Understanding the requirements and components of food safety management system (FSMS) and practical applications of microbiological risk assessment (MRA) tools for assessing microbiological risks in the food sector

Unit-I

Introduction to food microbiology and food safety; Microflora of food; Intrinsic and extrinsic factors affecting microbial growth and survival in food; Microbiological examination of food; Advances in isolation and enumeration of microorganisms in food; Principles of food preservation and significance; Preservation of food by physical methods – low, high temperatures, radiation; Preservation of food by chemical methods; Bio preservation of food.

Unit-II

Modified environment for storage of food; fermentative microorganisms as food and value-added product, single and mixed fermentation- lactic, yeast-lactic, mold-lactic fermentation in food; starter cultures for food fermentation; fermented milk, milk products, juices, vegetables and other beverages; fermented meat and fish products.

Unit-III

Food spoilage: causes and solutions; spoilage of fruits, vegetables, and their products; spoilage of dairy products, canned food, bakery and egg products, meat, fish, and seafood; newer methods for controlling spoilage of food; predictive modelling for food spoilage; food-borne outbreaks-bacterial agents for food-borne illnesses; fungal and algal agents for food-borne illnesses; food-borne animal parasites.

Unit-IV

Investigation of food-borne illnesses outbreaks; indicators of food microbial quality and safety; principles and applications of hurdle technology in food industry; principles of hygiene and sanitation in food service establishment; food safety laws; food safety and quality management system; principles and guidelines for conducting microbiological risk of food.

Suggested readings:

1. Adams M R, Moss M O and McClure P (2016) Food Microbiology (2016) 4th edition Publisher: Royal Society of Chemistry, ISBN: 9781782627623
2. Frazier W C and Westhoff D C (2013) Food Microbiology. 5th edition, Publisher: Mc Graw Hill India, ISBN: 978-1259062513
3. Jay J M, Loessner M J and Golden D (2005) Modern food microbiology, 7th edition, A, Publisher: Springer US, DOI: 10.1007/b100840, eBook ISBN 978-0-387-23413-7.

4. Karl R Matthews K R, Montville T J, Kniel K E (2017) Food Microbiology: An Introduction, 4th edition, Washington, DC : ASM Press, ISBN: 9781523112579.
5. Willey J, Sherwood L and Woolverton J C (2017) Prescott's Microbiology.10th edition, Publisher: McGraw Hill Education, ISBN: 9781259281594

Course title: Therapeutic Nutrition **Credit: 4**
Course code: SIAS NB 1 2 03 DCEC 4004 **Lectures: 60**

Course objective: To provide an understanding of role of therapeutic nutrition for the management of various diseases

Learning outcomes:

- Understanding the principles of meal planning
- Critical assessment of nutritional state and surveillance
- Understanding the role of diet in management of diseases

Unit-I

Introduction to meal meal planning, principles, factors affecting meal planning, steps involved in meal planning, food exchange list(s), diet plan for preschool and school children, adult man, woman and elderly, diet therapy, diet & stress in current scenario. Food faddism & the faulty food habits, Nutritive value of common Indian foods.

Unit-II

Nutrition in pregnancy - physiological stages of pregnancy, nutritional requirements, complication of pregnancy, diet during pregnancy, nutrition during lactation - physiology of lactation, nutritional requirements, nutrition during infancy - growth & development, nutritional requirements, breast feeding, infant formula, introduction of supplementary foods. Nutrition during early childhood (toddler/preschool)- growth & nutrient need, nutrition related problems, feeding patterns, nutrition of school children- nutritional requirement, nutrition during adolescence - growth & nutrient needs, food choices, eating habits, nutrition during adulthood - nutritional requirements, geriatric nutrition: factors affecting food intake and nutrient use, nutrient needs, nutrition related problems.

Unit-III

Nutritional problems in emergencies in vulnerable groups, macro and micronutrient deficiencies, nutritional assessment and surveillance. Nutritional screening and assessment of patients – out patient & hospitalized. Nutrition care plan and implementation. monitoring and follow up, ethical issues, dietary counselling. Nutritional relief and rehabilitation – assessment of food needs, food distribution strategy, mass and supplementary feeding, sanitation and hygiene, evaluation of feeding programs. Nutritional approach to tackle nutrition problems in emergencies. Therapeutic diets (clear fluid, full fluid, soft diet and Regular normal diet), types of hospital diets, diet in different diseases namely cancer, obesity, peptic ulcer, and stone patients

Unit-IV

Overview of enteral and parenteral nutrition in Indian context, principles underlying enteral and parenteral feeding, constituents of enteral and parental nutrition formulations, types of eternal and parenteral formulations, access techniques and devices available for eternal and parenteral feeding, formulation of guidelines, ethical issues and legal considerations, complications of eternal feeding overview of diseases, etiology, symptoms and dietary management of diabetes mellitus, hypertension, hypotension, hypothyroidism,and Rheumatoid arthritis.

Suggested readings:

1. Lewis JD, Ruemmele FM, Wu GD (2014) Nutrition, Gut Microbiota and Immunity: Therapeutic Targets for IBD: 79th Nestlé Nutrition Institute Workshop, New York, Nestlé Nutrition Institute Workshop Series, Vol. 79, 3318026697, 9783318026696
2. Kathleen Mahan L, MS, RD, CDE and Janice L Raymond, MS, RD, CD, (2017) Krause's Food & Nutrition Care Process. 14th edi., Saunders-Elsevier. ISBN: 9780323340755

3. Food, Nutrition, Physical Activity and the Prevention of Cancer- A Global Perspective. (2007) Washington E.D. WCRF (World Cancer Research Fund & American Institute for Cancer Research) Available from: http://discovery.ucl.ac.uk/4841/1/4841.pdf
4. Robert D. Lee, David C. Nieman (2013) Nutritional Assessment. 6th edition, , McGraw Hill Higher Education ISBN-13: 9780071326360
5. Mary JM, Pamela W-M and Jennifer MB (2016) Integrating Therapeutic and Complementary Nutrition (Modern Nutrition). CRC PRESS, Taylor and Franscis Group ISBN: 084931612X, 9780849316128, 9781420003413.

Course: Practical-II **Credit 5**
Course Code: SIAS NB 1 2 10 C 4004 **Lecture 150**

1. Estimation of calcium and phosphorus in food sample.
2. Estimation of total carotenoids in food sample
3. Estimation of iron in a food sample
4. Estimation of ascorbic acid in food sample
5. Isolation of microorganisms by pure culture technique and microbial count by Standard Plate Count Method
6. Morphological characteristics of various bacteria and fungi associated with food.
7. Use of biochemical tests for identifying bacteria.
8. Detection of aflatoxin in peanuts by thin layer chromatography
9. Microbiological analysis of water, milk, fruit juices, street foods
10. Isolation and screening of potential probiotic microorganisms
11. Preparation of probiotic fortified food products
12. Effect of prebiotics on the growth of selected probiotic microorganisms
13. Dietary assessment methods in epidemiological studies
    a. Duplicate diet approach
    b. Food frequency questionnaire
    c. Food consumption record
    d. 24-Hour dietary recall
    e. Dietary record
14. Planning a diet for infants, preschool children, pregnant and lactating women
15. Planning a diet for overweight, underweight, diabetic and celiac patients
16. Assessment of patient needs – nutritional assessment and screening

Suggested readings:

1. Raghuramulu N, Nair MK and Kalyansundaram S (2003) A manual of laboratory techniques. 2nd edition. National Institute of Nutrition, ICMR.
2. Bell C, Neaves Pand Wiliams AP (2006) Food Microbiology and Lab Practice.
3. Cappuccino JG and Sharman N (2002) Lab Manual of Microbiology. Pearson Education Publishing Co.
4. Ranganna S (2007) Handbook of analysis and quality control for fruits and vegetables products. 3rdedition. Tata Mcgraw – Hills: 25-45.

Course title: Nutritional Toxicology **Credit: 4**
Course code: SIAS NB 1 2 01 DCEC 4004 **Lectures:60**

Course objectives: To provide profound knowledge on the basic principles of toxicology and how different toxicants affect human health.

Learning outcomes:

- Identify and describe different sources of toxicity in the food supply
- Describe toxic effects of nutrients eaten in excess of requirements
- Understanding the relationship between nutrient uptake and drug bioavailability

Unit-I

Introduction to basic terms in toxicology, general principles of toxicology, classification of toxicants, mechanisms of toxicants, nature and complexity of food, antinutritional substances in food, overview of methods of toxicity testing (in vivo and in vitro studies), concept of risk analysis, steps involved in risk assessment.

Unit-II

Physical, chemical and biological hazards- types, sources, potential toxic effects of different hazards, naturally present toxicants in foods and their repair mechanism, foodborne illness – causes, prevention, treatment microbial toxins: types, properties, mode of action and toxin inactivation, food allergies and intolerances, food poisoning, types ,causative factors, symptoms and prevention, anti-nutritional factors their course of action, harmful effects and their mitigation.

Unit-III

Toxicity of Vitamins, minerals and dietary supplements, Food additives toxicity, Safety Determination of direct and indirect Food Additives, concept of Generally Regarded as Safe (GRAS), Acceptable Daily Intake (ADI), Estimated daily intake (EDI), adverse health effects of different additives, role of Joint FAO/WHO Expert Committee on Food Additives (JECFA) in assessing safety of food additives, Regulatory aspects of additives (FSSAI regulation).

Unit-IV

Disease states/drugs and nutrient deficiency, Food–Drug Interactions: mechanism of action, Interactions of drugs, food, alcohol and nutraceuticals, Strategies for prevention and management. Food packaging material, potential contaminants from food packaging material. Food laws and standards: Farmer Producer Organisation (FPO), ISI, Ag Mark, Codex Alimentarius, ISO, mark for vegetarian and non vegetarian foods, eco-friendly products and others in operation Carcinogens and carcinogenesis, Process-induced toxic compounds; nitrites, nitrates, and nitrosamines, lipid oxidation, Toxic components in foods of marine origin.

Suggested readings:

1. Yeung AWK, Tzvetkov NT, Jóźwik A, Horbanczuk OK, Polgar T, Pieczynska MD, Sampino S, Nicoletti F, Berindan-Neagoe I, Battino M, Atanasov AG (2019) Food toxicology: quantitative analysis of the research field literature.. Int J Food Sci Nutr. May 29:1-9. doi: 10.1080/09637486.2019.1620184. [Epub ahead of print] PMID: 31140340
2. Stanley TO (2004) Food and Nutritional Toxicology.1st edition, CRC Press, Boca Raton, FLA., ISBN :1587160714, 9781587160714.
3. Shaw IC (2013) Food safety: The science of keeping food safe. Wiley-Blackwell, ISBN: 144433722X.
4. Püssa T (2013) Principles of Food Toxicology (2013) 2nd edition, CRC Press, ISBN: 9781466504103.
5. Hathcock, JN (2012) Nutritional Toxicology Nutrition: Basic and Applied Science Series, Volume 1, Publisher: Elsevier, ISBN: 0323146937, 9780323146937
6. Sherrow V (2015) Food Safety (Point Counterpoint) 3rd edition, ISBN, 0791092895,

9780791092897, 978143810612.

Course title: Public Health Nutrition **Credit: 4**
Course code: SIAS NB 1 2 02 DCEC 4004 **Lectures: 60**

Course objectives: To familiarize the students with the concept of Public Health Nutrition and methods of nutritional assessment

Learning Outcomes:

- Become familiar with the concept of food and nutrition security as well as public health nutrition.
- Obtain the exposure of national healthcare delivery system and gain knowledge of assessment of nutritional status of individuals and community.
- Understand the public health aspects of malnutrition prevalent in the community.

UNIT I

Public Health Nutrition : Aim, scope and content of Public Health Nutrition, Role of Public Health Nutritionist in National development . Health – definition, dimensions, determinants and indicators , National Nutrition Mission- maternal nutrition (antenatal and postnatal care)

UNIT II

Assessment of Nutritional Status of Individual and Community, Meaning and significance of nutritional status assessment, Methods of nutritional assessment: Anthropometry, Biochemical and Biophysical methods, clinical methods, dietary intake and ecological variables including socio-cultural, biologic, environmental and economic, and vital health statistics. Errors in methods of assessing nutritional status, Rapid assessment procedures for community nutrition assessment

UNIT III

Public Health Aspects of Undernutrition: Etiology, clinical features, public health implications, preventive strategies for : Chronic Energy Deficiency/ Protein Energy Malnutrition and Severe Acute Malnutrition , Micronutrient deficiencies - Vitamin A deficiency, Nutritional Anemias, Iodine deficiency disorders, Vitamin D deficiency and Osteoporosis, Zinc Deficiency

UNIT IV

Public Health implications and preventive strategies for: Obesity, Hypertension, Cardiovascular diseases, Diabetes. Food and Nutrition Security : Concepts and definitions of food and nutrition security at the national, regional, household and individual levels, Impact of food production, losses, distribution, access, availability, consumption on food and nutrition security

Suggested Readings:

1. Community based Management of children with severe acute malnutrition, Operational & Technical guidelines (2012) Ministry of health & Family Welfare, NirmanBhawan, New Delhi
2. Indian Council of Medical Research: Dietary Guidelines for Indians. (2011)Dietary Guidelines for Indians: A manual (2nd ed.) second edition , NIN.
3. Gibney MJ, Margetts, BM, Kearney JM, Arab I (2004) Public Health Nutrition. NS Blackwell Publishing.
4. Longvah T, Ananthan R, Bhaskarachary K, Venkaiah K (2017) Indian food composition tables. National Institute of Nutrition.
5. Jelliffe DB and Jelliffe EFP (1989) Community Nutritional Assessment. Oxford University Press.
6. Management of SAM children through medical nutrition therapy (2009) Vol I & II. National Consensus Workshop. Published by DBT. Ministry of Science & Technology. Government of India and ICMR, New Delhi

7. Owen AY and Frankle RT (1986) Nutrition in the Community: The Art of Delivering Services (2nd ed.) Times Mirror/Mosby.
8. Park K (2017) Park's Textbook of Preventive and Social Medicine. 24th ed. Jabalpur M/s. Banarsidas Bhanot.
9. Ross AC (2012) Nutrition in health and disease. (Eds) Lippincott Williams & Wilkins.
10. Shils ME (1998) Nutrition in health and disease. (Eds) Lippincott Williams & Wilkins. 17
11. Vir S (2011) Public health nutrition in developing countries Part-1 & 2. Woodhead Publishing India limited.
12. Wadhwa A and Sharma S (2003) Nutrition in the Community. A text book.
13. SCN News, UN ACC/SCN Subcommittee on Nutrition.
14. https://www.who.int

SEMESTER-III

Course title: Nutrient Deficiencies and Assessment **Credit: 4**
Course code: SIAS NB 1 3 11 C 4004 **Lectures: 60**

Course objectives: The student will be able to understand nutritional deficiency diseases and their management

Learning outcomes:

- Identify the signs and symptoms of diseases related to nutrients deficiency
- Understand the aetiology and preventive measures for the different deficiency diseases
- Assess the nutritional status using anthropometric measurements and biochemical parameters.

UNIT I

Relationship between nutrition, health and disease, Macronutrients and micronutrients – functions, food sources, Recommended Dietary Allowances according to age, sex, activity, physiological condition. Impact of deficiency, excess or imbalanced intake of nutrients on health.

UNIT II

Nutritional deficiency diseases: Protein energy malnutrition, Nutritional anemias, Vitamin A deficiency, Iodine deficiency disorders, Vitamin D deficiency, etiology and pathogenesis, Clinical manifestations and biochemical changes.

Unit III

Public health aspects of malnutrition : Treatment of deficiency diseases- hospital and community setting. Prevention strategies- overview of National policies and programs, Nutrition surveillance and monitoring

Unit IV

Methods of Assessment of Nutritional Status: Types of diet surveys, Concept of diet quality and adequacy, Anthropometric measurements – indices and reference standards, biochemical parameters and clinical examination

Recommended Readings

1. Chadha R and Mathur P (2015) Nutrition: A Lifecycle Approach. Orient Blackswan, New Delhi.
2. ICMR (2010) Nutrient Requirements and Recommended Dietary Allowances for Indians.National Institute of Nutrition, Hyderabad.
3. Maurice E Shils and Moshe Shike A (2005) Nutrition in Health and Disease. Catharine Ross and Benjamin Caballero. 10th edition. Lipincott, William and Wilkins.
4. Gibson RS (2005) Principles of Nutritional Assessment. 2nd edition. Oxford University Press.

Course title: Nutrition in Metabolic Disorders **Credit: 4**
Course code: SIAS NB 1 3 12 C 4004 **Lectures: 60**

Course objective: To understand the concepts of different diseases and role of diet in the management of disease.

Learning outcomes:

- Understanding importance of nutritional assessment in the care of patients
- Understanding metabolic changes in various diseases/disorders and the associated principles of diet therapy
- Comprehend the rationale of prevention of various diseases/disorders

Unit-I

Concept, purpose and principles of diet therapy, basic concepts and methods of - (a) oral feeding (b) tube feeding (c) parental nutrition (d) intravenous feeding, etio-pathophysiology, metabolic and clinical aberrations, diagnosis, complication, treatment, dietary management and recent advances in obesity, overweight and underweight, Diabetes Mellitus – Type 1, Type 2, Diet in Diabetes mellitus: Incidence and predisposing factors, symptoms-types and tests for detection. Metabolism in diabetes dietary treatment & meal management hypoglycaemic agent, insulin and its types. Complication of diabetes.

Unit-II

Diet in surgical conditions and burns. Gout- Nature and occurrence of uric acid, causes, symptoms and diet. Diet in allergy and skin disturbances: Definition, classification, manifestations, common food allergies and dietetic treatment, incidence of Atherosclerosis, dietary principles, hyperlipidaemia, hypertension- causes and dietary treatment, etio-pathophysiology, metabolic and clinical aberrations, diagnosis, complication, treatment, dietary management and recent advances in cardio vascular diseases.

Unit-III

Diet in fever and infections- Types- metabolism in fever, general dietary consideration. Diet in gastritis, peptic ulcer- symptoms, clinical findings, treatment, chemically and mechanically irrigating foods, four stage diet (Liquid, soft, convalescent, liberalized diet). Overview of Nutrition in gastrointestinal disorders, nutrition in diseases of liver, nutrition in food allergy and intolerance.

Unit-IV

Diet in renal diseases: basic renal function, symptoms and dietary treatment in acute and chronic glomerulonephritis, nephrosis, renal failure, dialysis. urinary calculi-causes & treatment. diet in disturbances of small intestine and colon. aetiology, symptoms and dietary treatment in - jaundice, hepatitis, cirrhosis and hepatic encephalopathy. aetiology and dietary management in cancer, effect of cancer therapy on nutritional status, factors affecting carcinogenesis process

Suggested readings:

1. Kathleen Mahan L, MS, RD, CDE and Janice L Raymond, MS, RD, CD (2017) Krause's Food & the Nutrition Care Process, 14th Edition., Sylvia Escott-Stump., Saunders Elsevier. ISBN: 9780323340755
2. Michael J. Gibney, Marinos Elia, Ljungqvist O and Dowsett J. Blackwell Science (2011) Clinical Nutrition (The Nutrition Society Textbook), UK ISBN: 0632056266
3. Shils ME, Shike M, Ross AC, Caballero B and Cousins RJ (2012) Lipincott Modern Nutrition in Health and Disease. 11th edition, William and Wilkins. ISBN-10: 1605474614

4. Gilbert-Barness E, Barness LA and Farrell PM (2017) Metabolic Diseases: Foundations of Clinical Management, Genetics, and Pathology. 2nd Edition.. IOS Press. ISBN: 978-1-61499-717-7
5. Laurie E. Bernstein, Fran Rohr and Joanna R (2015) Helm Nutrition Management of Inherited Metabolic Diseases: Lessons from Metabolic University. Springer International Publishing. DOI: 10.1007/978-3-319-14621-8 ISBN 978-3-319-14621-8

Course title: Bioinformatics and Nutrigenomics **Credit: 4**
Course code: SIAS NB 1 3 13 C 4004 **Lectures: 60**

Course objective: To introduce the students in the field of bioinformatics and enables them to understand the concepts of gene and nutrient interaction.

Learning outcomes:

- Understanding the role of computer science in predicting structure and function of biomolecules
- Understanding similarities and differences among living organisms on the basis of genetic information
- Understanding the concept of gene and nutrient interaction.
- Understanding how genetic modification of crops can be used to more effectively deliver drugs, vaccines, nutrients and bioactive substances.
-

Unit-I

Historical background. Scope of bioinformatics - genomics, proteomics, computer aided drug design (structure based and ligand based approaches), Applications of bioinformatics. Introduction to biological databases - primary, secondary and composite databases, Different formats of molecular biology data. NCBI, nucleic acid databases (GenBank, EMBL, DDBJ, NDB), protein databases (PIR, Swiss-Prot, TrEMBL, PDB)

Unit-II

Similarity, identity and homology. Alignment-local and global alignment, pairwise and multiple sequence alignments, BLAST and CLUSTALW. Construction of phylogenetic tree; Protein structure prediction methods

Unit-III

Nutrient/diet gene interactions, bioactive food components, practical applications. Introduction to various target validation models (cell-line models, zebrafish model and animal models); Single nucleotide polymorphism and associated metabolic aberrations, Diseases which can be addressed by nutrigenomics; genes and gene products which are important in these diseases,

Unit-IV

Concept and scope of personalized nutrition. Metabolic effects of the dietary fibre and the modulation of gut microbiota. Scope of genetic modification in altering nutritional properties and content of bioactive substances in food with details of ongoing research in the field, concept and feasibility of GM therapeutic foods for drug and phytochemical delivery.

Suggested readings:

1. Xiong J (2006) Essential Bioinformatics. 1st edition, Cambridge University Press, ISBN 13: 978-0521600828.
2. Krane DE and Raymer ML Pearson (2003) Fundamental concepts of Bioinformatics . ISBN: 978-8177587579. (Incomplete)
3. Knight R, Larsen and Keller (2017) An Introduction to Bioinformatics, 1st edition, Education, ISBN: 978-1635490459.
4. Momand J, McCardy A, Heubah, S and Warter-Perez N (2016) Concepts of Bioinformatics and Genomics. 1st edition, Oxford University Press, ISBN: 978-0199936991

5. Qi L (2012) Gene-Diet Interactions in Complex Disease: Current Findings and Relevance for Public Health. Current nutrition reports, 1(4): 222–227. doi:10.1007/s13668-012-0029-8
6. Tucker KL, Smith CE, Lai CQ and Ordovas JM (2013) Quantifying diet for nutrigenomic studies. Annual review of nutrition, 33: 349–371. doi:10.1146/annurev-nutr-072610-145203.
7. Tanaka, T, Ngwa, JS, van Rooij, FJ, Zillikens, MC, Wojczynski, MK, Frazier-Wood, AC Nettleton, JA (2013) Genome-wide meta-analysis of observational studies shows common genetic variants associated with macronutrient intake. The American journal of clinical nutrition, 97(6): 1395–1402. doi:10.3945/ajcn.112.052183
8. Madden J, Williams CM, Calder PC, Lietz G., Miles E. A, Cordell H. et al (2011) The Impact of Common Gene Variants on the Response of Biomarkers of Cardiovascular Disease (Cvd) Risk to Increased Fish Oil Fatty Acids Intakes, Annual Review of Nutrition: 31: 203-234.
9. Institute of Medicine. 2007. Nutrigenomics and Beyond: Informing the Future: Workshop Summary. Washington, DC: The National Academies Press. https://doi.org/10.17226/11845.
10. Kaput J and Rodriguez R L (2006) Nutritional Genomics: Discovering the Path to Personalized Nutrition. John Wiley & Sons, Inc. https://doi.org/10.1002/0471781797

Course title: Practical-III **Credit: 4**
Course code: SIAS NB 1 3 14 C 4004 **Lecture : 120**

1. Isolation and characterization of microorganisms of food origin.
2. Detection of common adulterants in food.
3. Determination of mineral contents in the food sample.
4. Assessment of Anthropometry Measurements including clinical signs of Nutrient deficiency..
5. Diet plan to weight loss and weight gain.
6. Planning of diet for fever and infections
7. Planning of diet for diabetes mellitus
8. Planning of diet for renal disease patient
9. Planning of diet for cancer patient
10. Planning of diet for hepatitis patient
11. Sequence retrieval (protein and gene) from NCBI.
12. Structure download (protein and DNA) from PDB.
13. BLAST suite of tools for pairwise alignment.
14. Multiple sequence alignment using CLUSTALW.
15. Primary sequence analyses (Protparam).

Suggested readings:

1. Raghuramulu N, Nair MK and Kalyansundaram S (2003) A manual of laboratory techniques. 2nd edition. (eds). National Institute of Nutrition, ICMR.
2. Cappuccino J G (2019) Microbiology: A Laboratory Manual, 12th edition Pearson
3. Forsythe SJ (2010) The Microbiology of Safe Food . 2nd edition, Willey-Blackwell, U.K, ISBN: 978-1-405-14005-8
4. Lawley R, Curtis L and Davis J (2012) The Food Safety Hazard Guidebook. 2nd edition, Royal Society of Chemistry publishing, Cambridge, United Kingdom ISBN: 101849733813
5. Cappucino J and Sherman N (2010) Microbiology: A Laboratory Manual. 9th edition. Pearson Education limited.

Course title: Seminar
Course code: SIAS NB 1 3 145C 0202 **Credit: 2**

Seminar will be of 45-minute duration during which the presentation will be followed by questions session by the audience comprising of faculty and students. Every student shall be required to submit the topic of his/her seminar in consultation with the Head of the Department/Faculty members/student advisors well in advance so that the same may be displayed on the notice board. The presenter has to write an Abstract to be distributed during Seminar in addition to two copies of write-up giving relevant details of the background of the subject, methods used and references/List of sources from where the material for presentation has been collected.

Course title: Nutrition and Immunity **Credit: 4**
Course code: SIAS NB 1 3 03 DCEC 4004 **Lectures: 60**

Course objective: To provide knowledge on fundamental concepts of nutrition, immunity and diseases.

Learning outcomes:

- Understanding the relationship between nutrition, immunity and infection
- Comprehensive knowledge about the role of different nutrients in enhancing immunity
- Understanding Relationship between disease and immunity

Unit-I

Terminology related to immunity, introduction to infections and immunity, classification and history, overview of the auto defence mechanisms of the human body, cell and organs related immune system, Phagocytes their role and structure, antigen and antibodies, reaction between antigen and antibody, assessment of the immune response.

Unit-II

Interrelationship between nutrition and immunity. Effect of malnutrition i.e under and over nutrition on immune system. Different macro and micro nutrients and their relationship with immunity. Effect of amino acids on immunity. Antioxidants and immunity. Role of vitamins in immune functions and effect of deficiency, effect of deficiency and excess of vitamins and minerals on immune cell functions, role of micronutrients in improving immunity, effect of infection on the nutritional status, other factors affecting immunity- ageing, obesity, stress, exercise, alcohol, phytochemicals, pre- and probiotics.

Unit-III

Immune system: diseases, disorders and functions, effect of different disease and disorders on the immunity level of persons: allergies, autoimmune diseases , other diseases linked to immune system viz., autoimmune polyglandular syndrome, leukemia, chronic myeloid and ataxia telangiectasia.

Unit-IV

Probiotics and antioxidants – their effect on immune system. Immunity against infection – role of immunization. Maternal & children nutrition - Infections and birth outcomes immunity & infections of infants and children, Impact of breast feeding on immunity of infants, Immunization , prevention of communicable diseases, Relationship of Probiotics, prebiotics with immunity and nutrition.

Suggested readings:

1. Gershwin ME, Nestel P, Keen CL (2017) Handbook of Nutrition and Immunity (2017) 1st ed., Humana Press, DOI: 10.1007/978-1-59259-790-1, ISBN: 9781592597901
2. Pammi M, Vallejo JG and Abrams SA (2016) Nutrition-Infection Interaction and Impact on Human Health.1st ed., ,CRC Press, Taylor & Franscis Group, ISBN 9781138033764
3. Calder P and Yaqoob P (2013) Diet, Immunity and Inflammation. 1st ed., Woodhead Publishing ISBN: 9780857095749
4. Wu D, Lewis ED, Pae M and Meydani SN (2019) Nutritional Modulation of Immune Function: Analysis of Evidence, Mechanisms, and Clinical Relevance, Front Immunol. 15;9:3160. doi: 10.3389/fimmu.2018.03160. e Collection 2018 . Review. PMID: 30697214
5. Saika A, Nagatake T, Kunisawa J (2019) Host and Microbe-Dependent Dietary Lipid Metabolism in the Control of Allergy. Front Nutr. 10;6:36. doi: 10.3389/fnut.2019.00036. eCollection 2019. Review. PMID: 31024921

Course title: Food and Nutritional Biotechnology **Credit: 4**
Course code: SIAS NB 1 3 04 DCEC 4004 **Lectures: 60**

Course objective: The major objective of this course is to develop the understanding of role of biotechnology in relation to food and nutrition

Learning outcomes:

- Understand food fermentation for improved nutrition
- Understand novel food additives and supplements
- Understand mechanism and process of food spoilage and its preservation
- Understand monitoring of food quality and packaging of food

Unit-I

Introduction: microorganisms in food-historical developments, food fermentation Technology: origin, scope and development of fermented products, primary feed stock, raw materials and conversions, fermented food and microbial starters, commercial potential..

Unit-II

Development of novel food and food Ingredients: Single cell protein, polysaccharides, low calorie sweeteners, naturally produced flavor modifiers, amino acids, vitamins, food supplements, food coloring, neutraceuticals, water binding agents. Bioreactors in food fermentations: Cultivation of microorganisms, instrumentation regulation and process control, submerged and solid state fermentation, , Technological trends for improving the functionality of foods.

Unit-III

Food spoilage and preservation: general principle of spoilage, microbial toxins (endotoxins and exotoxins), contamination and preservation, factors affecting spoilage. Methods of food preservation (thermal processing, cold preservation, chemical preservatives & food dehydration); Role of radiations in food preservation, characteristics of radiation of interest in food preservation. Principles underlying the destruction of microorganisms by irradiation. Effect of irradiations on food constituents. Legal status of food irradiation.

Unit-IV

Biological controls and monitoring of food quality, packaging of food: Need for packaging, containers for packaging (glass, metal, plastics, molded pulp and aluminium foil), dispensing devices.

Suggested readings:

1. Perry Johnson (2002) Introduction to Food Biotechnology. Green Publisher; CRC Press. USA; ISBN 9780849311529
2. Jay James M, Loessner Martin J, Golden and David A (2006). Modern Food Microbiology 7th Edition, Springer, ISBN 978-0-387-23413-7
3. Buchanan, Robert and Doyle, Michael P (2013) Food microbiology: fundamentals and frontiers. 4th edition. & American Society for Microbiology ASM Press, Washington, DC, ISBN: 1555816266
4. Marwaha S S and Arora J K (2003)Biotechnological Strategies in Agro-processing. 2nd Edition Asia tech Publishers, New Delhi. ISBN-10: 8187680091
5. Parmjit S. Panesar and Satwinder S (2013) Biotechnology in Agriculture and Food Processing: Opportunities and Challenges. 1st edition,. Marwaha., CRC Press ISBN:1439888361, 9781439888360

Course title: Sports Nutrition **Credit: 4**
Course code: SIAS NB 1 3 05 DCEC 4004 **Lectures: 60**

Course objective:

1. To gain the knowledge and understanding of nutrition required for exercise and sport in order to enhance performance
2. To learn the role and significance of macro nutrients and micronutrients in achieving fitness.

Learning outcomes:

- Comprehensive knowledge about nutritional guidelines for athletes performing under altered climatic conditions.
- Understanding the importance and process of nutritional counselling for athletes.
- Gaining information about special nutritional concerns of travelling athlete and athletes with physical disabilities.

Unit-I

Introduction to Sports Nutrition – History, organizations working for sports nutrition, Importance of Nutrition in sports. Nutritional guidelines and nutritional requirements for younger and older athletes, nutritional concerns of travelling and vegan athletes, athletes performing under altered climatic conditions-high altitude mountaineers, high and low climatic temperature, nutrition guidelines for athletes with physical disabilities.

Unit-II

Integrated approach to care for athletes, assessment of sports performance, bioenergetics and body metabolism of physical activity and sports, macro- and micro nutrients for sport performance temperature regulation, fluid balance, fluid requirements of athletes and rehydration strategies for sports.

Unit-III

Recommended allowances and nutritional guidelines for different categories of high-performance sports, nutritional care during training, weight management and day-today recovery, nutrition for the pre-competition, competition and post competition recovery phase, supplements in sport: performance enhancing substances, drugs, ergogenic aids and herbs in sports performance, Meal replacement products (MRP), World Anti Doping Agency (WADA)

Unit-IV

Anaemia, osteoporosis, Diabetes Mellitus, hypertension and heart disease (physiology, effect of nutrition, age, sex and exercise on health, preventive and curative strategies), gastro intestinal disorders: peptic ulcer, gastroesophageal reflux disease (GERD), irritable bowel syndrome (IBS), etc., aetiology, pathophysiology and effect of exercise.

Suggested reading:

1. Tudor Bompa, Boris Blumstein, James Hoffman (2018) Integrated Periodization in Sports Training & Athletic Development: Combining Training Methodology, Sports Psychology, and Nutrition to Optimize Performance. 1st edition, Meyer & Meyer Sport, USA, ISBN: 1782551417
2. Marni Sumbal (2018) Essential Sports Nutrition: A Guide to Optimal Performance for Every Active Person. Callisto Media Incorporated. ISBN:1641521694
3. Burke L Y and Deking V (2006) Clinical Sports Nutrition. 3rd edition. Tata McGraw HillPub. England. ISBN: 9780074716021

4. Jeukendrup, Asker, Gleeson, Michael (2018) Sport Nutrition. 3rd Edition., Human Kinetics. USA ISBN: 1492529036.
5. Wolinsky Ira and Driskell, J (2004) Nutritional Ergogenic aids, 1st Edition, CRC Press NY. Management, Belmount (USA). Wadsworth/Thompson Learning. ISBN: 9780849316265

Generic Elective Courses

Course title: Hospital Food Service Administration **Credit: 4**
Course code: SIAS NB 1 1 01 GEC 4004 **Lectures: 60**

Course objectives: To enable students to gain knowledge in hospital functions and administration

Learning outcomes:

- Understanding of acquiring skills in maintaining medical records
- Understand the management of resources in hospitals

UNIT I

Hospital based health care and its changing scenario, effects of globalization on health care, concepts of corporate hospitals in developing countries, infrastructure and lay out of an ideal corporate hospital, functioning of modern, hospital and changing needs of patients, hospitality in hospital care

UNIT II

Patient Care Services Patient Admission / discharge, cafeteria and dietary services, front office services, housekeeping services, blood bank, diagnostic services, lab, physiotherapy, pharmacy operation theatre, outpatient and inpatient ward –admission

UNIT III

Principles of Hospital management Managerial activities for effective hospital functioning duties and responsibilities of hospital managers, qualities of office managers, effective inter and intra departmental co-ordination, understanding functioning of corporate multi specialty hospital

Unit IV

Marketing and Material management Human resource management, managerial accounting and financial management, importance of material management, principles of material management, inventory management. Hospitality in hospital care Management of dietary department, diet planning for hospital diets, purchasing, storage and quantity food production, patient compliance, food production, serving to patient- tray and trolley service, plate waste management, washing and garbage disposal.

Suggested readings:

1. . Sudhir Andrews (2008) Front Office Management and Operations, Tata Mc Graw – Hill Publishing Company Ltd.
2. Sakharka B M (2009) Principles of Hospital Administration and Planning, 2nd Edition, Jaypee Brothers Medical Publishers (p) Ltd.
3. Sherry Glied and Peter Smith (2011) The Oxford Handbook of Health Economics.
4. Jan Abel Olsen (2009) Principles in Health Economics and Policy, Oxford University Press.
5. Mohinder Chand (2009) Managing Hospitality Operations, 1st Edition, Anmol Publications Pvt. Ltd. New Delhi.
6. Goel S L (2009) Health Care System and Hospital Administration, Vol.7, Deep and Deep Publications Pvt. Ltd.
7. Kalkar SA (2010) Hospital Information Systems, Published by Asoke K.Ghosh, PHI Learning Pvt. Ltd.
8. http://eurpub.oxfordjournals.org/content.

Course title: Community Nutrition **Credit: 4**
Course code: SIAS NB 1 1 02 GEC 4004 **Lectures: 60**

Course objectives: To introduce students about health indicators and various programmes for the upliftment of the community

Learning outcomes:

- Understanding of health care system
- Role of various national and international agencies in the management of diseases

Unit -1

Community health concept: Definition and brief study of community, family, village and block. Definition, dimension and determinant of health, positive health, health situation in India,. Role of public nutritionist in health care delivery. Health Indices: fertility indicator, vital statistics, mortality, morbidity and demographic indicator, Human development Index, Reproductive health index. IMR, MMR, birth rate, sex ratio, poverty level. Concept of disease, causation (Agent, host, environmental factors) concept and control & prevention, modes of intervention.

Unit -II

Nutrition programs: National anemia prevention, Prevention of night blindness, National iodine prophylaxis program. The package programmes of immunization, nutrition education, feeding programmes. Malnutrition - causes, ecological factors, effects of malnutrition. Demographic changes due to malnutrition. Vitamin deficiency - B1, B2, Niacin, C, D - prevalence, programmes to combat. Protein deficiency diseases - PEM, Kwashiorkor prevalence, epidemiology and programs to combat, Nutritional Anaemia - Prevalence, programmes to control.

Unit—III

Nutrition and National Development: National nutritional policy - Aim, objectives, guidelines and thrust areas. PDS - Public distribution system. Need for voluntarism in community development, Assistance available to voluntary agencies from Ministries, Departments, Government of India, Central State Social Welfare Board etc, National nutrition surveillance system. Food for work etc.

Unit -IV Nutrition intervention Programmes - Objectives, operation of feeding programmes. ICDS, TINP, NNMS, IRDP, DWACRA. National organizations and their role in nutrition programmes - ICMR, NIN, NNMB, ICAR, CFTRI, NIPCID. International organizations - FAO, WHO, UNICEF, UNESCO, World Bank. Nutrition education - Meaning, nature and importance of nutrition education to the community, Training of workers in nutrition education programme . Principles of planning, executing and evaluation nutrition education programme. Methods and Techniques of organizing nutrition programmes using audio, video aids and exhibition, Problems of nutrition , Health care delivery - PHC, School Health services and their role in preventing communicable diseases

References:

1. Srilakshmi (2007) Food Science, 4th Edition. New Age International Ltd.
3. Srilakshmi (2005) Dietetics, Revised 5th edition. New Age International Ltd.
4. www. Mohfw.gov.in
5. Ann Burgess et al. (2009) Community Nutrition: A Handbook for Health and Development Workers. Oxford: Macmillan Education

Course title: Work Physiology, Physical Fitness and Health **Credit: 4**
Course code: SIAS NB 1 3 03 GEC 4004 **Lectures: 60**

Course objective: To provide an understanding of effect of physical activity on body composition, fitness and health.

Learning outcomes:

- Understanding the concepts & components of health and physical fitness
- Comprehensive knowledge of energy metabolism during exercise or physical activity
- Understanding the importance of maintaining thermoregulation, fluid & electrolyte balance

Unit-I

Definition of health, components of health, holistic health, positive health concept, Physical fitness- definition, components, methods of assessing, role in maintenance of healthy & wellness and types of exercises for fitness training, guidelines for physical activity to maintain health, prevention of obesity and its co-morbidities, techniques to assess physical fitness, Aging theories, physiology, mechanism and role of nutrients in arresting aging process

Unit-II

Body composition, Methods of measuring body composition: direct and indirect. Body composition in different physiological conditions, factors affecting body composition, muscle - structure, muscle classification and types of muscle contraction, major muscles of neck, shoulder, arms, chest, abdominal, back, hip and lower limbs, principles of muscle mechanics, Introduction of weight training, significance and principles of weight training, Do's and Don'ts of weight training

Unit-III

Energy metabolism and physical fitness: concept, importance, influencing factors, Techniques to measure energy expenditure and energy intake, types of energy systems, energy continuum and energy release, cardiovascular response to training and measurement of anaerobic & aerobic capacity, concept of isotonic/isometric/isokinetic exercises, various isotonic, isometric and isokinetic exercises for various muscles of the body, weight training exercises for the women, elderly people and for competitive sports person**.**

Unit-IV

Exercise and thermo regulatory mechanism, fluid and electrolyte balance, improving physical performance, Ergogenic aids: definition, market, types and effects, exercise and the neuroendocrine system, body composition and fat estimation calculation of kilocalories, harmful effects of quick weight reduction, Scientific approaches of weight reduction.

