हरियाणा केंद्रीय विश्वविद्यालय
CENTRAL UNIVERSITY OF HARYANA
NAAC ACCREDITED 'A' GRADE UNIVERSITY

MINUTES

35th Meeting of the Academic Council

Dated: 15/09/2022 at 11:00 AM

The 35th meeting of the Academic Council of the Central University of Haryana was held on September 15, 2022 at 11:00 A.M. in the Conference Room, Administrative Block, Central University of Haryana in blended mode.

The following members attended the meeting:

1. **Prof. (Dr.) Tankeshwar Kumar, Vice Chancellor - Chairperson**
2. Prof. (Dr.) Param Jeet Singh - (Online Mode)
3. Prof. B.B. Goel - (Online Mode)
4. Prof. Sathans - (Online Mode)
5. Dr. Ashwani Mahajan - (Online Mode)
6. Dr. Narender Hooda - (Online Mode)
7. Dr. P.K. Khurana - (Online Mode)
8. Prof. Sarika Sharma
9. Prof. Chanchal Kumar Sharma
10. Prof. Rajesh Kumar Malik
11. Prof. Anand Sharma
12. Prof. Vinod Kùmar
13. Prof. Phool Singh
14. Prof. Pawan Kumar Maurya
15. Prof. Dinesh Kumar Gupta
16. Dr. Monika
17. Dr. Bijender Singh
18. Dr. Dinesh Kumar
19. Dr. Rajesh Kumar Dubey
20. Prof. Vikas Garg
21. Prof. Surender Singh
22. Prof. Rajesh Kumar Gupta
23. Dr. Ranbir Singh
24. Prof. Ranjan Aneja
25. Prof. Ravinder Pal Ahlawat
26. Dr. Vishwanand Yadav

27. Dr. Rakesh Kumar
28. Dr. Rajendra Parsad Meena
29. Dr. Keshav Singh Rawat
30. Dr. Mona Sharma
31. Dr. Kanti Prakash Sharma
32. Dr. Jitendra Kumar
33. Prof. Harish Kumar
34. Prof. Parmod Kumar
35. Prof. Ajay Kumar Bansal
36. Dr. Payal Kanwar Chandel
37. Dr. Manoj Kumar Singh
38. Dr. Samiksha Godara
39. Dr. Ravinder Kaur
40. Prof. Dinesh Kumar, Dean (Academic) (Special Invitee)
41. Prof. Ranvir Singh (Special Invitee)
42. Prof. Rajiv Kaushik, COE (Special Invitee)
43. **Dr. Sunil Kumar, Registrar - Secretary**

The following members could not attend the meeting due to prior preoccupations and were granted leave of absence: -

1. Prof. Raj Kumar
2. Dr. Markanday Ahuja
3. Prof. P.C. Pattnaik
4. Prof. Ram Singh
5. Dr. Annapoorni Subramanian
6. Prof. Suresh Kumar
7. Dr. (Mrs.) Shimla
8. Prof. Neelam Sangwan
9. Prof. Suneel Kumar
10. Dr. Ashok Kumar
11. Prof. Gunjan Goel
12. Dr. Dharam Pal Punia
13. Dr. Ramesh Kumar
14. Dr. Santosh C. Hulagabali, Librarian

At the outset, the Hon'ble Vice-Chancellor welcomed all the members of the Academic Council particularly the new members namely Dr. Payal Kanwar Chandel and acknowledged & appreciated the contribution of the outgoing member namely Prof. Dinesh Chahal.

Thereafter, the Vice-Chancellor shared a brief progress report of the University made in the recent past:

1. **National Institutional Ranking Framework (NIRF):**
   In recently declared NIRF rankings-2022, the University has figured in the **rank bracket of 151-200 in the University category**. With various initiatives, the University will look forward to better its ranking in the coming years. Therefore, the University is making multipronged approach in holistic

development of the Institution such as restructuring the curriculum, recruiting new faculty and improving upon the infrastructure and implementation of National Education Policy.

2. **NAAC 2022 /Second cycle SSR submission:**
   The University has submitted the SSR on the NAAC website for 2nd cycle of accreditation on 23-06-2022.

3. **New Academic Programme UG/PG/PhD/Diploma:**
   The following new programmes are introduced w.e.f. the Academic Session-2022-23:

   Post-Graduate Programmes:
   M.Sc. (Geoinformatics); MA (Hindi Translation); M.Pharm. (Pharmacognosy)

   Ph.D. programmes:
   Ph.D. (CSIT); Ph.D. (Sanskrit); Ph.D. (JMC); Ph.D. (EVS)

4. **Dr. Ambedkar Centres of Excellence:**
   Dr. Ambedkar Centres of Excellence Scheme has been launched by Dr. Ambedkar Foundation, Ministry of Social Justice & Empowerment, Govt. of India on 22nd April, 2022. Under this scheme Dr. Ambedkar Centre of Excellence (DACE) is started in the Central University of Haryana. The purpose of the DACE scheme is to provide High Quality Free Coaching Facilities to the Scheduled Caste (SC) students for the Civil Services examinations, conducted by Union Public Service Commission (UPSC). The DACE is committed to provide an excellent training to SC students to broaden knowledge, develop critical-thinking, raise problem solving skills and confidence. The duration of coaching is one year. The scheme is funded by the Central Government.

   A total of **126** candidates appeared in the Entrance Examination and 100 candidate have been shortlisted. The recruitment of faculty is also ongoing and the interview is scheduled on 19-09-2022.

5. **Research Development Cell:**
   In order to implement NEP-2020 where University has to be centre of innovation using young minds and experienced faculties, the Research Development Cell has been constituted well in time, as per the directions from University Grants Commission. Its 5 sub-Committees will focus right from finance and infrastructure; Research programmes and policy development; collaboration and community; Product development monitoring and commercialisation; IPR Legal and Ethical matters. The University has to contribute to innovation which is a major key driver in the Indian economy as a process of nation building. It is pivotal in NIRF/NAAC and QS ranking.

6. **Academic Bank of Credit (ABC)**
   In order to implement NEP-2020, CUH has taken steps and is already registered with ABC. ABC will facilitate students to choose their own learning path to attain a degree/diploma/certificate working on the principle of multiple entry-multiple exit and anytime, anywhere and at any level of learning. ABC will further ensure the opening, closure, and validation of the Academic Bank of Accounts, verification, accumulation, and transfer or redemption for students. ABC portal has Digilocker framework which is a virtual storehouse that contains information on students' credits/certificates on their customised Digilocker account.

7. **New building projects sanctioned:**
   It is to bring to the notice of the house that Rs. **72.02 Cr.** has been sanctioned towards the two building projects (Central Library Building Rs. 34.25 Cr. and Auditorium Rs. 37.77 Cr.) under Higher Education Financing Agency (HEFA) during financial years from 2022-25.

Thereafter, the Agenda Items were taken up for consideration.

<table>
<tr><th>Item No.</th><th>Resolution Passed</th></tr>
<tr><td>35.1</td><td>Confirmation of the Minutes of the 34th meeting of the Academic Council held on 19.05.2022.

<u>Resolution Passed:</u>

The Minutes of the 34th meeting of the Academic Council held on 19.05.2022, were confirmed with following typographical amendments as suggested by the Council members:

a. <u>R.No.-3</u>: In clause-3.1 relating to procedure for admission, the word "GPET" be corrected as "GPAT".

b. <u>R.No.-4</u>:

➢ In the Annexure-III of Resolution No-4, in clause-2.4 the word "GPET" be corrected as "GPAT".

➢ In Clause-3.1, "a weightage of 50% to the Academic Qualification" be amended as "a weightage of 70% to the Academic Qualification" and "50% to the performance in the Interview" be amended as "30% to the performance in the Interview".

➢ In the end Note the phrase 'of the Vice-Chancellor' be inserted between 'decision' and 'shall' and the sentence be read as :

".....the decision of the Vice-Chancellor shall be reported to the Academic Council in its next meeting for ratification."

The minutes be accordingly amended by the concerned branch and to be kept in record.

Note: Prof. Rajesh Kumar Malik and Dr. Bijender Singh gave their dissent regarding delayed circulation and item no.12 of the minutes of the 34th meeting, which are recorded at Annexure-I, Page-12 to 14.</td></tr>
<tr><td>35.2</td><td>To report, record and confirm the action taken on the resolutions of the 34th meeting of the Academic Council held on 19.05.2022. (Annexure-II, Page-15 to 19)

<u>Resolution Passed</u>:

The action taken on the resolutions of the 34th meeting of the Academic Council held on 19.05.2022, were reported, recorded and confirmed with the observation that the action taken should be made more specific.

In case of the Action Taken Report on the Item No-23 & 24, it was resolved to constitute a Committee including Dean of the faculty. The approved syllabus will be sent to the Department for implementation.</td></tr>
<tr><td colspan="2"><u>ITEMS FOR CONSIDERATION</u></td></tr>
<tr><td>35.3</td><td>To consider the following amendments to Ordinance-XI relating to Constitution of the Board of Studies and terms of office of its members:

<table>
<tr><th>Existing Clause</th><th>Proposed Amendments</th></tr>
<tr><td>1) Each Department shall have a Board of Studies with the following constitution:</td><td>1) Each Department shall have a Board of Studies with the following constitution:</td></tr>
</table>
</td></tr>
</table>

	a. Head of the Department, who shall be the Chairman and Convenor b. All the Professors of the Department/Centre (ex-officio members) c. One Associate Professor of the Department by rotation in order of seniority d. One Assistant Professor of the Department by rotation in order of seniority e. One or Two subject experts, not in the service of the University, to be nominated by the Vice Chancellor. **f. Does not exist.**	a. Head of the Department, who shall be the Chairman and Convenor b. All the Professors of the Department/Centre (ex-officio members) c. One Associate Professor of the Department by rotation in order of seniority d. One Assistant Professor of the Department by rotation in order of seniority e. One or Two subject experts, not in the service of the University, to be nominated by the Vice Chancellor. f. **One or two industry experts or professionals to be nominated by the Vice-Chancellor.**
	Resolution Passed: Resolved that the amendments to Ordinance-XI, relating to Constitution of the Board of Studies and terms of office of its members, be approved with the following minor corrections and recommended to the Executive Council for consideration: **f. One or two industry experts or professionals to be nominated by the Vice-Chancellor, out of a panel recommended by the Head of the Department. However, the Vice-Chancellor may also nominate any industry experts or professionals from outside the panel.**	
35.4	To consider the recommendations of the Board of Studies of the Department of Computer Science & Information Technology dated 31-03-2022 and School Board of School of Basic Sciences dated 14-05-2022, for the scheme and syllabi of MCA (2 Year Programme), as per the CBCS, NEP-2020 and Learning Outcome Based Curriculum Framework (LOCF) guidelines, w.e.f. the Academic Session-2022-23. **(Annexure-III, Page-20 to 190)** **Resolution Passed:** Resolved that the recommendation of the Board of Studies/School Board be approved.	
35.5	To consider the recommendations of the Board of Studies of the Department of Computer Science & Information Technology dated 03-05-2022 and School Board of School of Basic Sciences dated 14-05-2022, for the scheme and syllabi of the course work for the Ph.D. programme in the Department of Computer Science and Information Technology, w.e.f. the Academic Session-2022-23. **(Annexure-IV, Page-191 to 217)** **Resolution Passed:** Resolved that the recommendation of the Board of Studies/School Board be approved.	
35.6	To consider the evaluation report(s) received from the External and Internal Examiner of the thesis submitted by Late. Ms. Ekta (Roll No. 10087), a research scholar in the School of Education. **(Confidential Report, to be placed on table)**	

	Note: 1. A proposal regarding award of Ph.D. degree posthumously to Late. Ms. Ekta (Roll No. 10087), a research scholar in the School of Education was submitted to the Academic Council for consideration in its 33rd meeting held on 12-10-2021. 2. The council 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. **Resolution Passed:** The Hon'ble Vice-Chancellor read out the Evaluation report of both the External Examiners and on the basis of the reports, the Council resolved to award Ph.D. Degree, posthumously, to Late. Ms. Ekta (Roll No. 10087), a research scholar in the School of Education and it be considered as a special case.
35.7	To consider the modalities for admission in Ph.D. programme under PwD quota as recommended by the Committee constituted vide notification No. CUH/2022/A&C/03 dated 05-01-2022. **(Annexure-V, Page-218 to 223)** **Note:** *The Academic Council vide its Resolution No-45 of the 33rd meeting held on 12-10-2021 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.* **Resolution Passed:** Approved.
35.8	To consider the recommendations of the Committee constituted vide Notification No. CUH/VCS/2022/Notification/98 dated 25-01-2022, regarding "*Proposal for setting up of Open and Distance Learning Centre at Central University of Haryana*". **(Annexure-VI, Page-224 to 236)** **Resolution Passed:** Approved in principal and recommended to the Executive Council for consideration. The courses will be started only after the approval of University Grants Commission, Distance Education Bureau.
35.9	To consider the adoption of the University Grants Commission (Academic Collaboration between Indian and Foreign Higher Educational Institutions to offer Twinning, Joint Degree and Dual Degree Programmes) Regulations, 2022. **(Annexure-VII, Page-237 to 250)** **Resolution Passed:** The Regulations has already been adopted in the 34th meeting of the Academic Council vide Resolution No.-22, hence withdrawn.
35.10	To consider the adoption of the University Grants Commission (Establishment and Operation of Academic Bank Of Credits in Higher Education) Regulations, 2021. **(Annexure-VIII, Page-251 to 265)** **Resolution Passed:** Resolved that the Regulations be adopted and an action plan be prepared for implementation.
35.11	To consider the adoption of the University Grants Commission "Guidelines for Pursuing Two Academic Programmes Simultaneously". **(Annexure-IX, Page-266 to 268)**

	Resolution Passed: Resolved that the Guidelines be adopted and an action plan be prepared for implementation including necessary amendments in the related Ordinances of the University affected by its implementation.
35.12	To discuss the matter related to moderation of Question Papers by external experts. Currently, as per **Ordinance XV: Programmes Leading to the Award of Postgraduate Degrees/Diplomas,** of the Ordinances of the University, moderation of question papers is required by a Board of Moderators. When this Ordinance was framed the University was merely having 1-2 Professors and there was no senior faculty member in most of the Department, whereas at present, the University has more than 25 Professors and 25 Associate Professors which enables the University to carry out in house moderation of question papers. **(Annexure-X, Page-269 to 282)** **Resolution Passed:** Resolved that the following amendments may be incorporated in the **Ordinance-XV** relating to "Programmes Leading To The Award Of Postgraduate Degrees/Diplomas" and recommended to the Executive Council for consideration:

Existing Clause	Proposed Clause
10.4. Setting of question papers and Evaluation: 10.4.1: 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 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	**10.4. Setting of question papers and Evaluation:** 10.4.1: 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 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 External Examiner, the question paper setting may be given to Professor/ Associate Professor or Assistant Professor with minimum five years of regular teaching experience at relevant level i.e. UG/PG.** **Provided that** in case of unavailability of external examiners, the Vice Chancellor may allow the **question paper setting** and evaluation to be performed by the Internal examiners only so that the conduct of examination and declaration of results is not delayed. The question papers shall be moderated by a Board of Moderators, **consisting of the Head of the Department, one or two Professors/ Associate Professors/ External Experts to be appointed by the Controller of Examinations out of the panel drawn by Head/Incharge of the concerned**

	department. The question papers shall be moderated by a Board of Moderators (Internal and/or External) to be appointed by the Controller of Examinations out of the panel drawn by Head/Incharge of the concerned department. **The Assistant Professor, having five years of teaching experience, may also be included in the panel.**

Resolved that the following amendments may be incorporated in the **Ordinance-XXIX** relating to "Programmes Leading to the Award of Bachelor of Technology (B. Tech.) Degree" and recommended to the Executive Council for consideration:

Existing Clause	Proposed Clause
10.4.2. (ii) Moderation of Question Papers: 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/In-charge of the concerned department.	**10.4.2. (ii) Moderation of Question Papers:** 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/In-charge of the concerned department. **The Assistant Professor, having five years of teaching experience, may also be included in the panel of moderators.**

35.13 To discuss the Ordinance-XV-A (General Rules for Examinations) of the Ordinances of the University, regarding provisions for Striking off the name of grossly irregular Students.

(Annexure-XI, Page-283 to 287)

Resolution Passed:

Resolved that the following amendments may be incorporated in the **Ordinance-XV-A**, relating to General Rules for Examination, be approved and recommended to the Executive Council for consideration:

Existing Clause	Proposed Clause
17. Attendance : (viii) No person shall be deemed to have satisfied the required conditions in respect of his instructions, unless in addition to the requirements regarding attendance and other conditions, he has appeared and satisfied by his performance the Head of the Department in such tests, written and/or oral, as may be held by him in his discretion. The Head of the Department shall have, and shall be deemed always to have had, the power to detain a student in the same class in which he has been	**17. Attendance :** (viii) No person shall be deemed to have satisfied the required conditions in respect of his instructions, unless in addition to the requirements regarding attendance and other conditions, he has appeared and satisfied by his performance the Head of the Department in such tests, written and/or oral, as may be held by him in his discretion. The Head of the Department shall have, and shall be deemed always to have had, the power to detain a student in the same class in which he has been

	studying, or not to send him/her in the same class in which he has been studying, or not to send him/her for the University Examination, in case he did not appear at the tests aforesaid or his performance was not satisfactory. The Head of the Department shall have power to strike off the name of a student who is grossly irregular in attendance in spite of warning, or when the absence of the student is for such a long period that he cannot put in requisite percentage of attendance.	studying, or not to send him/her in the same class in which he has been studying, or not to send him/her for the University Examination, in case he did not appear at the tests aforesaid or his performance was not satisfactory. **Provided that the Head of the Department shall struck off the name of a student from roll who is absent continuously without permission for 10 or more working days.** **The student can be re-admitted with the approval of the Vice-Chancellor on the recommendation of the Head of the Department/ Staff Council on payment of Rs. 1000/- if re-admission is sought within 07 days after struck-off the name. The re-admission fee increases by Rs. 100/- per day thereafter.** **Every Department is required to display the attendance of enrolled students at the end of every month on the Notice Board of the concerned Department. In case of unreasonable absence, the parents/guardian of the students shall be intimated by the Head of the Department/Teacher nominated by the Head of the Department.**
35.14	To discuss and resolve the matter related to excess intake (93 against 60 sanctioned seats vide BCI letter no. BCI:D:30:2021 (LE/Std. 9th Jan. 2021) dated 22-01-2021) in LL.B. 3-Year Programme during the Academic Session-2020-21, by the Department of Law. **(Annexure-XII, Page-288 to 294)** **Resolution Passed:** When the Item was taken up for discussion, Dean, School of Law submitted a letter No. BCI:1265:2022(LE) dated 12-09-2022 (**Annexure-XIII, Page-295**) received from Bar Council of India, regarding regularisation of excess admissions made during session-2020-21. BCI has intimated that the issue of regularisation of excess admission during session-2020-21 shall be put before the Standing Committee of the Bar Council of India in its meeting proposed to be held in the month of September and the decision shall be forwarded to the University. Therefore it was resolved to deliberate on the issue, if required, after the outcome of the meeting of the Standing Committee of the BCI in this regard and **hence item is withdrawn.**	
35.15	To consider the draft "Open Access Policy of Central University of Haryana", as recommended by the NIRF (Overall) Committee. **(Annexure-XIV, Page-296 to 310)** **Resolution Passed:** Resolved that the Regulations be adopted and an action plan be prepared for implementation.	

REPORTING ITEMS	
35.16	To report and record the action taken by the Vice-Chancellor in approving the starting of Ph.D. programmes in the Department of Journalism and Mass Communication w.e.f. Academic Session-2022-23. **Note:** The Academic Council vide Resolution No-17 of the 19th meeting held on 06-02-2016, authorised the Vice-Chancellor in approving the starting of Ph.D. programmes. **Resolution Passed:** The action taken by the Vice-Chancellor in approving the starting of Ph.D. programmes in the Department of Journalism and Mass Communication w.e.f. Academic Session-2022-23, was reported and recorded.
35.17	To report and record the approval of the Pharmacy Council of India in starting M.Pharm (Pharmacognosy) programme from the Academic Session 2022-23 with an annual intake capacity of 06 students. **(Annexure-XV, Page-311)** **Resolution Passed:** The receipt of the approval of the Pharmacy Council of India in starting M.Pharm (Pharmacognosy) programme from the Academic Session 2022-23 with an annual intake capacity of 06 students, was reported and recorded.
35.18	To report and record the action taken by the Vice-Chancellor in approving the request of the Head, Department of Physical Education and Sports regarding consideration of GEC-Fundamentals of Yoga, Course Code-SIAS YOGA 1101 GEC 3104 as the Credit requirements from the other departments, for the students of MPES 2020-22 batch. **Note:** During the COVID-19 pandemic, the students of Master of Physical Education and Sports (M.P.E.S.) 2020-22 batch have opted for Yoga as a Generic Elective Course in the 2nd Semester and 3rd semester. While filling out the examination forms for the 2nd semester, the students were not present in the physical mode due to COVID-19 pandemic restrictions and due to the communication gap between the students and the department, the same could not be filled on the Registration portal. The students were promoted to the 3rd semester by calculating the average marks of the 1st semester and internal marks of 2nd semester. The students have attended the classes for YOGA GEC-Fundamentals of Yoga, Course Code-SIAS YOGA 1101 GEC 3104 and submitted work assignments. The internal marks for the same have been forwarded to the Examination Branch by the concerned TIC of the Department of Yoga. **Resolution Passed:** The action taken by the Vice-Chancellor in approving the request of the Head, Department of Physical Education and Sports regarding consideration of GEC-Fundamentals of Yoga, Course Code-SIAS YOGA 1101 GEC 3104 as the Credit requirements from the other departments, for the students of MPES 2020-22 batch, was reported and recorded.

Supplementary Items	
35.19	To consider the recommendations of the Board of Studies of the Department of Computer Science and Information Technology dated 31-08-2022 and School Board of School of Basic Sciences dated 12-09-2022, for the scheme and syllabi of M.Sc. (Data Science) programme (1st Semester), w.e.f. the Academic Session-2022-23. **(Annexure-XVI, Page-312 to 383)** **Resolution Passed:** Resolved that the recommendations of the Board of Studies of the Department of Computer Science and Information Technology dated 31-08-2022 and School Board of School of Basic Sciences dated 12-09-2022, for the scheme and syllabi of M.Sc. (Data Science) programme (1st Semester), w.e.f. the Academic Session-2022-23, be approved.
35.20	To consider the application of Mr. Manish Kumar (Roll No. 191217), Research Scholar, Department of Mathematics, on the recommendations of the DRC/BoS & School Board, regarding waiving off the remaining residential period of the Ph.D. programmes. **(Annexure-XVII, Page-384 to 401)** **Note:** *Mr. Manish Kumar has been selected as Assistant Professor in Chhattisgarh State Government and also submitted his resignation from SRF-UGC.* **Resolution Passed:** Resolved that the recommendation of the Board of Studies/ School Board regarding completion of the remaining period of the residency in respect of Mr. Manish Kumar (Roll No. 191217), Research Scholar, Department of Mathematics, be approved. The Council further resolved that the scholar shall complete the remaining residency period, in one span, by taking leave from his employer, in stipulated time.
35.21	To consider the recommendations of the Board of Studies of the Department of Geography dated 11-05-2022 and School Board of School of Basic Sciences dated 12.09.2022, for the case of Mr. Sourabh Yadav (Roll No. 200785) to complete the period of two years regular for his Ph.D. program as per relevant university ordinance. **(Annexure-XVIII, Page-402 to 414)** Note: *Mr. Sourabh Yadav (Roll No. 200785) has been selected as Lecturer Inter College, Jasrana, Firozabad (Uttar Pradesh Secondary Education Service Selection Board).* **Resolution Passed:** Resolved that the recommendation of the Board of Studies/ School Board regarding completion of the remaining period of the residency with respect of Mr. Sourabh Yadav (Roll No. 200785), Research Scholar, Department of Geography, be approved. The Council further resolved that the scholar shall complete the remaining residency period, in one span, by taking leave from his employer, in stipulated time.
	The meeting ended with remarks that the meetings of the Academic Council will be conducted as per the approved regulation for conduct of the meetings of the Academic Council, with next meeting scheduled on 07-10-2022.

30/9/22

VICE-CHANCELLOR
(Chairperson)

30.9.22

REGISTRAR
(Secretary)

35th Meeting of the Academic Council
Date: 15.09.2022 at 11:00 AM
Venue: Conference Room, Administrative Block
Central University of Haryana, Mahendergarh

Note of Dissent against Agenda No. 35.1

Regarding the Agenda No. 35.1, it is submitted that as per the rules of conduct of meeting of Academic Council, the Secretary, Academic Council cum Registrar, CUH, was bound to circulate the draft minutes within one week. The 34th meeting of Academic Council was held on 19.05.2022. Accordingly, the Secretary, Academic Council cum Registrar, CUH, was bound to circulate the minutes up to 26.05.2022. However, the minutes were not circulated within the prescribed period. After waiting up to 03.06.2022 i.e. 15 days, the undersigned wrote an email to the Hon'ble Vice – Chancellor cum Chairman, Academic Council about the failure to circulation of the minutes of the Academic Council by its Secretary. The draft minutes were circulated on 06.06.2022 and objections/observations were invited within a week. The under signed made certain observations on dated 13.06.2022.

Then the final minutes were also not circulated up to three months and one letter was issued by the Secretary cum Registrar on August 19, 2022 regarding the justification on the Agenda Item No. 12.

Further, the minutes regarding agenda No. 12 are wrongly recorded as the agenda item was withdrawn by the Vice Chancellor before the House and the same thing was mentioned in the draft minutes circulated on 06.06.2022. However, in the final minutes, the dirty tricks have been adopted by making an afterthought solution after the lapse of 03 months. It is clear breach of trust of the August House.

Further, the necessary corrections regarding Agenda Items Nos. 23 & 24 have not been made in the final circulated minutes. The same thing is in the case of Agenda Item No. 4 in which the provisions have not been incorporated in consonance with the UGC Regulations, 2016 & 2018 dealing with award of Ph.D.

The final minutes were circulated on 25.08.2022 i.e. after the lapse of more than 03 months from the date of conduct of meeting. The non-circulation of minutes within prescribed period amounts to intentional disobedience of the law by public servant and failure to perform statutory duty. Further, circulation of the minutes after

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03 months' amounts to gross negligence and it makes the minutes futile and in-operative.

Hence, the minutes cannot be confirmed. Therefore, the undersigned submits the dissent opinion against the confirmation of the minutes of the 34th meeting of the Academic Council.

15/9/22

Professor Rajesh Kumar Malik
Member, Academic Council
Dean, School of Law
Central University of Haryana, Mahendergarh

15/9/2022

Dissent Opinion

प्राप्ति सं / Receipt No. 271
दिनांक / Date 15/9/2022
शैक्षणिक एवं परिषद शाखा, हुए वि
Academic & Council Branch, CUH

I hereby submit my dissent opinion to Agenda item 35.1 of Academic Council meeting held on 15/9/2022. My dissent is on the delayed circulation of minutes of meeting of AC held on 19/5/2022 as well as on agenda item No. 12.. withdrawn by the Chairman, AC. This dissent is on the circulation of Agenda item No. 12.

Thanks

Bijendra Singh
15/9/22
HOD, Biotech.

Member AC

ACTION TAKEN REPORT

34th meeting of the Academic Council held on 19/05/2022

R.No.	Resolution Passed	Action Taken
1.	The Minutes of the 33rd meeting of the Academic Council held on 12.10.2021, were confirmed.	Noted
2.	The action taken on the resolutions of the 33rd meeting of the Academic Council held on 12.10.2021, was reported, recorded and confirmed.	Noted
	ITEMS FOR CONSIDERATION	
3.	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 some amendments and recommended to Executive Council for consideration. **XXXX XXXX XXXX XXXX**	The recommendations regarding amendments to Ordinance-II (A) will be placed in the next meeting of the Executive Council.
4.	The Academic Council authorized the Vice-Chancellor to approve the Ordinance based on the suggestions given by the members during the meeting. The suggestions were put in the draft minutes but one Hon'ble member raised the point that this should have been in the form of Ordinance which was circulated among members on 19-08-2022 and is now Annexed as **Annexure-III (Page- 22 to 36)** for your information. The approved Ordinance will be put up to the Executive Council for consideration.	The recommendations regarding draft Ordinance-II (B) will be placed in the next meeting of the Executive Council.
5.	Resolved that the following amendments to the Statute-15(1) of the Statutes of the University relating to the creation of the Departments of Studies, as recommended by the Committee constituted to examine the request of some faculty members under the School of Engineering and Technology, be approved and recommended to the Executive Council for consideration: **XXXX XXXX XXXX XXXX**	The recommendations regarding amendments to Statute-15(1) will be placed in the next meeting of the Executive Council.
6.	Resolved that the following amendments to Ordinance-XVII (Assignment of Departments to The Schools), consequent upon the creation of Department of Vocational Studies and Skill Development, be approved with minor modifications and recommended to the Executive Council for consideration: **XXXX XXXX XXXX XXXX**	The recommendations regarding amendments to Ordinance-XVII will be placed in the next meeting of the Executive Council.
7.	Resolved that the Draft Guidelines for Joint Ph.D. supervision with reputed Government Universities/Organisations and acceptance of PG students for dissertation at Central University of Haryana, be approved,	Implemented

	except that seat allocated will be counted as one for all Supervisor/ Co-Supervisor.	
8.	Resolved that the draft "**Research Integrity and Plagiarism: Policy and Procedure of Central University of Haryana**", be approved.	Implemented
9.	Resolved that the recommendations of the Board of Studies of the Department of Vocational Studies and Skill Development dated 05.05.2022, for the scheme and syllabi of B.Voc. Retail and Logistics Management programme in the Department of Vocational Studies and Skill Development, as per the Learning Outcome Based Curriculum Framework (LOCF) guidelines, w.e.f. the Academic Session-2022-23, be approved. **(Annexure-VII, Page- 57 to 130)** **Note:** ***The Council authorize the Vice-Chancellor to approve the recommendations of the Board of Studies regarding tables to be incorporated of POs and COs. The information about percentage of change made in syllabus be also provided.***	Implemented
10.	Resolved that the recommendations of the Board of Studies of the Department of Vocational Studies and Skill Development dated 05.05.2022, for the scheme and syllabi of B.Voc. Biomedical Sciences programme in the Department of Vocational Studies and Skill Development, as per the Learning Outcome Based Curriculum Framework (LOCF) guidelines, w.e.f. the Academic Session-2022-23, be approved. **(Annexure-VIII, Page-131 to 218)** **Note:** ***The Council authorize the Vice-Chancellor to approve the recommendations of the Board of Studies regarding tables to be incorporated for POs and COs. The information about percentage of change made in syllabus be also provided.***	Implemented
11.	Resolved that the recommendations of the Board of Studies of the Department of Vocational Studies and Skill Development dated 05.05.2022, for the scheme and syllabi of B.Voc. Industrial Waste Management programme in the Department of Vocational Studies and Skill Development, as per the Learning Outcome Based Curriculum Framework (LOCF) guidelines, w.e.f. the Academic Session-2022-23, be approved. **(Annexure-IX, Page-219 to 269)** **Note:** ***The Council authorize the Vice-Chancellor to approve the recommendations of the Board of Studies regarding tables to be incorporated for POs and COs. The information about percentage of change made in syllabus be also provided.***	Implemented
REPORTING ITEMS		
12.	This item was withdrawn but two of the Hon'ble members gave dissent and one claimed that his dissent be included in the minutes of the meeting. Therefore, the item with background was circulated on 19-08-2022.	Noted

Background:

The Executive Council of the University in its 23rd Meeting dated 9th October 2015 vide Resolution no. 29 has authorized the Vice Chancellor to nominate the experts on the Selection Committee of Teachers on behalf of the Executive Council which is appended below:

"The Vice Chancellor informed the Executive Council that the Selection process for appointment to various teaching positions to begin very soon and that as per the Statute 18 of the Statutes of the University Experts have to be nominated by the Executive Council out of the panel drawn by the Academic Council. The Nominations of experts on the Selection Committee being confidential, the Executive Council authorized the Vice Chancellor to nominate experts on the Selection Committee on behalf of the Executive Council".

Later on 2019, the Statute 18 of the Statutes of the University was amended and got the accent of the Hon'ble Visitor of the University vide MHRD letter no. F.No.58-6/2018-CU-III dated 04th Dec 2019.

According to present Statue 18, experts to be nominated by the Vice chancellor out of the panel of names approved by the academic council.

On the perusal of the documents made available by the University, it was found that no panel of expert was formally got recommended or approved by the Academic Council till July 2021. Taking note of this and in light of mission mode recruitment as desired by the Ministry of Education, Vice Chancellor invited names of Experts from the available Professors/Deans of the University, to include in the panel of experts for approval by the academic council.

As and when the names received from the Professors the panel was approved under sub clause 3 of clause 11 of the Central University Act 2009 appended below: -

"The Vice Chancellor may, if he is of the opinion that immediate action is necessary on any matter, exercise any power conferred on any authority of the University by or under this Act and shall report to such Authority at its next meeting the action taken by him on such Matter".

Since the University was having only few Professors (9) out of 33 departments, the Names of Experts were also invited from well-known Professors of the region. The University is in growing stage and there are departments where no regular teacher is appointed. Therefore names were taken from Professors available in the region, and from Vidwan Website of the Inflib.net which are approved by the UGC along with their brief Profile on the following Link- Vidwan Profile Page (inflibnet.ac.in).

It is to add here that the Panel of Experts have been drawn formally first time in the University, in very transparent manners and, with inclusion of the lists from the internal and external Experts. The panel is reported to the Academic Council for information as an action taken by Vice Chancellor in approving the panel under clause 11(3) of the CU Act 2009.

The copy of the Panel of Experts is made available for the Academic Council in sealed cover along with his dissent attached herewith as

<table>
<tr><td></td><td>Annexure. It can be opened in the presence of the Vice-Chancellor, being confidential matter.</td><td></td></tr>
<tr><td>13.</td><td>The action taken by the Vice-Chancellor on 03-12-2021, on the recommendations made by the BoS and School Board, that the Research Scholar may complete the rest of the residency period by taking leave from their employer, was reported, recorded and confirmed.

Note: Ms. Shivani Yadav and Ms. Kavia Research Scholars from Department of Commerce submitted applications for relaxation of residual period of residency.

Ms. Shivani Yadav (Roll No-180510) Ph.D. Scholar of Department of Commerce has joined the Department for continuing her Ph.D. on 18-01-2022, by taking Extra Ordinary leave from her present employer.
(Annexure-XI, Page-276 to 277)</td><td>Reporting Item.
No action needed.</td></tr>
<tr><td>14.</td><td>The Action taken by the Vice-Chancellor, on the recommendations of the Committee constituted to discuss and finalise the proposals of starting of new programmes in various programmes of the University, in starting of the following new programmes from the Academic Session-2022-23, in anticipation of the approval from the Academic Council, was reported, recorded and confirmed:
<table>
<tr><th>S.No.</th><th>Name of Programme</th><th>Name of Department</th></tr>
<tr><td>1</td><td>M.Sc. Geoinformatics</td><td>Department of Geography</td></tr>
<tr><td>2</td><td>M.A. (Hindi Translation)</td><td>Department of Hindi</td></tr>
</table>
These two courses do not require any additional manpower.</td><td>Reporting Item.
No action needed.</td></tr>
<tr><td>15.</td><td>The action taken by the Vice-Chancellor on 13-01-2022, in approving the constitution of “Research Promotion Board” and its Guidelines, was reported, recorded and confirmed.</td><td>Reporting Item.
No action needed.</td></tr>
<tr><td>16.</td><td>The action taken by the Vice-Chancellor on 13-01-2022, in approving the “Guidelines for Sponsored Research Projects” at Central University of Haryana, was reported, recorded and confirmed.</td><td>Reporting Item.
No action needed.</td></tr>
<tr><td>17.</td><td>The receipt of the UGC letter F.No.1-10/2020 (CPP-II) dated 01-12-2021 regarding Extension of date for submission of thesis for terminal M.Phil./Ph.D. Students, was reported and recorded.</td><td>Reporting Item.
No action needed.</td></tr>
<tr><td>18.</td><td>The receipt of NCTE letter No.F./NRC/NCTE/HR….-M.P.Ed./342nd (Virtual) Meeting/2021/215666 dated 16-09-2021 regarding approval for starting M.P.Ed. Programme from the Academic Session 2021-22 with an annual intake capacity of 40 students, was reported and recorded.</td><td>Reporting Item.
No action needed.</td></tr>
<tr><td>19.</td><td>The action taken by the Vice-Chancellor in approving the starting of Ph.D. programmes in the Department of Environmental Studies w.e.f. Academic Session-2022-23, was reported and recorded.</td><td>Reporting Item.
No action needed.</td></tr>
<tr><td>20.</td><td>The action taken by the Vice-Chancellor in approving the starting of Ph.D. programmes in the Department of Sanskrit w.e.f. Academic Session-2022-23, was reported and recorded.</td><td>Reporting Item.
No action needed.</td></tr>
</table>

21.	The action taken by the Vice-Chancellor in approving the recommendations of the Standing Committee (Admissions) made in its meeting held on 11-04-2022, was reported and recorded.	Reporting Item. No action needed.
Supplementary Agenda Items		
22.	Resolved that the adoption of the University Grants Commission (Academic Collaborative between Indian and Foreign Higher Educational Institutions to offer Twinning, Joint Degree and Dual Degree Programmes) Regulations, 2022, received from Chairman, University Grants Commission, be approved.	Implemented
23.	Resolved that the recommendations of the Board of Studies of the Department of Law dated 27-08-2021 and School Board of School of Law dated 05-05-2022, for the scheme and syllabi of LL.M. (2 Year Course), as per the CBCS, NEP, 2020 and Learning Outcome Based Curriculum Framework (LOCF) guidelines, w.e.f. the Academic Session-2022-23, be approved. **(Annexure-XIX, Page-344 to 457)** **Note:** The Council authorize the Vice-Chancellor to approve the recommendations of the Board of Studies regarding tables to be incorporated for POs and COs. The information about percentage of changes made in syllabus be also provided. The first few general pages (about 20) of syllabus be also redesigned by the University by appropriate Committee.	Implemented
24.	Resolved that the recommendations of the Board of Studies of the Department of Law dated 27-08-2021 and School Board of School of Law dated 05-05-2022, for the scheme and syllabi of LL.B. (3 Year) Professional course, as per the CBCS, NEP, 2020 and Learning Outcome Based Curriculum Framework (LOCF) guidelines, w.e.f. the Academic Session-2022-23, be approved. **(Annexure-XX, Page-458 to 588)** **Note:** The Council authorize the Vice-Chancellor to approve the recommendations of the Board of Studies regarding tables to be incorporated for POs and COs. The information about percentage of changes made in syllabus be also provided.	Implemented
25.	The action taken by the Vice-Chancellor in approving the starting of Ph.D. programme in the Department of Computer Science and Information Technology w.e.f. Academic Session-2022-23, was reported, recorded and confirmed.	Reporting Item. No action needed.
Under Any other Item		
26.	The members were informed that University is applying for 2023-24 Integrated Teacher Education Programmes (ITEP).	Noted
	The meeting ended with a vote of thanks to the chair.	

Academic Branch <academicbranch@cuh.ac.in>

Fwd: School Board Meeting on 14-05-2022 at 10:30 A.M. onwards

HOD Computer Science & IT <hodcomputerscience@cuh.ac.in> Tue, Sep 6, 2022 at 11:50 AM
To: Council Academic <council@cuh.ac.in>

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विभागाध्यक्ष

कंप्यूटर विज्ञान और सूचना प्रौद्योगिकी विभाग,

बुनियादी विज्ञान पीठ

हरियाणा केंद्रीय विश्वविद्यालय, जांत-पाली, महेंद्रगढ़ (हरियाणा), 123031

Head of Department

Department of Computer Science & Information Technology,

School of Basic Science, Central University of Haryana,

Jant-Pali, Mahendragarh (Haryana), 123031

---------- Forwarded message ---------
From: **Dean School Of Basic Sciences** <deansobs@cuh.ac.in>
Date: Tue, May 31, 2022 at 5:59 PM
Subject: Re: School Board Meeting on 14-05-2022 at 10:30 A.M. onwards
To: <bonnie_kahlon@yahoo.com>, <talk2pawan@gmail.com>, <ckjaggi@gmail.com>, <sukhdeepsingh.cse@dcrustm.org>, <amitach1@yahoo.com>, Amita Chandra <achandra@physics.du.ac.in>, HoD Maths <hodmaths@cuh.ac.in>, HOD Physics <hodphysics@cuh.ac.in>, HOD Statistics <hodstatistics@cuh.ac.in>, CS and IT <hodcomputerscience@cuh.ac.in>, <hodgeography@cuh.ac.in>, <hodchemistry@cuh.ac.in>, <ssunita@cuh.ac.in>, Dr. Suneel Kumar <suneelkumar@cuh.ac.in>, <harishkumar@cuh.ac.in>, <Rajeshgupta@cuh.ac.in>, <mkgupta@cuh.ac.in>, <keshav@cuh.ac.in>, Suraj Arya <surajarya@cuh.ac.in>, <jitendra@cuh.ac.in>, Dr. Manish Kumar <manish.ks@cuh.ac.in>, <arunkajla@cuh.ac.in>, Dr. Rakesh Kumar <rks@cuh.ac.in>, <kapilstats@cuh.ac.in>, <kahlon_s@pu.ac.in>

Respected Madam/Sir,
First of all I would like to thank all esteemed members of the School Board for attending the meeting. Specially, I would like to pay sincere regards and gratitude to our External Subject Experts for giving valuable suggestions and guidance.
Please find herewith the minutes of the meeting of the School Board held on 14-05-2022 for your kind consideration and approval.

Minutes of Meeting of the School Board of School of Basic Sciences held on 14.05.2022

The meeting of the **School Board of School of Basic Sciences**, Central University of Haryana, Mahendergarh was held in the office of the Dean, School of Basic Sciences, Central University of Haryana on **14.05.2022** at **10:30 A.M.** onwards. The meeting was conducted through **offline & online mode** (Google Meet: meet.google.com/gmc-zzkc-pvy).

The following members were present in the meeting:

1. **Prof. Vinod Kumar** (Chairman, joined offline)
Dean, School of Basic Science
Head, Department of Chemistry
Central University of Haryana, Mahendergarh

2. Prof. Pawan Kumar Sharma (External Subject Expert, joined offline)
Professor, Department of Chemistry
Kurukshetra University, Kurukshetra, Haryana

3. **Prof. Chandra K. Jaggi** (External Subject Expert, joined online)
Professor, Department of Operational Research
Faculty of Mathematical Sciences, DU, Delhi

4. Prof. Sukhdeep Singh (External Subject Expert, joined offline)
Professor, Department of Computer Science & Engg.
Faculty of Mathematical Sciences, DU, Delhi

5. Prof. Amita Chandra (External Subject Expert, joined online)
Professor, Department of Physics & Astrophysics
North campus, DU, Delhi

6. Prof. Simrit Kahlon (External Subject Expert, joined online)
Professor, Department of Geography
Panjab University, Chandigarh

7. **Prof. Rajesh Kumar Gupta** (Member, joined offline)
Head, Department of Mathematics
Central University of Haryana, Mahendergarh

8. **Prof. Suneel Kumar** (Member, joined offline)
Head, Department of Physics & Astrophysics
Central University of Haryana, Mahendergarh

9. Prof. Harish Kumar (Member, joined offline)
Department of Chemistry
Central University of Haryana, Mahendergarh

10. Prof. Sunita Shrivastava (Member, joined offline)
Department of Physics & Astrophysics
Central University of Haryana, Mahendergarh

11. **Dr. Jitendra Kumar** (Member, joined online)
Head, Department of Geography
Central University of Haryana, Mahendergarh

12. **Dr. Keshav Singh Rawat** (Member, joined offline)
Head, Department of Computer Science and IT
Central University of Haryana, Mahendergarh

13. Dr. Manoj Kumar Gupta (Member, joined offline)
Department of Chemistry
Central University of Haryana, Mahendergarh

14. Dr. Suraj Arya (Member, joined offline)
Department of Cs& IT
Central University of Haryana, Mahendergarh

15. Dr. Manish Kumar (Member, joined offline)
Department of Geography
Central University of Haryana, Mahendergarh

16. Dr. Arun Kajla (Member, joined offline)
Department of Mathematics
Central University of Haryana, Mahendergarh

17. Dr. Rakesh Kumar (Member, joined online)
Department of Physics & Astrophysics
Central University of Haryana, Mahendergarh

18. Dr. Kapil Kumar (Member, joined offline)
Department of Statistics
Central University of Haryana, Mahendergarh

At the outset, the Chairman welcomed all the members and greeted the new members. The Chairman briefed all members about the past activities and agenda items to be discussed in the meeting. The external experts suggested that the agenda items and related documents should be circulated at least one week before the meeting and all members agreed with the same.
In the meeting, the following agenda items were deliberated in detail and resolved:

Item No.	Descriptions	
1.	Confirmation of the minutes of the meeting of the School Board of School of Basic Sciences held on 20-09-2021.	**Annexure-1-SOBS**
	Resolved that the minutes of the meeting of the School Board of School of Basic Sciences held on 20-09-2021, be approved.	
2.	To consider and approve the minutes of the meeting of the Board of Studies (BOS) of the Department of Chemistry, School of Basic Sciences held on 15-12-2021.	**Annexure-I-CHEM**
	Resolved that the minutes of the meeting of the Board of Studies (BOS) of Department of Chemistry, School of Basic Sciences held on 15-12-2021, be approved.	
3.	To consider and approve the minutes of the meeting of Board of Studies (BOS) of the Department of Computer Science & Information Technology, School of Basic Sciences held on 31/03/2022.	**Annexure-A**
	Resolved that the minutes of the meeting of the Board of Studies (BOS) of Department of Computer Science & Information Technology, School of Basic Sciences held on 31/03/2022, be approved.	
3a	To consider and approve the Scheme and Syllabi of MCA (Master of Computer Applications), two year Programme (w.e.f. Academic Session 2022-2023) as approved in BOS meeting of Department of Computer Science & Information Technology, held on 31/03/2022 and to recommend the same to the Academic Council for consideration and approval.	**Annexure-I-CS**
	Discussed and recommended to correct some typo errors in the Scheme and Syllabi of MCA (Master of Computer Applications), two Year Programme (w.e.f. Academic Session 2022-2023). **Resolved that Scheme and Syllabi of MCA (Master of Computer Applications), Two Year Programme (w.e.f. Academic Session 2022-2023) as approved in BOS meeting of Department of Computer Science & Information Technology held on 31/03/2022, with minor changes as mentioned above be**	

	approved and recommended the same to the Academic Council for consideration and approval.	
4.	To consider and approve the minutes of the meeting of Board of Studies (BOS) of the Department of Computer Science & Information Technology, School of Basic Sciences held on 03/05/2022.	**Annexure-B**
	Resolved that the minutes of the meeting of the Board of Studies (BOS) of the Department of Computer Science & Information Technology, School of Basic Sciences held on 03/05/2022, be approved.	
4a	To consider and approve the Scheme and Syllabi of Ph.D. (Computer Science) course work (w.e.f. Academic Session 2022-2023) as approved in BOS meeting of Department of Computer Science & Information Technology held on 03/05/2022 and to recommend the same to the Academic Council for consideration and approval.	**Annexure-II-CS**
	School Board members appreciated the starting of Ph.D. (Computer Science) in the Department of Computer Science and Information Technology. Discussed and Resolved the Scheme and Syllabi of Ph.D. (Computer Science) course work (w.e.f. Academic Session 2022-2023) as approved in the BOS meeting of Department of Computer Science & Information Technology held on 03/05/2022, be approved and recommended the same to the Academic Council for consideration and approval.	

Further, the external experts suggested that the meeting may be continued on another day as more time is required to discuss the other agenda items (from item no. 5 to 7) in detail for better outcomes, however, due to some technical reason the meeting cannot be continued. Therefore, remaining agenda items along with new agenda items will be discussed in the next meeting of the School Board to be scheduled in the future.

The meeting ended with thanks to the Chair.

Prof. Vinod Kumar	**Prof. Pawan Kumar Sharma**	**Prof. Chandra K. Jaggi**
Prof. Sukhdeep Singh	**Prof. Amita Chandra**	**Prof. Simrit Kahlon**
Prof. Rajesh Kumar Gupta	**Prof. Suneel Kumar**	**Prof. Harish Kumar**
Prof. Sunita Shrivastava	**Dr. Jitendra Kumar**	**Dr. Keshav Singh Rawat**
Dr. Manoj Kumar Gupta	**Dr. Suraj Arya**	**Dr. Manish Kumar**
Dr. Arun Kajla	**Dr. Rakesh Kumar**	**Dr. Kapil Kumar**

With Warm Regards

अधिष्ठाता / **Dean**
मौलिक विज्ञान पीठ / **School of Basic Sciences**
शैक्षणिक खंड-1, प्रथम मंज़िल / **Academic Block-1, 1st Floor**
हरियाणा केंद्रीय विश्वविद्यालय / **Central University of Haryana**
महेंद्रगढ़ (हरियाणा), भारत १२३०३१ / **Mahendergarh (Haryana), INDIA 123031**

On Tue, May 10, 2022 at 11:06 AM Dean School Of Basic Sciences <deansobs@cuh.ac.in> wrote:

> **Esteemed Members of the School Board**
> **School of Basic Sciences**
> **Central University of Haryana**
> **Mahendergarh, Haryana**
>
> Respected Sir/Madam,
> Greetings from the School of Basic Sciences, Central University of Haryana, Mahendergarh!
> I hope you and your family members are safe and sound.
> A meeting of **School Board** of the School of Basic Sciences, Central University of Haryana (CUH) is scheduled to be held on **14-05-2022 (Saturday)** at **10:30 A.M. onwards** in the office of the undersigned, first floor, Academic Block-1, Central University of Haryana, Mahendergarh. Agenda items of the meeting will be shared by tomorrow morning via email for your kind consideration.
>
> All members are requested to kindly make it convenient to attend the meeting.
>
> ***(Note: The members who are not able to attend the meeting in-person may join the meeting online. The link for the online platform will be shared via email one day before the meeting of the School Board).***
>
> Dr. Kesha Singh Rawat (Head, Department of Computer Science & Informatics) is requested to share a link for the online meeting as per schedule and will help in recording the minutes of the meeting.
> Dr. Devender Singh (TIC, Department of Statistics) will help in processing the TA/DA bill and Honorarium Bills of the External Experts.
>
> All External Experts are also requested to share the visit plan so that necessary arrangements can be made accordingly. Revised notification of School Board Constitution, TA and Honorarium Bill Forms (unfilled) are attached herewith for your kind information.
>
> With Sincere Regards
>
> अधिष्ठाता / **Dean**
>
> मौलिक विज्ञान पीठ / **School of Basic Sciences**
> शैक्षणिक खंड-1, प्रथम मंज़िल / **Academic Block-1, 1st Floor**
> हरियाणा केंद्रीय विश्वविद्यालय / **Central University of Haryana**
> महेंद्रगढ़ (हरियाणा), भारत १२३०३१ / **Mahendergarh (Haryana), INDIA 123031**

- **Annexure-A.pdf**
- **Annexure-B.pdf**
- **Annexure-I CS.pdf**
- **Annexure-II CS.pdf**

2 attachments

Annexure-I-CHEM.pdf
174K

CENTRAL UNIVERSITY OF HARYANA

Mahendergarh

Department of Computer Science & Information Technology

Minutes of BOS Meeting held on 31.03.2022

The **meeting** of the **Board of Studies** of the **Department of Computer Science & Information Technology**, School of Basic Sciences, Central University of Haryana, Mahendergarh was held through **online mode** (Google Meet) on **31.03.2022** at **11:00 am**.

The following members attended the meeting:

1. **Prof. Vinod Kumar** — Chairman
   Dean, School of Basic Science and Head, CS&IT
   Central University of Haryana, Mahendergarh
2. **Prof. Sonal Chawla** — Subject Expert(External)
   Department of Computer Science and Application
   Punjab University Chandigarh.
3. **Prof. Yogesh Chaba** — Subject Expert(External)
   Department of Computer Sci. & Engg
   Guru Jambheshwar University of Science and Technology,
   Hisar – Haryana.
4. **Dr. Keshav Singh Rawat** — Member
   Associate Professor,
   Computer Science & Information Technology
   Central University of Haryana, Mahendergarh
5. **Dr. Rakesh Kumar** — Invited Member
   Associate Professor, CSE
   TIC, CS & IT,
   Central University of Haryana, Mahendergarh

The Chairman welcomed all the members and briefed them about the past activities and also about the agenda items to be discussed in the meeting.

AGENDA ITEM NO. 1:

Approval of syllabus and scheme of MCA (Two Year) programme with respect to NEP(National Education Policy).

Decision:

All the members of BOS approved the revised scheme and syllabus of MCA (Two Year) programme in light of the National Education Policy-2020 as per Annexure-I.

The meeting ended with a vote of thanks.

Signatures of BOS Members:

Dr. Keshav Singh Rawat

Prof Yogesh Chaba

CONFIRMED THROUGH EMAIL

(Prof. Sonal Chawla)

Dr. Rakesh Kumar

20/4/2022

(Prof- Vinod Kumar)

CS and IT <hodcomputerscience@cuh.ac.in>

Regarding BOS Minutes & Remuneration held on 31.03.2022

Suraj Arya <surajarya@cuh.ac.in> Mon, Apr 18, 2022 at 7:02 PM
To: CS and IT <hodcomputerscience@cuh.ac.in>

Sir
Scheme and syllabus of MCA has been approved by the external subject experts . This is for your information.