Suggested readings:

1. Alvero JC, Ronconi M, García JR, Carrillo MD, Jiménez ML, Correas LG, Álvarez EC. (2017) Body composition changes after sport detraining period. Nutricion hospitalaria. 34(3):632-8.doi: 10.20960/nh.618.
2. Mazzoccoli G (2016) Body composition: Where and when. European journal of radiology. Aug 1;85(8):1456-60.doi: 10.1016/j.ejrad.2015.10.020. Epub 2015 Oct 31
3. William D. McArdle BS, Frank I. Katch EdD, Victor L. Katch EdD (2015) Essentials of Exercise Physiology (2015) 5th edition**,** Publsher: Wolters Kluwer, ISBN/ISSN 9781496302090
4. Per-Olof Astrand , Kaare Rodahl, Hans A. Dahl , Sigmund B (2003)Textbook of Work Physiology: Physiological Bases of Exercise, 4th Edition, Stromme Publisher: Champaign (Ill.) : Human kinetics ISBN: 0736001409

5. Ira Wolinsky (1997) Nutrition in Exercise and Sport 3nd edition, CRC Press. ISBN 9780849385605

Course : Nutrition Counselling **Credit 4**
Course Code : SIAS NB 1 3 04 GEC 4004 **Lecture 60**

Course objectives: To study the effect of acute and chronic diseases on the emotional and psychological state and behaviour of the individuals.

Learning outcomes

- Understand the principles and procedures of nutrition counselling and the role of the counsellor.
- Develop an understanding in lifestyles influence on health and well-being

UNIT I

Nutrition Counselling: Definition, concept, role of clinical dietician, the recipients, counselling environment. A systems approach to nutritional care: overview of the system, components of the system. Dietician as part of the medical team and outreach services

UNIT II

The Counselling Process Techniques for obtaining relevant information, Clinical Information, Medical History and General Profile, Dietary Diagnosis -Assessing food and nutrient intakes, Lifestyles, physical activity, stress, Nutritional Status, Correlating relevant information and identifying areas of need: Problem exploration and clarification, Developing new perspectives and setting goals, implementation, follow up and evaluation.

UNIT III

Counselling techniques: strategies and communication skills, rapport building and opening techniques, questioning, listening, reflecting, acceptance, silence, leading reassurance, non-verbal behaviour, terminating skills. Group Counselling: developing resources and aids for education and counseling, audio visual aids, computer in education, e- resource. Working with different groups, hospitalised patients (adults, pediatric, elderly, handicapped), adjusting and adapting to individual needs. Outpatients (adults, pediatric, elderly and handicapped), patient's education, techniques and modes, follow up, Monitoring and Evaluation of outcome: Home visit

UNIT IV

Policies and programmes: Components and evaluation of programmes for prevention and control of micronutrient deficiencies and improving food and nutrition security .National Nutrition Policy and National Nutrition Mission, National Food Security Act, National Health policy, Population policy, National water policy , National Urban Sanitation Policy etc.

References

1. Alam S (2008) Basics of Guidance and Counselling. Global Vision Publishing House, New Delhi
2. Nayak A K (2007) Guidance and Counselling. A P H Publishing Corporation, New Delhi.

SEMESTER-IV

Course title: Dissertation **Credit: 24**
Course code: SIAS NB 1 4 01 SEEC 0024

Guidelines for Project File

Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques, and state-of-the-art instrumentation.

Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student.

Sufficient time should be allowed for satisfactory completion of reports, taking into account that initial drafts should be critiqued by the faculty guide and corrected by the student at each stage.

The file is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation.

In general, the File should be comprehensive and include

- A short account of the activities that were undertaken as part of the project;
- A statement about the extent to which the project has achieved its stated goals.
- A statement about the outcomes of the evaluation and dissemination processes engaged in as part of the project;
- Any activities planned but not yet completed as part of the project, or as a future initiative directly resulting from the project;
- Any problems that have arisen that may be useful to document for future reference.
- The guidelines and format for dissertation is given below:
  .

Dissertation Guidelines

1. **GENERAL :**

The manual is intended to provide broad guidelines to the M.Sc. candidates in the preparation of the dissertation report. In general, the project report shall report, in an organised and scholarly fashion an account of original research work of the candidate leading to the discovery of new facts or techniques or correlation of facts already known.

2. NUMBER OF COPIES TO BE SUBMITTED:

Students should submit three copies to the Head of the Department concerned on or before the specified date.

3. ARRANGEMENT OF CONTENTS OF DISSERTATION:

Dissertation material should be arranged as follows:

1. Cover Page & Title page
2. Declaration
3. Certificate
4. Abstract (Hindi and English)
5. Acknowledgements
6. Table of Contents
7. List of Tables
8. List of Figures
9. List of Symbols, Abbreviations and Nomenclature (Optional)
10. Chapters
11. References
12. Appendices
13. One page CV

The Tables and Figures shall be introduced in the appropriate places.

4. PAGE DIMENSIONS AND MARGIN:

The dimensions of the dissertationshould be standard A4 size paper may be used for preparing the copies, **standard margin** with 1.5 line spacing.

5. MANUSCRIPT PREPARATION:

The general text of thesis shall be typed in font style Times New Roman and font size 12. Same quality of paper should be used for the preparation of the entire report/thesis; except figure, photos are shown.

5.1 Cover Page & Title Page - A specimen copy of the Cover page & Title page for report/thesis are given in Annexure I.

5.2 Certificate-The Bonafide Certificate as per the format shown in Annexure II

5.3 Abstract: Abstract should be an essay type (HINDI and ENGLISH) of narration not exceeding 500 words outlining the research problem, the methodology used for tackling it and a summary of the findings, typed in 1.5line spacing.

5.4 Acknowledgements: The acknowledgements shall be brief and should not exceed onepage. The student's signature shall be made at the right bottom above his / her name typed in capitals.

5.5 Table of contents - The table of contents should list all material following it as wellas any material which precedes it. The title page, Bonafide Certificate and Acknowledgment will not find a place among the items listed in the Table of Contents but the page numbers in lower case Roman letters are to be accounted for them. One and a half spacing should be adopted for typing the matter under this head. A specimen copy of the Table of Contents for report / thesis is given in Annexure III.

5.6 List of Table - The list should use exactly the same captions as they appear above thetables in the text and the caption shall follow 'sentence case'. One and a half spacing should be adopted for typing the matter under this head.

5.7 List of Figures - The list should use exactly the same captions as they appear belowthe figures in the text and the caption shall follow 'sentence case'. One and a half spacing should be adopted for typing the matter under this head

5.8 List of Symbols, Abbreviations and Nomenclature - One and a half spacing shouldbe adopted for typing the matter under this head. Standard symbols, abbreviations etc. should be used.

5.9 Chapters - The chapters may include

Chapter I – Introduction

Chapter II - Literature Review

Chapter III –Materials and Methods

Chapter IV- Results and Discussion

5.10 Research output/outcome if any published or presented in conference/seminar/symposium may be included.

5.11 List of References - Any works of other researchers, if used either directly orindirectly, should be indicated at appropriate places in the report/thesis. The citation may assume any one of the following forms**. APA Style.**

APA in-text citation style uses the author's last name and the year of publication, for example: (Field, 2005).

Example:

Derwing, T. M., Rossiter, M. J., & Munro, M. J. (2002). Teaching native speakers to listen to foreign-accented speech. *Journal of Multilingual and Multicultural Development*, 23(4), 245-259.

Thomas, H. K. (2004). *Training strategies for improving listeners' comprehension of foreign-accented speech* (Doctoral dissertation). University of Colorado, Boulder.

6. TYPING INSTRUCTIONS

6.1 General

This section includes additional information for final typing of the thesis. Some information given earlier under 'Manuscript preparation' shall also be referred. The impressions on the typed/duplicated/printed copies should be black in colour. Corrections, interlineations and crossing out of letters or words will not be permitted in any of the copies of the report/thesis intended for submission. Erasures, if made, should be neatly carried out in all copies. A sub-heading at the bottom of a page must have at least two full lines below it or else it should be carried over to the next page. The last word of any page should not be split using a hyphen. One and a half spacing should be used for typing the general text. The general text shall be typed in Font Style Times New Roman and Font Size 12.

Single spacing should be used for typing:

(i) Long Tables
(ii) Long quotations
(iii) Foot notes
(iv) Multilane captions
(v) References

6.2 Chapters The format for typing chapter headings, division headings and sub division headings shall be same as given in Table of Contents.

7. BINDING SPECIFICATIONS

Thesis should be spiral or soft cover book bound, the cover of thesis should be of dark greencolor, printed with golden ink and the text for printing should be identical as prescribed for the title page.

APPENDIX I A:(A typical Specimen of Cover Page & Title Page– **DISSERTATION**)

<Font Style Times New Roman - Bold>

TITLE OF DISSERTATION

<Font Size 18><1.5 line spacing>

DISSERTATION

<Font Size 14>

Submitted by

<Font Size 14><Italic>

NAME OF THE CANDIDATE

<Font Size 16>

Under the Supervision of

NAME OF THE SUPERVISOR

in partial fulfillment for the award of the degree of

<Font Size 14><1.5 line spacing>

MASTER OF SCIENCE IN

NAME OF THE PROGRAMME

<Font Size 16>

DEPARTMENT OF

SCHOOL OF ……..

CENTRAL UNIVERSITY OF HARYANA,

MAHENDERGARH-HARYANA

<Font Size 14><1.5 line spacing>

MONTH AND YEAR

DECLARATION

I ……, student of the School of Interdisciplinary and Life Sciences, Central University of Haryana, Mahendergarh hereby declare and certify with my signature that my thesis entitled

…… submitted to the Department of ……., Central University of Haryana, India in partial fulfillment of the requirements for the award of the Degree of Masters of Science is a record of original research work done by me and the dissertation has not been the basis for the award of any degree/diploma/associateship/fellowship or similar title of any candidate of any University. I have faithfully and accurately cited all my sources, including books, journals, handouts and unpublished manuscripts, as well as any other media, such as the Internet, letters or significant personal communications.

I understand the concept of "plagiarism" and declare that while drafting this dissertation I have refrained from plagiarism. I know that plagiarism not only includes direct copying, but also the extensive use of other's ideas without proper referencing or acknowledgement (which includes the proper use of references and quotation marks).

If my dissertation found to be plagiarized at any point of time, I'll be solely responsible and will be ready to accept any decision taken by the competent authority including rejection of my dissertation.

(Supervisor) (Signature of student)

APPENDIX – I B: ***(A typical Specimen of Certificate)***

For example -

(A typical Specimen of Table of Contents)

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TABLE OF CONTENTS

CHAPTER NO.	TITLE	PAGE NO.
	ABSTRACT	iii
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	1.2 NEED FOR THE STUDY	2
	1.3 OBJECTIVES OF THE STUDY	3
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	2.2.2 Product….	6

ANNEXURE II

Curriculum vitae

<Font Style Times New Roman, Font Size 14>

Personal Details

Name :

Date of birth : DD Month, YYYY

Place of birth :

Nationality : Indian

Permanent Address :

Email Id :

Mobile No. :

Education

M.Sc. (Subject) : YYYY Central University of Haryana, India

B.Sc. (Subject). : YYYY (Name of the University) with …. % of marks

Higher Secondary : YYYY (Name of the board) with …. % of marks

Secondary : YYYY, (Name of the board) with …. % of marks

Course-level Learning Outcomes

The course level learning outcomes have been given in the scheme of syllabus. Depending upon the nature of the course, every course has planned with different learning outcomes.

Teaching-Learning Process

The teaching learning processes incorporate a variety of modes and a regular use of ICT. These are listed below:

1. Classroom Teaching for topics which are intensely information-based. This is a very regular feature of all the courses in Nutrition Biology.

2. PowerPoint slides for topics which involve information related to intricate biological pathways such as metabolic pathways in the human body and microorganisms. Use of PowerPoint presentations are also made whenever the lectures are to be summarized in a crisp and pointwise manner to highlight salient /important conclusions from the topics.

3. Classroom Discussions are a regular feature while teaching. The students are drawn into impromptu discussions by the teacher during the process of teaching.

4. Video Displaying, both real-time and animations, are used for topics which require 3D dimensional viewing of the biological mechanisms to drive the point home. These have proved to be very helpful while teaching concepts of Human Physiology, Nutritional Biochemistry, Metabolomics and Nutrigenomics. These are also used to convey complexities of food allergens, antigen-antibody interactions and generation of antibody diversity during the teaching of Nutrition and Immunity.

5. Model Making is also used especially for understanding and building a perception of the students for the food pyramid, balanced diet, etc.

6. Laboratory Practical are an integral part of every course included in the PG programme in Nutrition Biology. This is also a daily affair for PG students

7.Anthropometric measurements and nutritional deficiency Problem Solving and is encouraged during the laboratory work.

8. Group Activity as well as discussions with the laboratory instructor/ among the students themselves/ Mentor is also encouraged during laboratory work.

9. Project Work is included in the programme where students work individually or in groups to design experiments to solve/answer a problem suggested by the Mentor or identified by the students in consultation with the Mentor. The students are mentored regularly during the duration the project is in progress.

10. Presentations/Seminars by the Students are regularly done. The students are mentored in presentation of data, interpretation of data and articulation with the students/teachers/Research Scholars during their presentation.

11. Presentations by Experts in different specialties of nutritional science are arranged to broaden the horizons of the students.

12. Interaction with subject matter experts (SMEs) is also encouraged during/after presentations to satisfy/ignite curiosities of the students related to developments in the different areas of Nutrition Biology.

13. Visits to Industries/Laboratories/hospitals/social outreach activities related to Food and nutritional sciences like fermentation, food, diagnostics, diet planning, nutritional education and awareness among public, etc. are organized to acquaint the students with real-life working environments of the professional nutritionist with a view to broaden their perspective of the subject of Nutrition Biology.

Blended Learning

As per UGC guidelines 40% of the courses of Nutrition Biology in each semester offered to students in blended mode. Blended Learning is learning that is facilitated by the effective combination of different modes of delivery, models of teaching and styles of learning and applying them in an interactively meaningful learning through a virtual environment. E-Learning is the use of technology to enable students to learn anytime and anywhere. E-Learning can include training, the delivery of just-in-time information and guidance from experts. Video lectures recorded in segments, case studies, reading material, homework, and quizzes are designed in advance and made available for online streaming or download. Students are expected to watch the videos, read the assigned material, and do homework before attending class, online or face-to-face, for discussions with the teacher/instructor or a teaching assistant.

Assessment and Evaluation

It is important that the students of the PG Nutrition Biology program achieve the desired results in terms of the learning outcomes to be professionally sound and competitive in a global society. Achieving the desired learning outcomes is also imperative in terms of job employment leading to a happy and prosperous individual and thereby a happy and prosperous society or nation. The assessment tasks are pivotal to get authentic feedback for the teaching learning process and for mid-course corrections and further improvements in future. The assessment tasks are carried out at various stages of the duration of the programme like regular class assessments, internal assessments, Term-End-Examination/Semester examinations, viva-voce, etc. The assessment tasks are listed below:

1. **Multiple Choice Questions (MCQ)** are one of the predominant form of assessment tasks. This task is used during all kinds of term and semester examinations.

2. **Short-AnswerQuestions** during term and semester examinations are used to assess the ability of the student to convey his thoughts in a coherent way where prioritization of the information in terms of their significance is tested.

3. **Surprise Quizzes** are regularly used during continuous assessment while the teaching learning process is continuing which prepares the student to quickly recall information or quickly analyze a problem and come up with proper solutions.

4. **Visual/Pictorial Quizzes** are used to sharpen the comprehension of the students after looking at all the components of a system.

5. **Impromptu Opinions** on nutrient deficiency, nutritional biomarkers, metabolic databases are sought from students during regular teaching learning which help them to think quickly in a given context. This helps build their ability to come up with solutions to problems which the students might not have confronted previously.

6. **Problem Solving Tasks** are generally given during the laboratory work.

7. **Data Interpretation** is also another assessment task which is used to develop analytical skills of the students. This assessment is used during laboratory work as well as during conduction of project work.

8. **Analytical Skills** are assessed during work related to several experiments like digestive enzyme kinetics, growth of bacteria, mutation frequencies.

9. **Paper/ Project presentations/seminars** are used to assess the articulation skills of the student. These are carried out both during the duration of the teaching learning processes as well as during Term-End-Examinations/Semester.

10. **Report Writing** is used to assess the keenness of the students for details related to nutritional sciences while visiting adopted villages/laboratories / industries as students invariably are required to submit a report after such visits.

11. **Assignment Writing** is used to assess the writing abilities of the students during holidays.

12. **Viva-voce** during the laboratory working hours is used to assess the overall practical/experimental knowledge and intelligence of the students.

Keywords

1. Anthropometric measurements, Nutritional science, clinical biochemistry, diet planning, clinical nutrition, nutritional biomarkers, food microbiology, food fermentation, Food Safety, nutritional education and nutrigenomics
2. LOCF
3. NEP-2020
4. Blended Learning
5. Face to face (F to F) Learning
6. Programme Outcomes
7. Programme Specific Outcomes
8. Course-level Learning Outcomes
9. Postgraduate Attributes
10. Learning Outcome Index
11. Formative Assessment and Evaluation
12. Comprehensive and Continuous Evaluation

Appendices

1. Curricular Reforms— Extracts from National Education Policy-2020

References

2. National Education Policy-2020. https://www.education.gov.in/sites/upload_files/mhrd/files/NEP_Final_English_0.pdf
3. The draft subject specific LOCF templates available on UGC website. https://www.ugc.ac.in/ugc_notices.aspx?id=MjY5OQ==
4. Draft Blended Mode of Teaching and Learning: Concept Note available on UGC website. https://www.ugc.ac.in/pdfnews/6100340_Concept-Note-Blended-Mode-of-Teaching-and-Learning.pdf

Annexure-LVIII

Central University of Haryana
School of Interdisciplinary and Applied Sciences
Department of Nutrition Biology

SCHEME AND CURRICULUM

Ph.D. Nutrition Biology

(*w.e.f.* 2021)

Department of Nutrition Biology

CENTRAL UNIVERSITY OF HARYANA,

MAHENDERGARH, HARYANA

SCHEME AND CURRICULUM

Semester	Core /Elective	Paper Code	Title of the Paper	Credit L-T-P
I	CC	SIAS NB 02 01 01 C 4004	Research Methodology	4+0+0
	CC	SIAS NB 02 01 02 C 4004	Advanced Analytical Techniques	4+0+0
	CC	SIAS NB 02 01 03 C 2002	Research and Publication Ethics (RPE)	2+0+0
	DCEC	SIAS NB 02 01 01 DCEC 4004	Advances in Nutritional Genomics and Metabolomics	4+0+0
		SIAS NB 02 01 02 DCEC 4004	Food and Nutrition Toxicology	4+0+0
	Total			**14**

Course: Research Methodology

Course code: SIAS NB 02 01 01 C 4004

Credit: 4

Lectures: 60

Course objective: To provide knowledge about tools and techniques related with scientific communication, research methodology and biosafety in biological experiments.
Learning outcomes:

- Understanding the existence of scientific knowledge
- Acquiring the skills of scientific reading, writing and presentations
- Appreciating the scientific ethics through case studies
- Understand the importance and level of biosafety at laboratory and industrial levels

Unit 1. Identification and defining of the Research Problem:

Familiarization of research areas; Review of literature using appropriate resources – reviews, research papers, books and patents; Use of tools for searching literature through electronic databases; Defining a research problem.

Unit 2. Experimental Approaches and Methodology

Experimental designs to address the research problem; Pros and cons of different experimental strategies; Finalization of experimental design; Tools and techniques to execute experiments; Means to validate and analyze data; Use of statistical tools for analyzing the significance and interpretation of the data; Methods of recording observations and documentation

Unit 3. Ethics and Safety in Biological Research

Guidelines for Biosafety and Bioethics; Institutional Biosafety Committee – Handling of Genetically modified organisms, Institutional Human and Animal Ethics Committee - compliance, concerns and approval; Safety practices and disposal of Bio-waste in the laboratory; Radioactivity and safety precautions; Handling and disposal of flammable and hazardous chemicals.

Unit 4. Presentation, Publication and Protection of Research Data.

Skills for scientific writing and research presentation – Term paper, Research project, Research report, Thesis, Research article and Review; Organization of the research document in to different sections (Introduction, Methodology, Results, Discussion, and Summary and Conclusions, Bibliography); Use of electronic tools for bibliographic

formatting and checking Plagiarism; Oral presentation skills; Patents and Intellectual property rights

Students are expected to undertake the following assignments, exercises for evaluation.

1. Identification and selection of the broad area of research

2. Review of literature, formulation of research plan and submission of term paper along with references

3. Oral presentation of research plan and experimental design

Evaluation will be based on term paper and oral presentation

SUGGESTED READINGS

1. Beauchamp T.L., Walters L., Kahn J.P. & Anna C. *Contemporary issues in Bioethics.* Wardsworth Publishers. Co. 2013. Print
2. Cross C.L. and Wayne W.D. *Biostatistics: Basic Concepts and Methodology for the Health Sciences.* 10th edition, Wiley. 2014. Print
3. Davis, G.B. and Straub D.W. *Writing the doctoral dissertation.* 3rd edition. Barron's Educational series. 2012. Print
4. Deepa Goel. *IPR, Biosafety and Bioethics*.1st edition. Pearson Education. 2013. Print
5. Kothari C.K. *Research Methodology: Methods and Techniques*. 3rd edition. New Age International. 2013. Print
6. Krishnaswamy, K.N., Mathiranjan M., and Sivakumar, A.I. *Management Research Methodology; Integration of Principles, Methods and Techniques.* Pearson Education. 2011. Print
7. Kumar R. *Research Methodology: A Step-by-Step Guide for Beginners*. 2nd edition, Pearson Education. 2005. Print
8. Montgomery, Douglas C. *Design and Analysis of Experiments*. 8th edition. Wiley. 2013. Print
9. Rao S and Richard J. *Introduction to Biostatistics and Research Methods*. 5th edition. Prentice Hall India Learning Private Limited. 2012. Print
10. Gastel, Barbara, and Robert A. Day. *How to write and publish a scientific paper*. ABC-CLIO, 2016.

Course: Advanced Analytical Techniques

Course code: SIAS NB 02 01 02 C 4004

Credit: 4

Lectures: 60

Course objective: To provide an advanced understanding of the core principles of various techniques used in biological experiments.

Learning outcomes:

- Demonstrate principles of various basic and advanced techniques used in biological experiments
- Critically analyze and interpret the results obtained from biological experiments

Unit 1. Recombinant DNA techniques and Genomics

Use of Restriction and modification enzymes in cloning; Plasmid vector; Transformation and Plasmid isolation; PCR; DNA sequencing methods (Sanger's chain termination method, and automated DNA sequencing); Next generation sequencing (NGS); Global expression profiling; Whole genome analysis of mRNA and protein expression; Real time PCR and Microarrays and their applications

Unit 2. Proteomics

UV and fluorescence spectroscopy; Circular Dichroism; Mass spectrometry - Principles and their applications; Protein separation techniques and instrumentation (Gel filtration, Ion exchange and Affinity chromatography, 1D and 2D Polyacrylamide gel electrophoresis); Immunochemical detection of proteins

Unit 3. Microbial and Cellular Techniques

Microscopic techniques; Microbial growth and kinetics (synchronous culture, continuous and batch and fed-batch cultures, chemostat and turbidostat); Methods for identifying microbes (polyphasic approach); Cell disruption and fractionation of organelles; Isolation and purification of membrane proteins; Various methods to study cell-cell and cell-virus fusion;

Flow cytometry techniques; Confocal and Atomic Force Microscopy; Types of Biosafety cabinets

Unit 4. Animal Models in Biology

Handling and maintenance of animals, Ventilated cages, Different routes of injections and collection of various biological components, Formulation of feed and design of experiment

Recap Unit

Preparation of solutions; Concepts of solution strength (concentration); Sterilization of solutions; Preparation of Buffers - Concept of pKa and Henderson-Hasselbach equation; Concept of conjugate acid and base

SUGGESTED READINGS

1. Ausubel FW. *Current Protocols in Molecular Biology*. Wiley-Blackwell. 2011. Print
2. Burgess R. and Deutcher MP. *Guide to Protein Purification*. Academic Press, San Diego, USA. 2009. Print
3. Butler, M. *Animal Cell Culture & Technology*. 1st edition. Tailor & Francis Publishers (UK). 2004. Print
4. Freshney, R.I. *Culture of Animal cells: A Manual of Basic Technique and specialized applications*. 7th edition. Wiley-Blackwell. 2016. Print
5. Green M.R. and Sambrook J. *Molecular Cloning: A Laboratory Manual. Vol. I, II, III.* 4th edition. Cold spring harbor laboratory press. 2013. Print
6. Owen J.A., Punt J., Stranford S.A. *Kuby: Immunology*. 7th edition. W.H. Freeman Publishers. 2013. Print
7. Plummer D.T. *An Introduction to Practical Biochemistry*. 3rd edition. McGraw Hill Higher Education. 2001. Print
8. Razdan, M. K. *Introduction to Plant Tissue Culture*. 2nd Edition. Oxford & IBH. 2008. Print

9. Sheehan, David. *Physical Biochemistry: Principles and Applications.* 2nd edition. Wiley. 2009. Print
10. Wilson K. and Walker J. *Principles and Techniques of Biochemistry and Molecular Biology*. 7th edition. Cambridge University Press India Pvt. Ltd. 2010. Print

Course title: Research and Publication Ethics **Credit: 2**

Course code: SIAS NB 02 01 03 C 2002 **Lectures: 30**

Course objective: To learn philosophy of science, research misconduct and integrity, publication plagiarism and ethics.

Learning Outcomes:

- Learn to identify the FFP in research and ethics of publication.
- Hands on session help to find research misconduct, predatory publication, publications metrics and plagiarism.
- To learn database citation and indexing of publication.

Part A: THEORY

Unit1 Philosophy & ethics

Introduction of Philosophy; definition, nature and scope, concept, branches. Ethics; definition, moral philosophy, nature of moral judgments and reactions.

Unit II Scientific conduct

Ethics with respect to science and research, Intellectual honesty and research integrity, Scientific Misconduct; falsification, fabrication and Plagiarism (FFP), Redundant publications; duplicate and overlapping publications, salami slicing.

Unit III Publication ethics

Publication ethics; definition, introduction and importance. Best Practices/ standards setting initiatives and guidelines: COPE, WAME etc., Conflict of Interest, Publication misconduct: definition, concept, problems lead to unethical behavior and vice-versa, types, Violation of publication ethics, authorship and contributor-ship, Identification of publication misconduct, complaint and appeals, Predatory publications and journals.

Part B: PRACTICE

Unit IV Open access publishing

Open access publications and initiatives, SHERPA/RoMEO online resource to check publisher copyright and self-achieving policies, Software tools to identify predatory publications developed by SPPU, Journal finder Journal suggestion tools vis. JANE, Elsevier journal finder, Springer journal suggested etc.

Unit V Publication misconduct

Group discussion; Subject specific ethical issues, FFP, Authorship, Conflict of interest, Complaint and appeals; example and fraud from India and abroad. Software tools; turnitin, urkund and other open source plagiarism tools.

Unit VI Database and research metrics

Database: Indexing citation database; Web of Science and Scopus etc., Research metrics; Impact factor of journal as per journal citation report, SNIP, SJR, IPP, Cite score, Metrics; h index, g index, i10, altmetrics.

Suggested readings

1. Bird A. Philosophy of science. Routledge. 2006. ISBN 9781138705579.
2. MacIntyre A. A short history of ethics: A history of moral philosophy from the homeric age to the twentieth century. London. 1967. ISBN: 9780268161286.
3. Chaddhah P. Ethics in competitive research, do not get scooped; do not get plagiarized. 2018. ISBN-10: 9387480860
4. On being a scientist, a guide to responsible conduct in research. National Academy of Science, National Academy of Engineering and Institute of Medicine. 2009. ISBN-10: 0309119707
5. Muralidhar K. Ghosh A. Singhvi A. Ethics in science education, research and governance. Indian National Science Academy. 2019. ISBN: 9788193948217

Course: Advances in Nutritional Genomics and Metabolomics

Course code: SIAS NB 02 01 01 DCEC 4004

Credit: 4

Lectures: 60

Course objective: To understand the concept of genomics and metabolomics in nutrition research

Learning Outcome

- Understanding of principles of nutritional genomics and metabolomics
- Understanding the significance and applications of nutritional genomics and metabolomics along with its resources and analysis

Unit 1

Nutritional Genomics: Genome & genomics, nutritionally important genes, gene regulation by lipids and carbohydrates, metabolic control analysis, transcriptomics, proteomics and metabolomics, nutrient-gene interaction and expression, genetic control of metabolic pathways, Nutri-Epigenomics and Nutri-Epigenetics.

Unit 2

Metabolomics: Overview of primary metabolism, Integration of Metabolism, The Metabolome – Metabolic flux, Metabolic flux analysis, metabolic engineering, metabolic phenotypes. Nutri-metabolomics, Molecular nutrition: basic understanding of the digestion, absorption, and metabolism of nutrients. Nutritional genomics and metabolomics in obesity and type 2 diabetes.

Unit 3

Nutrition genomics and metabolomics: Biological networks and their significance – at the level of genome, transcriptome, proteome, metabolome and fluxome. Applications and its role in systems biology. Food metabolome, Dietary metabolites and cellular metabolism, Analytical methods for detecting and quantifying metabolites. Metabolomics in nutrition research, Dietary lipids and lipidomics, Microflora and Regional metabolic phenotypes.

Unit 4

Metabolomics resources and analysis: tools, software, libraries, databases, experiment repositories, and meta-data storage. Nutri-miRomics, metabolomics in practice and case study from literature. Opportunities and challenges in nutritional genomics and metabolomics.

SUGGESTED READINGS

1. Lynnette R. Ferguson, *Nutrigenomics and Nutrigenetics in Functional Foods and Personalized,* CRC Press, ISBN 9781439876800 - CAT# K13569 Year 2013.
2. Afman L, Müller M. *Nutrigenomics: from molecular nutrition to prevention of disease*. J Am Diet Assoc. 106: 569-576, Year 2006
3. Corthésy-Theulaz I, den Dunnen JT, Ferré P, Geurts JMW, Müller M, van Belzen N, van Ommen B. *Nutrigenomics: the impact of biomics technology on nutrition research*. Ann Nutr Metab. 49: 355-265, Year 2005
4. Hirsch J.B., Evans D. *The state of nutrigenomics. Evaluating nutrition, biomarkers and genetics – you are what you eat.* Nutraceuticals World, September. 56-59, Year 2005.
5. *Metabolomics – A powerful Tool in Systems Biology*, Edited by J.Nielsen and M.C. Jewett, Springer Publishers, Year 2007
6. D'Auria J.C., Gershenzon J. *The secondary metabolism of Arabidopsis thaliana: Growing like a weed.* Curr. Opin. Plant Biol. 8: 308–316, Year 2005.
7. Fernie A.R. *The future of metabolic phytochemistry: Large numbers or metabolites, higher resolution, greater understanding.* Phytochemistry 68: 2861–2880, Year 2007.
8. https://www.ebi.ac.uk/training/online/course/introduction-metabolomics/designing-metabolomics-study/key-stages-metabolomics-study
9. https://link.springer.com/chapter/10.1007/978-3-319-43027-0_6 (*Nutritional Genomics: The Wave of the Future for Nutrition and Dietetics, 2016*)
10. The Human Metabolome Database (http://www.hmdb.ca/).
11. Sales N.M.R., Pelegrini P.B., and Goersch M.C. *Nutrigenomics: Definitions and Advances of This New Science.* J Nutr Metabol. 2014:1-6, Year 2014
12. Paik J.K. *Application of Nutrigenomics in Diabetes*. J Korean Diabetes. 17(4):266-270, Year 2016

Course: Food and Nutrition Toxicology

Course code: SIAS NB 02 01 02 DCEC 4004

Credit: 4

Lectures: 60

Course objectives: Understanding of the basic principles of food and nutritional toxicology and risk assessment.

Learning outcomes:

- Understanding of the various toxicants and their interaction with nutrients
- Understanding of the methods of safety evaluation and risk assessment

Unit 1

Food toxicology: significance and mechanism manifestation of toxic effects; classification of food toxicants; factors affecting toxicity of compounds; methods used in safety evaluation-risk assessments. Nutrient-toxicant interaction, Principles of toxicology: adsorption, distribution, metabolism and excretion (ADME) of xenobiotics; toxicokinetics; system toxicity; organ toxicity.

Unit 2

Nutritional toxicology: safety assessment on dietary components; case studies on the toxic (or detoxification) events associated with food intake and environmental exposure; *in-vivo* and *in-vitro* techniques for toxicological research. Toxicants and allergens in foods derived from plants, animals, marine, algae & mushroom; Food Poisoning.

Unit 3

Microbial toxins and food intoxications: source of contamination, effect on health, preventive measures, methods of inactivation/destruction. Naturally occurring toxicants, Food contaminants, Chemical toxins: pesticides, insecticides, metallic and others, residual effects, preventive measures, methods of removal. Derived Food toxicants- Processing & Packaging; Toxicants generated during food processing such as nitrosamines, acrylamide, benzene, dioxins and furans; persistent organic pollutants.

Unit 4

Toxicology & food additives; Toxicological aspects of nutrient supplements; toxicological aspects of fumigants, chlorinated solvents, autoxidation products, carcinogens in smoked

foods and pyrolysis, agrochemicals; heavy metals; intentional and unintentional additives. Food packaging material, potential contaminants from food packaging material, Permissible limits in food.

SUGGESTED READINGS

1. Fernando P. Carvalho. *Pesticides, environment, and food safety*, Food and Energy Security 6(2), Year 2017.(http://onlinelibrary.wiley.com/doi/10.1002/fes3.108/pdf)

2. Dellafiora L. and Dall'Asta C. *Forthcoming Challenges in Mycotoxins Toxicology Research for Safer Food—A Need for Multi-Omics Approach.* Toxins Year 2017, 9, 18; doi:10.3390/toxins9010018 (file:///C:/Users/dell/Downloads/toxins-09-00018.pdf)
3. Branen A. L, Davidson P. M and Salminon S. *Food Additives. Marcel Dekker.* Concon JM. Year 1990.
4. Marcel Dekker. *Food Toxicology - Principles & Concepts*. Hathcock JN. (Ed.). Year 1982.
5. Rechcigl M Jr. *Nutritional Toxicology*. Vol. I. Academic Press. Year 1983.
6. Shabbir S. *Handbook of Naturally Occurring Food Toxicants.* CRC Press. Year 2007.
7. Tweedy B. G.*Food Toxicology: A Perspective on Relative Risks*, Year 1991.

Annexure-LIX

Department of Pharmaceutical Sciences
Central University of Haryana
(NAAC ACCREDITED 'A' GRADE UNIVERSITY)

Dated: 26.08.2021

A meeting of the Board of Studies of Department of Pharmaceutical Sciences was held on 26.08.2021 (Thursday) at 12:00 Noon via **online mode** to discuss the agenda mentioned in letter no. DPS/2021/049 dated 23-08-2021.

Members Present:

Dr. Dinesh Kumar (Chairperson)

Prof. D.N. Mishra (Member)

1. The members considered and approved the commencement of new specialization in M. Pharm. i.e. M. Pharm. (Pharmacognosy) in the Department of Pharmaceutical Sciences w.e.f. academic session 2022-23.
2. The members considered and approved the Course curriculum of M. Pharm. (Pharmacology) as per NEP-2020 [Annexure-A].

Prof. D.N. Mishra
(Member)

26/08/2021
Dr. Dinesh Kumar
(Chairperson)

Ensst No. DPS/2021/53

Dated: 26-08-2021

Copy to:

1. All the members of Board of Studies (Department of Pharm. Sciences)
2. Assistant Registrar (Academic Branch), CUH.

Learning Outcome-based Curriculum Framework for M. Pharm (Pharmacology)

[NEP-2020]



Department of Pharmaceutical Sciences

CENTRAL UNIVERSITY OF HARYANA

Jant-Pali, Mahendergarh, Haryana-123031, India

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11. Blended Learning
12. Assessment and Evaluation
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1. Background

1.1. Introduction to Department of Pharmaceutical Sciences

The Department of Pharmaceutical Sciences was established in 2020 as a flagship department of Central University of Haryana to provide quality education and training to pharmacy graduates to become highly skilled and caring healthcare professionals and create new knowledge through excellence in basic and translational pharmaceutical research. The department is currently offering **M. Pharm. (Pharmacology)** course for Pharmacy graduates duly approved by Pharmacy Council of India (PCI), New Delhi. The department has engaged experienced, vibrant and well-qualified faculties involved in both teaching and research work. The faculty members have published a substantial number of research papers in journals of national and International repute.

The department is focussed to train the students/scholars in emerging fields of pharmacy catering to pharmaceutical industry and R&D. We have a vision to train and nurture the students towards fundamental & advanced research in pharmacy leading to technological innovation and entrepreneurship. Having collaborations with prominent national and international institutions in future, the department aims to carry out collaborative research in thrust areas of health and medicines.

The department also plans to initiate the research in the field of Natural products in future with focus to identify novel targets and explore their pharmacological benefits in the treatment of various ailments/disorders. The Department of Pharmaceutical Sciences aims at identifying and characterising both new biologically active natural products and their semisynthetic derivatives and at understanding their interactions with human targets on a molecular level using in silico, in vitro, and in vivo models. Based on this knowledge, new lead compounds and disease-relevant targets will be investigated and novel delivery systems for pharmaceutical active ingredients will be developed. Main areas of research include:

a) Ethnopharmacology of Indigenous medicinal plants
b) Development of Nanoformulations of selected Natural Products and their evaluation
c) Standardization and characterization of Ayurvedic/Homeopathic/Unani herbal formulations
d) Neuropharmacology
e) Pharmacovigilance

M. Pharm. (Pharmacology) provides unprecedented opportunities in Pharmaceutical industries focussed on preclinical and clinical research & development, regulatory aspects, Medical writing, and Intellectual property rights (IPR).

1.2.Vision of the Department

- To contribute in the innovation and leadership of healthcare system through superior dissemination of Pharmaceutical knowledge.

1.3.Mission of the Department

- To nurture the young minds towards fundamental & advanced Pharmaceutical research that contribute to the technological innovation and entrepreneurship.
- To provide an integrated and rigorous coursework to fulfill the needs of Pharmaceutical industry and society.
- To create a center of excellence by building collaborations with industry and research institutions.

2. Program Educational Objectives (PEOs)

- **PEO-1:** The Postgraduate students will have a comprehensive knowledge of designing, conducting, analysis, reporting and documentation of the preclinical and clinical research.
- **PEO-2:** The Postgraduate students will integrate basic Pharmacology knowledge and skills with healthcare requirements of the society.
- **PEO-3:** The Postgraduate students will become competent by applying their technical, and leadership skills in pharmaceutical research.

3. Program Outcomes

PO-1: Basic and applied knowledge: Interdisciplinary knowledge to find solution for the complex biological problems

PO-2: Problem analysis: Ability to analyse society related/ applied research problem, design and execute experiments to find relevant solutions

PO-3: Advanced Usage of Technology: Apply advanced instrumentation tools, online resources with an understanding of the troubleshooting and limitations

PO-4: Ethics: Commitment towards professional ethics and responsibilities as a social endeavour to bring harmony with nature

PO-5: Lifelong learning: Scientific skills for industrial applications and entrepreneurship

4. Programme Specific Outcomes (PSOs)

- **PSO-1:** To provide the efficient knowledge of fundamental concepts of Pharmacology.
- **PSO-2:** Analysis and problem solving capability in the field of pharmaceutical sciences.
- **PSO-3:** To develop the professional skills in the area of pharmacological sciences to meet global demand and look for opportunities in Pharmaceutical industries.
- **PSO-4:** To give exposure of latest tools and techniques utilized in preclinical and clinical pharmacology
- **PSO-5:** To give an immersive professional experience to adapt in a globe of constantly developing trend.
- **PSO-6:** To inculcate professional ethics, communication skills, and leadership skills.
- **PSO-7:** To develop students' ability to provide advice on the utilization of medicines and the promotion of drug safety.