---------- Forwarded message ---------
From: **sonal_chawla** <sonal_chawla@pu.ac.in>
Date: Wed, Apr 20, 2022 at 10:20 AM
Subject: Re: Fwd: Regarding BOS Minutes & Remuneration held on 31.03.2022
To: Suraj Arya <surajarya@cuh.ac.in>

Plz consider the Minutes of BOS held on 31.03.2022 Approved.. Will Fwd the remuneration form soon

Regards

Prof(Dr) Sonal Chawla

[Quoted text hidden]
[Quoted text hidden]

CENTRAL UNIVERSITY OF HARYANA

(*Established under the Central Universities Act, 2009*)

(NAAC Accredited 'A' Grade)

LOCF and NEP-2020 Based CBCS

Curriculum and Syllabi
of
Master of Computer Applications (MCA)
(w.e.f. 2022-23)

DEPARTMENT OF COMPUTER SCIENCE AND INFORMATION TECHNOLOGY

SCHOOL OF BASIC SCIENCES

Sr. No.	Table Contents	Page No.
	Vision and Mission	**3**
1.	**Background** **i) NEP-2020 and LOCF an integrated Approach** **ii) About the subject** **iii) About the Programme (Nature, extent, and aims)** **iv) Qualification Descriptors (possible career pathways)**	**5**
2.	**Program Educational Objectives (PEOs)**	**11**
3.	**Programme Outcomes (POs)**	**12**
4.	**Programme Specific Outcomes (PSOs)**	**14**
5.	**Postgraduate Attributes**	**15**
6.	**Structure of MCA Programme**	**17**
7.	**Learning Outcome Index (Mapping of Courses with POs and PSOs)**	**18**
8.	**Semester-wise Courses and Credit Distribution**	**22**
9.	**Course-Level Learning Outcomes**	**28**
10.	**Teaching-Learning Process**	**162**
11.	**Implementation of Blended Learning**	**162**
12.	**Assessment and Evaluation**	**163**
13.	**Keywords**	**164**
14.	**References**	**164**
15.	**Appendices**	**164**

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, nations, and the world, through the promotion of innovation, creative endeavors, and scholarly inquiry.

Mission

To serve as a beacon of change, through multi-disciplinary learning, for the creation of a knowledge community, by building a strong character and nurturing 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 be a Centre of Excellence for nurturing computer professionals with strong application expertise through experiential learning and research for matching the requirements of industry and society instilling in them the spirit of innovation and entrepreneurship by providing knowledge of computer systems in both hardware and software application design so that they contribute not only in the progress of software and its application but even encompass the entire emerging domain of computer technology.

Mission

1. To improve high-quality professional training at the postgraduate with an Emphasis on the basic principle of Computer Science and application.
2. To impart value-based, quality education that provides design and development like software applications in their entirety. Innovative learning-centric facilities for solving computational problems.

3. To promote research-based activities through analysis and interpretation of data and synthesis of the information for utilization in resolving practical problems relating to computer applications.
4. To provide help in promote\preparing students to qualify for exams like UGC-NET, GATE, and other competitive exams.
5. To provide a framework through Project Based Learning to support society and industry in promoting a multidisciplinary activity.
6. To provide a quality learning experience through effective classroom practices, the active learning style of teaching, and opportunities for meaningful interaction between students and faculty.
7. To develop a crystal clear evaluation system and experiential learning mechanism aligned with futuristic technologies and industry.
8. To undertake societal activities for the upliftment of rural/deprived sections of the society.

iii) Mapping of Vision and Mission

Vision and Mission of the University	**Vision and Mission of the Department**
To develop enlightened citizenship of a knowledge society for peace and prosperity of individuals, nations, and the world, through the promotion of innovation, creative endeavors, and scholarly inquiry.	**Yes**
To serve as a beacon of change, through multi-disciplinary learning, for the creation of a knowledge community, by building a strong character and nurturing value-based transparent work ethics, promoting creative and critical thinking for holistic development and self-sustenance for the people of India.	**Yes**
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.	**Yes**

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 the National Education Policy-2020 and UGC Quality Mandate for Higher Education Institutions-2021. The process of revising the curriculum could be prompted by the adoption of the "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 a 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 levels. 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 a 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 subject

Computer plays a significant role in every field of life. They help us in several ways, for example, they find applications in medicine, surgery, industrial process, aviation industry, making bills in various big shops & malls, creating presentation slides in application software for making notes & delivering lectures in colleges, universities, analysis of algorithms, programming languages, program design, development of software and computer hardware and a lot more. In short, not only in just one, but the Computer plays an all-rounded role in the field of education of students.

Computer and internet facilities are the most powerful devices that students can use to learn new skills & abilities in education. Innovation in Computer technology has a profound impact on education. It forms a part of the school curriculum as it is essential for every individual today. Computer education in schools plays a major noteworthy role in the career development of young students, it becomes an integral part of each student's life. Vast or Immense storage is yet another main great characteristic of a computer. Students and teachers can download and store a lot of educational materials, books, presentations, lecture/ address notes, question papers, and so on. Students can find many different ways to solve a certain problem given to them. Through computers, they can interact with people having the same issues & decisions.

Being actively used in various educational institutes like schools, colleges & big universities, and computer centers, computers are used to aid the learning process of students. Professors in colleges & teachers in schools take the help of audio-visual techniques to prepare lesson plans for students. For this, they use Microsoft PowerPoint to prepare electronic presentations about their lectures. These electronic presentations can be shown on multimedia and sound projectors in classrooms. It is an interesting and simple method to learn for students. Multimedia (Sight and sound) presentations are easy to deliver for teachers also as these presentations spare a great deal of time and effort. Computers can be used for online education & research. With the help of the internet, students can find useful information about their projects, and assignments and also can take useful help from other researchers as they store & organize their research materials on computers. In CBT (Computer Based Training), various projects & educational programs are prepared or set up with the assistance of expert educators and audio-visual media help. These educational programs are generally set up in the shape of lectures on a specific subject/ topic & are given on CDs. Students can learn when they wish at their homes. Using Computer Education students can-

- Enhances creativity & thinking skills
- Proves beneficial for career aspiration
- Design and develop a software application for different industries
- Provides efficient & better use of IT Technology
- Improves research work & helps in communicating with different education providers
- Gives instant information/ Quick processing of data on any topic in just a single click
- Manages the software, hardware & networks in any industry
- Involves in the design and development of the hardware components of PCs & laptops
- Develop software for peripheral computing devices such as printers, modems, scanners, etc.
- Write code and algorithms for operating systems like Windows, Linux, etc.
- Develop design, implementation, and management of information systems of computer hardware and software.

iii) About the Programme (Nature, extent, and aims) :

Master of Computer Applications (MCA) is a 2-year postgraduation programme. MCA course is now offered by more than 200 institutions all over India and is an important source of human resources for the software industry. The first MCA curriculum was proposed in 1982 and was later revised by a working group of the Indian Society of Technical Education in 1990. These curricula have been primarily used as guidelines by Universities that have a Board of Studies whose responsibility is to draft curricula. Needless to say, a good curriculum is an essential requirement for ensuring the quality of an academic programme. Information Technology is growing rapidly and Increasing applications of computers in almost all areas of human endeavor have led to a vibrant industry with concurrent rapid change in technology. Thus the challenge in designing a curriculum is to identify the areas of reasonably stable core competence and provide a sufficient number of electives and laboratories to accommodate changes. Thus the suggested curriculum has a strong laboratory and project orientation in which the use of new tools will be emphasized. Most courses will have an associated laboratory and it is expected that they will be equipped with the latest software tools. One of the major problems faced by almost all colleges offering MCA, courses is the lack of adequate faculty. This problem has no easy solution as industry jobs are plentiful and very remunerative. This problem can be partially alleviated if good educational material is available to students and Staff covering the curriculum. The objective of the MCA

programme is to prepare postgraduates for productive careers in the software industry, corporate sector, Govt. organizations, and academia by providing a skill-based environment for teaching and research in the core and emerging areas of the discipline. This Master's Degree Programme has been designed with a semester approach in mind. The first-year courses are aimed at skills development in computers using various technologies, core courses that provide a conceptual framework and the second year offer specialization courses, training, and project works.

iv) Qualification Descriptors (possible career pathways)

On successful completion of the MCA Programme, students of the department are expected to work at different platforms in addition to living productive and meaningful lives. Some of the possible career paths for the postgraduate students may be:

1. Software Developer

Software developer develops, tests, installs, and maintains brand new software systems for clients. Software developers are as much engaged in recommending upgrades in existing programs as they are in making all the application system pieces work together.

2. System Analyst

A systems analyst is an information technology professional who specializes in analyzing, designing, and implementing information systems. Systems analysts assess the suitability of information systems in terms of their intended outcomes.

3. Data Scientist

Data scientists are responsible for analyzing all the data that is collected to make predictions, understand consumer and market behavior, and overall improve business and customer service.

4. Network Manager

A Network Manager Manage and maintain the network, as well as network performance monitoring, Identifying, installing, and maintaining upgrades to the network.

5. Web Developer

A popular career choice among MCA graduates is getting into web designing and development. Web designers and developers enable back-end functionality and also ensure that the front end looks appealing.

6. Digital Marketing

After MCA learners can also make a career in digital marketing. This field is emerging day by day.

7. Self-Engagement

After MCA learners can also become an entrepreneur.

8. Govt. organizations

A popular career choice among MCA graduates is getting into Govt. organizations

9. Database Engineer

As a database administrator or engineer, you would be tasked with creating and managing databases, which store and organize data. Besides building new databases, you would also configure existing systems and ensure that everything remains functional

10. Go for Higher Studies

After MCA it is highly recommended that the learner should go for higher studies, depending upon his background and interest. After MCA the learner can opt followed degrees:

- M.Tech.
- Ph.D.

2. Program Educational Objectives (PEOs)

PEO 1

- To develop the ability to excel in a professional career and/or higher education excellence through the knowledge acquisition of computing, mathematics, and information communication technology.

PEO 2

- To extend the capability to plan, analyze, design, code, test, enforce and hold the software program product.

PEO 3

- To excel in professionalism, moral attitude, conversation skills, team building, and adaptingthe latest ICT tools/techniques.

PEO 4

- To analyze real-world problems, design, and develop computing models/systems for multidisciplinary domains that are feasible, suitable, economical, and socially acceptable.

PEO 5

- To develop the capabilities to pursue higher studies and establish a research practice for the contribution to academia/industry and multidisciplinary research.

PEO 6

- To enhance the capabilities to initiate startups and become entrepreneurs in various domains of computer science and Information technology.

3. 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 attaining important essential skills and abilities:

PO no.	Component	Outcomes
PO-1	Computational Knowledge:	Apply knowledge of computing fundamentals, computing specialization, mathematics, and domain knowledge appropriate for the computing specialization to the abstraction and conceptualization of computing models from defined problems and requirements.
PO-2	Problem Analysis:	Identify, formulate, research literature, and solve complex computing problems reaching substantiated conclusions using fundamental principles of mathematics, computing sciences, and relevant domain disciplines.
PO-3	Design /Development of Solutions	Design and evaluate solutions for *complex* computing problems, and design and evaluate systems, components, or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations.
PO-4	Conduct Investigations of Complex Computing Problems	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.
PO-5	Modern Tool Usage:	Create, select, adapt and apply appropriate techniques, resources, and modern computing tools to *complex* computing activities, with an understanding of the limitations.

PO-6	Professional Ethics	Understand and commit to professional ethics and cyber regulations, responsibilities, and norms of professional computing practice.
PO-7	Life-long Learning	Recognize the need, and have the ability, to engage in independent learning for continual development as a computing professional.
PO-8	Project management and finance	Demonstrate knowledge and understanding of the computing and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO-9	Communication Efficacy	Communicate effectively with the computing community, and with society at large, about *complex* computing activities by being able to comprehend and write effective reports, design documentation, make effective presentations, and give and understand clear instructions.
PO-10	Societal and Environmental Concerns	Understand and assess societal, environmental, health, safety, legal, and cultural issues within local and global contexts, and the consequential responsibilities relevant to professional computing practice.
PO-11	Individual and Team Work	Function effectively as an individual and as a member or leader in diverse teams and in multidisciplinary environments.
PO-12	Innovation and Entrepreneurship	Identify a timely opportunity and use innovation to pursue that opportunity to create value and wealth for the betterment of the individual and society at large.

4. Programme Specific Outcomes (PSOs)

The postgraduates shall be able to realize the following outcomes by the end of program studies:

Number	Programme Specific Outcomes
PSO-1	The ability to remember and understand the basic concept of associated subjects and Computer Fundamentals, Computer Programming, Design, and Analyze different Network Techniques.
PSO-2	The proficiency to understand, evaluate and analyze the design and algorithm concepts of computer architecture, Operating systems, Computer Networks, Software Engineering, Design and Analysis of Algorithms, Compiler Design, Artificial Intelligence, etc
PSO-3	The ability to design and solve problems in the field of Interdisciplinary subjects by applying the knowledge acquired from Data analysis, Software development & other allied topics.
PSO-4	The skills to develop, adopt, and assess the latest innovative industry best practices, then analyze and comprehend the young mindsets accordingly to their attitude toward higher studies, research, and to possess a successful path as a young entrepreneur.
PSO- 5	Analyze their abilities in systematic planning, developing, testing, and executing complex computing applications, in the field of Social Media and Analytics, Web Application Development, and Data Interpretations.

5. Postgraduate Attributes:

On completion of the post-graduate programme in MCA, students are expected to equip with the skills of creative, critical, and rational thinking associated with computers and their use for human society. The following attributes are expected from the students of MCA :

No.	P.G. Attributes
PGA-1	Describe the notion of mathematical thinking, mathematical proofs, and algorithmic thinking, and be able to apply them in problem-solving that involves Discrete Mathematical Structures, Design and Analysis of Algorithms, image processing, Compiler Design, etc.
PGA-2	Ability to use the updated tools, techniques, and modern Software tools necessary for software Development like Android Application Development, Data Science with R programming, Bioinformatics, Cloud Computing, etc.
PGA-3	Introduce the basic principles, techniques, and applications of Artificial Intelligence. Emphasis will be placed on the teaching of these fundamentals and labs for the 'hands-on' approach to understanding, as well as a challenging avenue for exploration and creativity.
PGA-4	Provide professional knowledge in specialized areas such as Computer Vision,Internet of Things, Natural Language Processing, Speech Recognition, etc.
PGA-5	Communicate effectively by comprehending, documenting, making effective presentations, and exchanging clear instructions through project reports and presentations.
PGA-6	Describe the fundamental concepts, Solve problems, use algorithms in machine learning and popular machine learning algorithms with programming in Python/ MatLab.and describethe concept of Deep Learning.
PGA-7	Design and implement smart, intelligent, and user-friendly interfaces for computer web applications using PHP version 5. Students will learn how to connect to any ODBC- compliant database and perform hands-on practice with a MySQL database to create database-driven HTML forms and reports, etc. Students also learn how to configure PHP and Apache Web Server.
PGA-8	Develop programming skills through C, PHP, object-oriented programming, javaprogramming, Advance Java Programming & Android, etc.

PGA-9	Develop robust, efficient software systems, Analyse the security requirements, and examine software problems in multiple aspects including, testing and implementation that would involve software engineering, data structures, networked programming**,** Wireless Sensor Networks, Network Security, etc
PGA-10	Analyze the relationship between organizations, information systems, business processes, Identify different techniques, store, and manipulate the huge data from different resources, involving E-commerce and Data Science with R programming.

6. Structure of Master of Computer Science and Application (MCA)

- **General, Course structure & Theme & Semester-wise credit distribution**

A. Definition of Credit:

1 Hour Lecture (L) per week	1 credit
1 Hour Tutorial (T) per week	1 credit
2 Hours Practical (Lab)/week	1 credit

B. Total credits:

The total credit of the MCA 2 Year programme is 104. The minimum qualifying marks for a course or programme shall be 40% (i.e., 'P' grade).

C. Structure of MCA program:

S. No.	Category	Breakup of Credits (Total =104)	%
1	**Professional Core Courses**	**72**	**69.23**
2	**Program Elective Courses** relevant to the branch	**12**	**11.54**
3	**General Elective Courses**: Taken from other departments	**8**	**7.69**
4	**Project work** and Internship in Industry / in house	**2+2+8=12**	**11.54**
5	**Mandatory Courses as bridge course:** [Fundamentals of Computer Science, Computer Programming using C, Computer Programming using C -Lab].	**non- Credit**	
	Total	**104**	

7. Learning Outcome Index

(Mapping of Courses with POs and PSOs)

A) Mapping of Courses with POs (First Year)

Semester	POs ⇨ / Courses ⇩	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
I	CC-1	M	W		W			W		S	M		
	CC-2	S	M			W		M		M		W	
	CC-3	W	M		M			M		W			
	CC-4	S	M	W	M	M	W	M	W	M	W	M	S
	CCP-1	M	M		M	M		W	W	M	M		M
	CCP-2	S	S	M	W		W	M		M		M	S
	CCP-3	S	M	W	M	M	M	S	S	S	S	S	S
	GEC-1	S	W			S				W	M		
	BC- 1	S				M		M	W	M		M	
	BC- 2	S	S		M	M		M		M	W	M	M
	BCP	S	S		M			M		M	W	M	S
II	CC-1	M	W			S		M	W	M	S	M	M
	CC-2	S	S	W	M	S	W	W	M	S	M		S
	CC-3	M	W			W		M	S	S	M	S	M
	CC-4	M	S	M	S	W		W		S		W	W
	CCP-1	M	W		M	M		M		M	W		M
	CCP-2	M	W		M	M	W	M		M		M	S
	CCP-3	S	S	W	M	M		W	M	M	W	W	
	PEC-1	W				S				S	M		
	PEC-2	M				S		M		W			
	PEC-3	M	W			W		W		W	M		
	PEC-4	S		M		M				M	M	W	M

6.1 B) 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	PO-10	PO-11	PO-12
	Courses ⇩												
III	CC-1	M			M	M	M	W		S	S	M	M
	CC-2	M	S		S	M				M		W	
	CC-3	M	M		M	M		M		S			S
	CC-4	M	M			M	W	M	M	S	S		
	GEC-II	W				S					M		
	CCP-1	M	M		W	M	W		M	M	S	W	S
	CCP-2	S	S	M	M	S	M	M		M	M	M	S
	PEC-1	S	W		M	M	M			M	M		M
	PEC-2	M			M		W			M	M		W
	PEC-3	W	S	M	S	M		W	M	M	W	M	M
	PEC-4	S		S		M				W	M	M	S
	PEC-5	M				M		M		S	W	M	
	MP												
	STR												
IV	CC-1	M	S		M	W	W		M	M	S	M	S
	CC-2	S	S		S	M		M		M	W		W
	CCP-1	M	S		M	W			M	M	W	M	S
	CCP-2	M	S	S	W	S	M	M		M	M	M	S
	PW	M	M			S		M	S	S	S		
	PEC-1	W	M			S	M			S	S		W
	PEC-2	S	W		M	M		W		M	M	W	
	PEC-3	W	W		S					W	M	M	
	PEC-4	M	W	W	M	S			W	M	W		W
	PEC-5	M	M	M	S	M		M	W	S	M	S	S
	PEC-6	M	M		W	S	W	M		W	M	W	M

B) Mapping of Courses with PSOs (First Year)

Semester	POs ⇨	PSO-1	PSO-2	PSO-3	PSO-4	PSO5
	Courses ⇩					
I	CC-1	S	M	S	S	S
	CC-2	S	S	W	W	M
	CC-3	W	S	W	W	M
	CC-4		W	S	W	W
	CCP-1	M	M	M	S	S
	CCP-2	W	M	W	W	M
	CCP-3		W	M	M	S
	GEC-1	W			W	M
	BC- 1	S	M	M	W	W
	BC-2	S	W	S	M	M
	BCP	S	W	S	M	S
II	CC-1	S	M	M	W	S
	CC-2	M	M	W	M	S
	CC-3	S	W	S	M	W
	CC-4	W	S	M	S	S
	CCP-1	S	S	M	M	S
	CCP-2	W	W	S	M	S
	CCP-3		S	M	W	M
	PEC-1	M	M	W	W	M
	PEC-2	M	S	S	S	S
	PEC-3	M	M	W	W	W
	PEC-4	W	S	W	W	W

6.2 B) Mapping of Courses with PSOs (Second Year)

Semester	POs ⇨	PSO-1	PSO-2	PSO-3	PSO-4	PSO-5
	Courses ⇩					
III	CC-1	W	S	M		S
	CC-2	M	S	M	M	S
	CC-3	M	S	W		S
	GEC-II	W			W	W
	CCP-1	S	W	S	S	S
	CCP-2	S	M	S	S	S
	PEC-1	M		S	M	S
	PEC-2	W	M	S	S	S
	PEC-3	W	S	S	S	S
	PEC-4	W	M	S	W	S
	PEC-5	W	M	M	W	M
	MP					
	STR					
IV	CC-1	W	W	S	S	M
	CC-2	M	M	S	S	M
	CCP-1	S	W	M	M	S
	CCP-2	S	W	S	S	S
	PW	S	S	M	S	S
	PEC-1	W	W	M	M	M
	PEC-2	W	M	W	W	W
	PEC-3	W	W	W		W
	PEC-4	W	S	M	M	M
	PEC-5		M	M	W	W
	PEC-6	W	W	M	M	S

8. Semester-wise Courses and Credit Distribution

Scheme and Syllabi of Master of Computer Applications (MCA) Two years Programme (with effect from the Academic Session 2022-23)

Total Credit = 104

Semester Wise Distribution of Credits: 26 + 26 + 28 + 24

Eligibility for Admission to MCA two year Programme:

Passed B.C.A/ B.Sc. (Computer Science)/ B.Sc. (IT) / B.E. (CSE)/ B.Tech. (CSE) / B.E. (IT) / B.Tech. (IT) or equivalent Degree.

OR

Passed any graduation degree (e.g.: B.E. / B.Tech. / B.Sc / B.Com. / B.A./ B. Voc./ etc.,) with Mathematics at 10+2 level or at Graduation level Obtained at least 50% marks (45% marks in case of candidates belonging to reserved category) in the qualifying examination. (**The students admitted with this eligibility will have to simultaneously undertake additional Bridge Course(s) as prescribed by the University during the first year *****).***

Bridge Course (Non-Credit Course)								
Sr.No.	**Course Code and Course No**	**Course Title**	**L**	**T**	**P**	**Hrs/Week**	**Total Credits**	**NEP-2020 relevancy**
1	SBS CS 01 01 01 E 3104	Fundamentals of Computer Science	**3**	**1**	**0**	4	**0**	Computer literacy skills
2	SBS CS 01 01 02 E 3104	Computer Programming using C	**3**	**1**	**0**	4	**0**	Basic programming skills development
3	SBS CS 01 01 03 E 0042	Computer Programming using C -Lab	**0**	**0**	**4**	4	**0**	Code organization skills

Note: It is compulsory for each student to pass out Bridge Course(s) during the first year only (two additional theory papers and one practical as prescribed in the scheme of Bridge Course). Papers under Bridge Course will be taught only in the 1st semester of the MCA programme.

Semester -1st (26 – Credits)

Sr. No.	Course Code and Course No	Course Title	L	T	P	Hrs/Week	Total Credits	NEP-2020 Relevancy
Core Courses (compulsory)								
1	SBS CS 01 01 01 C 3104	Data Structures	**3**	**1**	**0**	4	**4**	Complex data structure skills
2	SBS CS 01 01 02 C 3104	Computer Networks	**3**	**1**	**0**	4	**4**	Network data comm. Skills
3	SBS CS 01 01 03 C 3104	Discrete Mathematical Structures	**3**	**1**	**0**	4	**4**	Mathematical reasoning skills
4	SBS CS 01 01 04 C 3104	Operating System and Shell Programming	**3**	**1**	**0**	4	**4**	Solution wise c/c++ Programming skills
5	General Elective Course-I (To be taken from another department)						**4**	
6	SBS CS 01 01 05 C 0042	Data Structures using C Lab-I	**0**	**0**	**4**	4	**2**	Programming skills development
7	SBS CS 01 01 06 C 0042	Operating System and Shell Programming Lab -II	**0**	**0**	**4**	4	**2**	OS skills development
8	SBS CS 01 01 07 C 0042	Web Development using PHP Lab-III	**0**	**0**	**4**	4	**2**	Web development skills

Semester – 2nd (26 Credits)

Sr. No.	Course Code and Course No	Course Title	L	T	P	Hrs/Week	Total Credits	NEP-2020 Relevancy
Core Courses (compulsory)								
1	SBS CS 01 02 08 C 3104	Database Management System	**3**	**1**	**0**	**4**	**4**	Database manipulation skills
2	SBS CS 01 02 09 C 3104	Object-Oriented Programming	**3**	**1**	**0**	**4**	**4**	Object-based programming skills
3	SBS CS 01 02 10 C 3104	Software Engineering	**3**	**1**	**0**	**4**	**4**	Conceptual knowledge of software
4	SBS CS 01 02 11 C 3104	Design and Analysis of Algorithms	**3**	**1**	**0**	**4**	**4**	Algorithmic skills
5		Departmental Elective Course-I					**4**	
6	SBS CS 01 02 12 C 0042	Database Management System Lab-I	**0**	**0**	**4**	**4**	**2**	Database management skills
7	SBS CS 01 02 13 C 0042	Object-Oriented Programming using C++ Lab-II	**0**	**0**	**4**	**4**	**2**	Object-based programming skills
8	SBS CS 01 02 14 C 0042	Design and Analysis of Algorithms Lab-III	**0**	**0**	**4**	**4**	**2**	Algorithmic skills

List for Departmental Elective Courses-I

1	SBS CS 01 02 04 E 3104	Mobile Communication	**3**	**1**	**0**	4	**4**	Operation of mobile communications
2	SBS CS 01 02 05 E 3104	Management Information System and E-Commerce	**3**	**1**	**0**	4	**4**	Managing markets over online platform
3	SBS CS 01 02 06 E 3104	Quantum Computing	**3**	**1**	**0**	4	**4**	Quantum Entanglement skills
4	SBS CS 01 02 07 E 3104	Computer Graphics	**3**	**1**	**0**	4	**4**	Computer Graphics skills

Students have to undergo the training during summer vacations and prepare its report which will be evaluated in the 3rd Semester.

Semester – 3rd (28 Credits)

Sr. No.	Course Codeand Course No	Course Title	L	T	P	Hrs/Week	Total Credits	NEP-2020 Relevancy
Core Courses (compulsory)								
1	SBS CS 01 03 15 C 3104	Artificial Intelligence and Expert System	**3**	**1**	**0**	4	**4**	AI explorations & creative skills
2	SBS CS 01 03 16 C 3104	Theory of Computation	**3**	**1**	**0**	4	**4**	Computational solving skills
3	SBS CS 01 03 17 C 3104	Internet and Java Programming	**3**	**1**	**0**	4	**4**	Platform independent programming skills
4	Departmental Elective Course-II						**4**	
5	General Elective Course-II (To be taken from another department)						**4**	
6	SBS CS 01 03 18 C 0042	Internet and Java Programming Lab-I	**0**	**0**	**4**	**4**	**2**	Hands-on over platform independent programming skills
7	SBS CS 01 03 19 C 0042	Artificial Intelligence with Python Lab-II	**0**	**0**	**4**	**4**	**2**	Python programming skills
8	SBS CS 01 03 20 C 0042	Minor Project (Training)	**0**	**0**	4	**4**	**2**	Advanced skills enhancement
9	SBS CS 01 03 21 C 0042	Summer Training Report	**0**	**0**	**4**	4	**2**	Industrial skills development
List for Departmental Elective Courses-II (any one from the list*)								
1	SBS CS 01 03 08 E 3104	Network Programming	**3**	**1**	**0**	4	**4**	Networking skills
2	SBS CS 01 03 09 E 3104	Machine and Deep Learning	**3**	**1**	**0**	4	**4**	Machine learning skills

	10 E 3104	Project Management						
4	SBS CS 01 03 11 E 3104	Digital Image Processing	**3**	**1**	**0**	4	**4**	Image recognition skills
5	SBS CS 01 03 12 E 3104	Data Warehousing and Data Mining	**3**	**1**	**0**	4	**4**	Data processing skills

Semester – 4th (24 credits)

Sr. No.	Course Codeand Course No	Course Title	L	T	P	Hrs/Week	Total Credits	NEP-2020 relevancy
Core Courses (compulsory)								
1	SBS CS 01 04 22 C 3104	Data Science with R Programming	3	1	0	4	4	Huge data manipulating skills
2	SBS CS 01 04 23 C 3104	Compiler Design	3	1	0	4	4	Compiler optimizationskills
3	Departmental Elective Course-III						4	
4	SBS CS 01 04 24 C 0042	Data Science with R Programming Lab-I	0	0	4	4	2	Data manipulation programming skills
5	SBS CS 01 04 25 C 0042	Android Application Development Programming Lab-II	0	0	4	4	2	Application development skills
6	SBS CS 01 04 26 C 00168	Project Work (In House)	0	0	16	16	8	Research/ industry oriented skills

List for Departmental Elective Courses-III								
1	SBS CS 01 04 13 E 3104	Distributed and Cloud Computing	3	1	0	4	4	Cloud computation oriented
2	SBS CS 01 04 14 E 3104	Bioinformatics	3	1	0	4	4	Basics skills for bioinformatics
3	SBS CS 01 04 15 E 3104	Natural Language Processing and Speech Recognition	3	1	0	4	4	Speech recognitionskills
4	SBS CS 01 04 16 E 3104	Computer Vision	3	1	0	4	4	Design skills for Computer visionsoftware
5	SBS CS 01 04 17 E 3104	Embedded Programming	3	1	0	4	4	Micro-controller program learning
6	SBS CS 01 04 18 E 3104	Wireless Sensor Networks and Internet of Things	**3**	**1**	**0**	4	**4**	Wireless device communication skill

Generic Elective Courses (for students of other Departments**)**							
SBS CS 01 01 01 E 3104	Fundamentals of Computer Science	**3**	**1**	**0**	4	**4**	Inter/multidisciplinary
SBS CS 01 01 19 E 3104	Internet Fundamentals	**3**	**1**	**0**	4	**4**	Inter/multidisciplinary
SBS CS 01 02 05 E 3104	Management Information System and E-Commerce	**3**	**1**	**0**	4	**4**	Managing markets over the online platform

9. Course-Level Learning Outcomes

S.NO	Course Code	COURSE NAME	COURSE OUTCOMES(COS)
		Semester I	
1	SBS CS 01 01 01 C 3104	Data Structures	**1.** To learn the basic concepts about Data Structures andalgorithms. **2.** To understand the design of correct programs to solve problems **3.** Choose efficient data structures and apply them to solve problems. **4.** Analyze the efficiency of programs using sorting and hash tables. **5.** Evaluate the correctness of a program using loop invariants, preconditions, and postconditions in programs.
2	SBS CS 01 01 02 C 3104	ComputerNetworks	**1.** To learn about the basic concepts of Computer NetworkModules **2.** To understand network topologies, switching, and transmissionmedium. **3.** Apply the requirements for a given organizational structure andselect the most appropriate networking architecture and technologies. **4.** Analyze, specify, and design the topological and routing strategiesfor IP-based networking infrastructure. **5.** Evaluation of working knowledge of datagram and internet socket programming.
3	SBS CS 01 01 03 C 3104	Discrete Mathematical Structures	1. Describe the basic concept of mathematical thinking, mathematical proofs, and algorithmic thinking. 2. To understand the basics of discrete probability and number theory in problem-solving. 3. Apply algebraic techniques to analyze basic discrete structuresand algorithms. 4. Analyze the properties of graphs and related discrete structures. 5. Evaluation of the outcomes of graphs

4	SBS CS 01 01 04 C 3104	Operating Systemand Shell Programming	1. Demonstrates the basic concepts of key Linux library functions andsystem calls. 2. Understand the inner workings of Linux operating systems. 3. To apply shell scripts to perform repetitive tasks using while and for loops. 4. Design analysis and implementation of shell functions. 5. Result evaluation using deadlock and shell programming.
5	General ElectiveCourse-I (To be taken from another department)		
6	SBS CS 01 01 05 C 0042	Data Structures using C Lab-I	1. Design correct programs to solve problems. 2. Choose efficient data structures and apply them to solve problems. 3. Analyze the efficiency of programs based on time complexity. 4. Prove the correctness of a program using loop invariants, preconditions, and postconditions in programs.
7	SBS CS 01 01 06 C 0042	Operating Systemand Shell Programming Lab -II	1. Demonstrate the important Linux library functions and system calls. 2. Describe the inner workings of Linux operating systems. 3. Write shell scripts to perform repetitive tasks using while and for loops. 4. Design and implement shell functions.
8	SBS CS 01 01 07 C 0042	Web Developmentusing PHP Lab-III	1. Build a simple, yet functional web application using PHP/MySQL. 2. Setup and configure MySQL, PHP, and web server development environments. 3. Select, insert, update and delete data using SQL language. 4. Use PHP built-in functions and create custom functions.

Bridge Courses:			
1	SBS CS 01 01 01 E 3104	Fundamentals of ComputerScience	1. Learn about the fundamental concepts of computers. 2. To understand the role of the Internet and IPV4 and IPV6. 3. Apply binary logic to solve the problems. 4. Analyze Boolean logic and truth table. 5. Evaluate tasks like composing, formatting, and editing a word document andother office software.
2	SBS CS 01 01 02 E 3104	Computer Programming using C	1. Learn the basic concepts of programs connecting decision structures, loops, and functions. 2. Understand the difference between call by value and call byaddress. 3. Apply the dynamic behavior of memory by the use of pointers. 4. Analyze the arrays and differences between structure and union. 5. Evaluate the result based on array, structure, and union.
3	SBS CS 01 01 03 E 0042	Computer Programming using C - Lab-I	1. Understand the need for programing language 2. Use various data types as per requirements 3. Design programs connecting decision structures, loops, and functions. 4. Explain the difference between call by value and call by address. 5. Understand the dynamic behavior of memory by the use of pointers. 6. Understand the arrays and the difference between structure and union 7. Work with textual information, characters and strings. 8. Work with arrays of complex objects. 9. Understanding a concept of object thinking within the framework ofa functional model.

Semester II			
1	SBS CS 01 02 08 C 3104	Database ManagementSystem	1. Elaborate on different issues involved in the design and implementation of the basic database system. Study the physical and logical database designs, database modeling, relational, hierarchical, and network models. 2. Understanding and Practicing data manipulation language to query, update and manage a database. 3. Determine essential DBMS concepts such as database security, integrity, concurrency, distributed database, and intelligent database, Client/Server (Database Server), Data Warehousing and apply them to solve problems. 4. Develop a simple database system and analyze competence with the fundamental tasks involved with modeling, designing, and implementing a DBMS. 5. Evaluate the analyzed concept, including modeling and design.
2	SBS CS 01 02 09 C 3104	Object-Oriented Programming	1. Learn the basic concept of fundamentals of programming such as variables, conditional and iterative execution, methods, etc. 2. To understand the fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, etc. 3. Summarize important topics and apply principles of software development using OOP. 4. Analyze how to write computer programs to solve specific problems. 5. Evaluate problems to solve a particular computer program and fix

3	SBS CS 01 02 10 C 3104	Software Engineering	1. To interpret the problem statement for the software design. 2. To understand the requirements of the software efficiently. 3. Translate the requirements into the design model with modern tools and applications to solve problems. 4. Write the test cases and analyze the software modules. 5. Evaluation of software module test cases.
4	SBS CS 01 02 11 C 3104	Design and Analysis of Algorithms	1. To learn the basic concept of the asymptotic performance ofalgorithms. 2. To understand the write rigorous correctness proofs for algorithms. 3. Demonstrate familiarity with major algorithms and data structures and apply them to solve problems. 4. Analyze the real-life problems and their better solution. 5. Evaluation of the analyzed problem.
5.1	SBS CS 01 02 04 E 3104	Mobile Communication (Departmental ElectiveCourse-I)	1. Describe the basic fundamentals of wireless communications. 2. To understand security, energy efficiency, mobility, scalability,and their unique characteristics in wireless networks. 3. Apply basic skills for cellular network design. 4. Analyze knowledge of TCP/IP extensions for mobile and wireless networking. 5. Evaluation of mobile and wireless network results.

5.2	SBS CS 01 02 05 E 3104	Management InformationSystem and E-Commerce (Departmental ElectiveCourse-I)	1. Identify the basic concept of the relationship between the digital firm, electronic commerce, electronic business, and internet technology. 2. Understand the relationship between organizations, information systems, and business processes, including the processes for customer relationship management and supply chain management. 3. Demonstrate an understanding of the foundations and importance of E-commerce and apply them to solve problems. 4. Analyze the estimate of the effect of changing technology ontraditional business models and strategy. 5. Evaluation of analyzed problems of business models and strategies.
5.3	SBS CS 01 02 06 E 3104	Quantum Computing (Departmental ElectiveCourse-I)	1. Learn the basic concept of complex vector spaces. 2. To understand the quantum mechanics in quantum computing. 3. Apply the architecture of the quantum algorithms and solve the problems. 4. Analyze the fundamentals of quantum computation.
5.4	SBS CS 01 02 07 E 3104	Computer Graphics (Departmental ElectiveCourse-I)	1. Describe the basic concepts of computer graphics. 2. To implement various scan conversion problems with programming. 3. Apply various transformations to the digital drawings. 4. Analyze various modeling techniques in multimedia object creation. 5. Graphics evaluation and shading in 3D transformation.

6	SBS CS 01 02 12C 0042	Database Management System Lab-I	1. Elaborate on different issues involved in the design and implementation of a database system. Study the physical and logical database designs, database modeling, relational, hierarchical, and network models. 2. Analysis and Practice on data manipulation language to query, update and manage a database. 3. Determine essential DBMS concepts such as database security, integrity, concurrency, distributed database, and intelligent database, Client/Server (Database Server), Data Warehousing. 4. Develop a simple database system and demonstrate competence with the fundamental tasks involved with modeling, designing, and implementing a DBMS.
7	SBS CS 01 02 13C 0042	Object-Oriented Programming usingC++ Lab-II	1. Analyze fundamentals of programming such as variables, conditional and iterative execution, methods, etc. 2. Discuss the fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, etc. 3. Summarize important topics and principles of software development. 4. Practice writing a computer program to solve specific problems.
8	SBS CS 01 02 14C 0042	Design and Analysis of Algorithms Lab-III	1. Analyze the asymptotic performance of algorithms. 2. Write rigorous correctness proofs for algorithms. 3. Demonstrate familiarity with major algorithms and data structures. 4. Relate the real-life problems and their better solution.

Semester III			
1	SBS CS 01 03 15 C 3104	Artificial Intelligenceand Expert System	1. Choose problems that are amenable to solution by AI methods, andwhich AI methods may be suited to solving a given problem. 2. Examine a given problem in the language/framework of different AI methods 3. Apply basic AI algorithms (e.g., standard search algorithms or resolution) and solve problems. 4. Analyze and carry out an empirical evaluation of different algorithms on a problem formalization.
2	SBS CS 01 03 16 C 3104	Theory of Computation	1. Relate Practical problems to languages, automata, and computability. 2. Understand the mathematical and formal techniques for problem-solving. 3. Distinguish different computing languages and classify their respective types and apply them to solve the problems. 4. Analyze and design finite automata, pushdown automata, Turingmachines, formal languages, and grammars. 5. Evaluation of the analyzed problems in automata.
3	SBS CS 01 03 17 C 3104	Internet and Java Programming	1. Describe the basic fundamental blocks of the Internet and TCP/IP. 2. Understand classes, objects, members of a class, and relationships among them needed for a specific problem 3. Write Java application programs using OOP principles and proper program Structuring and apply them to solve problems. 4. Analyze the concepts of polymorphism, inheritance, and error handling techniques using exception handling. 5. Evaluation of AWT and Swings with the use of exception handling.

4.1	SBS CS 01 03 08 E 3104	Network Programming (DepartmentalElective Course-II)	1. To learn the basic concept of key protocols that support the Internet. 2. To understand the detailed knowledge of the TCP/UDP Sockets. 3. Apply advanced programming techniques such as Broadcasting, and Multicasting and apply them to solve the problem. **4.** Analyzing the DNS and Functional of IPV6 Evaluation of the security requirements of a networked programming environment and identify the issues to be solved
4.2	SBS CS 01 03 09 E 3104	Machine and Deep Learning (DepartmentalElective Course-II)	1. Discuss the basic concept of supervised and unsupervised learning algorithms. 2. To understand the fundamental concepts in machine learning and popular machine learning algorithms. 3. Solve problems related to the application of machine learning algorithms with programming in Python/MatLab. 4. Analyze the concept of Deep Learning. 5. Evaluation the result of Deep Learning.
4.3	SBS CS 01 03 10 E 3104	Software Project Management (DepartmentalElective Course-II)	1. To learn the basic concept of Software Project Management. 2. Understand the different techniques for software cost estimation 3. Apply activity planning and risk management and solve the problem**.** 4. Analysis of management and control projects. 5. Evaluation of project management.

4.4	SBS CS 01 03 11 E 3104	Digital Image Processing (DepartmentalElective Course-II)	1. Explain and analyze the steps of image formation, sampling, quantization, and representation digitally. 2. Outline and understand how images are processed by discrete,linear, time-invariant systems. 3. Apply how images are perceived by humans and how color is represented and solve problems. 4. Analyzing how image information can be modeled analytically and comparing the transform-domain representation of images (Fourier, DCT, Haar, WHT). 5. Evaluation of descriptors
4.5	SBS CS 01 03 12 E 3104	Data Warehousing & Data Mining (DepartmentalElective Course-II)	1. Comprehend the various architectures and its application with datamining 2. To understand the design and develop data mining algorithms to analyze raw real-world data 3. Monitor and apply to predict online digital activities and solve problems using them. 4. Analyse and Evaluate various mining techniques on complex data objects
5	General Elective Course-II (Tobe taken fromanother		
6	SBS CS 01 03 18 C 0042	Internet and Java ProgrammingLab-I	1. Describe the fundamental blocks of the Internet and TCP/IP. 2. Identify classes, objects, members of a class, and relationships among them needed for a specific problem 3 Write Java application programs using OOP principles and proper program structuring 4. Demonstrate the concepts of polymorphism, inheritance, and error handling techniques using exception handling

7	SBS CS 01 03 19 C 0042	Artificial Intelligencewith PythonLab-II	1. Choose problems that are amenable to solution by AI methods, and which AI methods may be suited to solving a given problem. 2. Examine a given problem in the language/framework of different AI methods 3. Describe basic AI algorithms (e.g., standard search algorithms or resolution). 4. Conclude and carry out an empirical evaluation of different algorithms on a problem formalization
8	SBS CS 01 03 20 C 0042	Minor Project(Training)	1. To provide students with hands-on experience in, troubleshooting, maintenance, fabrication, innovation, record keeping, documentation, etc. 2. Enhancing the skill and competency part of technical education. 3. To promote the concept of entrepreneurship. 4. Development of innovative thinking. 5. Identify the issues related to the recent trends in the field of computer science and its applications
9	SBS CS 01 03 21 C 0042	Summer TrainingReport	1. Improving critical thinking and problem-solving skills 2. Improving self-confidence 3. Causing interaction with a variety of individuals, systems, and organizations 4. Can learn about the Industrial environment. 5. Provide the solution to real-life problems

Semester IV			
1	SBS CS 01 04 22 C 3104	Data Science withR Programming	**1.** Learn the main R data structures – vector and data frame and import external data into R for data processing and statistical analysis. **2.** To understand review, manipulate, and summarize data-sets in R. **3.** Apply data sets to create testable hypotheses and identify appropriate statistical tests. **4.** Analyse R programming from a statistical perspective. **5.** Evaluating the techniques of R programming.
2	SBS CS 01 04 23 C 3104	Compiler Design	1. To learn the knowledge of lexical tools to develop a scanner & parser. 2. To understand the lexical, syntactic, and semantic analysis intomeaningful phases for a compiler to undertake language translation. 3. Design and develop software systems for backend of the compilerand apply them to solve problems. 4. Comprehend and analyses to new tools and technologies in compiler design. 5. Evaluation of basic Blocks, Loops in flow graph, Introduction to Global data flow analysis.
3.1	SBS CS 01 04 13 E 3104	Distributed andCloud Computing (DepartmentalElective Course-III)	1. Describe the basic concept of system models for distributed. 2. Understanding the different cloud computing. 3. Apply the cloud-enabling technologies, cloud mechanisms, and cloud architectures. 4. Analyse the different virtualization techniques Evaluation of the cloud and data security.

3.2	SBS CS 01 04 14 E 3104	Bioinformatics (DepartmentalElective Course-III)	1. Describe the basic concept of different types of Biological databases. 2. To understand the information Retrieval from Biological Databases 3. Describe pairwise sequence alignment, algorithms, and tools for pairwise alignment and apply them to solve the problem 4. Analyse protein folding and its significance 5 Apply algorithms and evaluation to real-world problems.
3.3	SBS CS 01 04 15 E 3104	Natural LanguageProcessing and Speech Recognition (DepartmentalElective Course-III)	1. Describe the challenges involved in developing NLP solutions. 2. Understand the various recent statistical methods in natural language processing. 3. Apply linguistics and their application to part-of-speech taggingand solve the problem using them. 4. Analyse background to various tools and aspects of NLP likesyntax and semantic analysis, parsing, machine translation, information retrieval, and statistical discourse processing 5. Evaluation of the Various Mechanics of apply algorithms and evaluation to the real-world problems
3.4	SBS CS 01 04 16 E 3104	Computer Vision (DepartmentalElective Course-III)	1. Describe image representation and the basics of computer vision. 2. Understand fundamental image processing for vision application. 3. Apply fundamental image recognition and decisions and solveproblems using them. 4. Analyse the pattern recognition methods. 5. Evaluate various applications using computer vision.

3.5	SBS CS 01 04 17 E 3104	Embedded Programming (DepartmentalElective Course-III)	1. Learn the basic concept of Embedded System 2. Understand the differences between the general computing system and the embedded system, and also recognize the classification of embedded systems. 3. Apply the architecture of the ATOM processor and itsprogramming aspects (assembly Level) 4. Analyse the interrupts, hyper-threading, and software optimization. 5. Evaluation of Design of real-time embedded systems using the concepts of RTOS.
3.6	SBS CS 01 04 18 E 3104	Wireless SensorNetworks and Internet of Things (DepartmentalElective Course-III)	1. Learn the Fundamental of Wireless Sensor Network 2. Understand various concepts of ubiquitous sensing 3. Apply Wireless Sensor Networks Principles in IoT 4. Analyse the role of Big Data, Cloud Computing, and Data Analytics in a typical IoT system. 5. Evaluation of the design of a simple IoT system made up of sensors, wireless network connection, data analytics, and display/actuators,
4	SBS CS 01 04 24 C 0042	Data Science withR Programming Lab-I	1. Learn the main R data structures – vector and data frame and import external data into R for data processing and statistical analysis. 2. Import, review, manipulate and summarize data sets in R. 3. Explore data sets to create testable hypotheses and identify appropriate statistical tests. 4. Apply R programming from a statistical perspective.

5	SBS CS 01 04 25 C 0042	Android Application Development Programming Lab-II	1. Install and configure Android application development tools. 2. Design and develop user interfaces for the Android platform. 3. Save state information across important operating system events. 4. Apply Java programming concepts to Android application development.
6	SBS CS 01 04 26 C 00168	Project Work (InHouse)	1. Learn management and scheduling skills. 2. Provide the solution to real-life problems and society. 3. Opportunity to work. with multidisciplinary problems. 4. Develop leadership and team leadership qualities. 5. Familiar with new tools and technologies.

Semester I

<table>
<tr><td rowspan="2">Scheme Version:

2022-2023</td><td rowspan="2">Name of the Subject:

Fundamental of computer science (Bridge course)</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>-</td><td>0</td><td>Total Hours:60</td></tr>
<tr><td rowspan="2">Subject Code: SBS CS 01 01 01 E 3104</td><td rowspan="2">Applicable to Programs:

M.C.A.</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: Basic Fundamentals of Computer Science.</td></tr>
<tr><td>Course Description</td><td colspan="7">To introduce knowledge on basics of fundamental of computer science and various aspects of computational theory, programming, algorithm design, and optimization, network and database management, mobile technologies, electronics and mathematics.</td></tr>
<tr><td>Course Objectives</td><td colspan="7">This course aims to give students an in-depth understanding of why computers are essential components in business, education and society. This course will provide hands-on use of Microsoft Office applications Word, Excel, Access and PowerPoint.</td></tr>
<tr><td>Course Outcomes:</td><td colspan="7">Upon successful completion of the course students will be able to:

COB010101.1 Learn about the fundamental concepts of computer.
COB010101.2 To understand the role of Internet and IPV4 and IPV6.
COB010101.3 Apply the binary logics to solve the problems.
COB010101.4 Analyse Boolean logics and truth table.</td></tr>
</table>

	COB010101.5 Evaluate tasks like compose, format and edit a word document and other office software	
	COURSE SYLLABUS	
Unit No.	**Content of Each Unit**	**Hours of Each Unit**
1.	**Overview of Computer System: [Course Outcome (s): COB010101.1]** Evolution of Computer Systems, Generations of Computers, Parts of Computer System, Categories of Computers, Computer System Characteristics, Computer Hardware. Working of input & output devices: keyboard, mouse, trackball, pen, touch screens, scanner, digital camera, monitor, and printer. Working of storage devices: magnetic tape, magnetic disk, CD, DVD. Software- System & Application.	**15**
2.	**The Internet: [Course Outcome (s): COB010101.2]** Introduction to networks and internet, history, Working of Internet, Internet Congestion, Modes of Connecting to Internet, Internet Service Providers (ISPs), Internet addressing, comparison of IPv4 and IPv6.	**15**
3.	**Information Representation: [Course Outcome (s): COB010101.3 & COB010101.4]** Number systems, BCD codes, character codes, error detecting and correcting codes, fixed-point and floating-point representation of information. Binary arithmetic operations, Booths multiplication. **Binary Logic:** Boolean algebra, Boolean functions, Truth Tables, Canonical and Standard forms, Simplification of Boolean functions, Digital logic gates.	**15**
4.	**Office Automation Tools Word Processing: [Course Outcome (s): COB010101.5]** Editing features, formatting features, saving, printing, table handling,	**15**

	page settings, spell-checking, macros, mail-merge, and equation editors. **Excel/Access Power Point Slides:** Templates, views, formatting slide, slides with graphs, animation, using special features, presenting slide shows.	

REFERENCE BOOKS

1. Norton, P., *Introduction to Computers*, Mc-Graw-Hill, 2017.

2. Raja, Raman V., *Fundamental of Computers*, Prentice Hall of India, 2014.

3. Sanders, D. H., *Computer Today*, Mc-Graw Hill, 1988.

4. Sinha, P.K. and Sinha, P., *Computer fundamentals*, BPB Publications, 2010.

5. Vermaat, M.E., *Discovering Computers & Microsoft Office 2013: A Fundamental Combined Approach*, Cengage Learning, 2013.

COURSE ARTICULATION MATRIX

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
COB010101.1	1	-	1	1	1	-	1	-	1	2	2	1
COB010101.2	2	-	-	-	1	-	1	3	1	-	1	1
COB010101.3	1	3	3	2	-	-	-	-	3	-	-	-
COB010101.4	1	2	-	-	-	-	-	-	3	-	-	-

COB010101.5	2	-	2	1	1	3	1	-	1	-	1	1

MAPPING OF COs WITH PSOs

Cos	PSO 1	PSO2	PSO3	PSO 4	PSO5
COB010101.1	3	2	-	1	1
COB010101.2	2	1	-	-	2
COB010101.3	3	3	1	1	-
COB010101.4	1	-	2	1	1
COB010101.5	2	1	2	2	1

Scheme Version: 2022-2023	**Name of the Subject:** Programming using C (Bridge Course)	**L**	**T**	**P**	**C**	**Semester: I**(1st Year)	**Contact hours per week:** 4
		3	**1**	**0**	**0**		**Total Hours:**60
Subject Code:	**Applicable to Programs:**	**Evaluation (Total**	**CIE**	**30 Marks**	**Examination Duration: 3 hours**		

SBS CS 01 01 02 E 3104	M.C.A.	**Marks):** 100	**TEE**	**70 Marks**	**Pre-requisite of course:** Basic Operating System and Shell Programming.
Course Description	To introduce knowledge on basics of fundamental of computer science and various aspects of computational theory, programming, algorithm design, and optimization, network and database management, mobile technologies, electronics and mathematics				
Course Objectives	The course is designed to provide knowledge of C language. Students will be able to develop logics which will help them to create programs, applications in C. Also by learning the basic programming constructs they can easily switch over to any other language in future. Student will learn the fundamental programming concepts and methodologies.				
Course Outcomes:	Upon successful completion of the course students will be able to: **COB010103.1** Learn the basic concepts of programs connecting decision structures, loops and functions. **COB010103.2** Understand the difference between call by value and call by address. **COB010103.3** Apply the dynamic behaviour of memory by the use of pointers. **COB010103.4** Analyse the arrays and difference between structure and union. **COB010103.5** Evaluate the result based on array, structure and union.				
	COURSE SYLLABUS				
Unit No.	**Content of Each Unit**				**Hours of Each Unit**
1.	**Elements of C: [Course Outcome (s): COB010103.1]** character set identifier and keywords, data type, declaration and definition. Operators: arithmetic,				**15**

	relational, logical, bit wise, unary, assignment and conditional operators their hierarchy arid associativity.	
2.	**Control statements: [Course Outcome (s): COB010103.2]** sequencing, selection, if and switch statement; repetition / loop statements: for, while, and do while loops; break, continue and goto statements.	**15**
3.	**Function: [Course Outcome (s): COB010103.2]** definition, declaration, and calling, call by value, call by reference prototype, passing parameters, actual and formal parameters, recursion.	**15**
4.	**Data Structures**: **[Course Outcome (s): COB010103.4 & COB010103.5]** arrays, structure, structure members, access to structure members union, string, data files. Pointer: declaration, operation of pointers, array to pointers, pointers to arrays.	**15**

REFERENCE BOOKS

1. Gottfried, B.S., *Programming with C*., McGraw Hill Education, 2018.

2. Hanly, J. R., Koffman, E.B. , *Problem Solving and Program Design in C*, 8th edition., Pearson Publications, 2015.

3. Kanetkar, Y., *Let Us C*, 16th Edition, BPB Publication, 2017.

4. Kelley, A., Pohl, I., *A Book on C: Programming in C*, Addison Wesley, 2000.

5. Kernighan, B.W. and Ritchie D., *The C Programming Language,* Pearson Publications, 2015.

COURSE ARTICULATION MATRIX

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
COB010103.1	2	3	2	3	2	-	-	1	2	1	-	-
COB010103.2	1	-	-	-	3	1	-	2	1	1	-	-
COB010103.3	1	2	3	2	-	2	1	3	2	-	2	-
COB010103.4	1	2	2	2	-	2	3	1	-	1	-	1
COB010103.5	1	2	2	1	-	1	3	-	-	1	-	1

MAPPING OF COs WITH PSOs

COs	PSO 1	PSO2	PSO3	PSO 4	PSO5
COB010103.1	3	3	2	3	-
COB010103.2	2	2	1	1	1

COB010103.3	1	3	2	1	-
COB010103.4	2	2	-	1	1
COB010103.5	2	3	1	2	-

<table>
<tr><td rowspan="2">Scheme Version:

2022-2023</td><td rowspan="2">Name of the Subject:

Data Structure</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: 47</td></tr>
<tr><td rowspan="2">Subject Code:

SBS CS 01 01 01 C 3104</td><td rowspan="2">Applicable to Programs:

M.C.A.</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: Basic Data Structure.</td></tr>
<tr><td>Course Description</td><td colspan="7">To introduce knowledge on basics of fundamental of computer science and various aspects of computational theory, programming, algorithm design, and optimization, network and database management, mobile technologies, electronics and mathematics</td></tr>
<tr><td>Course Objectives</td><td colspan="7">Using computer science theory, students will construct and analyze various data structures and abstract data types including lists, stacks, queues, trees, and graphs. Students will implement various sorting, searching, and hashing algorithms. Students will build a substantial, complex data structure.</td></tr>
</table>

Course Outcomes:	Upon successful completion of the course students will be able to: **CO010101.1** To learn the basic concepts about the Data Structures and Algorithm. **CO010101.2** To understand the design correct programs to solve problems **CO010101.3** Choose efficient data structures and apply them to solve problems. **CO010101.4** Analyse the efficiency of programs using sorting and hash table. **CO010101.5** Evaluate the correctness of a program using loop invariants, preconditions and post conditions in programs.	
	COURSE SYLLABUS	
Unit No.	**Content of Each Unit**	**Hours of Each Unit**
1.	**Introduction: [Course Outcome (s): CO010101.1]** Basic Terminology, Elementary Data Organization, Structure Operations, Algorithm, Complexity and Time-Space trade-off. **Arrays:** Array Definition, Representation and Analysis, Single and Multidimensional Arrays, Address Calculation, Application of Arrays.	**15**
2.	**Stacks: [Course Outcome (s): CO010101.2]** Array Representation and Implementation of the stack, Operations on Stacks: Push & Pop, Array Representation of Stack, Linked Representation of Stack, Operations Associated with Stacks, Application of stack: Conversion of Infix to Prefix and Postfix Expressions, Evaluation of postfix expression using stack. **Queues:** Array and linked representation and implementation of queues, Operations on Queue: Create,	**15**

	Add, Delete, Full and Empty, Circular queues, D-queues and Priority Queues. **Linked list:** Representation and Implementation of Singly Linked Lists, Traversing and Searching of Linked List, Overflow and Underflow, Insertion and deletion to/from Linked Lists, Insertion and deletion Algorithms, Doubly Linked List, Linked List in Array.	
3.	**Trees: [Course Outcome (s): CO010101.3]** Basic terminology, Binary Trees, Binary tree representation, Array and Linked Representation of Binary trees, Types of Binary Tree, Traversing Binary trees, Binary Search Tree (BST), Insertion and Deletion in BST, AVL Trees, Huffman algorithm. **Graphs:** Terminology & Representations, Graphs & Multi-graphs, Directed Graphs, Sequential Representations of Graphs, Adjacency Matrices, Traversal, Connected Component and Spanning Trees, Minimum Cost Spanning Trees.	**15**
4.	**Searching and Hashing: [Course Outcome (s): CO010101.4 & CO010101.5]** Sequential search, binary search, comparison and analysis, Hash Table, Hash Functions, Collision Resolution Strategies, Hash Table Implementation. **Sorting:** Insertion Sort, Bubble Sorting, Selection Sort, Quick Sort, Merge Sort, Heap Sort, Linear time sorting, Practical consideration for Internal Sorting and External Sorting.	**15**

REFERENCE BOOKS
1. Cormen, T.H., Leiserson, C.E., Rivest, R.L. and Stein, C., *Introduction to Algorithms,* MIT Press, 2010. 2. Goodrich, M.T., Tamassia, R. and Mount, D.M., *Data Structures and Algorithms in C++*, John Wiley & Sons, 2016. 3. Langsam, Y., Augenstein, M. and Tenenbaum, A.M., *Data Structures using C and C++,* Prentice Hall, 2015. 4. Lipschutz, S., *Schaum's Outline of Theory and Problems of Data Structures*, McGraw-Hill, 2014

COURSE ARTICULATION MATRIX

COs	**PO 1**	**PO 2**	**PO 3**	**PO4**	**PO 5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
COB010101.1	1	1	2	-	3	2	-	2	-	-	-	-
COB010101.2	2	1	2	1	-	1	-	3	1	-	3	-
COB010101.3	-	-	1	2	-	2	-	1	2	-	-	-
COB010101.4	-	2	-	-	1	-	2	2	-	1	2	2
COB010101.5	-	2	-	-	2	-	1	1	-	2	2	1

MAPPING OF COs WITH PSOs

Cos	PSO 1	PSO2	PSO3	PSO 4	PSO5
COB010101.1	2	3	2	3	1
COB010101.2	2	2	1	1	2

COB010101.3	1	3	2	-	1
COB010101.4	2	2	-	2	-
COB010101.5	2	3	-	1	2

Scheme Version: 2022-2023	**Name of the Subject:** Computer Network	**L**	**T**	**P**	**C**	**Semester:**	**Contact hours per week:** 4
		3	**1**	**0**	**4**	**I**(1st Year)	**Total Hours:** 60
Subject Code: SBS CS 01 01 02 C 3104	**Applicable to Programs:** M.C.A.	**Evaluation (Total Marks):** 100	**CIE**	**30 Marks**	**Examination Duration: 3 hours**		
			TEE	**70 Marks**	**Pre-requisite of course:** Basic Computer Network.		
Course Description	To introduce knowledge on basics of fundamental of computer science and various aspects of computational theory, programming, algorithm design, and optimization, network and database management, mobile technologies, electronics and mathematics						
Course Objectives	The main emphasis of this course is on the organization and management of local area networks (LANs). The course objectives include learning about computer network organization and obtaining a theoretical understanding of data communication and computer networks.						

Course Outcomes:	Upon successful completion of the course students will be able to: **CO010102.1** To learn about the basic concepts about Computer Network Modules **CO010102.2** To understand network topologies, switching and transmission medium. **CO010102.3** Apply the requirements for a given organizational structure and select the most appropriate networking architecture and technologies. **CO010102.4** Analyse, specify and design the topological and routing strategies for an IP based networking infrastructure. **CO010102.5** Evaluation of working knowledge of datagram and internet socket programming.	
	COURSE SYLLABUS	
Unit No.	**Content of Each Unit**	**Hours of Each Unit**
1.	**Introduction To Computer Networks: [Course Outcome (s): CO010102.1]** Definition of a Computer Network, The OSI Reference Model, The TCP/IP Reference Model, Protocols and Hardware involved in the OSI model, Comparison of the OSI & the TCP/IP. **Application Layer:** Domain name space, DNS in internet, electronic mail, FTP, WWW, HTTP, SNMP, multimedia, network security.	**15**
2.	**Physical Layer: [Course Outcome (s): CO010102.2]** Introduction: Network topologies; Linear Bus Topology, Ring Topology, Star Topology, Hierarchical or Tree Topology, Topology Comparison, Considerations when	**15**

	choosing a Topology: Switching; Circuit switching, Message switching, Packet switching. **Transmission Medium:** Introduction: Transmission medium; Guided & Unguided Transmission medium, Twisted pair, Coaxial cable, Optical fiber, Comparison of fiber optics and copper wire: Wireless transmission; Electromagnetic spectrum, Radio transmission, Microwave transmission.	
3.	**Data Link Layer: [Course Outcome (s): CO010102.4]** Introduction; Goal of DLL: Design issues of DLL; Services provided to the Network layer, Framing, Error control, Flow control, ARQ strategies: Stop-and-Wait, RTT estimation, sliding window, Go-Back-N retransmission, Error Detection and correction: Parity bits, Single bit error correction or (n, m), Error Detection or Cyclic Redundant Code (CRC): Data Link layer protocols; Transmission control protocols, HDLC.	**15**
4.	**Network Layer: Introduction: [Course Outcome (s): CO010102.3 & CO010102.5]** Design issues of Network layer; Nature of the service provided, Internetworking: Principles of Routing; Types of routing algorithms, Properties of routing algorithms, Optimality principle: Routing algorithms; Shortest path algorithm, Flooding, Distance vector routing, Hierarchical routing, Link state routing, Congestion: Factors of congestion, Comparison of flow control and congestion control, General principles of congestion control, Closed loop solution: IP protocol (IPV4).	**15**

	Transport Layer: Introduction: Services of Transport layer; Service primitives: Connection establishment: Connection Release: Transport Protocols; TCP protocol, UDP protocol	

REFERENCE BOOKS

1.Comer, D.E., and Droms, R.E., *Computer Networks and Internets,* Prentice-Hall Inc., 2018.

2. Forouzan, A.B., *Data Communications & Networking,* Tata McGraw-Hill Education, 2017.

3. Kundu, S., *Fundamentals of Computer Networks*, PHI Learning Pvt. Ltd., 2008.

4. Kurose, J.F., *Computer Networking: A Top-Down Approach Featuring the Internet,* Pearson Education India. 2016.

5. Stallings, W.S., *Data and Computer Communications,* Pearson Education India, 2013.

COURSE ARTICULATION MATRIX

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO010102.1	1	-	1	1	2	-	-	1	1	-	-	-
CO010102.2	2	1	-	-	-	1	-	2	2	1	2	-
CO010102.3	-	-	2	1	-	1	1	3	1	-	2	-
CO010102.4	1	1	-	-	-	2	1	1	1	1	3	2
CO010102.5	1	-	-	-	-	1	1	2	1	-	-	2

MAPPING OF COs WITH PSOs

Cos	PSO 1	PSO2	PSO3	PSO 4	PSO5
CO010102.1	3	3	-	1	1

CO010102.2	2	2	-	1	1
CO010102.3	1	2	-	2	2
CO010102.4	1	1	2	2	-
CO010102.5	2	2	-	1	-

Scheme Version: 2022-2023	**Name of the Subject:** Discrete Mathematical Structures	**L**	**T**	**P**	**C**	**Semester:**	**Contact hours per week:** 4
		3	**1**	**0**	**4**	**I**(1st Year)	**Total Hours:** 60
Subject Code: SBS CS 01 01 03 C 3104	**Applicable to Programs:** M.C.A.	**Evaluation (Total Marks):** 100	**CIE**	**30 Marks**	**Examination Duration: 3 hours**		
			TEE	**70 Marks**	**Pre-requisite of course:** Basic Discrete Mathematical Structure.		
Course Description	To introduce knowledge on basics of fundamental of computer science and various aspects of computational theory, programming, algorithm design, and optimization, network and database management, mobile technologies, electronics and mathematics						
Course Objectives	Using computer science theory, students will construct and analyze various data structures and abstract data types including lists, stacks, queues, trees, and graphs.						

	Students will implement various sorting, searching, and hashing algorithms. Students will build a substantial, complex data structure.	
Course Outcomes:	Upon successful completion of the course students will be able to: **CO010104.1** Describe the basic concept of mathematical thinking, mathematical proofs, and algorithmic thinking. **CO010104.2** To understand the basics of discrete probability and number theory in problem solving. **CO010104.3** Apply the algebraic techniques to analyse basic discrete structures and algorithms. **CO010104.4** Analyse the properties of graphs and related discreate structures. **CO010104.5** Evaluation the outcomes of graphs and trees and their properties.	
	COURSE SYLLABUS	
Unit No.	**Content of Each Unit**	**Hours of Each Unit**
1.	**Set Theory: [Course Outcome (s): CO010104.1]** Definition of Sets, Venn Diagrams, complements, Cartesian products, power sets, counting principle, cardinality and countability (Countable and Uncountable sets), proofs of some general identities on sets, pigeonhole principle. **Relation:** Definition, Types of relation, the composition of relations, domain and range of a relation, pictorial representation of a relation, properties of relation, partial ordering relation, Lattices, Hasse diagram.	**15**
2.	**Algebraic Structure: [Course Outcome (s): CO010104.2]** Binary composition and its properties definition of algebraic structure.	**15**

	Groups: Semi-group, Monoid Groups, Abelian group, properties of groups, Permutation Groups, Sub Group, Cyclic Group, Rings and Fields (definition and standard results).	
3.	**Propositional Logic: [Course Outcome (s): CO010104.2]** Proposition logic, basic logic, logical connectives, truth tables, tautologies, contradiction, normal forms (conjunctive and disjunctive), modus Ponens and modus Tollens, validity, predicate logic, universal and existential quantification, Boolean expressions, Karnaugh map.	**15**
4.	**Graphs: [Course Outcome (s): CO010104.4 & CO010104.5]** Graph terminology, types of graphs, connected graphs, components of the graph, Euler graph, Hamiltonian path and circuits, Graph coloring, Chromatic number. **Tree:** Definition, Types of trees (rooted, binary), properties of trees, binary search tree, tree traversing (preorder, inorder, postorder).	**15**

REFERENCE BOOKS

1. Kolman, B., Busby, R.C., and Ross, S.C., *Discrete Mathematical Structures*, Prentice-Hall, 2008.

2. Lipschutz, S., and Lipson, M.L., *Discrete Mathematics*, McGraw-Hill, 2017.

3. Liu, C.L., and Mohapatra, D.P., *Elements of Discrete Mathematics: A Computer Oriented Approach,* Tata McGraw-Hill, 2017.

4. Rosen, K.H., and Krithivasan, K., *Discrete Mathematics and Its Applications: With Combinatorics and Graph Theory*, Tata McGraw-Hill Education, 2017.

5. Sarkar, S.K., *A Textbook of Discrete Mathematics*, S. Chand Publishing, 2016.

COURSE ARTICULATION MATRIX

Cos	PO1	PO2	PO3	PO4	PO 5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO010104.1	2	2	1	-	1	2	-	1	2	-	-	-
CO010104.2	-	1	-	-	3	2	-	2	1	1	3	-
CO010104.3	3	-	1	2	-	1	1	-	3	-	2	3
CO010104.4	1	2	-	-	-	1	1	2	1	3	2	-
CO010104.5	-	-	1	-	-	1	1	2	3	-	2	2

MAPPING OF COs WITH PSOs

COs	PSO 1	PSO2	PSO3	PSO 4	PSO5
CO010104.1	2	2	2	-	1
CO010104.2	2	-	1	1	-
CO010104.3	-	-	1	-	-
CO010104.4	-	-	1	1	1
CO010104.5	2	-	2	-	-

<table>
<tr><td rowspan="2">Scheme Version:

2022-2023</td><td rowspan="2">Name of the Subject:

Operating System and Shell 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>3</td><td>1</td><td>0</td><td>4</td><td>Total Hours:60</td></tr>
<tr><td rowspan="2">Subject Code:

SBS CS 01 01 04 C 3104</td><td rowspan="2">Applicable to Programs:

M.C.A.</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: Basic Operating System and Shell Programming.</td></tr>
<tr><td>Course Description</td><td colspan="7">To introduce knowledge on basics of fundamental of computer science and various aspects of computational theory, programming, algorithm design, and optimization, network and database management, mobile technologies, electronics and mathematics</td></tr>
</table>

Course Objectives	A successful student will be able to understand the basic components of a computer operating system, and the interactions among the various components. The course will cover an introduction on the policies for scheduling, deadlocks, memory management, synchronization, system calls, and file systems. The students will implement solutions via C/C++ programs.	
Course Outcomes:	Upon successful completion of the course students will be able to: **CO010105.1** Demonstrates the basic concepts of key Linux library functions and system calls. **CO010105.2** Understand the inner workings of Linux operating systems. **CO010105.3** To apply shell scripts to perform repetitive tasks using while and for loops. **CO010105.4** Design analysis and implementation of shell functions. **CO010105.5** Result evaluation using deadlock and shell programming.	
	COURSE SYLLABUS	
Unit No.	**Content of Each Unit**	**Hours of Each Unit**
1.	**Operating System Introduction: [Course Outcome (s): CO010105.1] function**, characteristics, structures– simple batch, multiprogram med, timeshared, personal computer, parallel, distributed systems, real-time systems, system components, operating system services, system calls, virtual machines. **Process and CPU Scheduling:** Process concepts and scheduling, operation on processes, cooperating processes, threads and inter-process communication scheduling criteria, scheduling algorithm, multiple-processor scheduling, real time scheduling.	**15**

2.	**Management and Virtual memory: [Course Outcome (s): CO010105.2]** logical versus physical address space, swapping, contiguous allocation, paging, segmentation, segmentation with paging. Demand paging, performance of denuding paging, page replacement, page replacement algorithm, allocation of frames, thrashing.	**15**
3.	**File System Interface and Implementation: [Course Outcome (s): CO010105.3]** access methods, directory, structure, protection, file system structure, allocation methods, free space management, directory management, directory implementation, efficiency and performance. **I/O Management:** I/O software and its types, disk scheduling. **Process Management and Synchronization:** Critical section problem, synchronization, critical regions, monitors.	**15**
4.	**Deadlocks: [Course Outcome (s): CO010105.4 & CO010105.5] system** model, dead locks characterization, methods for handling deadlocks, deadlock prevention, deadlock avoidance, deadlock detection and recovery from deadlock. **Shell Programming:** vi editor, shell variables, I/O in shell, control structures, loops, subprograms, creating shell scripts. Basic system administration in Linux/Unix.	**15**

REFERENCE BOOKS

1. Das, S., *Your UNIX: The Ultimate Guide*, McGraw-Hill Inc., 2012.

2. Goerzen, J., *Linux Programming Bible*, IDG, 2000.

3. Kanetkar, Y.P., *UNIX Shell Programming*, BPB Publications, 2003.

4. Prata, S., and Waite Group, *Advanced UNIX: A Programmer's Guide*, HW Sams, 1985.

5. Venkateshmurthy, M.G., *Introduction to Unix and Shell Programming,* Pearson Education India, 2009.

COURSE ARTICULATION MATRIX

Cos	PO1	PO2	PO3	PO4	PO 5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO010105.1	2	1	1	1	1	3	-	-	3	1	-	-
CO010105.2	1	1	-	-	3	2	-	2	-	1	-	-
CO010105.3	1	3	1	2	-	1	1	3	2	-	3	-
CO010105.4	1	-	3	-	-	2	1	1	1	1	-	2
CO010105.5	1	1	-	2	-	-	1	2	-	1	2	2

MAPPING OF COs WITH PSOs

Cos	PSO 1	PSO2	PSO3	PSO 4	PSO5
CO010105.1	3	2	2	1	2
CO010105.2	2	1	1	1	1
CO010105.3	1	1	1	-	-
CO010105.4	-	-	-	2	1
CO010105.5	-	-	2	1	2

Semester II

<table>
<tr><td rowspan="2">Scheme Version:

2022-2023</td><td rowspan="2">Name of the Subject:

Database Management system</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 CS 01 02 08 C 3104</td><td rowspan="2">Applicable to Programs:

M.C.A.</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:

DBMS Basics</td></tr>
<tr><td>Course Description</td><td colspan="7">To introduce knowledge on basics of fundamental of computer science and various aspects of computational theory, programming, algorithm design, and optimization, network and database management, mobile technologies, electronics and mathematics</td></tr>
<tr><td>Course Objectives</td><td colspan="7">This course is intended to provide an introduction to the management of database systems. The course emphasizes the understanding of the fundamentals of relational systems including data models, database architectures, and database manipulations. The course uses a problem-based approach to learning.</td></tr>
<tr><td>Course Outcomes:</td><td colspan="7">Upon successful completion of the course students will be able to:

CO010209.1 Elaborate on different issues involved in the design and implementation of basic database system. Study the physical and logical database designs, database modelling, relational, hierarchical, and network</td></tr>
</table>

	models. **CO010209.2** Understanding and Practice on data manipulation language to query, update and manage a database. **CO010209.3** Determine essential DBMS concepts such as database security, integrity, concurrency, distributed database, and intelligent database, Client/Server (Database Server), Data Warehousing and apply them to solve problems. **CO010209.4** Develop a simple database system and analyse competence with the fundamental tasks involved with modelling, designing, and implementing a DBMS. **CO010209.5** Evaluate the analysed concept, including modelling and design.	
	COURSE SYLLABUS	
Unit No.	**Content of Each Unit**	**Hours of Each Unit**
1	**Basic Concepts: [Course Outcome (s): CO010209.1]** File Systems vs. DBMS, Characteristics of the Database Approach, Abstraction and Data Integration, Database users, Advantages and Disadvantages of a DBMS. **Database Systems Concepts and Architecture:** Data Models, Schema and Instances, DBMS architecture and Data Independence, Database languages and Interfaces, DBMS functions and component modules..	15
	Entity-Relationship Model: [Course Outcome (s): CO010209.2] Entity Types, Entity Sets, Attributes & keys, Relationships, Relationships Types, Roles and Structural Constraints, Design issues, E-R Diagrams, Design of an	15

2	E-R Database Schema, Reduction of an E-R Schema to Tables. **Relational Data Model:** Relational model concepts, Integrity constraints over Relations, Relational Algebra – Basic Operations. **SQL:** DDL, DML, and DCL, views & Queries in SQL, Specifying Constraints & Indexes in SQL.	
3	**Relational Database Design: [Course Outcome (s): CO010209.3]** Functional Dependencies, Decomposition, Normal forms based on primary keys (1 NF, 2 NF, 3 NF, & BCNF) **Transaction Processing Concepts:** Introduction to Transaction Processing, Transaction & System Concepts, Properties of Transaction, Schedules and Recoverability, Serializability of Schedules. **Concurrency Control Techniques:** Locking Techniques, Timestamp ordering, Multi- version Techniques, Optimistic Techniques, Granularity of Data items.	15
4	**Databases for Advanced Applications**: **[Course Outcome (s): CO010209.4 & CO010209.5]** Active database concepts, Temporal database concepts, Spatial databases, Deductive databases; Emerging Database Technologies: Mobile databases, Multimedia Databases, Geographic information systems (GIS); XML and Internet Databases: Structured, Semi-structured and	15

	Unstructured Data, Introduction to web databases and XML, Structure of XML data.	

REFERENCE BOOKS

1. Bayross, I., *SQL, PL/SQL: The Programming Language of Oracle,* BPB Publications. 2010.
2. Connolly, T.M. and Begg, C.E., *Database Systems: A Practical Approach to Design, Implementation, and Management*, Pearson Education, 2019.
3. Date, C.J., *An Introduction to Database Systems*, Pearson Education India, 2012.
4. Elmasri, R., *Fundamentals of Database Systems*, Pearson Education India, 2015.
5. Silberschatz, A., Korth, H.F. and Sudarshan, S., *Database System Concepts,* McGraw-Hill, 2013.

COURSE ARTICULATION MATRIX

COs	PO1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12
CO010209.1	1	2	-	-	1	-	3	1	3	3	-	-
CO010209.2	-	3	-	-	-	-	3	-	2	3	-	-
CO010209.3	1	2	-	-	1	-	2	1	3	3	3	2
CO010209.4	-	1	-	-	1	-	2	-	2	3	2	2
CO010209.5	-	1	-	-	1	-	3	-	2	3	2	1

MAPPING OF COs WITH PSOs

Cos	PSO 1	PSO2	PSO3	PSO 4	PSO 5
CO010209.1	1	1	3	-	-
CO010209.2	-	2	3	-	1
CO010209.3	2	2	3	2	1
CO010209.4	2	-	3	3	2
CO010209.5	-	2	3	2	1

<table>
<tr><td rowspan="2">Scheme Version:

2022-2023</td><td rowspan="2">Name of the Subject:

Object Oriented Programming</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 CS 01 02 09 C 3104</td><td rowspan="2">Applicable to Programs:

M.C.A.</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:

Basic C/C++ Programming.</td></tr>
<tr><td>Course Description</td><td colspan="7">To introduce knowledge on basics of fundamental of computer science and various aspects of computational theory, programming, algorithm design, and optimization, network and database management, mobile technologies, electronics and mathematics</td></tr>
</table>

Course Objectives	The objective of this 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.	
Course Outcomes:	Upon successful completion of the course students will be able to: **CO010211.1** Learn the basic concept of fundamentals of programming such as variables, conditional and iterative execution, methods, etc. **CO010211.2** To understand the fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, etc. **CO010211.3** Summarize important topics and apply principles of software development using OOP. **CO010211.4** Analyse how to write computer programs to solve specific problems. **CO010211.5** Evaluate problems to solve a particular computer program and fix them.	
	COURSE SYLLABUS	
Unit No.	**Content of Each Unit**	**Hours of Each Unit**
1.	**Object-Oriented Concepts: [Course Outcome (s): CO010211.4]** Data abstraction, Data Hiding, Encapsulation, polymorphism, modularity, hierarchy, typing, concurrency, persistence. C++ Basics: Classes and Objects, Data types, loops and decisions, structures and functions, Scope of class and its member, Nested Class, object arrays, Pointers, Constructor: parameterized constructor, multiple constructors, default constructor, copy constructor, implicit constructor, destructor function, dynamic allocation operators: new(), delete().	15

2.	**Inheritance: [Course Outcome (s): CO010211.4]** Base and Derived Classes, Single inheritance, Multilevel inheritance, Hierarchical inheritance, Hybrid Inheritance, Multiple inheritance, Protected Members, Casting Base-Class Pointers to Derived- Class Pointers, Using Member Functions, Overriding Base–Class Members in a Derived Class, Public, Protected and Private Inheritance, Using Constructors and Destructors in derived Classes.	15
3.	**Polymorphism: [Course Outcome (s): CO010211.4]** Compile time and Run time, Abstract class, Virtual class, Virtual base classes, pointers to base and derived classes, virtual functions, early and late binding, Pure virtual function, virtual destructor, virtual derivation. Friend function & Friend class, Inline functions, function overloading, Operator Overloading: Unary, Binary.	15
4.	**Generic Programming: [Course Outcome (s): CO010211.4]** Function Templates, Overloading Template Functions, Class Template, Class Templates and Non-Type Parameters. **Exception Handling:** Try, Throw, Catch, Throwing an Exception, Catching an Exception, Re-throwing an Exception. **File Handling:** Hierarchy of File Stream classes, Opening and Closing files, File modes, testing for errors, File pointers and their manipulations, ASCII & Binary files, Sequential and Random-access files. files, opening & closing a file, read () & write () functions, File manipulation using seekg (), tellg()	15

	functions.	

REFERENCE BOOKS

1. Cormen, T.H., Leiserson, C.E., Rivest, R.L. and Stein, C., *Introduction to Algorithms,* MIT Press, 2010.

2. Goodrich, M.T., Tamassia, R. and Mount, D.M., *Data Structures and Algorithms in C++*, John Wiley & Sons, 2016.

3. Langsam, Y., Augenstein, M. and Tenenbaum, A.M., *Data Structures using C and C++,* Prentice Hall, 2015.

4. Lipschutz, S., *Schaum's Outline of Theory and Problems of Data Structures*, McGraw-Hill, 2014

COURSE ARTICULATION MATRIX

COs	PO1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12
CO010211.1	1	-	1	-	-	3	1	3	-	-	-	-
CO010211.2	1	1	-	-	1	3	-	3	1	-	-	-
CO010211.3	2	-	1	-	-	3	1	3	-	1	3	-
CO010211.4	1	1	-	-	1	2	-	3	2	-	2	2
CO010211.5	1	1	-	-	1	3	-	3	-	-	-	1

MAPPING OF COs WITH PSOs

Cos	PSO 1	PSO2	PSO3	PSO 4	PSO 5

CO010211.1	3	-	-	1	3
CO010211.2	3	-	1	3	2
CO010211.3	1	2	2	3	3
CO010211.4	-	2	3	3	1
CO010211.5	-	2	2	3	2

<table>
<tr><td rowspan="2">Scheme Version:

2022-2023</td><td rowspan="2">Name of the Subject:

Software Engineering</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 CS 01 02 10 C 3104</td><td rowspan="2">Applicable to Programs:

M.C.A.</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">To introduce knowledge on basics of fundamental of computer science and various aspects of computational theory, programming, algorithm design, and optimization, network and database management, mobile technologies, electronics and mathematics</td></tr>
</table>

Course Objectives	The objective of this course is to provide a solid fundamental knowledge of software engineering. This course will help the students to utilize and exhibit strong communication and interpersonal skills, as well as professional and ethical principles when functioning as members and leaders of multi-disciplinary teams.	
Course Outcomes:	Upon successful completion of the course students will be able to: **CO010212.1** To interpret the problem statement for the software design. **CO010212.2** To understand the requirements of the software efficiently. **CO010212.3** Translate the requirements into the design model with modern tools and apply to solve problems. **CO010212.4** Write the test cases and analyse the software modules. **CO010212.5** Evaluation of software module test cases.	
	COURSE SYLLABUS	
Unit No.	**Content of Each Unit**	**Hours of Each Unit**
1	**Software and Software Engineering: [Course Outcome (s): CO010212.1]** software characteristics, software crisis, software engineering paradigms. Planning a Software Project: software cost estimation, project scheduling, personal planning, team structure	15
2	**Software Configuration Management: [Course Outcome (s): CO010212.2]** quality assurance, project monitoring, risk management. Software Requirement Analysis: structured analysis, object-oriented analysis and data modeling, software requirement specification, validation.	15

3	**Design and Implementation of Software: [Course Outcome (s): CO010212.3]** software design fundamentals, design methodology (structured design and object-oriented design), design verification, monitoring and control, coding. **Software Reliability:** metric and specification, fault avoidance and tolerance, exception handling, defensive programming.	15
4	**Testing: [Course Outcome (s): CO010212.4]** testing fundamentals, white box and black box testing, software testing strategies; unit testing, integration testing, validation testing, system testing, debugging Software **Maintenance:** maintenance characteristics, maintainability, maintenance side effects, CASE tools	15

REFERENCE BOOKS

1. Cormen, T.H., Leiserson, C.E., Rivest, R.L. and Stein, C., *Introduction to Algorithms,* MIT Press, 2010.

2. Goodrich, M.T., Tamassia, R. and Mount, D.M., *Data Structures and Algorithms in C++*, John Wiley & Sons, 2016.

3. Langsam, Y., Augenstein, M. and Tenenbaum, A.M., *Data Structures using C and C++,* Prentice Hall, 2015.

4. Lipschutz, S., *Schaum's Outline of Theory and Problems of Data Structures*, McGraw-Hill, 2014

COURSE ARTICULATION MATRIX

Cos	PO1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12
CO010212.1	1	3	1	-	1	-	1	1	3	-	-	-
CO010212.2	1	3	-	1	-	-	-	-	3	1	-	-
CO010212.3	-	2	1	-	-	-	1	-	3	-	3	-
CO010212.4	-	3	-	-	1	-	1	-	3	-	2	-
CO010212.5	-	3	1	-	-	-	1	-	3	1	2	2

MAPPING OF COs WITH PSOs

Cos	PSO 1	PSO2	PSO3	PSO 4	PSO 5
CO010212.1	-	1	3	-	1
CO010212.2	-	3	2	-	-
CO010212.3	-	2	2	2	2
CO010212.4	-	3	1	-	1
CO010212.5	-	2	2	-	1

<table>
<tr><td rowspan="2">Scheme Version:

2022-2023</td><td rowspan="2">Name of the Subject:

Design Analysis of Algorithms</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 CS 01 02 11 C 3104</td><td rowspan="2">Applicable to Programs:

M.C.A.</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:

Basics of C/C++.</td></tr>
<tr><td>Course Description</td><td colspan="7">To introduce knowledge on basics of fundamental of computer science and various aspects of computational theory, programming, algorithm design, and optimization, network and database management, mobile technologies, electronics and mathematics</td></tr>
<tr><td>Course Objectives</td><td colspan="7">The objective of this course is to reinforce basic design concepts (e.g., pseudo code, specifications, top-down design) and have the knowledge of algorithm design strategies. This course emphasizes mainly on the analysis of an algorithm w.r.t. time and space complexity.</td></tr>
<tr><td>Course Outcomes:</td><td colspan="7">Upon successful completion of the course students will be able to:

CO010213.1 To learn the basic concept of the asymptotic performance of algorithms.
CO010213.2 To understand the write rigorous correctness proofs for algorithms.
CO010213.3 Demonstrate familiarity with major algorithms and data structures and apply them to solve problems.
CO010213.4 Analyse the real-life problems and their better solution.</td></tr>
</table>

	CO010213.5 Evaluation of the analysed problem.	
	COURSE SYLLABUS	
Unit No.	**Content of Each Unit**	**Hours of Each Unit**
1	**Introduction to analysis of algorithms: [Course Outcome (s): CO010213.1]** Analysis of algorithms, asymptotic notation-Big- O, Omega and Theta notations, recurrence relations, solving recurrences, Abstract data types, Linear Data Structures and their sequential storage representation: stacks, queues, priority queues, and their applications.	12
2	**Divide and Conquer: [Course Outcome (s): CO010213.2]** General method, Binary Search, Exponentiation problem, Merge Sort, Quick Sort, Selection Sort, Strassen's Matrix Multiplication algorithms and analysis of algorithms for these problems. **Greedy Method:** General method, Knapsack Problem, Job sequencing with deadlines, Minimum Spanning trees, Single source shortest path and analysis of these algorithms.	12
3	**Dynamic Programming: [Course Outcome (s): CO010213.3]** General method, 0/1 Knapsack problem, Optimal BST, All Pairs shortest path, Traveling Salesman Problem, longest common subsequence (LCS).	12

	Back Tracking: General method, 8 queen's problem, graph coloring, Hamiltonian cycles and analysis of these problems.	
4	**NP-Hard and NP-Complete Problems: [Course Outcome (s): CO010213.4]** P, NP, NP-Hard & NP-Complete Classes, Reductions: Vertex cover, Simple Max-Cut, Hamiltonian Circuit, Traveling salesman problem, kernel, 3- dimensional matching, and other NP-Complete Problems, Satisfiability and variations, Cook's theorem, examples of NP-Hard problems.	10

REFERENCE BOOKS

1. Cormen, T.H., Leiserson, C.E., Rivest, R.L. and Stein, C., *Introduction to Algorithms,* MIT Press, 2010.

2. Goodrich, M.T., Tamassia, R. and Mount, D.M., *Data Structures and Algorithms in C++*, John Wiley & Sons, 2016.

3. Langsam, Y., Augenstein, M. and Tenenbaum, A.M., *Data Structures using C and C++,* Prentice Hall, 2015.

4. Lipschutz, S., *Schaum's Outline of Theory and Problems of Data Structures*, McGraw-Hill, 2014

COURSE ARTICULATION MATRIX

COs	PO1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12
CO010213.1	3	1	-	2	1	3	-	3	-	1	-	-
CO010213.2	3	1	1	-	1	2	-	3	-	-	-	-

CO010213.3	3	-	1	-	-	3	-	3	-	-	3	-
CO010213.4	3	1	-	-	-	3	-	3	-	1	2	2
CO010213.5	3	1	-	-	-	2	-	3	-	-	-	2

MAPPING OF COs WITH PSOs

Cos	PSO 1	PSO2	PSO3	PSO 4	PSO 5
CO010213.1	2	3	-	-	3
CO010213.2	-	3	2	2	3
CO010213.3	-	2	2	3	2
CO010213.4	-	-	3	2	1
CO010213.5	-	2	2	3	2

Scheme Version: 2022-2023	**Name of the Subject:** Mobile Communication	**L**	**T**	**P**	**C**	**Semester:** **II**(1st Year)	**Contact hours per week:** 3
		3	**1**	**0**	**4**		**Total Hours: 60**
Subject Code:	**Applicable to Programs:**	**Evaluation (Total**	**CIE**	**30 Marks**	**Examination Duration: 3 hours**		

SBS CS 01 02 04 E 3104	M.C.A.	**Marks):** 100	**TEE**	**70 Marks**	**Pre-requisite of course:** Basic Data Structure.
Course Description	To introduce knowledge on basics of fundamental of computer science and various aspects of computational theory, programming, algorithm design, and optimization, network and database management, mobile technologies, electronics and mathematics				
Course Objectives	This course will provide students with both broad and in-depth knowledge, and a critical understanding of mobile computing from different viewpoints: infrastructures, principles and theories, technologies, and applications in different domains. Student will understand the operation of mobile communications systems and their generation divisions.				
Course Outcomes:	Upon successful completion of the course students will be able to: **CO010205.1** Describe the basic fundamentals of wireless communications. **CO010205.2** To understand security, energy efficiency, mobility, scalability, and their unique characteristics in wireless networks. **CO010205.3** Apply basic skills for cellular networks design. **CO010205.4** Analyse knowledge of TCP/IP extensions for mobile and wireless networking. **CO010205.5** Evaluation of mobile and wireless network results.				
	COURSE SYLLABUS				
Unit No.	**Content of Each Unit**				**Hours of Each Unit**
1	**Introduction to Mobile Communications and Computing: [Course Outcome (s): CO010205.1]** Mobile Computing (MC): Introduction to MC, novel applications, limitations, and architecture. Mobile services, System architecture, Radio interface, Protocols, Localization and calling, Handover, Security, and New data services.				15

	(Wireless) Medium Access Control Motivation for a specialized MAC (Hidden and exposed terminals, Near and far terminals), SDMA, FDMA, TDMA, CDMA.	
2	**Mobile Network Layer: [Course Outcome (s): CO010205.4]** Mobile IP (Goals, assumptions, entities and terminology, IP packet delivery, agent advertisement and discovery, registration, tunneling and encapsulation, optimizations), Dynamic Host Configuration Protocol (DHCP) **Mobile Transport Layer:** Traditional TCP, Indirect TCP, Snooping TCP, Mobile TCP, Fast retransmit/fast recovery, Transmission /time-out freezing, Selective retransmission, Transaction oriented TCP.	15
3	**Database Issues: [Course Outcome (s): CO010205.2]** Hoarding techniques, caching invalidation mechanisms, client server computing with adaptation, power-aware and context-aware computing, transactional models, query processing, recovery, and quality of service issues. Data Dissemination: Communications asymmetry, classification of new data delivery mechanisms, push based mechanisms, pull-based mechanisms, hybrid mechanisms, selective tuning (indexing) techniques.	15
4	**Mobile Ad hoc Networks (MANETs):[Course Outcome (s): CO010205.3]**Overview, Properties of a MANET, spectrum of MANET applications, routing and various routing algorithms, security in MANETs. **Protocols and Tools:** Wireless Application Protocol-	15

	WAP. (Introduction, protocol architecture, and treatment of protocols of all layers), Bluetooth (User scenarios, physical layer, MAC layer, networking, security, link management) and J2ME.	

REFERENCE BOOKS

1. Cormen, T.H., Leiserson, C.E., Rivest, R.L. and Stein, C., *Introduction to Algorithms,* MIT Press, 2010.

2. Goodrich, M.T., Tamassia, R. and Mount, D.M., *Data Structures and Algorithms in C++*, John Wiley & Sons, 2016.

3. Langsam, Y., Augenstein, M. and Tenenbaum, A.M., *Data Structures using C and C++,* Prentice Hall, 2015.

4. Lipschutz, S., *Schaum's Outline of Theory and Problems of Data Structures*, McGraw-Hill, 2014

COURSE ARTICULATION MATRIX

COs	PO1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12
CO010205.1	1	2	-	-	1	-	2	-	3	-	-	-
CO010205.2	-	2	-	-	1	1	2	-	3	1	-	-
CO010205.3	-	2	-	-	-	1	-	-	3	-	3	-
CO010205.4	-	2	-	-	1	-	2	-	3	-	2	-
CO010205.5	-	3	-	-	1	-	-	-	2	1	-	-

MAPPING OF COs WITH PSOs

Cos	PSO 1	PSO2	PSO3	PSO 4	PSO 5
CO010205.1	3	-	-	-	1
CO010205.2	-	3	3	1	2
CO010205.3	2	3	3	1	2
CO010205.4	2	-	3	1	-
CO010205.5	-	2	3	-	3

<table>
<tr><td rowspan="2">Scheme Version:

2022-2023</td><td rowspan="2">Name of the Subject:

Management of Information System & E-commerece</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: 3</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 CS 01 02 05 E 3104</td><td rowspan="2">Applicable to Programs:

M.C.A.</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: Basic Data Structure.</td></tr>
<tr><td>Course Description</td><td colspan="7">To introduce knowledge on basics of fundamental of computer science and various aspects of computational theory, programming, algorithm design, and optimization, network and database management, mobile technologies, electronics and mathematics</td></tr>
</table>

Course Objectives	This course focuses on principles of e-commerce from a business perspective, providing an overview of business and technology topics, business models, virtual value chains and social innovation and marketing strategies. In addition, some of the major issues associated with e- commerce security, privacy, intellectual property rights, authentication, encryption, acceptable use policies, and legal liabilities will be explored. Students will build their own web presence and market it using an online platform.	
Course Outcomes:	Upon successful completion of the course students will be able to: **CO010206.1** Identify the basic concept of relationship between the digital firm, electronic commerce, electronic business and internet technology. **CO010206.2** Understand the relationship between organizations, information systems and business processes, including the processes for customer relationship management and supply chain management. **CO010206.3** Demonstrate an understanding of the foundations and importance of E-commerce and apply them to solve problems. **CO010206.4** Analyse the estimate the effect of changing technology on traditional business models and strategy. **CO010206.5** Evaluation of analyzed problems of business models and strategies.	
	COURSE SYLLABUS	
Unit No.	**Content of Each Unit**	**Hours of Each Unit**
1	**Introduction to the MIS concept [Course Outcome (s): CO010206.1]-** Definition, Role of the MIS, Impact of MIS, MIS and the user, Management as a control system, MIS support to the management, Management effectiveness and MIS, Organization as a system. MIS: organization effectiveness. **Decision Making and DSS-** Decision making concepts, decision-making process, decision- making	15

	by analytical modelling, Behavioral concepts in decision making, organizational decision-making, Decision structure, DSS components, Management reporting alternatives.	
2	**Enterprise Business system [Course Outcome (s): CO010206.2]-** Introduction, cross-functional enterprise applications, real- world case, Functional business system, Introduction, marketing systems, sales force automation, CIM, HRM, Customer relationship management, ERP, Supply chain management. **Client-Server Architecture and E-business Technology**- Client-server architecture, implementation strategies, Introduction to E-business, the model of E-business, Internet and World Wide Web, Intranet/Extranet, Electronic, Impact of Web on Strategic management, MIS in Web environment.	15
3	**Introduction to e-commerce [Course Outcome (s): CO010206.3]** E-commerce Business Models and Concepts, Ecommerce Infrastructure: The Internet and World Wide Web, Web design, JavaScript Internet Information Server (IIS); Personal Web Server (PWS), **E-Commerce techniques and Issues-** Introduction to Active Server Pages (ASP), Building an E-Commerce Web Site, E-Commerce Payment Systems, E-Commerce Marketing Techniques, Building product catalogue, Search Product catalogue, Web Spider and search agent, Ethical,	15

	Social and Political Issues in ECommerce.	
4	**Internet Communication [Course Outcome (s): CO010206.4]-** Transaction Systems, Shopping Carts, XML, E-Commerce Applications: Business-to-Consumer(B2C), Consumer-to-Consumer (C2C), Business- to- Business (B2B), Digital Government, Marketplaces, and Communities, Security and Encryption, Web Security.	15

REFERENCE BOOKS

1. Cormen, T.H., Leiserson, C.E., Rivest, R.L. and Stein, C., *Introduction to Algorithms,* MIT Press, 2010.

2. Goodrich, M.T., Tamassia, R. and Mount, D.M., *Data Structures and Algorithms in C++*, John Wiley & Sons, 2016.

3. Langsam, Y., Augenstein, M. and Tenenbaum, A.M., *Data Structures using C and C++,* Prentice Hall, 2015.

4. Lipschutz, S., *Schaum's Outline of Theory and Problems of Data Structures*, McGraw-Hill, 2014

COURSE ARTICULATION MATRIX

COs	PO1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12
CO010206.1	1	-	3	-	1	2	3	1	-	1	-	-
CO010206.2	1	1	2	-	1	2	1	1	-	1	-	-
CO010206.3	-	-	1	1	-	2	3	2	-	-	2	-

CO010206.4	-	2	-	1	1	2	2	1	-	-	3	2
CO010206.5	-	1	-	2	-	2	3	2	-	1	-	2

MAPPING OF COs WITH PSOs

Cos	PSO 1	PSO2	PSO3	PSO 4	PSO 5
CO010206.1	1	1	-	-	1
CO010206.2	-	3	-	2	-
CO010206.3	2	2	3	2	2
CO010206.4	-	2	-	1	1
CO010206.5	2	2	-	2	2

Scheme Version: 2022-2023	**Name of the Subject:** Quantum Computing	**L**	**T**	**P**	**C**	**Semester:** **II**(1st Year)	**Contact hours per week: 3**
		3	**1**	**0**	**4**		**Total Hours: 60**
Subject Code:	**Applicable to Programs:**	**Evaluation (Total**	**CIE**	**30 Marks**	**Examination Duration: 3 hours**		

SBS CS 01 02 06 E 3003	M.C.A.	**Marks):** 100	**TEE**	**70 Marks**	**Pre-requisite of course:**
Course Description	To introduce knowledge on basics of fundamental of computer science and various aspects of computational theory, programming, algorithm design, and optimization, network and database management, mobile technologies, electronics and mathematics				
Course Objectives	This course aims to introduce the fundamentals of quantum computation. This course provides an interdisciplinary introduction to the emerging field of quantum computer science, explaining basic quantum mechanics, quantum entanglement, its structure and its physical consequences and introduces quits.				
Course Outcomes:	Upon successful completion of the course students will be able to: **CO010207.1** Learn the basic concept of complex vector spaces. **CO010207.2** To understand the quantum mechanics in quantum computing. **CO010207.3** Apply architecture the quantum algorithms and solve problem. **CO010207.4** Analyse the fundamentals of quantum computation. **CO010207.5** Evaluation of the quantum computation.				
	COURSE SYLLABUS				
Unit No.	**Content of Each Unit**				**Hours of Each Unit**
1	**[Course Outcome (s): CO010207.1]** Complex numbers and its geometrical representations, Complex vector spaces, inner products and Hilbert spaces, Hermitian and unitary matrices, Tensor products of vector spaces				15
2	**[Course Outcome(s):CO010207.2]** Deterministic Systems, Probabilistic descriptions and Quantum systems, Basics of Quantum theory, Schrodinger's				15

	time dependent equation, Wave nature of Particles, state vector, operators, postulates of quantum mechanics, Dirac formalism, Stern-Gerlach experiment, electron spin, superposition of states, entanglement	
3	**[Course Outcome (s): CO010207.3]** Bits and Qubits, Classical gates versus quantum gates, single qubit gates, multiple qubit gates, design of quantum circuits, Deutsch's Algorithm, DeutschJozsa Algorithm, Simon's periodicity algorithm, Grover's search algorithm, Shor's Factoring algorithm	15
4	**[Course Outcome (s): CO010207.4]** Quantum programming languages, Probabilistic and Quantum computations, introduction to quantum cryptography and quantum information theory, Comparison between classical and quantum information theory, Bell states, no cloning theorem, Quantum error correction.	15

REFERENCE BOOKS

1. Cormen, T.H., Leiserson, C.E., Rivest, R.L. and Stein, C., *Introduction to Algorithms,* MIT Press, 2010.

2. Goodrich, M.T., Tamassia, R. and Mount, D.M., *Data Structures and Algorithms in C++*, John Wiley & Sons, 2016.

3. Langsam, Y., Augenstein, M. and Tenenbaum, A.M., *Data Structures using C and C++,* Prentice Hall, 2015.

4. Lipschutz, S., *Schaum's Outline of Theory and Problems of Data Structures*, McGraw-Hill, 2014

COURSE ARTICULATION MATRIX

Cos	PO1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12
CO010207.1	3	1	1	-	1	2	3	1	2	3	-	-
CO010207.2	2	-	1	-	1	2	1	1	2	2	-	-
CO010207.3	1	1	2	-	1	2	2	-	2	3	3	-
CO010207.4	1	1	-	-	1	2	-	1	2	2	-	-
CO010207.5	1	1	-	-	1	2	-	-	2	3	-	-

MAPPING OF COs WITH PSOs

Cos	PSO 1	PSO2	PSO3	PSO 4	PSO 5
CO010207.1	1	2	-	-	1
CO010207.2	-	3	3	1	2
CO010207.3	-	2	1	1	2
CO010207.4	3	-	-	1	1
CO010207.5	-	2	1	1	2

<table>
<tr><td rowspan="2">Scheme Version:

2022-2023</td><td rowspan="2">Name of the Subject:

Computer graphics</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 CS 01 02 07 E 3104</td><td rowspan="2">Applicable to Programs:

M.C.A.</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:

Basics of Graphic.</td></tr>
<tr><td>Course Description</td><td colspan="7">To introduce knowledge on basics of fundamental of computer science and various aspects of computational theory, programming, algorithm design, and optimization, network and database management, mobile technologies, electronics and mathematics</td></tr>
<tr><td>Course Objectives</td><td colspan="7">The main objective of this course is to introduce the concepts of computer graphics to the students. It starts with an overview of interactive computer graphics, two-dimensional system and mapping, then it presents the most important drawing algorithm, two- dimensional transformation; Clipping, filling and an introduction to 3-D graphics.</td></tr>
<tr><td>Course Outcomes:</td><td colspan="7">Upon successful completion of the course students will be able to:
CO010210.1 Describe the basic concepts of computer graphics.

CO010210.2 To implement various scan conversion problems with programming.

CO010210.3 Apply various transformations on the digital drawings.</td></tr>
</table>

	CO010210.4 Analyse various modelling techniques in multimedia object creation. **CO010210.5** Graphics evaluation and shading in 3D transformation.	
	COURSE SYLLABUS	
Unit No.	**Content of Each Unit**	**Hours of Each Unit**
1.	**Introduction: [Course Outcome (s): CO010210.1]** Survey of computer Graphics and its applications; Interactive and passive graphics; display processors; Graphic Devices: Display systems-refresh CRTs, raster scan and random scan monitors, grey shades, Interlacing, beam penetration shadow mask monitors, lookup tables, plasma panel, LED and LCD monitors, VGA and SVGA resolutions; Hard copy Devices-printers, plotters; Interactive Input Devices.	15
2.	**Drawing Geometry: [Course Outcome (s): CO010210.2]** Coordinate system; resolution; use of the homogeneous coordinate system; scan conversion: symmetrical DDA, simple DDA, Bradenham's line drawing algorithm, Circle drawing using DDA and polar coordinates, Bradenham's circle drawing algorithm, generation of an ellipse. Curve Drawing.	15
3.	**2-D Transformations: [Course Outcome (s): CO010210.3]** Translation; rotation; scaling; mirror reflection; shearing; zooming; panning; input techniques-	15

	pointing, positioning, rubber band methods and dragging; tweening, Morphing. Graphic operations: Clipping-line clipping using Sutherland-Cohen and midpoint sub- division algorithm, Liang Barsky Line clippers algorithm, polygon clipping; window and viewport; windowing transformation; Filling algorithms.	
4.	**3-D Graphics: [Course Outcome (s): CO010210.4]** 3D modelling of objects; 3D display techniques; coordinate system; 3D transformation matrices for translation, scaling and rotation; parallel projection; perspective projection; Hidden-surface removal - Z-buffer, back face, scan-line, depth- sorting, area subdivision; Shading - modelling light intensities, Gouraud shading, Phong shading.	15

REFERENCE BOOKS

1. Cormen, T.H., Leiserson, C.E., Rivest, R.L. and Stein, C., *Introduction to Algorithms,* MIT Press, 2010.

2. Goodrich, M.T., Tamassia, R. and Mount, D.M., *Data Structures and Algorithms in C++*, John Wiley & Sons, 2016.

3. Langsam, Y., Augenstein, M. and Tenenbaum, A.M., *Data Structures using C and C++,* Prentice Hall, 2015.

4. Lipschutz, S., *Schaum's Outline of Theory and Problems of Data Structures*, McGraw-Hill, 2014

COURSE ARTICULATION MATRIX

COs	PO1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12
CO010210.1	1	-	2	-	-	1	-	-	1	2	-	-
CO010210.2	-	-	2	-	2	-	-	1	-	1	-	-
CO010210.3	1	-	2	-	-	-	1	-	1	2	3	-
CO010210.4	-	-	2	-	1	-	-	-	-	-	3	3
CO010210.5	-	-	2	-	1	-	-	-	1	2	-	-

MAPPING OF COs WITH PSOs

Cos	PSO 1	PSO2	PSO3	PSO 4	PSO 5
CO010210.1	3	-	-	1	1
CO010210.2	2	1	2	2	1
CO010210.3	-	1	2	2	2
CO010210.4	-	2	2	3	2
CO010210.5	-	1	2	2	2

3rd Semester

<table>
<tr><td rowspan="2">Scheme Version:

2022-2023</td><td rowspan="2">Name of the Subject:

Artificial Intelligence and Expert System</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 CS 01 03 15 C 3104</td><td rowspan="2">Applicable to Programs:

M.C.A.</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">To introduce knowledge on basics of fundamental of computer science and various aspects of computational theory, programming, algorithm design, and optimization, network and database management, mobile technologies, electronics and mathematics</td></tr>
<tr><td>Course Objectives</td><td colspan="7">The primary objective of this course is to introduce the basic principles, techniques, and applications of Artificial Intelligence. Emphasis will be placed on the teaching of these fundamentals and labs for the ‘hands-on’ approach for understanding, as well as a challenging avenue for exploration and creativity.</td></tr>
<tr><td>Course Outcomes:</td><td colspan="7">Upon successful completion of the course students will be able to:

CO010319.1 Choose problems that are amenable to solution by AI methods, and which AI methods may be suited to solving a given problem.
CO010319.2 Examine a given problem in the language/framework of different AI methods
CO010319.3 Apply basic AI algorithms (e.g., standard search algorithms or</td></tr>
</table>

	resolution) and solve problems. **CO010319.4** Analyse and carry out an empirical evaluation of different algorithms on a problem formalization.	
	COURSE SYLLABUS	
Unit No.	**Content of Each Unit**	**Hours of Each Unit**
1.	**Basic Concepts: [Course Outcome CO010319.1]** AI and its importance, history of AI, applications areas, AI approach for solving problems. Problem representation: State space representation, problem reduction representation, bounding functions. Propositional logic: syntax and semantics. First order predicate logic (FOPL): syntax and semantics, conversion to clausal form, inference rules, unification, resolution principle, proof procedure, refutation.	15
2.	**Search and Control Strategies: [Course Outcome CO010319.2]** Strategies for state space search, data driven and goal driven search; Search algorithms- uninformed search (depth first, breadth first, depth first with iterative deepening) and informed search (Hill climbing, best first, A, A*, AO algorithm, mini-max etc.), computational complexity, Properties of search algorithms Admissibility, Monotonicity, Optimality, Dominance, etc., genetic algorithms.	15
3.	**Expert System Architecture: [Course Outcome CO010319.3]** Rule based architecture, non-production system architecture. Components of	15

	Expert Systems, Stages of expert system development, Expert systems applications, Building Expert System and Shell. Knowledge acquisition and validation.	
4.	**Managing uncertainty in expert systems: [Course Outcome CO010319.4]** Bayesian probability theory, Stanford certainty factor algebra, No monotonic logic and reasoning with beliefs, Fuzzy logic, Dempster/Shaffer theory.	15

REFERENCE BOOKS

1. Luger, G.F. and Stubblefield, W.A., Artificial Intelligence and The Design of Expert Systems, Benjamin-Cummings Publishing Co. Inc., 2008.