5. Postgraduate Attributes

- Pharmacy Knowledge
- Problem analysis
- Design and conduct the investigations of complex problems
- Modern tool usage
- Pharmacist and Society
- Leadership skills
- Communication skills
- Environment and sustainability
- Life-long learning
- Research ethics

6. Structure of Course (M. Pharm. Pharmacology)

Semester-I							
Core Course	**Course Code**	**Course**	**Credit Points**	**L**	**T**	**P**	**S**
1	MPL 101T	Modern Pharmaceutical Analytical Techniques	4	4	0	0	0
2	MPL 102T	Advanced Pharmacology-I	4	4	0	0	0
3	MPL 103T	Pharmacological and Toxicological Screening Methods-I	4	4	0	0	0
4	MPL 104T	Cellular and Molecular Pharmacology	4	4	0	0	0
5	MPL 105P	Pharmacology Practical-I	6	0	0	12	0
6	MPL 106S	Seminar/Assignment	4	0	0	0	7

Semester-II

Core Course	**Course Code**	**Course**	**Credit Points**	**L**	**T**	**P**	**S**
7	MPL 201T	Advanced Pharmacology II	4	4	0	0	0
8	MPL 202T	Pharmacological and Toxicological Screening Methods-II	4	4	0	0	0
9	MPL 203T	Principles of Drug Discovery	4	4	0	0	0
10	MPL 204T	Clinical Research and Pharmacovigilance	4	4	0	0	0
11	MPL 205P	Pharmacology Practical II	6	0	0	12	0
12	MPL 206S	Seminar/Assignment	4	0	0	0	7

Semester-III				
Core Course	**Course Code**	**Course**	**Credit Hours**	**Credit Points**
13	MPL 301T	Research Methodology and Biostatistics	4	4
14	MPL 302	Journal club	1	1
15	MPL 303	Discussion / Presentation (Proposal Presentation)	2	2
16	MPL 304	Research Work	28	14

Semester-IV

Core Course	Course Code	Course	Credit Hours	Credit Points
17	MPL 401	Journal club	1	1
18	MPL 402	Research Work	31	16
19	MPL 403	Discussion/Final Presentation	3	3

7. Learning Outcome Index (Core Courses)

PSO	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6	PSO-7
CC-1		✓	✓	✓	✓		
CC-2	✓	✓	✓		✓	✓	✓
CC-3	✓	✓	✓	✓	✓	✓	✓
CC-4	✓	✓	✓	✓	✓		✓
CC-5	✓	✓	✓	✓	✓	✓	
CC-6	✓				✓	✓	
CC-7	✓	✓	✓		✓	✓	✓
CC-8	✓	✓	✓	✓	✓		✓
CC-9		✓	✓	✓	✓		✓
CC-10		✓	✓	✓	✓	✓	✓
CC-11	✓	✓	✓	✓	✓	✓	
CC-12	✓				✓	✓	
CC-13		✓	✓	✓	✓		
CC-14		✓		✓	✓	✓	✓
CC-15		✓	✓		✓	✓	✓
CC-16		✓	✓	✓	✓	✓	✓
CC-17		✓		✓	✓	✓	✓
CC-18		✓	✓	✓	✓	✓	✓
CC-19		✓	✓		✓	✓	✓

8. Semester wise credits distribution

Semester	Credit Points
M. Pharm.-I	26
M. Pharm.-II	26
M. Pharm.-III	21
M. Pharm.-IV	20
Co-curricular Activities ▪ Attending Conference [01 credit], ▪ Scientific Presentations & other Scholarly Activities [01 credit]	02
Total Credit Points =	**95**

9. Course-level Learning Outcomes

9.1.Core Courses

Core Course-1: Modern Pharmaceutical Analytical Techniques (MPL 101T)

Subject name and code	Modern Pharmaceutical Analytical Techniques (MPL 101T)
Scope	This subject deals with various advanced analytical instrumental techniques for identification, characterization and quantification of drugs. Instruments dealt are NMR, Mass spectrometer, IR, HPLC, GC etc.
Learning outcomes	After completion of course, the student is able to know about ✓ Chemicals, drugs and Excipients ✓ The analysis of various drugs in single and combination dosage forms ✓Theoretical and practical skills of the instruments
Unit-1	UV-Visible spectroscopy: Introduction, Theory, Laws, Instrumentation associated with UV-Visible spectroscopy, Choice of solvents and solvent effect and Applications of UV-Visible spectroscopy, Difference/ Derivative spectroscopy. IR spectroscopy: Theory, Modes of Molecular vibrations, Sample handling, Instrumentation of Dispersive and Fourier – Transform IR Spectrometer, Factors affecting vibrational frequencies and Applications of IR spectroscopy, Data Interpretation. Spectroflourimetry: Theory of Fluorescence, Factors affecting fluorescence (Characteristics of drugs that can be analysed by flourimetry), Quenchers, Instrumentation and Applications of fluorescence spectrophotometer. Flame emission spectroscopy and Atomic absorption spectroscopy: Principle, Instrumentation, Interferences and Applications.
Unit-2	NMR spectroscopy: Quantum numbers and their role in NMR, Principle, Instrumentation, Solvent requirement in NMR, Relaxation process, NMR signals in various compounds, Chemical shift, Factors influencing chemical shift, Spin-Spin coupling, Coupling constant, Nuclear magnetic double resonance, Brief outline of principles of FT-NMR and 13C NMR. Applications of NMR spectroscopy.
Unit-3	Mass Spectroscopy: Principle, Theory, Instrumentation of Mass Spectroscopy, Different types of ionization like electron impact, chemical, field, FAB and MALDI, APCI, ESI, APPI Analyzers of Quadrupole and Time of Flight, Mass fragmentation and its rules, Meta stable ions, Isotopic peaks and Applications of Mass spectroscopy.

Unit-4	Chromatography: Principle, apparatus, instrumentation, chromatographic parameters, factors affecting resolution, isolation of drug from excipients, data interpretation and applications of the following: i. Thin Layer chromatography ii. High Performance Thin Layer Chromatography iii. Ion exchange chromatography iv. Column chromatography v. Gas chromatography vi. High Performance Liquid chromatography vii. Ultra High Performance Liquid chromatography viii. Affinity chromatography ix. Gel Chromatography
Unit-5	Electrophoresis: Principle, Instrumentation, Working conditions, factors affecting separation and applications of the following: a) Paper electrophoresis b) Gel electrophoresis c) Capillary electrophoresis d) Zone electrophoresis e) Moving boundary electrophoresis f) Iso electric focusing X ray Crystallography: Production of X rays, Different X ray methods, Bragg's law, Rotating crystal technique, X ray powder technique, Types of crystals and applications of X-ray diffraction.
Unit-6	Potentiometry: Principle, working, Ion selective Electrodes and Application of potentiometry. Thermal Techniques: Principle, thermal transitions and Instrumentation (Heat flux and power-compensation and designs), Modulated DSC, Hyper DSC, experimental parameters (sample preparation, experimental conditions, calibration, heating and cooling rates, resolution, source of errors) and their influence, advantage and disadvantages, pharmaceutical applications. Differential Thermal Analysis (DTA): Principle, instrumentation and advantage and disadvantages, pharmaceutical applications, derivative differential thermal analysis (DDTA). TGA: Principle, instrumentation, factors affecting results, advantage and disadvantages, pharmaceutical applications.

Core Course-2: Advanced Pharmacology - I (MPL 102T)

Subject name and code	Advanced Pharmacology - I (MPL 102T)
Scope	The subject is designed to strengthen the basic knowledge in the field of pharmacology and to impart recent advances in the drugs used for the treatment of various diseases. In addition, this subject helps the students to understand the concepts of drug action and mechanisms involved
Learning outcomes	After completion of course student is able to know about,

	✓ Discuss the pathophysiology and pharmacotherapy of certain diseases ✓ Explain the mechanism of drug actions at cellular and molecular level ✓ Understand the adverse effects, contraindications and clinical uses of drugs used in treatment of diseases
Unit-1	General Pharmacology a. Pharmacokinetics: The dynamics of drug absorption, distribution, biotransformation and elimination. Concepts of linear and non-linear compartment models. Significance of Protein binding. b. Pharmacodynamics: Mechanism of drug action and the relationship between drug concentration and effect. Receptors, structural and functional families of receptors, quantitation of drug receptors interaction and elicited effects.
Unit-2	Neurotransmission a. General aspects and steps involved in neurotransmission. b. Neurohumoral transmission in autonomic nervous system (Detailed study about neurotransmitters- Adrenaline and Acetylcholine). c. Neurohumoral transmission in central nervous system (Detailed study about neurotransmitters- histamine, serotonin, dopamine, GABA, glutamate and glycine]. d. Non adrenergic non cholinergic transmission (NANC). Cotransmission Systemic Pharmacology A detailed study on pathophysiology of diseases, mechanism of action, pharmacology and toxicology of existing as well as novel drugs used in the following systems Autonomic Pharmacology Parasympathomimetics and lytics, sympathomimetics and lytics, agents affecting neuromuscular junction
Unit-3	Central nervous system Pharmacology General and local anesthetics Sedatives and hypnotics, drugs used to treat anxiety. Depression, psychosis, mania, epilepsy, neurodegenerative diseases. Narcotic and non-narcotic analgesics.
Unit-4	Cardiovascular Pharmacology Diuretics, antihypertensives, antiischemics, anti- arrhythmics, drugs for heart failure and hyperlipidemia. Hematinics, coagulants, anticoagulants, fibrinolytics and antiplatelet drugs
Unit-5	Autocoid Pharmacology The physiological and pathological role of Histamine, Serotonin, Kinins Prostaglandins Opioid autocoids. Pharmacology of antihistamines, 5HT antagonists.

Core Course-3: Pharmacological and Toxicological Screening Methods-I (MPL 103T)

Subject name and code	Pharmacological and Toxicological Screening Methods-I (MPL 103T)
Scope	This subject is designed to impart the knowledge on preclinical evaluation of drugs and recent experimental techniques in the drug discovery and development. The subject content helps the student to understand the maintenance of laboratory animals as per the guidelines, basic knowledge of various in-vitro and in-vivo preclinical evaluation processes
Learning outcomes	After completion of course student is able to know about, ✓ Appraise the regulations and ethical requirement for the usage of experimental animals. ✓ Describe the various animals used in the drug discovery process and good laboratory practices in maintenance and handling of experimental animals ✓ Describe the various newer screening methods involved in the drug discovery process ✓ Appreciate and correlate the preclinical data to humans
Unit-1	Laboratory Animals Common laboratory animals: Description, handling and applications of different species and strains of animals. Transgenic animals: Production, maintenance and applications Anaesthesia and euthanasia of experimental animals. Maintenance and breeding of laboratory animals. CPCSEA guidelines to conduct experiments on animals Good laboratory practice. Bioassay-Principle, scope and limitations and methods
Unit-2	Preclinical screening of new substances for the pharmacological activity using in vivo, in vitro, and other possible animal alternative models. General principles of preclinical screening. CNS Pharmacology: behavioral and muscle coordination, CNS stimulants and depressants, anxiolytics, anti-psychotics, anti-epileptics and nootropics. Drugs for neurodegenerative diseases like Parkinsonism, Alzheimer's and multiple sclerosis. Drugs acting on Autonomic Nervous System.
Unit-3	Preclinical screening of new substances for the pharmacological activity using in vivo, in vitro, and other possible animal alternative models. Respiratory Pharmacology: anti-asthmatics, drugs for COPD and anti-allergics. Reproductive Pharmacology: Aphrodisiacs and antifertility agents Analgesics, anti-inflammatory and antipyretic agents. Gastrointestinal drugs: anti-ulcer, anti - emetic, antidiarrheal and laxatives.
Unit-4	Preclinical screening of new substances for the pharmacological activity using in vivo, in vitro, and other possible animal alternative models.

	Cardiovascular Pharmacology: antihypertensives, antiarrythmics, antianginal, antiatherosclerotic agents and diuretics. Drugs for metabolic disorders like anti-diabetic, antidyslipidemic agents. Anti-cancer agents. Hepatoprotective screening methods
Unit-5	Preclinical screening of new substances for the pharmacological activity using in vivo, in vitro, and other possible animal alternative models. Iimmunomodulators, Immunosuppressants and immunostimulants General principles of immunoassay: theoretical basis and optimization of immunoassay, heterogeneous and homogenous immunoassay systems. Immunoassay methods evaluation; protocol outline, objectives and preparation. Immunoassay for digoxin and insulin Limitations of animal experimentation and alternate animal experiments. Extrapolation of in vitro data to preclinical and preclinical to humans

Core Course-4: Cellular and Molecular Pharmacology (MPL 104T)

Subject name and code	Cellular and Molecular Pharmacology (MPL 104T)
Scope	The subject imparts a fundamental knowledge on the structure and functions of cellular components and help to understand the interaction of these components with drugs. This information will further help the student to apply the knowledge in drug discovery process.
Learning outcomes	After completion of course student is able to know about, ✓ Explain the receptor signal transduction processes. ✓ Explain the molecular pathways affected by drugs. ✓ Appreciate the applicability of molecular pharmacology and biomarkers in drug discovery process. ✓ Demonstrate molecular biology techniques as applicable for pharmacology
Unit-1	Cell biology Structure and functions of cell and its organelles Genome organization. Gene expression and its regulation, importance of siRNA and micro RNA, gene mapping and gene sequencing Cell cycles and its regulation. Cell death– events, regulators, intrinsic and extrinsic pathways of apoptosis. Necrosis and autophagy.
Unit-2	Cell signaling Intercellular and intracellular signaling pathways. Classification of receptor family and molecular structure ligand

	gated ion channels; G-protein coupled receptors, tyrosine kinase receptors and nuclear receptors. Secondary messengers: cyclic AMP, cyclic GMP, calcium ion, inositol 1,4,5-trisphosphate, (IP3), NO, and diacylglycerol. Detailed study of following intracellular signaling pathways: cyclic AMP signaling pathway, mitogen-activated protein kinase (MAPK) signaling, Janus kinase (JAK)/signal transducer and activator of transcription (STAT) signaling pathway.
Unit-3	Principles and applications of genomic and proteomic tools DNA electrophoresis, PCR (reverse transcription and real time), Gene sequencing, micro array technique, SDS page, ELISA and western blotting, Recombinant DNA technology and gene therapy Basic principles of recombinant DNA technology-Restriction enzymes, various types of vectors. Applications of recombinant DNA technology. Gene therapy- Various types of gene transfer techniques, clinical applications and recent advances in gene therapy.
Unit-4	Pharmacogenomics Gene mapping and cloning of disease gene. Genetic variation and its role in health/ pharmacology Polymorphisms affecting drug metabolism Genetic variation in drug transporters Genetic variation in G protein coupled receptors Applications of proteomics science: Genomics, proteomics, metabolomics, functionomics, nutrigenomics Immunotherapeutics Types of immunotherapeutics, humanisation antibody therapy, Immunotherapeutics in clinical practice
Unit-5	A. Cell culture techniques Basic equipments used in cell culture lab. Cell culture media, various types of cell culture, general procedure for cell cultures; isolation of cells, subculture, cryopreservation, characterization of cells and their application. Principles and applications of cell viability assays, glucose uptake assay, Calcium influx assays Principles and applications of flow cytometry B. Biosimilars

Core Course-5: Pharmacological Practical - I (MPL 105P)

PART-A:

1. Analysis of pharmacopoeial compounds and their formulations by UV Vis spectrophotometer
2. Simultaneous estimation of multi component containing formulations by UV spectrophotometry
3. Experiments based on HPLC
4. Experiments based on Gas Chromatography
5. Estimation of riboflavin/quinine sulphate by fluorimetry
6. Estimation of sodium/potassium by flame photometry Handling of laboratory animals.

PART-B:

1. Various routes of drug administration.
2. Techniques of blood sampling, anesthesia and euthanasia of experimental animals.
3. Functional observation battery tests (modified Irwin test)
4. Evaluation of CNS stimulant, depressant, anxiogenics and anxiolytic, anticonvulsant activity.
5. Evaluation of analgesic, anti-inflammatory, local anesthetic, mydriatic and miotic activity.
6. Evaluation of diuretic activity.
7. Evaluation of antiulcer activity by pylorus ligation method.
8. Oral glucose tolerance test.
9. Isolation and identification of DNA from various sources (Bacteria, Cauliflower, onion, Goat liver).
10. Isolation of RNA from yeast
11. Estimation of proteins by Braford/Lowry's in biological samples.
12. Estimation of RNA/DNA by UV Spectroscopy
13. Gene amplification by PCR.
14. Protein quantification Western Blotting.
15. Enzyme based in-vitro assays (MPO, AChEs, α amylase, α glucosidase).
16. Cell viability assays (MTT/Trypan blue/SRB).
17. DNA fragmentation assay by agarose gel electrophoresis.
18. DNA damage study by Comet assay.
19. Apoptosis determination by fluorescent imaging studies.
20. Pharmacokinetic studies and data analysis of drugs given by different routes of administration using software
21. Enzyme inhibition and induction activity
22. Extraction of drug from various biological samples and estimation of drugs in biological fluids using different analytical techniques (UV)
23. Extraction of drug from various biological samples and estimation of drugs in biological fluids using different analytical techniques (HPLC)

Core Course-6: Advanced Pharmacology II (MPL 201T)

Subject name and code	Advanced Pharmacology II (MPL 201T)
Scope	The subject is designed to strengthen the basic knowledge in the field of pharmacology and to impart recent advances in the drugs used for the treatment of various diseases. In addition, the subject helps the student to understand the concepts of drug action and mechanism involved
Learning outcomes	✓ Upon completion of the course the student shall be able to: Explain the mechanism of drug actions at cellular and molecular level ✓ Discuss the Pathophysiology and pharmacotherapy of certain diseases ✓ Understand the adverse effects, contraindications and clinical uses of drugs used in treatment of diseases
Unit-1	Endocrine Pharmacology Molecular and cellular mechanism of action of hormones such as growth hormone, prolactin, thyroid, insulin and sex hormones Anti-thyroid drugs, Oral hypoglycemic agents, Oral contraceptives, Corticosteroids. Drugs affecting calcium regulation
Unit-2	Chemotherapy Cellular and molecular mechanism of actions and resistance of antimicrobial agents such as ß-lactams, aminoglycosides, quinolones, Macrolide antibiotics. Antifungal, antiviral, and anti-TB drugs.
Unit-3	Chemotherapy Drugs used in Protozoal Infections Drugs used in the treatment of Helminthiasis Chemotherapy of cancer Immunopharmacology Cellular and biochemical mediators of inflammation and immune response. Allergic or hypersensitivity reactions. Pharmacotherapy of asthma and COPD. Immunosuppressants and Immunostimulants
Unit-4	GIT Pharmacology Antiulcer drugs, Prokinetics, antiemetics, anti-diarrheals and drugs for constipation and irritable bowel syndrome. Chronopharmacology Biological and circadian rhythms, applications of chronotherapy in various diseases like cardiovascular disease, diabetes, asthma and peptic ulcer
Unit-5	Generation of free radicals, role of free radicals in etiopathology of various diseases such as diabetes, neurodegenerative diseases and cancer. Protective activity of certain important antioxidant Recent Advances in Treatment: Alzheimer's disease, Parkinson's disease, Cancer, Diabetes mellitus

Core Course-7: Pharmacological and Toxicological Screening Methods-II (MPL 202T)

Subject name and code	Pharmacological and Toxicological Screening Methods-II (MPL 202T)
Scope	This subject imparts knowledge on the preclinical safety and toxicological evaluation of drug & new chemical entity. This knowledge will make the student competent in regulatory toxicological evaluation.
Learning outcomes	✓ Upon completion of the course, the student shall be able to, Explain the various types of toxicity studies. ✓ Appreciate the importance of ethical and regulatory requirements for toxicity studies. ✓ Demonstrate the practical skills required to conduct the preclinical toxicity studies.
Unit-1	Basic definition and types of toxicology (general, mechanistic, regulatory and descriptive) Regulatory guidelines for conducting toxicity studies OECD, ICH, EPA and Schedule Y OECD principles of Good laboratory practice (GLP) History, concept and its importance in drug development
Unit-2	Acute, sub-acute and chronic- oral, dermal and inhalational studies as per OECD guidelines. Acute eye irritation, skin sensitization, dermal irritation & dermal toxicity studies. Test item characterization- importance and methods in regulatory toxicology studies
Unit-3	Reproductive toxicology studies, Male reproductive toxicity studies, female reproductive studies (segment I and segment III), teratogenecity studies (segment II) Genotoxicity studies (Ames Test, in vitro and in vivo Micronucleus and Chromosomal aberrations studies) In vivo carcinogenicity studies
Unit-4	IND enabling studies (IND studies)- Definition of IND, importance of IND, industry perspective, list of studies needed for IND submission. Safety pharmacology studies- origin, concepts and importance of safety pharmacology. Tier1- CVS, CNS and respiratory safety pharmacology, HERG assay. Tier2- GI, renal and other studies
Unit-5	Toxicokinetics- Toxicokinetic evaluation in preclinical studies, saturation kinetics Importance and applications of toxicokinetic studies. Alternative methods to animal toxicity testing.

Core Course-8: Principles of Drug Discovery (MPL 203T)

Subject name and code	Principles of Drug Discovery (MPL 203T)
Scope	The subject imparts basic knowledge of drug discovery process. This information will make the student competent in drug discovery process
Learning outcomes	Upon completion of the course, the student shall be able to ✓ Explain the various stages of drug discovery. ✓ Appreciate the importance of the role of genomics, proteomics and bioinformatics in drug discovery ✓ Explain various targets for drug discovery. ✓ Explain various lead seeking method and lead optimization ✓ Appreciate the importance of the role of computer aided drug design in drug discovery
Unit-1	An overview of modern drug discovery process: Target identification, target validation, lead identification and lead Optimization. Economics of drug discovery. Target Discovery and Validation-Role of Genomics, Proteomics and Bioinformatics. Role of Nucleic acid microarrays, Protein microarrays, Antisense technologies, siRNAs, antisense oligonucleotides, Zinc finger proteins. Role of transgenic animals in target validation.
Unit-2	Lead Identification- combinatorial chemistry & high throughput screening, in silico lead discovery techniques, Assay development for hit identification. Protein structure: Levels of protein structure, Domains, motifs, and folds in protein structure. Computational prediction of protein structure: Threading and homology modeling methods. Application of NMR and X-ray crystallography in protein structure prediction
Unit-3	Rational Drug Design Traditional vs rational drug design, Methods followed in traditional drug design, High throughput screening, Concepts of Rational Drug Design, Rational Drug Design Methods: Structure and Pharmacophore based approaches Virtual Screening techniques: Drug likeness screening, Concept of pharmacophore mapping and pharmacophore based Screening
Unit-4	Molecular docking: Rigid docking, flexible docking, manual docking; Docking based screening. De novo drug design. Quantitative analysis of Structure Activity Relationship History and development of QSAR, SAR versus QSAR, Physicochemical parameters, Hansch analysis, Fee Wilson analysis and relationship between them.
Unit-5	QSAR Statistical methods – regression analysis, partial least square analysis (PLS) and other multivariate statistical methods. 3D-QSAR approaches like COMFA and COMSIA Prodrug Design-Basic concept, Prodrugs to improve patient acceptability, Drug solubility, Drug absorption and distribution, site specific drug delivery and sustained drug action. Rationale of prodrug design and practical consideration of prodrug design

Core Course-9: Clinical Research and Pharmacovigilance (MPL 204T)

Subject name and code	Clinical Research and Pharmacovigilance (MPL 204T)
Scope	This subject will provide a value addition and current requirement for the students in clinical research and pharmacovigilance. It will teach the students on conceptualizing, designing, conducting, managing and reporting of clinical trials. This subject also focuses on global scenario of Pharmacovigilance in different methods that can be used to generate safety data. It will teach the students in developing drug safety data in Pre-clinical, Clinical phases of Drug development and post market surveillance.
Learning outcomes	Upon completion of the course, the student shall be able to, ✓ Explain the regulatory requirements for conducting clinical trial ✓ Demonstrate the types of clinical trial designs ✓ Explain the responsibilities of key players involved in clinical trials ✓ Execute safety monitoring, reporting and close-out activities ✓ Explain the principles of Pharmacovigilance ✓ Detect new adverse drug reactions and their assessment ✓ Perform the adverse drug reaction reporting systems and ✓ communication in Pharmacovigilance
Unit-1	Regulatory Perspectives of Clinical Trials: Origin and Principles of International Conference on Harmonization - Good Clinical Practice (ICH-GCP) guidelines Ethical Committee: Institutional Review Board, Ethical Guidelines for Biomedical Research and Human Participant- Schedule Y, ICMR Informed Consent Process: Structure and content of an Informed Consent Process Ethical principles governing informed consent process
Unit-2	Clinical Trials: Types and Design Experimental Study- RCT and Non RCT, Observation Study: Cohort, Case Control, Cross sectional Clinical Trial Study Team Roles and responsibilities of Clinical Trial Personnel: Investigator, Study Coordinator, Sponsor, Contract Research Organization and its management
Unit-3	Clinical Trial Documentation- Guidelines to the preparation of documents, Preparation of protocol, Investigator Brochure, Case Report Forms, Clinical Study Report Clinical Trial Monitoring- Safety Monitoring in CT Adverse Drug Reactions: Definition and types. Detection and reporting methods. Severity and seriousness assessment. Predictability and preventability assessment, Management of adverse drug reactions; Terminologies of ADR.

Unit-4	Basic aspects, terminologies and establishment of pharmacovigilance History and progress of pharmacovigilance, Significance of safety monitoring, Pharmacovigilance in India and international aspects, WHO international drug monitoring programme, WHO and Regulatory terminologies of ADR, evaluation of medication safety, Establishing pharmacovigilance centres in Hospitals, Industry and National programmes related to pharmacovigilance. Roles and responsibilities in Pharmacovigilance
Unit-5	Methods, ADR reporting and tools used in Pharmacovigilance International classification of diseases, International Nonproprietary names for drugs, Passive and Active surveillance, Comparative observational studies, Targeted clinical investigations and Vaccine safety surveillance. Spontaneous reporting system and Reporting to regulatory authorities, Guidelines for ADRs reporting. Argus, Aris G Pharmacovigilance, VigiFlow, Statistical methods for evaluating medication safety data.
Unit-6	Pharmacoepidemiology, Pharmacoeconomics, Safety pharmacology

Core Course-10: Pharmacology Practical II (MPL 205P)

1. To record the DRC of agonist using suitable isolated tissues preparation.
2. To study the effects of antagonist/potentiating agents on DRC of agonist using suitable isolated tissue preparation.
3. To determine to the strength of unknown sample by matching bioassay by using suitable tissue preparation.
4. To determine to the strength of unknown sample by interpolation bioassay by using uitable tissue preparation
5. To determine to the strength of unknown sample by bracketing bioassay by using suitable tissue preparation
6. To determine to the strength of unknown sample by multiple point bioassay by using suitable tissue preparation.
7. Estimation of PA2 values of various antagonists using suitable isolated tissue preparations.
8. To study the effects of various drugs on isolated heart preparations
9. Recording of rat BP, heart rate and ECG.
10. Recording of rat ECG

11. Drug absorption studies by averted rat ileum preparation.
12. Acute oral toxicity studies as per OECD guidelines.
13. Acute dermal toxicity studies as per OECD guidelines.
14. Repeated dose toxicity studies- Serum biochemical, haematological, urine analysis, functional observation tests and histological studies.
15. Drug mutagenicity study using mice bone-marrow chromosomal aberration test.
16. Protocol design for clinical trial.(3 Nos.)
17. Design of ADR monitoring protocol.
18. In-silico docking studies. (2 Nos.)
19. In-silico pharmacophore based screening.
20. In-silico QSAR studies.
21. ADR reporting

9.2. Elective Courses for other Departments

GEC-1: Clinical Research

Subject name	Clinical Research
Scope	The subject will impart the fundamental knowledge on the clinical drug development process of drugs.
Learning outcomes	The students shall be able to learn the ✓ Different aspects of clinical trial ✓ Ethics in clinical research ✓ Regulatory Perspectives of Clinical Trials ✓ types of clinical trial designs ✓ responsibilities of key players involved in clinical trials
Unit-1	Clinical Drug Development Process Different types of Clinical Studies, Phases of clinical trials, Clinical Trial protocol, Phase 0 studies, Phase I Phase II studies, Phase III studies, Phase IV studies (Post Marketing Studies; PSUR) Regulatory Perspectives of Clinical Trials: Origin and Principles of International Conference on Harmonization - Good Clinical Practice (ICH-GCP) guidelines Ethical Committee: Institutional Review Board, Ethical Guidelines for Biomedical Research and Human Participant- Schedule Y, ICMR
Unit-2	Regulatory Perspectives of Clinical Trials: Origin and Principles of International Conference on Harmonization - Good Clinical Practice (ICH-GCP) guidelines

	Ethical Committee: Institutional Review Board, Ethical Guidelines for Biomedical Research and Human Participant- Schedule Y, ICMR
Unit-3	Clinical Trials: Types and Design Experimental Study- RCT and Non RCT, Observation Study: Cohort, Case Control, Cross sectional Clinical Trial Study Team Roles and responsibilities of Clinical Trial Personnel: Investigator, Study Coordinator, Sponsor, Contract Research Organization and its management

GEC-2: Pharmacovigilance

Subject name	Pharmacovigilance
Scope	The subject will impart advanced knowledge on methods, tools and significance of Pharmacovigilance
Learning outcomes	The students shall be able to learn the ✓ Explain the principles of Pharmacovigilance ✓ Detect new adverse drug reactions and their assessment ✓ Perform the adverse drug reaction reporting systems and communication in Pharmacovigilance
Unit-1	Basic aspects, terminologies and establishment of pharmacovigilance History and progress of pharmacovigilance, Significance of safety monitoring, Pharmacovigilance in India and international aspects
Unit-2	WHO international drug monitoring programme, WHO and Regulatory terminologies of ADR, evaluation of medication safety, establishing pharmacovigilance centres in Hospitals, Industry and National programmes related to pharmacovigilance. Roles and responsibilities in Pharmacovigilance
Unit-3	Methods, ADR reporting and tools used in Pharmacovigilance International classification of diseases, International Nonproprietary names for drugs, Passive and Active surveillance, Comparative observational studies, Targeted clinical investigations and Vaccine safety surveillance.
Unit-4	Spontaneous reporting system and Reporting to regulatory authorities, Guidelines for ADRs reporting. Argus, Aris G Pharmacovigilance, VigiFlow, Statistical methods for evaluating medication safety data.

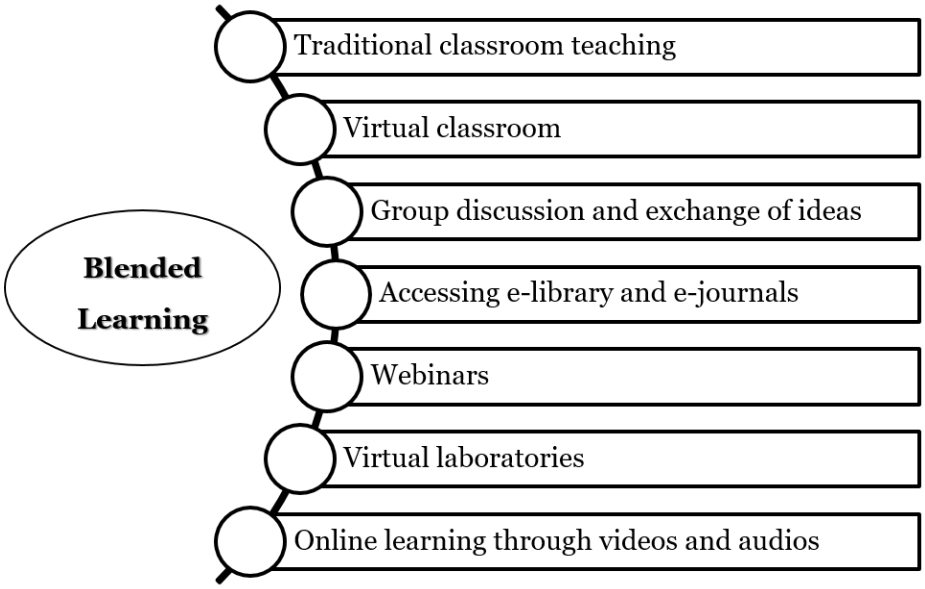
10.Teaching-Learning Process

1. Classroom Lectures
2. Interactive sessions
3. Animation and videos demonstration
4. Quizzes
5. Flipped classroom
6. Group discussions

7. Seminars
8. Electronic learning
9. Tutorials
10. Laboratory demonstrations
11. Collaborative Learning
12. Self-assessed or peer-assessed assignments

11.Blended Learning

A concept that includes framing teaching learning process and incorporates both face to face teaching and teaching supported by ICT. Blended learning incorporates direct as well as indirect instruction, collaborative teaching learning, and individualized computer-assisted learning.



12.Assessment and Evaluation

Internal assessment: Continuous mode

Subject type	Criteria	Maximum Marks
Theory	Attendance	8
	Student – Teacher interaction	2
	Total	**10**
Practical	Attendance	10

	Based on Practical Records, Regular viva voce, etc.	10
	Total	**20**

Scheme for awarding internal assessment: Continuous mode

Guidelines for the allotment of marks for attendance

Percentage of Attendance	Theory	Practical
95 – 100	8	10
90 – 94	6	7.5
85 – 89	4	5
80 – 84	2	2.5
Less than 80	0	0

- Mid-semester and Comprehensive End-term Examination of courses
- Continuous evaluation in the form of
    - ✓ Class work,
    - ✓ Check-in assessment
    - ✓ Periodical quizzes,
    - ✓ Group discussions
    - ✓ Surprise tests,
    - ✓ Tutorials,
    - ✓ Laboratory work evaluation
- Collaborative Assignments
- Open book learning to assess problem solving and analytical abilities
- Oral presentations
- Multiple choice examination
- Problem solving exercises in groups

13.Keywords

- NEP-2020
- Blended Learning
- Programme Educational Objectives (PEOs)
- Learning Outcomes
- Programme Outcomes
- Postgraduate Attributes

- Continuous Mode
- Programme Specific Outcomes
- Course-level Learning Outcomes
- Learning Outcome Index
- Teaching-Learning Process

14. References

1. National Education Policy-2020. https://www.education.gov.in/sites/upload_files/mhrd/files/NEP_Final_English_0.pdf
2. Pharmacy council of India, M. Pharm Syllabus https://www.pci.nic.in/pdf/Syllabus_M_Pharm.pdf
3. Blended Mode of Teaching and Learning: Concept Note. https://www.ugc.ac.in/pdfnews/6100340_Concept-Note-Blended-Mode-of-Teaching-and-Learning.pdf

Annexure-LX

Department of Pharmaceutical Sciences
Central University of Haryana
(NAAC ACCREDITED 'A' GRADE UNIVERSITY)

Dated: 14.09.2021

A meeting of the Board of Studies of Department of Pharmaceutical Sciences was held on 14.09.2021 (Tuesday) at 12:00 Noon via **online mode** to discuss the agenda mentioned in letter no. DPS/2021/058 dated 13-09-2021.

Members Present:

Dr. Dinesh Kumar (Chairperson)

Prof. D.N. Mishra (Member)

1. The members considered and approved the scheme and Syllabus of PhD Coursework (Pharmaceutical Sciences) in the Department of Pharmaceutical Sciences w.e.f. academic session 2021-22.

14/09/2021

Prof. D.N. Mishra
(Member)

14/09/2021

Dr. Dinesh Kumar
(Chairperson).

Ensst No. DPS/2021/59

Dated: 14-09-2021

Copy to:

1. All the members of Board of Studies (Department of Pharm. Sciences)
2. Assistant Registrar (Academic Branch), CUH.

Central University of Haryana
School of Interdisciplinary and Applied Sciences

Department of Pharmaceutical Sciences

SCHEME AND SYLLABUS

Ph.D. Course Work (Pharmaceutical Sciences)
(w.e.f. 2021-22)

Department of Pharmaceutical Sciences
CENTRAL UNIVERSITY OF HARYANA, MAHENDERGARH, HARYANA

SCHEME AND CURRICULUM

Semester	Core /Elective	Paper Code	Title of the Paper	Credit
I	CC	SIAS PS 02 01 01 C 4004	Research Methodology (RM)	4
	CC	SIAS PS 02 01 02 C 4004	Advanced Pharmaceutical Research (APR)	4
	CC	SIAS PS 02 01 03 C 2002	Research and Publication Ethics (RPE)	2
	EC	SIAS PS 02 01 04 E 4004 SIAS PS 02 01 05 E 4004 SIAS PS 02 01 06 E 4004	To be opted by students from any department of the School	4
				Total=14

C: Core; E: Elective

List of EC offered by the Department of Pharmaceutical Sciences:

1. CNS Pharmacology (SIAS PS 02 01 04 E 4004)
2. Novel Drug Delivery Systems (SIAS PS 02 01 05 E 4004)
3. Natural Product Research Techniques (SIAS PS 02 01 06 E 4004)

Course: Research Methodology **Credit: 4**
Course code: SIAS PS 01 01 01 C **Lectures: 60**

Course objective: To provide knowledge about tools and techniques related with scientific communication, research methodology and biosafety in biological experiments.

Unit 1. Identification and defining of the Research Problem:

Familiarization of research areas; Review of literature using appropriate resources – reviews, research papers, books and patents; Use of tools for searching literature through electronic databases; Defining a research problem.

Unit 2. Experimental Approaches and Methodology

Experimental designs to address the research problem; Pros and cons of different experimental strategies; Finalization of experimental design; Tools and techniques to execute experiments; Means to validate and analyze data; Use of statistical tools for analyzing the significance and interpretation of the data; Methods of recording observations and documentation

Unit 3. Ethics and Safety in Biological Research

Guidelines for Biosafety and Bioethics; Institutional Biosafety Committee – Handling of Genetically modified organisms, Institutional Human and Animal Ethics Committee - compliance, concerns and approval; Safety practices and disposal of Bio-waste in the laboratory; Radioactivity and safety precautions; Handling and disposal of flammable and hazardous chemicals.

Unit 4. Presentation, Publication and Protection of Research Data

Development of skills for scientific writing and research presentation – Term paper, Research project, Research report, Thesis, Research article and Review; Organization of the research document in to different sections (Introduction, Methodology, Results, Discussion, and Summary and Conclusions, Bibliography); Use of electronic tools for bibliographic formatting and checking Plagiarism; Development of Oral presentation skills; Patents and Intellectual property rights

Students are expected to undertake the following assignments, exercises for evaluation.

1. Identification and selection of the broad area of research

2. Review of literature, formulation of research plan and submission of term paper along with references

3. Oral presentation of research plan and experimental design

Evaluation will be based on term paper and oral presentation

Suggested Readings

1. Research Methodology: Methods And Techniques (2019) 4th ed., Kothari CR and Garg G, New Age International Publishers, ISBN: 978-9386649225.
2. Principles of Research Methodology: A Guide for Clinical Investigators (2012) 1st ed., Supino, Phyllis G., Borer, Jeffrey S, Springer, ISBN: 978-1-4614-3360-6.
3. Communicate Science Papers, Presentations, and Posters Effectively (2015) Patience GS, Boffito DC, Patience P, Academic Press, ISBN: 978-0128015001.
4. Successful Scientific Writing: A Step-by-Step Guide for the Biological and Medical Sciences (2014) 4th ed., Matthews JR and Matthews RW, Cambridge University Press ISBN: 978-1107691933.
5. Doing Science: Design, Analysis, and Communication of Scientific Research. (2001) Valiela I, Oxford: Oxford University Press, ISBN 10:019538573X.
6. Beauchamp T.L., Walters L., Kahn J.P. & Anna C. *Contemporary issues in Bioethics.* Wardsworth Publishers. Co. 2013. Print
7. Cross C.L. and Wayne W.D. *Biostatistics: Basic Concepts and Methodology for the Health Sciences.* 10th edition, Wiley. 2014. Print
8. Davis, G.B. and Straub D.W. *Writing the doctoral dissertation.* 3rd edition. Barron's Educational series. 2012. Print
9. Deepa Goel. *IPR, Biosafety and Bioethics*.1st edition. Pearson Education. 2013. Print
10. Krishnaswamy, K.N., Mathiranjan M., and Sivakumar, A.I. *Management Research Methodology; Integration of Principles, Methods and Techniques.* Pearson Education. 2011. Print
11. Montgomery, Douglas C. *Design and Analysis of Experiments*. 8th edition. Wiley. 2013. Print
12. Rao S and Richard J. *Introduction to Biostatistics and Research Methods*. 5th edition. Prentice Hall India Learning Private Limited. 2012. Print
13. IPR, Biosafety and Bioethics (2013) Parashar S, Goel D, Pearson Publishing India, ISBN: 9788131774700.
14. An Introduction to Ethical, Safety and Intellectual Property Rights Issues in Biotechnology (2017) Nambisan P, Academic Press, ISBN: 9780128092316.
15. http://dbtindia.gov.in/guidelines-biosafety

Course: Advanced Pharmaceutical Research **Credit: 4**
Course code: SIAS PS 01 01 02 C **Lectures: 60**

Course objective: To provide knowledge about tools and techniques required to carry out Pharmaceutical research.

Learning Outcomes:

- Explain advanced proteomic and genomic techniques used in the drug discovery process.
- Elucidate basic cell culture techniques along with demonstration.
- Explain the cell signaling mechanisms implicated in various diseases

Unit 1.