2. Nilsson, N.J., Principles of Artificial Intelligence, Morgan Kaufmann, 2014.

3. Patterson, D.W., Introduction to Artificial Intelligence and Expert Systems, Prentice-hall of India, 2007.

4. Rich, E.K. and Nair, S.B., Artificial Intelligence, New Delhi, 2009.

5. Russell, S., and Norvig, P., Artificial Intelligence: A Modern Approach, Prentice Hall, 2015.

COURSE ARTICULATION MATRIX

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO010319.1	1	-	3	-	1	-	-	2	1	1	-	-
CO010319.2	-	1	3	2	-	2	-	-	-	-	-	-
CO010319.3	1	2	3	2	1	-	1	-	1	-	-	-

CO010319.4	-	1	3	-	-	1	-	1	-	1	2	-
CO010319.5	1	1	3	2	-	-	1	-	1	-	-	-

MAPPING OF COs WITH PSOs

Cos	PSO 1	PSO2	PSO3	PSO 4	PSO5
CO010319.1	2	2	2	2	-
CO010319.2	1	2	1	1	1
CO010319.3	2	2	1	-	2
CO010319.4	1	2	2	2	1
CO010319.5	1	2	1	1	2

<table>
<tr><td rowspan="2">Scheme Version:

2022-2023</td><td rowspan="2">Name of the Subject:

Theory of Computation</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: 3</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 CS 01 03 16 C 3104</td><td rowspan="2">Applicable to Programs:

M.C.A.</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">To introduce knowledge on basics of fundamental of computer science and various aspects of computational theory, programming, algorithm design, and optimization, network and database management, mobile technologies, electronics and mathematics</td></tr>
<tr><td>Course Objectives</td><td colspan="7">This course aims to introduce the fundamentals of quantum computation. This course provides an interdisciplinary introduction to the emerging field of quantum computer science, explaining basic quantum mechanics, quantum entanglement, its structure and its physical consequences and introduces quits.</td></tr>
<tr><td>Course Outcomes:</td><td colspan="7">Upon successful completion of the course students will be able to:
CO010208.1 Relate practical problems to languages, automata, and computability.
CO010208.2 Understand the mathematical and formal techniques for solving problems.
CO010208.3 Distinguish different computing languages and classify their respective types and apply them to solve problem.</td></tr>
</table>

	CO010208.4 Analyze and design finite automata, pushdown automata, Turing machines, formal languages, and grammars. **CO010208.5** Evaluation of the analysed problems in automata.	
	COURSE SYLLABUS	
Unit No.	**Content of Each Unit**	**Hours of Each Unit**
1	**Recursive Languages [Course Outcome CO010208.1]:** Recursive definition, Alphabets, Language, Regular expression, definitions of Finite state machine, Transition graphs, Deterministic & non-deterministic finite state machines, Regular grammar, Left-linear and right linear, Thomson's construction to convert regular Expression to NDFA & subset algorithm to convert NDFA to DFA. Minimization of DFA, Finite state machine with output (Moore machine and Mealy Machine), conversion of Moore machine to Mealy machine & vice-versa.	**15**
2	**Properties of Regular Languages [Course Outcome CO010208.2]:** Conversion of DFA to regular expression, Pumping lemma, Properties and limitations of finite state machine, Decision properties of regular languages, Application of finite automata. **Context Free Grammar:** Context free grammar, Writing context free grammar for problems, Derivation tree and ambiguity, Application of context free grammars, Chomsky and Greibach Normal form, Conversion of CFG to CNF and GNF. Properties of context free grammar, CYK algorithm	**15**

3	**PDA [Course Outcome CO010208.3 & CO010208.4] :** Push down stack machine, Design of deterministic and non-deterministic push-down stack, Parser design. **Turing Machine :**Turing machine definition and design of Turing Machine, Church- Turing Thesis, Variations of Turing Machines, combining Turing machine, Universal Turing Machine, Post Machine, Chomsky Hierarchy.	**15**
4	**Incommutability [Course Outcome CO010208.4]:** Halting problem, Turing enumerability, Turing acceptability and Turing decidability, Unsolvable problems about Turing machines. Computation Complexity: P, NP and NP Complete Problems.	**15**

REFERENCE BOOKS

1. Cormen, T.H., Leiserson, C.E., Rivest, R.L. and Stein, C., *Introduction to Algorithms,* MIT Press, 2010.

2. Goodrich, M.T., Tamassia, R. and Mount, D.M., *Data Structures and Algorithms in C++*, John Wiley & Sons, 2016.

3. Langsam, Y., Augenstein, M. and Tenenbaum, A.M., *Data Structures using C and C++,* Prentice Hall, 2015.

4. Lipschutz, S., *Schaum's Outline of Theory and Problems of Data Structures*, McGraw-Hill, 2014

COURSE ARTICULATION MATRIX

COs	PO1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12
CO010207.1	-	1	-	3	-	-	-	-	-	1	-	-
CO010207.2	3	-	3	-	-	1	-	2	-	1	-	-
CO010207.3	1	-	-	3	1	-	-	2	3	-	3	-
CO010207.4	-	-	-	3	-	1	-	1	-	-	2	3
CO010207.5	2	-	3	-	1	-	-	2	2	1	-	2

MAPPING OF COs WITH PSOs

Cos	PSO 1	PSO2	PSO3	PSO 4	PSO 5
CO010207.1	1	2	-	-	1
CO010207.2	-	1	-	-	2
CO010207.3	1	-	-	-	-
CO010207.4	-	1	-	-	2
CO010207.5	-	1	-	2	1

<table>
<tr><td rowspan="2">Scheme Version:

2022-2023</td><td rowspan="2">Name of the Subject:

Internet and java Programming</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 CS 01 03 17 C 3104</td><td rowspan="2">Applicable to Programs:

M.C.A.</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">To introduce knowledge on basics of fundamental of computer science and various aspects of computational theory, programming, algorithm design, and optimization, network and database management, mobile technologies, electronics and mathematics</td></tr>
<tr><td>Course Objectives</td><td colspan="7">The objective of this course is to teach students about programming in the Java language and the use of Java in a variety of technologies and on different platforms.</td></tr>
<tr><td>Course Outcomes:</td><td colspan="7">Upon successful completion of the course students will be able to:

CO010321.1 Describe the basic fundamental blocks of the Internet and TCP/IP.
CO010321.2 Understand classes, objects, members of a class and relationships among them needed for a specific problem
CO010321.3 Write Java application programs using OOP principles and proper program Structuring and apply them to solve problems.
CO010321.4 Analyse the concepts of polymorphism, inheritance and error handling techniques using exception handling.</td></tr>
</table>

	CO010321.5 Evaluation of AWT and Swings with the use of exception handling.	
	COURSE SYLLABUS	
Unit No.	**Content of Each Unit**	**Hours of Each Unit**
5.	**Internetworking with TCP / IP: [Course outcome CO010321.1]** Review of network technologies, Internet addressing, Address resolution protocols (ARP / RARP), Routing IP datagrams, Reliable stream transport service (TCP) TCP / IP over ATM networks, Internet applications - E-mail, Telnet, FTP, NFS, Internet traffic management.	**15**
6.	**[Course outcome CO010321.2]** The overview of Java's architecture and the architecture of the Java Virtual Machine (JVM). Methods: **Method** Declarations, this reference, Method Overloading, Constructors, The Default Constructor and Constructors overloading. Arrays, Anonymous Arrays, Multidimensional Arrays, The main () Method, Program Arguments. **Classes:** Declaring Members (Fields and Methods), Instance Members, Static Members. **Objects:** Class Instantiation, Reference Values, and References. Primitive Data Types, Variable Declarations, Initial Values for Variables, Class Declarations.	**15**

7.	**Object-Oriented Programming:** [**Course outcome CO010321.3]** Single Implementation Inheritance, Overriding Methods, Hiding Members, The Object Reference super, Chaining Constructors Using this () and super (). **Interfaces:** Defining Interfaces, Abstract Method Declarations, Implementing Interfaces, Extending Interfaces, Interface References, Constants in Interfaces, Polymorphism and Dynamic Method Lookup	**15**
8.	**Exception Handling:** [**Course outcome CO010321.4]** The try Block, the catch Block, the finally Block, the throw Statement, the throws Clause, Checked and Unchecked Exceptions, Defining New Exceptions. **Multithreading:** Overview of Threads, the Main Thread, Thread Creation, Synchronization, Thread Transitions. Basics of Event Handling, Graphics Programming using AWT and Swing	**15**

REFERENCE BOOKS

1. Comer, D.E., Stevens, D.L. and Evangelista, M., Internetworking with TCP/IP, Vol. III: Client-Server Programming and Applications, Prentice Hall, 2001.
2. Deitel, P. and Deitel, H., Java How to Program, Pearson Education, 2015.
3. Eckel, B., Thinking in Java, Pearson Education, 2006.
4. Freeman, A. and Ince, D., Programming the Internet with Java, Addison-Wesley Longman Publishing Co. Inc., 1998.
5. Horstmann, C.S. and Cornell, G., Core Java Volume I (Fundamentals), Pearson, 2019.

COURSE ARTICULATION MATRIX

COs	**PO 1**	**PO 2**	**PO 3**	**PO4**	**PO 5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO010321.1	-	-	-	2	1	1	1	3	1	1	-	-
CO010321.2	-	1	-	-	1	2	2	3	2	-	-	-
CO010321.3	-	-	-	2	-	2	1	3	1	1	3	-
CO010321.4	-	1	-	-	1	1	1	3	1	-	-	3
CO010321.5	-	-	-	2	2	2	1	3	1	-	-	2

MAPPING OF COs WITH PSOs

COs	PSO 1	PSO2	PSO3	PSO 4	PSO5
CO010321.1	2	2	2	3	1
CO010321.2	2	3	2	3	1
CO010321.3	1	3	1	2	1
CO010321.4	1	2	1	2	2
CO010321.5	1	2	1	2	2

<table>
<tr><td rowspan="2">Scheme Version:

2022-2023</td><td rowspan="2">Name of the Subject:

Network Programming</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: 3</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 CS 01 03 08 E 3104</td><td rowspan="2">Applicable to Programs:

M.C.A.</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: Basic Computer Network.</td></tr>
<tr><td>Course Description</td><td colspan="7">To introduce knowledge on basics of fundamental of computer science and various aspects of computational theory, programming, algorithm design, and optimization, network and database management, mobile technologies, electronics and mathematics</td></tr>
<tr><td>Course Objectives</td><td colspan="7">The objective of this course is to teach how to write network programs using an application program interface (or API), implement basics of socket programming using TCP Sockets. This course will guide the students to create client and server applications using the "Sockets" API and the implementation of Data link layer protocol and TCP layer.</td></tr>
<tr><td>Course Outcomes:</td><td colspan="7">Upon successful completion of the course students will be able to:

CO010309.1 To learn the basic concept of key protocols that support the Internet.
CO010309.2 To understand the detailed knowledge of the TCP/UDP Sockets.
CO010309.3 Apply advanced programming techniques such as Broadcasting, Multicasting and apply them to solve problem.
CO010309.4 Analysing the DNS and Functional of IPV6
CO010309.5 Evaluation of the security requirements of a networked programming environment and identify the issues to be solved.</td></tr>
</table>

	COURSE SYLLABUS	
Unit No.	**Content of Each Unit**	**Hours of Each Unit**
1.	**Introduction to Network Programming: [Course Outcome CO010309.1]**OSI model, Unix standards, TCP and UDP & TCP connection establishment and Format, Buffer sizes and limitation, standard internet services, Protocol usage by common internet application. **Sockets:** Address structures, value – result arguments, Byte ordering and manipulation function and related functions Elementary TCP sockets – Socket, connect, bind, listen, accept, fork and exec function, concurrent servers. Close function and related function.	**15**
2.	**TCP client server: [Course Outcome CO010309.3]** Introduction, TCP Echo server functions, Normal startup, terminate and signal handling server process termination, Crashing and Rebooting of server host shutdown of server host. **I/O Multiplexing and socket options:** I/O Models, select function, Batch input, shutdown function, poll function, TCP Echo server, getsockopt and setsockopt functions. Socket states, Generic socket option IPV6 socket option ICMPV6 socket option IPV6 socket option and TCP socket options.	**15**

3.	**Elementary UDP sockets: [Course Outcome CO010309.2 & CO010309.4]** Introduction UDP Echo server function, lost datagram, summary of UDP example, Lack of flow control with UDP, determining outgoing interface with UDP. **Elementary name and Address conversions:** DNS, get host by Name function, Resolver option, Function and IPV6 support, uname function, other networking information.	**15**
4.	**IPC: [Course Outcome CO010309.5]** Introduction, File and record locking, Pipes, FIFOs streams and messages, Name spaces, system IPC, Message queues, Semaphores. **Remote Login:** Terminal line disciplines, Pseudo-Terminals, Terminal modes, Control Terminals, rlogin Overview, RPC Transparency Issues.	**15**

REFERENCE BOOKS

1. Chan, T., Unix System Programming using *C++*, Prentice Hall, 1999 .
2. Glass, G. and Ables, K., *UNIX for Programmers and Users*, Prentice Hall, 2003.
3. Richard, S.W., *Unix Network Programming. In The Sockets Networking API (Vol. 1)*, Pearson Education India, 2015.
4. Rochkind, M.J., *Advanced UNIX Programming*, Pearson Education, 2004.
5. Stevens, W.R., Rudoff, A.M. and Fenner, B., *UNIX Network Programming Volume 1: The Sockets Networking API (Vol. 3)*, Addison-Wesley Professional, 2003.

COURSE ARTICULATION MATRIX

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO010309.1	-	2	-	-	1	-	2	2	3	1	-	-
CO010309.2	1	2	1	-	-	1	2	2	3	-	-	-
CO010309.3	1	1	1	-	1	1	2	1	2	1	3	3
CO010309.4	-	1	-	-	1	-	1	2	2	-	-	-
CO010309.5	1	-	-	1	-	1	1	1	2	1	2	3

MAPPING OF COs WITH PSOs

Cos	PSO 1	PSO2	PSO3	PSO 4	PSO5
CO010309.1	2	2	1	2	1
CO010309.2	2	2	1	1	1
CO010309.3	1	1	-	-	-
CO010309.4	1	1	-	-	2
CO010309.5	2	1	1	1	-

<table>
<tr><td rowspan="2">Scheme Version:

2022-2023</td><td rowspan="2">Name of the Subject:

Machine and Deep Learning</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: 3</td></tr>
<tr><td>3</td><td>1</td><td>0</td><td>4</td><td>Total Hours: 60</td></tr>
<tr><td>Subject Code:

SBS CS 01 03 09 E 3104</td><td>Applicable to Programs:

M.C.A.</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">Pre-requisite of course:</td></tr>
<tr><td>Course Description</td><td colspan="7">To introduce knowledge on basics of fundamental of computer science and various aspects of computational theory, programming, algorithm design, and optimization, network and database management, mobile technologies, electronics and mathematics</td></tr>
<tr><td>Course Objectives</td><td colspan="7">This course will serve as a comprehensive introduction to various topics in machine learning. At the end of the course, the students should be able to design and implement machine learning solutions to classification, regression, and clustering problems; and be able to evaluate and interpret the results of the algorithms.</td></tr>
<tr><td>Course Outcomes:</td><td colspan="7">Upon successful completion of the course students will be able to:

CO010310.1 Discuss the basic concept of supervised and unsupervised learning algorithms.
CO010310.2 To understand the fundamental concepts in machine learning and popular machine learning algorithms.
CO010310.3 Solve problems related to the application of machine learning algorithms with programming in Python/MatLab.</td></tr>
</table>

	CO010310.4 Analyse the concept of Deep Learning. **CO010310.5** Evaluation the result of Deep Learning.	
	COURSE SYLLABUS	
Unit No.	**Content of Each Unit**	**Hours of Each Unit**
1.	**Introduction: [Course Outcome CO010310.1]** History of Machine Learning, Programs vs learning algorithms, Machine Learning definition, types of learning, hypothesis space and inductive bias, evaluation, cross-validation, Instance based learning, Feature reduction, Collaborative filtering-based recommendation, Gradient Descent learning.	**15**
2.	**Supervised Learning: [Course Outcome CO010310.2]** General notions - Bayes optimality, curse of dimensionality, overfitting and model, selection, bias vs. variance tradeoff, generative vs. discriminative for parameter estimation, feature selection, and etc Linear methods - linear, logistic regression and generalized linear models, naive Bayes, linear discriminant analysis, support vector machines Nonlinear methods - kernel methods, nearest neighbor, decision trees, neural networks, and etc Ensemble learning - bagging, boosting, and etc.	**15**

3.	**Unsupervised Learning: [Course Outcome CO010310.3]** Clustering and density estimations - K-means/vector quantization, mixture models, Dimensionality reduction - linear and nonlinear methods, Principal components analysis. **Deductive Learning:** Probability theory and Bayes rule. Naive Bayes learning algorithm. Parameter smoothing. Generative vs. discriminative training. Logistic regression. Bayes nets and Markov nets for representing dependencies.	**15**
4.	**Deep Learning: [Course Outcome CO010310.4]** Artificial Neural Networks, Perceptron, Multilayer networks and Backpropagation algorithm, Introduction to Deep Neural networks, Recurrent Neural Networks (RNNs) and Convolutional Neural Networks (CNNs).	**15**

REFERENCE BOOKS

1. Alpaydin, E., *Introduction to Machine Learning*, MIT Press, 2004.
2. Bishop, C.M., *Pattern Recognition and Machine Learning,* Springer, 2006.
3. Hastie, T., Tibshirani, R. and Friedman, J., *The Elements of Statistical Learning*, Springer, 2008.
4. Mitchell, T.M., *Machine Learning,* McGraw- Hill, 1997.
5. Russell, S. and Norvig, P., *Artificial Intelligence: A Modern Approach,* Prentice Hall, 2002.

COURSE ARTICULATION MATRIX

Cos	PO1	PO2	PO3	PO4	PO 5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO010310 .1	1	-	1	-	1	3	-	1	-	1	-	-
CO010310 .2	1	1	1	1	1	3	1	2	1	2	3	-
CO010310 .3	-	2	1	-	1	3	1	-	1	-	3	3
CO010310 .4	1	-	-	1	1	3	-	1	-	1	2	-
CO010310 .5	-	2	1	1	1	3	-	1	-	2	-	2

MAPPING OF COs WITH PSOs

Cos	PSO 1	PSO2	PSO3	PSO 4	PSO5
CO010310.1	2	3	2	3	1
CO010310.2	1	2	1	-	1
CO010310.3	1	2	1	-	1
CO010310.4	1	1	1	2	1
CO010310.5	1	3	2	2	1

<table>
<tr><td rowspan="2">Scheme Version:

2022-2023</td><td rowspan="2">Name of the Subject:

Software Project Management</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: 3</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 CS 01 03 10 E 3104</td><td rowspan="2">Applicable to Programs:

M.C.A.</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">To introduce knowledge on basics of fundamental of computer science and various aspects of computational theory, programming, algorithm design, and optimization, network and database management, mobile technologies, electronics and mathematics</td></tr>
<tr><td>Course Objectives</td><td colspan="7">This course is aimed at introducing the important concepts of project management related to managing software development. Students will also get familiar with the different activities involved in Software Project Management. Further, they will also come to know how to successfully plan and implement a software project management activity, and to complete a specific project in time with the available budget.</td></tr>
<tr><td>Course Outcomes:</td><td colspan="7">Upon successful completion of the course students will be able to:

CO010311.1 To learn the basic concept of Software Project Management.
CO010311.2 Understand the different techniques for software cost estimation
CO010311.3 Apply activity planning and risk management and solve problem
CO010311.4 Analyse of management and control projects.
CO010311.5 Evaluation of project management.</td></tr>
</table>

	COURSE SYLLABUS	
Unit No.	**Content of Each Unit**	**Hours of Each Unit**
5.	**Project Evaluation and Project Planning: [Course Outcome CO010311.1]** 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.	**15**
6.	**Project Life Cycle and Effort Estimation: [Course Outcome CO010311.2]** 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.	**15**
7.	**Activity Planning and Risk Management: [Course Outcome CO010311.3]** 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	**15**

8.	**Project Management and Control: [Course Outcome CO010311.4]** 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.	**15**

REFERENCE BOOKS

1. Futrell, R.T., Shafer, L.I. and Shafer, D.F., *Quality Software Project Management*, Prentice Hall, 2001.
2. Meredith, J.R., Shafer, S.M. and Mantel S.J., *Project Management: A Strategic Managerial Approach*, John Wiley & Sons, 2017.
3. Royce, W., *Software Project Management*, Pearson Education India, 1998.
4. Stellman, A. and Greene, J., *Applied Software Project Management*, O'Reilly Media, Inc., 2005.
5. Wysocki, R.K., *Effective Software Project Management*, John Wiley & Sons, 2010.

COURSE ARTICULATION MATRIX

Cos	PO1	PO2	PO3	PO4	PO 5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO010311. 1	-	3	1	-	3	-	-	1	-	1	-	-
CO010311. 2	1	2	1	1	3	-	1	1	1	1	-	-
CO010311. 3	1	2	1	-	3	-	1	-	1	1	2	-
CO010311. 4	-	3	1	-	2	-	-	1	2	1	3	3
CO010311. 5	-	2	1	-	3	-	1	1	2	2	2	1

MAPPING OF COs WITH PSOs

Cos	PSO 1	PSO2	PSO3	PSO 4	PSO5
CO010311.1	1	3	2	3	2
CO010311.2	2	2	1	1	1
CO010311.3	1	2	1	-	2
CO010311.4	-	2	1	1	2
CO010311.5	1	2	1	1	1

<table>
<tr><td rowspan="2">Scheme Version:

2022-2023</td><td rowspan="2">Name of the Subject:

Digital Image Processing</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: 3</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 CS 01 03 11 E 3104</td><td rowspan="2">Applicable to Programs:

M.C.A.</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">To introduce knowledge on basics of fundamental of computer science and various aspects of computational theory, programming, algorithm design, and optimization, network and database management, mobile technologies, electronics and mathematics</td></tr>
<tr><td>Course Objectives</td><td colspan="7">In this course, students will understand the image fundamentals and mathematical transforms necessary for image processing. Study about the image enhancement techniques, image restoration procedures and image compression procedures. Students will learn about the image segmentation and representation techniques & pattern recognition and interpretation.</td></tr>
<tr><td>Course Outcomes:</td><td colspan="7">On completion of the module the student will be able to:
CO010312.1 Explain and analyse the steps of image formation, sampling, quantization and representation digitally.
CO010312.2 Outline and understand how images are processed by discrete, linear, time-invariant systems.
CO010312.3 Apply how images are perceived by humans and how colour is represented and solve problems.
CO010312.4 Analysing how image information can be modeled analytically</td></tr>
</table>

	and compare transform- domain representation of images (Fourier, DCT, Haar, WHT). **CO010312.5** Evaluation of descriptors	
	COURSE SYLLABUS	
Unit No.	**Content of Each Unit**	**Hours of Each Unit**
5.	**Digital Image Fundamentals: [Course Outcome CO010312.1]** Digital Image Processing, Origins of Digital Image Processing Application of Digital Image Processing, Steps in Digital Image Processing, Components of an Image Processing System, Image formation, Image transforms – Fourier transforms.	**15**
6.	**Image Enhancement Techniques: [Course Outcome CO010312.2 & CO010312.3]]** Histogram modification techniques - Image smoothening Image Sharpening - Image Restoration - Degradation Model – Noise models - Spatial filtering – Frequency domain filtering.	**15**
7.	**Image Compression & Segmentation: [Course Outcome CO010312.3]** Compression Models - Elements of information theory Error free Compression -Image segmentation –Detection of discontinuities, Region based segmentation - Morphology.	**15**
8.	**Representation and Description: [Course Outcome CO010312.4]** Representation schemes- Boundary descriptors- Regional descriptors - Relational Descriptors.	**15**

REFERENCE BOOKS

1. Christopher, R.M., *An Introduction to MATLAB for Behavioral Researchers.*, SAGE Publications, Inc., 2013
2. Forsyth, D., and Ponce, J., *Computer Vision: A Modern Approach.*, Pearson Education India., 2015.
3. Gonzalez, C., Rafael., E., and Woods, R., *Digital Image Processing*., Pearson Publication., 2007.
4. Gonzalez, R., Woods, R., and Eddins, S., *Digital Image Processing Using MATLAB*., McGraw Hill Education., 2017.
5. Jayaraman, S., Veerakumar, T., and Esakkirajan, S., *Digital Image Processing*., McGraw Hill Education., 2017.

COURSE ARTICULATION MATRIX

Cos	PO1	PO2	PO3	PO4	PO 5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO010312.1	3	1	-	1	1	-	-	1	2	-	-	-
CO010312.2	3	2	1	-	1	1	1	1	1	2	-	-
CO010312.3	3	1	1	2	1	-	2	-	1	1	-	3
CO010312.4	2	1	-	1	-	1	1	-	-	1	2	2
CO010312.5	2	1	1	2	1	-	2	-	-	1	2	-

MAPPING OF COs WITH PSOs

Cos	PSO 1	PSO2	PSO3	PSO 4	PSO5
CO010312.1	1	3	2	3	1
CO010312.2	-	1	-	-	-
CO010312.3	1	1	1	-	2
CO010312.4	-	1	-	-	-
CO010312.5	1	1	2	3	1

<table>
<tr><td rowspan="2">heme Version:

2022-2023</td><td rowspan="2">Name of the Subject:
Data Warehousing and Data Mining</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: 3</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 CS 01 03 12 E 3104</td><td rowspan="2">Applicable to Programs:
M.C.A.</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">To introduce knowledge on basics of fundamental of computer science and various aspects of computational theory, programming, algorithm design, and optimization, network and database management, mobile technologies, electronics and mathematics</td></tr>
</table>

Course Objectives	The main objective of this course is to impart the knowledge on how to implement classical models and algorithms in data warehousing and data mining and to characterize the kinds of patterns that can be discovered by association rule mining, classification and clustering. Data quality and methods and techniques for pre-processing of data.	
Course Outcomes:	Upon successful completion of the course students will be able to: **CO010313.1** Comprehend the various architectures and its application with data mining **CO010313.2** To understand the design and develop data mining algorithms to analyze raw real-world data **CO010313.3** Monitor and apply to predict online digital activities and solve problem using them. **CO010313.4** Analyse and Evaluate various mining techniques on complex data objects	
	COURSE SYLLABUS	
Unit No.	**Content of Each Unit**	**Hours of Each Unit**
1	**[Course Outcome CO010313.1]** Basic Concepts, Data Warehousing Components, Building a Data Warehouse, Database Architectures for Parallel Processing, Parallel DBMS Vendors, Multidimensional Data Model, Data Warehouse Schemas for Decision Support, Concept Hierarchies, Characteristics of OLAP Systems, Typical OLAP Operations, OLAP and OLTP.	**15**
2	**[Course Outcome CO010313.2]** Introduction to Data Mining Systems, Knowledge Discovery Process, Data Mining Techniques, Issues, Applications, Data Objects and attribute types, Statistical description of data, Data Preprocessing,	**15**

	Cleaning, Integration, Reduction, Transformation and Discretization, Data Visualization, Data similarity and dissimilarity measures.	
3	**[Course Outcome CO010313.3]** Mining Frequent Patterns, Associations and Correlations, Mining Methods, Pattern Evaluation Method, Pattern Mining in Multilevel, Multi-Dimensional Space, Constraint Based Frequent Pattern Mining, Classification using Frequent Patterns	**15**
4	**[Course Outcome CO010313.4]** Decision Tree Induction, Bayesian Classification, Rule Based Classification, Classification by Back Propagation, Support Vector Machines, Lazy Learners, Model Evaluation and Selection, Techniques to improve Classification Accuracy, Clustering Techniques, Cluster analysis, Partitioning Methods, Hierarchical Methods, Density Based Methods.	**15**

REFERENCE BOOKS

1. Berson, A. and Smith, S.J., *Data Warehousing, Data Mining & OLAP*, Tata McGraw Hill, 2017.
2. Han, J., Pei, J. and Kamber, M., *Data Mining Concepts and Techniques*, Elsevier, 2011.
3. Pujari, A.K., *Data Mining Techniques*, Universities Press, 2010.
4. Soman, K.P., Diwakar, S. and Ajay, V., *Insight into Data Mining Theory and Practice,*PHI, 2009.
5. Witten, I.H. and Frank, E., *Data Mining: Practical Machine Learning Tools and Techniques*, Elsevier, 2016

COURSE ARTICULATION MATRIX

Cos	PO1	PO2	PO3	PO4	PO 5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO010313.1	-	3	-	1	-	1	3	1	-	2	-	-
CO010313.2	1	2	1	-	1	-	2	-	1	2	-	-
CO010313.3	-	3	1	1	2	2	2	2	1	2	3	-
CO010313.4	-	2	-	-	1	-	2	-	-	2	2	3
CO010313.5	-	2	1	-	2	1	2	-	1	2	-	-

MAPPING OF COs WITH PSOs

COs	PSO 1	PSO2	PSO3	PSO 4	PSO5
CO010313.1	2	-	-	-	-
CO010313.2	1	3	2	3	1
CO010313.3	-	3	1	3	1
CO010313.4	-	-	2	1	1
CO010313.5	-	2	2	3	1

Semester IV

<table>
<tr><td rowspan="2">Scheme Version:

2022-2023</td><td rowspan="2">Name of the Subject:

Data Science with R Programming</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 CS 01 04 22 C 3104</td><td rowspan="2">Applicable to Programs:

M.C.A.</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">To introduce knowledge on basics of fundamental of computer science and various aspects of computational theory, programming, algorithm design, and optimization, network and database management, mobile technologies, electronics and mathematics</td></tr>
<tr><td>Course Objectives</td><td colspan="7">In this course, students will have knowledge on accessing, storing and manipulating the huge data from different resources. Students will understand the working environment of Pig and Hive for processing the structured and unstructured data. & Differentiate the RDBMS and Hive architectures, and implement queries to process the data.</td></tr>
<tr><td>Course Outcomes:</td><td colspan="7">Upon completion of the module the student will be able to:
CO010426.1 Learn the main R data structures – vector and data frame and import external data into R for data processing and statistical analysis.
CO010426.2 To understand review, manipulate and summarize data-sets in R.</td></tr>
</table>

	CO010426.3 Apply data-sets to create testable hypotheses and identify appropriate statistical tests. **CO010426.4** Analyse R programming from a statistical perspective. **CO010426.5** Evaluating the techniques of R programming.	
	COURSE SYLLABUS	
Unit No.	**Content of Each Unit**	**Hours of Each Unit**
1	**Introduction of Data Science: [Course Outcome CO010426.1]** Introduction to data science, Data collection, integration, management, modeling, analysis, visualization, prediction and informed decision making, Big data definition, structured and unstructured data. Exploratory data analysis Components of Hadoop Eco System- Data Access and storage, Data Intelligence, Data Integration, Data Serialization, Monitoring, Indexing	**15**
2	**R Programming: [Course Outcome CO010426.2]** Basic commands, graphics, indexing data, loading data, Data types in R: Numeric/character/logical; real/integer/complex, creation of new variables, vectors, matrices, data frames, and lists, accessing elements of a vector or matrix.	**15**
	Operations with R: [Course Outcome CO010426.3] import and export of files, for loop, repeat loop, while loop, if command, if else command. Graphics in R: the plot command, histogram, bar-plot, box- plot, points, lines, segments, arrows, inserting mathematical	**15**

3	symbols in a plot, pie diagram matrix operations such as addition, subtraction, multiplication, rank, eigenvalues, matrix inverse, generalized inverse, solution of linear equations.	
4	**Statistics Techniques and R: [Course Outcome CO010426.4]** measures of central tendency and dispersion. Covariance, correlation, regression, some discrete and continuous probability z and t tests, F test for equality of variances, Chi-square tests.	**15**

REFERENCE BOOKS

1. Braun, W.J. and Murdoch, D.J., *A First Course in Statistical Programming with R.*, Cambridge University Press., 2008.
2. Hadley, W., *Advanced R.*, Chapman and Hall/CRC Press, 2019.
3. Jones, O., Maillardet, R. and Robinson, A., *Introduction to Scientific Programming and Simulation Using R.*, Chapman and Hall/CRC., 2014.
4. Rhys, H.I., *Machine Learning with R, The Tidyverse, and MLR.*, Manning Publications., 2020.
5. Zumel, N., Mount, J. and Porzak, J., *Practical Data Science with R.*, Manning Publications., 2019.

COURSE ARTICULATION MATRIX

Cos	PO1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12
CO010426.1	-	2	1	-	1	1	2	1	1	2	-	-
CO010426.2	1	2	-	-	1	-	3	2	1	2	-	-
CO010426.3	-	3	1	-	1	2	2	1	1	3	3	-
CO010426.4	1	3	-	-	1	-	3	2	1	2	2	2
CO010426.5	-	2	1	-	1	2	2	1	1	2	-	2

MAPPING OF COs WITH PSOs

Cos	PSO 1	PSO2	PSO3	PSO 4	PSO 5
CO010426.1	3	2	-	1	1
CO010426.2	2	1	2	3	-
CO010426.3	1	1	2	3	2
CO010426.4	2	-	2	1	1
CO010426.5	3	2	2	1	2

<table>
<tr><td rowspan="2">Scheme Version:

2022-2023</td><td rowspan="2">Name of the Subject:

Compiler Design</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 CS 01 04 23 C 3104</td><td rowspan="2">Applicable to Programs:

M.C.A.</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">To introduce knowledge on basics of fundamental of computer science and various aspects of computational theory, programming, algorithm design, and optimization, network and database management, mobile technologies, electronics and mathematics.</td></tr>
<tr><td>Course Objectives</td><td colspan="7">The aim of this course is to provide students with the knowledge and abilities to design and implement compilers. It describes the steps of compilation starting with the scanner, and then, followed by the parser design and implementation. The course also provides information on semantic analysis and, local and global compiler optimization algorithms.</td></tr>
<tr><td>Course Outcomes:</td><td colspan="7">Upon successful completion of the course students will be able to:

CO010318.1 To learn the knowledge of lexical tool to develop a scanner & parser
CO010318.2 To understand the lexical, syntactic and semantic analysis into meaningful phases for a compiler to undertake language translation.
CO010318.3 Design and develop software system for backend of the compiler and apply them to solve problems.
CO010318.4 Comprehend and analyse to new tools and technologies in compiler</td></tr>
</table>

	design. **CO010318.5** Evaluation of basic Blocks, Loops in flow graph, Introduction to Global data flow analysis.	
	COURSE SYLLABUS	
Unit No.	**Content of Each Unit**	**Hours of Each Unit**
5.	**Compiler structure [Course Outcome:CO010318.1]** Analysis-Synthesis model of compilation, Various phases of a compiler, Tool based approach to Compiler Construction **Lexical analysis** Interface with input, Parser and Symbol table, Token, Lexeme and Patterns. Difficulties in Lexical Analysis. Error reporting. Implementation. Regular definition, Transition diagrams, LEX.	**15**
6.	**Syntax analysis [Course Outcome:CO010318.2 & CO010318.3]** CFGs, Ambiguity, Associativity, Precedence, Top-Down Parsing, Recursive Descent Parsing, Transformation on the grammars, Predictive Parsing, Bottom-Up Parsing, Operator Precedence grammars, LR parsers (SLR, LALR, LR), YACC. **Syntax directed definitions** Inherited and Synthesized Attributes, Dependency Graph, Bottom Up and Top-Down Evaluation of Attributes, L- and S-Attributed Definitions.	**15**
7.	**Type checking [Course Outcome:CO010318.4]** Type System, Type Expressions, Structural and Name Equivalence of types, Type Conversion, Overloaded Functions and Operators	**15**

	Run time system Storage Organization, Activation Tree, Activation Record, Parameter Passing, Symbol Table, Dynamic Storage Allocation.	
8.	**Intermediate code generation [Course Outcome: CO010318.5]:** Intermediate Representations, Translation of Declarations, Assignments, Control Flow, Boolean Expressions and Procedure Calls. **Code generation and instruction selection** Issues, Basic Blocks and Flow Graphs, Register Allocation, Code Generation, DAG representation of programs, Code Generation from DAGS, Peep-Hole Optimization, Code Generators, Specifications of machine.	**15**

REFERENCE BOOKS

1. Aho, A.V., Sethi, R. and Ullman, J.D., *Compilers: Principles, Techniques and Tools*, Pearson, 2008.
2. Appel, A.W., *Modern Compiler Implementation in C*, Cambridge University Press, 2004.
3. Dham here, D.M., *Compiler Construction – Principles & Practice*, Macmillan India, 2008.
4. Fischer, C.N. and LeBlanc Jr, R.J., *Crafting a Compiler*, Pearson, 2011.
5. Holub, A.I., *Compiler Design in C*, PHI, 1992.

COURSE ARTICULATION MATRIX

Cos	PO1	PO2	PO3	PO4	PO 5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO010318. 1	2	-	-	-	-	1	-	1	1	-	-	-
CO010318. 2	3	-	2	1	-	-	1	-	1	1	-	3
CO010318. 3	3	1	1	2	-	1	1	1	3	-	3	2
CO010318. 4	2	3	-	2	-	1	1	1	1	1	-	2
CO010318. 5	1	-	-	1	-	-	1	-	1	-	-	-

MAPPING OF COs WITH PSOs

Cos	PSO 1	PSO2	PSO3	PSO 4	PSO5
CO010318.1	2	2	1	1	-
CO010318.2	2	2	1	-	1
CO010318.3	2	2	-	-	1
CO010318.4	1	2	2	1	1
CO010318.5	1	1	-	-	1

<table>
<tr><td rowspan="2">Scheme Version:

2022-2023</td><td rowspan="2">Name of the Subject:

Distributed and Cloud Computing</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 CS 01 04 13 E 3104</td><td rowspan="2">Applicable to Programs:

M.C.A.</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">To introduce knowledge on basics of fundamental of computer science and various aspects of computational theory, programming, algorithm design, and optimization, network and database management, mobile technologies, electronics and mathematics</td></tr>
<tr><td>Course Objectives</td><td colspan="7">Cloud computing is a key distributed systems paradigm that has grown popular in the last few years. Cloud technologies are pervasive, touching our daily lives any time we access the world wide web, use a mobile app, or make a retail purchase. The objective of this course is to teach the fundamental concepts of how and why Cloud systems works, as well as Cloud technologies that manifest these concepts such as Amazon AWS, Microsoft Azure and OpenStack etc.. Students will learn distributed systems concepts like virtualization, data parallelism.</td></tr>
<tr><td>Course Outcomes:</td><td colspan="7">Upon successful completion of the course students will be able to:

CO010414.1 Describe the basic concept of system models for distributed.
CO010414.2 Understanding the different cloud computing.
CO010414.3 Apply the cloud-enabling technologies, cloud mechanisms, and</td></tr>
</table>

	cloud architectures. **CO010414.4** Analyse the different virtualization techniques **CO010414.5** Evaluation of the cloud and data security.	
	COURSE SYLLABUS	
Unit No.	**Content of Each Unit**	**Hours of Each Unit**
1	**Introduction to Distributed System: [Course Outcome CO010414.1]** Models and Enabling Technologies, Computer Clusters for Scalable Parallel Computing, Virtual Machines and Virtualization of Clusters and Data centers.	**15**
2	**Introduction to Cloud Computing: [Course Outcome CO010414.2 & CO010414.3]** Cloud Computing in a Nutshell System Model for Distributed and Cloud Computing, Roots of Cloud Computing, Grid and Cloud, Layers and Types of Clouds, Desired Features of a Cloud, Basic Principles, of Cloud Computing, Challenges and Risks, Service Models	**15**
3	**Virtual Machines and Virtualization of Cluster and Data Centres: [Course Outcome CO010414.4]** Levels of Virtualization, Virtualization structures/Tools and Mechanism, Virtualization of CPU, Memory and I/O Devices, Virtual Clusters and Resources Management, Virtualization Data- Centre Automation **Service Oriented Architecture for Distributed Computing:** Services & SOA, Message Oriented Middleware, Workflow in SOA.	**15**

4	**Cloud Security, Data Security in the Cloud: [Course Outcome CO010414.5]** An Introduction to the Idea of Data Security, The Current State of Data Security in the Cloud CryptDb: Onion Encryption layers- DET, RND, OPE, JOIN, SEARCH, HOM, and Homomorphism Encryption, FPE	**15**

REFERENCE BOOKS

1. Coulouris, G.F., Dollimore, J. and Kindberg, T., *Distributed Systems: Concepts and Design*, Pearson education, 2005.
2. Erl, T., Puttini, R. and Mahmood, Z., *Cloud Computing: Concepts, Technology, & Architecture*, Pearson Education, 2013.
3. Hwang, K., Dongarra, J. and Fox, G.C., *Distributed and Cloud Computing: From Parallel Processing to The Internet of Things*, Morgan Kaufmann, 2013.
4. Tanenbaum, A.S. and Van Steen, M., *Distributed systems: principles and paradigms*, Prentice-Hall, 2007.
5. Velte, T., Velte, A. and Elsenpeter, R., *Cloud Computing, A Practical Approach*, McGraw-Hill, Inc., 2009.

COURSE ARTICULATION MATRIX

COs	PO1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12
CO010414.1	1	1	-	1	1	1	1	2	2	1	-	-
CO010414.2	2	-	1	2	1	1	-	2	2	1	-	-
CO010414.3	2	1	2	-	1	2	1	2	2	-	-	3
CO010414.4	1	-	-	2	1	2	-	1	2	1	-	3
CO010414.5	1	-	1	-	1	-	1	-	2	1	-	2

MAPPING OF COs WITH PSOs

Cos	PSO 1	PSO2	PSO3	PSO 4	PSO 5
CO010414.1	2	2	2	3	2
CO010414.2	2	1	1	2	1
CO010414.3	2	1	1	2	1
CO010414.4	-	1	-	-	1
CO010414.5	1	2	1	1	1

<table>
<tr><td rowspan="2">Scheme Version:

2022-2023</td><td rowspan="2">Name of the Subject:

Bioinformatics</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 CS 01 04 14 E 3104</td><td rowspan="2">Applicable to Programs:

M.C.A.</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">To introduce knowledge on basics of fundamental of computer science and various aspects of computational theory, programming, algorithm design, and optimization, network and database management, mobile technologies, electronics and mathematics</td></tr>
<tr><td>Course Objectives</td><td colspan="7">The unprecedented increase in the amount of available biological data ranging from protein sequences to biomedical images have rendered the use of computers and computational techniques for analysing and managing the biological data inevitable. This course aims to provide students with the basics of bioinformatics algorithms that have been applied over various types of biological data.</td></tr>
<tr><td>Course Outcomes:</td><td colspan="7">Upon successful completion of the course students will be able to:

CO010415.1 Describe about the basic concept of different types of Biological databases.
CO010415.2 To understand the information Retrieval from Biological Databases.
CO010415.3 Describe about pairwise sequence alignment, algorithms and tools</td></tr>
</table>

	for pairwise alignment and apply them to solve problem **CO010415.4** Analyse about protein folding and its significance **CO010415.5** Apply algorithms and evaluation to the real-world problems.	
	COURSE SYLLABUS	
Unit No.	**Content of Each Unit**	**Hours of Each Unit**
1	**Introduction to Bioinformatics: [Course Outcome CO010415.1 & CO010415.2]** What is a Database, Types of Databases, Biological Databases, Pitfalls of Biological Databases, Information Retrieval from Biological Databases.	**15**
2	**Sequences: [Course Outcome CO010415.3]** 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.	**15**
3	**Structures: [Course Outcome CO010415.4]** 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.	**15**
4	**Transcriptomics: [Course Outcome CO010415.5]** Methods for analyzing gene expression and microarray data. Techniques: clustering, SVMs. Agent-based Genome Analysis: Automation of genome analysis using intelligent software agents. Drug Discovery	**15**

	Informatics: Approaches to drug discovery using bioinformatics techniques.	

REFERENCE BOOKS

1. Compeau, P. and Pevzner, P.A., *Bioinformatics Algorithms: An Active Learning Approach*, Active Learning Publishers, 2018.
2. Jones, N.C., Pevzner, P.A. and Pevzner, P., *An Introduction to Bioinformatics Algorithms*, MIT press, 2004.
3. Krawetz, S.A. and Womble, D.D., *Introduction to Bioinformatics: A Theoretical and Practical Approach*, Springer Science & Business Media, 2003.
4. Lesk, A., *Introduction to bioinformatics*, Oxford University Press, 2019.
5. Mandoiu, I. and Zelikovsky, A., *Bioinformatics Algorithms: Techniques and Applications*, John Wiley & Sons, 2008

COURSE ARTICULATION MATRIX

COs	**PO1**	**PO2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO11**	**PO12**
CO010415.1	1	1	1	1	2	1	-	2	2	2	-	-
CO010415.2	-	2	1	2	-	-	1	1	-	2	-	-
CO010415.3	2	2	1	1	1	-	-	1	-	1	2	-
CO010415.4	1	1	1	1	2	-	-	-	1	2	2	-
CO010415.5	1	1	1	1	-	-	-	1	-	1	2	2

MAPPING OF COs WITH PSOs

Cos	PSO 1	PSO2	PSO3	PSO 4	PSO 5
CO010415.1	1	2	1	2	-
CO010415.2	1	2	1	2	1
CO010415.3	-	1	1	-	1
CO010415.4	-	1	1	-	-
CO010415.5	1	1	1	1	1

<table>
<tr><td rowspan="2">Scheme Version:

2022-2023</td><td rowspan="2">Name of the Subject:

Natural Language Processing and Speech Recognition</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 CS 01 04 15 E 3104</td><td rowspan="2">Applicable to Programs:

M.C.A.</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">To introduce knowledge on basics of fundamental of computer science and various aspects of computational theory, programming, algorithm design, and</td></tr>
</table>

	optimization, network and database management, mobile technologies, electronics and mathematics	
Course Objectives	The objective of this course is to give students a clear understanding of linguistics methods, various tools and aspects of NLP like syntax and semantic analysis, parsing, machine translation, information retrieval and statistical discourse processing.	
Course Outcomes:	Upon successful completion of the course students will be able to: **CO010416.1** Describe the challenges involved in developing NLP solutions. **CO010416.2** Understand the various recent statistical methods in natural language processing. **CO010416.3** Apply the linguistics and their application to part-of-speech tagging and solve the problem using them. **CO010416.4** Analyse background to various tools and aspects of NLP like syntax and semantic analysis, parsing, machine translation, information retrieval and statistical discourse processing **CO010416.5** Evaluation the Various Mechanics of Speech	
	COURSE SYLLABUS	
Unit No.	**Content of Each Unit**	**Hours of Each Unit**
1	**Introduction: [Course Outcome CO010416.1]** 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.	**15**
2	**N-gram Language Models: [Course Outcome CO010416.2 & CO010416.3]** The role of language models. Simple N-gram models. Estimating parameters and smoothing. Evaluating language models.	**15**

	Part of Speech Tagging and Sequence Labeling: Lexical syntax. Hidden Markov Models (Forward and Viterbi algorithms and EM training)	
3	**Syntactic parsing: [Course Outcome CO010416.4]** 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.	**15**
4	**Mechanics of Speech: [Course Outcome CO010416.5] 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.	**15**

REFERENCE BOOKS

1. Jurafsky, D. and Martin, J.H., *Speech and Language Processing*, Pearson, 2020.
2. Lane, H., Howard, C. and Hapke, H., *Natural Language Processing in Action*, Manning Publications, 2019.
3. Manning, C. and Schutze, H., *Foundations of Statistical Natural Language Processing*, MIT Press, 1999.
4. Rabiner, L.R. and Juang, B.H., *Fundamentals of Speech Recognition*, Pearson, 2009
5. Thanaki, J., *Python Natural Language Processing*, Packt, 2017.

COURSE ARTICULATION MATRIX

COs	PO1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12
CO010416.1	1	-	1	3	1	2	1	2	-	2	-	-
CO010416.2	1	1	1	3	1	2	-	2	1	1	-	-
CO010416.3	2	-	1	3	1	1	1	2	1	2	2	-
CO010416.4	1	-	1	2	1	-	-	2	-	1	3	-
CO010416.5	2	1	-	3	1	1	-	-	1	1	-	2

MAPPING OF COs WITH PSOs

Cos	PSO 1	PSO2	PSO3	PSO 4	PSO 5
CO010416.1	1	2	2	1	1
CO010416.2	-	1	1	-	1
CO010416.3	-	1	1	-	2
CO010416.4	1	2	-	1	2
CO010416.5	1	2	1	2	1

<table>
<tr><td rowspan="2">Scheme Version:

2022-2023</td><td rowspan="2">Name of the Subject:

Computer Vision</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 CS 01 04 16 E 3104</td><td rowspan="2">Applicable to Programs:

M.C.A.</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">To introduce knowledge on basics of fundamental of computer science and various aspects of computational theory, programming, algorithm design, and optimization, network and database management, mobile technologies, electronics and mathematics</td></tr>
<tr><td>Course Objectives</td><td colspan="7">The objectives of this course are to develop the understanding of the basic principles and techniques of image processing and image understanding, and to develop your skills in the design and implementation of computer vision software. This course will explore some of the basic principles and techniques from these areas which are currently being used in real- world computer vision systems and the research and development of new systems.</td></tr>
<tr><td>Course Outcomes:</td><td colspan="7">Upon successful completion of the course students will be able to:

CO010417.1 Describe image representation and basics of computer vision.
CO010417.2 Understand fundamental image processing for vision application.
CO010417.3 Apply fundamental image recognition and decisions and solve problem using them.</td></tr>
</table>

	CO010417.4 Analyse the pattern recognition methods. **CO010417.5** Evaluate various applications using computer vision.	
	COURSE SYLLABUS	
Unit No.	**Content of Each Unit**	**Hours of Each Unit**
1	**[Course Outcome CO010417.1]** Digital image representation, image acquisition, storage and processing. fundamental steps in image processing, Introduction to Image Processing, Computer Vision and Computer Graphics, Monocular imaging system, basics of Image Formation, Radiance, Irradiance, BRDF, color etc. Binocular imaging systems, Multiple views geometry, Structure determination, shape from shading and Photometric Stereo.	**15**
2	**[Course Outcome CO010417.1 & CO010417.4]** Introduction, definition, Active vision system, Machine vision components, hardware's and algorithms, segmentation, data reduction, feature extraction, edge detection, image recognition and decisions, identification, Triangulation geometry, resolution passive and active stereo imaging, optical scanners, interfacing machine vision system, vision system calibration.	**15**
3	**[Course Outcome CO010417.3]** Structure of the human eye, image formation, brightness adaptation and discrimination, a simple image model, uniform and non-uniform sampling and quantization, distance measures,	**15**

	Fourier and wavelet descriptors, Multiresolution analysis, Hough transforms and other simple object recognition methods, PCA, HMM and GMM.	
4	**[Course Outcome CO010417.5]** Face detection and Face recognition, Eigen faces, Active appearance and 3D shape models of faces. Surveillance – foreground-background separation, particle filters, Chamfer matching, tracking, and occlusion, combining views from multiple cameras, human gait analysis.	**15**

REFERENCE BOOKS

1. Davies, E. R., *Computer & Machine Vision,* 4th Edition, Academic Press, 2012.
2. Forsyth, D.A. and Ponce, J., *Computer Vision: A Modern Approach*. Prentice Hall Professional Technical Reference, 2002.
3. Mark, N.A.S., *Feature Extraction & Image Processing for Computer Vision*, 3rd Edition, Academic Press, 2012.
4. Prince, S.J., *Computer Vision: Models, Learning, and Inference*, Cambridge University Press, 2012.
5. Szeliski, R., *Computer Vision: Algorithms and Applications (CVAA)*. Springer Science and Business Media, 2010.

COURSE ARTICULATION MATRIX

Cos	PO1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12
CO010417.1	3	-	2	2	1	-	-	1	1	1	-	-
CO010417.2	3	2	2	-	1	1	-	-	1	-	-	-
CO010417.3	3	1	1	2	1	-	-	2	-	1	2	-

CO010417.4	3	2	1	-	1	-	-	-	1	-	2	3
CO010417.5	3	2	1	-	1	-	-	1	1	-	-	2

MAPPING OF COs WITH PSOs

Cos	PSO 1	PSO2	PSO3	PSO 4	PSO 5
CO010417.1	2	2	2	1	-
CO010417.2	-	1	1	1	1
CO010417.3	1	2	2	2	-
CO010417.4	-	2	1	-	2
CO010417.5	1	1	1	3	-

<table>
<tr><td rowspan="2">Scheme Version:

2022-2023</td><td rowspan="2">Name of the Subject:

Embedded Programming</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 CS 01 04 17 E 3104</td><td rowspan="2">Applicable to Programs:

M.C.A.</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">To introduce knowledge on basics of fundamental of computer science and various aspects of computational theory, programming, algorithm design, and optimization, network and database management, mobile technologies, electronics and mathematics</td></tr>
<tr><td>Course Objectives</td><td colspan="7">In this course, Student will understand the architecture of embedded processors, microcontrollers, and peripheral devices and appreciate the nuances of programming micro- controllers in assembly for embedded systems. The challenges in developing operating systems for embedded systems. Students will learn about programming these systems in high-level languages such as C.</td></tr>
<tr><td>Course Outcomes:</td><td colspan="7">Upon completion of the module the student will be able to:

CO010418.1 Learn the basic concept of Embedded System
CO010418.2 Understand the differences between the general computing system and the embedded system, also recognize the classification of embedded systems.
CO010418.3 Apply the architecture of the ATOM processor and its</td></tr>
</table>

	programming aspects (assembly Level) **CO010418.4** Analyse the interrupts, hyper threading and software optimization. **CO010418.5** Evaluation of Design real time embedded systems using the concepts of RTOS.	
	COURSE SYLLABUS	
Unit No.	**Content of Each Unit**	**Hours of Each Unit**
1	**Introduction of Embedded Systems: [Course Outcome CO010418.1 & CO010418.2]** Concept of Embedded System Design: Design challenge, Processor technology, IC technology, Embedded Design technology.	**15**
2	**Single and General-Purpose Processor: [Course Outcome CO010418.3]** introduction, basic architecture, operation, super-scalar and VLSIIW architecture, application specific instruction set processors (ASIPS), microcontrollers, digital signal processors, selecting a microprocessor.	**15**
3	**Memory and Input / Output Management: [Course Outcome CO010418.4]** Interfacing Analog and digital blocks: Analog-to-Digital Converters (ADCs), Digital to-Analog, Converters (DACs)., Communication basics and basic protocol concepts, Microprocessor interfacing: I/O addressing, Port and Bus based, I/O, Memory mapped I/O, Standard I/O interrupts, Direct memory access, communication principles parallel, serial and wireless.	**15**

4	**Processes and Operating Systems: [Course Outcome CO010418.5]** Real time operating systems, Kernel architecture: Hardware, Device Embedded operating systems, Task scheduling in embedded systems: task scheduler, first in first out, shortest job first, round robin, priority-based scheduling. Types of embedded operating systems.	**15**

REFERENCE BOOKS

1. Barrett, S.F. and Pack, D.J., *Embedded Systems: Design and Applications.*, Pearson Education India, 2008.
2. Barry, P. and Crowley, P., *Modern Embedded Computing: Designing Connected, Pervasive, Media-Rich Systems*, Morgan Kaufmann Publication, 2012.
3. Kamal, R., *Embedded Systems: Architecture, Programming and Design.*, 2nd Edition., McGraw Hill Education, 2008.
4. Shibu, K.V., *Introduction to Embedded Systems.*, McGraw Hill Education, 2017.
5. Vahid, F. and Givargis, T., *Embedded System Design: A Unified Hardware / Software Introduction.*, Wiley Publication, 2006.

COURSE ARTICULATION MATRIX

COs	PO1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO10	PO11	PO12
CO010418.1	-	1	-	3	-	-	2	2	-	1	-	-
CO010418.2	1	-	-	3	1	1	2	3	1	-	-	-
CO010418.3	1	1	-	2	1	-	3	1	-	1	3	3
CO010418.4	-	-	-	2	1	2	1	2	2	-	2	-

CO010418.5	1	-	-	2	1	-	1	1	1	-	-	2

MAPPING OF COs WITH PSOs

Cos	PSO 1	PSO2	PSO3	PSO 4	PSO 5
CO010418.1	1	2	1	2	1
CO010418.2	1	2	1	2	1
CO010418.3	1	2	1	1	2
CO010418.4	3	2	2	1	2
CO010418.5	1	1	1	1	1

<table>
<tr><td rowspan="2">Scheme Version:

2022-2023</td><td rowspan="2">Name of the Subject:

Wireless Sensor Network and Internet of Things</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 CS 01 04 18 E 3104</td><td rowspan="2">Applicable to Programs:

M.C.A.</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>
</table>

Course Description	To introduce knowledge on basics of fundamental of computer science and various aspects of computational theory, programming, algorithm design, and optimization, network and database management, mobile technologies, electronics and mathematics	
Course Objectives	The objective of this course is to impart comprehensive knowledge of the wireless networks needed for design and implementation of a typical IoT system. The course also aims at developing necessary skills required for efficient network infrastructure of an IoT. This course focuses on the latest microcontrollers with application development, product design and prototyping. This also focuses on interoperability in IoT along with various IoT Platforms for application development.	
Course Outcomes:	Upon completion of the module the student will be able to: **CO010427.1** Learn the Fundamental of Wireless Sensor Network **CO010427.2** Understand various concepts of ubiquitous sensing **CO010427.3** Apply Wireless Sensor Networks Principles in IoT **CO010427.4** Analyse the role of Big Data, Cloud Computing and Data Analytics in a typical IoT system. **CO010427.5** Evaluation of the design a simple IoT system made up of sensors, wireless network connection, data analytics and display/actuators, and write the necessary control software.	
	COURSE SYLLABUS	
Unit No.	**Content of Each Unit**	**Hours of Each Unit**
5.	**Introduction to Wireless Sensor Network: [Course Outcome CO010427.1]** Wireless Sensor, Coverage & Placement, Topology Management in Wireless Sensor Network, Mobile WSNs, Medium Access Control in Wireless Networks, Routing in WSNs, Enabling Technologies for WSNs	**15**

6.	**Architecture of Wireless Sensor Network: [Course Outcome CO010427.2]** Sensor Network Scenarios, Optimization Goals, Figures of Merit, Design Principles for WSNs, Service Interfaces of WSNs Gateway Concepts Hardware Components, Energy Consumption of Sensor Nodes, Operating Systems and Execution Environments	**15**
7.	**Internet of Things (IOT): [Course Outcome CO010427.3]** Sensing, Actuation, Basics of Networking, Communication Protocols Sensor Networks, Machine to Machine Communications. Understanding of the IoT ecosystem, various layers in building an IoT application and interdependencies.	**15**
8.	**Applications of IOT & Arduino: [Course Outcome CO010427.4 & CO010427.5]** IoT Introduction to Arduino Programming, Integration of Sensors and Actuators with Arduino, IoT platforms like PTC Thing Worx and IoT frameworks like MS Azure, usage of these platforms to build applications like Smart Cities and Smart Homes, Connected Vehicles, Smart Grid, Case Study: Agriculture, Healthcare	**15**

REFERENCE BOOKS

1. Hersent, O., Boswarthick, D. and Elloumi, O., *Internet Of Things: Key Applications and Protocols.*, Wiley Publication., 2015.
2. Holler, J., Tsiatsis, V., Mulligan, C., Avesand, S., Karnouskos, S. and Boyle, D., *From Machine to Machine to the Internet of Things: Introduction to a New Age of Intelligence*., Academic Press., 2014.
3. Raj, P. and Raman, A.C., *The Internet of Things: Enabling Technologies, Platforms, and*

Use Cases., Auerbach Publications., 2017.

4. Yasuura, H., Kyung, C.M., Liu, Y. and Lin, Y.L., *Smart Sensors at the IoT Frontier.*, Springer Publication., 2018.
5. Zheng, J. and Jamalipour, A., *Wireless Sensor Networks: A Networking Perspective.*, Wiley Publication., 2014.

COURSE ARTICULATION MATRIX

COs	**PO1**	**PO2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO11**	**PO12**
CO010427.1	1	-	2	3	1	1	1	-	2	-	-	-
CO010427.2	-	1	1	2	2	-	-	1	2	1	-	-
CO010427.3	1	-	2	3	-	-	1	-	1	2	3	-
CO010427.4	-	2	2	2	1	-	-	-	2	-	2	3
CO010427.5	1	1	1	1	-	1	-	-	1	-	2	2

MAPPING OF COs WITH PSOs

Cos	PSO 1	PSO2	PSO3	PSO 4	PSO 5
CO010427.1	2	2	2	2	1
CO010427.2	2	2	1	1	2
CO010427.3	1	2	1	2	1
CO010427.4	1	2	1	2	1
CO010427.5	-	2	1	-	1

Scheme Version: 2022-2023	Name of the Subject: Internet Fundamentals	L	T	P	C	Semester: I[st] Sem	Contact hours per week: 4
		3	1	0	4		Total Hours:60
Subject Code: SBS CS 01 01 19 E 3104	**Applicable to Programs:** GEC	**Evaluation (Total Marks):** 100	**CIE**	**30 Marks**	**Examination Duration: 3 hours**		
			TEE	**70 Marks**	**Pre-requisite of course:** Basic Internet fundamentals		
Course Description	To introduce knowledge on basics of fundamental of computer science and various aspects of computational theory, programming, algorithm design, and optimization, network and database management, mobile technologies, electronics and mathematics						
Course Objectives	This course aims to introduce the building blocks of the internet and to provide the necessary skills to utilize the internet efficiently.						
Course Outcomes:	Upon successful completion of the course students will be able to: **COB010102.1** Describe how the Internet works. **COB010102.2** Understand the connections that need to be made in order to access the internet. **COB010102.3** Demonstrate internet tools technologies including current web-based applications, e-mail, and social networking tools and apply them to solve problems. **COB010102.4** Analyse the privacy & security protocols involved in the internet communication. **COB010102.5** Evaluation of the internet security and document security.						
	COURSE SYLLABUS						
Unit No.	**Content of Each Unit**					**Hours of Each Unit**	
1.	**Electronic Mail**: **[Course Outcome (s): COB010102.3]** Introduction, advantages and disadvantages, Use rids, Pass words, e-mail addresses, message components, message composition, mailer features, E-mail inner workings, E-mail management, Mime types, Newsgroups, mailing lists, chat rooms.					**15**	

2.	**The Internet**: **[Course Outcome (s): COB010102.1]** Introduction to networks and internet, history, Working of Internet, Internet Congestion, Modes of Connecting to Internet, Internet Service Providers (ISPs), Internet addressing, comparison of IPv4 and IPv6.	**15**
3.	**Languages and Servers**: **[Course Outcome (s): COB010102.2]** Basic and advanced HTML, XML basics. Introduction to Web Servers: PWS, IIS, Apache; Microsoft Personal Web Server. Accessing & using these servers.	**15**
4.	**Privacy and Security Topics**: **[Course Outcome (s): COB010102.4 & COB010102.5]** Introduction, Encryption schemes, Secure Web document, Digital Signatures, Firewalls.	**15**

REFERENCE BOOKS

1. Castro, E., *HTML for the World Wide Web with XHTML and CSS: Visual QuickStart Guide*, Peachpit Press 2006.

2. Comer, D.E. and Droms, R.E., *Computer Networks and Internets,* Prentice-Hall, Inc., 2003.

3. Deitel, H.M., Deitel, P.J. and Nieto, T.R., *Internet & World Wide Web How to Program*, Pearson Education, 2011.

4. Gralla, P., *How the Internet Works*, QUE Publication, 2006.

5. Greenlaw, R. and Hepp, E., *Inline/Online: Fundamentals of the Internet and The World Wide Web*, McGraw-Hill Higher Education, 2001.

COURSE ARTICULATION MATRIX

Cos	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
COB010102.1	1	-	1	-	1	2	-	1	2	1	-	-
COB010102.2	1	1	-	-	3	-	-	-	1	-	-	-
COB010102.3	1	3	1	2	-	1	1	-	3	2	3	-
COB010102.4	1	-	-	-	-	2	-	1	1	-	-	2
COB010102.5	1	-	-	-	1	1	1	2	-	-	3	2

MAPPING OF COs WITH PSOs

COs	PSO 1	PSO2	PSO3	PSO 4	PSO5
COB010102.1	2	1	-	-	2
COB010102.2	3	2	1	1	1
COB010102.3	1	-	-	1	-
COB010102.4	1	-	2	-	3
COB010102.5	1	-	2	2	-

10. Teaching –Learning Process

Teaching aids		Open-ended problem/ Numerical	Project-type activity	Lab Work	Open-ended lab work	Delivery mode		Beyond the curriculum
Video, Ppt. etc	Online lecture					Theory/ Description	Numerical/ Designed problem	
Yes	Yes	Yes				90%	10%	10%

Teaching-Learning mode

- Lectures
- Discussions
- Simulations
- Role Playing
- Participative Learning
- Interactive Sessions
- Seminars
- Research-based Learning/Dissertation or Project Work
- Technology-embedded Learning

11. 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

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. 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

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

- **Syllabi & Scheme**

CENTRAL UNIVERSITY OF HARYANA

Mahendergarh

Department of Computer Science & Information Technology

Minutes of BOS Meeting held on 03.05.2022

The **meeting** of the **Board of Studies** of the **Department of Computer Science & Information Technology**, School of Basic Sciences, Central University of Haryana, Mahendergarh was held on **03.05.2022** at **11:00 am**.

The following members attended the meeting:

1. **Dr. Keshav Singh Rawat** — Chairman
   Head, Computer Science & Information Technology
   Central University of Haryana, Mahendergarh
2. **Prof. Sonal Chawla** — Subject Expert(External)
   Department of Computer Science and Application
   Punjab University Chandigarh.
3. **Prof. Yogesh Chaba** — Subject Expert(External)
   Department of Computer Sci. &Engg
   Guru Jambheshwar University of Science and Technology,
   Hisar – Haryana.
4. **Dr. Keshav Singh Rawat** — Member
   Associate Professor,
   Computer Science & Information Technology
   Central University of Haryana, Mahendergarh
5. **Dr. Suraj Arya** — Invited Member
   Assistant Professor (Contractual) , CS&IT
   Central University of Haryana, Mahendergarh

The Chairman welcomed all the members and briefed them about the past activities and also about the agenda items to be discussed in the meeting.

AGENDA ITEM NO:1

To place before the Board of studies for confirmation the minutes of the meeting of the Board of Studies of the Department of Computer Science & Information Technology Scheduled on 30th of March, 2022 at 11.00 AM. (Annexure-1)

Decision:

The Minutes of the 6th meeting of the BoS were Confirmed and Approved as attached in Annexure-1.

AGENDA ITEM NO:2

To place before the Board of studies for approval to start the Ph.D. programme in the Department of Computer Science & Information Technology. The scheme and course contents of the Ph.D. course work has been prepared as per the university ordinance and attached for approval in annexure-2.

Decision:

All the members of BoS approved the Ph.D. (Computer Science) programme in the Department of Computer Science & Information Technology with the scheme and course contents of the Ph.D. course work as per Annexure-2.

3/5/2022

AGENDA ITEM NO:3

To place before the Board of studies for approval of the panel of DRC (Departmental Research Committee) members as per university ordinance. (Annexure-3)

Decision:

All the members of BoS approved the panel of DRC (Departmental Research Committee) members of the Ph.D. (Computer Science) programme in the Department of Computer Science & Information Technology as per Annexure-3.

AGENDA ITEM NO:4

To place before the Board of studies for Approval of the panel of external examiners for theory, practical examination & moderation of question papers for the MCA programme. (Annexure-4)

Decision:

All the members of BoS approved the panel of external examiners for theory, practical examination & moderation of question papers for the MCA programme as per Annexure-4. The BoS further authorized the HOD to appoint any other examiner/ external expert in addition to the list (Annexure-4) if required.

AGENDA ITEM NO:5

The Board of Studies suggested that the department should extend its infrastructure (Computer labs, research labs, classrooms, department library, seminar hall, etc.) to promote a quality research and learning environment in the Department of Computer Science & Information Technology

The meeting ended with a vote of thanks.

3.5.22

Dr. Suraj Arya
Invited Member
Assistant Professor (Contractual) , CS&IT
Central University of Haryana, Mahendergarh

3/5/2022

Prof. Yogesh Chaba
Subject Expert (External)
Department of Computer Sci. &Engg
Guru Jambheshwar University of Science and Technology, Hisar – Haryana.

(Attended Online)

Prof. Sonal Chawla
Subject Expert (External)
Department of Computer Science and Application,
Punjab University Chandigarh.

03/05/2022

Dr. Keshav Singh Rawat
Chairman
Head, Computer Science & Information Technology, Central University of Haryana, Mahendergarh

CENTRAL UNIVERSITY OF HARYANA

Mahendergarh

Department of Computer Science & Information Technology

Minutes of BOS Meeting held on 31.03.2022

The **meeting** of the **Board of Studies** of the **Department of Computer Science & Information Technology**, School of Basic Sciences, Central University of Haryana, Mahendergarh was held through **online mode** (Google Meet) on **31.03.2022** at **11:00 am**.

The following members attended the meeting:

1. **Prof. Vinod Kumar** — Chairman
   Dean, School of Basic Science and Head, CS&IT
   Central University of Haryana, Mahendergarh
2. **Prof. Sonal Chawla** — Subject Expert(External)
   Department of Computer Science and Application
   Punjab University Chandigarh.
3. **Prof. Yogesh Chaba** — Subject Expert(External)
   Department of Computer Sci. & Engg
   Guru Jambheshwar University of Science and Technology,
   Hisar – Haryana.
4. **Dr. Keshav Singh Rawat** — Member
   Associate Professor,
   Computer Science & Information Technology
   Central University of Haryana, Mahendergarh
5. **Dr. Rakesh Kumar** — Invited Member
   Associate Professor, CSE
   TIC, CS & IT,
   Central University of Haryana, Mahendergarh

The Chairman welcomed all the members and briefed them about the past activities and also about the agenda items to be discussed in the meeting.

AGENDA ITEM NO. 1:

Approval of syllabus and scheme of MCA (Two Year) programme with respect to NEP(National Education Policy).

Decision:

All the members of BOS approved the revised scheme and syllabus of MCA (Two Year) programme in light of the National Education Policy-2020 as per Annexure-I.

The meeting ended with a vote of thanks.

Signatures of BOS Members:

Dr. Keshav Singh Rawat

Prof Yogesh Chaba

CONFIRMED THROUGH EMAIL

(Prof. Sonal Chawla)

Dr. Rakesh Kumar

20/4/2022

(Prof. Vinod Kumar)

CENTRAL UNIVERSITY OF HARYANA

(Established under the Central Universities Act, 2009)

(NAAC Accredited 'A' Grade)

CBCS Based

Curriculum and Syllabi
of
Ph.D. (Computer Science) Course Work

(w.e.f. July, 2022)

DEPARTMENT OF COMPUTER SCIENCE AND INFORMATION TECHNOLOGY

SCHOOL OF BASIC SCIENCES

CENTRAL UNIVERSITY OF HARYANA

SCHOOL OF BASIC SCIENCES

DEPARTMENT OF COMPUTER SCIENCE AND INFORMATION TECHNOLOGY

Course Structure and curriculum for course work for Ph.D. (Computer Science)

Sr. No	Course No	Course Name	Course Code	Course Type	Credit
1.	CSP-01	Research Methodology	SBS CS 020101 C 5016	Core	6
Compulsory course as per UGC guidelines (Offered by Central Library)					
2.	CSP-02	Research and Publication Ethics	CPE-RPE	Core	2
Any one course from					
3.	CSP-03	Internet of Things(IOT)	SBS CS 020101 E 5016	Elective	6
4.	CSP-04	Data Warehouse and Mining	SBS CS 020102 E 5016	Elective	6
5.	CSP-05	Data Science	SBS CS 020103 E 5016	Elective	6
				Total credit=	**14**

Eligibility: PG Degree in computer science / computer science and application / information technology / computer science and engineering OR specialization in computer / information technology domain.

** Selection criteria, eligibility, examination, reservation policy, etc. as per UGC guidelines / CU Haryana PhD ordinance*

Central University of Haryana
Department of Computer Science and Information Technology

Course Type	:	**Core**
Course Name	:	**Research Methodology**
Course Code	:	**SBS CS 020101 C5016**
Contact Hrs per week		6
Credit	:	6

Course Objective and Learning Outcomes:
The guiding philosophy of knowledge creation and dissemination will be discussed in this course The 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 fromliterature review - Development of working hypothesis

UNIT-III: SCIENTIFIC SOFTWARE IN RESEARCH DESIGN AND METHODS AS APPLIED
Data Analysis using Tools like MS Excel, Tableau and SQL, etc.
Digital Methods and Web Search Internal basics, Internet protocols, pre-requisites, search engines – Scopus, Google scholar, Scifinder, research gate; using advanced search techniques, web resources, e-journals, e-books, journal access, subscribingTOC alerts, hot articles, citation index – h-index and i-index; Impact factor

UNIT-V: REPORTING, DOCUMENTATION, AND PRESENTATION
Scientific Document Organization and writing of research papers, short communications, review articles, monographs, technical and survey reports, authored books, and edited books and

dissertations.

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, acknowledgment, avoiding plagiarism, Oralpresentations-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 Computer Science and Information Technology

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 judgment, 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 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 policies
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 the journal as per Journal Citation Report, SNIP, SJR, IIP, Cite Score
2. Metrics: h index, g index, i10 index, metrics

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 Academies Press.
5. Resnik, D. B. (2011). What is ethics in research and why is it important. National Institute of Environmental Health Sciences, 1-10. Retrieved 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
8. Vishal Goyal, G S Batra "Research and Publication Ethics" DPS Publication House

Central University of Haryana
Department of Computer Science and Information Technology

Course Type	:	**Elective**
Course Title	:	**Internet of Things (IoT)**
Course Code	:	**SBS CS 020101 E 5016**
Contact Hrs. per week	:	**6**
Credit	:	**6**

Course Objective and Learning Outcomes:
Students will understand the concepts of Internet of Things and can able to build IoT applications Understand the concepts of Internet of Things, analyze basic protocols in wireless sensor networks, Design IoT applications in different domains and be able to analyze their performance

UNIT I
Introduction to IoT Sensing, Actuation, Networking basics, Communication Protocols, Sensor Networks, Machine-to-Machine Communications, IoT Definition, Characteristics IoT Functional Blocks, Physical design of IoT, Logical design of IoT, Communication models & APIs

UNIT II
M2M to IoT-The Vision-Introduction, From M2M to IoT, M2M towards IoT-the global context, A use case example, Differing Characteristics Definitions, M2M Value Chains, IoT Value Chains, An emerging industrial structure for IoT M2M vs IoT

UNIT III
An Architectural Overview–Building architecture, Main design principles and needed capabilities, An IoT architecture outline, and standards considerations Reference Architecture and Reference Model of IoT

UNIT IV
IoT Reference Architecture- Getting Familiar with IoT Architecture, Various architectural views of IoT such as Functional, Information, Operational, and Deployment Constraints affecting design in IoT world-Introduction, Technical design Constraints

UNIT V
Domain-specific applications of IoT. Home automation, Industry applications, Surveillance applications, Other IoT application
Developing IoT solutions Introduction to Python, Introduction to different IoT tools, Introduction to Arduino and Raspberry Pi, Data Aggregation for the IoT in Smart Cities, Privacy and Security Issues in IoT

7

Suggested Readings

1. Vijay Madisetti and ArshdeepBahga, "Internet of Things (A Hands-onApproach)", 1E, VPT
2. Jan Holler, VlasiosTsiatsis, Catherine Mulligan, Stefan Avesand, StamatisKarnouskos, David Boyle, "From Machine-to-Machine to the Internet of Things: Introduction to a New Age of Intelligence", 1st Edition, Academic Press
3. Francis daCosta, "Rethinking the Internet of Things: A Scalable Approach to Connecting Everything", 1st Edition, Apress Publications
4. CunoPfister, Getting Started with the Internet of Things, O"Reilly

Central University of Haryana
Department of Computer Science and Information Technology

Course Type	:	**Elective**
Course Title	:	**Data Warehouse and Mining**
Course Code	:	**SBS CS 020102 E5016**
Contact Hrs per week		6
Credit	:	**6**

Course Objective and Learning Outcomes:
This course gives an introduction to methods and theory for the development of data warehouses and data analysis using data mining. Data quality and methods and techniques for preprocessing of data. Modeling and design of data warehouses. Algorithms for classification, clustering, and association rule analysis Practical use of software for data analysis.

UNIT I
Introduction: Fundamentals of data mining, Data Mining Functionalities, Classification of Data Mining Systems, Data Mining Task Primitives, Integration of a Data Mining System with a Database or a Data Warehouse System, Major issues in Data Mining. Data Preprocessing: Need for Preprocessing; the Data, Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization, and Concept Hierarchy Generation.

UNIT II
Data Warehouse and OLAP Technology for Data Mining: Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, Further Development of Data Cube Technology, From Data Warehousing to Data Mining Different types of Cubes and Data Generalization: Further Development of Data Cube and OLAP Technology, Attribute-Oriented Induction

UNIT III
Mining Frequent Patterns, Associations, and Correlations: Basic Concepts, Efficient and Scalable Frequent Itemset Mining Methods, Mining various kinds of Association Rules, From Association Mining to Correlation Analysis, Constraint-Based Association Mining. Classification and Prediction. Issues Regarding Classification and Prediction, Classification by Decision Tree Induction, Bayesian Classification, Rule-Based Classification, Classification by Backpropagation, Support Vector Machines, Associative Classification, Lazy Learners, Other Classification Methods, Prediction, Accuracy and Error measures, Evaluating the accuracy of a Classifier or a Predictor, Ensemble Methods

9

UNIT IV

Cluster Analysis Introduction: Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, Partitioning Methods, Hierarchical Methods, Density-Based Methods, GridBased Methods, Model-Based Clustering Methods.

UNIT V

Introduction to different applications of Data Mining: Time Series and Sequence Data Mining, Graph Mining, Social Network Analysis, Spatial Data Mining, Multimedia Data Mining, Text Mining, Mining the World Wide Web. Additional Themes on Data Mining and Social Impacts of Data Mining

Suggested Reading:

1. Data Mining – Concepts and Techniques - Jiawei Han & Micheline Kamber, Morgan Kaufmann Publishers, 2nd Edition, 2006.
2. Introduction to Data Mining – Pang-Ning Tan, Michael Steinbach and Vipin Kumar, Pearson education.
3. Data Warehousing in the Real World – Sam Aanhory & Dennis Murray Pearson Edn Asia
4. Data Warehousing Fundamentals – Paulraj Ponnaiah Wiley student Edition
5 Data Mining Introductory and advanced topics –Margaret H Dunham, Pearson education
6. Data Mining Techniques – Arun K Pujari, University Press.

Central University of Haryana
Department of Computer Science and Information Technology

Course Type	:	**Elective**
Course Title	:	**Data Science**
Course Code	:	**SBS CS 020103 E 5016**
Contact Hrs per week	:	**6**
Credit	:	**6**

Course Objective and Learning Outcomes:
It offers students to learn, understand, and practice big data analytics and machine learning approaches, which include the study of modern computing Big data technologies. Scaling up machine learning techniques focusing on industry applications. Conceptualization and summarization of big data and machine learning, trivial data versus big data, big data computing technologies, machine learning techniques, and scaling up machine learning approaches

UNIT I
Introduction to core concepts and technologies: Introduction, Terminology, data science process, data science toolkit, Types of data, Example applications.

UNIT II
Data collection and management: Introduction, Sources of data, Data collection and APIs, Exploring and fixing data, Data storage and management, Using multiple data sources

UNIT III
Data analysis: Introduction, Terminology and concepts, Introduction to statistics, Central tendencies and distributions, Variance, Distribution properties, and arithmetic, Samples/CLT, Basic machine learning algorithms, Linear regression, SVM, Naive Bayes.

UNIT IV
Data visualization: Introduction, Types of data visualization, Data for visualization, Data types, Data encodings, Retinal variables, Mapping variables to encodings, Visual encodings.

UNIT V
Applications of Data Science, Technologies for visualization, Recent trends in various data collection and analysis techniques, various visualization techniques, and application development methods used in data science.

Suggested Reading:

1. Cathy O'Neil and Rachel Schutt. Doing Data Science, Straight Talk From The Frontline. O'Reilly
2. Jure Leskovek, Anand Rajaraman and Jeffrey Ullman. Mining of Massive Datasets. v2.1, Cambridge University Press.

Annex . 3

Central University of Haryana

Department of Computer Science & Information Technology

Panel of External Expert of Departmental Research Committee (DRC) for Ph.D.

S.No.	Name of Expert	Designation	Name of the Institute/University	Address for Communication	Mob No	Email Id
1	Prof. Vikram Goyal	Professor	Indraprastha Institute of Information Technology, Delhi	Department of Computer Science and Engineering, IIIT Delhi	9311832905	vikram@iiitd.ac.in
2	Prof. Yogesh Chaba	Professor	Guru Jambheshwar University of Science and Technology, Hisar	Department of Computer Science & Engineering GJUS&T Hisar	9416080020	yogeshchaba@yahoo.com,
3	Prof. Yudhvir Singh	Professor	Maharishi Dayanand University, Rohtak (Haryana)	Department of Computer Sci. & Engg. Maharishi Dayanand University, Rohtak(Haryana)	9315517965	yudhvirsingh@rediffmail.com
4	Prof. Vishal Goyal	Professor	Punjabi University Patiala, Punjab, India.	Department of Computer Science, Punjabi University Patiala, Punjab, India.	9501096111	Vishal.pu.@gmail.com
5	Dr. Sandeep Kumar Sood	Associate Professor	NIT Kurukshetra, Haryana	Department of Computer Applications, NIT Kurukshetra, Haryana	9465204534	San1198@gmail.com
6	Prof. Parvinder Singh	Professor	Deenbandhu Chhotu Ram University of Science & Technology, Murthal, Sonepat, Harana, India-131039	Department of Computer Science & Engineering, Deenbandhu Chhotu Ram University of Science & Technology, Murthal, Sonepat, Harana, India-131039	+91-9416108322 + 91-130-2484137	parvindersingh.cse@dcrustm.org , Parvinder23@rediffmail.com
7	Dr. Piyush Pratap Singh	Associate Professor	School of Computer & Systems Sciences, JNU, Delhi	School of Computer & Systems Sciences, JNU, Delhi	9314474403	piyushpsingh@mail.jnu.ac.in

3/5/2022

02/05/2022

Central University of Haryana

Department of Computer Science & Information Technology

List of Question Paper Moderators TEEE 2022-2023 (even and odd Semester) for MCA programme

Semester: I and II

S.no.	Name of the question paper moderators	Internal /External	Designation	Name of the Institute/University	Address for Communication	Mob No	Email Id
1	Prof. Vikram Goyal	External	Professor	Indraprastha Institute of Information Technology, Delhi	Department of Computer Science and Engineering, Indraprastha Institute of Information Technology, Delhi	9311832905	vikram@iiitd.ac.in
2	Prof. Yogesh Chaba	External	Professor	Guru Jambheshwar University of Science and Technology, Hisar	Department of Computer Science & Engineering GJUS&T Hisar	9416080020	yogeshchaba@yahoo.com,
3.	Prof. Vishal Goyal	External	Professor	Punjabi University Patiala, Punjab, India.	Department of Computer Science, Punjabi University Patiala, Punjab, India.	9501096111	Vishal.pu.@gmail.com
4	Prof. Yudhvir Singh	External	Professor	Maharishi Dayanand University, Rohtak(Haryana)	Department of Computer Sci. &Engg. Maharishi Dayanand University, Rohtak(Haryana)	9315517965	yudhvirsingh@rediffmail.com
5	Prof. Parvinder Singh	External	Professor	Deenbandhu Chhotu Ram University of Science & Technology, Murthal, Sonepat, Harana, India-131039	Department of Computer Science & Engineering, Deenbandhu Chhotu Ram University of Science & Technology, Murthal, Sonepat, Harana, India-131039	+91-9416108322 + 91-130-2484137	parvindersingh.cse@dcrustm.org , Parvinder23@rediffmail.com

Practical Examination Panel

Central University of Haryana
List of External Examiners For UG/PG/RES TEE 2022-2023

Name of Department			Computer Science & Information Technology				Date of approval		
Semester			Ist				Academic session	2022-2023	
Sl No	Course Name	Course Code	Name of the Examiner	Internal /External	Designation	Name of the Institute/University	Address for Communication	Mob No	Email Id
1	Computer Programming using C -Lab-I	SBS CS 01 01 03 E 0042	Prof. Sanjeev Kumar	External	Professor	Guru Jambheshwar University of Science and Technology, Hisar	Department of Computer Science & Engineering, Guru Jambheshwar University of Science and Technology, Hisar	9812870344	sanjukhambra@ yahoo.co.in
			Prof.Yudhvir Singh	External	Professor	Maharishi Dayanand University, Rohtak(Haryana)	Department of Computer Sci. & Engg. Maharishi Dayanand University, Rohtak(Haryana)	9315517965	yudhvirsingh@rediffmail.com
			Prof. Vikram Goyal	External	Professor	Indraprastha Institute of Information Technology, Delhi	Department of Computer Science and Engineering, IIIT Delhi	9311832905	vikram@iiitd.ac.in
2	Data Structures using C Lab-I	SBS CS 01 01 05 C 0042	Dr. Parvinder Singh	External	Professor	Deenbandhu Chhotu Ram University of Science and Technology (DCRUST), Sonepat	Department of Computer Engineering, Deenbandhu Chhotu Ram University of Science and Technology (DCRUST), Sonepat	9416108231	parvindersingh.cse@dcrustm.org , Parvinder23@rediffmail.com
			Prof Rajesh Bhatia	External	Professor	Punjab Engineering College University of Technology, Chandigarh	Department of Computer Science and Engineering	2484176	_
			Prof. Indu Chhabra	External	Professor	Panjab University	Department of Computer Science & Application	9815230664	indu_c@pu.ac.in

			Dr. Sandeep Kumar Sood	External	Associate Professor	NIT, Kurukshetra, Haryana	Department of Computer Application, NIT, Kurukshetra, Haryana	9465204534	san1198@gmail.com
3	Operating System and Shell Programming Lab -II	SBS CS 01 01 06 C 0042	Prof.Yudhvir Singh	External	Professor	Maharishi Dayanand University, Rohtak(Haryana)	Department of Computer Sci. & Engg. Maharishi Dayanand University, Rohtak(Haryana)	9315517965	yudhvirsingh@rediffmail.com
			Dr. Parvinder Singh	External	Professor	Deenbandhu Chhotu Ram University of Science and Technology (DCRUST), Sonepat	Department of Computer Engineering, Deenbandhu Chhotu Ram University of Science and Technology (DCRUST), Sonepat	9416108231	parvindersingh.cse@dcrustm.org , Parvinder23@rediffmail.com
			Prof. Sanjeev Kumar	External	Professor	Guru Jambheshwar University of Science and Technology, Hisar	Department of Computer Science & Engineering, Guru Jambheshwar University of Science and Technology, Hisar	9812870344	sanjukhambra@ yahoo.co.in
4	Web Development using PHP Lab-III	SBS CS 01 01 07 C 0042	Prof. Amit Prakash Singh	External	Professor	GGSIPU, Delhi	University School of Information, Communication and Technology	9899166168	amit@ipu.ac.in
			Dr. Virender Kumar Ranga	External	Associate Professor	National Institute of Technology, Kurukshetra, Haryana (on Lien as Associate Professor at DTU)	Department of Computer Engineering	9416158283	virender.ranga@nitkkr.ac.in, virendersinghmtech@gmail.com
			Prof.Yudhvir Singh	External	Professor	Maharishi Dayanand University, Rohtak(Haryana)	Department of Computer Sci. & Engg. Maharishi Dayanand University, Rohtak(Haryana)	9315517965	yudhvirsingh@rediffmail.com
			Prof. Sanjeev Kumar	External	Professor	Guru Jambheshwar University of Science and Technology, Hisar	Department of Computer Science & Engineering	9812870344	sanjukhambra@ yahoo.co.in

Practical Examination Panel

Central University of Haryana
List of External Examiners For UG/PG/RES TEE 2021-2022

Name of Department			Computer Science & Information Technology				Date of approval		
Semester			II				Academic session	2021-2022	
SL NO	**Course Name**	**Course Code**	**Name of the Examiner**	**Internal /External**	**Designation**	**Name of the Institute/University**	**Address for Communication**	**Mob No**	**Email Id**
1	Database Management System Lab-I	SBS CS 01 02 12 C 0042	Dr. Parvinder Singh	External	Professor	Deenbandhu Chhotu Ram University of Science and Technology (DCRUST), Sonepat	Department of Computer Engineering, Deenbandhu Chhotu Ram University of Science and Technology (DCRUST), Sonepat	9416108231	parvindersingh.cse@dcrustm.org , Parvinder23@rediffmail.com
			Prof. O. P. Verma	External	Professor	Delhi Technological University, Delhi	Department of Computer Science and Engineering , DTU, Delhi	9910050177	opverma@dce.ac.in
			Prof.Yudhvir Singh	External	Professor	Maharishi Dayanand University, Rohtak(Haryana)	Department of Computer Sci. & Engg. Maharishi Dayanand University, Rohtak(Haryana)	9315517965	yudhvirsingh@rediffmail.com
2	Object Oriented Programming using C++ Lab-II	SBS CS 01 02 13 C 0042	Prof. Amit Prakash Singh	External	Professor	GGSIPU, Delhi	University School of Information, Communication and Technology, GGSIPU, Delhi	9899166168	amit@ipu.ac.in

			Dr. Pradeep Chouksey	External	Associate Professor	Central University of HP	Central University of HP, Dharamshala	8109233762	dr.pradeep.chouksey@gmail.com
			Dr. Parvinder Singh	External	Professor	Deenbandhu Chhotu Ram University of Science and Technology (DCRUST), Sonepat	Department of Computer Engineering	-9.416E+09	parvindersingh.cse@dcrustm.org , Parvinder23@rediffmail.com
3	Design and Analysisof Algorithms Lab-III	SBS CS 01 02 14C 0042	Dr. Virender Kumar Ranga	External	Associate Professor	National Institute of Technology, Kurukshetra, Haryana (on Lien as Associate Professor at DTU)	Department of Computer Engineering	9416158283	virender.ranga@nitkkr.ac.in, virendersinghmtech@gmail.com
			Dr. Sandeep Kumar Sood	External	Associate Professor	NIT, Kurukshetra, Haryana	Department of Computer Application, NIT, Kurukshetra, Haryana	9465204534	san1198@gmail.com
			Dr. Sanjeev Kumar	External	Professor	Guru Jambheshwar University of Science and Technology, Hisar	Department of Computer Science & Engineering, GJUS&T Hisar	9812870344	sanjukhambra@ yahoo.co.in

Panel for Theory paper setter

Central University of Haryana
List of External/Internal Examiners For UG/PG/RES TEE 2022-23

Name of Department	Computer Science & Information Technology	Date of approval	
Semester	Ist	Academic session	2022-2023

SL NO	Course Name	Course Code	NAME OF THE PAPER SETTER	Internal /External	DESIGNATION	Name of the Institute/University	Address for Communication	Mob No	Email Id
1	Data Structures	SBS CS 01 01 01 C 3104	Dr. Sandeep Kumar Sood	External	Associate Professor	NIT, Kurukshetra, Haryana	Department of Computer Application, NIT, Kurukshetra, Haryana	9465204534	san1198@gmail.com
			Prof. Sanjeev Sofat	External	Professor	Punjab University, Chandigarh	Depratment of Computer Science and Engineering	9814741410	sanjeevsofat@pec.edu.in
			Prof. Vikram Goyal	External	Professor	Indraprastha Institute of Information Technology, Delhi	Department of Computer Science and Engineering, Indraprastha Institute of Information Technology, Delhi	9311832905	vikram@iiitd.ac.in

			Prof O P Verma	External	Professor	Delhi Technological University, Delhi	Department of Computer Science and Engineering , DTU, Delhi	9910050177	opverma@dce.ac.in
2	Computer Networks	SBS CS 01 01 02 C 3104	Prof Shailender Kumar	External	Professor	Delhi Technological University, Delhi	Department of Computer Science and Engineering , DTU, Delhi		shailenderkumar.verma@gmail.com
			Prof Rajesh Bhatia	External	Professor	Punjab Engineering College University of Technology, chandigarh	Department of Computer Science and Engineering	9463369282	rbhaitia@pec.edu.in rbhaitiapatiala@gmail.com
3	Discrete Mathematical Structures	SBS CS 01 01 03 C 3104	Prof. Srinivasa K G	External	Professor	National Institute of Technical Teachers Training & Research, Chandigarh	Dept. of Information Mgmt & Coordination,NITTTR, Chandigarh	9731696526	kgsrinivasa@nitttrchd.ac.in.
			Prof Rajesh Bhatia	External	Professor	Punjab Engineering College University of Technology, chandigarh	Department of Computer Science and Engineering	9463369282	rbhaitia@pec.edu.in rbhaitiapatiala@gmail.com
			Prof. Maninder Singh	External	Professor	Thapar University, Patiala	Department of Computer Science and Engineering, TU, Patiala	9815608309	msingh@thapar.edu
4	Operating System and Shell Programming	SBS CS 01 01 04 C 3104	Prof. Sonal Chawla	External	Professor	Panjab University, Chandigarh	Department of Computer Science & Application, Panjab University, Chandigarh	9815968085	sonal_chawla@pu.ac.in

			Prof. Sanjay Kumar Dhurandher	External	Professor	Netaji Subhas University of Technology, Delhi	Department of Information Technology	011-25000170	dhurandher@gmail.com
			Prof. Amit Doegar	External	Associate Professor	National Institute of Technical Teachers Training and Research (NITTTR), Chandigarh	Dept. of Computer Science & Engineering	9872003944	amit@nitttrchd.ac.in

Panel for Theory paper setter

Central University of Haryana
List of External/Internal Examiners For UG/PG/RES TEE 2022

Name of Department			Computer Science & Information Technology				Date of approval		
Semester			II				Academic session	2021-2022	
SL NO	Course Name	Course Code	NAME OF THE PAPER SETTER	Internal /External	DESIGNATION	Name of the Institute/University	Address for Communication	Mob No	Email Id
1	Database Management System	SBS CS 01 02 08 C 3104	Dr. Virender Kumar Ranga	External	Associate Professor	National Institute of Technology, Kurukshetra, Haryana (on Lien as Associate Professor at DTU)	Department of Computer Engineering	9416158283	virender.ranga@nitkkr.ac.in, virendersinghmtech@gmail.com
			Dr. Sukhdip Singh	External	Professor	Deenbandhu Chhotu Ram University of Science and Technology (DCRUST), Sonepat	Department of Computer Engineering	9416475706/ 8295113501	Sukhdeepsingh.cse@ dcrustm.org
			Dr. Priyanka Ahlawat	External	Assistant Professor	National Institute of Technology, Kurukshetra, Haryana	Department of Computer Engineering National Institute of Technology, Kurukshetra, Haryana – 136119	9034996998	priyankaahlawat@nitkkr.ac.in
2	Object Oriented Programming	SBS CS 01 02 09 C 3104	Dr. Kavita Taneja	External	Assistant Professor	Punjab University, Chandigarh	Department of Computer Science and Applications	9646893072	kavitataneja@pu.ac.in
			Dr. Mayank Dave	External	Professor	National Institute of Technology, Kurukshetra, Haryana	Department of Computer Engineering,BT-404, NIT Campus, Kurukshetra 136119	9896408121	mdave@nitkkr.ac.in

			Dr. Sujata	External	Assistant Professor	Indian Institute of Technology (IIT) Ropar	Department of Computer Science and Engineering	8054407385	sujata@iitrpr.ac.in
									-
3	Software Engineering	SBS CS 01 02 10 C 3104	Prof. Sonal Chawla	External	Professor	Panjab University, Chandigarh	Department of Computer Science & Application, Panjab University, Chandigarh	9815968085	sonal_chawla@pu.ac.in
			Dr. Sandeep Kumar Garg	External	Associate Professor	Indian Institute of Technology (IIT) Roorkee	Department of Computer Science and Engineering	7579024426	sandeep.garg@cs.iitr.ac.in
			Prof. Gurpreet Singh Lehal	External	Professor	Punjab University, Patiala	Department of Computer Science	9815473767	gslehal@gmail.com, gslehal@yahoo.com
4	Design and Analysis of Algorithms	SBS CS 01 02 11 C 3104	Prof. Sanjay Kumar Dhurandher	External	Professor	Netaji Subhas University of Technology, Delhi	Department of Information Technology	011-25000170	dhurandher@gmail.com
			Prof. Savita Gupta	External	Professor	Punjab University, Chandigarh	Department of Computer Science and Engineering, University Institute of Engineering and Technology	7087940363, 9463330763	savita2k8@yahoo.com
			Prof. Sonal Chawla	External	Professor	Panjab University, Chandigarh	Department of Computer Science & Application, Panjab University, Chandigarh	9815968085	sonal_chawla@pu.ac.in

5	"Mobile Communication/Management Information System and E-Commerce/Quantum Computing/Computer Graphics"	SBS CS 01 02 04 E 3104/SBS CS 01 02 05 E 3104 /SBS CS 01 02 06 E 3104/SBS CS 01 02 07 E 3104	Dr. Sandeep Kumar Sood	External	Associate Professor	NIT, Kurukshetra, Haryana	Department of Computer Application, NIT, Kurukshetra, Haryana	9465204534	san1198@gmail.com
			Prof.Yudhvir Singh	External	Professor	Maharishi Dayanand University, Rohtak(Haryana)	Department of Computer Sci. & Engg. Maharishi Dayanand University, Rohtak(Haryana)	9315517965	yudhvirsingh@rediffmail.com
			Prof. Bijendra Kumar	External	Professor	Netaji Subhas University of Technology, Delhi	Depratment of Computer Science and Engineering	9868769007	bizender@gmail.com
									-

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/2022/A&C/03 Date: 05.01.2022

अधिसूचना/NOTIFICATION

The Hon'ble Vice-Chancellor has been pleased to constitute a Committee consisting of the following members to recommend the modalities for admissions in Ph.D. programmes of the University under PwD category, in consonance with Resolution No-45, passed by the Academic Council of the University, in its 33rd meeting:

1. **Prof. Ajay Kumar Bansal**
   Professor, Dept. of Electrical Engineering
2. **Dr. Phool Singh**
   Associate Professor, School of Engineering and Technology
3. **Dr. Manoj Kumar Singh**
   Associate Professor, School of Engineering and Technology
4. **Dr. Parmod Kumar**
   Associate Professor, School of Education
5. **Dr. Pardeep Singh**
   Assistant Professor, Department of Law

Encl: *Resolution No-45 passed by the Academic Council in its 33rd meeting.*

5.1.2022

Assistant Registrar
(Academic & Council Branch)

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

1. All the members of the Committee
2. Assistant Registrar, Vice-Chancellor's Secretariat (for kind information of Hon'ble Vice-Chancellor), CUH
3. Office of the Registrar (for kind information of Registrar), CUH

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

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.

Central University of Haryana, Mahendergarh

Date: 06/01/2022

Minutes of meeting of committee for Modalities for Admission in Ph.D. Programme under PwD Category at Central University of Haryana

The meeting of Committee constituted vide Notification No. CUH/2022/A&C/03 dated 5-1-2022 to recommend the Modalities for Admission in Ph.D. Programmes of the University under PwD Category was held on January 6, 2022 at 4:00 PM in the office of Registrar, Administrative Block, Central University of Haryana. The following members attended the meeting:

1. Prof. Ajay Kumar Bansal, Department of Electrical Engineering
2. Prof. Phool Singh, Mathematics under SOET
3. Prof. Parmod Kumar, School of Education
4. Dr. Manoj Kumar Singh, Physics under SOET
5. Dr. Pardeep Singh, Department of Law
6. Prof. Sarika, Registrar and Convenor, PWD cell (Special Invitee)

After detailed discussion on the issue and considering the resolution no. 45 passed by passed by the Academic Council in 33rd meeting, the committee recommended the following:

- In compliance with Section 32 of Rights of Person with Disabilities Act, 2016, CUH provides for 5 % reservation for persons with benchmark disabilities.
- The reservation shall be applicable irrespective of the method of admission i.e. Direct, through entrance, interview etc.
- This 5 % reservation may be calculated on the basis of the total number of seats offered for admission in a particular year i.e. in proportion with the number of seats available. However, implementation of the reservation will be made department-wise.
- The seats for persons with benchmark disabilities may be reserved in a particular year based upon the number of seats offered in a particular Department and the number of eligible candidates with benchmark disabilities applying for the same (in the order of merit based on product of number of seats and number of eligible candidates in that year).
- In case there is a tie in product between two or more Department, total number of available seats need to be seen and reservation would be marked to the department having more seats so as to break the tie.
- Based upon the number of seats being offered and number of candidates applying under PWD category, the identified Departments need to give reservation horizontally.
- As one seat may be reserved out of total 20 (calculating 5 % reservation) so those departments in which reservation has been given in a particular year under PWD quota, the next seat under PWD quota will only be

offered once there exists any seat in addition to the first 20 seats in the Department. Each Department must prepare a record/register to this effect so as to ensure 5 % reservation compliance (horizontal) for persons with benchmark disabilities.

- A relaxation up to 5 % in the minimum eligibility to be given to the persons with benchmark disabilities.
- Those students with benchmark disabilities, who are able to secure admission on the basis of general merit, will not be counted towards the 5 % reservation for persons with benchmark disabilities. It is an imperative to fill all seats reserved for people with benchmark disabilities in a particular year.

Based on the recommendation, the PwD seats for the year 2021-22 will be divided as follows:

Total number of department in University offering Ph.D.: 25

Total number of department in which PwD candidates applied: 18

Total PwD candidates: 63

Total PWD seats: 8 (5% of 155)

SN	Name of Department	Total no of seats	Eligible candidates	Product	Merit	Remark
1	Civil Engineering	7	1	7	XV	
2	Hindi	7	3	21	VI	1 seat
3	Law	3	4	12	XI	
4	Mathematics	8	4	32	II	1 seat
5	Physics and Astrophysics	9	3	27	IV	1 seat
6	Management Studies	5	4	20	VII	1 seat
7	Computer Science and Engineering	6	2	12	XII	
8	Sociology	3	2	6	XVI	
9	Library and information Science	4	4	16•	IX	
10	Economics	5	3	15	X	
11	Political Science	7	8	56	I	1 seat
12	Yoga	2	1	2	XVIII	
13	Education	8	2	16•	VIII	1 seat
14	Psychology	12	2	24	V	1 seat
15	Geography	2	5	10	XIV	
16	Chemistry	7	4	28	III	1 seat
17	Statistics	3	1	3	XVII	

18	English and Foreign language	6	2	12	XIII	

NOTE• Since there is a tie in the product (i.e. 16) between Department of Library & Information Science and Department of Education, so given the higher number of vacant seats (8 Ph.D seats), the reservation would be marked to the department of Education for breaking the tie.

On the basis of the above table, in session 2021-22, the following department will have one PwD seat:

1. Department of Political Science
2. Department of Mathematics
3. Department of Chemistry
4. Department of Physics and Astrophysics
5. Department of Psychology
6. Department of Hindi
7. Department of Management Studies
8. Department of Education

The meeting ended with the vote of thanks.

(Prof. Ajay Kumar Bansal) (Prof. Phool Singh) (Prof. Parmod Kumar)

10/1/2022

(Dr. Manoj Kumar Singh) (Dr. Pardeep Singh) (Prof. Sarika)

10/1/22

हरियाणा केंद्रीय विश्वविद्यालय
CENTRAL UNIVERSITY OF HARYANA
(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)
जिला महेंद्रगढ़, हरियाणा - 123031 District Mahendergarh, Haryana

No.: CUH/VCS/2022/Notification/98 **Date: 25.01.2022**

NOTIFICATION

Sub.: Constitution of Committee for establishment of Centre for Distance Learning.

A Committee, consisting of the following, is hereby constituted to establish the **Centre for Distance Learning** in the University:

1. Prof. Dinesh Kumar Gupta, Dean, Students' Welfare
2. Prof. Parmod Kumar, School of Education
3. Dr. Dinesh Chahal, Associate Professor, School of Education
4. Dr. Ajai Pal Sharma, Assistant Professor, Management Studies
5. Dr. Devendra Kumar, TIC, Department of Statistics
6. Sh. Rajesh Kumar, Section Officer, Finance Section

This issues with the approval of the Competent Authority.

Assistant Registrar
Vice-Chancellor's Secretariat

Copy to:

1. All Members of the Committee.
2. OSD to Vice-Chancellor, CUH.
3. P.S. to Registrar, CUH.

MINUTES OF MEETING

The meetings of the Committee for establishment up of Centre for Distance Learning constituted vide office order no. CUH/VCS/2022/Notification/98, dated 25 June 2022 was held on 27 May 2022 and 3 June 2022 to prepare proposal for setting up of Centre for Open and Distance Learning in the Central University. The Committee comprising of the following members:

1. Prof. Dinesh Kumar Gupta-	**Chairman**
2. Prof. Parmod Kumar, School of Education-	**Member**
3. Dr Dinesh Chahal, Associate Professor, School of Education -	**Member**
4. Dr. Ajai Pal Sharma, Assistant Professor, Management Studies-	**Member**
5. Dr. Devendra Kumar, TlC, Department of Statistics-	**Member**
6. Sh. Rajesh Kumar, Section Officer, Finance Section	**Member**

After detailed deliberations on the matter of establishment of Open Distance Learning Centre. The Committee finalised the proposal for the Centre. The proposal is submitted for kind consideration and approval of the competent authority, please.

3/6/22
Dr. Parmod Kumar

03/6/22
Dr AP Sharma

03.06.2022
(Dr. Devendra Kumar)

3/6/22
(Rajesh Kumar)

3/6/22
(Dr Dinesh Chahal)

Proposal for

Setting Up of Open and Distance Learning Centre

at

Central University of Haryana

PROPOSAL FOR
OPEN AND DISTANCE LEARNING CENTRE
AT
CENTRAL UNIVERSITY OF HARYANA, MAHENDERGARH

1. About the University

1.1 The Central University of Haryana (Established vide Act No. 25 of 2009 of Parliament) is located in southern Haryana on Mahendergarh – Charkhi Dadri Road at a distance of 15 Kms from Mahendergarh. Currently, the University is running in full swing with near about 4000 students/scholars pursuing UG/PG/Research Programms. The University has been accredited with 'A' Grade by NAAC and one of the leading University to implement National Education Policy-2020(NEP-2020) in a phased manner.

2. Rationale for Open and Distance Learning Centre at CUH

2.1 As per the National Educational Policy-2020 (NEP-2020), more Higher Education Institutions (HEIs) to be established and developed in the Remote and Backward regions to ensure full access, equity, and inclusion. There shall, by 2030, be at least one large multidisciplinary HEI in or near every district. Steps shall be taken towards developing high-quality higher education institutions both public and private that have medium of instruction in local/Indian languages or bilingually. The aim will be to increase the Gross Enrolment Ratio in higher education including vocational education from 26.3% (2018) to 50% by 2035. While a number of new institutions may be developed to attain these goals, a large part of the capacity creation will be achieved by consolidating, substantially expanding, and also improving existing HEIs (NEP 2020, page, 35).

2.2 NEP-2020 further envisioned that "Institutions will have the option to run Open and Distance Learning (ODL) and Online Programmes, in order to enhance their offerings, improve access, increase GER, and provide opportunities for lifelong learning (SDG 4). All ODL programmes and their components leading to any

diploma or degree will be of standards and quality equivalent to the highest quality programmes run by the HEIs on their campuses".

2.3 During Covid-19 pandemic, it has also been proved that Open and Distance Learning has emerged as one of the most important platforms of Teaching and Learning process. In order to contribute in achieving the gross enrolment ration of 50% and to create ecosystem for Life Long Learning, the Central University of Haryana is planning to establish a Centre for Distance Learning, which will not only cater the backward district of Southern Haryana, but, will also impart quality education in adjoining districts of Haryana state and Rajasthan states as well.

3. Dual Degree Programmes

3.1 As per UGC Guidelines-2022 "Guidelines for Pursuing Two Academic Programmes Simultaneously" issued in 2012 , students across the country can pursue two-degree programmes at the same time. Students can take up these courses in offline-online/ODL, both programmes in offline, and both degrees in online mode. This will also allow students to take admission to more than one college at the same time. Looking at this situation, the number of aspirants for admission in the ODL would rise from the existing students pursuing degrees.