Proteomics

UV and fluorescence spectroscopy; Protein separation techniques and instrumentation (Gel filtration, Ion exchange and Affinity chromatography, Sodium dodecyl sulphate–polyacrylamide gel electrophoresis (SDS-PAGE), Two-dimensional gel electrophoresis (2D-PAGE), Two-dimensional difference gel electrophoresis (2D DIGE); Protein Microarray: Different types; Mass spectrometry: Principles and their applications, Immunochemical detection of proteins.

Genomics

Genome Organization; Gene Sequencing; Gene mapping; Polymerase chain reaction (PCR), RT-PCR, Real-Time PCR; RNA-interference; Recombinant DNA technology; Gene therapy; Pharmacogenomics.

Unit 2. OECD Guidelines

Acute, sub-acute and chronic- oral, dermal and inhalational studies as per OECD guidelines; Acute eye irritation, skin sensitization, dermal irritation & dermal toxicity studies.

Unit 3. Cell culture techniques

Basic equipments used in cell culture lab; Types of Biosafety cabinets; Cell lines; various types of cell culture; Cell culture media; General procedure for cell cultures: isolation of cells, subculture, cryopreservation, Detection of contamination, characterization of cells and their application. Principles and applications of cell viability assays; Flow cytometry techniques; Confocal and Atomic Force Microscopy.

Unit 4. Cell Signaling

Secondary messengers: cyclic AMP, cyclic GMP, calcium ion, inositol 1,4,5-trisphosphate, (IP3), NO, and diacylglycerol (DAG); Detailed study of following intracellular signaling pathways: Nrf2-ARE signaling, NF-κB signaling; Cannabinoid signaling; Endoplasmic reticulum stress, PARP-over-

activation, mitogen-activated protein kinase (MAPK) signaling, Janus kinase (JAK)/signal transducer and activator of transcription (STAT) signaling pathway.

SUGGESTED READINGS

1. Ausubel FW. Current Protocols in Molecular Biology. Wiley-Blackwell. 2011. Print
2. The Cell, A Molecular Approach. Geoffrey M Cooper.
3. Pharmacogenomics: The Search for Individualized Therapies. Edited by J. Licinio and M -L. Wong
4. Handbook of Cell Signaling (Second Edition) Edited by Ralph A. et.al
5. Molecular Pharmacology: From DNA to Drug Discovery. John Dickenson et.al
6. Basic Cell Culture protocols by Cheril D.Helgason and Cindy L.Miller
7. Basic Cell Culture (Practical Approach) by J. M. Davis (Editor)
8. Animal Cell Culture: A Practical Approach by John R. Masters (Editor)
9. Current protocols in molecular biology vol I to VI edited by Frederick
10. M.Ausuvel et la. Butler, M. Animal Cell Culture & Technology. 1st edition. Tailor & Francis Publishers (UK). 2004. Print
11. Freshney, R.I. Culture of Animal cells: A Manual of Basic Technique and specialized applications. 7th edition. Wiley-Blackwell. 2016. Print

Course title: Research and Publication Ethics (as per UGC guidelines) **Credit: 2**

Course code: SIAS PS 01 01 03 C **Lectures: 30**

Course objective: To learn philosophy of science, research misconduct and integrity, publication plagiarism and ethics.

Learning Outcomes:

- Learn to identify the FFP in research and ethics of publication.
- Hands on session help to find research misconduct, predatory publication, publications metrics and plagiarism.
- To learn database citation and indexing of publication.

Part A: THEORY

Unit1 Philosophy & ethics **(3 hrs)**

Introduction of Philosophy; definition, nature and scope, concept, branches. Ethics; definition, moral philosophy, nature of moral judgments and reactions.

Unit II Scientific Conduct **(5 hrs)**

Ethics with respect to science and research, Intellectual honesty and research integrity, Scientific Misconduct; falsification, fabrication and Plagiarism (FFP), Redundant publications; duplicate and overlapping publications, salami slicing.

Unit III Publication Ethics **(7 hrs)**

Publication ethics; definition, introduction and importance. Best Practices/ standards setting initiatives and guidelines: COPE, WAME etc., Conflict of Interest, Publication misconduct: definition, concept, problems lead to unethical behavior and vice-versa, types, Violation of publication ethics, authorship and contributor-ship, Identification of publication misconduct, complaint and appeals, Predatory publications and journals.

Part B: PRACTICE

Unit IV Open Access publishing **(4 hrs)**

Open access publications and initiatives, SHERPA/RoMEO online resource to check publisher copyright and self-achieving policies, Software tools to identify predatory publications developed by SPPU, Journal finder Journal suggestion tools vis. JANE, Elsevier journal finder, Springer journal suggester etc.

Unit V Publication Misconduct **(4 hrs)**

Group discussion; Subject specific ethical issues, FFP, Authorship, Conflict of interest, Complaint and appeals; example and fraud from India and abroad. Software tools; turnitin, urkund and other open source plagiarism tools.

Unit VI Database and Research Metrics **(7 hrs)**

Database: Indexing citation database; Web of Science and Scopus etc., Research metrics; Impact factor of journal as per journal citation report, SNIP, SJR, IPP, Cite score, Metrics; h index, g index, i10, altmetrics.

Course: CNS Pharmacology **Credit: 4**

Course code: SIAS PS 01 01 04 E **Lectures: 60**

Course objective: To understand and identify the basic neuroscience with cellular and molecular basis of CNS-associated disorders.

Learning outcomes:

- Understanding the concept of receptors and basic neuroscience
- Explain the pathophysiology of various CNS diseases
- Understanding of animal models used for drug screening and elucidation of molecular mechanisms.
-

Unit 1. Introduction to receptors:

The differences between ionotropic and metabotropic receptors, tyrosine receptor kinases and steroid receptors; interactions between metabotropic receptors and the different types of G proteins and adenylate cyclase. Involvement of G proteins and adenylate cyclase in signal transduction and the role of transcription factors; calcium homeostasis

Unit 2. Systems Neuroscience:

Communication between neuron, neuronal plasticity and cellular and molecular mechanisms of learning and memory; Sensory systems; Aplysia and hippocampal physiology; Uses of neural networks.

Unit 3. Pathophysiology of brain disorders:

Molecular and cellular mechanisms underlying the pathophysiology of Alzheimer's, Parkinson's, motor neuron; mood disorders; Ischemic Brain injury and Epilepsy; Neuropathology of the dementias; free radical damage; Excitotoxicity; Epigenetic influences on Brain disorders

Unit 4. Animal Models: Behavioral and muscle co-ordination, CNS stimulants and depressants, anxiolytics, anti-psychotics, Cerebral ischemia, anti-epileptics and nootropics. Drugs for neurodegenerative diseases like Parkinsonism, Alzheimer's and Huntington.

Suggested Readings

1. Screening methods in pharmacology (vol I & II), R.A. Turner, 1st edition; eBook ISBN: 9781483264233.
2. Neurobiology of Brain Disorders: Biological Basis of Neurological and Psychiatric Disorders 1st Edition, Michael Zigmond Joseph Coyle Lewis Rowland; ISBN: 9780123982704.
3. Systems Neuroscience, 1st edition, Cheung-Hoi YU, Albert, Li, Lina (Eds.) ISBN 978-3-319-94593-4.

Course: Novel Drug Delivery Systems **Credit: 4**

Course code: SIAS PS 01 01 05 E **Lectures: 60**

Course objective: The course is designed to describe novel drug delivery systems.

Learning outcome:

- Learning of various novel drug delivery systems.
- Understanding the disease/organ/cell based targeting approaches

Unit 1. Introduction to Novel drug delivery systems:

Principles of drug targeting and molecular basis of targeted drug delivery:

Receptor mediated endocytosis; Different levels of targeting-first order, second order and third order targeting; Different types of targeting-active and passive targeting.

Physico-chemical approaches of targeting: Stimuli responsive: Magnetically, thermal and pH assisted drug delivery systems, Chemical drug delivery (prodrugs), Lipid-drug/Polymer- drug conjugates

Unit 2. Disease based targeting approaches:

Novel approaches to target diseases and disorders such as cancer and infectious diseases, exploitation of disease environment for the targeted delivery of therapeutics.

Unit 3. Organ based targeting:

Novel strategies for CNS, pulmonary, liver, and colon targeting.

Unit 4. Cell/Organelles based targeting:

Mitochondria, Nuclear targeting, lymphatics/M cells, liver parenchymal cells/macrophages, hepatocytes and bone marrow cells.

Suggested Readings

1. Novel Drug Delivery System, Y.W. Chein, Vol 50, Marcel Dekker, NY.

2. Controlled Drug Delivery Systems, Robinson, Vol 29, Marcel Dekker, NY.

3. Transdermal Controlled Systemic Medications, YW Chein, Vol 31, Marcel Dekker, NY.

4. Bioadhesive DDS, E. Mathiowitz, Vol 98, Marcel Dekker, NY.

5. Nasal System Drug Delivery, K.S.E. Su, Vol 39, Marcel Dekker, NY.

6. Drug Delivery Devices, Vol 32, P Tyle Marcel Dekker, NY.

7. Polymers for Controlled Drug Delivery, P.J. Tarcha, CRC Press.

8. Pharmaceutical Biotechnology, Vyas, CBS, Delhi.

9. Biotechnology of Industrial Antibiotics, E.J. Vandamme, Marcel Dekker, NY.

10. Protein Formulation & Delivery, E.J. McNally, Vol 99, Marcel Dekker, NY.

11. Drug Targeting, M.H. Rubinstein, John Wiley, NY.

Course Title: Natural Product Research Techniques **Credit: 4**

Course Code: SIAS PS 01 01 06 E **Lectures: 60**

Course objective: The course is designed to describe the separation of compounds from multicomponent samples.

Learning outcome:

- Learning of various novel separation and extraction techniques.
- Understanding the basics and application of spectral techniques in natural products

Unit 1.

a. Extraction/fractionation techniques in Natural products.
b. Selection of TLC/HPTLC plates and sorbents, sample preparation, sample clean up, application of sample, selection of mobile phase, development (separation), factors influencing HPTLC separation, detection/visualization, instrumentation, densitometric scanners, selection of suitable wavelengths for scanning, in-situ scanning. Preparative TLC, dual-phase TLC, reverse phase TLC, flexibility and efficiency, quantification of results, documentation, purity profile of drug substances, validation of analytical parameters, comparative evaluation of HPTLC and HPLC. TLC and reversed-TLC of unknown commercial herbal products and drugs, detection and classification of components, qualitative and quantitative estimation of active constituents, analysis of herbal drug mixtures, electroplanar chromatography/electrophoresis.

Unit 2.

High performance liquid chromatography (HPLC):

Basic principles of separation, Resolution, minimum resolution, resolution as a function of solvent strength, selectivity and plate number, strategies to improve resolution, sample size effect on resolution, systematic approach to method development; Sample preparation; HPLC sorbents; Semi-preparative and preparative HPLC systems.

Column and Flash Chromatography:

Principle, apparatus, instrumentation, chromatographic parameters, factors affecting resolution and applications.

Unit 3. Hyphenated techniques:

Basic principles and applications of LC-MS, LC-NMR, and supercritical fluid chromatography

Unit-4. Spectral Techniques in Natural products:

Theory, Principle, Instrumentation and interpretation of UV, IR, NMR, and Mass Spectroscopy

Suggested readings:

1. Spectrometric Identification of Organic compounds - Robert M Silverstein, Sixth edition, John Wiley & Sons, 2004.
2. Principles of Instrumental Analysis - Doglas A Skoog, F. James Holler, Timothy A. Nieman, 5th edition, Eastern press, Bangalore, 1998.
3. Instrumental methods of analysis – Willards, 7th edition, CBS publishers.
4. Practical Pharmaceutical Chemistry – Beckett and Stenlake, Vol II, 4th edition, CBS Publishers
5. Pharmaceutical Analysis- Modern methods – Part B - J W Munson, Volume 11, Marcel Dekker Series

Date: 01.09.2021

हरियाणा केंद्रीय विश्वविद्यालय, योग विभाग की बैठक का कार्यवृत्त

- अध्ययन समिति की बैठक 1 सितम्बर 2021 को 12 बजे गूगल मीट के माध्यम से आयोजित की गई।
- प्रो. नीलम सांगवान (अध्ययन समिति की अध्यक्षा) डीन स्कूल ऑफ इंटर डिसिप्लिनरी एंड एप्लाइड साइंसेज, हरियाणा केंद्रीय विश्वविद्यालय, अध्यन समिति के सदस्य डॉ. ईश्वर भारद्वाज, पूर्व प्रोफेसर और डीन स्कूल ऑफ हेल्थ, गुरुकुल कांगरी विश्वविद्यालय, हरिद्वार, उत्तराखंड और डॉ. गणेश शंकर गिरी, प्रोफेसर और योग विभाग के प्रमुख, डॉ. हरि सिंह गौर विश्वविद्यालय सागर, मध्य प्रदेश और डॉ. अजय पाल, असिस्टेण्ट प्रोफेसर और प्रभारी शिक्षक, डॉ रवि कुमार, अतिथि व्याख्याता, योग विभाग, हरियाणा केंद्रीय विश्वविद्यालय उपस्थित थे।
- डॉ. अजय पाल ने, योग विभाग, हरियाणा केंद्रीय विश्वविद्यालय की ओर से इस बैठक में भाग लेने के लिए अध्ययन समिति के सभी सदस्यों का स्वागत किया।
- प्रो. नीलम सांगवान ने नई राष्ट्रीय शिक्षा नीति-2020 के अनुरूप विषय वस्तु में बदलाव करने की आवश्यकता क्यों है? इस पर अध्ययन समिति के सदस्यों को अवगत कराया।
- बैठक की कार्यसूची ईमेल के माध्यम से पहले समिति के प्रत्येक सदस्य को भेज दी गई थी, उस पर बिंदुवार चर्चा की गई।
- अध्ययन समिति के सदस्यों ने नयी राष्ट्रीय शिक्षा नीति 2020 के आधार पर तैयार किये गए एम.एससी. योग के पाठ्यक्रम का आद्योपान्त साङ्गोपाङ्ग अध्ययन किया।
- दोनों बाहरी विशेषज्ञों ने इस पाठ्यक्रम को लागू करने के लिए और अधिक संकायों को विभाग के लिए आवश्यक बताया। योग विभाग को प्रत्येक सेमेस्टर में पढ़ाने के लिए कुछ अतिथि शिक्षकों की आवश्यकता है।
- अध्ययन समिति के सदस्यों ने हिन्दी और अंग्रेजी के लिए प्रयुक्त किये गए फॉण्ट की एकरूपता बनाये रखने का सुझाव दिया।

- अध्ययन समिति के सदस्यों ने आवासीय प्रशिक्षण के उपरांत प्रशिक्षण का व्योरा देने के लिए एक प्रारूप बनाये जाने का सुझाव दिया।
- शोधार्थियों के लिए पाठ्यक्रम की विषय वस्तु को राष्ट्रीय शिक्षा नीति-2020 के अनुरूप करने के लिए अध्ययन समिति ने सुझाव दिया

डॉ. ईश्वर भारद्वाज,
(अध्ययन समिति के सदस्य)
पूर्व प्रोफेसर और डीन स्कूल ऑफ हेल्थ,
गुरुकुल कांगरी विश्वविद्यालय, हरिद्वार, उत्तराखंड,
हरिद्वार

डॉ. गणेश शंकर गिरी
(अध्ययन समिति के सदस्य)
प्रोफेसर और योग विभाग के प्रमुख
डॉ. हरि सिंह गौर विश्वविद्यालय सागर
मध्य प्रदेश

डॉ रवि कुमार,
अतिथि व्याख्याता
हरियाणा केन्द्रीय विश्वविद्यालय,

डॉ. अजय पाल
(विभागीय प्रतिनिधि)
असिस्टेण्ट प्रोफेसर एवं शिक्षक प्रभारी
हरियाणा केन्द्रीय विश्वविद्यालय

प्रो. नीलम सांगवान

(अध्यक्षा अध्ययन समिति)
संकाय अध्यक्ष
अन्तः विषय एवं अनुप्रयुक्त विज्ञान
हरियाणा केन्द्रीय विश्वविद्यालय

NEP and Learning Outcome-based Curriculum Framework (LOCF)

For

परास्नातक योग

M.Sc. Yoga



Department of Yoga

School of Interdisciplinary and Applied Sciences

CENTRAL UNIVERSITY OF HARYANA

2021

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Background

Change is the law of nature, where change keeps happening, there is something new and worth learning. Continuous research is being done in all the fields of education all over the world and on the basis of the same research, changes in the teaching method also become inevitable. Yoga is such a subject, which has traveled very quickly from the caves of the mountain to the commercial world. It is becoming a part of the daily routine of the people, so in view of its need, it becomes necessary to change our curriculum, so that the students can develop the qualities, knowledge and skills in themselves according to the global need, so that they can effectively face the challenges and changes of the coming times.

Why do we need to revise our syllabus -

Due to rapidly changing employment scenario and global ecosystem

The curriculum will not only help students learn but more importantly learn how to learn.

Our syllabus should have less content and more practical skills

Curriculum should be such that students develop the ability to think critically and solve problems

Curriculum should be such that creative and multidisciplinary competence is developed

The curriculum should be such that education is more experiential, holistic, integrated, inquiry-driven, discovery-oriented, learner-centred, discussion-based, flexible and of course, enjoyable.

Programme Outcomes

After doing this course, along with the increase in the knowledge of the students, the following qualities will be included:

- **Basic and applied knowledge:** Interdisciplinary knowledge to find solution for the complex biological problems
- **Problem analysis:** Ability to analyse society related/ applied research problem, design and execute experiments to find relevant solutions
- **Advanced Usage of Technology**: Apply advanced instrumentation tools, online resources with an understanding of the troubleshooting and limitations
- **Ethics:** Commitment towards professional ethics and responsibilities as a social endeavor to bring harmony with nature
- **Lifelong learning:** Scientific skills for industrial applications and entrepreneurship

Programme Specific Outcomes

On completing M.Sc. in Yoga Programme, the students shall be able to realise the following outcomes:

PSO-1 Be acquainted with the difference between Hath Yoga and Raj Yoga.

PSO-2 They will be aware of the types of Yoga in ancient Indian literature.

PSO-3 They will learn the sequence of Hath-Yogic practices.

PSO-4 They will be able to get the practice of Yoga Practices in an effective manner.

PSO-5 Know about the anatomy and physiology of different parts of the body and explain the effects of Yoga.

PSO-6 They will develop the ability to do Yoga therapy.

PSO-7 Develop skills to cope up the change and challenges of life.

Postgraduate Attributes

- Disciplinary Knowledge
- Creative and Critical Thinking
- Reflective Thinking
- Problem Solving
- Analytical Reasoning
- Communication Skills
- Research Skills
- Life Skills
- Multicultural Competence
- Moral and Ethical Values
- Life-long Learning
- Global Competency

Structure of Programme

Semesters	Core Course (CC)	Discipline Centric Elective Courses (DCEC)	Interdisciplinary / Generic Elective Course (GEC)	Online from Swayam portal	Total
I	20	3	-	3	26
II	20	4	4		28
III	15	4	4	2	25
IV	21	-	-	-	23
Total	76	11	8	5	100

Instructions for the Students:

Course Type

Core Course (CC): There are core courses in every semester. These courses are to be compulsorily studied by a student as core courses to complete the requirement of this discipline of study.

Discipline Centric Elective Courses (DCEC): These are Elective courses and can be chosen from a pool of papers in all Semesters. These will be supportive to gain in depth understanding in concerned field of Yoga and are mandatory as per course curriculum.

Generic Elective Course (GEC): Generic Elective Course is to be taken from an unrelated discipline available in the School. It is interdisciplinary/open elective as per course curriculum available/offered by other departments included in the School and the GEC Course offered by the Department of Yoga is meant for the students of other disciplines.

Online/Moocs/SWYAM: As stated in the new National Education Policy-2020 that 40% of the course will be given through online mode, this provision has been made keeping in mind that fact.

Introduction:

Yoga is an ancient Indian scientific system and is evolved by Vedic Rishis for holistic growth of body, mind and spirit. It has potential for prevention of physiological and psychosomatic disorders and promotion of inclusive health. The eclectic approach of Yoga brings harmony in the individual and social life. It brings suitable changes in the behavioral pattern and attitude thereby helps to improve the inter-personal relationship at home and also in the society. Therapeutic benefits of Yoga have also been revealed by many scientific researches carried out all over the world. Today, Yoga has become very popular and has gained essential, indispensable and even imperative space in the lives of individual dignitaries.

Structure of Program:

Semester – I

Course	Title of the Paper	L	T	P	C
SIAS YOGA 1101 C 4105	Fundamentals and Foundation of Yoga	4	1	0	05
SIAS YOGA 1102 C 4105	Principles, Practices and Essentials of Haṭha-Yoga	4	1	0	05
SIAS YOGA 1103 C 00105	Yoga Practical – 1	0	0	10	05
SIAS YOGA 1104 C 4105	Yogic Practices and Human Anatomy and Physiology -1	4	1	0	05
Elective					
SIAS YOGA 1101 GEC 2124	Yoga and Self Management	2	1	2	4
SIAS YOGA 1101 DCEC 2103	Āyurvedic Svasthavṛtta and Diet	2	1	0	3
SIAS YOGA 1102 DCEC 2103	Eminent Ancient and Medieval Philosophers and Yogis of India	2	1	0	3
Total					23

- One online course can be taken as per availability

Course	Title of the Paper	L	T	P	C
Online from Swayam portal	AICTE - NITTT - Module 3 - Communication Skills, Modes & Knowledge Dissemination By Er. Amandeep Kaur | National Institute of Technical Teachers Training and Research, Chandigarh				3
Online from Swayam portal	BLI-225: Communication Skills By Dr. Zuchamo Yanthan | Indira Gandhi National Open University				4

Semester –II

Course	Title of the Paper	L	T	P	C
SIAS YOGA 1205 C 4105	Pātañjala-Yogasūtra	4	1	0	05
SIAS YOGA 1206 C 4105	Yogic Practices and Human Anatomy and Physiology -2	4	1	0	05
SIAS YOGA 1207 C 00105	Yoga Practical – 2	0	0	10	05
SIAS YOGA 1208 C 4105	Principle Upaniṣads, Gītā and Yogavāsiṣṭha	4	1	0	05
Elective					
SIAS YOGA 1202 GEC 2124	Fundamentals of Yoga	2	1	2	04
SIAS YOGA 1203 DCEC 2124	Complementary And Alternative Therapy	2	1	2	04
SIAS YOGA 1204 DCEC 3104	Indian Philosophy	3	1	0	04
Total					28

Semester – III

Course	Title of the Paper	L	T	P	C
SIAS YOGA 1309 C 4105	Research Methodology and Statistics in Yoga	4	1	0	05
SIAS YOGA 1310 C 00105	Yoga Practical – 3	0	0	10	05
SIAS YOGA 1311 C 4105	Teaching methods in Yoga	4	1	0	05
Elective					
SIAS YOGA1303 GEC 2124	Yoga and Holistic Health	2	1	2	04
SIAS YOGA 1305 DCEC	Principles of Naturopathy and Natural Dietics	3	1	0	04

3104					
SIAS YOGA 1306 DCEC 2124	Holistic Health and Yoga Therapy	2	1	2	04
Total					23

- One online course can be taken as per availability

Course	Title of the Paper	L	T	P	C
Online from Swayam portal	Health Research Fundamentals By Multi Faculty | National Institute of Epidemiology				2
Online from Swayam portal	Development Research Methods By Prof. Rajshree Bedamatta | IIT Guwahati				2
Online from Swayam portal	Introduction to Research By Prof. Prathap Haridoss | IIT Madras				2

Semester - IV

Course	Title of the Paper	L	T	P	C
SIAS YOGA 1412 C 00105	Yoga Practical -4 and Naturopathy	0	0	10	05
SIAS YOGA 1413 C 00016	Desertation/Internship	0	0	0	16
Total					21

Special Note: It is decided by acadmic council that one credit (over and above the credits already prescribed) be given to the student who recite the National Anthem, National Song and University Kulgeet.

Learning Outcome Index

I. Programme Outcomes and Programme Specific Outcomes

PO	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5	PSO-6	PSO-7
PO-1	X	✓	✓	✓	✓	✓	✓
PO-2	✓	X	X	✓	✓	✓	✓
PO-3	X	✓	X	X	✓	✓	✓
PO-4	✓	✓	X	X	X	X	✓
PO-5	X	X	✓	✓	✓	✓	✓

I. Core Courses (CC):

PSO	CC-1	CC-2	CC-3	CC-4	CC-5	CC-6	CC-7	CC-8	CC-9	CC-10	CC-11	CC-12	CC-13
PSO-1	✓	✓	✓	✓	✓	✓	✓	✓	X	✓	✓	✓	✓
PSO-2	✓	✓	✓	X	✓	X	✓	✓	X	✓	✓	✓	✓
PSO-3	✓	✓	✓	X	✓	X	✓	✓	X	✓	✓	✓	✓
PSO-4	X	X	✓	✓	X	✓	✓	X	X	✓	✓	✓	✓
PSO-5	X	X	✓	✓	X	✓	✓	X	X	✓	✓	✓	✓
PSO-6	X	X	✓	✓	X	✓	✓	X	X	✓	✓	✓	✓
PSO-7	✓	✓	✓	X	✓	X	✓	✓	X	✓	X	✓	X

II. Elective Courses (EC):

PSO	EC-1	EC-2	EC-3	EC-4	EC-5	EC-6	EC-7	EC-8	EC-9
PSO-1	✓	✓	✓	✓	X	✓	✓	X	✓
PSO-2	✓		✓	✓	X	✓	✓	X	✓
PSO-3	✓	X	X	✓	X	X	✓	X	✓
PSO-4	X	X	✓	X	X	✓	X	X	✓
PSO-5	X	X	X	X	X	✓	X	X	✓
PSO-6	X	X	X	X	X	✓	X	✓	✓
PSO-7	✓	✓	✓	✓	✓	✓	✓	✓	✓

प्रथम सत्र - First Semester

पाठ्यक्रम का विषय: योग के आधारभूत मौलिक तत्त्व

Course Title: Fundamentals of Yoga

Course Code: SIAS YOGA 1101 C 4105

Objective:

- To equip the students basics of Yoga
- Students will familiarize themselves with Yogic terminology

Outcome of the Paper: Upon successful completion of this course, students will be able to:

- Know the difference between Hath Yoga and Raj Yoga
- How many types of Yoga is there in our ancient literature

Unit-I परिचय - Introduction

1. योग का अर्थ एवं परिभाषाएँ, योग का स्वरूप, योग का उद्देश्य - Meaning, Definitions, Form and Objectives of Yoga
2. योग की उत्पत्ति, योग का इतिहास और विकास - Origin, Development and Historical Background of Yoga.
3. योग से संबन्धित भ्रामक धारणायें एवं उनके समाधान - Misconceptions about Yoga and their Solutions.
4. नाड़ी और प्राण की अवधारणायें, कुण्डलिनी एवं षट्चक्र का परिचय - Conceptions of Nāḍī and Prāṇa, Introduction to Kuṇḍalinī and Ṣaṭcakra.

Unit-II विभिन्न ग्रन्थों एवं परम्पराओं में योग - Yoga in Different Texts and Traditions

1. वेदों, उपनिषदों व गीता में योग का स्वरूप - Form of Yoga in Vedas, Upaniṣads and Gītā.
2. न्याय, वैशेषिक, सांख्य, मीमांसा, वेदान्त बौद्ध और जैन दर्शनों में योग का स्वरूप - Form of Yoga in Nyāya, Vaiśeṣika, Sāṉkhya, Mīmāṃsā and Vedānta Schools of Indian Philosophy.
3. आयुर्वेद, योगवाशिष्ठ एवं तंत्र में योग का स्वरूप - Form of Yoga in Āyurveda, Yoga-

Vāsiṣṭha and Tantras.

Unit-III योग के विभिन्न प्रकार –

1.**(संक्षिप्त परिचय) - Different Types of Yoga** - 1. (Brief Introduction)

हठयोग - Haṭha-yoga, राजयोग - Rāja-yoga, मन्त्रयोग - Mantra-yoga, लययोग - Laya-yoga कर्मयोग - Karma-yoga, ज्ञानयोग - Jñāna–yoga, भक्तियोग - Bhakti-yoga

Unit-IV योगाभ्यास की अनिवार्यताएँ - Essentials for Yoga Practice:

1. योगाभ्यास के नियम एवम् अनुशासन - Rules and Disciplines in Yogic Practices
2. योगाभ्यास का स्थान एवं समय - Place and Timing of Yogic Practices
3. योगाभ्यासी की भोजन सूची एवं सारिणी - List and Schedule of Diet of Yoga Practitioner
4. योगाभ्यास के मार्ग में बाधायें - Obstacles in the Path of Yoga Practice
5. योगाभ्यास का अनुक्रम - Sequence of Yogic Practices

आवश्यक पठनीय - Essential Readings:

1. स्वामी विज्ञानानन्द सरस्वती, योग-विज्ञान, योग निकेतन ट्रस्ट, ऋषिकेश - 1998
2. राजकुमारी पाण्डेय, भारतीय योगपरम्परा के विविध आयाम, राधा प्रकाशन, नई दिल्ली - 2008
3. स्वामी विवेकानन्द, ज्ञान-भक्ति-कर्म-योग और राजयोग, अद्वैत आश्रम, कलकत्ता - 2000
4. कामाख्या कुमार, योग-महाविज्ञान, Standard Publisher, New Delhi
5. कल्याण (योगाङ्क), गीता प्रेस गोरखपुर - 2002
6. कल्याण (योग तत्त्वांक), गीता प्रेस गोरखपुर - 1991
7. डॉ॰ ईश्वर भारद्वाज, औपनिषदिक अध्यात्म विज्ञान, सत्यम् पब्लिकेशन्स, उत्तम नगर, नई दिल्ली

सन्दर्भ ग्रन्थ - Suggested Readings:

1. योग-विज्ञानम्, आचार्य बालकृष्ण, पतञ्जलि योग-पीठ, हरिद्वार
2. वेदों में योग विद्या, स्वामी दिव्यानन्द
3. भारतीय दर्शन, आचार्य बलदेव उपाध्याय
4. भारत के महान् योगी, विश्वनाथ मुखर्जी
5. सन्त-चरित, स्वामी शिवानन्द
6. The Yoga Tradition, Motilal Banarsidass
7. K.S. Joshi - Yoga in Daily Life, Orient Paper Back Publication, New Delhi -

1985.
8. S.P. Singh - History of Yoga - PHISPC, Center for Studies of Civilization, Delhi, Ist Edn. - 2010
9. S. P. Singh and Yogi Mukesh - Foundation of Yoga, Standard Publishers, New Delhi - 2010

पाठ्यक्रम का विषय: हठयोग के सिद्धान्त, अभ्यास एवम् अनिवार्यताएँ

Course Title: Principles, Practices and Essentials of Haṭhayoga
Course Code: SIAS YOGA 1102 C 4105

Objective of the Paper:

- To equip the students basics of Hath-Yoga
- Students will familiarize themselves with Hatha-Yogic texts

Outcome of the Paper: Upon successful completion of this course, students will be able to:

- Know the the sequences of Hath-Yogic practices
- Differenciate between Chaturanga Yoga and Saptanga Yoga

Unit-I परिचय - Introduction:

1. हठयोग की परिभाषा एवम् उद्देश्य - Haṭhayoga, its definition and objectives
2. हठयोग की उत्पत्ति एवं परम्परा - Origin and Tradition of Haṭhayoga
3. हठाभ्यास-हेतु उचित स्थान, वातावरण, ऋतु एवं काल का महत्त्व - Importance of proper Place, Environment, Season and Time for Haṭha practice
4. हठाभ्यास-हेतु साधक व बाधक तत्त्व - Aids and Obstructions to Haṭha practice
5. हठाभ्यास-हेतु निषिद्ध एवं संस्तुत आहार - Prohibited and Recommended Food for Haṭha practice.

Unit-II षट्कर्म की अवधारणा - Concept of Ṣaṭkarmas

1. षट्कर्म और अष्ट-कर्म का परिचय – Introduction of Ṣaṭkarmas and Ashta-karma
2. षट्कर्म का अर्थ और प्रकार – Meaning of Ṣaṭkarmas and types

3. षट्कर्म का उद्देश्य और अभ्यास की विधि – Purpose of Ṣaṭkarmas and its method of practice
4. षट्कर्म अभ्यास का समय और सावधानियाँ – Ṣaṭkarmas Practice Timings and Precautions
5. षट्कर्मों के भौतिक और योगिक महत्त्व – Physical and Yogic Significance of Ṣaṭkarmas

Unit-III आसन, प्राणायाम, मुद्रा और बन्ध की अवधारणा – Concept of Āsanas, Prāṇāyāma, Mudrā and Bandha

1. आसन, प्राणायाम, मुद्रा और बन्ध का परिचय – Introduction of Āsanas, Prāṇāyāma, Mudrā and Bandha
2. आसन का अर्थ, प्रकार और अभ्यास के तरीके – Meaning of Āsanas, types and method of practice
3. प्राणायाम, मुद्रा और बन्ध का अर्थ, प्रकार और अभ्यास के तरीके – Meaning of Prāṇāyāma, Mudrā and Bandha, types and method of practice
4. आसन अभ्यास का समय, सावधानियाँ एवं लाभ – Āsanas Practice Timings, precautions and benefits
5. प्राणायाम, मुद्रा और बन्ध अभ्यास का समय, सावधानियाँ एवं लाभ – Prāṇāyāma, Mudrā and Bandha Practice Timings, precautions and benefits

Unit-IV प्रत्याहार, धारणा, ध्यान, समाधि और नादानुसन्धान की अवधारणा – Concept of Pratyāhāra, Dhāranā, Dhyān, Samādhi and Nādānusandhāna

1. प्रत्याहार, धारणा, ध्यान, समाधि और नादानुसन्धान का परिचय – Introduction of Pratyāhāra, Dhāranā, Dhyān, Samādhi and Nādānusandhāna
2. प्रत्याहार, धारणा का अर्थ, प्रकार और अभ्यास के तरीके – Meaning of Pratyāhāra, Dhāranā types and method of practice
3. ध्यान, समाधि और नादानुसन्धान का अर्थ, प्रकार और अभ्यास के तरीके – Meaning of Dhyān, Samādhi and Nādānusandhāna, types and method of practice
4. प्रत्याहार, धारणा अभ्यास का समय, सावधानियाँ एवं लाभ – Pratyāhāra, Dhāranā Practice Timings, precautions and benefits
5. ध्यान, समाधि और नादानुसन्धान अभ्यास का समय, सावधानियाँ एवं लाभ – Dhyān, Samādhi and Nādānusandhāna Practice Timings, precautions and benefits

आवश्यक पठनीय - Essential Readings:

1) घेरण्ड-सहिंता, स्वामी निरञ्जनानन्द, योग भारती, मुंगेर, बिहार - 1997

2) हठ-योग-प्रदीपिका, स्वामी दिगम्बर जी व रघुनाथ शास्त्री, कैवल्यधाम, लोनावला, पूना - 2006

3) घेरण्ड-संहिता, स्वामी दिगम्बर जी व एम.एल. घरोटे, कैवल्यधाम, लोनावला, पूना - 1978

4) हठ-योग-प्रदीपिका, स्वामी मुक्तिबोधानन्द सरस्वती, योग पब्लिकेशन्स ट्रस्ट, मुंगेर, बिहार - 2000

5) स्वामी सत्यानन्द सरस्वती, आसन-प्राणायाम-मुद्रा-बन्ध, योग पब्लिकेशन्स ट्रस्ट, मुंगेर, बिहार - 2006

6) स्वामी कुवलयानन्द व एस.ए. शुक्ल, गोरक्ष-षट्कर्म, कैवल्यधाम, लोनावला, पूना - 2006

सन्दर्भ ग्रंथ - Suggested Readings:

1. B.K.S. Iyengar - Light on Yoga, Harper Collins Publisher, New Delhi - 2012
2. B.K.S. Iyengar - Light on Pranayama, Harper Collins Publisher, New Delhi - 2012
3. M.L.Gharote - Hatha Ratnavali, Kaivalyadham SMYM Samiti, Lonavala - 2009
4. M.L.Gharote - Siddhasiddhant Paddhati, Kaivalyadham SMYM Samiti, Lonavala - 2005

यौगिक अभ्यास

पाठ्यक्रम का विषय: यौगिक क्रियाओं का क्रमिक अभ्यास

Course Title: Sequential practice of Yoga practices

Course Code: SIAS YOGA 1103 C 00105

Objective of the Paper:

- To learn how to practice different Yogic practices
- What are the different Yogic techniques and how to perform them?

Outcome of the Paper: Upon successful completion of this course, students will be able to:

- Do Yogasana practices with effective manners
- Do different Yogic Shatkarmas like Jal Neti, Sutra Neti etc.

- **षट्कर्म - Ṣaṭkarmas:** गजकरणी (कुञ्जल), जलनेति, सूत्रनेति, रबरनेति, अग्निसार, वातक्रम-कपालभाति -

Gajakaraṇ,, (Kuñjala), Jalaneti, Sūtraneti, Rabarneti, Agnisāra, Vātakrama-Kapālabhāti

- **सूक्ष्म-व्यायाम - Subtle Exercise:** स्वामी धीरेन्द्र ब्रह्मचारी कृत 'सूक्ष्म व्यायाम' से प्रथम बीस क्रियाएँ - First twenty exercises from the Book - 'Sūkṣma Vyāyāma' of Swami Dhirendra Brahmachari.
- **सूर्य-नमस्कार (संबद्ध मन्त्रोच्चारण-पूर्वक) - Sūrya-Namaskāra** (Along recitation of concerned mantras)
- **आसन - Āsanas:** उत्तानपादासन, भुजंगासन, शलभासन, नौकासन, विपरीत-नौकासन या नाभ्यासन, मकरासन, धनुरासन, सिद्धासन, स्वस्तिकासन, पद्मासन, उत्थित-पद्मासन, वक्रासन, अर्धमत्स्येन्द्रासन, गोमुखासन, वज्रासन, सुप्तवज्रासन, कूर्मासन, उत्तानकूर्मासन, शांकासन (गुरुप्रणामासन), दण्डासन, सिंहासन, भद्रासन, मार्जार्यासन, व्याघ्रासन, कागासन, ताड़ासन, कटिचक्रासन, पार्श्वचक्रासन, त्रिकोणासन, कोणासन, ऊर्ध्वहस्तोत्तानासन, उत्कटासन, पादहस्तासन, नटराजासन व शवासन - Uttānapādāsana, Bhujaṉgāsana, Śalabhāsana, Naukāsana, Vipar,,ta-Naukāsana or Nābhyāsana, Makarāsana, Dhanurāsana, Siddhāsana, Svastikāsana, Padmāsana, Utthita-Padmāsana, Vakrāsana, Ardhamatsyendrāsana, Gomukhāsana, Vajrāsana, Supta-Vajrāsana, Kurmāsana, Uttāna-Kurmāsana, Śaśāṉkāsna (Gurupraṇāmāsana), Daṇḍāsana, Siṉhāsana, Bhadrāsana, Mārjāryāsana, Vyāghrāsana, Kāgāsana, Tāḍāsana, Kaṭicakrāsana, Pārśva-cakrāsana, Trikoṇāsana, Koṇāsana, Ūrdhvahastottānāsana, Utkaṭāsana, Pādahastāsana, Naṭarājāsana and Śavāsana
- **प्राणायाम - Prāṇāyāma:** नाड़ीशोधन, अनुलोम-विलोम, सूर्यभेदी, उज्जायी व शीत्कारी - Nāḍīśodhana, Anuloma-Viloma, Sūryabhedī, Ujjāyī, and Śītkārī
- **मुद्रा व बन्ध - Mudrā and Bandha**: उड्डियानबन्ध, मूलबन्ध, जालन्धरबन्ध, विपरीतकरणी, तड़ागी, काकी व शाम्भवी - Uḍḍiyānabandha, Mūlabandha, Jālandharabandha, Viparītakaraṇī, Taḍāgī, Kāki and Śāmbhavī
- **ध्यान - Meditation**: ओंड्कारध्यान व प्रेक्षाध्यान - Oṉkāradhyāna and Prekṣādhyāna

आवश्यक पठनीय - Essential Readings:

1. स्वामी धीरेन्द्र ब्रह्मचारी, सूक्ष्म व्यायाम, मोरारजी देसाई नेशनल ईन्स्टिट्यूट ऑव योग, निकट गोल डाकखाना, नई दिल्ली
2. O.P. Tiwari - Asana why and how, Kaivalyadham SMYM Samiti, Lonavala - 2012.
3. M.L. Gharote - Guidelines for Yogic Practices, Medha Publication, Lonavala.

4. स्वामी सत्यानन्द सरस्वती, आसन-प्राणायाम-मुद्रा-बन्ध, योग पब्लिकेशन्स ट्रस्ट, मुंगेर, बिहार - 2006
5. पं. श्रीराम शर्मा, प्रज्ञा अभियान का योग व्यायाम, ब्रह्मवर्चस् शोध संस्थान, शान्तिकुञ्ज, हरिद्वार - 1998.