4. Alignment with the University's Power

4.1 In the CENTRAL UNIVERSITIES ACT, 2009, as mentioned in the powers of the university includes in point v) to provide facilities through the distance education system to such persons as it may determine; further in the definitions, Distance Education System is described as: "distance education system" means the system of imparting education through any means of communication, such as broadcasting, telecasting, internet, correspondence courses, seminars, contact programmes or the combination of any two or more such means;" Further, the University shall work in Dual Mode. The UGC Regulations clarifies that the Dual Mode University means a Higher Educational Institution offering programmes under conventional mode and also under Open and Distance Learning mode and/or Online mode.

5. Setting up of the ODL Centre

5.1 Establishment of Open and Distance Learning Centre and to offer programmes/courses through open and distance learning mode at the CUH following the University Grant Commission (UGC) (Open and Distance Learning Programmes and online Programmes) Regulations 2020 is necessary for meeting out the requirements for continuous and life-long learning and also for delivering knowledge to the newly emerging areas to the students and learners studying in other academic institutions in this region in the light of NEP-2020. This ODL Centre shall offer equitable and equal opportunities for those learners who do not have access to formal system of education due to any reasons.

5.2 As per the UGC Regulations, Open and Distance Learning Mode means a mode of providing flexible learning opportunities by overcoming separation of teacher and learner using a variety of media, including print, electronic, online and occasional interactive face-to-face meetings with the learners or Learner Support Services to deliver teaching-learning experiences, including practical or work experiences.

6. Objectives of the ODL Centre

6.1 Accordingly, the objectives of proposed ODL Centre are to:

6.1.1 Reach out to all strata of society in meeting out their quest for knowledge, to empower and enrich the learners with global standards of education.

6.1.2 Provide a convenient platform for people of all ages to pursue their dreams of higher education.

6.1.3 Facilitate lifelong learning, and to provide opportunities to learn in a free environment at their own pace and speed

6.1.4 Provide learners a chance for clarity of concepts, and to build in-depth functional domain knowledge and practical application using ICT.

7. Requirement for Human Resources

7.1 A Centre for Open and Distance Learning (ODL) may be set up in the University as per the staff and infrastructure requirement mention in the University Grant

Commissions (Open and Distance Learning Programmes and Online Programmes) Regulations, 2020 (page, 92) and the details are given below:

7.1.1 The Centre may be named as **Centre for Open and Distance Learning**(ODL)

7.1.2 One **full time Director** (Not below the rank of Associate Professor as per the UGC Regulations);

7.2 **Academic staff strength** - At least two faculty members (full-time dedicated) per Open and Distance Learning Programme at Professor/Associate Professor/Assistant Professor level:(provided that in case of Under Graduate (UG) and Post Graduate (PG) programmes in same discipline, instead of 4 faculty members, 3 faculty members shall be required).

7.3 **Administrative staff** strength at Head Quarters or Main Campus (up to 5,000 students):

(a) Deputy Registrar - 1;

(b) Assistant Registrar - 1;

(c) Section Officer - 1;

(d) Assistants - 2;

(e) Computer operators - 2;

(f) Multi-Tasking Staff – 2

(g) In case of the enrolment higher than 5,000 the number of positions in the Centre for Distance and Online Learning may be increased by the HEI appropriately.

(h) Availability of qualified counsellors/mentors meeting such standards of competence as specified in the UGC Regulations

8. Centre of for Internal Quality Assurance.

8.1 The Centre for Internal Quality Assurance (CIQA) may be set up in the University for quality assurance in ODL system as per the requirements mentioned in the University Grant Commissions (Open and Distance Learning Programmes and Online Programmes) Regulations, 2020 below:

(a) Director (not below the rank of Associate Professor as per the UGC Regulations) (page 80).

(b) The following staff may also be deputed for Smooth working of the CIQA:

(i) Dy/Asstt. Director -02 (Two) (not below the rank of Assistant Professor as per the UGC Regulations)

(ii) Computer Operators for administrative and help and maintenance of data/records. 02 (Two)

(iii) Multi-tasking staff-01(One).

9. Programs to be Offered

9.1 In the next academic calander, the University is planning to start the following distance learning programs in the begining:

(a)	M. A. English.	(b)	M.A. Economics.
(c)	M.A. Political Science.	(d)	M.A. Hindi.
(e)	M.A. Journalism and Mass Communication	(f)	M. Com.
(g)	Skill based Certificate and Diploma courses.		

Programme Project Report shall be prepared for all the programmes on offer for the approval of the BOS and Academic Council.

9.2 The procedure/rules for award of Degree/Diploma, duration, admission criteria and method, development of self-learning material, delivery mechanism, learner support, assessment/examination, infrastructure, etc. shall be in accordance with the UGC Regulations and necessary Ordinances may be brought out through the statutory bodies. The University shall formally apply to the Distance Education Bureau prior to launching of the programmes.

10. Self-learning Material

10.1 As per the UGC Regulations, at least 60%. of Self Learning Materials shall be developed by the in-house faculty of the Higher Educational Institution and the remaining 40%. of the materials can be sourced from available resources such as other Higher Educational Institutions, Open Educational Resources (OER), and SWAYAM, platform duly approved by the statutory authorities of the Higher Educational Institution.

10.2As per the UGC Regulations, Self-Learning Material for Open and Distance Learning mode means and includes contents in the form of course material,

whether print or in e- form, which is inter-alia self-explanatory, self-contained, self-directed at the learner, and amenable to self-evaluation, and enables the learner to acquire the prescribed level of learning in a course of study, but does not include text-books or guide-books;

11. Use of e-resources:

11.1 As per the provisions of the UGC Regulations, the University offering programme(s) in Open and Distance Learning mode shall take such measures as are necessary to blend Information Communication Technologies (ICT) including those developed by National Mission on Education through Information and Communication Technology, for enhancing effectiveness of teaching – learning process, and administrative functioning and for maintenance of updated information at all times in respect of status of admissions, registration, for managing teaching-learning activities through online support for interactive learning with learner feedback, to facilitate the use of Open Educational Resources (OER), Massive Open Online Courses and for continuous as well as comprehensive evaluation, certification, and other aspects of learner support.

11.2 The University has its LMS (http//elms.cuh.ac.in) which has more than 300 courses and the University also has an MOU with the INFLIBNET Centre to use e-PGP content over the LMS. So, University is readily in a position to use 40 percent of the OER as per the Regulations.

12. Budgetary Requirement

12.1 The following estimates are made for cost and revenue on the programmes to be offered at the initial stage. The income and expenditure is based for the 3-year projection

Tentative Expenditure on Self Learning Material			
	Writing of course material (Rs, 6000 per unit, one credit means four units) 60 % of total to be counted as SLM; Here cost of both the year of Master's is counted	Printing Cost Approximately per page cost for printing on black and white is counted at 50 paise for the first five hundred copies of the text material; average per unit page is counted 12 pages.	Learner Support Services Learner support would be available online interactions, guidance and counselling to the extent of minimum of pace to face.
M. A. English (100 credits)	60x4= 240 240 x 6000 =14,40,000/-	240 x 12= 2880 1440 x 500 = 7,20,000/-	1,60,000 x 3 = 4,80,000/-
M.A. Economics (100 credits)	60x4= 240 240 x 6000 = 14,40,000/-	240 x 12= 2880 1440 x 500 = 7,20,000/-	1,60,000 x 3 = 4,80,000/-
M.A. Political Science (100 credits)	60x4= 240 240 x 6000 = 14,40,000/-	240 x 12= 2880 1440 x 500 = 7,20,000/-	1,60,000 x 3 = 4,80,000/-
M.A. Hindi (100 credits)	60x4= 240 240 x 6000 = 14,40,000/-	240 x 12= 2880 1440 x 500 = 7,20,000/-	1,60,000 x 3 = 4,80,000/-
M.A. Journalism and Mass Communication (100 credits)	60x4= 240 240 x 6000 = 14,40,000/-	240 x 12= 2880 1440 x 500 = 7,20,000/-	1,60,000 x 3 = 4,80,000/-
M. Com(100 credits)	60x4= 240 240 x 6000 = 14,40,000/-	240 x 12= 2880 1440 x 500 = 7,20,000/-	1,60,000 x 3 = 4,80,000/-
Total	**86,40,000/-**	**43,20,000/-**	**28,80,000/-**

Potential Enrolment and Revenue			
	1st Year	2nd Year	3rd Year
M. A. English 1st Year – 8,800/- 2nd Year – 8,800/-	100 x 8,800/- = 8,80,000/-	100x2x8,800 = 17,60,000/-	100x2x8,800 = 17,60,000/-
M.A. Economics 1st Year – 8,800/- 2nd Year – 8,800/-	100 x 8,800/- = 8,80,000/-	100x2x8,800 = 17,60,000/-	100x2x8,800 = 17,60,000/-
M.A. Political Science 1st Year – 8,800/- 2nd Year – 8,800/-	100 x 8,800/- = 8,80,000/-	100x2x8,800 = 17,60,000/-	100x2x8,800 = 17,60,000/-
M.A. Hindi 1st Year – 8,800/- 2nd Year – 8,800/-	100 x 8,800/- = 8,80,000/-	100x2x8,800 = 17,60,000/-	100x2x8,800 = 17,60,000/-
M.A. Journalism and Mass Communication 1st Year – 10,400/- 2nd Year – 10,400/-	100 x 10,400 =10,40,000/-	100x2x10,400 = 20,80,000/-	100x2x10,400 = 20,80,000/-
M. Com 1st Year – 10,400/- 2nd Year – 10,400/-	100 x 10,400 =10,40,000/-	100x2x10,400 = 20,80,000/-	100x2x10,400 = 20,80,000/-
Total	**= 56,00,000/-**	**=1,12,00,000/-**	**=1,12,00,000/-**

Note : Fees estimated as per the existing Fee Structure of Kurukshetra University, Kurukshetra (Haryana) (Attached as Annexure-I).

12.2In the beginning, the existing manpower for administrative, support services and infrastructure of the University will be used in setting up of the Centre for Open and Distance Learning in the University. However, minimum of two faculty members may be involved on contractual basis

12.3The additional posts enumerated above are required to be sanctioned by the UGC to recoup the programme to start Open and Distance Learning Centre to contribute in achieving the gross enrolment ration of 50% and to create eco space for Life Long Learning.

12.4The University is also planning to start more programs in future on the bases of requirement and need of the local population in the nearby area of Southern Haryana and adjoining states of the Rajasthan.

12.5The Centre will be self-sustained after a short span of time to meet its further requirement and to develop the more learner-friendly setup.

12.6Skill based certificate and Diploma programms will also be launched to enhance the skills of the current students and bother working and non-working populations.

12.7Every year 2-3 new programms may be launched with a view to run the Centre in fully self-finance sustainable manner.

Dr AP Sharma
03/06/2022

Dr. Parmod Kumar
3/6/2022

03/06/2022
(Dinesh Kumar Gupta)

3/6/22
Rajesh Kumar, SO

03.06.2022
(Dr. Devender Kumar)

3/6/2022
(for Dinesh Chahal)

TABLE-I

FEES PAYABLE PER ANNUM

TRADITIONAL PROGRAMMES

Sr. No.	Name of Programme	1st Installment (At the time of Admission)	2nd Installment (as per schedule given in Section-II (C) at page 7 & 8)	Total Fee (Per Year)
1	B.A. (General) (3-Year) Part-I/II/III	2900	2900	5800
2	B.Com. (General) (3-Year) Part-I/II/III	3200	3200	6400
3	M.A. (2-Year) in Sanskrit Part-I/II	3300	3300	6600
4	M.A. (2-Year) in Philosophy Part-I/II	3300	3300	6600
5	M.A. (2-Year) in Panjabi Part-I/II	3300	3300	6600
6	M.A. (2-Year) in Hindi, Part-I/II	4400	4400	8800
7	M.A. (2-Year)in English, Part-I/II	4400	4400	8800
8	M.A. (2-Year) in Pol. Science. Part-I/II	4400	4400	8800
9	M.A. (2-Year) in Public Admin Part-I/II	4400	4400	8800
10	M.A. (2-Year) in History Part-I/II	4400	4400	8800
11	M.A. (2-Year) in Economics Part-I/II	4400	4400	8800
12	M.Sc. (2-Year) in Mathematics Part-I/II	4400	4400	8800
13	M.Sc. (2-Year) in Geography Part-I/II	4400	4400	8800
14	Master of Commerce (2-Year) Part-I/II	5200	5200	10400

PROFESSIONAL PROGRAMMES

(I)	**COMPUTER/ IT PROGRAMMES**			
1	Certificate Programme in Computer Application (1-Year)	4500	4500	9000
2	Bachelor of Computer Application (3-Year) Part-I/II/III	7300	7300	14600
3	P.G. Dip. in Computer Application (1-Year)	8800	8800	17600
4	M.Sc. Computer Science (Software) (2-Year) Part-I/II	8800	8800	17600
5	M.C.A. (2 year) Part I/ II	8800	8800	17600
(II)	**COMMERCE & MANAGEMENT PROGRAMMES**			
1	P.G. Dip. in Export Marketing Mgt. (I Year)	4100	4100	8200
2	P.G. Diploma in Taxation	10300	10300	20600
3	P.G. Diploma in Business Analytics	10300	10300	20600
4	M.B.A. (2-Year) Part-I/II	13500	13500	27000
5	M.B.A. Hospitality Mgt. (2Year) Part-I/II	13500	13500	27000
(III)	**LIBRARY AND INFORMATION SCIENCE PROGRAMMES**			
1	Diploma in Library & Information Sc.(1-Year)	5200	5200	10400
2	Bachelor of Library & Information Sc. (1-Year)	5200	5200	10400
3	Master of Library & Information Sc.(1-Year)	5800	5800	11600
(IV)	**JOURNALISM & MASS COMMUNICATION PROGRAMMES**			
1	P.G. Diploma in Journalism & Mass Comm. (1-Year)	5200	5200	10400
2	Master of Arts in Mass Communication (2-Year)Part-I/II	5200	5200	10400
(V)	**EDUCATION PROGRAMMES**			
1	B.Ed. (2-Year) Part-I/II	16700	16700	33400
2	Master of Arts in Education (2-Year) Part-I/II	8800	8800	17600
(VI)	**LAW PROGRAMMES**			
1	LL.M. Part-II only for continuing students of Jan, 2021	10300	10300	20600
2	P.G. Diploma in Cyber Law & IPR	5800	5800	11600
(VII)	**ENVIRONMENTAL EDUCATION PROGRAMMES**			
1	P.G. Diploma in Environmental Education (1-Year)	4400	4400	8800
2	Master of Arts in Environmental Education(2-Year)Part-I/II	4400	4400	8800
VALUE ADDED PROGRAMMES				
1	Certificate Programme in Urdu (1-Year)	1900	1900	3800
2	Diploma in Yoga (1-year)	3100	3100	6200
3	Diploma in Gita (1-year)	3000	3000	6000
4	P.G. Dip. in Translation(Hindi/Eng.) (1-Year)	3000	3000	6000
5	P.G. Diploma in Human Rights (1-year)	5300	5300	10600

NOTE: 1. * This includes Examination/Registration/Establishment/Eligibility/Continuation /Membership fee of Population Club Rs.6/- Alumni Fee Rs.100/- etc. but exclusive of late admission or late examination fees, etc.

2. **Fees mentioned above are charged per year and can be paid in two installments.**
3. **The Students may pay Rs. 1000/- as Alumni Life Time Membership Fee, if interested.**

रजिस्ट्री सं. डी.एल.- 33004/99 REGD. No. D. L.-33004/99

भारत का राजपत्र
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असाधारण
EXTRAORDINARY

भाग III—खण्ड 4
PART III—Section 4

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विश्वविद्यालय अनुदान आयोग

अधिसूचना

नई दिल्ली, 2 मई, 2022

फा. सं. 4-1/2022(IC).—विश्वविद्यालय अनुदान आयोग अधिनियम, 1956 की धारा 26 की उप-धारा (1) की खंड (च) और (छ) द्वारा प्रदत्त शक्तियों का प्रयोग करते हुए और दिनांक 11.07.2016 की राजपत्र अधिसूचना के माध्यम से अधिसूचित किए गए विश्वविद्यालय अनुदान आयोग (भारतीय और विदेशी शैक्षिक संस्थानों के मध्य अकादमिक सहयोग के मानकों की प्रोन्नति एवं अनुरक्षण) विनियम, 2016 का अधिक्रमण करते हुए विश्वविद्यालय अनुदान आयोग, एतद्वारा निम्नलिखित विनियम बनाता है, नामत: -

1. लघु शीर्षक, अनुप्रयोग और प्रवर्तन:-

1.1. इन विनियमों को विश्वविद्यालय अनुदान आयोग (युगल उपाधि, संयुक्त उपाधि और दोहरी उपाधि कार्यक्रमों की पेशकश करने हेतु भारतीय और विदेशी उच्चतर शिक्षा संस्थानों के बीच शैक्षिक सहयोग) विनियम, 2022 (इसके पश्चात् विनियमों कहा जाएगा) कहा जाएगा।

1.2. ये विनियम युगल उपाधि, संयुक्त उपाधि और दोहरी उपाधि कार्यक्रमों की पेशकश करने के लिए भारतीय उच्चतर शिक्षा संस्थानों और विदेशी उच्चतर शिक्षा संस्थानों के बीच शैक्षिक सहयोग के लिए न्यूनतम मानकों का निर्धारण करते हैं।

1.3. ये विनियम निम्न पर पर लागू होंगे-

1.3.1. उपाधि(यां) प्रदान करने के लिए विदेशी उच्चतर शिक्षा संस्थानों के साथ सहयोग करने के इच्छुक भारतीय उच्चतर शिक्षा संस्थान; और

1.3.2. भारतीय उच्चतर शिक्षा संस्थानों के साथ सहयोग करने के इच्छुक विदेशी उच्चतर शिक्षा संस्थान।

1.4. ये विनियम शासकीय राजपत्र में उनके प्रकाशन की तिथि से लागू होंगे।

2. परिभाषाएं:-

2.1. "अधिनियम" का अभिप्राय, समय-समय पर यथा-संशोधित, विश्वविद्यालय अनुदान आयोग अधिनियम, 1956 से है;

2.2. "शैक्षिक सहयोग" का अभिप्राय, एक लिखित करार के माध्यम से निम्नवत प्रयोजनार्थ, भारतीय उच्चतर शिक्षा संस्थान(नों) और विदेशी उच्चतर शिक्षा संस्थान(नों) के बीच शैक्षिक साझेदारी से है;

2.2.1. युगल उपाधि कार्यक्रम

2.2.2. संयुक्त उपाधि कार्यक्रम;

2.2.3. दोहरी उपाधि कार्यक्रम;

2.3. एक विदेशी उच्चतर शिक्षा संस्थान के संबंध में "मूल्यांकन और प्रत्यायन एजेंसी", का अभिप्राय किसी ऐसी एजेन्सी अथवा निकाय से है जिसे उस संस्थान के संबंधित देश में विधि के तहत स्थापित अथवा निगमित किसी प्राधिकरण अथवा उस देश में किसी अन्य सांविधिक प्राधिकरण द्वारा अनुमोदित किया गया हो, मान्यता प्रदान की गई हो अथवा जो उच्चतर शिक्षा संस्थानों की गुणवत्ता और मानकों का मूल्यांकन, प्रत्यायन अथवा गुणवत्ता आश्वासन के प्रयोजनार्थ प्रत्यायन निकायों के वैश्विक नेटवर्क का सदस्य हो;

2.4. भारतीय उच्चतर शिक्षा संस्थान के संबंध में "मूल्यांकन और प्रत्यायन एजेंसी" का अभिप्राय, विश्वविद्यालय अनुदान आयोग (आकलन एवं प्रत्यायन एजेंसियों की मान्यता एवं सर्वेक्षण) विनियम, 2014 के अंतर्गत मान्यता प्राप्त एजेंसी से है;

2.5. "आयोग" का अभिप्राय, अधिनियम की धारा 4 के अंतर्गत स्थापित विश्वविद्यालय अनुदान आयोग से है;

2.6. "परंपरागत पद्धतियों" का अभिप्राय, एक नियमित कक्षा परिवेश में शिक्षक और शिक्षार्थी के मध्य सम्मुख पारस्परिक वार्तालाप के माध्यम से ज्ञान अर्जन का अवसर उपलब्ध कराए जाने की एक पद्धति से है, जो ऑनलाइन पद्धति के उपयोग के माध्यम से शिक्षार्थी हेतु पूरक शिक्षण, यदि कोई हो तो, को अपवर्जित नहीं करता है;

2.7. "'क्रेडिट' मान्यता और अंतरण" का अभिप्राय, किसी भारतीय उच्चतर शिक्षा संस्थान द्वारा स्वयं अथवा किसी विदेशी उच्चतर शिक्षा संस्थान और अनुलोमत: द्वारा संयुक्त रूप से प्रदान किए गए किसी कार्यक्रम के लिए "'क्रेडिट"' संबंधी अपेक्षाओं हेतु मान्यता प्रदान किए जाने, परिमाणित किए जाने अथवा सम्मिलित किए जाने हेतु किसी विदेशी उच्चतर शिक्षा संस्थान द्वारा प्रदत्त "'क्रेडिट"' से है;

2.8. "उपाधि" का अभिप्राय, विश्वविद्यालय अनुदान आयोग अधिनियम की धारा 22 के उपबंधों के अनुरूप किसी भारतीय उच्चतर शिक्षा संस्थान द्वारा प्रदान की गई उपाधि और संबंधित देश के संगत नियमों और विनियमों के अनुसार किसी विदेशी उच्चतर शिक्षा संस्थान द्वारा प्रदान की गई उपाधि से है;

2.9. "विदेशी उच्चतर शिक्षा संस्थान" का अभिप्राय, विदेश में विधिवत रूप से स्थापित अथवा निगमित अथवा मान्यता प्राप्त किसी उच्चतर शिक्षा संस्थान से है जो स्नातकपूर्व और/ अथवा उच्चतर स्तरों पर शैक्षिक और अनुसंधान कार्यक्रमों की पेशकश करता है;

2.10. इन विनियमों के प्रयोजनार्थ "फ्रेंचाइजिंग" का अभिप्राय और उसमें, मान्यता प्राप्त उच्चतर शिक्षा संस्थान की ओर से अथवा उसके नाम से युगल उपाधि, संयुक्त उपाधि और दोहरी उपाधि कार्यक्रमों की पेशकश करने अथवा संबंधित कार्यकलापों हेतु इन विनियमों के तहत मान्यता प्राप्त उच्चतर शिक्षा संस्थानों के अलावा किसी व्यक्ति अथवा संस्थान अथवा संगठन को औपचारिक अथवा अनौपचारिक रूप से अनुमति प्रदान करना शामिल है, "फ्रेंचाईज" और "फ्रेंचाइजिंग" वाक्यांश का अर्थ तदनुसार समझा जाएगा;

2.11. "भारतीय उच्चतर शिक्षा संस्थान" का अभिप्राय, विश्वविद्यालय अनुदान आयोग अधिनियम, 1956 की धारा 2(च) के तहत किसी विश्वविद्यालय अथवा धारा 3 के तहत किसी सम विश्वविद्यालय संस्थान से है;

2.12. "कार्यक्रम" का अभिप्राय, स्नातकोत्तर और डॉक्टोरल कार्यक्रमों सहित उपाधि प्रदान करने वाले शैक्षिक कार्यक्रमों से है;

2.13. "सांविधिक निकाय" का अभिप्राय, विश्वविद्यालयों अथवा पेशेवर कार्यक्रम(मों) सहित अध्ययन कार्यक्रम(मों) में शिक्षण, परीक्षा और अनुसंधान के मानकों को विनियमित करने, उनका समन्वय करने, उनका निर्धारित करने और उन्हें बनाए रखने के लिए केंद्रीय अधिनियम द्वारा अथवा उसके तहत स्थापित अथवा निगमित निकाय से है, जिसके परिणामस्वरूप उपाधि(यां) प्राप्त की जाएं;

3. सहयोग संबंधी उपबंध:-

इन विनियमों के अंतर्गत भारतीय और विदेशी उच्चतर शिक्षा संस्थानों के बीच शैक्षिक सहयोग से निम्नलिखित शैक्षिक क्रियाकलाप किए जा सकेंगे: -

3.1. युगल कार्यक्रम

3.1.1. "युगल कार्यक्रम" एक सहयोगात्मक व्यवस्था होगी जिसके तहत विश्वविद्यालय अनुदान आयोग के विनियमों का अनुपालन करते हुए, भारतीय उच्चतर शिक्षा संस्थान में नामांकित छात्र आंशिक रूप से भारत में तथा आंशिक रूप से विदेशी उच्चतर शिक्षा संस्थान में अपना अध्ययन कार्यक्रम कर सकते हैं।

3.1.2. इस प्रकार के युगल कार्यक्रमों के तहत प्रदान की जाने वाली उपाधि केवल भारतीय उच्चतर शिक्षा संस्थान द्वारा प्रदान की जाएगी।

3.1.3. युगल कार्यक्रम के अंतर्गत, छात्रों द्वारा विदेशी उच्चतर शिक्षा संस्थान में अर्जित "क्रेडिट" को भारतीय उच्चतर शिक्षा संस्थान द्वारा प्रदान की जाने वाली उपाधि हेतु गिना जाएगा। तथापि, विदेशी उच्चतर शिक्षा संस्थान से छात्रों द्वारा अर्जित "क्रेडिट", कार्यक्रम हेतु निर्धारित कुल 'क्रेडिटों' के 30 प्रतिशत से अधिक नहीं होना चाहिए।

3.1.4. भारतीय छात्रों द्वारा विदेशी संस्थान से अर्जित किए जाने वाले 'क्रेडिट' और भारतीय संस्थानों से विदेशी छात्रों द्वारा अर्जित 'क्रेडिट' पारंपरिक पद्धतियों से प्राप्त किए जाएंगे।

3.1.5. प्रत्येक संस्थान अपने संबंधित पाठ्यक्रमों के लिए एक प्रतिलेख जारी करेगा, जिसमें यह टिप्पणी होगी कि छात्र ने भागीदार संस्थान में कुछ मॉड्यूल, जहां कहीं लागू हों, किए हैं।

3.1.6. भारतीय उच्चतर शिक्षा संस्थान यह सुनिश्चित करेगा कि विदेशी उच्चतर शिक्षा संस्थान से छात्रों द्वारा अर्जित 'क्रेडिट' अतिव्यापी पाठ्यक्रम विषयवस्तु/पाठ्यचर्या से नहीं होंगे।

3.1.7. कार्यक्रम की संपूर्ण अवधि के लिए यथा लागू, शुल्क (विदेशी उच्चतर शिक्षा संस्थान द्वारा प्रदान किए गए पाठ्यक्रमों सहित) को प्रवेश के समय सार्वजनिक किया जाएगा। शुल्क ढांचा तर्कसंगत होना चाहिए ताकि गुणवत्तापूर्ण उच्चतर शिक्षा तक समाज के सभी वर्गों की पहुंच हो तथा यह किफायती हो।

3.1.8. इस प्रकार के युगल उपाधि कार्यक्रम के तहत प्रदान की जाने वाली कोई भी उपाधि विश्वविद्यालय अनुदान आयोग अधिनियम, 1956 की धारा 22(3) के उपबंधों के अनुरूप होनी चाहिए और साथ ही यह संबंधित सांविधिक प्राधिकरण द्वारा ऐसी उपाधि प्रदान करने के लिए यथा-निर्धारित मानकों, मानदंडों और अपेक्षाओं के अनुरूप होनी चाहिए।

3.1.9. सहयोगी उच्चतर शिक्षा संस्थान, उन छात्रों के लिए निकास मार्ग की व्यवस्था करेंगे जो छात्रों द्वारा अर्जित 'क्रेडिटों' की भावी संस्वीकृति के संबंध में स्पष्ट विनिर्देशों के साथ युगल कार्यक्रम को पूर्ण करने में असमर्थ हैं।

3.2. संयुक्त उपाधि कार्यक्रम

3.2.1. "संयुक्त उपाधि कार्यक्रम" के लिए, पाठ्यक्रम को सहयोगी भारतीय और विदेशी उच्चतर शिक्षा संस्थानों द्वारा संयुक्त रूप से तैयार किया जाएगा और कार्यक्रम के पूर्ण होने पर, भारतीय उच्चतर शिक्षा संस्थान और सहयोगी विदेशी उच्चतर शिक्षा संस्थान द्वारा एकल प्रमाणपत्र के रूप में उपाधि प्रदान की जाएगी।

3.2.2 पेशकश किया जाने वाला कोई भी संयुक्त उपाधि कार्यक्रम, विश्वविद्यालय अनुदान आयोग अधिनियम, 1956 की धारा 22(3) में विनिर्दिष्ट उपाधि के नाम और अवधि के अनुरूप होगा और इस प्रकार के उपाधि कार्यक्रम की पेशकश करने के लिए न्यूनतम पात्रता और अन्य मानदंडों और मानकों के अनुरूप होगा।

3.2.3. छात्रों को प्रत्येक भारतीय और विदेशी उच्चतर शिक्षा संस्थानों से कुल 'क्रेडिट' का कम से कम 30 प्रतिशत अर्जित करना होगा। भारतीय छात्रों द्वारा विदेशी संस्थान से अर्जित किए जाने वाले 'क्रेडिट' और भारतीय संस्थानों से विदेशी छात्रों द्वारा अर्जित 'क्रेडिट' पारंपरिक पद्धति के माध्यम से प्राप्त किए जाएंगे।

3.2.4.किसी संस्थान में पाठ्यक्रम(मों) के लिए अर्जित 'क्रेडिट' को दोनों संस्थानों द्वारा संयुक्त रूप से प्रदान की जाने वाली उपाधियों हेतु गिना जाएगा।

3.2.5. सहयोगी उच्चतर शिक्षा संस्थान यह सुनिश्चित करेंगे कि छात्रों द्वारा अर्जित 'क्रेडिट' अतिव्यापी पाठ्यक्रम विषयवस्तु/ पाठ्यचर्या से नहीं होंगे; और जिस संस्थान में विद्यार्थी उक्त पाठ्यक्रम के लिए पंजीकृत है उसके प्रत्येक पाठ्यक्रम के लिए छात्र केवल एक परीक्षा देगा और मूल्यांकन प्रणाली से गुजरेगा।

3.2.6. डॉक्टोरल उपाधि कार्यक्रम के मामले में, प्रत्येक संस्थान में छात्रों के लिए शोध पर्यवेक्षक होना चाहिए। अध्ययन कार्यक्रम के दौरान विद्यार्थियों को प्रत्येक सहयोगी संस्थान में कम से कम एक सेमेस्टर बिताना होगा। तथापि, भागीदार संस्थानों द्वारा संयुक्त रूप से तैयार किए गए ढांचे का अनुपालन करते हुए छात्रों को एक शोध प्रबंध भी जमा करना होगा।

3.2.7. कार्यक्रम की संपूर्ण अवधि के लिए यथा लागू, शुल्क (विदेशी उच्चतर शिक्षा संस्थान द्वारा प्रदान किए गए पाठ्यक्रमों सहित) को प्रवेश के समय सार्वजनिक किया जाएगा। शुल्क ढांचा तर्कसंगत होना चाहिए ताकि गुणवत्तापूर्ण उच्चतर शिक्षा तक समाज के सभी वर्गों की पहुंच हो तथा यह किफायती हो।

3.2.8 प्रत्येक संस्थान अपने संबंधित पाठ्यक्रमों के लिए एक प्रतिलेख जारी करेगा, जिसमें यह टिप्पणी होगी कि छात्र ने भागीदार संस्थान में कुछ मॉड्यूल, जहां कहीं लागू हों, किए हैं।

3.2.9. सहयोगी उच्चतर शिक्षा संस्थान, उन छात्रों के लिए निकास मार्ग की व्यवस्था करेंगे जो छात्रों द्वारा अर्जित 'क्रेडिटों' की भावी संस्वीकृति के संबंध में स्पष्ट विनिर्देशों के साथ युगल कार्यक्रम को पूर्ण करने में असमर्थ हैं।

3.2.10. संयुक्त उपाधि कार्यक्रम की पेशकश से संबंधित अन्य सभी उपबंध भागीदार संस्थानों द्वारा आपस में निर्धारित किए जाएंगे जोकि संबंधित संस्थान और देश के संबंधित नियमों, विनियमों और विधियों के अनुरूप होंगे।

3.3. दोहरी उपाधि कार्यक्रम

3.3.1. "दोहरी उपाधि कार्यक्रम" भारतीय और विदेशी उच्चतर शिक्षा संस्थानों द्वारा समान विधा/ विषय क्षेत्रों तथा उसी स्तर पर संयुक्त रूप से तैयार और पेशकश किए जाएंगे। इस प्रकार के कार्यक्रम के लिए उपाधियां, भारतीय और विदेशी उच्चतर शिक्षा संस्थानों द्वारा दोनों संस्थानों की उपाधि संबंधी अपेक्षाओं पर खरा उतरने पर अलग-अलग और एक ही समय, प्रदान की जाएंगी। इसे किसी भी प्रकार से पृथक विधाओं/ विषय क्षेत्रों और/ अथवा स्तरों पर एक साथ किए जा रहे दो उपाधि कार्यक्रम नहीं माना जाएगा।

3.3.2. दोहरी उपाधि कार्यक्रम के अंतर्गत, किसी भारतीय उच्चतर शिक्षा संस्थान द्वारा पेशकश की जाने वाली उपाधि, वि.अ.आ. अधिनियम, 1956 की धारा 22(3) में विनिर्दिष्ट उपाधि के नाम और अवधि के अनुरूप होनी चाहिए और इस प्रकार की उपाधि कार्यक्रम की पेशकश करने हेतु न्यूनतम पात्रता और अन्य मानदंड और मानकों के अनुरूप भी होनी चाहिए।

3.3.3. भावी छात्रों को भारतीय और विदेशी, दोनों उच्चतर शिक्षा संस्थानों की प्रवेश संबंधी अपेक्षाओं को पूरा करना होगा और उसे दोनों संस्थानों में अलग-अलग आवेदन करना होगा और दोनों संस्थानों में अलग-अलग प्रवेश प्राप्त करना होगा।

3.3.4. छात्रों को भारतीय संस्थान से कुल 'क्रेडिट' का कम से कम 30 प्रतिशत अर्जित करना होगा। भारतीय छात्रों द्वारा विदेशी संस्थान से अर्जित किए जाने वाले 'क्रेडिट' और भारतीय संस्थानों से विदेशी छात्रों द्वारा अर्जित 'क्रेडिट' पारंपरिक पद्धति के माध्यम से प्राप्त किए जाएंगे।

3.3.5 किसी संस्थान में पाठ्यक्रम(मों) के लिए अर्जित 'क्रेडिट' को दोनों संस्थानों द्वारा प्रदान की जाने वाली उपाधियों हेतु गिना जाएगा।

3.3.6. सहयोगी उच्चतर शिक्षा संस्थान यह सुनिश्चित करेंगे कि छात्रों द्वारा अर्जित 'क्रेडिट' अतिव्यापी पाठ्यक्रम विषयवस्तु/ पाठ्यचर्या से नहीं होंगे; और जिस संस्थान में छात्र उक्त पाठ्यक्रम के लिए पंजीकृत है उसके प्रत्येक पाठ्यक्रम के लिए छात्र केवल एक परीक्षा देगा और मूल्यांकन प्रणाली से गुजरेगा।

3.3.7. डॉक्टोरल उपाधि कार्यक्रम के मामले में, प्रत्येक संस्थान में एक छात्रों के लिए शोध पर्यवेक्षक होना चाहिए। अध्ययन कार्यक्रम के दौरान छात्रों को प्रत्येक सहयोगी संस्थान में कम से कम एक सेमेस्टर बिताना होगा। तथापि, भागीदार संस्थानों द्वारा संयुक्त रूप से तैयार किए गए ढांचे का अनुपालन करते हुए छात्रों को एक शोध प्रबंध भी जमा करना होगा।

3.3.8. कार्यक्रम की संपूर्ण अवधि के लिए यथा लागू, शुल्क (विदेशी उच्चतर शिक्षा संस्थान द्वारा प्रदान किए गए पाठ्यक्रमों सहित) को प्रवेश के समय सार्वजनिक किया जाएगा। शुल्क ढांचा तर्कसंगत होना चाहिए ताकि गुणवत्तापूर्ण उच्चतर शिक्षा तक समाज के सभी वर्गों की पहुंच हो तथा यह किफायती हो।

3.3.9. प्रत्येक संस्थान अपने संबंधित पाठ्यक्रमों के लिए एक प्रतिलेख जारी करेगा, जिसमें यह टिप्पणी होगी कि छात्र ने भागीदार संस्थान में कुछ मॉड्यूल किए हैं।

3.3.10. सहयोगी उच्चतर शिक्षा संस्थान, उन छात्रों के लिए निकास मार्ग की व्यवस्था करेंगे जो छात्रों द्वारा अर्जित 'क्रेडिटों' की भावी संस्वीकृति के संबंध में स्पष्ट विनिर्देशों के साथ युगल कार्यक्रम को पूर्ण करने में असमर्थ हैं।

3.3.11. दोहरी उपाधि कार्यक्रम की पेशकश से संबंधित अन्य सभी उपबंध सहभागी संस्थानों द्वारा अपने संबंधित संस्थान और देश के संबंधित नियमों, विनियमों और कानूनों के अनुरूप पारस्परिक रूप से तय किए जाएंगे।

4. सहयोग हेतु शर्तें:-

4.1. भारतीय उच्चतर शिक्षा संस्थान, किसी भी विदेशी उच्चतर शिक्षा संस्थान के साथ शैक्षिक सहयोग के लिए अपने उपयुक्त प्राधिकारी, जैसे शासी बोर्ड/ प्रबंधन बोर्ड/ सिंडिकेट/ कार्यकारी परिषद् का अनुमोदन प्राप्त करेंगे।

4.2. भारतीय उच्चतर शिक्षा संस्थान, तकनीकी, चिकित्सा, विधि, कृषि और ऐसे अन्य पेशेवर कार्यक्रमों में सहयोग करने से पूर्व संगत सांविधिक परिषदों/ निकायों से आवश्यक अनुमोदन प्राप्त करेंगे।

4.3. भारतीय उच्चतर शिक्षा संस्थान, विशिष्ट देशों के साथ सहयोग के लिए समय-समय पर भारत सरकार द्वारा विहित मानदंडों का अनुपालन करेंगे।

4.4. भारतीय उच्चतर शिक्षा संस्थानों की प्रयोगशाला, पुस्तकालय और कार्यशाला सुविधाओं सहित शैक्षिक अवसंरचना, संगत पेशेवर सांविधिक परिषदों/निकायों की अपेक्षाओं को पूरा करेगी।

4.5. भारतीय उच्चतर शिक्षा संस्थान को सहयोग हेतु अपने सहयोगी विदेशी उच्चतर शिक्षा संस्थान(नों) के साथ एक लिखित समझौता ज्ञापन अथवा करार करना होगा। समझौता ज्ञापन अथवा करार में सहयोग के प्रयोजन और संबंधित उपबंधों का विवरण स्पष्ट रूप से सम्मिलित होना चाहिए।

4.6. सहयोगात्मक व्यवस्थाओं के तहत शैक्षिक अपेक्षाओं तथा पेशकश किए जाने वाले अध्ययन कार्यक्रम(मों) के अन्य विवरणों को ऐसे कार्यक्रमों के आरंभ होने से पूर्व भारतीय और विदेशी, दोनों उच्चतर शिक्षा संस्थानों की वेबसाइटों में स्पष्ट रूप से प्रदर्शित करके सार्वजनिक किया जाएगा।

4.7. जहां कहीं भी विदेशी मुद्रा का लेन-देन शामिल हो, उच्चतर शिक्षा संस्थान (भारतीय और विदेशी), समय-समय पर भारतीय रिजर्व बैंक और भारत सरकार द्वारा जारी संगत विनियमों, मानदंडों, अधिसूचनाओं और अनुदेशों का अनुपालन करेंगे।

4.8. भारतीय उच्चतर शिक्षा संस्थान यह सुनिश्चित करेगा कि अध्ययन कार्यक्रम(मों) और/ अथवा पेशकश किए जाने वाले शोध कार्यक्रम, भारत की राष्ट्रीय सुरक्षा और क्षेत्रीय अखंडता के विरुद्ध नहीं है।

4.9. संबंधित संस्थान, इन विनियमों के सभी उपबंधों का अनुपालन करेंगे और भारत सरकार और समय-समय पर संबंधित सांविधिक निकाय(यों) द्वारा विनिर्दिष्ट किसी अन्य शर्त(तों) का भी अनुपालन करेंगे।

5. पात्रता:

भारतीय और विदेशी उच्चतर शिक्षा संस्थान, इन विनियमों के तहत युगल उपाधि, संयुक्त उपाधि और दोहरी उपाधि कार्यक्रमों की पेशकश करने के लिए पात्र होंगे बशर्ते वे निम्नलिखित पात्रता मानदंडों को पूरा करते हों: -

5.1. उपर्युक्त बिंदु 2.11 में उल्लिखित कोई भी भारतीय उच्चतर शिक्षा संस्थान, जो राष्ट्रीय मूल्यांकन और प्रत्यायन परिषद (एनएएसी) अथवा इस संबंध में प्राधिकृत किसी अन्य एजेंसी द्वारा मान्यता प्राप्त है और आवेदन करते समय 4-प्वाईंट स्केल पर न्यूनतम 3.01 अंक प्राप्तकर्ता है।

अथवा

जो आवेदन करते समय 'टाइम्स हॉयर एजुकेशन' अथवा 'क्यू.एस.वर्ल्ड यूनिवर्सिटी रैंकिंग' के शीर्षस्थ 1000 संस्थानों में स्थान रखता हो;

अथवा

जो आवेदन करते समय 'राष्ट्रीय संस्थागत रैंकिंग फ्रेमवर्क' (एनआईआरएफ) की विश्वविद्यालय श्रेणी में शीर्षस्थ 100 संस्थानों में स्थान रखता हो;

5.2. जैसा कि उपर्युक्त बिंदु 2.9 में उल्लिखित है, कोई भी ऐसा विदेशी उच्चतर शिक्षा संस्थान, जो आवेदन करते समय 'टाइम्स हायर एजुकेशन' अथवा 'क्यूएस वर्ल्ड यूनिवर्सिटी रैंकिंग' के शीर्षस्थ 1000 संस्थानों में स्थान रखता हो;

6. अंतर्राष्ट्रीय मामला संबंधी कार्यालय:-

सहयोगी भारतीय उच्चतर शिक्षा संस्थान में अंतर्राष्ट्रीय मामलों के लिए एक कार्यालय होगा जो एकल संपर्क बिंदु के रूप में कार्य करेगा और सभी सहयोगात्मक क्रियाकलापों को पूरा करने के लिए जिम्मेदार होगा, जिसमें असीमित रूप से निम्नवत शामिल हैं:

6.1. विनियामक/सांविधिक निकायों के साथ संपर्क करना;

6.2. विदेशी उच्चतर शिक्षा संस्थानों के साथ सहयोगात्मक व्यवस्था के अंतर्गत पंजीकृत सभी छात्रों के लिए समन्वय एजेंसी के रूप में कार्य करना;

6.3. सहयोगात्मक व्यवस्था के तहत विदेशी उच्चतर शिक्षा संस्थानों में विदेश जाने वाले भारतीय छात्रों से संबंधित मामलों पर कार्यवाही करना;

6.4. अभिलेखों का रखरखाव करना और अंतरराष्ट्रीय सहयोग से संबंधित जानकारी का प्रसार करना;

6.5. विदेशी छात्रों के लिए नोडल एजेंसी के रूप में कार्य करना और विदेशी छात्रों का स्वागत करने और उन्हें सहायता प्रदान करने से संबंधित सभी मामलों का समन्वय करना;

6.6. विदेशों में प्रचार संबंधी क्रियाकलापों और 'ब्रांड' तैयार करने के अभियान में जुटना;

6.7. शैक्षिक सहयोग से संबंधित जानकारी को उच्चतर शिक्षा संस्थान की वेबसाइट पर उपलब्ध कराना और जब कभी भी ऐसी जानकारी मांगी जाए, उसे आयोग को उपलब्ध कराना।

6.8. इन विनियमों के तहत पेशकश किए गए कार्यक्रमों में प्रवेश लेने वाले भारतीय और विदेशी छात्र, दोनों की शिकायतों को दूर करना।

7. विविध शर्तें:-

7.1 इन विनियमों के तहत प्रदान की गई उपाधि, निम्नवत विनिर्दिष्टताओं के साथ, भारतीय उच्चतर शिक्षा संस्थान द्वारा प्रदान की गई किसी भी समवर्ती उपाधि के समकक्ष होगी: (i) किसी भी प्राधिकरण से समकक्षता प्राप्त करने की कोई आवश्यकता नहीं होगी; और (ii) प्रदत्त उपाधि में, साधारणतया, किसी भारतीय उच्चतर शिक्षा संस्थान द्वारा प्रदान की जाने वाली उपाधि से जुड़े सभी लाभ, अधिकार और विशेषाधिकार होंगे।

7.2. इन विनियमों के तहत पेशकश किए जाने वाले कार्यक्रमों को ऑनलाइन और ओ.डी.एल. पद्धति से आयोजित करने की अनुमति नहीं दी जाएगी।

7.3. इन विनियमों के तहत किसी भी विदेशी उच्चतर शिक्षा संस्थान और भारतीय उच्चतर शिक्षा संस्थान के बीच, गुप्त रूप से अथवा प्रकट रूप से, अथवा किसी भी नाम से, कोई 'फ्रेंचाईजी' व्यवस्था/ अध्ययन केन्द्र चलाने की अनुमति नहीं होगी।

7.4. विश्वविद्यालय अनुदान आयोग अधिनियम, 1956 की धारा 3 के तहत कोई समविश्वविद्यालय संस्थान मौजूदा समविश्वविद्यालय विनियमों के अनुरूप तथा इन विनियमों के उपबंधों का अनुपालन करते हुए शैक्षिक सहयोग करेगा।

7.5. सहयोग के लिए समझौता ज्ञापन/ करार में छात्र संबंधी दायित्व, शुल्क और अन्य वित्तीय व्यवस्थाएं, बौद्धिक संपदा अधिकार, छात्रों की उपस्थिति संबंधी पैटर्न, दोनों उच्चतर शिक्षा संस्थानों में अध्ययन कार्यक्रम के लिए उपस्थित रहने की अवधि, संयुक्त पर्यवेक्षण व्यवस्था, शोध प्रबंध की भाषा और परीक्षाएं, प्रवेश तथा मूल्यांकन प्रक्रिया और स्नातक प्रक्रिया, जहां कहीं भी लागू हो, से संबंधित उपबंध शामिल होंगे।

7.6. सहयोग से जुड़े विधिक मामलों सहित छात्रों की शिकायतों से संबंधित मामलों का निपटान शैक्षिक सहयोग करने वाले भारतीय उच्चतर शिक्षा संस्थान द्वारा किया जाएगा।

7.7. निगरानी अनिवार्य सार्वजनिक प्रकटीकरण के माध्यम से की जाएगी।

7.8. सहयोगी भारतीय उच्चतर शिक्षा संस्थान, आयोग को समय-समय पर शैक्षणिक सहयोग के संबंध में अपेक्षित जानकारी उपलब्ध कराएगा।

8. उल्लंघन किए जाने की स्थिति में परिणाम:-

8.1. यदि यह पाया जाता है कि संबंधित भारतीय उच्चतर शिक्षा संस्थान ने इन विनियमों का उल्लंघन किया है, तो आयोग अधिनियम की धारा 14 के तहत यथा उपबंधित, कार्रवाई करेगा और अपनी वेबसाइट तथा मीडिया के माध्यम से भी सूचित करेगा कि उक्त सहयोगात्मक व्यवस्था के तहत पेशकश किए जाने वाले अथवा चलाए जा रहे यह कार्यक्रम(मों) इन विनियमों के अनुरूप नहीं हैं।

8.2. आयोग, इन विनियमों का उल्लंघन करने के लिए भारतीय उच्चतर शिक्षा संस्थान(नों) के विरुद्ध यथा विहित आगे की कार्रवाई भी कर सकता है।

9. निवर्चन:-

9.1. इन विनियमों के निवर्चन के संबंध में किसी भी प्रश्न पर आयोग द्वारा निर्णय लिया जाएगा और इस मामले में उसका निर्णय अंतिम और बाध्यकारी होगा।

9.2. भारतीय और विदेशी उच्चतर शिक्षा संस्थानों के बीच सहयोगात्मक व्यवस्था के संबंध में उत्पन्न होने वाला कोई भी विवाद, भारतीय विधि द्वारा अभिनिर्णित होगा।

10. कठिनाई दूर करने की शक्ति:-

10.1. यदि इन विनियमों के उपबंधों को लागू करने अथवा प्रभावी बनाने में कठिनाई उत्पन्न होती है, तो आयोग, कठिनाई को दूर करने के लिए जैसा आवश्यक और उचित प्रतीत हो, भारत के राजपत्र में एक आदेश प्रकाशित कर वि०अ०आ० अधिनियम, 1956 अथवा इन विनियमों के उपबंधों से असंगत उपबंधों का लोप करने उपबंध कर सकता है।

बशर्ते कि इन विनियमों के लागू होने की तिथि से दो वर्षों की अवधि की समाप्ति के बाद आयोग द्वारा इस उपबंध के तहत कोई आदेश नहीं दिया जाएगा।

प्रो. रजनीश जैन, सचिव

[विज्ञापन III/4/असा./57/2022-23]

UNIVERSITY GRANTS COMMISSION
NOTIFICATION

New Delhi, the 2nd May, 2022

F. No. 4-1/2022(IC).—In exercise of the powers conferred by clauses (f) and (g) of sub-section (1) of section 26 of the University Grants Commission Act, 1956 and in supersession of the University Grants Commission (Promotion & Maintenance of Standards of Academic Collaboration between Indian and Foreign Educational Institutions) Regulations, 2016 notified vide Gazette Notification dated 11.07.2016, the University Grants Commission hereby makes the following Regulations, namely:-

1. Short title, application and commencement: -

1.1. These Regulations may be called the University Grants Commission (Academic Collaboration between Indian and Foreign Higher Educational Institutions to offer Twinning, Joint Degree and Dual Degree Programmes) Regulations, 2022 (hereafter referred to as the Regulations).

1.2. These regulations lay down the minimum standards for academic collaboration between Indian Higher Educational Institutions and foreign Higher Educational Institutions to offer Twinning, Joint Degree and Dual Degree Programmes.

1.3. These Regulations shall apply to-

1.3.1. Indian Higher Educational Institutions intending to collaborate with Foreign Higher Educational Institutions leading to award of degree(s); and

1.3.2. Foreign Higher Educational Institutions intending to collaborate with Indian Higher Educational Institutions.

1.4. These Regulations shall come into force on the date of their publication in the Official Gazette.

2. Definitions: -

2.1. "Act" means the University Grants Commission Act, 1956, as amended from time to time;

2.2. "Academic Collaboration" means academic partnership between Indian Higher Educational Institution(s) and Foreign Higher Educational Institution(s), put into place through an instrument of written Agreement for the purposes of

2.2.1. Twinning Programme

2.2.2. Joint Degree Programme;

2.2.3. Dual Degree Programme;

2.3. "Assessment and Accreditation Agency", in respect of a Foreign Higher Educational Institution, means an agency or body approved, recognized or authorized by an authority, established or incorporated under a law in its home country or any other statutory authority in that country or member of global network of accreditation bodies for the purpose of assessing, accrediting or assuring quality and standards of Higher Educational Institutions;

2.4. "Assessment and Accreditation Agency", in respect of an Indian Higher Educational Institution, means an agency recognized under the University Grants Commission (Recognition and monitoring of Assessment and Accreditation Agencies) Regulations, 2014;

2.5. "Commission" means the University Grants Commission established under section 4 of

the Act;

2.6. "Conventional mode" means a mode of providing learning opportunities through face-to-face interaction between the teacher and learner in regular class room environment but does not exclude supplementary instructions if any for the learner through use of online;

2.7. "Credit Recognition and Transfer" shall mean 'Credit' conferred by a Foreign Higher Educational Institution to be recognised, quantified and included towards the credit requirements for a programme delivered by an Indian Higher Educational Institution solely or jointly with a Foreign Higher Educational Institution and vice versa;

2.8. "Degree" means a degree awarded by an Indian Higher Educational Institution in accordance with the provisions of the section 22 of the UGC Act and a Degree awarded by a Foreign Higher Education Institution in accordance with the relevant rules and regulation of respective foreign country;

2.9. "Foreign Higher Educational Institution" means a Higher Educational Institution duly established or incorporated or recognised in a foreign country and offering academic and research programmes at the undergraduate and/or higher levels;

2.10. "Franchising" for the purpose of these regulations, means and includes the practice of allowing, formally or informally, any person or institution or organisation, other than the Higher Educational Institution recognised under these regulations for offering Twinning, Joint and Dual Degree programmes or any related activity on behalf of or in the name of the recognised Higher Educational Institution, and the terms "franchise" and "franchisee" shall be construed accordingly.

2.11. "Indian Higher Educational Institution" means a university within the meaning of Section 2(f) or an institution deemed to be university under Section 3 of the UGC Act, 1956;

2.12. "Programme" means educational programmes leading to award of Degree(s) including Post graduate and Doctoral programmes;

2.13. "Statutory Body" means a body established or incorporated by or under a Central Act to regulate, coordinate, determine and maintain standards of teaching, examination and research in universities or programme(s) of study, including professional programme(s) leading to the award of degree(s);

3. Provisions of Collaboration: -

Academic Collaboration between Indian and Foreign Higher Educational Institutions under these Regulations shall facilitate the following academic activities: -

3.1. Twinning Programme

3.1.1. "Twinning Programme" shall be a collaborative arrangement whereby students enrolled with an Indian Higher Educational Institution may undertake their programme of study partly in India, complying with relevant UGC Regulations, and partly in the Foreign Higher Educational Institution.

3.1.2. The degree offered under such twinning programmes shall be awarded by the Indian Higher Educational Institution only.

3.1.3. Under twinning programme, credits earned by the students at a Foreign Higher Educational Institution shall be counted towards the degree awarded by the Indian Higher Educational Institution. However, credits earned by the student from the Foreign Higher Educational Institution shall not exceed 30 per cent of the total credits for the

programme.

3.1.4. Credits to be earned by the Indian students from the foreign institution and credits earned by the foreign students from Indian institutions shall be obtained through conventional mode.

3.1.5. Each institution shall issue a transcript for their respective courses, with a remark indicating that the student has taken certain modules at the partner institution, wherever applicable.

3.1.6. The Indian Higher Educational Institution shall ensure that the credits earned by the students from the Foreign Higher Educational Institution shall not be from overlapping course contents/curriculum.

3.1.7. Fees as applicable for the entire duration of the programme (including courses imparted by the Foreign Higher Educational Institution) shall be made public at the time of admission. Fee structure should be reasonable so as to make quality Higher Education accessible and affordable to all sections of the society.

3.1.8. Any degree to be awarded under such twinning programme must be in conformity with the provisions of section 22 (3) of the UGC Act, 1956 and shall also be in conformity with the norms, standards and requirement for award of such degree, as laid down by the statutory authority concerned.

3.1.9. The collaborating Higher Educational Institutions shall make provisions for exit pathways for students who are unable to complete the Twinning programme with clear specification with respect to future acceptance of credits earned by the students.

3.2. Joint Degree Programme

3.2.1. For a "Joint Degree programme", the curriculum shall be designed jointly by the collaborating Indian and Foreign Higher Educational Institutions and, upon completion of the programme, the Degree is awarded by the Indian Higher Educational Institution and the collaborating Foreign Higher Educational Institution with a single Certificate.

3.2.2. Any Joint degree programme to be offered shall conform to the nomenclature and duration of the degrees as specified in section 22 (3) of the UGC Act, 1956 and shall also conform to minimum eligibility and other norms and standards to offer such degree programme.

3.2.3. The students must earn at least 30 per cent of the total credits from each of the Indian and Foreign Higher Educational Institutions. Credits to be earned by the Indian students from the foreign institution and credits earned by the foreign students from Indian institutions shall be obtained through conventional mode.

3.2.4. Credits earned for the course(s) in an institution shall count towards the degrees jointly awarded by both the institutions.

3.2.5. The collaborating Higher Educational Institutions shall ensure that the credits earned by the students shall not be from overlapping course contents/curriculum and the student shall submit to only one examination and evaluation process for each of the courses by the institutions in which he/she has registered for that course.

3.2.6. In case of a doctoral degree programme, students must have a supervisor at each institution. The student shall spend a minimum of one semester in each of the collaborating institutions during the study programme. However, the student shall submit a single thesis adhering to a framework jointly devised by the participating

institutions.

3.2.7. Fees as applicable for the entire duration of the programme (including courses imparted by the Foreign Higher Educational Institution) shall be made public at the time of admission. Fee structure should be reasonable so as to make quality Higher Education accessible and affordable to all sections of the society.

3.2.8. Each Higher Educational Institution shall issue a transcript for their respective courses, with a remark indicating that the student has taken certain modules at the partner institution.

3.2.9. The collaborating Higher Educational Institutions shall make provisions for exit pathways for students who are unable to complete the Joint Degree programme with clear specification with respect to future acceptance of credits earned by the students.

3.2.10. All other provisions related to offering of Joint Degree Programme shall be decided mutually by the participating institutions conforming to the respective rules, regulations and laws of their respective institution and country.

3.3. Dual Degree Programme

3.3.1. "Dual Degree Programme" shall be a programme jointly designed and offered by the Indian and Foreign Higher Educational Institutions in the same disciplines/subject areas and in the same level. The degrees for such programme shall be conferred by the Indian and Foreign Higher Educational Institutions, separately and simultaneously, upon completion of degree requirements of both the institutions. This shall not in any way be construed as two degree programmes in separate disciplines/subject areas and/or levels being pursued simultaneously.

3.3.2. Under the Dual degree programme, the degrees to be offered by an Indian Higher Educational Institution shall conform to the nomenclature and duration of the degrees as specified in section 22 (3) of the UGC Act, 1956 and shall also conform to minimum eligibility and other norms and standards to offer such degree programme.

3.3.3. Prospective students must meet the admission requirements of both the Indian and Foreign Higher Educational Institutions and shall apply to and be admitted separately to both the institutions.

3.3.4. The students must earn at least 30 percent of total credits from the Indian institution. Credits to be earned by the Indian students from the foreign institution and credits earned by the foreign students from Indian institutions shall be obtained through conventional mode.

3.3.5. Credit earned for the course(s) in an institution shall count towards degrees to be awarded by both the institutions.

3.3.6. The collaborating Higher Educational Institutions shall ensure that the credits earned by the students shall not be from overlapping course contents/curriculum; and the student shall submit to only one examination and evaluation process for each of the courses by the institutions in which he/she has registered for that course.

3.3.7. In case of a doctoral degree programme, students must have a supervisor at each institution. The student shall spend a minimum of one semester in each of the collaborating institutions during the study programme. However, the student shall submit a single thesis adhering to a framework jointly devised by the participating institutions.

3.3.8. Fees as applicable for the entire duration of the programme (including courses imparted by the Foreign Higher Educational Institution) shall be made public at the time of admission. Fee structure should be reasonable so as to make quality Higher Education accessible and affordable to all sections of the society.

3.3.9. Each of the Higher Educational Institutions concerned shall issue a transcript for its respective courses, with a remark indicating that the student has taken certain modules at the partner institution.

3.3.10. The collaborating Higher Educational Institutions shall make provisions for exit pathways for students who are unable to complete the Dual Degree programme with clear specification with respect to future acceptance of credits earned by the students.

3.3.11. All other provisions related to offering of Dual Degree Programme shall be decided mutually by the participating institutions conforming to the respective rules, regulations and laws of their respective institution and country.

4. Conditions for Collaboration: -

4.1. The Indian Higher Educational Institutions shall obtain the approval of its appropriate authority, like Board of Governors/Board of Management/Syndicate/Executive Council for academic collaboration with any Foreign Higher Educational Institution.

4.2. Indian Higher Educational Institutions shall seek necessary approval from the relevant Statutory Councils/ Bodies before entering into collaboration in technical, medical, legal, agricultural and such other professional programmes.

4.3. The Indian Higher Educational Institutions shall abide by the norms prescribed by the Government of India from time to time for collaboration with specific countries.

4.4. Academic infrastructure, including laboratory, library and workshop facilities of the Indian Higher Educational Institutions shall meet the requirements of the relevant professional Statutory Councils/ Bodies.

4.5. The Indian Higher Educational Institution shall have to enter into a written Memorandum of Understanding or Agreement with its partner Foreign Higher Educational Institution(s) for collaboration. The MoU or Agreement must categorically include the purposes and related provisions of collaboration.

4.6. The academic requirements and other details of the programme(s) of study to be offered under collaborative arrangements shall be made public by displaying prominently in the websites of both Indian and Foreign Higher Educational Institutions, before the commencement of such programmes.

4.7. Wherever foreign exchange is involved, the Higher Educational Institutions (Indian and foreign), shall abide by and comply with the relevant regulations, norms, notifications and instructions issued by the Reserve Bank of India and Government of India from time to time.

4.8. The Indian Higher Educational Institution shall ensure that the programme(s) of study and/or research offered is not against the national security and territorial integrity of India.

4.9. The Institutions concerned shall comply with all the provisions of these Regulations and also abide by any other condition(s) specified by the Government of India and Statutory Body (ies) concerned from time to time.

5. Eligibility:

The Indian and Foreign Higher Educational Institutions shall be eligible to offer Twinning, Joint Degree and Dual Degree programmes under these regulations provided they fulfil the following eligibility criteria: -

5.1. Any Indian Higher Educational Institution as mentioned in 2.11 which is accredited by National Assessment and Accreditation Council (NAAC) or any other Agency authorised in this behalf, with a minimum score of 3.01 on a 4-point scale at the time of application;

or

which figures in the top 1000 of Times Higher Education or QS World University ranking at the time of application;

or

which figures in the top 100 in university category of National Institutional Ranking Framework (NIRF) at the time of application;

5.2. Any Foreign Higher Educational Institution as mentioned in 2.9 figuring in top 1000 of Times Higher Education or QS World University ranking at the time of application.

6. Office for International Affairs: -

The Collaborating Indian Higher Educational Institution shall have an office for International Affairs which shall function as single point of contact, and shall be responsible for carrying out all collaborative activities including, but not limited to:

6.1. Liaising with regulatory/statutory bodies;

6.2. Working as coordinating agency for all students registered under collaborative arrangements with Foreign Higher Educational Institutions;

6.3. Addressing matters related to Indian students proceeding abroad to Foreign Higher Educational Institutions under collaborative arrangements;

6.4. Maintaining records and disseminate information related to international collaborations;

6.5. Working as the nodal agency for foreign students and coordinate all matters relating to welcoming and supporting foreign students;

6.6. Engaging in promotional activities and brand building campaign abroad;

6.7. Making information relating to academic collaboration available on the Higher Educational Institution's website and provide the same to Commission whenever asked for.

6.8. Addressing the grievances of students, both Indian and foreign, who take admission in programmes offered under these Regulations.

7. Miscellaneous conditions: -

7.1. The Degree awarded under these Regulations shall be equivalent to any corresponding degree awarded by the Indian Higher Educational Institution with the following stipulations: (i) there shall be no further requirement of seeking equivalence from any authority; and (ii) the degree shall have all benefits, rights and privileges as obtaining in the case of degree, awarded by an Indian Higher Educational Institution ordinarily.

7.2. The programmes offered under these Regulations shall not be allowed in online and ODL mode.

7.3. No franchise arrangement/Study Centre, whether overtly or covertly, by whatever nomenclature

used, between a Foreign Higher Educational Institution and an Indian Higher Educational Institution shall be allowed under these Regulations.

7.4. An Institution Deemed to be a University under section 3 of the University Grants Commission Act, 1956 shall enter into academic collaboration in accordance with the extant Deemed to be University Regulations and also in compliance with the provisions of these Regulations.

7.5. The MoU/Agreement for collaboration shall include provisions related to student obligations, fees and other financial arrangements, intellectual property rights, student's attendance patterns, duration of stay for the study programme in both the Higher Educational Institutions, joint supervision arrangements, language of thesis and examinations, admission and evaluation process and graduation procedures, wherever applicable.

7.6. Matters relating to the grievances of students, including legal matters relating to the collaboration shall be addressed by the Indian Higher Educational Institution entering into academic collaboration.

7.7. The monitoring shall be done through mandatory public disclosure.

7.8. The collaborating Indian Higher Educational Institution shall furnish information regarding the academic collaboration, as required by the Commission from time to time.

8. Consequence of violations: -

8.1. If the Indian Higher Educational Institution concerned is found to have violated these Regulations, the Commission shall take action as provided under section 14 of the Act and shall also notify on its website and also through media that the programme(s) offered or conducted through the said collaborative arrangements are not in conformity with these Regulations.

8.2. The Commission may also take further action as prescribed against Indian Higher Educational Institution(s) for violating these Regulations.

9. Interpretation: -

9.1. Any question as to the interpretation of these Regulations shall be decided by the Commission and its decision shall be final and binding in the matter.

9.2. Any dispute arising in relation to collaborative arrangement between Indian and Foreign Higher Educational Institution(s) shall be governed by the Indian law.

10. Power to remove difficulty:-

10.1. If any difficulty arises in implementation or in giving effect to the provisions of these Regulations, the Commission may by an order published in the official gazette make provisions, not inconsistent with the provisions of the UGC Act, 1956 or these Regulations, as may appeared to be necessary or expedient for removing the difficulty.

Provided that no order under this provision shall be made by the Commission after the expiry of a period of two years from the date of coming into force of these Regulations.

Prof. RAJNISH JAIN, Secy.

[ADVT.-III/4/Exty./57/2022-23]

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असाधारण
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अधिसूचना

नई दिल्ली, 28 जुलाई, 2021

मि. सं. 14-31/ 2018 (सी॰पी॰पी॰--II).—विश्वविद्यालय अनुदान आयोग, विश्वविद्यालय अनुदान आयोग अधिनियम, 1956 की धारा 26 की उप-धारा (1) के खंड (च) और (छ) के अन्तर्गत प्रदत्त शक्तियों का प्रयोग करते हुए केंद्र सरकार के अनुमोदन से एतद् द्वारा निम्नलिखित विनियम बनाता है, नामतः

1. **लघु शीर्षक, अनुप्रयोग एवं प्रवर्तन :** (1) इन विनियमों को **विश्वविद्यालय अनुदान आयोग का (उच्चतर शिक्षा में एकेडमिक क्रेडिट्स बैंक की स्थापना और संचालन) विनियम, 2021** कहा जाएगा।

(2) ये विनियम एक केंद्रीय अधिनियम, एक प्रांतीय अधिनियम या एक राज्य अधिनियम द्वारा या उसके तहत स्थापित या निगमित भारत में सभी विश्वविद्यालयों; विश्वविद्यालय अनुदान आयोग अधिनियम, 1956 (1956 का 3) की धारा 3 के तहत मानित विश्वविद्यालय के रूप में घोषित संस्थान; और इन विनियमों में परिभाषित स्वायत्त महाविद्यालयों पर लागू होंगे।

(3) वे भारत के राजपत्र में उनकी अधिसूचना की तारीख से प्रभावी होंगे।

2. **परिभाषाएं:-** इन विनियमों में, जब तक संदर्भ से अन्यथा वांछित न हो

(क) "अधिनियम" का अर्थ विश्वविद्यालय अनुदान आयोग अधिनियम, 1956 (1956 का 3) है;

(ख) "एकेडमिक बैंक खाता" का अर्थ एक विद्यार्थी द्वारा एकेडमिक क्रेडिट्स बैंक के साथ खोला गया और संचालित एक व्यक्तिगत खाता है, जिसमें विद्यार्थी द्वारा अध्ययन किए गए पाठ्यक्रमों से अर्जित सभी शैक्षणिक क्रेडिट निक्षेपित, मान्य, संचित, पोषित, अंतरित, पुष्टिक्रत अथवा किसी उपाधि प्रदान वाली संस्था द्वारा डिग्री या डिप्लोमा या प्रमाणपत्र आदि प्रदान करने के प्रयोजन से विमोचित किए जाते हैं;

(ग) "एकेडमिक क्रेडिट्स बैंक" का अभिप्राय एक अकादमिक व्यवस्था से है, जो एक डिजिटल या वर्चुअल या ऑनलाइन इकाई के रूप में है, जिसे आयोग द्वारा केंद्र सरकार के अनुमोदन से स्थापित किया गया है, ताकि विद्यार्थियों का शैक्षणिक खाताधारक बनना सुगम हो सके, जिसके फलस्वरूप क्रेडिट स्वीकृति, क्रेडिट संचयन, क्रेडिट अंतरण और क्रेडिट मोचन की औपचारिक प्रणाली के माध्यम से उपाधि प्रदान करने वाले वाले उच्चतर शिक्षा संस्थानों में या ऐसे संस्थानों के मध्य विद्यार्थियों की निर्बाध अंतरणीयता का मार्ग प्रशस्त हो;

(घ) "शैक्षणिक लचीलापन" का अर्थ है, दृढ़ पाठ्यचर्या को हटाते हुए अध्ययन विषयों में पाठ्यक्रमों के रचनात्मक संयोग से अन्तर्निमेय व अभिनव पाठ्यविषयी संरचना के प्रावधान से अध्ययन हेतु बहुप्रवेश एवं बहुनिर्गम की सुविधा के साथ डिग्री या डिप्लोमा या स्नातकोत्तर डिप्लोमा या प्रमाण पत्र की पेशकश को सक्षम कर जीवन पर्यंत अधिगम की नवीन संभावनाओं का निर्माण करना;

(ङ) "स्वायत्त महाविद्यालय" का अर्थ ऐसे किसी भी संस्थान से है, चाहे वह इस नाम से जाना जाता है या किसी अन्य नाम से, जिसे आयोग द्वारा संबद्ध विश्वविद्यालय और संबंधित राज्य सरकार की सिफारिशों पर स्वायत्तता का दर्जा दिया गया है, जिसके आधार पर यह अकादमिक और रचनात्मक लचीलेपन के साथ एक पाठ्यक्रम या शैक्षणिक कार्यक्रम संचालित करता है; एवं एक विश्वविद्यालय से कोई योग्यता प्राप्त करने के लिए विश्वविद्यालय के विधान एवं अध्यादेशों के अनुरूप ऐसे पाठ्यक्रम या शैक्षणिक कार्यक्रम संचालित किए जाने तथा ऐसे पाठ्यक्रमों या शैक्षणिक कार्यक्रमों में अध्यायनरत विद्यार्थियों को संगत योग्यता प्रदान किए जाने बाबत परीक्षा कराये जाने हेतु वर्तमान में मान्यता प्राप्त है;

(च) "आयोग" का वही अर्थ होगा जो अधिनियम की धारा 2 के खंड (क) में दिया गया है;

(छ) "पाठ्यक्रम" का अर्थ उन विहित इकाइयों में एक से है जो एक निर्दिष्ट अध्ययन कार्यक्रम में समावेशित होती हैं;

(ज) "क्रेडिट" का अभिप्राय एक सेमेस्टर (13-15 सप्ताह) की अवधि के लिए प्रति सप्ताह सिद्धांत-कक्षा के एक घंटे या एक घंटे के ट्यूटोरियल या दो घंटे के प्रयोगशाला कार्य के परिणामस्वरूप एक क्रेडिट प्रदान किए जाने की मानक गणना पद्धति से है; जो एक उच्चतर शिक्षण संस्थान, जिस पर ये विनियम लागू होंगे, प्रदान करता है; और इंटर्नशिप के लिए इंटर्नशिप के प्रति एक सप्ताह में एक क्रेडिट होगी, अधिकतम छह क्रेडिट की सीमा तक;

(झ) "क्रेडिट-संचय" का अभिप्राय एकेडमिक क्रेडिट्स बैंक द्वारा 'एकेडमिक बैंक खाते' में विद्यार्थियों द्वारा निक्षेपित किए गए 'क्रेडिट' को स्थानांतरित करने और समेकित करने से है जो उनके द्वारा किसी पाठ्यक्रम में अध्ययन से अर्जित किए गए हों;

(ञ) "क्रेडिट-मान्यता" का अभिप्राय एक पंजीकृत उच्च शिक्षण संस्थान के माध्यम से अर्जित क्रेडिट्स और ऐसे उच्चत्तर शिक्षा संस्थान द्वारा सीधे एकेडमिक क्रेडिट्स बैंक को हस्तांतरित क्रेडिट्स से है;

(ट) "क्रेडिट-रिडेम्पशन" का अभिप्राय पंजीकृत डिग्री प्रदान करने वाले उच्चत्तर शिक्षा संस्थान द्वारा डिग्री या डिप्लोमा या प्रमाणपत्र या पीएचडी कोर्स वर्क आदि के लिए 'क्रेडिट आवश्यकताओं' को पूरा करने के उद्देश्य से एकेडमिक क्रेडिट्स बैंक में बनाए गए विद्यार्थियों के ' एकेडमिक बैंक खाते' में अर्जित 'क्रेडिट' को विनिमय करने की प्रक्रिया से है;

(ठ) "क्रेडिट-अंतरण" का अभिप्राय उस प्रक्रिया से है जिसके द्वारा पंजीकृत उच्चत्तर शिक्षा संस्थान भारत में किसी भी पंजीकृत उच्चत्तर शिक्षा संस्थान में नामांकित विद्यार्थियों द्वारा अध्ययन किए गए 'पाठ्यक्रमों' के सापेक्ष विश्वविद्यालय अनुदान आयोग क्रेडिट मानदंडों का अनुपालन करते हुये उसके व्यक्तिगत एकेडमिक बैंक खातों में निर्धारित 'क्रेडिट' प्राप्त करने या प्रदान करने में सक्षम हैं;

(ङ) "उच्चत्तर शिक्षा संस्थान" का अर्थ उन संस्थानों से है जिन्हें स्वयं या विश्वविद्यालय अनुदान आयोग अधिनियम, 1956 की धारा 22 के अनुसार डिग्री प्रदान करने का अधिकार है;

(ढ) "व्यावसायिक मानक निर्धारण निकाय" का अर्थ उच्चतर शिक्षा के प्रासंगिक क्षेत्रों में मानकों को निर्धारित करने और बनाए रखने के लिए संसद के एक अधिनियम के तहत निर्मित, स्थापित या गठित एक नियामक या प्रमुख निकाय है;

(ण) "कार्यक्रम" या "अध्ययन-कार्यक्रम" का अर्थ अधिनियम की धारा 22 की उपधारा (3) के तहत आयोग द्वारा विनिर्दिष्ट उपाधियों के संगत लक्षित उच्च शिक्षा कार्यक्रम है;

(त) "पंजीकृत उच्चत्तर शिक्षा संस्थान" का अर्थ एक योग्य उच्चत्तर शिक्षा संस्थान है जो इन विनियमों के तहत एकेडमिक बैंक ऑफ क्रेडिट द्वारा पंजीकृत है;

(थ) "सांविधिक प्राधिकरण" का अभिप्राय उच्चत्तर शिक्षण संस्थानों के सांविधिक निकाय, जैसे कि शासी परिषद या कार्यकारी परिषद या सिंडिकेट या प्रबंधन बोर्ड या शैक्षणिक परिषद, से है जो संस्था की ओर से निर्णय लेने के लिए सक्षम हों;

(द) "विद्यार्थी" का अर्थ है एक उच्चत्तर शिक्षा संस्थान में एक निर्दिष्ट क्रेडिट-आधारित पाठ्यक्रम या अध्ययन-कार्यक्रम में प्रवेशित और अध्ययनरत व्यक्ति।

3. एकेडमिक क्रेडिट्स बैंक. – (1) एकेडमिक क्रेडिट बैंक, इन विनियमों के माध्यम से बनाए गए उपयुक्त क्रेडिट ट्रांसफर तंत्र के साथ देश में उच्चत्तर शिक्षा संस्थानों में विद्यार्थियों के पाठ्यक्रम ढांचे और अंतःविषय या बहु-विषयक शैक्षणिक गतिशीलता के लचीलेपन को बढ़ावा देने के लिए एक राष्ट्रीय स्तर की सुविधा होगी; और जो मल्टीपल एंट्री-मल्टीपल एग्जिट के साथ-साथ कहीं, भी कभी भी और किसी भी स्तर की शिक्षा के सिद्धांत पर कार्य करते हुये विद्यार्थियों को डिग्री या डिप्लोमा या स्नातकोत्तर-डिप्लोमा या शैक्षणिक योग्यता प्राप्त करने के लिए अपना स्वयं का सीखने का रास्ता चुनने की सुविधा प्रदान करेगा।

(2) एकेडमिक क्रेडिट्स बैंक उच्चत्तर शिक्षा के कई विषयों के एकीकरण को सक्षम करेगा, जिससे उन्नत रचनात्मकता, नवाचार, उच्चकोटि की सोच और विवेचनात्मक विश्लेषण सहित वांछित सीखने के परिणाम प्राप्त होंगे।

(3) एकेडमिक क्रेडिट्स बैंक कई उच्चत्तर शिक्षा विषयों या संस्थानों में अध्ययन-कार्यक्रम में व्यापक विकल्पों के साथ पाठ्यचर्या में लचीलापन, तथा अनूठे और रुचिकर पाठ्यक्रमों के विकल्प प्रदान करके विद्यार्थियों को सार्थक स्वायत्तता प्रदान करेगा।

4. एकेडमिक क्रेडिट्स बैंक के उद्देश्य.- (1) देश भर में उच्चत्तर शिक्षा में शिक्षार्थी के अनुकूल दृष्टिकोण के साथ विद्यार्थी केंद्रितता को बढ़ावा देना और उच्चत्तर शिक्षा में अधिक अंतःविषय दृष्टिकोण को बढ़ावा देना।

(2) विद्यार्थियों को उनकी अभिवृत्ति और ज्ञानेच्छा के अनुरूप सर्वोत्तम पाठ्यक्रमों या पाठ्यक्रमों के संयोजन का चयन करने में सक्षम बनाना।

(3) विद्यार्थियों को संगत व्यवस्था और लागत के साथ अपनी पढ़ाई के गतिक्रम को चुनने की अनुमति देना।

(4) विद्यार्थियों को एक विश्वविद्यालय या स्वायत्त महाविद्यालय के दृढ़, नियमित रूप से नियत डिग्री या पाठ्यक्रमों के बजाय अपनी डिग्री को तैयार करने या विशिष्ट आशोधन या विशेषज्ञताएं करने की अनुमति देना।

(5) विद्यार्थियों को उनकी समय की प्राथमिकताओं के अनुसार अपनी डिग्री पूरी करने के लिए मल्टीपल एंट्री-मल्टीपल एग्जिट को सक्षम बनाते हुये, डिग्री या डिप्लोमा या स्नातकोत्तर डिप्लोमा या सर्टिफिकेट प्रोग्राम या पीएचडी हेतु कोर्स वर्क के लिए विभिन्न विषयों और उच्चत्तर शिक्षा संस्थान के मध्य विद्यार्थियों को अंतरणीयता प्रदान करना।

(6) उन्नत अंतरणीयता के साथ परिसरों या विश्वविद्यालयों या स्वायत्त महाविद्यालयो में एकीकरण के माध्यम से वितरित और मिश्रित तरीके से होने वाली शिक्षण-अधिगम गतिविधियों को प्रक्रियात्मक रूप से प्रोत्साहन देना।

(7) सभी के लिए, अर्थात, पूर्णकालिक और अंशकालिक दोनों माध्यमों के औपचारिक और अनौपचारिक विद्यार्थियों के बीच आजीवन अधिगम को सुलभ करना,

(8) ज्ञानेच्छा को परिपूरित करने के लिए, अपनी शैक्षणिक दिशाओं को चुनने और बदलने की स्वतंत्रता, ज्ञान के विभिन्न क्षेत्रों को जोड़ने और विद्यार्थियों को अपने जीवन के लक्ष्यों को आगे बढ़ाने के लिए सही नींव और बिल्डिंग ब्लॉक हासिल करने में मदद करने के लिए।

5. क्रेडिट के एकेडमिक बैंक की संगठनात्मक संरचना.- (1) एकेडमिक क्रेडिट्स बैंक अपने हितग्राहियों के रूप में विद्यार्थियों के साथ उच्च शिक्षण संस्थानों के एकेडमिक क्रेडिट डेटाबेस की एक डिजिटल या आभासी या ऑनलाइन संग्रहागार इकाई होगी।

(2) एकेडमिक क्रेडिट्स बैंक को "राष्ट्रीय अकादमिक निक्षेपागार" की तर्ज पर स्थापित किया जाएगा; और उच्चत्तर स्तर की शिक्षा के सभी हितधारकों के उपयोग के लिए एकेडमिक क्रेडिट्स बैंक और इसके परिचालन तंत्र के सभी विवरण प्रदान करने वाली एक सक्रिय वेबसाइट होगी।

(3) एकेडमिक क्रेडिट्स बैंक, वित्तीय उद्देश्यों के लिए वाणिज्यिक बैंकों की तरह शैक्षणिक उद्देश्यों के लिए एक बैंक होगा, एकेडमिक खाताधारकों के रूप में विद्यार्थियों के साथ, एकेडमिक क्रेडिट्स बैंक क्रेडिट सत्यापन, क्रेडिट संचय, क्रेडिट हस्तांतरण या मोचन और अकादमिक उपाधियों के प्रमाणीकरण सहित विभिन्न प्रकार की सेवाएं प्रदान करेगा।

(4) एकेडमिक क्रेडिट्स बैंक द्वारा क्रेडिट या शैक्षणिक उपाधियों का प्रमाणीकरण, किसी भी तरह से, डिग्री और अन्य शैक्षणिक योग्यता प्रदान करने के लिए एकेडमिक क्रेडिट्स बैंक के साथ पंजीकृत उच्चत्तर शिक्षा संस्थानों की वैधानिक शक्तियों पर अतिक्रमण के रूप में नहीं माना जाएगा।

(5) एकेडमिक क्रेडिट्स बैंक केंद्र सरकार या आयोग, जैसा सुसंगत हो, द्वारा अधिकृत निकाय के रूप में पंजीकृत उच्चत्तर शिक्षा संस्थान से विद्यार्थियों द्वारा अर्जित क्रेडिट के प्रमाणीकरण रिकॉर्ड प्रदान करने के लिए कार्य करेगा ।

(6) किसी भी स्नातक या स्नातकोत्तर डिग्री या डिप्लोमा या प्रमाण पत्र अथवा पीएचडी कार्यक्रमों हेतु विहित पाठ्यक्रम के लिए वांछित क्रेडिट तथा अध्ययन के आवश्यक घटक पंजीकृत उच्चत्तर शिक्षा संस्थान द्वारा निर्धारित किए जाएंगे।

(7) एकेडमिक क्रेडिट्स बैंक प्रत्येक विद्यार्थी को डिजिटल रूप में अद्वितीय या व्यक्तिगत एकेडमिक बैंक खाता खोलने की सुविधा प्रदान करेगा; और खाताधारक को एक विशिष्ट आईडी और मानक संचालन प्रक्रिया (एसओपी) उपलब्ध कराई जाएगी।

6. क्रेडिट के एकेडमिक बैंक के कार्य.- (1) एकेडमिक क्रेडिट्स बैंक विद्यार्थी के एकेडमिक बैंक खाते में पंजीकृत उच्चत्तर शिक्षा संस्थान द्वारा संचालित पाठ्यक्रमों के लिए क्रेडिट जमा करेगा; और ऐसे क्रेडिट की वैधता आयोग द्वारा समय-समय पर जारी किए गए मानदंडों और दिशानिर्देशों के अनुसार होगी।

बशर्ते कि, एकेडमिक क्रेडिट्स बैंक सीधे विद्यार्थियों से पाठ्यक्रम क्रेडिट से संबंधित किसी भी दस्तावेज को स्वीकार नहीं करेगा और ऐसे दस्तावेजों को तभी मान्य मानेगा जब उन्हें क्रेडिट प्रदान करने वाले संबंधित पंजीकृत उच्चत्तर शिक्षा संस्थान द्वारा प्रेषित किया जाय।

(2) एकेडमिक क्रेडिट्स बैंक इन विनियमों के तहत, हितग्राहियों के बीच अपनी भूमिका को बढ़ावा देने के अलावा, उच्चत्तर शिक्षा संस्थान को पंजीकृत करेगा, शैक्षणिक बैंक खातों के खोलने, समापन और सत्यापन को सुनिश्चित करेगा; और विद्यार्थियों के लिए क्रेडिट सत्यापन, क्रेडिट संचय, और क्रेडिट हस्तांतरण या मोचन भी सुनिश्चित करेगा।

(3) राष्ट्रीय योजनाओं जैसे 'स्वयं', एनपीटीईएल, वी-लैब आदि या किसी निर्दिष्ट विश्वविद्यालय के माध्यम से ऑनलाइन मोड के माध्यम से विद्यार्थियों द्वारा किए गए पाठ्यक्रमों को भी क्रेडिट हस्तांतरण और क्रेडिट संचय के लिए मान्य किया जाएगा।

(4) एकेडमिक क्रेडिट्स बैंक के कार्य दूरस्थ या गैर-संपर्क माध्यम तक सीमित नहीं हैं; बल्कि यह विभिन्न मौजूदा और भविष्य-संगत शिक्षण अधिगम मॉडलों के समामेलन तक विस्तारित होगा; तथा यह 'सिद्धांत' या 'प्रयोगिक' मूल्यांकन द्वारा विद्यार्थियों द्वारा प्राप्त क्रेडिट्स को भी मान्य कर सकता है, यदि उन्हें प्रथक क्रेडिट पाठ्यक्रम के रूप संचालित किया गया है।

(5) पाठ्यक्रम सामग्री, पाठ्यक्रम लेनदेन, प्रस्तावित पाठ्यक्रमों के लिए शैक्षिक प्रौद्योगिकियों, उनके समय, निरंतर मूल्यांकन विधियों, उपस्थिति और मूल्यांकन के नए तरीकों के संबंध में मानदंड पंजीकृत उच्चत्तर शिक्षा संस्थान द्वारा

तय किए जाएंगे, और व्यापक नीति और राष्ट्रीय शिक्षा नीति -2020 के तहत समग्र, बहु-विषयक शिक्षा का दर्शन के अनुरूप होंगे।

(6) विद्यार्थियों के हित में, एकेडमिक क्रेडिट्स बैंक के पास अर्जित और जमा किए गए क्रेडिट, डिग्री या डिप्लोमा या स्नातकोत्तर डिप्लोमा या प्रमाण पत्र के लिए मोचन हेतु क्रेडिट प्रदान करने वाले और क्रेडिट स्वीकृत करने वाले उच्चत्तर शिक्षा संस्थान द्वारा निर्दिष्ट अलग-अलग समयावधि के लिए अधिकतम सात साल की समय सीमा तक वैध होंगे।

(7) एकेडमिक क्रेडिट्स बैंक आयोग, अखिल भारतीय तकनीकी शिक्षा परिषद और राष्ट्रीय शिक्षक शिक्षा परिषद के दायरे में आने वाले सभी उच्चत्तर शिक्षा कार्यक्रमों को शामिल करेगा; यद्यपि अन्य विधाओं के व्यावसायिक कार्यक्रमों के अध्ययन के संबंध में में क्रेडिट्स को उपयुक्त व्यावसायिक मानक निर्धारण निकाय और केंद्र सरकार के अनुमोदन से शामिल किया जा सकता है।

(8) एकेडमिक क्रेडिट्स बैंक उन विद्यार्थियों के लिए क्रेडिट मान्यता और क्रेडिट रिडेम्पशन प्रक्रिया की सुविधा भी प्रदान करेगा, जो अपनी व्यक्तिगत पसंद के अनुसार सभी ऐसे पाठ्यक्रमों को चुन सकते हैं जो किसी विशेष विषय क्षेत्र में न आते हों किन्तु एक पंजीकृत उच्चत्तर शिक्षा संस्थान द्वारा प्रदान किए जाने वाली स्नातक डिग्री के लिए कुल क्रेडिट आवश्यकता को पूरा करते हैं; और उच्चत्तर शिक्षा संस्थान द्वारा प्रदान की जाने वाली ऐसी स्नातक डिग्री आयोग द्वारा विनिर्दिष्ट की जा सकती है।

(9) पंजीकृत उच्चत्तर शिक्षा संस्थान में विशिष्ट उच्चत्तर शिक्षा कार्यक्रम के हिस्से के रूप में विद्यार्थी द्वारा अपनी रुचि आधारित पाठ्यक्रमों के अतिरिक्त, विद्यार्थियों को निर्धारित पाठ्यक्रम से परे अपनी पसंद के इस तरह के डिग्री कार्यक्रम के लिए भी स्वतंत्रता होगी, और उनके क्रेडिट्स संबंधित शैक्षणिक बैंक खाते में अर्जित होंगे।

पंजीकृत उच्चत्तर शिक्षा संस्थान निर्धारित शैक्षणिक कार्यक्रम से परे विद्यार्थियों द्वारा किए गए पाठ्यक्रमों के संबंध में अर्जित क्रेडिट के सापेक्ष डिप्लोमा या प्रमाण पत्र प्रदान कर सकते हैं।

(10) व्यावसायिक डिग्री या डिप्लोमा या स्नातकोत्तर डिप्लोमा या प्रमाणपत्र कार्यक्रम संचालित कर रहे पंजीकृत उच्चत्तर शिक्षा संस्थान से 'कौशल-पाठ्यक्रम' के माध्यम से विद्यार्थियों द्वारा प्राप्त किए गए क्रेडिट्स भी एकेडमिक क्रेडिट्स बैंक के माध्यम से क्रेडिट के संग्रहण और मोचन के लिए पात्र हैं।

(11) शैक्षणिक वर्ष 2021-2022 के दौरान या उसके उपरांत पंजीकृत उच्चत्तर शिक्षा संस्थान में 'पाठ्यक्रम' से प्राप्त क्रेडिट ही एकेडमिक क्रेडिट्स बैंक के माध्यम से क्रेडिट ट्रांसफर, क्रेडिट संग्रहण और क्रेडिट रिडेम्पशन के लिए पात्र हैं।

(12) एकेडमिक क्रेडिट्स बैंक के उद्देश्यों को पूरा करने के लिए, आयोग एकेडमिक क्रेडिट्स बैंक को ऐसी वित्तीय और प्रशासनिक सहायता प्रदान कर सकता है, जैसा वह उचित समझे।

7. एकेडमिक क्रेडिट्स बैंक के साथ पंजीकरण करने के लिए उच्चत्तर शिक्षा संस्थान के अनुमोदन के लिए पात्रता मानदंड.- (1) विनियम 1 के उप-विनियम (2) को संतुष्ट करने वाले विश्वविद्यालय और स्वायत्त महाविद्यालय जो राष्ट्रीय मूल्यांकन और प्रत्यायन परिषद द्वारा 'ए' ग्रेड स्तर से अथवा राष्ट्रीय प्रत्यायन बोर्ड द्वारा न्यूनतम 675 अंकों के साथ कम से कम तीन कार्यक्रमों के लिए प्रत्यायित हो अथवा जिन्हें विश्वविद्यालय अनुदान आयोग द्वारा सूचीबद्ध प्रत्यायन एजेंसी से समरूप प्रत्यायन या ग्रेड या प्राप्तांक प्राप्त हो। तथापि यदि संस्थान द्वारा संचालित कार्यक्रमों की संख्या तीन से कम हो तो प्रत्येक कार्यक्रम में 675 अथवा इससे अधिक अंक प्राप्त हों या राष्ट्रीय संस्थागत रैंकिंग फ्रेमवर्क (एनआईआरएफ) या भारत सरकार द्वारा समय-समय पर स्थापित किए जाने वाले समतुल्य मूल्यांकन और प्रत्यायन निकाय द्वारा शीर्ष 100 रैंक किए गए संस्थान, या वह उच्च शिक्षण संस्थान जो क्वाक्वेरेली साइमंड्स (क्यूएस) या टाइम्स हायर एजुकेशन (टीएचई) द्वारा विश्व रैंकिंग के शीर्ष 1000 में शुमार हों; श्रेष्ठ संस्थान; भारत सरकार द्वारा घोषित राष्ट्रीय महत्व के संस्थान एकेडमिक क्रेडिट्स बैंक के साथ पंजीकरण के लिए पात्र हैं।

(2) एकेडमिक क्रेडिट्स बैंक के साथ पंजीकरण के समय प्रत्यायन या रैंकिंग की स्थिति मान्य होनी चाहिए।

(3) उच्चत्तर शिक्षा संस्थान को एकेडमिक क्रेडिट्स बैंक के साथ पंजीकरण के लिए आवेदन करने के लिए अपने संबंधित सांविधिक प्राधिकरणों जैसे शासी या कार्यकारी परिषद या सिंडिकेट या प्रबंधन बोर्ड या अकादमिक परिषद आदि से अनुमोदन प्राप्त करना होगा।

(4) पूर्ण डिग्री कार्यक्रमों में प्रवेश के अलावा पंजीकृत उच्चत्तर शिक्षा संस्थानों को विद्यार्थियों को एकल पाठ्यक्रमों में प्रवेश देना होगा:

बशर्ते, किसी भी उच्चत्तर शिक्षा संस्थान के पाठ्यक्रम (पाठ्यक्रमों) में अतिसंकुलता से बचने के लिए, ऐसे उच्चत्तर शिक्षा संस्थान को ऐसे पाठ्यक्रम (पाठ्यक्रमों) में अतिरिक्त सीटें रखने की अनुमति होगी, जो उपयुक्त व्यावसायिक मानक निर्धारण निकाय द्वारा पूर्वानुमोदन के अधीन होगी।

बशर्ते कि, ऐसे पाठ्यक्रमों के संबंध में, जो किसी व्यावसायिक मानक निर्धारण निकाय के दायरे में नहीं आते हैं, पंजीकृत उच्चत्तर शिक्षा संस्थान, आवश्यक बुनियादी ढांचे की उपलब्धता के अधीन, अपने सांविधिक अथॉरिटी के अनुमोदन से अतिरिक्त सीटों का सृजन कर सकता है।

बशर्ते यह भी कि, पंजीकृत उच्चत्तर शिक्षा संस्थान विशेष रूप से एकेडमिक क्रेडिट्स बैंक योजना के उद्देश्य के लिए 'पाठ्यक्रम' का एक सेट भी संचालित कर सकते हैं।

(5) पंजीकृत उच्चत्तर शिक्षा संस्थान के पास ऑडियो-विजुअल सुविधाओं, ई-संसाधनों, वर्चुअल कक्षाओं और स्टूडियो आदि के संदर्भ में उपयुक्त शैक्षिक बुनियादी ढांचा होगा, और विशेष रूप से ओडीएल या ऑन-लाइन पाठ्यक्रमों या कार्यक्रमों के सुचारु संचालन के लिए उच्च बैंडविड्थ इंटरनेट कनेक्टिविटी एवं रूबरू सिद्धांत या व्यावहारिक या प्रशिक्षण पाठ्यक्रमों हेतु प्रासंगिक विश्वविद्यालय अनुदान आयोग विनियमों औरया या विधियों या उच्चत्तर शिक्षा संस्थान के अध्यादेशों के तहत समय-समय पर निर्दिष्ट अन्य बुनियादी सुविधाएं होंगी ।

(6) एक पंजीकृत उच्चत्तर शिक्षा संस्थान के पास अपनी वेबसाइट पर एक वेबपेज होगा जिसमें एकेडमिक क्रेडिट्स बैंक की सुविधा का विवरण, सभी पंजीकृत उच्चत्तर शिक्षा संस्थान की सूची, विद्यार्थियों को सुविधा का प्रभावी ढंग से उपयोग करने के लिए दिशा-निर्देश या मानक प्रचालन प्रक्रिया (एसओपी), एकेडमिक क्रेडिट्स बैंक की वेबसाइट के लिंक के साथ उपलब्ध होगा।

8. एकेडमिक क्रेडिट्स बैंक कार्यान्वयन पद्धति.- (1) एकेडमिक क्रेडिट्स बैंक अनिवार्य रूप से एक क्रेडिट-आधारित, और अत्यधिक लचीली, विद्यार्थी-केंद्रित सुविधा है।

(2) पंजीकृत उच्चत्तर शिक्षा संस्थान, अपने सांविधिक अथॉरिटी के अनुमोदन से, अन्य बातों के साथ-साथ, पाठ्यक्रम पंजीकरण, पाठ्यक्रम अर्हताओं, अंतर-विषयक एवं बहु-विषयक पाठ्यक्रमों के लिए स्वीकृति, ऐसे पाठ्यक्रमों के लिए दिए जाने वाले क्रेडिट, क्रेडिट अंतरण और अन्य अनुमोदित उच्चत्तर शिक्षा संस्थानों से क्रेडिट स्वीकृति और दिए जाने वाले ग्रेड की प्रकृति आदि से संबंधित मौजूदा अध्यादेशों में संशोधन करेंगे।

(3) पंजीकृत उच्चत्तर शिक्षा संस्थान विद्यार्थियों को एक या अधिक पंजीकृत उच्चत्तर शिक्षा संस्थानो द्वारा संचालित पाठ्यक्रमों में से विद्यार्थी द्वारा चुने गए पाठ्यक्रमों का उपयोग करके अपनी खुद की डिग्री को अनुकूलित या डिजाइन करने के लिए प्रोत्साहित और सक्षम करेंगे।

बशर्ते, विद्यार्थी को डिग्री या डिप्लोमा या प्रमाणपत्र प्रदान करने वाले उच्चत्तर शिक्षा संस्थान से क्रेडिट का कम से कम पचास प्रतिशत अर्जित करना आवश्यक होगा।

बशर्ते कि, विद्यार्थी को डिग्री या डिप्लोमा या प्रमाण पत्र प्रदान करने के लिए आवश्यक कोर विषय क्षेत्र में आवश्यक संख्या में क्रेडिट अर्जित करने की आवश्यकता होगी, जैसा कि डिग्री प्रदान करने वाली उच्चत्तर शिक्षा संस्थान द्वारा निर्दिष्ट किया गया है, जिसमें विद्यार्थी नामांकित है।

(4) उपविनियम (3) में प्रदान की गई एकेडमिक क्रेडिट्स बैंक की सुविधा के तहत लचीलेपन का लाभ उठाने वाले विद्यार्थी न कि पूरे 'अध्ययन-कार्यक्रम' के लिए, जिसके कारण पंजीकृत उच्चत्तर शिक्षा संस्थान द्वारा डिग्री प्रदान की जाती है, वरन अपनी पसंद और अभिवृत्ति के अनुसार केवल एकल पाठ्यक्रमों में प्रवेश लेने के भी हकदार हैं ताकि उन्हें क्रेडिट संग्रहण सुलभ हो सके।

(5) एकेडमिक क्रेडिट्स बैंक विनियम 7 के तहत निर्धारित पात्रता मानदंडों को पूरा करने वाले उच्चत्तर शिक्षा संस्थानों की एक परिवर्तनशील ऑनलाइन निर्देशिका बनाए रखेगा।

(6) क्रेडिट परिभाषा, क्रेडिट संचय, क्रेडिट ट्रांसफर, क्रेडिट रिडेम्पशन के संदर्भ में एकेडमिक क्रेडिट्स बैंक की सेवाओं के उपयोग के विवरण के संबंध में प्रत्येक पंजीकृत उच्चत्तर शिक्षा संस्थान एकेडमिक क्रेडिट्स बैंक के साथ एकेडमिक बैंक खाता खोलने के इच्छुक सभी विद्यार्थियों को विद्यार्थी परामर्श और मार्गदर्शन प्रदान करेगा; साथ ही विद्यार्थियों के एकेडमिक बैंक खाते खोलने, बंद करने और वैधीकरण के संबंध में सहयोग और मार्गदर्शन प्रदान करेगा जहां ऐसे अनुरोधों की सिफारिश एकेडमिक क्रेडिट्स बैंक के साथ पहले से ही पंजीकृत मूल विश्वविद्यालय या स्वायत्त महाविद्यालयो के माध्यम से की जाती हैं।

(7) विद्यार्थियों द्वारा अर्जित क्रेडिट्स को एकेडमिक क्रेडिट्स बैंक के साथ संबंधित एकेडमिक बैंक खाते में जमा किया जाएगा और किसी भी डिग्री या डिप्लोमा या प्रमाण पत्र प्रदान करने के लिए क्रेडिट्स के कम्यूटेशन के उद्देश्य से क्रेडिट प्रदान करने वाले संस्थानों द्वारा निर्दिष्ट और शैक्षणिक योग्यता प्रदान करने वाले पंजीकृत उच्चत्तर शिक्षण संस्थानों द्वारा इसकी स्वीकृति के अनुरूप अधिकतम सात वर्षों के लिए मान्य होंगे।

उपरोक्त शैक्षणिक योग्यता को प्रदान करने के लिए किसी भी क्रेडिट को भुनाए जाने के बाद, ऐसे क्रेडिट को संबंधित विद्यार्थी के एकेडमिक बैंक खाते से अपरिवर्तनीय रूप से डेबिट कर दिया जाएगा।

(8) जहां कोई विद्यार्थी निर्दिष्ट डिग्रीया डिप्लोमा या परास्नातक डिप्लोमा या प्रमाण पत्र प्रदान किए जाने हेतु पंजीकृत उच्चत्तर शिक्षा संस्थान द्वारा अनुमोदित क्रेडिट की कुल संख्या और क्रेडिट की प्रकृति की पर्याप्तता के मानदंडों को पूरा करता है, तो विद्यार्थी उच्चत्तर शिक्षा संस्थान द्वारा इस तरह की उपाधि के लिए पात्र होगा।

(9) एक बार उपयोग या भुनाने के बाद, किसी विद्यार्थी द्वारा अर्जित क्रेडिट को किसी अन्य औपचारिक शैक्षणिक योग्यता को प्राप्त करने के लिए पुन: उपयोग नहीं किया जा सकता है।

(10) सांविधिक प्राधिकरणों के अनुमोदन से, एकेडमिक क्रेडिट्स बैंक द्वारा एक पंजीकृत उच्चत्तर शिक्षा संस्थान को उसके द्वारा प्रस्तावित पाठ्यक्रमों की संरचना बहु-विषयक या अंतर-विषयक उच्चत्तर शिक्षा को बढ़ावा देने के उद्देश्य से मूल पाठ्यक्रम या मूल ऐच्छिक या मुक्त ऐच्छिक या कौशल वृद्धि ऐच्छिक या क्षमता वृद्धि ऐच्छिक आदि के रूप में उचित क्रेडिट आवश्यकताओं के साथ विभाजित करने के लिए प्रोत्साहित किया जाएगा।

(11) शैक्षणिक योग्यता आदि प्रदान करने में, पंजीकृत उच्चत्तर शिक्षा संस्थान आयोग या व्यावसायिक मानक निर्धारण निकाय द्वारा समय-समय पर निर्धारित क्रेडिट्स की संख्या और समयावधि के संबंध में सुसंगत मानदंडों और दिशानिर्देशों का पालन करेंगे।

बशर्ते कि, समय अवधि के संबंध में, एकेडमिक क्रेडिट्स बैंक सुविधा के तहत शैक्षणिक योग्यता पाने वाले विद्यार्थी, निर्धारित क्रेडिट अर्जित करने के बाद, अधिकतम एक सेमेस्टर की छूट का लाभ उठा सकते है, जबकि पाठ्यक्रम या कार्यक्रम की अवधि दो साल या अधिक (चार सेमेस्टर या अधिक) की हो।

(12) एक पंजीकृत उच्चत्तर शिक्षा संस्थान अपने पाठ्यक्रम शुल्क को उस पाठ्यक्रम के क्रेडिट की संख्या के आधार पर निर्धारित कर सकता है जिसके लिए विद्यार्थी नामांकित है।

(13) उच्चतर शिक्षण संस्थानों द्वारा इन विनियमों के अधीन पात्र संस्थानों के रूप में एक पंजीकरण शुल्क देय होगा, जो केंद्र सरकार या आयोग, जैसा भी मामला हो, की पूर्व-स्वीकृति से निर्धारित किया जाएगा।

9. विश्वविद्यालयों और एकेडमिक क्रेडिट्स बैंक द्वारा निगरानी, सहयोग और गुणवत्ता आश्वासन.- (1) यह पंजीकृत उच्चत्तर शिक्षा संस्थान की जिम्मेदारी होगी कि वे विश्वविद्यालय स्तर पर और उनके संबद्ध स्वायत्त महाविद्यालयों के स्तर पर एकेडमिक क्रेडिट्स बैंक कार्यक्रम के परिवर्धन व परिचालन की निगरानी करें।

(2) पंजीकृत उच्चत्तर शिक्षा संस्थान एकेडमिक क्रेडिट्स बैंक सुविधा के कामकाज की गुणवत्ता में सुधार के लिए और एकेडमिक क्रेडिट्स बैंक के सहयोग से समग्र या बहु-विषयक शिक्षा को बढ़ावा हेतु शिक्षक या कर्मचारी प्रशिक्षण, परामर्श, शैक्षणिक और प्रशासनिक लेखा परीक्षा और अन्य साधन प्रस्तुत करेंगे और जो कि संकाय विकास कार्यक्रम

या गुणवत्ता सुधार कार्यक्रम या व्यावसायिक विकास कार्यक्रम या प्रौद्योगिकी विकास कार्यक्रम के रूप में हो सकता है।

(3) पंजीकृत विश्वविद्यालयया स्वायत्त महाविद्यालय के स्तर पर एकेडमिक क्रेडिट्स बैंक के कार्यान्वयन का गुणवत्ता आश्वासन संबंधित विश्वविद्यालय या स्वायत्त महाविद्यालय द्वारा या तो आंतरिक गुणवत्ता आश्वासन प्रकोष्ठ (आईक्यूएसी) या पंजीकृत उच्चत्तर शिक्षा संस्थान द्वारा विनिश्चित किसी अन्य उपयुक्त संरचित तंत्र के माध्यम से विकसित किया जा सकता है।

(4) प्रत्येक पंजीकृत उच्चत्तर शिक्षा संस्थान अपनी वेबसाइट पर एकेडमिक क्रेडिट्स बैंक के संगत में अपनी गतिविधियों के वार्षिक प्रतिवेदन के साथ ही गुणवत्ता आश्वासन, गुणवत्ता संपोषण और गुणवत्ता उननयन के लिए किए गए उपायों का विवरण अपलोड करेगा।

(5) विद्यार्थियों की शिकायतोंया अपीलों को दूर करने के लिए केंद्र सरकार या विश्वविद्यालय अनुदान आयोग या एकेडमिक क्रेडिट्स बैंक के स्तर पर और एकेडमिक क्रेडिट्स बैंक के साथ पंजीकृत प्रत्येक एचईआई के स्तर पर एक 'एकेडमिक क्रेडिट्स बैंक-परिवेदना निवारण तंत्र' होगा।.

10. उल्लंघन के परिणाम.- यदि कोई पंजीकृत उच्चत्तर शिक्षा संस्थान इन विनियमों के तहत निर्धारित शर्तों या आवश्यकताओं को पूरा करने में विफल रहता है, तो आयोग, सुनवाई का एक उचित अवसर प्रदान करने के बाद, आयोग द्वारा निर्धारित समय के भीतर कमी को ठीक करने के लिए संस्थान को निर्देश दे सकता है; और ऐसा करने में उच्चत्तर शिक्षा संस्थान की ओर से विफल रहने पर, एकेडमिक क्रेडिट्स बैंक से ऐसे संस्थान का पंजीकरण समाप्त कर दिया जाएगा; और, इसके अतिरिक्त, अधिनियम के तहत अनुदान प्रदान करना बंद कर दिया जाएगा, जहां ऐसे अनुदान संस्था के लिए अनुदेय हैं।

11. व्याख्या.- इन विनियमों की व्याख्या के संबंध में किसी भी प्रश्न पर निर्णय विश्वविद्यालय अनुदान आयोग द्वारा लिया जाएगा, और उसका निर्णय इस मामले में अंतिम और बाध्यकारी होगा।

प्रो. रजनीश जैन, सचिव, विश्वविद्यालय अनुदान आयोग

[विज्ञापन-III/4/असा./167/2021-22]

UNIVERSITY GRANTS COMMISSION

NOTIFICATION

New Delhi, the 28th July, 2021

F. No. 14-31/2018 (CPP-II).—In exercise of the powers conferred by clauses (f) and (g) of sub-Section (1) of Section 26 of the University Grants Commission Act, 1956, the University Grants Commission with the approval of the Central Government hereby makes the following regulations, namely:-

1. Short title, Application and Commencement.- (1) These Regulations may be called the University Grants Commission (Establishment and Operation of Academic Bank Of Credits in Higher Education) Regulations, 2021.

(2) These Regulations shall apply to all Universities in India established or incorporated by or under a Central Act, a Provincial Act or a State Act; the institutions Deemed-to be Universities declared as such under Section 3 of the University Grants Commission Act, 1956 (3 of 1956); and the Autonomous Colleges as defined in these regulations.