सन्दर्भ ग्रंथ - Suggested Readings:

1. B.K.S. Iyengar - Light on Yoga, Harper Collins Publisher, New Delhi, 2012.
2. B.K.S. Iyengar - Light on Pranayama, Harper Collins Publisher, New Delhi, 2012.
3. Swami Kuvlayanand - Asana, Kaivalyadham SMYM Samiti, Lonavala, 1993.

पाठ्यक्रम का विषय: योगाभ्यास एवं मानवीय अवयव-संघटन व शारीर संरचना- 1

Course Title: Human Anatomy, Physiology and Yogic Practices - 1
Course Code: SIAS YOGA 1104 C 4105

Objective of the Paper:

- To know about human body systems
- How Yogic practices do impact our body systems?

Outcome of the Paper: Upon successful completion of this course, students will be able to:

- Anatomy and physiology of different parts of the body
- Explain the impact of Yogic practices on body systems

UNIT-I कोशिका, ऊतक, शरीर व मन का परिचय - Introduction to Cell, Tissue, Body and Mind

1.शरीर की परिभाषा, शरीर का षडंगत्व, पुरुष के आयुर्वेदोक्त चार भेद - चेतना-पुरुष, धातु-पुरुष, पंचविंशति-पुरुष, षड्धातु-पुरुष - Human Body, Its six types of organism, Four Types of Puruṣa according to Āyurveda - Catena-Puruṣa, Dhatu-Puruṣa, Pañcaviṉśati-Puruṣa, Ṣaḍdhātu- Puruṣa

2. **मानवीय कोशिका - Human Cell** संरचना व इसके विभिन्न अवयवों के कार्य - Structure and Functions

3. ऊतक की संरचना, प्रकार तथा कार्य – Structure, Types and Functions of Tissue

4. मन की परिभाषा, मन की उत्पत्ति, मन का स्थान, मन का निग्रह, मन के कर्म के संदर्भ में ध्यान समन्वय - Definition of Mind, Origin of Mind, Place of Mind, Keeping the Mind in Check, Meditational Sequence with regards to Functions of Mind

UNIT II अस्थि पेशीय तन्त्र एवं योग – Musculoskeletal system and Yoga

1. अस्थि की परिभाषा, अस्थि के भेद, अस्थि की संख्या, अस्थि की संरचना, अस्थि के कार्य - Definition of Bone, Types of Bones, Number of Bones, Structure of Bones, Function of Bones
2. तरुणास्थि/उपास्थि का स्थान, तरुणास्थि/उपास्थि के भेद और कार्य - Place of Cartilage, Types and Functions of Cartilage
3. सन्धि-स्थल, प्रकार, घुटने व कशेरुका सन्धि-स्थल की संरचना - Joints, their Types, Structure of the Joints of Knee and Vertebra
4. अस्थि-तंत्र पर योगाभ्यास का प्रभाव - Impact of Yoga on Skeletal System
5. मांस-धातु की संरचना, पेशी का परिचय, पेशियों की संख्या व भेद - Structure of Flesh, Introduction of Muscles, Number and Types of Muscles
6. पेशी की संरचना, पेशियों के कार्य - Structure of Muscle, Functions of Muscles
7. शरीर की प्रधान पेशियों का संक्षिप्त परिचय यथा फ्रन्टेलिस, आक्सीपीटोफ्रंटालिस, टैम्पोरोपेरन्टालिस, स्टरनोक्लीडोमैस्टायड, लैटिसमस-डोरसाई, ट्रपीजियस, रैक्टस-फेमोरिस, रैक्टस-एबडोमिनिस, डैल्टायड, बाइसैप्स-ब्राची, ट्राईसैप्स-ब्राची, ट्राईसैप्स-सुराए, ग्लूटियस-मैक्सीमस, रेक्टस-फेमोरिस, सारटोरियस, गैस्ट्रोक्नीमियस - Short Introduction of Main Muscles of Body, for example - Frontalis, Occipitofrontalis, Sternocleidomastoid, Latissimus-dorsi, Trapezius, Rectus-femoris, Rectus-abdominis, Deltoid, Biceps-brachii, Triceps-brachii, Triceps-surae, Gluteus-maximus, Rectus-femoris, Sartorius, Gastrocnemius
8. योगाभ्यास का पेशी-तन्त्र पर प्रभाव - Impact of Yogic Exercises on Muscle system

UNIT III श्वसन तन्त्र एवं योग - Respiratory System and Yoga

1. श्वसन की परिभाषा, श्वसन के भेद, श्वसन तन्त्र की संरचना, श्वसन की क्रिया – बाह्य व आन्तरिक - Definition of Respiration, Types of Respiration, Structure of Respiratory System, Inner and Outer Function of Respiration
2. गैसों का परिवहन, श्वसन-क्रिया की नियंत्रण प्रक्रियायें - Movement of Gases, Regulatory Functions of Respiration
3. श्वसन क्षमताएं व आयतनों की संक्षिप्त जानकारी - Capacity of Respiration and Short Information

of Expansion

4. श्वसन तन्त्र पर योगाभ्यास का प्रभाव - Impact of Yogic Exercises on Respiratory System

UNIT IV अन्तःस्त्रावी-तन्त्र, नाड़ी-तन्त्र एवं योग - Endocrinal System, Nervous System and Yoga

1. अन्तःस्त्रावी व बहिस्त्रावी ग्रन्थियों का परिचय - Introduction to Endocrine and Exocrine Glands
2. एन्जाइमस व हार्मोन में अन्तर, पीयूष ग्रन्थि, पिनियल ग्रन्थि, परिचुल्लिका ग्रन्थी, चुल्लिका ग्रन्थि, बाल्य-ग्रन्थि (थाइमॉस) आदि ग्रन्थियों का परिचय - Difference between Enzyme and Harmon, Introduction to different Glands like - Pituitary Gland, Pineal Gland, Para-thyroid Gland, Thyroid Gland, Thymus etc.
3. अग्नाशय तथा एड्रीनल ग्रन्थि, डिम्ब व अण्डकोष ग्रन्थियों की स्थिति, हार्मोन व उनके कार्य - Pancreas and Adrenal Glands, Position of Ovaries and Testes, Harmon and their Functions
4. योगाभ्यास का अन्तःस्त्रावी व बहिःस्त्रावी ग्रन्थियों पर प्रभाव - Impact of Yogic Exercises on Endocrine and Exocrine System of Glands
5. नाड़ी-तन्त्र – सामान्य परिचय, विभिन्न भाग, संरचना एवं कार्य - Nervous System, General Information, Different Parts, Its Structure and Function

आवश्यक पठनीय -Essential Readings:

1. Shirley Teles, A Glimpses of Human Body, Swami Vivekanand Yoga Prakashan, Bangalore - 2014
2. M.M. Gore, Anatomy and Physiology of Yogic Practices, Motilal Banarsidass, New Delhi-2007
3. Ross and Wilson, Human Anatomy and Physiology in Health and Illness, Churchill Livingstone- 2010

पाठ्यक्रम का विषय: योग और स्व-प्रबन्धन

Course Title: Yoga and Self-Management
Course Code: SIAS YOGA 1101 GEC 2124

Objective of the Paper

- To equip the students with the knowledge of different aspects of self-management
- Students will familiarize themselves with applications of Yoga in Self-Management.

Outcome of the Paper

- Explore and increase awareness of how people and critical incidents in their life story has shaped their own personal values.
- Understand the role of character and virtues for a successful and meaningful life and increase awareness of their own personal character strengths.
- Increase capacity for self-questioning and discovering their own biases Students will have sound understanding of self-management and be able to manage themselves.

Unit – I योग का परिचय / Introduction of Yoga

1. योग का संक्षिप्त इतिहास और उत्पत्ति / Brief history and origin about Yoga
2. योग का अर्थ और परिभाषा / Meaning and definition of Yoga
3. योग की भ्रांतियाँ / Misconceptions about Yoga
4. हठ-योग व राज-योग का संक्षिप्त परिचय / Introduction of Hath-Yoga and Raj Yoga
5. प्रायोगिक-योग / Yoga-practical

   पवन मुक्तासन भाग एक, वज्रासन, दंडासन, मकरासन, पवन मुक्तासन, उदाराकर्षण, ताड़ासन, तिर्यक-ताड़ासन, कपालभाति और योगिक श्वसन/ Pawan Muktasan Part one and Vajrasana, Dandasana, Makarasana, Pawan Muktasana, Udrakarshana, Tadasana, Tiryaka-Tadasana, Kapalbhati, Yogic breathing.

Unit – II स्व की अवधारणा / Concept of Self

1. मन की आधुनिक अवधारणा और उसके स्तर / Modern concept of mind and its levels
2. आदर्श आत्म, आत्म-छवि, आत्म-सम्मान / Ideal self, Self-image, Self-esteem
3. मन, बुद्धि, चित्त, अहंकार और अन्तः करण चतुष्टय की योगिक अवधारणा / Yogic concept of mind, intellect, chitta, ego and concept of four states of conscience
4. योग में चेतना और उसकी अवस्थाएँ / Consciousness and its states
5. प्रायोगिक-योग / Yoga-practical

जल नेति, अग्निसार, जालन्धर बन्ध, कटिचक्रासन, शशांकासन, नौकासन, सेतुबन्धासन, उत्कटासन त्रिकोणासन, अनुलोम-विलोम प्राणायाम / Jal Neti, Agnisara, Jalandhara Bandha, Katichkrasana, Shashankasana, Naukasana, Setubandhasana, Utkatasana Trikonasana, Anulom-Vilom Pranayama.

Unit – III विचारों की अवधारणा एवं योगिक प्रबन्धन / Conceptualization and Yogic Management of Ideas

1. सोच और इसकी प्रक्रिया क्या है? / What is thinking and its process?
2. विचारों का विकास और परिवर्तन का प्रतिरूप / Development of ideas and patterns of change

3. विचारों को प्रभावित करने वाले कारक और विचारों की शक्ति / Factors affecting thoughts and power of thoughts
4. विचारों का योगिक प्रबन्धन / Yogic management of thoughts
5. प्रायोगिक-योग / Yoga-practical

गत्यात्मक मेरु वक्रासन, नौका सञ्चालन, शशांकभुजङ्गासन,समकोणासन वृक्षासन, मूर्धासन, भ्रामरी प्राणायाम, ज्ञान मुद्रा, नासाग्र मुद्रा / Dynamic Meru Vakrasana, Boat Steering, Shashankabhujangasana, Samkonasana Vrikshasana, Murdhasana, Bhramari Pranayama, Jnana Mudra, Nasal Mudra.

Unit – IV विचारों की अवधारणा एवं योगिक प्रबन्धन / Conceptualization and Yogic Management of Ideas

1. भावनाएं और उनकी प्रक्रिया क्या हैं? / What are emotions and their process?
2. भावों का विकास और परिवर्तन का प्रतिरूप / Development of emontions and patterns of change
3. भावों को प्रभावित करने वाले कारक और भावों की शक्ति / Factors affecting emotions and power of emotions
4. भावों का योगिक प्रबन्धन / Yogic management emotions
5. प्रायोगिक-योग / Yoga-practical

तितली-आसन, सरल-धनुरासन, अर्द्ध-शलभासन, विपरीतकरणी-आसन, पद्मासना, पद-हस्तासन, पश्चिमोत्तानासन और पूर्वोत्तानासन, सीत्कारी प्राणायाम, योगनिद्रा / Butterfly-asana, Saral-Dhanurasana, Ardha-Salabhasana, Viparitakarani-asana, Padmasana, Pada-Hastasana, Paschimottanasana and Purvottanasana, Sitkari Pranayama, Yoganidra.

Essential Readings

1. Yoga and Self Management by Dr. Asha Arpit , Publisher :- Own fantasy own art, ISBN-10:- 8192388301
2. New Perspectives in Stress Management by Dr. HR Nagendra & Dr. R Nagarathna, Publisher:- Swami Vivekananda Yoga Prakashana, ISBN:- 978-81-87313-01-4
3. स्वामी धीरेन्द्र ब्रह्मचारी ,निकट गोल डाकखाना ,मोरारजी देसाई नेशनल ईन्स्टिट्यूट ऑव योग ,सूक्ष्म व्यायाम , – नई दिल्ली 1966
4. स्वामी सत्यानन्द सरस्वती,आसन-प्राणायाम-मुद्रा-बन्ध, योग पब्लिकेशन्स ट्रस्ट, मुंगेर बिहार, 2006
5. पंडित श्रीराम शर्मा आचार्य, समय का सदुपयोग, युग निर्माण योजना विस्तार ट्रस्ट, गायत्री तपोभूमि, मथुरा, 2018.

सन्दर्भ ग्रंथ- Suggested Readings:

1. 1. B.K.S. Iyengar - Light on Yoga, Harper Collins Publisher, New Delhi- 2012
2. 2. B.K.S. Iyengar - Light on Pranayama, Harper Collins Publisher, New Delhi- 2012
3. 3. Swami Kuvlayanand - Asana, Kaivalyadham SMYM Samiti, Lonavala– 1993
4. Swami Satyananda Saraswati - Asana Pranayama Mudra Bandhas, Yoga Publication Trust, Munger, Bihar - 2006

पाठ्यक्रम का विषय: आयुर्वेदिक्, स्वस्थवृत्त और आहार

Course Title: Āyurvedic Svasthavṛtta and Diet

Course Code: SIAS YOGA 1101 DCEC 2103

Objective of the Paper:

- To understand the concept of Svasthavṛtta
- To know about Ahar and Mitahar

Outcome of the Paper: Upon successful completion of this course, students will be able to:

- Know Ayurvedic concept of heath
- Use the teachings of daily regimen and night regimen in his/her life

Unit-I - आयुर्वेद का परिचय- Introduction of Āyurveda

1. आयुर्वेद का अर्थ एवं परिभाषा - Meaning and definition of Āyurveda
2. आयुर्वेद का इतिहास -History of Āyurveda
3. आयुर्वेद का उद्देश्य - Purpose of Āyurveda
4. आयुर्वेदिक् चिकित्सा के लाभ - Benefits of Āyurvedic therapy
5. आयु की अवधारणा - Concept of Āyu

Unit-II - स्वस्थवृत्त का परिचय - Introduction of Svasthavṛtta

1. स्वस्थवृत्त का सामान्य परिचय - General introduction of Svasthavṛtta
2. त्रिदोषों की अवधारणा - Concept of Tridosha
3. स्वस्थवृत्त और ऋतुचर्या - Svasthavṛtta and Seasonal regimen

4. दिनचर्या और रात्रिचर्या - Day and Night regimen
5. स्वास्थ्य में स्वस्थवृत्त की भूमिका - Role of Svasthavṛtta in health

Unit- III - समग्र स्वास्थ्य और आहार - Holistic health and Diet

1. आहार और पोषण की अवधारणा - Concept of Diet and Nutrition
2. स्थूल पोषक तत्त्व और उनकी आवश्यकता - Macronutrients and their utility
3. सूक्ष्म पोषक तत्त्व और उनकी आवश्यकता - Micronutrients and their utility
4. पोषक तत्वों के स्रोत - Sources of nutrients
5. आहार का स्वास्थ्य पर प्रभाव - Impact of Diet on health

Unit- IV - यौगिक आहार - Yogic Diet

1. मिताहार की अवधारणा - Concept of Mitahara
2. पारंपरिक योग ग्रंथों के अनुसार यौगिक आहार का वर्गीकरण - Classification in Yogic diet according to traditional Yoga texts
3. शरीर की प्रकृति के अनुसार आहार - Diet according to the body constitution
4. योग साधना में योग आहार का महत्व और स्वस्थ जीवन में इसकी भूमिका - Importance of Yogic Diet in Yog Sadhana and its role in healthy living

आवश्यक पठनीय - Essential Readings:

1. ब्रह्मानंद त्रिपाठी, श्रीमद्भगवत् अष्टांगहृदयम्, चौखम्बा पब्लिशर्स, वाराणसी – 2015
2. शैलजा श्रीवास्तव, अष्टांग हृदयम (सूत्रस्थान) एवम आयुर्वेद के मूलभूत सिद्धान्त, चौखम्बा ओरिएंटल पब्लिशर्स, वाराणसी – 2017
3. विनोद वर्मा, पतंजलि और आयुर्वेदिक योग, राजकमल प्रकाशन – 2000
4. नागेंद्र कुमार नीरज, मेरा आहार मेरा स्वास्थ्य, पॉपुलर बुक डिपो, नई दिल्ली – 2012
5. सर्वेश कुमार अग्रवाल, स्वस्थवृत्त विज्ञान, चौखम्बा ओरिएंटल पब्लिशर्स, वाराणसी – 2018
6. अनीता सिंह, सम्पूर्ण आहार एवम पोषण विज्ञान, स्टार पब्लिकेशन, आगरा -2016
7. Nagendra Kumar Neeraj, Miracles of Naturopathy, Popular Book Depot – 2004

सन्दर्भ ग्रन्थ - Suggested Readings:

1. पंडित श्रीराम शर्मा आचार्य जी, जीवेम शरदः शतम, युग निर्माण योजना, मथुरा - 2004
2. David Frawley, Yoga and Ayurveda: Self-Healing and Self-Realization, Motilal Banarsidass New Delhi- 2013
3. Sunetra Roday, Food Science and Nutrition, Oxford University Press, 2018

पाठ्यक्रम का विषय: प्राचीन एवं मध्यकालीन प्रसिद्ध भारतीय दार्शनिक व योगी

Course Title: Eminent Ancient and Medieval Philosophers and Yogis of India
Course Code: SIAS YOGA 1102 DCEC 2103

Objective of the Paper:

- To know about our great Indian Yogis
- To learn about the teachings of Yogies of India

Outcome of the Paper: Upon successful completion of this course, students will be able to:

- Recognise our great Yogis and their contribution towards society
- Familiar with our great ancient Indian heritage and culture

UNIT-I संक्षिप्त जीवन-वृत्त तथा दर्शन व योग के प्रति योगदान - Short Life Sketch and their Contribution to Philosophy and Yoga

1. महर्षि मनु - Maharṣi Manu, 2. महर्षि याज्ञवल्क्य - Maharṣi Yājñavalakya, 3. महर्षि अष्टावक्र - Maharṣi Aṣṭāvakra, 4. विदेह राजा जनक - Videha Rājā Janaka, 5. ऋषिका मैत्रेयी - Ṛṣikā Maitrey, 6. ऋषिका गार्गी - Ṛṣikā Gārgī

UNIT-II संक्षिप्त जीवन-वृत्त तथा दर्शन व योग के प्रति योगदान - Short Life Sketch and their Contribution to Philosophy and Yoga

1. महर्षि वाल्मीकि - Maharṣi Vālmīki, 2. महर्षि वेदव्यास - Maharṣi Vedavyāsa, 3. महर्षि वसिष्ठ - Maharṣi Vasiṣṭha, 4. महर्षि विश्वामित्र - Maharṣi Viśvāmitra

UNIT- III संक्षिप्त जीवन-वृत्त तथा दर्शन व योग के प्रति योगदान - Short Life Sketch and their Contribution to Philosophy and Yoga

1. मुनि अक्षपाद गौतम - Muni Akṣapāda Gautama, 2. मुनि कणाद - Muni Kaṇāda, 3. मुनि कपिल - Muni Kapila, 4. पतञ्जलि - Muni Patañjali मुनि जैमिनि - Muni Jaimini, 2. मुनि बादरायण - Muni Bādarāyaṇa,

UNIT-IV संक्षिप्त जीवन-वृत्त तथा दर्शन व योग के प्रति योगदान - Short Life Sketch and their Contribution to Philosophy and Yoga

1. 1. आदि शंकराचार्य - Ādi Śaṉkarācārya, 2. योगी मत्स्येन्द्रनाथ - Yogi Matsyendranātha, 3.योगी गोरक्षनाथ - Yogi Gorakshanātha, 4. सन्त ज्ञानेश्वर - Santa Jñāneśwara , 5. मुनि गौतम बुद्ध - Muni Gautama Buddha, 6. मुनि महावीर जिन - Muni Mahavira Jina

आवश्यक पठनीय - Essential Readings:

1) विश्वनाथ मुखर्जी, भारत के महान् योगी, विश्वविद्यालय प्रकाशन, नई दिल्ली - 2005

2) विश्वनाथ मुखर्जी, भारत की महान् साधिकायें, विश्वविद्यालय प्रकाशन, नई दिल्ली - 2005

3) कल्याण (भक्त अङ्क), गीता प्रेस गोरखपुर

4) कल्याण (सन्त अङ्क), गीता प्रेस गोरखपुर

5) पं. श्रीराम शर्मा, प्रज्ञा अभियान का योग व्यायाम, ब्रह्मवर्चस् शोध संस्थान, शान्तिकुञ्ज, हरिद्वार - 1998.

सन्दर्भ ग्रंथ- Suggested Readings:

1. कल्याण (योग-तत्त्वांक व योगाङ्क), गीता प्रेस गोरखपुर, क्रमशः1991व 2002

2. राकेश दीक्षित, शरीर-रचना एवं क्रिया-विज्ञान, भाषा भवन, मथुरा - 2005

3. डॉ. भास्कर गोविन्द घाणेकर, सुश्रुत (शरीर स्थान)

4. डॉ. मुकुन्द स्वरूप वर्मा, शरीर रचना विज्ञान

द्वितीय सत्र -Second Semester

पाठ्यक्रम का विषय: पातञ्जल योगसूत्र

Course Title: Pātañjala Yogasūtra

Course Code: SIAS YOGA 1205 C 4105

Objective of the Paper:

- To provide teachings of Patanjal Yoga Sutra
- How does one can control their mental fluctuations?

Outcome of the Paper: Upon successful completion of this course, students will be able to:

- Know mental fluctuations and methods of control them.
- Use the teachings of Patanjali in daily life.

Unit-I पातञ्जल योगसूत्र का परिचयचित्त , की भूमियाँ, चित्तवृत्तियाँ, अभ्यास और वैराग्य रूपी संसाधन, योगअंतराय-, चित्तप्रसादन - Introduction of Patañjali's Yogasūtra, Cittabhūmis, Cittavṛttis, Abhyāsa & Vairāgya as the tools, Yoga-Antarāyas, Citta-Prasādana

Unit-II क्रियायोग- और उसके प्रकार, ईश्वर का स्वरूप, पंच क्लेश, चतुर्व्यूहवाद, कर्म सिद्धान्त - Kriyā-Yoga and its Kinds, Concept of Īśvara, Pañca-kleśas, Caturvyūhavāda, Karma Theory
अष्टाङ्गयोग, यम ,नियम-वितर्क और महाव्रत की अवधारणा ,आसन, प्राणायाम, प्रत्याहार और उनकी सिद्धियाँ - Eight Steps of Yoga, Yamas & Niyamas, Concept of Vitarka and Mahāvratas, Āsanas, Prāṇāyāma, Pratyāhāra and their Siddhis

Unit-III धारणा, ध्यान एवं समाधि का परिचय और संयम का स्वरूप, समाधि के प्रकारसम्प्रज्ञात -, असम्प्रज्ञात, ऋतम्भरा प्रज्ञा, विवेकख्याति, धर्ममेघ समाधि - Introduction of DhāraṇāDhyān ,aand Samādhi, Nature of Sa ṁyama , Kinds of Samādhi -Samprajñāt aAsampra ,jñāta, Ṛtambharā PrajñāVivek ,akhyāti, Dharamamegha Samādhi

यौगिक अभ्यास

पाठ्यक्रम का विषय: यौगिक क्रियाओं का क्रमिक अभ्यास -2

Course Title: Sequential practice of Yoga practices-2

Course Code: SIAS YOGA 1207 C 00105

Objective of the Paper:

- To learn how to practice different Yogic practices
- What are the different Yogic techniques and how to perform them?

Outcome of the Paper: Upon successful completion of this course, students will be able to:

- Do Yogasana practices with effective manners
- Do different Yogic Shatkarmas like Jal Neti, Sutra Neti etc.
- Perform all the Sukshama and sthul vyayama

टिप्पणी - प्रथम सत्र के पाठ्यक्रम में आई सभी षट्कर्म क्रियायें, सूक्ष्म व्यायाम, आसन, प्राणायाम, मुद्रा, बन्ध व ध्यान द्वितीय सत्र में भी सम्मिलित रहेंगे - Ṣaṭkarmas (Kriyās), Subtle Exercises, Āsanas, Prāṇāyāma, Mudrās, Bandhas and Meditation practiced in the first semester shall also be included in the syllabus of the second semester

1. **षट्कर्म** - व्युत्क्रम,कपालभाति- दण्डधौति (दाएँ व बाएँ ,मध्य) नौलि ,- **Ṣaṭkarmas** - Vyutkrama-Kapālabhāti, Daṇḍadhauti, Naulī (Central, Right and Left)
2. **सूक्ष्मव्यायाम-** - स्वामी धीरेन्द्र ब्रह्मचारी कृत 'सूक्ष्म व्यायाम' से सभी 1)से 48क्रियाएँ (- **Sūkṣma Vyāyāma** (Subtle Exercises) of Svāmī Dhīrendra Brahmacārī 1)to 48(
3. **सूर्यनमस्कार-** (संबद्ध मन्त्रोच्चारणपूर्वक-) - **Sūrya-Namaskāra** (Along recitation of concerned mantras)
4. **आसन - ध्यानात्मक व विश्राम-दायक आसन** - सिंहासन, मुक्तासन, भद्रासन, स्वस्तिक आसन, मकरासन -**Āsanas - Meditative and Relaxative Āsanas** - Siṁhāsana, Muktāsana, Bhadrāsana, Svastikāsana, Makarāsana - **सांस्कृतिक आसन - खड़े होकर किए जाने वाले आसन** - उत्कटासन, पादहस्तासन, वृक्षासन, गरुड़ासन - **Cultural Āsanas - Standing Āsanas** - Utkaṭāsana, Pādahastāsana, Vṛkṣāsana, Garuḍāsana - **कमर के बल लेट कर किए जाने वाले आसन** - सर्वांगासनचक्रासन ,हलासन ,मत्स्यासन , - **Spine Yoga Asanas** - Sarvāṅgāsana, Matsyāsana, Halāsana, Cakrāsana - **पेट के बल लेटकर किए जाने वाले आसन** - भुजंगासन, विपरीत-नौकासन, एकपाद-धनुरासन - **Prone Yoga Āsanas** - Bhujaṅgāsana, Viparīta-Naukāsana, Ekapāda-Dhanurāsana - **बैठकर किए जाने वाले आसन** - जानुशीर्षासनबद्धपद्मासन ,तोलाङ्गुलासन ,आकर्णधनुरासन , - **Sitting Yoga Āsanas** - Jānuśirṣāsana, Ākarṇadhanurāsana, Tolāṅgulāsana, Baddha-Padmāsana - **उन्नत आसन** - एकपादस्कन्दासन, बकासन, पूर्ण उष्ट्रासन, शीर्षासन - **Advance Āsanas** - Ekpādaskandāsana, Bakāsana, Pūrṇa Uṣṭrāsana, Śīrṣāsana
5. **प्राणायाम** - भस्त्रिका शीतली व भ्रामरी ,**-** Prāṇāyāma - Bhastrikā, Sītalī and Bhrāmarī
6. **मुद्रा व बन्ध** - अश्विनीमुद्रा, महामुद्रामहावेधमुद्रा व शक्तिचालिनीमुद्रा ,महाबन्ध , - **Mudrās and Bandhas** - Aśvinīmudrā, Mahāmudrā, Mahābandha, Mahāvedhamudrā and Śakticālinīmudrā

.7**ध्यान** - सोऽहम् साधना, गायत्रीध्यान व-मन्त्र- विपश्यना-ध्यान - Dhyānas **(**Meditation) - So'ham Sādhanā, Gāyatrī-Mantra-Meditation, Vipaśyanā-Meditation

आवश्यक पठनीय -Essential Readings:

5. स्वामी धीरेन्द्र ब्रह्मचारीनई ,निकट गोल डाकखाना ,मोरारजी देसाई नेशनल ईन्स्टिट्यूट ऑव योग ,सूक्ष्म व्यायाम ,

- दिल्ली 1966
6. स्वामी सत्यानन्द सरस्वती2006 - बिहार ,मुंगेर ,योग पब्लिकेशन्स ट्रस्ट ,बन्ध-मुद्रा-प्राणायाम-आसन ,
7. O.P. Tiwari - Asana Why and How, Kaivalyadham SMYM Samiti, Lonavala- 2012
8. M.L. Gharote - Guidelines for Yogic Practices, Medha Publication, Lonavala - 1982
9. पं - हरिद्वार ,शान्तिकुञ्ज ,ब्रह्मवर्चस् शोध संस्थान ,प्रज्ञा अभियान का योग व्यायाम ,श्रीराम शर्मा .1998

सन्दर्भ ग्रंथ- Suggested Readings:

1. B.K.S. Iyengar - Light on Yoga, Harper Collins Publisher, New Delhi- 2012
2. B.K.S. Iyengar - Light on Pranayama, Harper Collins Publisher, New Delhi- 2012
3. Swami Kuvlayanand - Asana, Kaivalyadham SMYM Samiti, Lonavala- 1993
4. Swami Satyananda Saraswati - Asana Pranayama Mudra Bandhas, Yoga Publication Trust, Munger, Bihar - 2006

पाठ्यक्रम का विषय: मुख्य उपनिषद्, श्रीमद्भगवद्गीता और योगवासिष्ठ

Course Title: Principal Upaniṣads, Gītā and Yogavāsiṣṭha

Course Code: SIAS YOGA 1208 C 4105

Objective of the Paper:

- To know about principal Upanishads
- To learn about the teachings of Upanishadas

Outcome of the Paper: Upon successful completion of this course, students will be able to:

- Understad about teachings of Upanishadas
- How Upanishads are helpful to human beings

Unit-I ईशावास्योपनिषद् - कर्म-निष्ठा, विद्या और अविद्या, ब्रह्म का स्वरूप - **Īśāvāsyopaniṣad**- Karmaniṣṭhā, Vidyā & Avidyā, Nature of Brahman - **केनोपनिषद्** - आत्मा और मन, सत्य की अनुभूति, यक्ष के उपाख्यान का संदेश - **Kenopaniṣad** - Ātmā and the Mind, Realization of Truth, Message of Yakṣa-Episode - **कठोपनिषद्** - योग की परिभाषा, आत्मा का स्वरूप एवं आत्मानुभूति का महत्त्व - **Kaṭhopaniṣad** - Definition of Yoga, Nature of Soul, Importance of Self Realization - **प्रश्नोपनिषद्** - प्राण और रयि की अवधारणा, पंचप्राण - **Praśnopaniṣad** - Concept of Prāṇa & Rayi (Creation), Pañcaprāṇa

Unit-II मुंडकोपनिषद - विद्या - परा तथा अपरा, ब्रह्मविद्या की विशेषताएं, तप और गुरुभक्ति, सृष्टि की उत्पत्ति, ध्यान का उद्देश्य - **Muṇḍakopaniṣad** - Vidyā - Parā & Aparā, Characteristics of Brahmavidyā, Tapas & Gurubhakti, Creation, Goal of Meditation - **माण्डूक्योपनिषद्** - चेतना की चार अवस्थाएँ एवं ओंकार से इनका संबन्ध - **Māṇḍukyopaniṣad** - Four States of Consciousness and their relation with Oṁ-kāra; **ऐतरेयोपनिषद्** - आत्मा, ब्रह्माण्ड और ब्रह्म की अवधारणा - **Aitareyopaniṣad** - Concepts of Ātmā, Universe and Brahman

Unit-III तैत्तिरीयोपनिषद् - पंचकोश, शिक्षावल्ली, आनंदवल्ली, भृगुवल्ली का संक्षिप्त विवरण - **Taittirīyopaniṣad** - Pañcakośa, Śikṣāvalli; Ānandavalli and Bhṛguvalli in short; **छान्दोग्योपनिषद्** - ओम ध्यान, शाण्डिल्य-विद्या - **Chāndogyopaniṣad** - Om Meditation, Śāṇḍilyavidyā - **बृहदारण्यकोपनिषद्** - याज्ञवल्क्य-मैत्रेयी-संवाद - **Bṛhadāraṇyakopaniṣad** - Dialogue between Yājñavalkya and Maitreyī, **योगवासिष्ठ** - योगवासिष्ठ का सामान्य परिचय, आधि और व्याधि, मुक्ति के चार द्वारपाल, सत्वगुण का विकास, ध्यान के आठ चरण, सप्त भूमियाँ - **Yogavāsiṣṭha** - General Introduction of Yogavāsiṣṭha, Three Methods of Yoga, Ādhi & Vyādhi, Four Gatekeepers of Salvation, Promotion of Sattva Guṇa, Eight Steps of Meditation, Sapta Bhūmis

Unit-IV श्रीमदभगवद्गीता - **Bhagavadgītā** - योग की परिभाषाएं - आत्मा का स्वरूप, स्थितप्रज्ञ, सांख्ययोग (अध्याय-2), कर्मयोग (अध्याय-3), ध्यानयोग (अध्याय-6), भक्तों के प्रकार (अध्याय-7), भक्ति की प्रकृति (अध्याय-12), भक्तियोग के साधन और साध्य, त्रिगुण और प्रकृति का स्वरूप, योगी का आहार एवं उसका वर्गीकरण (अध्याय 14 व 17), देवासुर संपद्विभागयोग (अध्याय-16), मोक्ष का उपदेश (अध्याय-18) - Definitions of Yoga, Concepts of Ātmā, Sthitaprajña, Sāṁkhyayoga (Chapter-II), Karmayoga (Chapter-III), Dhyānayoga (Chapter-VI), Types of Bhakta (Chapter-VII), Nature of Bhakti (Chapter-XII), Means and Goal of Bhaktiyoga, the Triguṇas and Concept of Prakṛti, Food prescribed for Yoga Practitioner & Classification of Food (Chapter-XIV &

XVII), Daivāsurasampad-vibhāgayoga (Chapter-XVI), Concept of Salvation (Chapter-XVIII)

सन्दर्भ ग्रंथ- Suggested Readings:

1. उपनिषद् अंक, कल्याण, गीता प्रेस गोरखपुर2015 -
2. उपनिषद् प्रकाशसत्यव्रत सिद्धांतालंकार - , विजयकृष्ण लखनपाल, डब्ल्यू 77 - ए, ग्रेटर कैलाश, नई दिल्ली-1981
3. साधक संजीवनी - स्वामी प्रेमसुख दास जी महाराज, गीता प्रेस गोरखपुर 1990 -
4. उपनिषद् दीपिका डॉ॰ रामनाथ वेदालंकार -
5. श्रीमदभगवद्गीता, शाङ्करभाष्य, गीताप्रेस, गोरखपुर 2015 -
6. गीता रहस्य - बाल गंगाधर तिलक2019 -
7. गीताभाष्य - सत्यव्रत सिद्धांतालंकार, उत्तर प्रदेश 2013 -
8. The Principal Upanishads, S.Radha Krishan, Harpee Collins Publishers, A-75, Sector 37, Noida ,Uttar Pradesh - 201301

पाठ्यक्रम का विषय: योग के मूल तत्त्व

Course Title: Fundamentals of Yoga

Course Code: SIAS YOGA 1202 GE 2124

Objective of the Paper:

- To know about Yoga
- To eradicate the misunderstanding about Yogic practices

Outcome of the Paper: Upon successful completion of this course, students will be able to:

- Know about meaning and definition of Yoga
- Familiar with an authentic foundation of Yogic practices

Unit-I योग का अर्थ, परिभाषाएँ, योग का लक्ष्य व उद्देश्य, योग का इतिहास, वर्तमान समय में योग की प्रासंगिकता, योग पद्धतियाँ - ज्ञानयोग, भक्तियोग, कर्मयोग, हठयोग एवं राजयोग - Meaning of Yoga, Definitions, Aim and objectives of Yoga, History of Yoga, Relevance of Yoga in modern times, Mantra-Yoga, Jñānayoga, Bhakti-Yoga, Karma-Yoga, Haṭha-Yoga and Rāja-Yoga विभिन्न शास्त्रों में योग का स्वरूप **-** उपनिषद्, गीता, सांख्य, - **Form of Yoga in different Texts**- Upaniṣads, Gītā, Sāṁkhya,

प्रायोगिक-योग / Yoga-practical

पवन मुक्तासन भाग एक, वज्रासन, दंडासन, मकरासन, पवन मुक्तासन, उदाराकर्षण, ताड़ासन, तिर्यक-ताड़ासन, कपालभाति और योगिक श्वसन/ Pawan Muktasan Part one and Vajrasana, Dandasana, Makarasana, Pawan Muktasana, Udrakarshana, Tadasana, Tiryaka-Tadasana, Kapalbhati, Yogic breathing.

Unit-II यौगिक ग्रन्थों का सामान्य परिचय - पातंजल योगसूत्र, श्रीमद्भगवद्गीता- शिवसंहिता- एवं हठरत्नावली - **General Introduction to Yogic Texts** - Patanjali Yoga Sūtra, Śrīmadbhagavadgītā, Śivasaṁhitā and Haṭharatnāvalī

प्रायोगिक-योग / Yoga-practical

जल नेति, अग्निसार, जालन्धर बन्ध, कटिचक्रासन, शशांकासन, नौकासन, सेतुबन्धासन, उत्कटासन त्रिकोणासन, अनुलोम-विलोम प्राणायाम / Jal Neti, Agnisara, Jalandhara Bandha, Katichkrasana, Shashankasana, Naukasana, Setubandhasana, Utkatasana Trikonasana, Anulom-Vilom Pranayama.

Unit-III प्रसिद्ध आधुनिक योगियों का संक्षिप्त परिचय एवं योग- सम्बन्धी योगदान- महर्षि दयान्द सरस्वती, स्वामी विवेकानन्द, श्री अरविन्द, महर्षि रमण, पंडित श्रीराम शर्मा, महर्षि शिवानन्द, टी कृष्णमाचार्य, , महर्षि महेश योगी व स्वामी राम (हिमालय) - **Short Introduction and Contribution of Prominent Modern Yogis Regarding Yoga** - Maharṣi Dayānanda Sarasvatī, Swami Vivekananda, Shri Aurobindo, Maharṣi Ramaṇa, Pt. Śrīrām Śarmā, Maharṣi Śivānanda, T. Kṛṣṇāmacārya, Maharṣi Maheśa Yogi and Svāmī Rām (Himālaya)

प्रायोगिक-योग / Yoga-practical

गत्यात्मक मेरु वक्रासन, नौका सञ्चालन, शशांकभुजङ्गासन,समकोणासन वृक्षासन, मूर्धासन, भ्रामरी प्राणायाम, ज्ञान मुद्रा, नासाग्र मुद्रा / Dynamic Meru Vakrasana, Boat Steering, Shashankabhujangasana, Samkonasana Vrikshasana, Murdhasana, Bhramari Pranayama, Jnana Mudra, Nasal Mudra.

Unit-IV भारत के प्रमुख योग संस्थानों का संक्षिप्त परिचय - कैवल्यधाम, लोनावला; बिहार योग भारती, मुंगेर; मोरारजी देसाई राष्ट्रीय योग संस्थान, नई दिल्ली; स्वामी विवेकानन्द योग अनुसन्धान संस्थानबंगलुरू ,; पतञ्जलि योगपीठ, हरिद्वार; गुरुकुल कांगड़ी विश्वविद्यालयहरिद्वार , और देव संस्कृति विश्वविद्यालय- हरिद्वार , **Short Introduction of The Chief Yoga Schools in India** - Kaivalyadhāma, Lonavla; Bihar Yoga Bhāratī, Munger; Morarji Desai National Institute of Yoga, New Delhi; Swami Vivekananda Yoga Research Institute, Bengaluru; Patañjali Yogapeetha, Haridwar; Gurukul Kangri Vishwavidyalaya, Haridwar and Dev Sanskriti Vishwavidyalaya, Haridwar.

प्रायोगिक-योग / Yoga-practical

तितली-आसन, सरल-धनुरासन, अर्द्ध-शलभासन, विपरीतकरणी-आसन, पद्मासना, पद-हस्तासन, पश्चिमोत्तानासन और पूर्वोत्तानासन, सीत्कारी प्राणायाम, योगनिद्रा / Butterfly-asana, Saral-Dhanurasana, Ardha-Salabhasana, Viparitakarani-asana, Padmasana, Pada-Hastasana, Paschimottanasana and Purvottanasana, Sitkari Pranayama, Yoganidra.

Essential Readings:

1. Vijnananand Saraswati - Yog Vijyan, Yoga Niketan Trust, Rishikesh - 1998
2. Rajkumari Pandey-Bhartiya Yoga Parampara ke Vividh Ayam, Radha Publication, New Delhi - 2008
3. Swami Vivekanand - Jnan, Bhakti, Karma Yoga & Rajyoga, Advait Ashram, Culcutta - 2000
4. Kamakhya Kumar - Yoga Mahavigyan, Standard Publisher, NewDelhi - 2011
5. Kalyan (Yogank) - Gita Press Gorakhpur - 2002
6. Kalyan (Bhakt Ank) - Gita Press Gorakhpur, Kalyan (Sant Ank) - Gita Press, Gorakhpur - 1928

Suggested Readings:

1. K.S. Joshi - Yoga in Daily Life, Orient Paperback Publication, New Delhi - 1985
2. S.P. Sing - History of Yoga - PHISPC, Center for Studies of Civilization Ist - 2010

पाठ्यक्रम का विषय: पूरक और वैकल्पिक चिकित्सा

Course Title: Complementary and Alternative Therapy
Course Code: SIAS YOGA 1203 DCEC 2124

Objective of the Paper:

- To equip students with alternative therapies
- To heal themselves and society

Outcome of the Paper: Upon successful completion of this course, students will be able to:

- To do therapies from Yoga and alternate methods
- To provide Aqupressue and Marma therapy

Unit – I परिचय / Introduction

पूरक और वैकल्पिक चिकित्सा/ Complementary and Alternative Therapy:

1. संक्षिप्त इतिहास, अर्थ, परिभाषा, उद्देश्य और प्रकार / Brief history , Meaning, Definition Objectives and Types
2. व्यापकता, अनुप्रयोग और सीमाएं / Prevalence, Applications and Limitations

Mind Body Therapy:

3. उत्पत्ति, अर्थ, परिभाषा, उद्देश्य, सिद्धांत/ Origin, Meaning, Definition, Aims, and Principles,
4. कारक, प्रभाव, व्यापकता, अनुप्रयोग और सीमाएं / Factors, Impacts, Prevalence, Applications and Limitations.
5. मन शरीर की औषधि की आवश्यकता, मन शरीर संबंध और आधुनिक चिकित्सा / Need of mind body medicine; Mind body relationship and modern medicine

पूरक और वैकल्पिक चिकित्सा के प्रयोग / Application of complementary and Alternative Therapy: विद्यार्थियों को वैकल्पिक चिकित्सा से संबंधित चार्ट और उपकरण दिखाकर उनका परिचय कराना/ Introducing students to alternative medicine by showing them charts and tools

Unit – II

- **शरीर-मन के आमूल-चूल परिवर्तन पर आधारित चिकित्सा / Manipulative -Body Based Therapy (MBT)**

1. अर्थ, परिभाषा, उद्देश्य, सिद्धांत, प्रकार / Meaning, Definition, Aims, Principles, Types

2. प्रभाव, व्यापकता, अनुप्रयोगों और सीमाएं / Impacts, Prevalence, Applications and Limitations.

एक्यूप्रेशर / Acupressure

3. उत्पत्ति , अर्थ, परिभाषा / Origin, Meaning, Definition,
4. पांच तत्व सिद्धांत, ची क्लॉक साइकिल सिद्धांत /Five elements theory, Principles of Chi Clock Cycle
5. मेरिडियन सिस्टम और 12 प्रमुख मेरिडियन और रिफ्लेक्सोलॉजी पर एक्यूपॉइंट्स का पता लगाना / Meridian Systems and Locating Acupoints on 12 Major Meridians and Reflexology

प्रयोग/Practical

एक्यूप्रेशर, ची क्लॉक साइकिल और मेरिडियन सिस्टम के प्रयोग/ Uses of Acupressure, Chi Clock Cycle and Meridian System

Unit – III

- **ऊर्जा चिकित्सा / Energy Medicine:**

1. इतिहास, अर्थ, परिभाषा, और प्रकार / History, Meaning, Definition, and Types
2. सिद्धांत, अनुप्रयोग और सीमाएं / Principles, Applications and Limitations

- **प्राणिक हीलिंग / Pranic Healing:**

3. इतिहास, अर्थ, परिभाषा, प्राण के स्रोत; सिद्धांत, प्रकार / History, Meaning and Sources of Prana; Principles, Types
4. जैव प्लाज्मिक-बॉडी/आभा :संरचना प्रकार और आकार / Bio-Plasmic Body/Aura: Structure types and size

- **ऊर्जा केंद्र / Energy Centers (EC):**

5. अर्थ, प्रकार) मेजर, माइनर और मिनी(, / Meaning, Types (Major, Minor and Mini),
6. आकार, रंग, कार्य और उनके रोगों के परिणाम / Sizes, colors, Functions and Consequences of their dysfunctions

प्रयोग/Practical

प्राणिक हीलिंग के प्रयोग/ Uses of Pranic Healing

Unit – IV

- ***मर्म* चिकित्सा / Marma Therapy**

उत्पत्ति, इतिहास, अर्थ, परिभाषा, उद्देश्य, आधारभूत-तत्त्व/ बुनियादी बातें, वितरण और मानव शरीर में मर्म-बिंदुओं का वर्णन / Origin, History, Meaning, Aims, Fundamentals, Distributions and Description of Marma Points in the human body. पीठ दर्द, अवसाद, उच्च रक्तचाप/हाइपोटेंशन, माइग्रेन, अनिद्रा, मिर्गी, चिंता, मासिक धर्म विकार, अस्थमा, निमोनिया, वैरिकाज़ नसें, संकट और मायोपियास / Back Pain, Depression, Hypertension / Hypotension, Migraine, Insomnia, Epilepsy, Anxiety, Menstrual Disorder, Asthma, Pneumonia, Varicose Veins, Distress and Myopias

प्रयोग/Practical

मर्म-चिकित्सा के प्रयोग/ Uses of Marma-Therapy

<u>सन्दर्भ ग्रंथ- Suggested Readings</u>:

1. Acharya,B. (2005). Ayurveda Jadi-buti Rahasya. Haridwar, India: Divya Prakshan.
2. Holford, P.& Burne, J. (2007). Food is better medicine than drugs. Great Britain: Piatkus.
3. Holford, P. (2014). Good Medicine. Great Britain: Piatkus.
4. Joshi, K.S. (2010). Marma Science & Principle of Marma Therapy. (1st ed.) Haridwar, India: Martyunjay Mission.
5. Lian, Yu-Lin; Chen, Chun-Yan; Hammes, M. & Kolster, B. C. (2005). Pictorial atlas of acupuncture: An illustrated manual of acupuncture points. Solvenia: h. f. Ullmann.
6. Micozzi, M.S. (2015). Fundamentals of complementary and alternative medicine (5th ed.). China. ELSEVIER SAUNDERS.
7. Patanjali Research Foundation. (2015). Research Publications. Haridwar, India: Divya Prakashan.
8. Peeters, J. (2008). Reflexology. Bath BAIIHE, UK:Paragon.
9. Ramdev, S. (2006). Yoga Sadhana and Yoga Chikitsa Rahasya. Haridwar, India: Divya Prakashan.
10. Ramdev, S. (2009). Pranayam Rahasya. Haridwar, India: Divya Prakashan.
11. Sah, R, L, Joshi, B., &Joshi, G. (2002). Vedic health care system. New Delhi, India: New Age Books.
12. Sharma, S. (1998). Jivem Saradm Satam. Mathura, India: Akhand Jyoti Samsthan.

पाठ्यक्रम का विषय: भारतीय दर्शन

Course Title: Indian Philosophy

Course Code: SIAS YOGA 1204 DCEC 3104

Objective of the Paper:

- To provide knowledge about Theistic Philosophy and Anti-Theistic Philosophy
- To enhance the understanding about philosophical terminology

Outcome of the Paper: Upon successful completion of this course, students will be able to:

- They will be recognize the different schools of philosophy
- They will be familiar Shad-darshanas

Unit-I - परिचय-Introduction

1. दर्शन का अर्थ एवं परिभाषा - Meaning and definition of Philosophy
2. भारतीय-दर्शन का परिचय और उसकी उपयोगिता - Introduction of Indian Philosophy and its relevance .
3. षड्दर्शन की सामान्य अवधारणा - Basic concepts of Shad-darshanas
4. ज्ञान-मीमांसा तत्व-मीमांसा आचार-मीमांसा तथा मुक्ति, सांख्य-योग और वेदान्त-दर्शन के विशेष सन्दर्भ में - Epistemology, Metaphysics, Ethics and Liberation with special emphasis to Samkhya, Yoga and Vedanta Darshana

Unit-II - आस्तिक दर्शनों का परिचय - Introduction of Theistic Philosophy

1. योग-दर्शन का सामान्य परिचय - General introduction of Yoga Philosophy
2. योग-दर्शन- चित्त-वृत्ति, प्रमाण, चित्त-प्रसादन, क्लेश - Yoga Philosophy-Chitta, Vritti, Evidence, Mind-appeasement, Tribulation
3. सांख्य-दर्शन का सामान्य परिचय - General introduction of Sankhya Philosophy
4. वेदान्त-दर्शन का सामान्य परिचय - General introduction of Vedant Philosophy

Unit-III - आस्तिक दर्शनों का परिचय - Introduction of Anti-Theistic Philosophy

1. न्याय-दर्शन का सामान्य परिचय - General introduction of Nyay Philosophy
2. वैशेषिक-दर्शन का सामान्य परिचय - General introduction of Vaisheshika Philosophy
3. मीमांसा-दर्शन का सामान्य परिचय – General introduction of Mimansa Philosophy

Unit-IV - नास्तिक दर्शनों का परिचय - Introduction of Theistic Philosophy

1. चार्वाक-दर्शन का सामान्य परिचय - General introduction of the Carkvak Philosophy
2. बौद्ध-दर्शन का सामान्य परिचय - General introduction of the Buddhist Philosophy
3. जैन-दर्शन का सामान्य परिचय - General introduction of The Jain Philosophy

आवश्यक पठनीय - Essential Readings:

1. हरेन्द्र प्रसाद सिन्हा, भारतीय दर्शन की रुपरेखा, मोतीलाल बनारसी दास, नई दिल्ली - 2006
2. आचार्य बलदेव उपाध्याय, भारतीय दर्शन, चौखम्बा पब्लिशर्स, वाराणसी - 2000
3. स्वामी विवेकानन्द, वेदान्त, रामकृष्ण मठ नागपुर - 2000
4. राहुल सांकृत्यायन, बौद्ध दर्शन, किताब महल, नई दिल्ली - 2018
5. पंडित श्रीराम शर्मा आचार्य जी, दर्शन, युग निर्माण योजना, मथुरा - 2004
6. पंडित श्रीराम शर्मा आचार्य जी, वैशेषिक दर्शन, युग निर्माण योजना, मथुरा - 2004
7. आचार्य उदयवीर शास्त्री, सांख्य दर्शनम्, सुबोध पब्लिकेशन, नई दिल्ली - 2017

सन्दर्भ ग्रन्थ - Suggested Readings:

1. खेमराज श्रीकृष्णदास, सांख्य दर्शनम्, खेमराज श्रीकृष्णदास, मुम्बई - 2015
2. शशिप्रभा कुमार, वैशेषिक दर्शन में पदार्थ निरूपण, डी के प्रिंटवर्ड - 2013
3. जयदेव वेदालंकार, भारतीय दर्शन शास्त्र का इतिहास (न्याय-वैशेषिक), नई भारतीय पुस्तक निगम - 2006
4. महेन्द्र कुमार जैन, जैन दर्शन, श्री गणेश वर्णी जैन शोध संस्थान, वाराणसी - 2009
5. M. Hiriyanna - Outline of Indian Philosophy, Motilal Banarasi Das -1993
6. C.D. Sharma - A critical survey of Indian Philosophy, Motilal Banarsidass -2016.
7. Dutta and Chaterjee - Indian Philosophy - Rupa & Co; 2010.
8. S.N Das Gupta - History of Indian Philosophy (1-5 Vol), Motilal Banarasi Das -1975.
9. S. Radhakrishan - Indian Philosophy, Oxford - 2008

तृतीय सत्र -Third Semester

पाठ्यक्रम का विषय: योग में अनुसंधान पद्धति और सांख्यिकी

Course Title: Research Methodology and Statistics in Yoga
Course Code: SIAS YOGA 1309 C 4105

Objective of the Paper:

- To understand the methods of research
- To know type of research and research design

Outcome of the Paper: Upon successful completion of this course, students will be able to:

- Organize, manage and present data
- Analyze statistical data graphically using frequency distributions and cummulative frequency distributions

Unit-I अनुसन्धान परिचय - Introduction of Research

1. अनुसन्धान का अर्थ, परिभाषा, प्रकृति और प्रकार - Meaning, definition, nature and types of research
2. अनुसन्धान का संक्षिप्त इतिहास और विकास - Brief history and development of research
3. योग में अनुसन्धान की आवश्यकता और महत्व - Require and importance of research in Yoga
4. शोध समस्या- इसके अर्थ और विशेषताएं - Research problem- its meaning and characteristics
5. परिकल्पना - अर्थ, प्रकृति और प्रकार - Hypothesis - meaning, nature and types

Unit-II - अनुसन्धान के चर, प्रतिदर्श और प्रतिदर्श चयन – Research Variables, Sample and Sampling

1. चर का अर्थ और स्वरूप - Meaning and Nature of Variable
2. चर के प्रकार और चर को प्रभावित करने वाले कारक - Types of Variables and factors affecting the variables
3. प्रतिदर्श, प्रतिदर्श आकार और इसकी गणना - Sample, sample size and its calculation
4. प्रतिदर्श आकार गणना की आवश्यकता और प्रतिदर्श आकार को प्रभावित करने वाले कारक - Need of sample size calculation and factors affecting sample size
5. प्रतिदर्श चयन का अर्थ , प्रकृति और प्रकार - Meaning, Nature and Types of sampling

Unit-III - अनुसन्धान के तरीके और रूपरेखा – Research Design and methods

1. अनुसन्धान के लक्षण - Characteristics of research
2. अनुसन्धान के तरीके और उनके प्रकार (अवलोकन / प्रतिभागी अवलोकन, सर्वेक्षण, साक्षात्कार, केन्द्रित समूह, प्रयोग, माध्यमिक तथ्य विश्लेषण / अभिलेखीय अध्ययन, मिश्रित तरीके (उपरोक्त में से कुछ का संयोजन)) - Research methods and their types (Observation / Participant Observation, Surveys, Interviews, Focus Groups, Experiments, Secondary Data Analysis / Archival Study, Mixed Methods (combination of some of the above))
3. अनुसंधान रूपरेखा के लक्षण - Characteristics of research design
4. अनुसंधान रूपरेखा के प्रकार (गुणात्मक अनुसंधान रूपरेखा, मात्रात्मक अनुसंधान रूपरेखा और उनके विभाजन) - Types of Research Design (Qualitative research design, Quantitative research design and their divisions)
5. शोध प्रतिवेदन लेखन की विधि तथा शैली - Method and style of writing research report

6. शोध प्रतिवेदन लेखन - Research Report Writing

Unit-IV - सांख्यिकी और उसके अनुप्रयोग - Statistics and its application

1. अनुसंधान तथ्यों का लेखाचित्र निरूपण और पैरामीट्रिक / गैर पैरामीट्रिक परीक्षण (सहसंयोजक का विश्लेषण, विचरण का विश्लेषण, टी-परीक्षण, काई-वर्ग) - Graphical representation of Research data and Parametric/Non-parametric tests (Analysis of covariance, Analysis of variance, t-test, Chi-square)
2. केंद्रीय प्रवृत्ति की माप : माध्य, माध्यिका और बहुलक- Measures of Central Tendency: Mean, Median and Mode
3. परिवर्तनशीलता की माप - औसत विचलन, चतुर्थक विचलन, मानक विचलन, श्रेणी और भिन्नता - Measures of Variability – Average Deviation Quartile deviation, Standard deviation, Range and Variance
4. सांख्यिकी में एक्सेल का प्रयोग – Use of Excel in statistics
5. कुछ उपयोगी सांख्यिकीय उपकरण (सामाजिक विज्ञान के लिए सांख्यिकीय पैकेज (SPSS), सांख्यिकीय कम्प्यूटिंगके लिए आर फाउंडेशन (R) , द मैथवर्क्स (MATLAB) – Some useful statistical tools (Statistical Package For The Social Sciences (SPSS), R Foundation for Statistical Computing(R), The Mathworks (MATLAB))

आवश्यक पठनीय - Essential Readings:

1. एस एम शुक्ल, सांख्यिकी के मूल तत्व, साहित्य भवन प्रकाशन, आगरा – 2019
2. एस.पी.सिंह, सांख्यकी: सिद्धान्त एवं व्यवहार, एस. चंद प्रकाशन, दिल्ली – 1978
3. Bell, J. Doing Your Research Project: A Guide for First-time Researchers in Education and Social Science, Viva Books, New Delhi- 1997
4. Bulmer, M.C., Sociological Research Methods: An Introduction, Macmillan, Hong Kong - 1984
5. Festinger L. and Katz, D. (ed.), Research Methods in the Behavioral Sciences, Amerind Publishing, New Delhi – 1977

सन्दर्भ ग्रंथ - Suggested Readings:

1. Holloway, I, Basic Concepts of Qualitative Research, Blackwell Science, London -1997

Jain, G., Research Methodology: Methods and Techniques, Mangal Deep, Jaipur – 1998

पाठ्यक्रम का विषय: यौगिक क्रियाओं का क्रमिक अभ्यास -3

Course Title: Sequential practice of Yoga practices-3
Course Code: SIAS YOGA 1310 C 00105

Objective of the Paper:

- To learn how to practice different Yogic practices
- What are the different Yogic techniques and how to perform them?

Outcome of the Paper: Upon successful completion of this course, students will be able to:

- Do advance Yogasana practices with effective manners
- Do different Yogic Shatkarmas like Jal Neti, Sutra Neti, Kapalbhati and Nauli.

टिप्पणी – प्रथम सत्र और द्वितीय सत्र के पाठ्यक्रम में आई सभी क्रियायें, सूक्ष्म व्यायाम, आसन, प्राणायाम, मुद्रा, बन्ध व ध्यान तृतीय सत्र में भी सम्मिलित रहेंगे-Ṣaṭkarmas (Kriyās), subtle Exercises, Postures, Prāṇāyāma, Mudrās, Bandhas and Meditation practiced in the first semester and second semester shall also be included in the syllabus of the third semester.

यौगिक क्रियाओं का क्रमिक अभ्यास - Sequence of Yoga Practices

- **षट्कर्म - Ṣaṭkarmas:** गजकरणी (कुञ्जल), जलनेति, सूत्रनेति, वस्त्रधौति, अग्निसार, वातक्रम, व्युत्क्रम और शीतक्रम-कपालभाति - Gajakaraṇī (Kuñjala), Jalaneti, Sūtraneti, Vastradhauti, Agnisāra, Vātakrama, Vyutkram and Shitkram-Kapālabhāti
- **सूक्ष्म-व्यायाम - Subtle Exercise:** स्वामी धीरेन्द्र ब्रह्मचारी कृत 'सूक्ष्म व्यायाम' से सभी अड़तालीस क्रियाएँ और स्थूल व्यायाम – All forty-eight exercises and Sthool Vyayam from the Book - 'Sūkṣma Vyāyāma' of Swami Dhirendra Brahmachari
- **सूर्य-नमस्कार (संबद्ध मन्त्रोच्चारण-पूर्वक) - Sūrya-Namaskāra** (Along recitation of concerned mantras)
- **आसन - Āsanas: ध्यानात्मक व विश्राम-दायक आसन-** पदमासन, सिद्धासन, वज्रासन, सिंहासन, मुक्तासन, भद्रासन, स्वास्तिकासन, अदवासना, मकरासन, जयेष्टिकासना, आनन्दमदिरासना, **Meditative and Relaxative Postures-** Padmāsana, Siddhāsana, Vjrāsana, Siṁhāsana, Muktāsana, Bhadrāsana, Svastikāsana, Makarāsana, Jyestikāsana, Ananda-Madirasana **सांस्कृतिक आसन- खड़े होकर किए जाने वाले आसन -** तिर्यक-कटि-चक्रासन, मेरु-प्रतिष्ठासन, समकोणासन, द्विकोणासन, उत्थिता लोलसाना, डोलसाना, शीर्ष-अंगुष्ठ-योगासन, उत्थित-जनु-शीर्षासन, मूर्धासन, उत्कटासन, पादहस्तासन, वृक्षासन, गरुड़ासन-**Cultural**

Postures- Asana performed in standing position-Tiryaka Kati Chakrāsana, Meru Prishthāsana, Samakonāsana, Dwikonāsana, Utthita Lolāsana, Dolāsana, Sirshā-Angustha-Yogasana, Utthita-Janu-Sirshāsana, Moordhāsana, Utkaṭāsana, Pādahastāsana, Vṛkṣāsana, Garuḍāsana**. कमर के बल लेट कर किए जाने वाले-** हस्तपाद-अंगुष्ठासन, मेरु-आकर्षणासन, सर्वांगासन ,मत्स्यासन ,हलासन ,चक्रासन- **Lying in Supine-Position-** Hasta-Pada-Angushthasana, Meru-Akarshansana, Sarvāṅgāsana, Matsyāsana, Halāsana, Cakrāsana. **पेट के बल लेटकर किए जाने वाले-** गुप्त-पद्मासन, सर्पासन, उत्तान-प्रतिष्ठासन, अर्ध-पद्म-पश्चिमोत्तानासन, भुजंगासन**,** विपरीत-नौकासन**,** एकपाद धनुरासन- **Lying in Prone Position-** Gupta-Padmāsana, Sarpāsana, Utthān-Pristhāsana, Ardha-Padma-Paschimottānāsana, Bhujaṅgāsana, Viparīta-Naukāsana, Eka-Pāda Dhanurāsana**. बैठकर किए जाने वाले-** अर्ध-पद्म-पश्चिमोत्तानासन, जानुशीर्षासन ,आकर्णधनुरासन ,तोलाङ्गुलासन ,बद्धपद्मासन- **Sitting Postures** – Ardh-Padm-Paschimottānāsana Jānuśirṣāsana, Ākarṇadhanurāsana, Tolāṅgulāsana, Baddha-padmāsana**. उन्नत आसन -** पूर्ण-शलभासन, पूर्ण-धनुरासन, कन्धरासन, एकपादस्कंदासन**,** बकासन**,** पूर्ण उष्ट्रासन**,** शीर्षासन- **Advance Postures-** Poorna-Shalabhasana, Poorna-Dhanurasana, Kandharasana, Ekpādaskandāsana, Bakāsana, Purṇa Uṣṭrāsana, Śīrṣāsana.

- **प्राणायाम - Prāṇāyāma**: नाड़ीशोधन, अनुलोम-विलोम, सूर्यभेदी, उज्जायी व शीत्कारी, भस्त्रिका ,शीतली व भ्रामरी - Nāḍīśodhana, Anuloma-Viloma, Sūryabhedī, Ujjāyī, and Śītkārī, Bhastrikā, Sītalī and Bhrāmarī
- **मुद्रा व बन्ध - Mudrā and Bandha**: अश्विनीमुद्रा**,** महामुद्रा ,महाबन्ध ,महावेधमुद्रा, उड्डियानबन्ध, मूलबन्ध, जालन्धरबन्ध, विपरीतकरणी, तड़ागी, काकी व शाम्भवी **-** Aśvinimudrā, Mahāmudrā, Mahābandha, Mahāvedhamudrā, Uḍḍiyānabandha, Mūlabandha, Jālandharabandha, Viparītakaraṇī, Taḍāgī, Kākī and Śāmbhavī

- **ध्यान - Meditation**: योग निद्रा और सविता की ध्यान धारणा **-** Yoga Nidrā, Savitā Ki Dhyān Dhārana

आवश्यक पठनीय - Essential Readings:

1. स्वामी धीरेन्द्र ब्रह्मचारी, सूक्ष्म व्यायाम, मोरारजी देसाई नेशनल ईन्स्टिट्यूट ऑव योग, नई दिल्ली
2. स्वामी सत्यानन्द सरस्वती, आसन-प्राणायाम-मुद्रा-बन्ध, योग पब्लिकेशन्स ट्रस्ट, मुंगेर, बिहार-2006
3. पं. श्रीराम शर्मा, प्रज्ञा अभियान का योग व्यायाम, ब्रह्मवर्चस् शोध संस्थान, शान्तिकुञ्ज, हरिद्वार-1998
4. O.P. Tiwari - Asana why and how, Kaivalyadham SMYM Samiti, Lonavala-2012
5. M.L. Gharote - Guidelines for Yogic Practices, Medha Publication, Lonavala
6. Swami Satyananda Saraswati - Asan, Pranayama, Mudra, Bandha, Yoga publcation trust,

Munger, 2006.

सन्दर्भ ग्रंथ - Suggested Readings:

1. B.K.S. Iyengar - Light on Yoga, Harper Collins Publisher, New Delhi-2012
2. B.K.S. Iyengar - Light on Pranayama, Harper Collins Publisher, New Delhi-2012
3. Swami Kuvlayanand - Asana, Kaivalyadham SMYM Samiti, Lonavala-1993

पाठ्यक्रम का विषय: योग में शिक्षण विधियाँ

Course Title: Teaching methods in Yoga
Course Code: SIAS YOGA 1311 C 4105

Objective of the Paper:

- To know about Yoga teachings
- Students will equip with teaching tools

Outcome of the Paper: Upon successful completion of this course, students will be able to:

- Know meaning and definition of education
- Diliver an effective lecture cum demonstration

Familiar with an authentic foundation of Yogic therapy

Unit-I - शिक्षण और अधिगम - Teaching and Learning

1. शिक्षा का अर्थ और परिभाषा, Meaning and definition of education
2. शिक्षण के सिद्धान्त और उसके आयाम, Principles of teaching and its dimensions
3. अधिगम के सिद्धान्त और उसके आयाम, Principles of learning and its dimensions
4. अधिगम और शिक्षण में सम्बन्ध, Relationship between learning and teachings
5. शिक्षण को प्रभावित करने वाले कारक, Factors influencing teaching methods

Unit-II - योग में शिक्षण विधियाँ – Teaching Methods in Yoga

1. योग शिक्षक की भूमिका और गुण – Role and characteristics of Yoga teacher
2. योग के विशेष संदर्भ के साथ शिक्षण विधियाँ - Teaching methods with special reference to Yoga
3. योग शिक्षण को प्रभावित करने वाले कारक - Factors influencing Yoga teaching
4. योग शिक्षण के आवश्यक तत्व - Essential elements of Yoga teaching
5. एक व्यक्ति, छोटे समूह और बड़े समूह को योग सिखाने के तरीके - Methods of teaching Yoga to an individual, small group and large group

6. योग में व्याख्यान सह प्रदर्शन: इसका अर्थ, महत्व और इसकी प्रस्तुति का तरीका - Lecture cum demonstration in Yoga: Its meaning, importance and method of its Presentation

Unit-III - पाठ योजना- Lesson plan

1. पाठ योजना: इसका अर्थ और आवश्यकता - Lesson plan: Its meaning and need
2. योग में पाठ योजना तैयार करना - Preparation of lesson plan in Yoga
3. विशिष्ट योग साधनाओं में पाठों की प्रस्तुति - Presentation of lessons in specific Yogic practices

Unit-IV – शिक्षण सहायता प्रणाली - Teaching Support System

1. शिक्षण सहायता प्रणाली: पारंपरिक, आधुनिक और आईसीटी आधारित - Teaching Support System: Traditional, Modern and ICT based
2. शिक्षण में पॉवर पॉइंट प्रेजेंटेशन का परिचय और आवश्यकता – Introduction of Power Point Presentation in teachings and its need
3. शिक्षण में पॉवर पॉइंट प्रेजेंटेशन के लाभ – Benefits of Power Point Presentation in teachings

आवश्यक पठनीय - Essential Readings:

1. M L Gharote Shri S K Ganguly, Teaching method for yogic Practice, Kaivalyadhama, Pune – 2001
2. S. K. Mangal, Uma Mangal, Essentials of Educational Technology, PHI Learning Pvt. Ltd., 2009
3. एस.एस.चहल, स्वास्थ्य, शारीरिक एवं योग शिक्षा, भारत बुक हाउस, 2018

सन्दर्भ ग्रंथ - Suggested Readings:

1. Mark Stephens, Teaching Yoga: Essential Foundations and Techniques, North Atlantic Books - 2010
2. Yoga Training Manual for School Children, Morarji Desai National Institute of Yoga, New Delhi- 2010
3. Swami Kuvalyananda Scientific Survey Yogic Poses Extract from the book Asana, Kaivalyadhama - 2006
4. Aruna Goel, Yoga Education: Philosophy and Practice, Deep & Deep Publication - 2007

पाठ्यक्रम का विषय: योग और समग्र स्वास्थ्य

Course Title: Yoga and Holistic Health
Course Code: SIAS YOGA 1303 GEC 2124

Objective of the Paper:

- To know aobut holistic health
- Students will equip with preventive care tools of Yoga

Outcome of the Paper: Upon successful completion of this course, students will be able to:

- Familiar with Pancha Prana, Panch kosha and Panch Mahabhutas
- Know the ways of healthy livings

Unit- I परिचय - Introduction:

1. स्वास्थ्य की परिभाषा और महत्व - Definition & Importance of Health
2. स्वास्थ्य के आयाम: शारीरिक, मानसिक, सामाजिक और आध्यात्मिक - Dimensions of Health: Physical, Mental, Social and Spiritual
3. त्रिगुणों की अवधारणा-स्वास्थ्य और स्वास्थ्य-लाभ में उनकी भूमिका - Concepts of Trigunas and their role in Health and Healing
4. पञ्च-महाभूत व षट-चक्र की अवधारणा-स्वास्थ्य और स्वास्थ्य-लाभ में उनकी भूमिका - Concepts of Pancha-mahabhutas and Shat-chakra, their role in Health and Healing
5. पञ्च-प्राण व पञ्च-कोष की अवधारणा-स्वास्थ्य और स्वास्थ्य-लाभ में उनकी भूमिका - Concepts of Pancha-prana and Pancha-koshas, their role in Health and Healing

प्रायोगिक-योग / Yoga-practical

पवन मुक्तासन भाग एक, वज्रासन, दंडासन, मकरासन, पवन मुक्तासन, उदाराकर्षण, ताड़ासन, तिर्यक-ताड़ासन, कपालभाति और योगिक श्वसन/ Pawan Muktasan Part one and Vajrasana, Dandasana, Makarasana, Pawan Muktasana, Udrakarshana, Tadasana, Tiryaka-Tadasana, Kapalbhati, Yogic breathing.

Unit- II - निवारक स्वास्थ्य देखभाल में योग की भूमिका - Role of Yoga in preventive health care

1. जीवन के एक तरीके के रूप में योग - Yoga as a way of life
2. मानसिक और भावनात्मक स्वास्थ्य और योग - Mental and Emotional Health and Yoga
3. स्वस्थ रहने के योगिक सिद्धांत (आहार , विहार, आचार और विचार)-Yogic Principles of Healthy Living (Ahara, Vihara, Achara and Vichara)
4. स्वस्थ जीवन के लिए योगिक सकारात्मक दृष्टिकोण (मैत्री, करुणा, मुदिता और उपेक्षा) की भूमिका - Role of Yogic Positive Attitudes (Maitri, Karuna, Mudita and Upeksha) for Healthy Living

प्रायोगिक-योग / Yoga-practical

जल नेति, अग्निसार, जालन्धर बन्ध, कटिचक्रासन, शशांकासन, नौकासन, सेतुबन्धासन, उत्कटासन त्रिकोणासन, अनुलोम-विलोम प्राणायाम / Jal Neti, Agnisara, Jalandhara Bandha, Katichkrasana,

Shashankasana, Naukasana, Setubandhasana, Utkatasana Trikonasana, Anulom-Vilom Pranayama.

Unit- III - समग्र स्वास्थ्य हेतु यौगिक अवधारणा – Yogic concept of holistic health

1. त्रिदोषों की अवधारणा - Concept of Tridosha
2. स्वस्थ वृत्त और ऋतुचर्या - Swastha Vritta and Seasonal regimen
3. दिनचर्या और रात्रिचर्या - Day and Night regimen
4. समग्र स्वस्थ्य में इनकी भूमिका - Role of Yogic concept in holistic health

प्रायोगिक-योग / Yoga-practical

गत्यात्मक मेरु वक्रासन, नौका सञ्चालन, शशांकभुजङ्गासन,समकोणासन वृक्षासन, मूर्धासन, भ्रामरी प्राणायाम, ज्ञान मुद्रा, नासाग्र मुद्रा / Dynamic Meru Vakrasana, Boat Steering, Shashankabhujangasana, Samkonasana Vrikshasana, Murdhasana, Bhramari Pranayama, Jnana Mudra, Nasal Mudra.

Unit- IV - समग्र स्वास्थ्य और आहार - Holistic health and Diet

1. आहार और पोषण की अवधारणा - Concept of Diet and Nutrition
2. स्थूल पोषक तत्त्व और उनकी आवश्यकता - Macronutrients and their utility
3. सूक्ष्म पोषक तत्त्व और उनकी आवश्यकता - Micronutrients and their utility
4. आहार का समग्र स्वास्थ्य पर प्रभाव - Impact of Diet on holistic health

प्रायोगिक-योग / Yoga-practical

तितली-आसन, सरल-धनुरासन, अर्द्ध-शलभासन, विपरीतकरणी-आसन, पद्मासना, पद-हस्तासन, पश्चिमोत्तानासन और पूर्वोत्तानासन, सीत्कारी प्राणायाम, योगनिद्रा / Butterfly-asana, Saral-Dhanurasana, Ardha-Salabhasana, Viparitakarani-asana, Padmasana, Pada-Hastasana, Paschimottanasana and Purvottanasana, Sitkari Pranayama, Yoganidra.

आवश्यक पठनीय - Essential Readings:

1. पंडित श्रीराम शर्मा आचार्य जी, चिकित्सा उपचार के विविध आयाम, अखण्ड ज्योति संस्थान, मथुरा – 1995
2. सुरेश लाल बर्णवाल, योग और मानसिक स्वास्थ्य, न्यू भारती बुक कॉर्पोरेशन, दिल्ली - 2002
3. स्वामी रामदेव, योग साधना एवं योग चिकित्सा रहस्य, दिव्य प्रकाशन- 2004

4. अरुण कुमार साव और डॉ अखिलेश्वर साव, योग चिकित्सा (सिद्धांत व व्यव्हार), चौखम्भा ओरिएन्टलिआ - 2019
5. कामाख्या कुमार, योग चिकित्सा संदर्शिका, श्री वेदमाता गायत्री ट्रस्ट, हरिद्वार - 2014
6. मनोरमा नीखरा, मानसिक समस्याएं योग एवं प्राणचिकित्सा, देव संस्कृति विश्वविद्यालय शान्तिकुञ्ज, हरिद्वार - 2017
7. एम.एम. गोरे, शरीर विज्ञान और योगाभ्यास, मोतीलाल बनारसीदास, नई दिल्ली – 2007
8. K.N. Udupa- Stress and its management by yoga, Motilal banarsidass publication, 1998
9. R. Nagarathna and Dr. H.R. Nagendra, Yoga and Health, Swami Vivekananda Yoga Prakashana - 2002
10. R. Nagarathna and Dr. H. R. Nagendra, Yoga for Promotion of Positive Health, Swami Vivekananda Yoga Prakashana-2004
11. Swami Satyananda Saraswati - Yogic Management of Common, Yoga Publication Trust, Munger, Bihar - 2002

सन्दर्भ ग्रंथ – Suggested Readings:

1. Sat Bir Singh Khalsa Principles and Practice of Yoga in Health Care, Sage Publishing- 2016
2. Ganesh Shankar-Classical And Modern Approaches to Yoga, Pratibha Prakashan, New Delhi
3. R.S. Bhogal -Yoga & Mental Health & Beyond, Kaivalyadham S.M.Y.S. samiti, Lonavala, 2015
4. K.S. Joshi-Speaking Of Yoga & Nature Cure Therapy, Sterling Publishers Private Ltd

पाठ्यक्रम का विषय: प्राकृतिक चिकित्सा और प्राकृतिक आहार विज्ञान के सिद्धांत

Course Title: Principles of Naturopathy and Natural Dietetics
Course Code: SIAS YOGA 1305 DCEC 3104

Objective of the Paper:

- To know how does Naturopathy workes
- To provide knowledge about theraputic effect of Naturopathy

Outcome of the Paper: Upon successful completion of this course, students will be able to:

- Know about hydrotherapy
- Know about mud therapy

Unit-I - प्राकृतिक चिकित्सा का सामान्य परिचय – General Introduction of Naturopathy

1. प्राकृतिक चिकित्सा का अर्थ और परिभाषा - Meaning and definition of Naturopathy

2. प्राकृतिक चिकित्सा का संक्षिप्त इतिहास - Brief history of Naturopathy
3. प्राकृतिक चिकित्सा का महत्व - Importance of Naturopathy
4. प्राकृतिक चिकित्सा के मूल सिद्धान्त - Basic principles of Naturopathy
5. रोग का मूल कारण, रोगों की जीर्ण और तीव्र अवस्था - Root cause of disease, Chronic and acute states of diseases
6. विजातीय विषाक्तता का सिद्धान्त, उभार का सिद्धान्त - Principle of foreign poisoning matter, Aggregative principles

Unit-II - जल चिकित्सा – Hydrotherapy

1. जल चिकित्सा और पानी के गुणों का महत्व **-** Importance of water therapy and properties of water
2. जल चिकित्सा के सिद्धांत और पानी के उपयोग के तरीके - पानी का सेवन - Principles of Water therapy and techniques of water use - Water-intake
3. मानव शरीर पर विभिन्न तापमान के पानी का प्रभाव **-** Effects of water of different temperature on human body
4. विभिन्न प्रकार के स्नान - प्राकृतिक स्नान, सरल और घर्षण स्नान, मेरुदण्ड स्नान, मेहन स्नान, भाप स्नान, कटि स्नान, गर्म पानी से पैर स्नान **-** Different type of bath - Natural bath, Simple and Frictional bath, Spinal bath, Mehan bath, Steam bath, Trunk bath, hotfoot bath
5. विभिन्न प्रकार की पट्टी - पूरे शरीर का गीला आवरण, छाती, पेट, गर्दन, हाथ और पैर की पट्टी - Different type of Wraps – Wet wrap of whole body, bandage of chest, stomach, neck, hand and foot
6. स्पंजी और एनीमा - Sponging and Enema

Unit-III - विभिन्न तत्वों से चिकित्सा – Therapy from different elements

1. मिट्टी चिकित्सा - मिट्टी के प्रकार और विशेषताएं, शरीर पर मिट्टी के प्रभाव - Mud Therapy - Mud types and characteristics, effects of mud on body
2. मिट्टी की पट्टी और मिट्टी स्नान - Mud packs and Mud-bath
3. सूर्य-किरणों का महत्व, मानव शरीर पर सूर्य-किरणों की क्रिया-प्रतिक्रियाएँ - Importance of Sun-rays, action-reactions of Sun-rays on human body
4. सूर्य स्नान और विभिन्न रंगों के उपयोग - Sun-bath and uses of various colours
5. वायु का महत्व, वायु का स्वास्थ्य पर प्रभाव, वायु-स्नान - Importance of Air, health effects of Air, Air-bath

Unit-IV – – Aakash and Diet Therapy

1. आहार चिकित्सा परिचय, विधि एवं लाभ- Introduction of diet therapy, method and benefits
2. उपवास - इसके सिद्धांत और शारीरिक प्रभाव - Fasting - Its principles and physiological effects
3. उपवास के नियम और उपवास के प्रकार – Rules of fasting and types of fasting
4. स्वास्थ्य और रोगों पर उपवास का प्रभाव – Impact of fasting on health and diseases
5. उपवास के विभिन्न तरीके - जल, रस, फल, एक आहार – Different modes of fasting - Water, Juice, Fruit, One Diet

6. विभिन्न प्रकार के आहार - आदर्श आहार, प्राकृतिक आहार, उपचार के लिए उचित आहार – Different types of diet - Ideal diet, Natural diet, Proper diet for treatment
7. आदर्श आहार और संतुलित आहार में अंतर – Difference between ideal diet and balanced diet

आवश्यक पठनीय - Essential Readings:

1. Henry Lindlahr, Nature Cure Philosophy and Practice Based on the Unity of Disease and Cure, Nabu Press, Charleston, South Carolina -2014
2. नागेंद्र कुमार नीरज, मेरा आहार मेरा स्वास्थ्य, पॉपुलर बुक डिपो, नई दिल्ली – 2012
3. नागेंद्र कुमार नीरज, जल चिकित्सा, पॉपुलर बुक डिपो, नई दिल्ली – 2018
4. पी.डी. मिश्रा, प्राकृतिक चिकित्सा: सिद्धान्त एवं व्यवहार, उत्तर प्रदेश हिन्दी संस्थान - 2012
5. गणेश नारायण चौहान, भोजन के द्वारा चिकित्सा -1,पॉपुलर बुक डिपो, नई दिल्ली – 2012
6. राकेश जिन्दल, प्राकृतिक आयुर्विज्ञान, आयोग्य सेवा प्रकाशन - 2019

सन्दर्भ ग्रंथ - Suggested Readings:

5. Edwin D Babbitt, Human culture and cure, in 6 parts, College of Fine Forces; 2nd edition-1887
6. John Harvey Kellogg, Art of Massage, Tech Services, Inc, United States - 1997

Rudolph M. Ballentine, Diet and Nutrition: A Holistic Approach, Himalayan Institute Press, Honesdale - 2005

पाठ्यक्रम का विषय: समग्र स्वास्थ्य और योग चिकित्सा

Course Title: Holistic Health and Yoga Therapy
Course Code: SIAS YOGA 1306 DCEC 2124

Objective of the Paper:

- To know about Yoga therapy
- To eradicate the misunderstanding about Yoga therapy

Outcome of the Paper: Upon successful completion of this course, students will be able to:

- Principles of Yoga therapy
- Familiar with an authentic foundation of Yogic therapy

Unit-I योग चिकित्सा परिचय – Introduction to Yoga Therapy:

1. योग चिकित्सा का अर्थ और परिभाषा – Meaning and definition of Yoga Therapy

2. योग चिकित्सा का इतिहास – History of Yoga Therapy
3. योग चिकित्सा के सिद्धान्त – Principles of Yoga Therapy
4. योग चिकित्सा की सीमाएं – Limitations of Yoga Therapy

योग चिकित्सा के अनुप्रयोग / Applications of Yoga Therapy

सरल रोगों की योग चिकित्सा जैसे कब्ज, अम्लीयता, पेट में गैस का बनना आदि/ Yoga therapy for simple diseases like constipation, acidity, gas formation in the stomach etc.

Unit- II - निवारक स्वास्थ्य देखभाल में योग की भूमिका - Role of Yoga in preventive health care

1. जीवन के एक तरीके के रूप में योग - Yoga as a way of life
2. मानसिक और भावनात्मक स्वास्थ्य और योग - Mental and Emotional Health and Yoga
3. स्वस्थ रहने के योगिक सिद्धांत (आहार , विहार, आचार और विचार)-Yogic Principles of Healthy Living (Ahara, Vihara, Achara and Vichara)
4. स्वस्थ जीवन के लिए योगिक सकारात्मक दृष्टिकोण (मैत्री, करुणा, मुदिता और उपेक्षा) की भूमिका - Role of Yogic Positive Attitudes (Maitri, Karuna, Mudita and Upeksha) for Healthy Living

योग चिकित्सा के अनुप्रयोग / Applications of Yoga Therapy

सरल रोगों की योग चिकित्सा जैसे कमर दर्द, ग्रीवा का दर्द घुटनों का दर्द आदि/ Yoga therapy for simple diseases like back pain, cervical pain, knee pain etc.

Unit- III - योग से स्वास्थ्य – Health through Yoga

1. स्वास्थ्य की परिभाषा और महत्व - Definition & Importance of Health
2. स्वास्थ्य के आयाम: शारीरिक, मानसिक, सामाजिक और आध्यात्मिक - Dimensions of Health: Physical, Mental, Social and Spiritual
3. त्रिगुणों की अवधारणा-स्वास्थ्य और स्वास्थ्य-लाभ में उनकी भूमिका - Concepts of Trigunas and their role in Health and Healing
4. पञ्च-महाभूत व षट-चक्र की अवधारणा-स्वास्थ्य और स्वास्थ्य-लाभ में उनकी भूमिका - Concepts of Pancha-mahabhutas and Shat-chakra, their role in Health and Healing
5. पञ्च-प्राण व पञ्च-कोष की अवधारणा-स्वास्थ्य और स्वास्थ्य-लाभ में उनकी भूमिका - Concepts of Pancha-prana and Pancha-koshas, their role in Health and Healing

योग चिकित्सा के अनुप्रयोग / Applications of Yoga Therapy

सरल रोगों की योग चिकित्सा जैसे उच्च रक्तचाप, मोटापा और मधुमेह आदि / Yoga therapy for simple diseases like high blood pressure, obesity and diabetes etc.

Unit- IV - योग चिकित्सा के एकीकृत दृष्टिकोण - Integrated Approach of Yoga therapy

1. ख़राब-स्वास्थ्य के संभावित कारण - Potential causes of Ill-health
2. आधि और व्याधि की अवधारणा - Concepts of Aadhi and Vyadhi
3. आरामतलब जीवन शैली विकारों का योगिक प्रबन्धन (कब्ज, मोटापा, मधुमेह, गठिया, उच्च रक्तचाप) - Yogic management of sedentary lifestyle disorders (Constipation, Obesity, Diabetes, Arthritis, Hypertension)
4. मानसिक विकारों का योग प्रबन्धन (तनाव, अनिद्रा, अवसाद, दुश्चिन्ता) - Yogic management of mental disorders (Stress, Insomnia, Depression, Anxiety)

योग चिकित्सा के अनुप्रयोग / Applications of Yoga Therapy

सरल रोगों की योग चिकित्सा जैसे तनाव दुश्चिन्ता और अवसाद आदि / Yoga therapy for simple diseases like stress, anxiety and depression etc.

आवश्यक पठनीय - Essential Readings:

1. पंडित श्रीराम शर्मा आचार्य जी, चिकित्सा उपचार के विविध आयाम, अखण्ड ज्योति संस्थान, मथुरा – 1995
2. सुरेश लाल बर्णवाल, योग और मानसिक स्वास्थ्य, न्यू भारती बुक कॉर्पोरेशन, दिल्ली - 2002
3. स्वामी रामदेव, योग साधना एवं योग चिकित्सा रहस्य, दिव्य प्रकाशन- 2004
4. अरुण कुमार साव और डॉ अखिलेश्वर साव, योग चिकित्सा (सिद्धांत व व्यव्हार), चौखम्भा ओरिएन्टलिआ - 2019
5. कामाख्या कुमार, योग चिकित्सा संदर्शिका, श्री वेदमाता गायत्री ट्रस्ट, हरिद्वार - 2014
6. मनोरमा नीखरा, मानसिक समस्याएं योग एवं प्राणचिकित्सा, देव संस्कृति विश्वविद्यालय शान्तिकुञ्ज, हरिद्वार - 2017
7. एम.एम. गोरे, शरीर विज्ञान और योगाभ्यास, मोतीलाल बनारसीदास, नई दिल्ली – 2007
8. K.N. Udupa- Stress and its management by yoga, Motilal banarsidass publication, 1998
9. R. Nagarathna and Dr. H.R. Nagendra, Yoga and Health, Swami Vivekananda Yoga Prakashana - 2002
10. R. Nagarathna and Dr. H. R. Nagendra, Yoga for Promotion of Positive Health, Swami Vivekananda Yoga Prakashana-2004
11. Swami Satyananda Saraswati - Yogic Management of Common, Yoga Publication Trust, Munger, Bihar - 2002

सन्दर्भ ग्रंथ – Suggested Readings:

1. Sat Bir Singh Khalsa Principles and Practice of Yoga in Health Care, Sage Publishing- 2016
2. Ganesh Shankar-Classical And Modern Approaches to Yoga, Pratibha Prakashan, New Delhi

3. R.S. Bhogal -Yoga & Mental Health & Beyond, Kaivalyadham S.M.Y.S. samiti, Lonavala, 2015
4. K.S. Joshi-Speaking Of Yoga & Nature Cure Therapy, Sterling Publishers Private Ltd

चतुर्थ सत्र -Fourth Semester

पाठ्यक्रम का विषय: यौगिक अभ्यास-4 और प्राकृतिक चिकित्सा

Course Title: Yoga Practical -4 and Naturopathy
Course Code: SIAS YOGA 1412 C 00105

Objective of the Paper:

- To learn how to practice different Yogic practices
- What are the different naturopathy techniques?

Outcome of the Paper: Upon successful completion of this course, students will be able to:

- Do Yogasana practices with effective manners
- Familiar with Naturophathy practices

टिप्पणी – प्रथम सत्र, द्वितीय सत्र और तृतीय सत्र के पाठ्यक्रम में आई सभी क्रियायें, सूक्ष्म व्यायाम, आसन, प्राणायाम, मुद्रा, बन्ध व ध्यान चतुर्थ सत्र में भी सम्मिलित रहेंगे-Ṣaṭkarmas (Kriyās), subtle Exercises, Postures, Prāṇāyāma, Mudrās, Bandhas and Meditation practiced in the first semester, second semester and third semester shall also be included in the syllabus of the fourth semester.

यौगिक क्रियाओं का क्रमिक अभ्यास - Sequence of Yoga Practices

- **षट्कर्म - Ṣaṭkarmas:** गजकरणी (कुञ्जल), जलनेति, सूत्रनेति, वस्त्रधौति, अग्निसार, वातक्रम, व्युत्क्रम और शीतक्रम-कपालभाति - Gajakaraṇī (Kuñjala), Jalaneti, Sūtraneti, Vastradhauti, Agnisāra, Vātakrama, Vyutkram and Shitkram-Kapālabhāti
- **सूक्ष्म-व्यायाम - Subtle Exercise:** स्वामी धीरेन्द्र ब्रह्मचारी कृत 'सूक्ष्म व्यायाम' से सभी अड़तालीस क्रियाएँ और स्थूल व्यायाम – All forty-eight exercises and Sthool Vyayam from the Book - 'Sūkṣma Vyāyāma' of Swami Dhirendra Brahmachari
- **सूर्य-नमस्कार (संबद्ध मन्त्रोच्चारण-पूर्वक) - Sūrya-Namaskāra** (Along recitation of concerned mantras)
- **आसन - Āsanas:** अर्धबद्धपद्मोत्तानासन, अर्धचंद्रासन, अर्धपद्महलासना, अर्धपद्मपद्मोत्तानासन, अष्टांगनमस्कार, अष्टावक्रासन, बकध्यानासन, बकासन, भूनमनासन, भूमिपाद मस्तकासन, ब्रह्मचर्यासना, धनुराकर्षणासना, डोलासन, द्रुतउत्कटासन, द्रुतहलासना, द्वयहस्तभुजंगासन, द्वयजानुनमन, द्वयपादकंधारसाना, द्वयपादशीर्षासन, द्विकोणासन, गर्भपिण्डासन, गत्यात्मकमेरुवक्रासन, गोरक्षासन, हनुमानासन, ज्येष्ठिकासन, कंधरासन, कपिलासन, कश्यपासन, लोलासन, मत्स्यक्रीड़ासन, मयूरासन, मेरुदण्डासन, मेरुपृष्ठासन, नटराजासन, निरालाम्ब-पश्चिमोत्तानासन, निरालाम्बा-शीर्षासन, उर्ध्वपद्मासन, पादप्रसार-पश्चिमोत्तानासन, पदाधीरासन, पद्ममयूरासन, पद्मपार्वतासन, सैथिल्यासन, समकोणासन, सन्तुलनासना, शीर्षअंगुष्ठयोगासन, शीर्षपादभूमिसर्पासन, स्कन्धचक्र, स्तम्भन-आसन, तोलांगुलासन, उत्थितहस्त-मेरुदण्डासन, वशिष्ठासन, वातायन आसन, विश्वामित्रासन, वृश्चिकासन Ardha-Baddha-Padmottanasana, Ardha-Chandrasana, Ardha-Padma-Halasana, Ardha-Padma-Padmottanasana, Ashtanga-Namaskara, Astavakrasana, Baka-Dhyanasana, Bakasana, Bhu-Namanasana, Bhumi-Pada-Mastakasana, Brahmacharyasana, Dhanurakarshanasana, Dolasana, Druta-Utkatasana, Druta-Halasana, Dwi-Hasta-Bhujangasana, Dwi-Janu-Naman, Dwi-Pada-Kandharasana, Dwi-Pada-Sirasana, Dwikonasana, Garbha-Pindasana, Gatyatmak-Meru-Vakrasana, Gorakshasana, Hanumanasana, Jyestikasana, Kandharasana, Kapali-Asana, Kashyapasana, Lolasana, Matsya-Kridasana, Mayurasana, Merudandasana, Meru Prishthasana, Natarajasana, Niralamba-Paschimottanasana, Niralamba Sirshasana, Oordhwa Padmasana, Pada-Prasar-Paschimottanasana, Padadhirasana, Padma-Mayurasana Padma-Parvatasana, Saithalyasana, Samakonasana, Santolanasana, Sirsha-Angustha-Yogasana, Sirshapada-Bhumi Sparshasana,

Skandha Chakra, Stambhan Asana, Tolangulasana, Utthita-Hasta-Merudandasana, Vashishthasana, Vatayanasana, Vishwamitrasana, Vrischikasana.

- **प्राणायाम - Prāṇāyāma**: बाह्यवृत्ति, अभ्यान्तरवृत्ति , स्तम्भवृत्ति प्राणायाम - Bahyavritti, Abhyantarvritti, Stambhavritti Pranayama
- **मुद्रा व बन्ध - Mudrā and Bandha**: अश्विनीमुद्रा, महामुद्रा ,महाबन्ध ,महावेधमुद्रा, उड्डियानबन्ध, मूलबन्ध, जालन्धरबन्ध, विपरीतकरणी, तड़ागी, काकी व शाम्भवी - Aśvinimudrā, Mahāmudrā, Mahābandha, Mahāvedhamudrā, Uḍḍiyānabandha, Mūlabandha, Jālandharabandha, Viparītakaraṇī, Taḍāgī, Kākī and Śāmbhavī
- **ध्यान - Meditation**: चक्रीय ध्यान, भावातीत ध्यान - Cyclic Meditation, Transcendental Meditation
- **प्राकृतिक चिकित्सा- Naturopathy**
  - (i) आहार चिकित्सा -- Diet Therapy
  - (ii) उपवास चिकित्सा - Fasting Therapy
  - (iii) अभ्यंग चिकित्सा - Masso Therapy
  - (iv) वायु चिकित्सा - Air Therapy
  - (v) सूर्य चिकित्सा – Sun Therapy
  - (vi) जल चिकित्सा – Hydortherapy
  - (vii) मृदा चिकित्सा - Mud Therapy

आवश्यक पठनीय - Essential Readings:

1. स्वामी धीरेन्द्र ब्रह्मचारी, सूक्ष्म व्यायाम, मोरारजी देसाई नेशनल ईन्स्टिट्यूट ऑव योग, नई दिल्ली
2. स्वामी सत्यानन्द सरस्वती, आसन-प्राणायाम-मुद्रा-बन्ध, योग पब्लिकेशन्स ट्रस्ट, मुंगेर, बिहार-2006
3. पं. श्रीराम शर्मा, प्रज्ञा अभियान का योग व्यायाम, ब्रह्मवर्चस् शोध संस्थान, शान्तिकुञ्ज, हरिद्वार-1998
4. नागेंद्र कुमार नीरज, मेरा आहार मेरा स्वास्थ्य, पॉपुलर बुक डिपो, नई दिल्ली – 2012
5. नागेंद्र कुमार नीरज, जल चिकित्सा, पॉपुलर बुक डिपो, नई दिल्ली – 2018
6. पी.डी. मिश्रा, प्राकृतिक चिकित्सा: सिद्धान्त एवं व्यवहार, उत्तर प्रदेश हिन्दी संस्थान - 2012
7. गणेश नारायण चौहान, भोजन के द्वारा चिकित्सा -1,पॉपुलर बुक डिपो, नई दिल्ली – 2012
8. राकेश जिन्दल, प्राकृतिक आयुर्विज्ञान, आयोग्य सेवा प्रकाशन - 2019
9. O.P. Tiwari - Asana why and how, Kaivalyadham SMYM Samiti, Lonavala-2012
10. M.L. Gharote - Guidelines for Yogic Practices, Medha Publication, Lonavala
11. Swami Satyananda Saraswati - Asan, Pranayama, Mudra, Bandha, Yoga publcation trust, Munger, 2006.

12. Stewart Mitchell, Naturopathy, Vermillion; New Ed edition, London -2001
13. Krishan Kumar Suman, Naturopathy Modern Way of Life, Lotus Press, Delhi - 2010

सन्दर्भ ग्रंथ - Suggested Readings:

1. B.K.S. Iyengar - Light on Yoga, Harper Collins Publisher, New Delhi-2012
2. B.K.S. Iyengar - Light on Pranayama, Harper Collins Publisher, New Delhi-2012
3. Swami Kuvlayanand - Asana, Kaivalyadham SMYM Samiti, Lonavala-1993

पाठ्यक्रम का विषय: शोध-निबंध

Course Title: Dissertation
Course Code: SIAS YOGA 1413 C 00016

Objective of the Paper:

- To provide practical knowledge of Yoga research
- To familiar with working environment of research

Outcome of the Paper: Upon successful completion of this course, students will be able to:

- Write a project for research
- Present their research papers in seminars
- Prepare for Ph.D.

Guidelines for Dissertation

Research experience is as close to a professional problem-solving activity as anything in the curriculum. It provides exposure to research methodology and an opportunity to work closely with a faculty guide. It usually requires the use of advanced concepts, a variety of experimental techniques,

and state-of-the-art instrumentation. Research is genuine exploration of the unknown that leads to new knowledge which often warrants publication. But whether or not the results of a research project are publishable, the project should be communicated in the form of a research report written by the student. Sufficient time should be allowed for satisfactory completion of reports, taking into account that initial drafts should be critiqued by the faculty guide and corrected by the student at each stage. The file is the principal means by which the work carried out will be assessed and therefore great care should be taken in its preparation.

In general, the File should be comprehensive and include

- A short account of the activities that were undertaken as part of the project;
- A statement about the extent to which the project has achieved its stated goals.
- A statement about the outcomes of the evaluation and dissemination processes engaged in as part of the project;
- Any activities planned but not yet completed as part of the project, or as a future initiative directly resulting from the project;
- Any problems that have arisen that may be useful to document for future reference.
- The guidelines and format for dissertation is given below:

Dissertation Guidelines

1. GENERAL : The manual is intended to provide broad guidelines to the M.Sc. candidates in the preparation of the dissertation report. In general, the project report shall report, in an organised and scholarly fashion an account of original research work of the candidate leading to the discovery of new facts or techniques or correlation of facts already known.

2. NUMBER OF COPIES TO BE SUBMITTED: Students should submit three copies to the Head of the Department concerned on or before the specified date

3. ARRANGEMENT OF CONTENTS OF DISSERTATION: Dissertation material should be arranged as follows:

    - Cover Page & Title page
    - Declaration
    - Certificate
    - Abstract (Hindi and English)
    - Acknowledgements
    - Table of Contents
    - List of Tables
    - List of Figures
    - List of Symbols, Abbreviations and Nomenclature (Optional)
    - Chapters
    - References

- Research Papers (if published)
- Appendices
- One page CV

The Tables and Figures shall be introduced in the appropriate places.

4. PAGE DIMENSIONS AND MARGIN: The dimensions of the dissertation should be standard A4 size paper may be used for preparing the copies, standard margin with 1.5 line spacing.
5. MANUSCRIPT PREPARATION: The general text of thesis shall be typed in font style Times New Roman and font size 12. Same quality of paper should be used for the preparation of the entire report/thesis; except figure, photos are shown.

5.1 Cover Page & Title Page - A specimen copy of the Cover page & Title page for report/thesis are given in Annexure I.

5.2 Certificate-The Bona-fide Certificate as per the format shown in Annexure II

5.3 Abstract: Abstract should be an essay type (HINDI and ENGLISH) of narration not exceeding 500 words outlining the research problem, the methodology used for tackling it and a summary of the findings, typed in 1.5line spacing.

5.4 Acknowledgements: The acknowledgements shall be brief and should not exceed one page. The student's signature shall be made at the right bottom above his / her name typed in capitals.

5.5 Table of contents - The table of contents should list all material following it as well as any material which precedes it. The title page, Bona-fide Certificate and Acknowledgment will not find a place among the items listed in the Table of Contents but the page numbers in lower case Roman letters are to be accounted for them. One and a half spacing should be adopted for typing the matter under this head. A specimen copy of the Table of Contents for report / thesis is given in Annexure III.

5.6 List of Table - The list should use exactly the same captions as they appear above the tables in the text and the caption shall follow 'sentence case'. One and a half spacing should be adopted for typing the matter under this head.

5.7 List of Figures - The list should use exactly the same captions as they appear below the figures in the text and the caption shall follow 'sentence case'. One and a half spacing should be adopted for typing the matter under this head.

5.8 List of Symbols, Abbreviations and Nomenclature - One and a half spacing should be adopted for typing the matter under this head. Standard symbols, abbreviations etc. should be used.

5.9 Chapters - The chapters may include

Chapter I – Introduction
Chapter II - Literature Review
Chapter III –Aims and objectives
Chapter IV –Materials and Methods
Chapter V- Results and Discussion
Chapter VI –Conclusion and limitations

Chapter VII –References

5.10 Research output/outcome if any published or presented in conference/seminar/symposium may be included.

5.11 List of References - Any works of other researchers, if used either directly or indirectly, should be indicated at appropriate places in the report/thesis. The citation may assume any one of the following forms.

American Psychological Association (APA) Style. APA in-text citation style uses the author's last name and the year of publication, for example: (Field, 2005).

Example:

Derwing, T. M., Rossiter, M. J., & Munro, M. J. (2002). Teaching native speakers to listen to foreign-accented speech. Journal of Multilingual and Multicultural Development, 23(4), 245- 259.

Thomas, H. K. (2004). Training strategies for improving listeners' comprehension of foreign accented speech (Doctoral dissertation). University of Colorado, Boulder.

6. TYPING INSTRUCTIONS

6.1 General

This section includes additional information for final typing of the thesis. Some information given earlier under 'Manuscript preparation' shall also be referred. The impressions on the typed/duplicated/printed copies should be black in colour. Corrections, interlineations and crossing out of letters or words will not be permitted in any of the copies of the report/thesis intended for submission. Erasures, if made, should be neatly carried out in all copies. A subheading at the bottom of a page must have at least two full lines below it or else it should be carried over to the next page. The last word of any page should not be split using a hyphen. One and a half spacing should be used for typing the general text. The general text shall be typed in Font Style Times New Roman and Font Size 12.

Single spacing should be used for typing:

(i) Long Tables
(ii) Long quotations
(iii) Foot notes
(iv) Multilane captions
(v) References

For Hindi typing one can use Hindi Kruti Dev 010 Font size 16, Kokila font size 18,Line spacing 1.5 in text, Line spacing for references 1.15,Heading should be bold, font size for references will be reduced by 2 points in each.

6.2 Chapters

The format for typing chapter headings, division headings and sub division headings shall be same as given in Table of Contents.

7. BINDING SPECIFICATIONS

8. Thesis should be spiral or soft cover book bound, the cover of thesis should be of dark Saffron color, printed with silver ink and the text for printing should be identical as prescribed for the title page.

Instructions for the internship:
During this course students will be given internship opportunity, selection for internship will be on the basis of merit. About 50% students can be given internship opportunity. It will depend on how many institutes willing to offer internship.

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Teaching Learning Process

- Lectures
- Discussions
- Practice of Yogic Practices
- Practice of Yogic Shatkarmas
- Therapy application
- Alternative therapies applications
- Participative Learning
- Interactive Sessions
- Seminars
- Research-based Learning/Dissertation or Project Work
- Technology-embedded Learning

Blended Learning

Concept: Blended Learning is a pedagogical approach that combines face to-face classroom methods with computer-mediated activities in the process of teaching and learning. It implies nice blend of face-to-face and online activities to make the learning processes more interesting and engaging. It focuses on integration of traditional classroom activities and innovative ICT-enabled strategies. It emphasises student-centric learning environment where the teacher is the facilitator for productive and measurable learning outcomes. It optimises and compliments the face to face learning, giving ample freedom and flexibility to the students and teachers to access and explore the wide range of open-access sources such as video lectures, recordings and articles through digital platforms. It gives freedom and autonomy to the teachers in selection of appropriate digital platforms, resources and time-slots to complement and supplement face to face learning. The Blended Learning doesn't undermine the role of the teacher, rather it gives him/her an opportunity to explore the unexplored in accordance with the requirements of the curriculum.

Key Features of Blended Learning:

- Student-Centric Pedagogical Approach focusing on flexibility in timing, quality content, needs and interests of students and freedom to study through the mode of his/her choice;
- Freedom to select variety of mediums and techniques;
- Increased student engagement in learning;
- Enhanced teacher and student interaction;
- Improved student learning outcomes;
- More flexible teaching and learning environment;
- More responsive for self and continuous learning;
- Better opportunities for experiential learning;
- Increased learning skills;
- Greater access to information, improved satisfaction and learning outcomes.

Assessment and Evaluation

- Continuous Comprehensive Evaluation at regular after achievement of each Course-level learning outcome
- Participate in University level, district level, state level and national level Yogasana competition and quiz.
- Yoga theraputical and alternative therapies application in camps organized by Department level.
- Formative Assessment on the basis of activities of a learner throughout the programme instead of one-time assessment
- Oral Examinations to test presentation and communication skills
- Open Book Examination for better understanding and application of the knowledge acquired
- Group Examinations on Problem solving exercises
- Seminar Presentations

- Review of Literature
- Collaborative Assignments

Key Features of Revised Curriculum

The following changes have been made in the subject matter prepared by the Department of Yoga on the basis of national education policy 2020 which are as follows -

- Further efforts have been made to enhance Indian knowledge, tradition, language, culture and values in the subject matter.
- The subject matter has been made research oriented.
- Entire content is kept bilingual.
- Keeping in mind the technical and online medium, two such courses have been added which can be done through SWYAM.
- A curriculum has been set up among the students to improve their communication skills.
- A curriculum has been set up for research so that the skill of writing research papers can be developed in students.

- Efforts have been made to keep the subject matter more experimental than theoretical, with 2 hours of practical added each week in the elective and therapy subjects.
- Elective subjects have been added in each semester to give more autonomy to the students.

Keywords

- LOCF
- SWAYAM, MOOCs
- NEP-2020
- Blended Learning
- Face to face (F to F) Learning
- Programme Outcomes
- Programme Specific Outcomes
- Course-level Learning Outcomes
- Postgraduate Attributes
- Learning Outcome Index
- Formative Assessment and Evaluation
- Comprehensive and Continuous Evaluation

References

- National Education Policy-2020. https://www.education.gov.in/sites/upload_files/mhrd/files/NEP_Final_English_0.pdf
- The draft subject specific LOCF templates available on UGC website. https://www.ugc.ac.in/ugc_notices.aspx?id=MjY5OQ==
- Draft Blended Mode of Teaching and Learning: Concept Note available on UGC website. https://www.ugc.ac.in/pdfnews/6100340_Concept-Note-Blended-Mode-of-Teaching-and-Learning.pdf
- Communication Skills Modes & Knowledge Dissemination https://onlinecourses.swayam2.ac.in/ntr21_ed37/preview
- Health Research Fundamentals, https://onlinecourses.nptel.ac.in/noc21_hs62/preview

Appendix

Curricular Reforms— Extracts from National Education Policy-2020

I. National Education Policy: Vision of Higher Education:

- Enabling the development of an enlightened, socially conscious, knowledgeable, and skilled nation
- The basis for knowledge creation and innovation thereby contributing to a growing national economy.
- The key to more vibrant, socially engaged, cooperative communities and a happier, cohesive, cultured, productive, innovative, progressive, and prosperous nation.
- Contributing towards sustainable livelihoods and economic development of the nation
- Creating holistic, thoughtful, creative and well-rounded individuals equipped with the key 21st century skills.

II. NEP: Emphasis on Integrated Approach:

- An integrated higher education system, including professional and vocational education;
- Enabling and encouraging high-quality multidisciplinary and cross-disciplinary education;
- 21st century capacities in fields across the arts, humanities, languages, sciences, social sciences, and professional, technical, and vocational fields;

- ❖ Even engineering institutions, such as IITs, to move towards more holistic and multidisciplinary education with more arts and humanities.
- ❖ Students of arts and humanities will aim to learn more science
- ❖ Efforts to incorporate more vocational subjects and soft skills in general education
- ❖ Integration of the humanities and arts with STEM for positive learning outcomes.

III. NEP: Recommendation on Curricular Aspects:

- ❖ Revamping curriculum, pedagogy, assessment, and student support for enhanced student experiences;
- ❖ Developing real understanding and learning how to learn - away from the culture of rote learning.
- ❖ Developing character, ethical and Constitutional values, intellectual curiosity, scientific temper, creativity, spirit of service
- ❖ Prepare the students for more meaningful and satisfying lives and work roles
- ❖ Identifying specific sets of skills and values across domains, while enabling the students to become economically independent.

IV. NEP: Recommended Skills

- ❖ 21st century capabilities across the range of disciplines;
- ❖ Personal accomplishment and enlightenment;
- ❖ Constructive public engagement;
- ❖ Productive contribution to the society;
- ❖ Scientific temper and evidence-based thinking;
- ❖ Creativity and innovativeness;
- ❖ Critical thinking and higher-order thinking capacities,
- ❖ Communication skills,
- ❖ Current affairs and knowledge of critical issues facing local communities, States, country and the world.
- ❖ In-depth learning and mastery of curricula across fields
- ❖ Social and moral awareness,
- ❖ Sense of aesthetics and art;
- ❖ Oral and written communication;
- ❖ Health and nutrition;
- ❖ Physical education, fitness, wellness, and sports;
- ❖ Collaboration and teamwork;
- ❖ Problem solving and logical reasoning;
- ❖ Environmental awareness, water/resource conservation, sanitation and hygiene
- ❖ In-depth learning and mastery of curricula across fields
- ❖ Social and moral awareness,
- ❖ Sense of aesthetics and art;
- ❖ Oral and written communication;
- ❖ Health and nutrition;
- ❖ Physical education, fitness, wellness, and sports;
- ❖ Collaboration and teamwork;
- ❖ Problem solving and logical reasoning;

- ❖ Environmental awareness, water/resource conservation, sanitation and hygiene

V. NEP: Recommended Reforms

- ❖ Introduction of contemporary subjects such as Artificial Intelligence, Design Thinking, Holistic Health, Organic Living, Environmental Education, Global Citizenship Education (GCED), etc. to develop various important skills among students.
- ❖ Skills and values to be imbibed through engaging processes of teaching and learning
- ❖ Curriculum content to be reduced to make space for critical thinking and more holistic, inquiry-based, discovery-based, discussion-based, and analysis-based learning
- ❖ Content will focus on key concepts, ideas, applications, and problem solving
- ❖ Experiential learning including hands-on learning, arts-integrated and sports-integrated education,
- ❖ Story-telling-based pedagogy in each subject.
- ❖ Various aspects and forms of art and culture as the basis for learning of concepts across subjects
- ❖ Imbibing the Indian ethos through integration of Indian art and culture in teaching and learning process
- ❖ Curriculum and pedagogy to be strongly rooted in the Indian and local context and ethos in terms of culture, traditions, heritage, customs, language, philosophy, geography, ancient and contemporary knowledge, societal and scientific needs, indigenous and traditional ways of learning etc.
- ❖ Empowering the students through flexibility in course choices
- ❖ Imaginative and flexible curricular structures to enable creative combinations of disciplines for study
- ❖ Offering multiple entry and exit points by removing currently prevalent rigid boundaries and creating new possibilities for life-long learning.
- ❖ Indian standards will be aligned with the International Standard Classification of Occupations maintained by the International Labour Organization.
- ❖ No hard separation among ‘curricular’, ‘extracurricular ’, or ‘co-curricular’, among ‘arts’, ‘humanities’, and ‘sciences’, or between ‘vocational’ or ‘academic’ streams.
- ❖ Exposure to Indian knowledge system, cultural traditions and classical literature through promotion of multilingualism and reverence for Indian classical languages
- ❖ Weaving the cultural aspects of the languages - such as films, theatre, storytelling, poetry, and music with various relevant subjects and real-life experiences
- ❖ “Knowledge of India” to educate the students about knowledge from ancient India and its contributions to modern India
- ❖ Basic ethical reasoning, traditional Indian values and human and Constitutional values to be developed in all students.
- ❖ Credit-based courses and projects in the areas of community engagement and service, environmental education, and value-based education.
- ❖ Opportunities for internships with local industry, businesses, artists, crafts persons, etc. so that students engage with the practical side of their learning to improve their employability.

- Focus areas for vocational education will be chosen based on skills gap analysis and mapping of local opportunities.
- Focus on research and innovation through start-up incubation centres; technology development centres; and greater industry-academic linkages;
- Technical Education requires closer collaborations between industry and higher education institutions to drive innovation in curricular planning for desired outcomes.
- Technical education should have a renewed focus on opportunities to engage deeply with other disciplines for enhancing the employability of the youth.
- Continuous formative assessment to further the goals of each programme.
- Moving away from high-stakes examinations towards more continuous and comprehensive evaluation.
- Assessing the student achievement based on the learning goals for each programme, making the system fairer and outcomes more comparable.
- All programmes, courses, curricula, and pedagogy across subjects, including those in-class, online, and in ODL modes to achieve global standards of quality.
- Faculty be given the freedom to design their own curricular and pedagogical approaches within the approved framework, including textbook and reading material selections, assignments, and assessments.
- Empowering the faculty to conduct innovative teaching, research, and service as they see best.
- Classroom transactions to shift towards competency-based learning and education
- The assessment tools to be aligned with the learning outcomes, capabilities, and dispositions as specified for each subject

Central University of Haryana

Minutes of Meeting

Date: 06.10.2021

A meeting of the committee constituted vide letter no. CUH/2021/DSW/1848 dated 29.09.2021, to discuss the preparation of guidelines/proposal for awarding 1-2 credits for Seva/Service/Community Service programmes in tune with the existing provisions of Swachh Bharat Summer Internship programme, was held in the office of Dean Student's Welfare on 06.10.2021 at 3:30 pm. The following members were present in the meeting:

1. Prof. Dinesh Kumar Gupta, DSW
2. Dr. Anand Sharma, Deputy DSW
3. Dr. Parmod Kumar, Nodal Officer, Unnat Bharat Abhiyan
4. Dr. Ramesh Kumar, Nodal Officer, Ek Bharat Shrestha Bharat
5. Dr. Surender Singh, Eco Club
6. Dr. Dinesh Chahal, Coordinator, NSS and YRC

The following members could not attend the meeting:

1. Prof. Rajbir Singh Dalal, Centre for Community Development
2. Dr. Renu Yadav, Women Empowerment Cell

At the outset, Prof. Dinesh Kumar Gupta, Dean Students Welfare welcomed the members and briefed them about the meeting. The committee discussed the matter in length and resolved the following points:

1. The 2-Credits 'Add-on Course' proposed for all students (from Semester I to IV) in compliance the resolution of 32nd Academic Council meeting held on 23.04.2021.
2. The course will be 2- Credits of practical based/field work as per the existing ordinance of the University
3. The details/outline of proposed course scheme and syllabus is attached at Annexure 1.

The meeting ended with Vote of Thanks.

Prof. Dinesh Kumar Gupta

Dr. Anand Sharma,

Dr. Parmod Kumar,

Dr. Surender Singh

Dr. Ramesh Kumar

Dr. Dinesh Chahal

Annexure -1

Nomenclature: Community Service

Credit: 02

Semester: I to IV

Duration: 60 Hours (Maximum 4 hours a day)

Process/Activities- 10 activities, with minimum of 6 activities for qualifying for 02 Credits

Evaluation: 30%(Continuous/Internal), 70% (Viva-voce)

Course Objectives:

The students will be aligned with the social welfare issues in their day to day life during studies at the University.

Learning Objectives:

After Completion of the course, the students will be

- Acquaint with the community service/activities
- Practice various community Based Activities
- Apply various Community Based Activities in the student day to day life
- Acquaint with the community problems and also find remedial measures.

Syllabus:

- Community service: Concept, Importance
- Objective of Community Service
- Mode of Community Service
- Functioning of Community Service
- Awareness programmes
- Role of Youth in National Building
- Importance of National Days
- Government welfare schemes
- Social Entrepreneurship

Orientation for the above topics will be offered at the beginning of each semester

Activities:

1. Cleanliness Drive in University and nearby villages
2. Plantation Drive in University and nearby villages
3. Awareness rallies/Campaigns
4. National Day celebrations
5. Senior Citizen welfare scheme
6. Remedial classes for needy students
7. Participation in camps- Eye donation, Blood donation, organ donation etc.
8. Promotion of Government welfare scheme
9. House hold survey
10. Awareness of Innovative practices/methods for improvement in community based program through ICT/Digital Initiatives

Course Delivery

- A Team of Faculty members related to different activities, will be identified
- Activity Coordinators/Co-coordinator will be identified and notified by the office of the DSW

हरियाणा केंद्रीय विश्वविद्यालय

(संसद के अधिनियम संख्या-25 (2009) के तहत स्थापित)

जांट-पाली, महेंद्रगढ़- 123031 (हरियाणा)

Annexure-LXIII

CENTRAL UNIVERSITY OF HARYANA

(Established vide Act No. 25 (2009) of Parliament)

Jant-Pali, Mahendergarh-123031 (Haryana)

No: CUH/2021/A&C/481 Date: 25.08.2021

अधिसूचना/NOTIFICATION

विषय: **Integrated/UG/PG/Ph.D.** कार्यक्रम के छात्रों के लिए शुल्क संरचना, शुल्क भुगतान के निर्देश, छात्रों द्वारा देय अन्य शुल्क और शुल्क वापसी नियम.

Sub: Fee Structure for the students of Integrated/UG/PG/Ph.D. programmes, Instructions for Fee Payment, Other Fee Payable by the Students and Rules for Refund of Fee.

पिछली अधिसूचना No. CUH/2020/A&C/371 दिनांक 17.09.2020 की निरंतरता में, सभी संबंधित की जानकारी के लिए अधिसूचित किया जाता है कि अकादमिक सत्र-2021-22 से Integrated/UG/PG/Ph.D. कार्यक्रम के छात्रों के लिए शुल्क संरचना (मेस शुल्क और छात्रावास शुल्क के अतिरिक्त), शुल्क भुगतान के निर्देश, छात्रों द्वारा देय अन्य शुल्क और शुल्क वापसी के नियम, अनुलग्नक के अनुसार होंगे।

In continuation of the previous Notification No. CUH/2020/A&C/371 dated 17.09.2020, it is hereby notified for the information of all concerned that the Fee Structure (other than Mess Fee & Hostel Fee), Instructions for Fee Payment, Other Fee Payable by the Students and Rules for Refund of Fee for the students of Integrated/UG/PG/Ph.D. programmes, w.e.f Academic Session-2021-22, shall be as per the attached Annexure.

जितेन्द्र मोर 25.8.2021

सहायक कुलसचिव /Assistant Registrar

शैक्षणिक एवं परिषद शाखा/Academic & Council Branch

सूचनार्थ एवं आवश्यक कार्यार्थ प्रतिलिपि:

Copy of above is forwarded to the following for information and necessary action:

1. सभी अधिष्ठाता/विभागाध्यक्ष/प्रभारी, हकेंवि/All Dean/HoDs/TIC, CUH
2. अधिष्ठाता छात्र कल्याण, हकेंवि/ Dean Students Welfare, CUH
3. वित्त अधिकारी, हकेंवि/ Finance Officer, CUH
4. परीक्षा नियंत्रक, हकेंवि/ Controller of Examinations, CUH
5. सहायक कुलसचिव, कुलपति सचिवालय, (माननीय कुलपति महोदय के सूचनार्थ) हकेंवि/Assistant Registrar, Vice-Chancellor's Secretariat (for kind information of Hon'ble Vice-Chancellor), CUH
6. कुलसचिव कार्यालय, (कुलसचिव महोदय के सूचनार्थ), हकेंवि / Office of the Registrar (for kind information of Registrar), CUH
7. सूचना एवं कम्प्यूटर तकनीक अनुभाग, हकेंवि/ ICT Section, CUH

CENTRAL UNIVERSITY OF HARYANA

First Year Fee Structure

S.No.	Account Head	Integrated Programmes	UG Programmes				PG Programmes						Ph.D.	
		(B.Sc.-M.Sc)/ BA.LL.B. Hons	LL.B. (3 Year Professional Course)	B.Tech.	B.Voc.	B.Sc. (Hons)	Humanities and Social Sciences	Science/ Professional Courses/ M.P.Ed./ M.P.E.S.	M.Pharm.	B.Ed.	M.Ed.	M.Tech	Humanities and Social Sciences	Sciences/ Professional Courses
		A	B	C	D	E	F	G	H	I	J	K	L	M
1	Security Deposit (Refundable)	2000	2000	5000	2000	2000	1000	2000	2000	3000	3000	2000	2000	2000
2	Admission Fee	1500	1500	3000	500	1500	500	1500	1500	2000	3000	1500	2500	2500
3	Enrolment Fee	600	600	600	600	600	600	600	600	600	600	600	1000	1000
4	Registration Fee	0	0	0	0	0	0	0	0	0	0	0	2000	2000
5	Identity Card	100	100	100	100	100	100	100	100	100	100	100	100	100
6	Red Cross Fund	80	80	80	80	80	80	80	80	80	80	80	80	80
7	NSS fee	20	20	20	20	20	20	20	20	20	20	20	20	20
8	Insurance fee	200	200	200	200	200	200	200	200	200	200	200	200	200
9	Student Welfare Fund	400	400	400	400	400	400	400	400	400	400	400	800	800
10	Annual Day	100	100	100	100	100	100	100	100	100	100	100	100	100
11	University Magazine	200	200	200	200	200	200	200	200	200	200	200	200	200
12	Library Fee	1000	1000	1000	1000	1000	1000	1000	2000	4000	2000	1000	2000	2000

		A	B	C	D	E	F	G	H	I	J	K	L	M
13	Tuition Fee	4000	1000	36000	2570	4000	1000	1000	3000	5000	5000	26000	1000	1000
14	Electricity/Water charges	300	300	300	300	300	300	300	300	300	300	300	600	600
15	Cultural activities Fee	150	150	150	150	150	150	150	150	150	150	150	200	200
16	Computer Lab Fee/ Internet Fee/ICT	400	400	400	400	400	400	400	400	1000	2000	400	3000	3000
17	Examination Fee	3000	3000	6000	1000	3000	1000	3000	3000	3000	3000	3000	2000	2000
18	University Development Fund	300	300	6000	300	300	300	300	300	300	300	300	2100	2100
19	Medical Charges	250	250	250	250	250	250	250	250	250	250	250	250	250
20	Sports Fee	250	250	250	250	250	250	250	250	250	250	250	250	250
21	Lab Fee/Industrial visit/field work/Internship	3000	3000	5000	1500	3000	0	3000	3000	2000	2000	3000	0	2000
22	Student Academic activities	100	100	100	100	100	100	100	100	100	100	100	200	200
23	Course Fee	0	0	0	0	0	0	0	0	5000	0	0	0	0
Total		**17950**	**14950**	**65150**	**12020**	**17950**	**7950**	**14950**	**17950**	**28050**	**23050**	**39950**	**20600**	**22600**
Total (For SC/ST Students) *(Tution Fee Exempted for SC/ST Students)*		**13950**	**13950**	**29150**	**9450**	**13950**	**6950**	**13950**	**14950**	**23050**	**18050**	**13950**	**19600**	**21600**

Note:

The Annual Fee is to be paid in two Installments i.e. one Installmement in each semester.

Installment Details														
1	1st Installment (50%)	8975	7475	32575	6010	8975	3975	7475	8975	14025	11525	19975	10300	11300
2	2nd Installment (50%)	8975	7475	32575	6010	8975	3975	7475	8975	14025	11525	19975	10300	11300

For SC/ST Students: The SC/ST Students may pay their annual fees in three instalments. **First Instalment:** Admission Fees, Enrolment Fees, Identity Card Fee, Insurance Fee, Security deposit. The remaining fees may be paid in two equal instalments upto 15 days from the commencement of the Term End Examinations.

CENTRAL UNIVERSITY OF HARYANA

Subsequent/Final Year Fee Structure

S.No.	Account Head	Integrated Programmes	UG Programmes				PG Programmes						Ph.D.	
		(B.Sc.-M.Sc)/ BA.LL.B. Hons	LL.B. (3 Year Professional Course)	B.Tech.	B.Voc.	B.Sc. (Hons)	Humanities and Social Sciences	Science/ Professional Courses/ M.P.Ed./ M.P.E.S.	M.Pharm.	B.Ed.	M.Ed.	M.Tech.	Humanities and Social Sciences	Sciences/ Professional Courses
		A	B	C	D	E	F	G	H	I	J	K	L	M
1	Red Cross Fund	80	80	80	80	80	80	80	80	80	80	80	80	80
2	NSS fee	20	20	20	20	20	20	20	20	20	20	20	20	20
3	Insurance fee	200	200	200	200	200	200	200	200	200	200	200	200	200
4	Student Welfare Fund	400	400	400	400	400	400	400	400	400	400	400	500	500
5	Annual Day	100	100	100	100	100	100	100	100	100	100	100	100	100
6	University Magazine	200	200	200	200	200	200	200	200	200	200	200	200	200
7	Library Fee	1000	1000	3600	1000	1000	1000	1000	2000	4000	2500	1000	2000	2000
8	Tuition Fee	4000	1000	36000	2570	4000	1000	1000	3000	5000	5000	26000	1000	1000
9	Electricity/Water charges	300	300	300	300	300	300	300	300	300	300	300	600	600
10	Cultural activities Fee	150	150	150	150	150	150	150	150	150	150	150	200	200
11	Computer Lab Fee/ Internet Fee/ICT	500	500	500	500	500	500	500	500	1100	2100	500	3000	3000

		A	B	C	D	E	F	G	H	I	J	K	L	M
12	Examination Fee	3000	3000	6000	1000	3000	2000	3000	3000	3000	3000	3000	2000	2000
13	University Development Fund	300	300	6000	300	300	300	300	300	300	300	300	2500	2500
14	Medical Charges	250	250	250	250	250	250	250	250	250	250	250	250	250
15	Sports Fee	250	250	250	250	250	250	250	250	250	250	250	250	250
16	Lab Fee/Industrial visit/field work/Internship	3000	3000	6000	2600	3000	0	3000	3000	5000	2000	3000	0	2000
17	Student Academic activities	100	100	100	100	100	100	100	100	100	100	100	200	200
18	Course Fee	0	0	0	0	0	0	0	0	5000	0	0	0	0
Total		**13850**	**10850**	**60150**	**10020**	**13850**	**6850**	**10850**	**13850**	**25450**	**16950**	**35850**	**13100**	**15100**
Total (For SC/ST Students) *(Tution Fee Exempted for SC/ST Students)*		**9850**	**9850**	**24150**	**7450**	**9850**	**5850**	**9850**	**10850**	**20450**	**11950**	**9850**	**12100**	**14100**

Note:

The Annual Fee is to be paid in two Installments i.e. one Installmement in each semester.

Installment Details														
1	1st Installment (50%)	6925	5425	30075	5010	6925	3425	5425	6925	12725	8475	17925	6550	7550
2	2nd Installment (50%)	6925	5425	30075	5010	6925	3425	5425	6925	12725	8475	17925	6550	7550

For SC/ST Students: The SC/ST Students may pay their annual fees in three instalments. **First Instalment:** Admission Fees, Enrolment Fees, Identity Card Fee, Insurance Fee, Security deposit. The remaining fees may be paid in two equal instalments upto 15 days from the commencement of the Term End Examinations.

Instructions for Fee Payment.

1. The fees for M.A. Psychology shall be at par with the Science Courses.
2. Professional Courses include M.B.A., LL.M., M.C.A., M.A. J.M.C., M.H.M.C.T., M. Lib.& In. Sc., M.T.T.M., M.Pharma, LL.B., M.P.ED. or any other professional course introduced by the University
3. **The fee shall be submitted by the students within 10 working days of the commencement of each semester. However, fee for the first semester is to be submitted along with admission**.
4. Late Fee/Fine: Rs. 500/- within 15 days after due date; there after Rs. 50/Day with permission of respective Dean's.
5. The student will not be allowed to appear in End Term Examination if fee is not paid before 15 days of the commencement of the term end examinations on the recommendation of respective Dean.
6. SC/ST Students: The SC/ST Students may pay their annual fees in three instalments.
7. First Instalment: Admission Fees, Enrolment Fees, Identity Card Fee, Insurance Fee, Security deposit
8. Remaining fees may be paid in two equal instalments upto 15 days from the commencement of the Term End Examinations.
9. Tuition fee exempted for SC/ST Students.
10. Security Deposit: Security deposit can be claimed by the student within one year, after completing a course after that it will be forfeited. However, an amount of Rs. 500/- will be deducted automatically from the Security Deposit towards Alumni Registration.
11. The students shall bear the expenses of fee, if any, prescribed for Uniform and other such expenses, wherever necessary.
12. Fee refund as per the University fee refund rules, as amended from time to time.
13. The students need to pay the fee as per the fee structure prevailing in the year of admission throughout his/her tenure.
14. Readmission Fee: If a student is not attending classes without sanctioned leave for more than 10 working days , his/her name shall be struck off from the roll and he/she shall be required to pay Rs. 750 as Re-admission fee after due approval from Head of the Department /Dean of the concerned School. The same fee is applicable for students seeking re-admission after availing Zero semester/Non-promoted cases.

OTHER FEE PAYABLE BY THE STUDENTS

Sr. No.	Particulars	Fee Amount (Rs.)
1.	Duplicate Identity Card	100
2.	Migration Certificate	400
3.	Provisional Result	250
4.	Provisional Degree	300
5.	Re-Admission Fee	750
6.	Duplicate Detailed Marks Certificate (DMC/Mark sheet)	200
7.	Revaluation Fee	1000 (Per Paper)
8.	Re-Appear Fee	600 (Per Paper)
9.	Official Transcript Fee	1000 (per copy)
10.	Degree Fee/ Duplicate Degree	500
11.	Duplicate Hall Ticket	100
12.	Verification of Degree/ Marks Card	500
13.	Ph.D. thesis Submission	5000
14.	M.Phil. thesis Submission	3000
15.	Photocopy of Answer Booklets	500

CENTRAL UNIVERSITY OF HARYANA

Refund of Fee Rules

Sr. No.	Percentage of Refund of Fees	Point of time when notice of withdrawal of admission is received in the University.
1.	100%	15 days or more before the formally-notified last date of admission (Excluding Open Counselling)
2.	90%	less than 15 days before the formally-notified last date of admission (Excluding Open Counselling)
3.	80%	15 days or less after the formally-notified last date of admission (Excluding Open Counselling)
4.	50%	30 days or less, but more than 15 days, after formally-notified last date of admission (Excluding Open Counselling)
5.	00%	More than 30 days after formally-notified last date of admission (Excluding Open Counselling)

Additional Rules

Sr. No.	Reasons for seeking refund	Quantum of fee to be refunded
1.	When Admission is made inadvertently due to error/omission/ commission on the part of the University	Full fee including examination fee
2.	When cancellation of admission is due to concealment/falsification of facts, submission of false/ fake certificate(s), non-submission of the required documents, providing misleading information by the student or for any error/mistake on the part of the student	No fee to be refunded
3.	If a student provisionally admitted to a programmee on declaration of the result of his/her qualifying examination/compartmental examination become ineligible for admission and his/her admission is cancelled	50% of total fee + security deposit
4.	In case a student, after his/her admission, expires within one month of the last date of admission	Full fee will be refunded to his/her parents.

5.	When a student has been allowed to change the programme of study within the departments of the University	After adjustment of fees already paid, the student will be required to pay the remaining amount as prescribed for the new programme. In case the amount paid by the student in the previous programme is more than the amount due for the second programme, the excess amount will be refunded.
6.	Cancellation due to non - submission of migration certificate, category certificate or other essential document till last date specified during admission	No fee will be refunded except security deposit
8	When a student of self-financing programme applies for the withdrawal of admission on or before the last date of admission (Excluding Open Counselling)	Full fee after deduction of Rs. 1000/-

Refund of hostel dues shall be made as per the Hostel Rules in force and as amended from time to time.

In all cases, securities deposit/caution money (if any) shall be refunded after submission of clearance from the relevant departments, provided he/she applies for refund of the same within a period of one year from the date of leaving the institution

Annexure-LXIV

Central University of Haryana

Mahendergarh-123031 (Haryana) INDIA

(NAAC ACCREDITED 'A' GRADE UNIVERSITY)

No.: DPS/2021/52
Dated: 25-08-2021

Subject: Administrative Approval for starting new course, M. Pharm. (Pharmacognosy) in the Department of Pharmaceutical Sciences.

This is to inform you that Department of Pharmaceutical Sciences was started in 2020 with M. Pharm. (Pharmacology) course. Currently, only one Course of M. Pharm. is being run by the department. M. Pharm. programme is offered in various specializations like Pharmacognosy, Drug regulatory affairs, Pharmaceutical Analysis, Pharmaceutical Quality Assurance, Pharmaceutics, Pharmaceutical Chemistry, Industrial Pharmacy, Pharmacy Practice etc by Pharmacy Council of India, New Delhi, a regulatory body of Pharmacy profession in India.

In the proposed plan for next 5 years submitted to University during May 2021 in the light of NEP-2020, it has been mentioned to commence of M. Pharm (Pharmacognosy) program w.e.f 2022-23 in the Department of Pharmaceutical Sciences [A]. This course is highly demanding in Herbal drug Pharmaceutical Industry. Moreover, this new course is not offered by any Govt. University in South Haryana and Central University of Rajasthan. It is also pertinent to mention here that one faculty [Dr. Dinesh Kumar, Associate Professor] related to the above mentioned specialization is already working in the department on regular basis.

In view of above, a proposal for starting new M.Pharm. Course i.e. M.Pharm. [Pharmacognosy] in the Department of Pharmaceutical Sciences w.e.f. 2022-23 may kindly be granted.

Submitted for the administrative approval, please.

25/08/2021

Head
Dept. of Pharm. Sciences

25/8/2021.

Dean, School of Interdisciplinary & Applied Sciences

Hon'ble Vice-Chancellor

26/8/21

Annexure-LXV

UGC Guidelines on Examinations and Academic Calendar in view of the COVID-19 Pandemic

ज्ञान-विज्ञान विमुक्तये

University Grants Commission
Bahadur Shah Zafar Marg
New Delhi

July, 2021

UGC Guidelines on Examinations and Academic Calendar in view of the COVID-19 Pandemic – July, 2021

I. Introduction

Keeping in view the prevailing situation due to the COVID-19 pandemic; the order of the Hon'ble Supreme Court of India regarding the cancellation of School Board examinations for class/grade-XII; the earlier order of the Hon'ble Supreme Court upholding the UGC's guidelines of July 6, 2020 regarding terminal semester/ final year examinations; the earlier UGC guidelines on examination and academic calendar dated April 29, 2020, July 6, 2020 and September 24, 2020; and, the larger interest of students, the following guidelines are being issued by the UGC in respect of examinations and the academic calendar for universities, colleges and institutions deemed to be universities (who are collectively called "**Higher Education Institutions**" in these guidelines) in continuation of the earlier guidelines.

II. Examinations

The provisions as contained in the guidelines issued earlier as mentioned above shall apply for the current academic session 2020-21. Further, the Terminal Semester/ Final Year Examinations (2020-2021) be compulsorily conducted in offline (pen & paper)/ online/ blended (online + offline) mode by no later than August 31, 2021 following the prescribed protocols/ guidelines related to the COVID-19 pandemic.

For intermediate semester/year students, assessment shall be based on internal evaluation and previous semester as suggested in 2020 guidelines.

III. Academic Calendar

The provisions contained in the UGC Guidelines dated 24.09.2020 shall be applicable for the academic session 2021-2022. For students of the intermediate semester/year, the Higher Education Institutions may start their academic session (in online/offline/blended mode) as early as possible, following the guidelines/directions related to the COVID-19 pandemic issued by the appropriate government/competent authority.

In addition, the following guidelines shall also apply regarding the academic calendar for the first-year under-graduate and post-graduate students in Higher Education Institutions:

1. The Hon'ble Supreme Court of India's order dated June22, 2021 in Writ Petition(s) (Civil) No. 522 of 2021 (Mamta Sharma versus Central Board of Secondary Education & Others) has noted as follows:

"….Attorney General for India by pointing out that U.G.C. will be issuing necessary instructions to ensure that the admission process by the colleges and institutions should commence only after the declaration of results by the C.B.S.E. and I.C.S.E., including the State Boards."

Accordingly, Higher Education Institutions shall ensure that the admission process for undergraduate courses/programmes for the academic session 2021-2022 commences only after the declaration of results by the CBSE, ICSE and State Boards. It is expected that all the School Boards will declare their results for the class/grade-XII examinations by July 31, 2021.

2. Admissions to the first year courses/programmes for the session 2021-2022 shall be completed by no later than September 30, 2021. The last date for admissions to fill up the remaining vacant seats shall be October 31, 2021. The relevant documents of the qualifying examination can be accepted up to December 31, 2021.

3. The academic session 2021-2022 shall commence latest by October 1, 2021 for first semester/year students.

4. Accordingly, Higher Education Institutions shall follow the calendar given below for the academic session 2021-2022:

Admission Process for Undergraduate Level Programmes (in view of point no. 1 of Academic Calendar)	To Commence only after the declaration of results by the C.B.S.E. and I.C.S.E., including the State Boards. It is expected that School Boards will declare the results of the class/grade-XII examinations by 31.07.2021.
Completion of Admission Process for Undergraduate and Postgraduate Programmes in online/offline/blended mode	30.09.2021
Commencement of Classes for intermediate semester/year students in online/offline/blended mode	As early as possible
Commencement of Classes of Undergraduate and Postgraduate students' Fresh batch (First Semester/Year)	*Latest by 01.10.2021
Preparatory Break	**To be planned by the Higher Education Institutions
Conduct of Examinations	
Semester Break	
Commencement of Classes for Even Semester	
Preparatory Break	
Conduct of Examinations	
Semester Break begins	
Semester Break ends	31.07.2022
Commencement of Next Academic Session for this batch	01.08.2022

*If there is a delay in declaration of result of the qualifying examinations, Higher Education Institutions may plan and start the academic session by October 18, 2021. The teaching-learning process may continue in offline/ online/ blended mode.

**Higher Education Institutions may plan for classes, breaks, conduct of examinations, semester break etc. during the period October 1, 2021 to July 31, 2022 following necessary protocols/guidelines/directions/advisories issued by the Central/State Governments and competent authorities from time to time, in view of the COVID-19 pandemic.

5. In view of the financial hardships being faced by parents due to lockdowns and related factors, a full refund of fees should be made on account of all cancellations of admissions/ migrations of students up to October 31, 2021 for the academic session 2021-2022 as a special case. It is made clear that the entire fee, including all charges, should be refunded (i.e. there should be zero cancellation charges) on account of cancellations/ migrations up to October 31, 2021. Thereafter, on cancellation/ withdrawal of admissions up to December 31, 2021, the entire fee collected from a student should be refunded in full after deducting not more than Rs.1000/- as processing fee.

6. The guidelines issued by the UGC on April 29, 2020 and July 6, 2020 highlighting the modes of teaching, conduct of examinations, importance of physical & social distancing etc. should be read along with the present guidelines and shall remain mandatory, but the present guidelines shall prevail in the event of any conflict.

7. The present guidelines are subject to the advisories/directives issued by the apex statutory bodies/councils concerned, e.g., AICTE, NCTE, BCI, NMC, DCI, INC, PCI, AYUSH etc. regarding examinations and academic calendars.

Notwithstanding the present guidelines regarding the conduct of examinations and commencement of the next academic session, every Higher Education Institution shall ensure that it is prepared in all respects to carry out the academic activities following necessary protocols/guidelines/directions/advisories issued by the Central/State Governments or competent authorities from time to time, in view of the COVID-19 pandemic.

Annexure-LXVI

School of Business and Management Studies

School Board Meeting

Dated: 8th Oct 2021

A special online School Board Meeting of the School of Business and Management Studies was held at 2:30 pm on 8th Oct 2021 to discuss the special agenda:

1. To consider DRC recommendation for extension of the period of submission of PhD thesis of Ms Geeta Rani, Scholar of the Department of Management Studies
2. To consider DRC recommendation on request of Mr Sudhir Case of Mr. Sudhir, PhD Scholar, Department of Economics for continuation of his Ph D Program after joining as Assistant Professor, Department of Higher Education, Govt of Haryana

Members attended the meeting:

1. Prof T.R. Kundu, Prof (Retd.) of Economics, KU, Kurukshetra
2. Prof B.K Punia, Professor, Haryana School of Business
3. Prof Sunil Kabia, Bundelkhand University, Jhansi
4. Dr Anand Sharma, Head, Management Studies & Dean SBMS CUH
5. Dr. Ranjan Aneja, Head, Department of Economics CUH
6. Dr Ranbir Singh, Head, Department of Tourism and Hotel Management CUH
7. Dr. Ajai Pal Sharma, Member (Management Studies)
8. Dr Suman, Member (Commerce)
9. Dr Rashmi Tanwar, Member (Economics)
10. Dr Dilbag Singh, Member (DTHM)

Minutes of the Meeting

At the outset Dr Anand Sharma, Dean, SBMS welcomed all the members to the first School Board meeting and apprised them about the special agenda of the meeting.

Recommendation of the School Board

1. The case of Ms Geeta Rani was presented by the Head, Department of Management Studies, which was earlier recommended by the Departmental Research Committee held on 30.12.2020. In addition to the recommendation of the DRC, the Committee also considered UGC letter No.F.1-10/2020)CPP-II) dated 3rd Dec 2020 and dated 16th mar 2021 (copy attached) issued for "Extension of date of thesis submission for terminal M.Phil /Ph.D students" and extended the date up to 31st Dec 2021.

Keeping in view the Covid-19 Pandemic situations and UGC letters, the School Board recommended extension of period for the submission of her thesis by 31.12.2021.

2. Dr Ranjan Aneja presented the recommendations of DRC in respect of Mr Sudhir who joined government Job as Assistant Professor eleven months before completion of his two years residency period requirement. Then he requested that he might be allowed to continue Ph D by exempting his remaining 11 months residency period or be allowed to continue as part time Ph D scholar. Then Dr Suman also discussed similar cases of Ms Kavita and Ms Shivani in Commerce department as well. Board members discussed many options in detail and then unanimously resolved and recommended that either;

a. The scholars may be asked to complete their respective residual residency period by taking leave from their present organisation **OR**

b. The Competent Authority of the University may take a decision to convert their regular PhD into Part Time PhD

The meeting ended with a vote of thanks.

Dr Dilbag Singh

Dr. Ajai Pal Sharma

Dr Anand Sharma

Dr Rashmi Tanwar

Dr. Ranjan Aneja 8/10/21

Dr Suman

Dr Ranbir Singh 12/10/21

Prof Sunil K. Kabia

Prof B.K Punia

Prof T.R. Kundu

experts approval received through email.
Submitted for kind approval/direction. 18/10/21

Registrar
For putting up in AC Meeting as table agenda
Saika 12/10/21

VC
12/10/21

ज्ञान-विज्ञान विमुक्तये

प्रो. रजनीश जैन
सचिव
Prof. Rajnish Jain
Secretary

सत्यमेव जयते

विश्वविद्यालय अनुदान आयोग
University Grants Commission
(शिक्षा मंत्रालय, भारत सरकार)
(Ministry of Education, Govt. of India)
बहादुरशाह जफ़र मार्ग, नई दिल्ली-110002
Bahadur Shah Zafar Marg, New Delhi-110002
Ph :. 011-23236288/23239337
Fax : 011-2323 8858
E-mail : secy.ugc@nic.in

D.O.No.1-10/2020(CPP-II) **2nd September, 2021**

PUBLIC NOTICE

Sub: Extension of date for submission of thesis for terminal M.Phil/Ph.D students.

In continuation of UGC Public Notices of even number dated 03.12.2020 and 16.03.2021, this is hereby notified that considering a large number of requests and also keeping in view the larger interest of the research scholars, the extension given for submission of M.Phil/Ph.D thesis till 31stDecemeber, 2021 shall also be applicable to all such students whose due date of submission of M.Phil/Ph.D thesis is on or before 31.12.2021. However, tenure of fellowship will remain upto five year only.

Earlier public notices are available on UGC website www.ugc.ac.in.

(Rajnish Jain)

MEMORANDUM OF UNDERSTANDING

BETWEEN

Annexure-LXVIII

CENTRAL UNIVERSITY OF HARYANA(CUH)
&
CENTRAL UNIVERSITY OF HIMACHAL PRADESH (CUHP)

This Academic Alliance is made on the 04th day of October, 2021

BY AND BETWEEN THE PARTIES

Central University of Haryana (CUH) is a Central University established under the Central Universities Act, 2009 of the Parliament. It is one of the 15 Central Universities established by MHRD (now MoE), GoI under XIth Five Year Plan (2007-12). The University is fully funded by the University Grants Commission (UGC). Permanent Campus of the University is situated in 488 acres of land at Jant-Pali Villages, Mahendergarh district of Haryana from where CUH is running its academic operations.

And

Central University of Himachal Pradesh (CUHP) is also a Central University established under the Central Universities Act, 2009 of the Parliament. It is one of the 15 Central Universities established by MHRD (now MoE), GoI under XIth Five Year Plan (2007-12). The University is fully funded by the University Grants Commission (UGC). The University has its Permanent Campuses in Dharamshala and Dehra, District Kangra, Himachal Pradesh from where CUHP is running its Academic operations.

For the development of joint collaboration in accordance with our mutual interests in developing programmes of academic and scholarly exchanges and for research, **Central University of Haryana, Mahendergarh** and **Central University of Himachal Pradesh, Dharamshala**, mutually agree to join this Academic Alliance. Both parties agree to exercise their best efforts to develop the following forms of cooperation:

1. To establish ties for academic cooperation in the relevant areas of academics and research.
2. To promote mutual understanding, academic collaboration and research to explore the ways and means to achieve self-reliance in India.

3. To jointly organize seminars, conferences, workshops and short-term continuing education programmes on the topics of mutual interest with participation from faculty from both sides.
4. To guide research candidates registered in either of the institutions for doctoral and post-graduate programmes with joint-supervision.
5. To cooperate on any other activities that may be identified on a consensual basis as and when such an opportunity arises.
6. To mutually share the research facilities available with both the universities.
7. The exchange of students, scholars and faculty for internships, focused research projects, quality initiatives and innovations in academics, research and governance.
8. To form the research groups for collaborative researches in various disciplines.
9. To mutually share the expertise of human resources available with both the universities.
10. To jointly organize Faculty Development/ Leadership programmes, professional trainings, symposia and colloquia on the themes of national/international relevance.
11. To mutually facilitate each other in phased implementation of NEP-2020, Academic Bank of Credits, CBCS and Multiple Entry/Exit Options.

The Collaborative Platform will connect the faculties, students and researchers across different disciplines. Both parties can develop specialized group for academic and research, leading to cutting-edge innovations and research with the fruitful translational outcome.

Both, **Central University of Haryana, Mahendergarh** and **Central University of Himachal Pradesh, Dharamshala** are committed to work together to develop specific agreements on the points above. The agreement will provide logistics and management details appropriate to the successful operation of the programme. The agreement will fulfil the spirit and purpose of this general Academic Alliance. The operational details regarding implementation of the agreement shall be finalized with mutual consent.

DURATION and TERMINATION

This Academic Alliance shall commence on its date of execution by the Parties and will be terminated:

(a) after 5 years; or
(b) at any time for convenience by either party with 30 days' written notice; or whichever of the above occurs the earlier.

Notwithstanding this understanding, the Academic Alliance may be subject to modification or revision by mutual written agreement.

ASSIGNMENT

No party can assign this agreement to any other party without the consent of each other.

LEGAL COMPLIANCE

Jurisdiction Laws: The parties acknowledge that activities under this Academic Alliance, depending on their nature, be subject to law of the land. Each party agrees to assist the other party to understand the requirements of the local laws in relation to activities undertaken under this Academic Alliance.

LOGOS, NAMES AND MARKS

The parties agree that neither this document nor any performances or actions taken in connection therewith shall create a partnership or joint venture between them, and that neither shall advertise, state or otherwise imply anything to the contrary. Unless otherwise agreed in writing, neither party shall use, display, or otherwise engage the logos, names, trademarks, or other identification or protected intellectual property of the other.

DISPUTE RESOLUTION

The parties resolve to negotiate on all issues in an open and cooperative manner. Should any dispute arise between them in relation to this Academic Alliance, the parties shall seek to resolve them on the basis of mutual trust and cooperation. Should no such resolution be achieved, the parties shall state their disagreement in writing and either party may exercise its right to terminate this memorandum forthwith and without prejudice or penalty.

FORCE MAJEURE

Neither Party shall have any liability whatsoever or be deemed to be in default for any delay or failure in performance under this Academic Alliance, resulting from acts beyond the control of that Party, including but not limited to acts of God, war or national emergency, accident, fire, riot or epidemics.

NOTICE

Any notice, approval, consent, request or other communication required or permitted to be given or made under this Academic Alliance will be in writing in the English language and will be served or delivered to the registered office address of individual party as placed in this alliance in its preamble.

SEVERABILITY

If any provision of this agreement becomes invalid, unenforceable or prohibited by law, such provision shall be considered as inoperative and remainder will be operative and shall continue remain valid.

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RELATIONSHIP

This duty shall survive even after the termination of this Academic Alliance for next 5 years after the expiry of this Academic Alliance.

AGREEMENT

The following signatories, on behalf of their respective organizations, agree, without prejudice, to meet the terms of the Academic Alliance. Each Party shall bear its own cost to implement this Academic Alliance. All information and/or data that may be exchanged, acquired and shared in connection with the areas of cooperation shall be treated as strictly confidential and shall not be divulged without the written consent of the disclosing party unless the same has already been in public domain. This obligation shall continue to bind the Parties hereto notwithstanding the termination of the Academic Alliance.

Signatories

Central University of Haryana, Mahendergarh 4/10/21 **Prof. Tankeshwar Kumar** **Vice-Chancellor**	**Central University of Himachal Pradesh, Dharamshala** **Prof. S.P.Bansal** **Vice-Chancellor**
Witness 1	Witness 1 **Prof. Vishal Sood** **Registrar(Addl. Charge), CUHP**
Witness 2	Witness 2 4/10/21 **Prof. Pardeep Kumar** **Dean Student Welfare, CUHP**

3. 4/10/21

Witness 3
Prof. Rajnish Shukla
Vice Chancellor, MGAHV, Wardha

Proceedings of the Meeting of the Departmental Research Committee held on 13.09.2021 at 12:30 PM in office of Head, Department of Economics, CUH

The following members were present:

1. Dr. Ranjan Aneja, Head, Department of Economics
2. Prof. N K Bishnoi, External Expert
3. Dr. Rashmi Tanwar, Assistant Professor, Department of Economics
4. Dr. Ajeet Kumar Sahoo, Assistant Professor, Department of Economics

Item No. 1: Approval of topic to the M.Phil Economics (2020-21)

A list of following M.Phil Students (2020-21) is placed before the committed for approval of supervisor.

Sr. No.	Name of Student	Roll No.	Supervisor	Topic
1	Mahima Kathuria	200051	Dr. Ajeet Kumar Sahoo	Attitude and Acceptability towards COVID-19 vaccine in India: Insight from behavioral Economics
2	Satyajit Mallick	200053	Dr. Rashmi Tanwar	An Empirical Analysis of Wagner's Law: A Study of Odisha

Resolution: approved.

Item No. 2: The committee studied the reports of thesis evaluation and viva-voce report of Mr. Umer Jeelanie Banday, Roll No. 10054, who defended his Ph.D thesis in the public viva-voce examination (open), conducted on 02.09.2021 at 11 AM through Google meet.

On the basis of the recommendations submitted by both external examiners in their evaluation reports and the report of the viva-voce examination, the departmental research committee recommends that Mr. Umer Jeelanie Banday, be awarded the degree of Doctor of Philosophy in Economics w.e.f 02.09.2021 (i.e., the date of his viva-voce)

Resolution: Recommended.

Item No. 3: Application of Mr. Sudhir, Ph.D Scholar

Mr. Sudhir was admitted in Ph.D course (Roll No. 180031) in July, 2018 and subsequently registered for Ph.D on 17.01.2019.
He was selected as an Assistant Professor of Economics, Department of Higher Education, Government of Haryana and subsequently joined the same on 12.02.2020.
As per clause 7.10 of Ordinance- II (A) Degree of Doctor of Philosophy (Ph.D.), two year minimum residency period is required from the date of registration.
He has submitted an application on 17.08.2021 to waive off the remaining residency period i.e., 12.02.2020 to 16.01.2021 or convert his Ph.D into the part time Ph.D.

Submitted to Mallo Notech

The committee discussed his case and on the recommendations of his supervisor, it is recommended that either his remaining period of residency period may be waived off or his admission is converted into Part time Ph.D by the competent authority.

Item No. 4: Application of Mr. Shine Raju Kappil, Ph.D Scholar

An application of Mr. Shine Raju Kappil, Ph.D Student (Roll No. 180030) regarding the no objection certificate to join a job as an Assistant Professor, Christ University, Pune.

Mr. Shine Raju Kappil was admitted in Ph.D course (Roll No. 180030) in July, 2018 and subsequently registered for Ph.D on 05.08.2019.

As per clause 7.10 of Ordinance- Ii (A) Degree of Doctor of Philosophy (Ph.D.), two year minimum residency period is required from the date of registration. He has completed his residency period w.e.f. 04.08.2021

His case is discussed and on the basis of recommendations of supervisor, the committee recommends that as he has already completed the requirement of minimum residency period, he may be issued an NOC to join the said post.

(Rashmi Tanwar) (Ajeet Kumar Sahoo) (Ranjan Aneja) (NK Bishnoi)

Letter/Note of Dissent, in Regard to Agenda No. 06 of 33rd Meeting of Academic Council

The undersigned does not agree with the recommendations of the committee constituted to review the ordinance- II (A) and the agenda item no. 6 of the meeting of Academic Council held today i.e. on 12.10.2021, hence submits the dissent opinion/note due to the following reasons:

1. That the Clause 2.5 was added in the above mentioned ordinance by the Academic Council in its 29th meeting held on 14/01/2020, by accepting the recommendations of the committee headed by Dr. M.P. Poonia, Vice-Chairman, AICTE, (Member, Academic Council also) along with Sh. Satish Bathla, Professor, University of Delhi, Dr. Shimla, Former Registrar BPS Mahila Vishwavidyalaya Khanpur Kalan, Sonipat & YMCA Faridabad (Member, Academic Council also), Prof. K.P.S. Mahalwar (Member, Academic Council) and the undersigned Dean, School of Law, Governance, Public Policy and Management (Member, Academic Council also), as the members of the committee.
2. That the Clause 2.5 is strictly in accordance with Clause 11.2 of University Grant Commission (Minimum Standards and Procedure for award of M.Phil./Ph.D. Degree) Regulations, 2016, which is reproduced as:

   "Part-Time Ph.D. will be allowed provided all the conditions mentioned in the extent Ph.D. regulations are met."
3. That the University Grants Commission vide letter no. F No.-1/2014 (PS) Dated 10.03.2017, clarified that Ph.D. degrees which are pursued either full time or part-time, will be treated as degrees awarded through regular mode provided these are inconformity with the existing statutes/bye-laws/ordinances etc. of the degree awarding university. However, the Ph.D. acquired under distance mode is not permitted.
4. That the Chairperson and the members of the Committee, which recommended to delete Clause 2.5, were very well present in the 29th & 30th meeting of the Academic Council i.e. at the time of the approval of the above said ordinance and confirmation of the minutes of the academic council.
5. That the Ordinance was approved by 45th Meeting of the Executive Council in its meeting held on 27/01/2020. That the Chairperson and the members of the committee didn't raise any objection/submit the note of dissent neither at the time of approval of the ordinance II- (A) consisting of the Clause 2.5 nor till date.

6. That the University didn't receive any complaint against the inclusion of the Clause 2.5, from teaching faculty/non-teaching staff/students and even outsiders.
7. That the ordinance was finally approved by the UGC/MoE, Govt. of India and finally by the His Excellency, Visitor of the University i.e. The President of India.
8. That the recommendations of the committee are totally unjustified and unreasonable and the same have been made with the sole motive to cause disrespect to the Academic Council, which amounts to the contempt of the Academic Council.
9. That if the Clause 2.5, was illegal as per the Chairperson and the members of the committee, which recommended the deletion of the Clause, then they are fully responsible/accountable for spoiling the career of the students, who have already been admitted in pursuance of the above mentioned Clause i.e. 2.5, as the non-disclosure of the illegality intentionally amounts to an offence under criminal law. Further, if they were ignorant about the law, then also, they are liable for their acts as ignorance of law is no excuse, especially when they are the members of the August House, dealing with academic matters i.e. Academic Council.
10. That the Clause 2.5, was added after a due deliberation in the number of meeting conducted either at Gurugram or at Delhi. The members of the committee have been paid a huge amount in the form of T.A. /D.A. and Sitting Charges. If the committee has made the recommendations of inclusion of 2.5, in violation of UGC regulations, then the committee members may be held accountable and be asked to refund the amount paid to them. Further, they should be blacklisted from any type of membership in the University. Furthermore, the same action is required to be taken against the all the members of the Academic Council who were present in the meetings when the agenda item regarding the approval of the Ph.D. Ordinance dealing with Part-Time Ph.D. was considered and approved. Further, the officials of the UGC and Ministry of Education who examined the ordinance and didn't raise any objection on the Clause 2.5, whereas on some other Clauses of the same Ordinance, the observations were made by the UGC and MoE, Govt. of India and it was sent for the approval of His Excellency i.e. The President of India.
11. That the making of the recommendations by the members of the Academic Council who are the Internal Members has caused a disrespect and humiliation to all the External Members of the Academic Council, who were part of the Committee which made recommendations for the inclusion of Clause 2.5.

12. That it is for the information of this August House that some of the following prominent Government Universities/IIT's, which are offering Part-Time Ph.D. out of which one Institute is at the 1st Ranking of the Educational Institutions of the Country:

1. Indian Institute of Science, Bengaluru
2. Indian Institute of Technology, Delhi
3. Indian Institute of Technology, Ropar
4. Indian Institute of Technology, Madras
5. Indian Institute of Technology, Kanpur
6. Indian Institute of Technology, Kharagpur
7. Indian Institute of Technology, Guwahati
8. Delhi Technology University, Delhi
9. Dr. B.R. Ambedkar University, Delhi
10. PEC University of Technology, Chandigarh
11. BITS, Pilani
12. GGSIPU, Dwarka, New Delhi.

19/10/2021

Professor Rajesh Kumar Malik
Dean, School of Law
Member, Academic Council, (CUH)

Annexure-LXXI

F.No. 58-6/2018-CU.III
Government of India
Ministry of Education
Department of Higher Education
*****

New Delhi, the 17th March, 2021

To

The Registrar,
Central University of Haryana,
Jant-Pali, Mahendergarh,
Haryana-123029.

Subject:- Addition/amendment to Ordinances/statutes of the University.

.....

Sir,

Please refer to your letters No. CUH/20/A&C/354,356 & 357 dated 10.7.2020, on the above subject.

2. UGC has no objection to the proposals submitted by the University except the following Ordinances/Statutes:-

Ord./Statute	Subject	Comments of UGC
Ordinance IV-B	Career Advancement Scheme 1(B) Career Advancement Scheme (CAS) 2018	Clause 3 may be reframed strictly as per UGC Regulations on "Minimum Qualifications for Appointment of Teachers and other Academic Staff in Universities and Colleges and Measures for the Maintenance of Standards in Higher Education, 2018"
Ordinance-II-A	Degree of Doctor of Philosophy (Ph.D)	
Clause 2.4	--	University may be asked to reframe this ordinance in accordance with UGC (Minimum Standards and Procedure for Award of M.Phil/Ph.D Degree) Regulations, 2016.
Clause 2.5	--	UGC has no objection on the proposed amendment. Notwithstanding anything contained in these Regulations or any other Rule or Regulation, for the time being in force, no university shall conduct M.phil and Ph.D Programmes through distance education mode.

		Parti-time Ph.D will be allowed provided all the conditions mentioned in the extant Ph.D Regulations are met.
Ordinance XVII	Assignment of Departments to the Schools	UGC has no objection on the proposed amendment, subject to the condition that university may obtain the prior approval of the MoE/Ministry of Finance before starting any new School/Centre/Deptt. and manpower as per instructions issued by MoE vide D.O. No. F.61-1/2018-Desk(U) dated 16th June, 2020.
Statute-15(1): Clause (b) shall be amended.	Departments of Studies	UGC has no objection on the proposed amendment, subject to the condition that university may obtain the prior approval of the MoE/Ministry of Finance before starting any new School/Centre/Deptt. and manpower as per instructions issued by MoE vide D.O. No. F.61-1/2018-Desk(U) dated 16th June, 2020.
Statute-11 : Clause (iii) shall be amended	--	UGC has no objection on the proposed amendment, subject to the condition that university may obtain the prior approval of the MoE/Ministry of Finance before starting any new School/Centre/Deptt. and manpower as per instructions issued by MoE vide D.O. No. F.61-1/2018-Desk(U) dated 16th June, 2020.

3. It is requested that the Ordinances/Statutes may be revised as per the above comments of UGC and re-submitted to this Department for further necessary action.

Yours faithfully,

(C.P. Ratnakaran)
Under Secretary to the Govt. of India

Copy to the Vice Chancellor, Central University of Haryana.