(3)They shall come into force from the date of their notification in the Gazette of India.

2. Definitions.- In these Regulations, unless the context otherwise requires,-

(a) "Act" means the University Grants Commission Act, 1956 (3 of 1956);

(b) "Academic Bank Account" means an individual account with the Academic Bank of Credits opened and operated by a student, to which all academic credits earned by the Student from course(s) of study are deposited, recognised, maintained, accumulated, transferred, validated or redeemed for the purposes of the award of degree/diploma/certificates etc. by an awarding institution;

(c) "Academic Bank of Credits" means an academic service mechanism as a digital or virtual or online entity established by the Commission with the approval of the Central Government, to facilitate students to become its academic account holders, thereby paving the way for seamless student mobility between or within degree-granting Higher Educational Institutions through a formal system of credit recognition, credit accumulation, credit transfers and credit redemption to promote distributed and flexible teaching-learning;

(d) "Academic Flexibility" means the provision for innovative and interchangeable curricular structures to enable creative combinations of Courses or Programmes in Disciplines of study leading to Degree or Diploma or Post Graduate Diploma or Certificate of Study offering multiple entry and multiple exit facilities, while removing rigid curricular boundaries and creating new possibilities of life-long learning;

(d) "Autonomous college" means any institution, whether known as such or by any other name, accorded with autonomous status by the Commission upon the recommendations of the affiliating university and the State Government concerned, by virtue of which it provides for a course or programme of study with academic and innovative flexibility for obtaining any qualification from a university; and which, in accordance with the Statutes and Ordinances of such university, is recognised as competent to provide for such course or programme of study and present students undergoing such course or programme of study for the examination leading to the award of such qualification;

(f) "Commission" shall have the same meaning as assigned to it in clause (a) of section 2 of the Act;

(g) "Course" means one of the specified units which go to comprise a specified programme of study;

(h) "Credit" means the standard methodology of calculating one hour of theory or one hour of tutorial or two hours of laboratory work, per week for a duration of a semester (13-15 weeks) resulting in the award of one credit; which is awarded by a higher educational institution on which these regulations apply; and, Credits' for internship shall be one credit per one week of internship, subject to a maximum of six credits;

(i) "Credit-accumulation" means the facility created by Academic Bank of Credits in the Academic Bank Account opened by students in order to transfer and consolidate the credits earned by them by undergoing Courses;

(j) "Credits-recognition" means the credits earned through a registered Higher Educational Institution and transferred directly to the Academic Bank of Credits by such Higher Educational Institution;

(k) "Credit-redemption" means the process of commuting the accrued credits in the Academic Bank Account of the students maintained in ABC for the purpose of fulfilling the credits requirements for the award of Degrees or Diplomas or Certificates or Course work for Ph.D. programme etc., by the registered degree-awarding Higher Educational Institutions;

(l) "Credit-transfer" means the mechanism by which the Registered Higher Educational Institutions are able to receive or provide prescribed credits to individual Academic Bank Accounts in

adherence to the University Grants Commission credit norms for the 'course/s' undertaken by students enrolled in any Registered Higher Education Institution within India;

(m) "Higher Education Institutions" means the institutions which are empowered to award degrees by themselves or in accordance with section 22 of the Act;

(n) "Professional Standards Setting Body" means a regulatory or principal body created, established or constituted under an Act of Parliament for determining and maintaining standards in the relevant areas of higher education;

(o) "Programme" or "Programme of study" means a higher education programme pursued for a degree specified by the Commission under sub -section (3) of section 22 of the Act;

(p) "Registered Higher Education Institution" means an eligible Higher Educational Institution which is registered by the Academic Bank of Credits, under these regulations;

(q) "Statutory authority" means statutory bodies of higher educational institutions, such as the Governing Council or Executive Council or Syndicate or Board of Management or Academic Council, competent to take decisions on behalf of the institution.

(r) "Student" means a person admitted to, and pursuing, a specified credit-based course/programme of study in a higher education institution.

3. Academic Bank of Credits.- (1) Academic Bank of Credits, shall be a national-level facility to promote flexibility of curriculum framework and interdisciplinary or multidisciplinary academic mobility of students across Higher Education Institutions in the country with appropriate credit transfer mechanism created through these regulations and shall facilitate students to choose their own learning path to attain a Degree or Diploma or Post Graduate diploma or academic qualification, working on the principle of multiple entry-multiple exit as well as any-time, any-where, and any-level learning.

(2) Academic Bank of Credits shall enable the integration of multiple disciplines of higher learning, leading to the desired learning outcomes including enhanced creativity, innovation, higher order thinking and critical analysis.

(3) Academic Bank of Credits shall provide significant autonomy to students by providing extensive choice of courses for a programme of study, flexibility in curriculum, novel and engaging course options across a number of higher education disciplines or institutions.

4. Objectives of Academic Bank of Credits.-(1)To promote student centricity with learner-friendly approaches in higher education across the country and promote a more inter-disciplinary approach in higher education.

(2) To enable students to select the best courses or combination of courses to suit their aptitude and quest for knowledge.

(3) To permit students to choose a pace for their studies along with the associated logistics and costs.

(4) To allow students to tailor their degrees or make specific modifications or specialisations rather than undergoing the rigid, regularly prescribed degree or courses of a single university or autonomous college.

(5) To enable multiple entry-multiple exit for students to complete their degrees as per their time preferences, providing mobility across various disciplines and HEIs for Degree or Diploma or Post Graduate Diploma or Certificate programme or Course work for the Ph.D. programme.

(6) To support, procedurally, the teaching-learning activities to happen in a distributed and blended manner through integration across campuses or universities or autonomous colleges with increased mobility.

(7) To facilitate lifelong learning amongst all, i.e., formal and informal students from both full-time and part-time modes.

(8) To satisfy the students' quest for knowledge, freedom to choose and change their academic directions, connect different domains of knowledge and help them acquire the right foundations and building blocks to pursue their life goals.

5. Organisational Structure of Academic Bank of Credits.- (1)Academic Bank of Credits shall be a digital or virtual or online store-house entity of academic credit data base of Higher Education Institution with students as its stakeholder.

(2) Academic Bank of Credits shall be established, on the lines of the National Academic Depository shall have a dynamic website providing all details of Academic Bank of Credits and its operational mechanism for the use of all stakeholder of higher education.

(3) Academic Bank of Credits shall be a bank for academic purposes, on the pattern of commercial banks for financial purposes, with students as academic account holders to whom, the Academic Bank of Credits shall provide a variety of services including credit verification, credit accumulation, credit transfer or redemption and authentication of academic awards.

(4) Authentication of credits or academic awards by Academic Bank of Credits shall not, in any way, be construed as encroachment on the statutory powers of Higher Education Institutions registered with Academic Bank of Credits to award degrees and other academic qualifications.

(5) ABC shall act as the body empowered by the Central Government or the Commission, as the case may be, to provide authenticated records of credits earned by students from Registered Higher Education Institutions.

(6) The requirement of credits as well as essential components of study for award of any Under Graduate or Post Graduate or diploma or certificate, or the Course work requirements for the Ph.D. programmes shall be as prescribed by Registered HEIs.

(7) Academic Bank of Credits shall provide to every student the facility to open unique or individual Academic Bank Account in digital form; and the account holder shall be provided with a unique ID and access to the Standard Operating Procedure (SOP).

6. Functions of Academic Bank of Credits. -(1) Academic Bank of Credits shall deposit Credits awarded by Registered Higher Education Institutions, for Courses pursued therein, in the Academic Bank Account of the student and the validity of such credits shall be as per norms and guidelines issued by the Commission from time to time:

Provided that ABC shall not accept any document pertaining to course credits directly from students and shall entertain such documents as valid only when the same are transmitted by the respective, Registered Higher Education Institution awarding the credits.

(2) ABC shall register Higher Education Institutions under these regulations, ensure the opening, closure and validation of Academic Bank Accounts and shall also ensure credit verification, credit accumulation, and credit transfer or redemption for students; apart from promoting its role among stakeholder.

(3) Courses undergone by the students through the online modes through National Schemes like SWAYAM, NPTEL, V-Lab etc. or of any specified university, shall also be considered for credit transfer and credit accumulation.

(4) The functions of ABC are not limited to distance or a non-contact mode; and shall extend to amalgamation of various existing and futuristic teaching-learning models and it may also consider

credits obtained by students in assessments for theory or practicals, if the same are offered as separate credit courses.

(5) The norms in respect to the curriculum content, curriculum transaction, educational technologies for the courses offered, their timing, continuous evaluation methods, attendance and novel methods of assessment shall be as decided by the Registered Higher Education Institution, and shall be consistent with the overarching policy and philosophy of holistic, multidisciplinary education under National Education Policy-2020.

(6) In the interests of students, credits earned and deposited with ABC shall be valid for the purpose of redemption to a degree or diploma or Post Graduate diploma or certificate, for varying duration as specified by the credit awarding and credit accepting Higher Education Institution subject to a maximum duration of seven years.

(7) Academic Bank of Credits shall encompass all higher education programmes coming under the purview of the Commission, the All India Council of Technical Education, and the National Council of Teacher Education; credits in professional programmes of study in respect of other disciplines may be included with the approval of the appropriate professional standards setting body and the Central Government.

(8) Academic Bank of Credits shall also facilitate the credit recognition and credit redemption process for students who may opt, according to their individual choice, for all courses, not falling in any particular subject domain, but fulfilling the total credits requirement for the Under Graduate degree to be awarded by a Registered Higher Education Institution and such Under Graduate degree to be awarded by the Higher Education Institution may be specified by the Commission.

(9) In addition to the choice based courses to be undertaken by the student as a part of the specific higher education programme in Registered Higher Education Institutions, students shall also have freedom to take additional courses of their aptitude, beyond the curriculum prescribed for such degree programme, and accrue credits in their respective Academic Bank Account:

Provided that Registered Higher Education Institutions may award diploma or certificate against credits accrued in respect of courses undertaken by students beyond the prescribed curriculum.

(10) Credits obtained by students by undergoing Skill-courses from Registered Higher Education Institutions offering vocational Degree or Diploma or Post Graduate Diploma or Certificate programmes are also eligible for accrual and redemption of credits through the Academic Bank of Credits.

(11) Credits obtained by undertaking Courses in Registered HEIs during or after the academic year 2021-2022 alone are eligible for Credit transfer, Credit accrual and Credit redemption through Academic Bank of Credits.

(12) For carrying out the purposes of the Academic Bank of Credits, the Commission may provide such financial and administrative assistance to the Academic Bank of Credits, as it may deem fit.

7. Eligibility Criteria for approval of HEIs to register with Academic Bank of Credits.-(1) Universities and Autonomous Colleges satisfying sub-regulation (2) of regulation 1, which are accredited by either National Assessment and Accreditation Council with minimum 'A' Grade or by National Board of Accreditation for at least three programme(s) with a minimum score of 675 individually (however, if the number of programme(s) being run by the Institution is less than three, then each of the programmes should secure 675 or more marks); or top 100 National Institutional Ranking Framework (NIRF) or similar Assessment and Accreditation body(ies) to be established by Government of India from time to time or those Indian Higher Education Institutions appearing in top 1000 world ranking of Quacquarelli Symonds (QS)/ Times Higher

Education (THE); Institutions of Eminence or Institutions of National Importance as declared by Government of India are eligible to register with Academic Bank of Credits.

(2) Accreditation or ranking status must be valid at the time of registration with Academic Bank of Credits.

(3) HEIs shall obtain approval from their respective statutory authorities such as the Governing or Executive Council or Syndicate or Board of Management or Academic Council etc., to apply for registration with Academic Bank of Credits.

(4) Registered Higher Education Institutions shall be required to admit students to individual courses, in addition to their admissions to full degree programmes:

Provided that in order to avoid overcrowding in a course(s) of any Higher Education Institution, such Higher Education Institution shall be permitted to have additional (supernumerary) seats in such course(s), subject to prior approval by the appropriate professional standards setting body:

Provided further that in respect of courses, not coming under the purview of any professional standards setting body the Registered Higher Education Institution may, subject to availability of required infrastructure, create supernumerary seats with the approval of its statutory authorities:

Provided also that, Registered Higher Education Institution may also offer a set of Courses, exclusively for the purpose of the Academic Bank of Credits Scheme.

(5) Registered Higher Education Institution shall have the appropriate educational infrastructure in terms of audio-visual facilities, e-resources, Virtual classrooms and studios etc., and specifically high bandwidth internet connectivity to support ODL or On-line courses or programmes and other infrastructural facilities for face to face theory or practical/ or training courses as specified, from time to time, under the relevant University Grants Commission Regulations and/or Statutes or Ordinances of the Higher Education Institution.

(6) A Registered Higher Education Institution shall have a webpage on its website containing details of the facility of Academic Bank of Credits, list of all Registered Higher Education Institutions, guidelines or Standard Operating Procedures for the students to utilise the facility effectively, along with a link to the website of Academic Bank of Credits.

8. Academic Bank of Credits Implementation methodology. - (1)Academic Bank of Credits is essentially a credit-based, and highly flexible, student-centric facility.

(2) Registered Higher Education Institutions shall, with the approval of their statutory authorities, amend the extant Ordinances relating to, inter alia, Course registration, Course requirements, acceptance for inter-disciplinary and multi-disciplinary courses, Credits to be offered to such courses, Credit transfers and Credits acceptance from other approved Higher Education Institutions, nature of grades to be awarded etc.

(3) Registered Higher Education Institutions shall encourage and enable students to customise or design their own degrees utilising Courses selected by the student from among courses offered by one or more of the Registered Higher Education Institutions:

Provided that, the student shall be required to earn at least fifty per cent of the credits from the Higher Education Institution awarding the degree or diploma or certificate:

Provided further that, the student shall be required to earn the required number of credits in the core subject area necessary for the award of the degree or Diploma or Certificate, as specified by the degree awarding Higher Education Institution, in which the student is enrolled.

(4) Students availing flexibility under the facility of ABC provided in sub-regulation (3) are entitled to subscribe only to Courses of their choice and aptitude, so as to enable them to accumulate credits and not to the entire Programme of study leading to the award of a degree by the Registered Higher Education Institution.

(5) The ABC shall maintain a dynamic online directory of Higher Education Institutions which satisfy the eligibility criteria stipulated under regulation 7.

(6) Every Registered Higher Education Institution shall provide student counselling and guidance to all students desirous of opening an Academic Bank Account with Academic Bank of Credits, in regard to the details of utilisation of the services of Academic Bank of Credits in terms of Credit definition, Credit accumulation, Credit transfer, Credit redemption as well as in respect of the opening, closure and validation of Academic Bank Accounts of students where such requests are recommended through the parent University or Autonomous colleges which are already registered with Academic Bank of Credits.

(7) Credits earned by students shall be deposited in the respective Academic Bank Account with ABC and shall be valid for not exceeding seven years as specified by the credit awarding institutions and subject to its acceptance by the Registered Higher Education Institution awarding academic qualifications, for the purpose of commutation of credits for the award of any Degree or Diploma or Certificate:

Provided that once any credit is redeemed for the award of the aforementioned academic qualification, such credit shall be irrevocably debited from the respective student's Academic Bank Account.

(8) Where a student fulfils the norms of sufficiency of total number of credits and of the nature of credits, approved by a Registered Higher Education Institution for the award of the specified Degree or Diploma or Post Graduate Diploma or Certificate, the student shall be eligible for such award by that Higher Education Institution.

(9) Once used, or redeemed, Credits earned by a student cannot be re-used for the award of any other formal academic qualifications.

(10) With the approval of its statutory authorities, a Registered Higher Education Institution shall be encouraged by Academic Bank of Credits to apportion the structure of courses offered by it as core courses or core electives or open electives or skill enhancement electives or ability enhancement electives etc. with appropriate credit requirements, in order to promote multi-disciplinary or inter-disciplinary higher education.

(11) In awarding academic qualifications etc., Registered Higher Education Institutions shall follow the norms and guidelines, in regard to the number of credits and duration of time, stipulated from time to time by the Commission or the professional standards setting body, as the case may be:

Provided that in respect of time duration, a student pursuing academic qualifications under the Academic Bank of Credits facility may, after earning the stipulated credits, avail a relaxation of a maximum of one semester, provided the duration of the course or programme is of two-years or more (Four semesters or more).

(12) A Registered Higher Education Institution may fix its Course fee based on the number of credits of a course for which the student is enrolled.

(13) The Higher Education Institution shall pay a fee for registration as an eligible institution under these regulations, which shall be determined with the prior approval of the Central Government or the Commission, as the case may be.

9. Monitoring, support and Quality assurance by Universities and ABC.- (1) It shall be the responsibility of Registered Higher Education Institutions, to monitor the development and operationalisation of the Academic Bank of Credits programme at the university level and at the level of their affiliated autonomous colleges.

(2) Registered Higher Education Institutions shall offer teacher or staff training, mentoring, academic and administrative audit and other measures for improving the quality of performance of the Academic Bank of Credits facility and promotion of holistic/multidisciplinary education with the support of Academic Bank of Credits, which may be in the form of Faculty Development Programmes or Quality Improvement Programmes or Professional Development Programmes or Technology Inculcation Programmes.

(3) The Quality assurance of the implementation of Academic Bank of Credits at the level of the registered university or autonomous college shall be developed by the University or autonomous college concerned either through the Internal Quality Assurance Cell (IQAC) or any other appropriate structured mechanism as may be decided by the Registered Higher Education Institution.

(4) Every Registered Higher Education shall upload, annually, on its website, a report of its activities *vis a vis* the Academic Bank of Credits, as well as of measures taken by it for Quality assurance, Quality sustenance and Quality enhancement.

(5) There shall be an Academic Bank of Credits-Grievance Redressal Mechanism at the level of Central Government/University Grants Commission/Academic Bank of Credits, and at the level of every Higher Education Institution registered with Academic Bank of Credits to address the grievance/appeals of students.

10. Consequences of violation.- Where a Registered Higher Education Institution fails to fulfil the conditions or requirements prescribed under these regulations, the Commission may, after providing a reasonable opportunity of being heard, direct the institution to rectify the deficiency within such period of time as may be stipulated by the Commission and on failure on the part of the Higher Education Institution to do so, terminate the registration of such institution from Academic Bank of Credits and, in addition, cease to provide grants under the Act, where such grants are admissible to the institution.

11. Interpretation.- Any question as to the interpretation of these Regulations shall be decided by the Commission, and its decision shall be final and binding in the matter.

Prof. RAJNISH JAIN, Secy., UGC

[ADVT.-III/4/Exty./167/2021-22]

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Guidelines for Pursuing Two Academic Programmes Simultaneously



University Grants Commission
Bahadur Shah Zafar Marg
New Delhi

April, 2022

Guidelines for Pursuing Two Academic Programmes Simultaneously

Background

The National Education Policy - NEP 2020 states that pedagogy must evolve to make education more experiential, holistic, integrated, inquiry-driven, discovery-oriented, learner-centred, discussion-based, flexible, and, of course, enjoyable. The policy envisions imaginative and flexible curricular structures to enable creative combinations of disciplines for study, that would offer multiple entry and exit points, thus, removing currently prevalent rigid boundaries and creating new possibilities for life-long learning and centrally involve critical and interdisciplinary thinking.

With the rapid increase in demand for higher education and limited availability of seats in regular stream, several Higher Education Institutions (HEIs) have started a number of programmes in Open and Distance Learning (ODL) mode to meet the aspirations of students. It has also led to the emergence of online education programmes which a student can pursue within the comforts of her / his home. The issue of allowing the students to pursue two academic programmes simultaneously has been examined by the Commission keeping in view the proposals envisaged in the National Education Policy - NEP 2020 which emphasizes the need to facilitate multiple pathways to learning involving both formal and non-formal education modes.

In view of above, UGC has framed the following Guidelines.

Objectives

To allow the students to pursue two academic programmes simultaneously keeping in view the following objectives envisaged in NEP 2020:

- recognizing, identifying, and fostering the unique capabilities of each student, by sensitizing teachers as well as parents to promote each student's holistic development in both academic and non-academic spheres;
- no hard separations between arts and sciences, between curricular and extra-curricular activities, between vocational and academic streams, etc. in order to eliminate harmful hierarchies among, and silos between different areas of learning;

- multidisciplinarity and a holistic education across the sciences, social sciences, arts, humanities, and sports for a multidisciplinary world in order to ensure the unity and integrity of all knowledge;
- enabling an individual to study one or more specialized areas of interest at a deep level, and also develop character, ethical and constitutional values, intellectual curiosity, scientific temper, creativity, spirit of service.
- offering the students, a range of disciplines including sciences, social sciences, arts, humanities, languages, as well as professional, technical, and vocational subjects to make them thoughtful, well-rounded, and creative individuals.
- preparing students for more meaningful and satisfying lives and work roles and enable economic independence.

Guidelines

1. A student can pursue two full time academic programmes in physical mode provided that in such cases, class timings for one programme do not overlap with the class timings of the other programme.
2. A student can pursue two academic programmes, one in full time physical mode and another in Open and Distance Learning (ODL)/Online mode; or up to two ODL/Online programmes simultaneously.
3. Degree or diploma programmes under ODL/Online mode shall be pursued with only such HEIs which are recognized by UGC/Statutory Council/Govt. of India for running such programmes.
4. Degree or diploma programmes under these guidelines shall be governed by the Regulations notified by the UGC and also the respective statutory/professional councils, wherever applicable.
5. These guidelines shall come into effect from the date of their notification by the UGC. No retrospective benefit can be claimed by the students who have already done two academic programmes simultaneously prior to the notification of these guidelines.

The above guidelines shall be applicable only to the students pursuing academic programmes other than Ph.D. programme.

Based on the above guidelines, the universities can devise mechanisms, through their statutory bodies, for allowing their students to pursue two academic programmes simultaneously as mentioned above.

Annexure-X

ORDINANCE- XV

PROGRAMMES LEADING TO THE AWARD OF POSTGRADUATE DEGREES/DIPLOMAS

1. Definitions of Key Words:

1.1 **'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.

1.2 **'Academic Year':** Two consecutive (one odd + one even) semesters shall constitute one academic year.

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

1.4 **'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.

1.5 '**Credit Point':** It is the product of the grade point and the number of credits for a course.

1.6 **'Grade Point':** It is a numerical weight allotted to each letter grade on a 10-point scale.

1.7 **'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.

1.8 **'Programme':** An educational programme leading to the award of a Degree, Diploma or Certificate.

1.9 **'Credit-Based Semester System (CBSS)':** Under the CBSS, the requirement for awarding a degree or diploma or certificate is prescribed in terms of number of credits to be completed by the students.

1.10 **'Semester':** Each Semester shall consist of 15-18 weeks of academic work equivalent to 90 actual teaching days. The odd semester may be scheduled 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.

1.11 **'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.

1.12 **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.

1.13 **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. Eligibility for Admission:

A candidate may be admitted to the Master's Degree programme if he/she has obtained a Bachelor's degree under 10+2+3 system, recognized by the University, or a degree recognized as its equivalent, provided that such a candidate has attained the minimum eligibility/qualification at the time of admission, as decided by the University from time to time.

3. Type of Courses:

Each programme may have three types of courses, viz,. Core courses, Elective courses, and Self-study/Skill-based courses.

3.1 Core courses:

3.1.1. The core courses are those courses whose knowledge is deemed essential for the students registered for a particular Master's degree programme. Where feasible and necessary, two or more programmes may prescribe one or more common core courses.

3.1.2. The core courses shall be mandatory for all the students registered for that Master's degree programme.

3.1.3. The core courses shall be spread over all the semesters of the programme.

3.2 Elective courses:

The elective courses can be chosen from a pool of papers. These courses are intended to:

- allow the student to specialize in one or more branches of the broad subject area;
- help the student to acquire knowledge and skills in a related area that may have applications in the broad subject area;
- help the student to bridge any gap in the curriculum and enable acquisition of essential skills (e.g. statistical, computational, language, communication skills, etc.); and
- help the student to pursue an area of interest.

- The student may also choose additional elective courses offered by the University to enable him/her to acquire extra credits from the discipline, or across the discipline.

3.3 Self-study/Skill-based Courses:

The self-study courses are optional, 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.

Note: A course (Core/Elective/Self-study/skill-based) may also take the form of a Dissertation, Project work, Practical training, Field work or Internship/Seminar.

4. Mobility Options and Credit Transfers:

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

4.1 A student can take the courses of any other university subject to equivalence of the core/elective courses and availability of seats, adopting due administrative process and formal consent of the university/universities. The University shall constitute an Equivalence Committee for the purpose.

4.2 A student availing inter-university mobility shall continue to be a bonafide student of the University where he initially got admission and in case he/she earns credit from a different university, the credits earned shall be transferred to his/her parent University.

4.3 It shall be the responsibility of the student to assess the feasibility and practicality of vertical mobility (across universities) as it doesn't entitle a student to be exempted or relaxed from any of the requisites (sessionals, attendance, assignments, end-semester examinations, programme duration etc.) for the completion of the programme.

4.4 The mobility option should not be interpreted as inter-university migration.

4.5 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.

4.6 The mobility shall be permissible from the Regular Mode to the Regular Mode of learning only, and cannot be replaced by Open/Distance/Online in place of regular mode.

4.7 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.

5. **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 hour of instruction per week (1 credit course = 15 contact hours of instruction per semester)
(ii) 3 credits = 3 hours of instruction per week (3 credit course = 45 contact hours of instruction per Semester)
(iii) 1 credit = 1 hour of tutorial per week (1 credit course = 15 contact hours of instruction per semester)

A core/elective course with practical component may carry upto 6 credits while a core/elective course without practical component may carry upto 5 credits; a self-study course shall normally carry not more than 3 credits. However, a dissertation/ project work/field work may carry up to 16 credits (along with other core/elective courses); and a semester-long dissertation/project work/field work may carry upto 24 credits.

6. Course Coding:

Each course offered by a school/department is identified by a unique course code indicating school, department, programme, semester, course no., core (C) /elective course (E), Serial No. of the course, No. of credits attached to lectures, tutorials, practical and total number of credits for the course respectively.

For example, the course code for fifth core course of the first programme in the second semester in department of Chemistry under the school of Chemical Sciences carrying 4 credits (3 lectures and one practical) may be- SCS CHEM 01 02 05 C 3014. However, the concerned Board of Studies/School Board may recommend a specific course codification pattern for the approval of the Academic Council.

7. Duration of Programme:

The minimum duration for completion of a one-year Post-Graduate Diploma programme shall be two consecutive semesters (one odd and one even semester), for a two-year A Master's degree programme in any subject there shall be four consecutive semesters (two odd and two even semesters) and for a three-year Master's programme, there will be six semesters, i.e. three odd and three even semesters. *The maximum period for completion shall be four semesters, Eight semesters and twelve semesters, respectively:*

Provided that a semester or a year may be declared by the Academic Council 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 fulfillment of requirements laid down in this respect by the regulations. Such a zero semester/year shall not be counted for calculation of the duration of the programme in the case of such a student.

8. Student Advisor:

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

9. Course Registration

9.1. 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.

9.2. 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 in the prescribed proforma in triplicate, duly signed by him/her, the Student Advisor and the Head of the Department, within the deadline notified for the purpose by the University.

9.3. 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 registration fee of Rs. 100/-.

9.4. A student shall register for a minimum of 20 credits and can register for a maximum of 30 credits in a semester (subject to 100 (±4) credits throughout the duration of the two year PG programme), unless specified otherwise by the University for a programme of study/course.

9.5. 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 of 20 credits. Withdrawal from a course may not be allowed for those who had late registration.

9.6. 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 (elective or self-study/skill-based), for valid reasons with the consent of the Student Advisor not later than two weeks from the date of commencement of the semester.

9.7. 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.

9.8. The elective courses opted and registered by the student either from parent or other department and attempted in the end semester examination shall have to be qualified. Such elective courses shall not be replaced. However, a student shall have the option of choosing an elective course from other departments irrespective of the semester in which the course is offered. For example; a student of odd/even Semester can opt an elective course of other department offered in any odd/even semester respectively.

10. Examination and Internal Assessment

The internal assessment work and the End-Semester examination shall have the weightage of 30% and 70%, respectively.

10.1. ***Internal Assessment***

10.1.1 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. 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.

10.1.2. Internal Assessment Test 1 shall be held around the sixth week of the semester for the syllabi covered till then.

10.1.3. Internal Assessment Test 2 shall be held around the twelfth week for the syllabi covered between seventh and twelfth week.

10.1.4. 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.

10.1.5. 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 <90%	3 marks
90% to <95%	4 marks
95% to 100 %	5 marks
(ii) Assignments/Presentations and Class Participation	5 marks
(iii) Internal Assessment Test-1	10 marks
(iv) Internal Assessment Test-2	10 marks
(v) Deleted	

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.

10.1.6. 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.

10.1.7. 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.

10.2. ***End-Semester Examination:***

10.2.1. 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.

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

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

I.Periodic presentation : 30%

II. Project Report : 40%

III. Viva voce- : 30%

Or

as decided by the Board of Studies of the Department concerned.

10.2.4. 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, and,

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

10.3. ***Letter Grades and Grade Points*****:**

An absolute grading system shall be adopted to grade the students.

10.3.1. Under the absolute grading system, marks shall be converted to grades based on pre-determined class intervals.

10.3.2. 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.

10.3.3. Detail Marks Sheet issued at the end of the semester or the programme shall carry marks/percentage and equivalent grades both.

10.3.4. 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

10.4. Setting of question papers and Evaluation

10.4.1. 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 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.

10.4.2. 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.

10.4.3. 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.

10.4.4. The result of the students shall be subject to moderation by a Board of Moderators appointed by the University for each programme/course.

10.4.5. Pattern of Question Papers in End-Semester Exams. for assessment and evaluation of students:

1. 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.

2. 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.

10.5. 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:

10.5.1. 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.

10.5.2. 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 re-submit the Project Work / Project Report / Dissertation / Field Work Report/ Training Report etc. for a maximum of three times (including the first submission).

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

10.5.4. 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 is allowed to re-appear in the courses of both odd and even semesters.

10.5.5. 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.

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

10.6. 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.

10.6.1. 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.

10.6.2. (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.

10.7. **Minimum Credit requirements:**

10.7.1. 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).

10.7.2. 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).

10.7.3. 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).

11. 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):

11.1. 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 ith course and Gi is the grade point scored by the student in the ith course.

11.2. 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 ith semester and Ci is the total no. of credits in that semester.

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

12. Illustration of the Computation of SGPA and CGPA

12.1. 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

12.2 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,

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

= (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.

12.3. 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.

13. Removal of Student Name from the Programme:

13.1. 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).

13.2. 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 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.

14. Miscellaneous

14.1. 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.

14.2. *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.*

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Ordinance-XV-A
General Rules for Examination

1. Applications for admission to University examinations shall be made in the prescribed form and forwarded to the Controller of Examinations through the Head of the Department/Dean of the School concerned:

2. While forwarding the applications for admission to various examinations the Head of the Department/the Dean of the School concerned shall be required to certify in respect of each applicant as follows:

   "that the candidate has satisfied himself by the production of a certificate of a competent authority that he has passed the examination which qualifies him for admission to the examination."

The Controller of Examinations shall send the admission tickets of all the candidates, whose applications for admission to the various examinations have been received by the Head of the Department, the Dean of the School concerned for delivery to the candidates concerned. Before delivering the admission ticket to each candidate the Head of the Department/the Dean of the School concerned shall satisfy himself that the candidate concerned has put in the requisite attendance at lectures etc. as laid down in the Ordinances of the University and is otherwise eligible to appear at the respective examination. The admission tickets in respect of candidates who have not fulfilled the attendance requirements or are otherwise not eligible to appear at the examination shall not be delivered to them and shall be returned to the Controller of Examinations together with a statement showing the detailed attendance position and/or other facts in each case.

Provided that if practical examination in any subject is held before the examination in theory papers, it shall not be necessary for the Controller of Examinations, in respect of candidates who are pursuing a regular course of study, to send Admission Tickets to enable them to take such practical examination, and it shall suffice if he sends a list containing the roll numbers of such candidates to the Head of the Department/the Dean of the School for being put up on the notice board of the Department/School to enable such candidates to take their examination on the basis of the roll numbers assigned to them. Such candidates shall take the practical examination provisionally subject to their being issued Admission Tickets later in terms of the foregoing provision.

3. (i) Application for admission to examinations shall be accompanied by the prescribed fees.

   (ii) A candidate who due to sickness or other cause is unable to present himself for any examination shall not be entitled to claim a refund of his fees, but such a candidate may be permitted to present himself at the next ensuing examination without payment of a further fee.

4. (i) Subject to the provisions contained in Clause 2 above every candidate whose application has been accepted by the University for admission to an examination shall be

[1] Amended by the Executive Council in its meeting held on 09th October, 2015

given an admission ticket showing the name of the candidate and the roll number assigned to him for admission to the examination.

(ii)The ticket shall be sent to the HoD/Dean of the School concerned, who will give it to the candidate after obtaining his signature on the ticket.

5. A candidate may not be admitted into the examination hall, if he fails to present to the officer-in-charge of the examination his admission ticket or to satisfy the officer that it will be produced within a reasonable time.

6. The Officer-in-Charge of the examination shall have power to call upon any candidate appearing at an examination to give a specimen signature for purpose of identification.

7. Permission to appear at a University examination may be withdrawn before or during the course of the examination for conduct which, in the opinion of the Vice-Chancellor, justifies the candidate's exclusion.

8. If a candidate for any University examination owes any money to the University on any account and fails to pay the money, or has borrowed or has in his possession any book, apparatus, or other property belonging to the University or any kit supplied by the N.C.C./N.S.S. and fails to return the same, the Vice-Chancellor may withhold or authorise the withholding of the admission ticket of the candidate, or, if the admission ticket has already been issued suspend the order of admission till all such money has been paid or such property returned by the candidate.

9. Notwithstanding anything contained expressly or impliedly in these rules, the Vice-Chancellor may, on being satisfied after such enquiry as he may deem fit, withdraw retrospectively, prior to the publication of the final result of a candidate in a course, the permission granted to such candidate to pursue that course or to appear at a University examination in relation thereto, on any of the following grounds or cancel the result of such candidate, if it comes to his notice, within 4 months of the publication of the said final result that:

   (i) The candidate was ineligible for admission to the course but was wrongly admitted, or

   (ii) The candidate was ineligible to take the examination on account of shortage of attendance but was permitted to do so by some mistake or some other unavoidable reason, or

   (iii) A discrepancy was found in the attendance record on account of which the candidate who had taken the examination was in fact ineligible, or

   (iv) A discrepancy was discovered in the award of marks etc. which rendered that result of the candidate liable to be cancelled to his disadvantage.

   (v) Any other ground which makes the candidate ineligible to appear in the examination.

[1] Amended by the Executive Council in its meeting held on 09th October, 2015

Provided that no such action shall be taken by the Vice- Chancellor without giving an opportunity to the concerned candidate to show cause against the proposed action and provided further that such action shall be reported to the Academic Council for the confirmation.

10. Subject to the provisions of the Act, the Statutes and the Ordinances, the regulations may provide for all other matters relating to conduct of examinations including those concerning examination committees, tabulation of marks and results, fee for re-checking examination results and for the supply of marks, dates for submission of examination forms, directions to candidates for examinations, directions to superintendents of examinations and duties of invigilators.

11. – 16. Omitted

17. **Attendance:**

(i) A student of any of the Master's/Post-graduate courses will not be eligible to appear in any examination of any semester unless he/she has attended, in all subjects, 75% of the lectures/presentations and practicals separately, delivered in the University for the course of study in each semester.

(ii) In case a student who

a) is selected as a member of the N.C.C. to participate in the annual N.C.C. Camps or is deputed to undertake Civil Defence work and allied duties; or

b) is enrolled in the National Service Scheme and is deputed to various public assignments by or with the approval of the Head of the Department concerned; or

c) is selected to participate in sports as part of their Curricular Activities (CA); or

d) represents the University in Inter University tournaments organized by the University, or a student selected for coaching camp of the University team Camp organized by the University or a student who represents Haryana state in National tournaments organized by National Sports Federations, or a student who represents the University in tournaments organized by Association of Indian Universities, or a student who represents India in International Tournaments organized by International Federations/ Associations and FISU, (selection through AIU), or a student who represents India in Olympics/Commonwealth Games/Youth Games/ World Championships/ organized by International Olympic Committee, or in national or international fixtures in games and sports approved by the Competent Authority; or

e) is required to represent the University at the Inter-University Youth Festival; or

[1] Amended by the Executive Council in its meeting held on 09th October, 2015

f) is required to participate in periodical training in the Territorial Army or a student who is deputed by the University to take part in Inter-University sports or fixtures, debated, Seminars, symposia or social work projects or a student who is required to participate in curricular activities held in other Universities or such other activities held in other Universities approved by the Head for this purpose.

On calculating the total number of lectures etc. delivered in the University for his/her course of study in each Semester, the number of lectures etc., delivered in each subject, during the period of absence and as approved by the Head for the above purpose, shall deemed to have been attended by the student.

(iii) The Head of the Department may consider, on the basis of the Medical Certificates produced, exceptionally hard cases of students who had fallen seriously ill or had met with an accident during the year disabling them from attending classes for a certain period, with a view to determining whether the lectures etc. delivered during the said period, or a part thereof, could be excluded for purposes of calculation of attendance of the year and decide each case on its own merits.

(iv) The Departments shall be required to notify the attendance position of each of their students for each month on the notice board and the website of the University, and clearly indicate the lectures/ practical/ presentation/ tutorials held subject wise and the numbers attended by each student.

(v) The Department shall notify on the notice board and the website of the College, the final attendance position of each of its students within five days of the dispersal of the classes in the last session of the Semester. Not later than five days, thereafter, a student may, by an application to the Head, claim benefit of exclusion of lectures under sub-clause (iii) above on grounds to be specified and accompanied by the relevant documents. All such applications submitted within time shall be considered and disposed of by the Head of the Department at least 3 days prior to the commencement of the examination, in which the student is intending to appear.

(vi) The benefit of exclusion of lectures contemplated in para (iii) above, shall in no case exceed 1/3 of the total number of lectures/practicals/ presentation/tutorials delivered.

(vii) In the case of a married woman student who is granted maternity leave, in calculating the total number of lectures delivered in the University for her course of study in each semester, in the number of lectures in each subject delivered during the period of her maternity leave shall not be taken into account.

(viii) No person shall be deemed to have satisfied the required conditions in respect of his instructions, unless in addition to the requirements regarding attendance and other conditions, he has appeared and satisfied by his performance the Head of the Department in such tests, written and/or oral, as may be held by him in his discretion. The Head of the Department shall have, and shall be deemed always to

[1] Amended by the Executive Council in its meeting held on 09th October, 2015

have had, the power to detain a student in the same class in which he has been studying, or not to send him/her in the same class in which he has been studying, or not to send him/her for the University Examination, in case he did not appear at the tests aforesaid or his performance was not satisfactory. The Head of the Department shall have power to strike off the name of a student who is grossly irregular in attendance in spite of warning, or when the absence of the student is for such a long period that he cannot put in requisite percentage of attendance.

Provided that in cases of the programmes which are governed by the Regulatory Bodies, the attendance rules laid down under the relevant regulations by the respective Regulatory Body for the said programme shall be followed.[1]

Note: Clause 17 of the Ordinance will be implemented from the Academic Session 2015-16.

[1] 27th Meeting of the Executive Council on 4th June, 2016

[1] Amended by the Executive Council in its meeting held on 09th October, 2015

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Tel. :(91) 011-4922 5000
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भारतीय विधिज्ञ परिषद्
BAR COUNCIL OF INDIA

(Statutory Body Constituted under the Advocates Act, 1961)
21, Rouse Avenue Institutional Area, Near Bal Bhawan, New Delhi - 110002

BCI: D: 30 : 2021 (LE/Std. 9th Jan. 2021) **22.01.2021**

1.	**The Registrar,** **Central University of Haryana,** **Academic Block – 03,** **University Campus, Jant-Pali** **Mahendergarh,** **Haryana – 123 031** **Email : hodlaw@cuh.ac.in**
2.	**The Principal/Head of the Deptt.,** **Department of Law,** **Central University of Haryana,** **Academic Block – 03,** **University Campus, Jant-Pali** **Mahendergarh,** **Haryana – 123 031**
3.	**The Secretary** **Bar Council of Punjab & Haryana,** **Law Bhawan, Sector-37-A,** **Dakshin Marg, Chandigarh**

Sub.: Interim Consent Letter of fresh Recognition to Central University of Haryana, Mahendergarh, Haryana as per Section 7(1)(i) of the Advocates Act, 1961 for the purpose of conferring the Degrees in Law in three year LL.B course and fresh approval to its Department of Law, Central University of Haryana, Mahendergarh, Haryana for imparting three year LL.B course with intake of one section of 60 students for a period of one year i.e. for the academic year 2020-2021 subject to deposit of late charges for filings much beyond the prescribed period and charges towards virtual inspection fee (Total Rs. 11 lakh).

Sir,

This is to bring to your kind knowledge that the Standing Committee of Bar Council of India by virtue of its meeting held on 9th January, 2021 considered the matter of fresh recognition as well as fresh approval to three LL.B course to Central University of Haryana, Mahendergarh, Haryana.

It transpires from the inspection report that Central University is already running two law courses i.e Ph.D (Law) and LL.M (2 Years) regular course for which they have separate faculty.

It appears that the college has 8 qualified law teachers at present and are being paid UGC scale. Therefore, it appears that for starting of first year of three year LL.B course, the law faculty which is already available for LL.M and Ph.D. courses would be sufficient, but for the second year onwards, more faculty would be required.

Apart from that, Centre of Legal Education has presently only 4 classrooms whereas 8 classrooms would be required. From next year more rooms would be required with the increase in number of promoted students to higher classes.

This Centre of Legal Education will have to take all measures for enhancement of infrastructure as per norms of Bar Council of India Legal Education Rules, 2008, in case it intends to increase the number of students being a CLE of repute.

That apart, Centre of Legal Education is required to invest Rs. 10 lakh to upgrade the library before the start of next academic session.

An undertaking of complying with all the conditions in this regard, by way of duly notarized affidavit has to be filed by the College within four weeks and compliance of what is done by then must be mentioned therein.

Thereafter, further as and when actual compliance is done within the stipulated period another affidavit/s has/have to be filed, along with supporting documents.

After consideration of the matter, and subject to the undertaking and complying with conditions which have been enumerated herein, and subject to further conditions, **fresh Recognition to Central University of Haryana, Mahendergarh, Haryana** as per Section 7(1)(i) of the Advocates Act, 1961 for the purpose of conferring the Degrees in Law in three year LL.B course and fresh approval fresh approval to its **Department of Law, Central University of Haryana, Mahendergarh, Haryana** for imparting **three year LL.B course** with intake of **one section of 60 students** for a period of **one year** i.e. for the academic year **2020-2021** is hereby granted **subject to deposit of late charges for filings much beyond the prescribed period and charges towards virtual inspection fee (Total Rs. 11 lakh).**

You are requested to kindly note that you will be required to seek extension of approval of affiliation for imparting three year LL.B course from the next academic year onwards by way of filing an application in such respect.

Kindly note that if any, guarantee fee, and/or fee under any head is due and unpaid, the same shall be required to be paid upon being intimated of the same.

You may kindly bear in mind that the Bar Council of India is the sole and supreme sanctioning authority for seats and as a general rule it does not allow any supernumerary quota of seats for law degree courses, over and above the sanctioned strength of seats and whatever reservation of seats is to done by the University as a general rule has to be done within sanctioned strength of seats.

Further kindly ensure to furnish authenticated and signed bank statements of salary transferred to your faculty and also Indian Bar Review and other minimum Library requirement purchase receipts, failing which the Center of Legal Education shall be liable to the natural consequences, which may include revocation of recognition/approval granted.

Specific conditions imposed by the inspection team and approved by the Committee <u>required to be complied with</u> :-

1. CLE must efficiently improve the Girls Common Room.

2. Tables and Chairs of the Moot Court should be maintained as per BCI norms.

3. Books of more than five lacs rupees should be purchased for departmental library within two months from the date of approval of grant.

4. A separate building with proper class rooms size for CLE must be constructed before commencement of next academic session.

Further, the University/College must specify the timing of the college which has not been given. College should also maintain the timing which has to be minimum 5 ½ hours with half an hour break.

College is directed to file an affidavit to the Bar Council of India within four weeks mentioning the timing of the classes. The relevant rules of Legal Education which are mandatory to be ensured are as follows :-

Rule (xxiii), Chapter I

"(xxiii) "Regular Course of Study" means and includes a course which runs for at least five hours a day continuously with an additional half an hour recess every day and running not less than thirty hours of working schedule per week."

Rule 5 of Schedule III

"Classes may be conducted between 8 a.m. to 7 p.m. in a Centre of Legal Education, which is not fully residential. However the Library may remain open till 10 p.m."

Further, the institution should follow the attendance rule and file affidavit that they are following the aforesaid rule. The next inspection team shall also see whether the said rules are being followed by the university or not. The relevant Rule 12 is given below :-

"12. End Semester Test: No student of any of the degree program shall be allowed to take the end semester test in a subject if the student concerned has not attended minimum of 70% of the classes held in the subject concerned as also the moot court room exercises, tutorials and practical training conducted in the subject taken together.

Provided that if a student for any exceptional reasons fail to attend 70% of the classes held in any subject, the Dean of the University or the Principal of the Centre of Legal Education, as the case may be, may allow the student to take the test if the student concerned attended at least 65% of the classes held in the subject concerned and attended 70% of classes in all the subjects taken together. The similar power shall rest with the Vice Chancellor or Director of a National Law University, or his authorized representative in the absence of the Dean of Law.

Provided further that a list of such students allowed to take the test with reasons recorded be forwarded to the Bar Council of India."

University/College should also admit students as per the below mentioned Rule:

7.Minimum marks in qualifying examination for admission: Bar Council of India may from time to time, stipulate the minimum percentage of marks not below 45% of the total marks in case of general category applicants, 42% for OBC category and 40% of the total marks in case of SC and ST applicants, to be obtained for the qualifying examination, such as +2 Examination in case of Integrated Five Years' course or Degree course in any discipline for Three years' LL.B. course, for the purpose of applying for and getting admitted into a Law Degree Program of any recognized University in either of the streams.

Provided that such a minimum qualifying marks shall not automatically entitle a person to get admission into an institution but only shall entitle the person concerned to fulfill other institutional criteria notified by the institution concerned or by the government concerned from time to time to apply for admission.

University/College to follow Clause-24, Schedule-II of Legal Education Rule-2008 lays down Moot Court exercises and Internship; Clause-25, Schedule-III lays down Minimum period of Internship which is quoted hereunder. **However, during the pandemic period, it has been left open to the University to choose any alternative mode with respect to the same, owing to practical feasibility of the same.**

24. Moot court exercise and Internship:

This paper may have three components of 30 marks each and a viva for 10 marks.

(a) Moot Court (30 Marks). Every student may be required to do at least three moot courts in a year with 10 marks for each. The moot court work will be on assigned problem and it will be evaluated for 5 marks for written submissions and 5 marks for oral advocacy.

(b) Observance of Trial in two cases, one Civil and one Criminal (30 marks):

Students may be required to attend two trials in the course of the last two or three years of LL.B. studies. They will maintain a record and enter the various steps observed during their attendance on different days in the court assignment. This scheme will carry 30 marks.

(c) Interviewing techniques and Pre-trial preparations and Internship diary (30 marks):

Each student will observe two interviewing sessions of clients at the Lawyer's Office/Legal Aid Office and record the proceedings in a diary, which will carry 15 marks. Each student will further observe the preparation of documents and court papers by the Advocate and the procedure for the filing of the suit/petition. This will be recorded in the diary, which will carry 15 marks.

(d)The fourth component of this paper will be Viva Voce examination on all the above three aspects. This will carry 10 marks.

25. Minimum Period of Internship: (a) Each registered student shall have completed minimum of twelve weeks internship for Three Year Course stream and twenty weeks in case of Five Year Course stream during the entire period of legal studies under NGO, Trial and Appellate Advocates, Judiciary, Legal Regulatory authorities, Legislatures and Parliament, Other Legal Functionaries, Market Institutions, Law Firms, Companies, Local Self Government and other such bodies as the University shall stipulate, where law is practiced either in action or in dispute resolution or in management.

Provided that internship in any year cannot be for a continuous period of more than Four Weeks and all students shall at least gone through once in the entire academic period with Trial and Appellate Advocates.

(b) Each student shall keep Internship diary in such form as may be stipulated by the University concerned and the same shall be evaluated by the Guide in Internship and also a Core Faculty member of the staff each time. The total mark shall be assessed in the Final Semester of the course in the 4th Clinical course as stipulated under the Rules in Schedule II.

University/College should also follow Rule-10 of Legal Education Rules 2008 which is quoted hereunder :-

10. Semester system

The course leading to either degree in law, unitary or on integrated double degree, shall be conducted in semester system in not less than 15 weeks for unitary degree course or not less than 18 weeks in double degree integrated course with not less than 30 class-hours per week including tutorials, moot court room exercise and seminars provided there shall be at least 24 lecture hours per week.

Provided further that in case of specialized and/or honours law courses there shall be not less than 36 class-hours per week including seminar, moot court and tutorial classes and 30 minimum lecture hours per week.

Provided further that Universities are free to adopt trimester system with appropriate division of courses per trimester with each of the trimester not less than 12 weeks.

College/University should also follow Rule 17 and Rule 18 of Schedule III of Legal Education Rules 2008 which is quoted hereunder :-

Rule 17. Core Faculty:

There shall be sufficient number of full time faculty members in each Centre of Legal Education (i.e. ,Department, constituent or affiliated college) to teach each subject at all point of time for running courses who can be supported by part time or visiting faculty. Such a core faculty shall in no case be less than six in the

first year of the approval with both streams in operation, eight in the second year and ten in the case of third year of law courses. In addition, for the integrated course there shall be adequate faculty in the subjects offered in the liberal educational subjects as part of the course by the institution. These faculties in the liberal educational discipline in Arts, Science, Management, Commerce, Engineering, Technology or any other discipline shall possess qualification as is required under the UGC guideline or under such other standard setting body as the discipline is allotted to by any Act, statute, or Rules of the Government of India or of a State.

For the Three Year Bachelor of Law degree course only with two sections without the Honour program, there shall be minimum of 4 core faculty in the first year six in the second and eight in the third year in addition to the Principal/Head or Dean as the case may be.

Provided that an institution intending to run any specialized or honours course must have at least three faculty in the group in which specialization and honours courses are offered.

Provided further that each full time faculty shall take as many classes in the subject or subjects as may be assigned to them on the basis of standard prescribed by 'the standard setting institution' like UGC.

Provided further, if any institution of a University, which was already affiliated to the University and approved to run professional courses of either scheme or both by the Bar Council of India after inspection of the University, falls short of required full time faculty, the new admission in courses may be required to remain suspended until new required number of faculty is procured. The University shall before starting a new academic session, notify which institutions are only be allowed to admit fresh students.

Provided further that if while inspecting the University it was found that in any institution of the University adequate number of full time faculty was not there in the staff, the Bar Council after giving notice to the University might give a public notice directing the University not to admit students in the new academic year in that institution.

Rule -18 Minimum weekly class program per subject (paper):.

There shall be for each paper (with 4 credit) Four class-hours for one hour duration each and one hour of tutorial/moot court/project work per week.

For the present moment authenticated signed and certified Bank Statements bearing bank stamp/seal and signature of the bank manager for a period of three months with effect from the date of receipt of this letter for the preceding period of three months must be furnished immediately.

This must be continued to be submitted every three months without fail.

Kindly ensure to comply with all the above stipulated and all other requisite Rules of Legal Education 2008 by way of compliance by way of

duly notarized affidavit by attaching adequate documentation proof with the same with a period of 4 weeks for being eligible to be issued further Approval for further subsequent academic years.

This letter is subject to final approval/confirmation of the Legal Education Committee and General Council of the Bar Council of India.

You are also requested to attach a copy of this letter with your compliance report/reply.

It is suggested that all information should be provided to Bar Council of India both in hard and soft copy/pen-drive and by email at complianceaffiliationle@gmail.com.

This is for your information and necessary action.

Yours sincerely,

Ashok Kumar Pandey
Joint Secretary
HOD, Legal Education Dept.
Bar Council of India

Srimanto Sen
Secretary
Bar Council of India

E-mail : bciinfo21@gmail.com
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भारतीय विधिज्ञ परिषद्
BAR COUNCIL OF INDIA

(Statutory Body Constituted under the Advocates Act, 1961)

21, Rouse Avenue Institutional Area, Near Bal Bhawan, New Delhi - 110002

BCI:D: 1265 : 2022(LE) 12.09.2022

The Dean,
School of Law,
Central University of Haryana,
Mahendergarh-123031
Haryana

Ref. : Your letter No. CUH/LAW/271 dated 23.11.2021 with regard to regularization of admissions made in the year 2020-2021 in one additional section in three year LL.B course.

Sir/Ma'am,

With reference to your above mentioned letter dated 23.11.2021 with regard to regularization of admissions made in the year 2020-2021 in one additional section in three year LL.B course. In this connection, it is to inform you that your matter will be placed before the forthcoming meeting of the Standing Committee of Legal Education Committee which is likely to be scheduled before the end of this month. Thereafter, the said decision will be intimated to you.

Yours sincerely,

(Ashok Kumar Pandey)
Joint Secretary

Copy to :-
The Registrar,
Central University of Haryana,
Mahendergarh-123031
Haryana

OPEN ACCESS POLICY

of Central University of Haryana

[Draft]

Recommended by
NIRF (Overall) Committee

Proposed by
Pandit Deendayal Upadhyaya Central Library
Central University of Haryana
Jant-Pali, Mahendergarh-123031
Haryana-India
http://library.cuh.ac.in/
library@cuh.ac.in

Date of draft proposal:	V.1, 15th Nov. 2021
Date of revised draft proposal:	V.2, 23rd May, 2022
Date of feedback sought from the faculty of CUH:	23rd May, 2022
Date of revised final proposal:	V.3, 27th May, 2022

Approval body:	…….
Date of approval:	……..
Date effective:	…….
Date of review/ revision/ updates:	Periodically

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OPEN ACCESS POLICY OF CENTRAL UNIVERSITY OF HARYANA (CUH)

[DRAFT]

1. Policy Terms

1.1. It is advised that all the scholarly works produced by the University funds or by other public funds either at CUH or elsewhere with CUH affiliation are to be deposited in the University's open access institutional digital repository i.e. Gyan Pravah, henceforth called as CUH-IDR*.

1.1.a. For depositing the scholarly works and institutional publications, the University shall set up CUH-IDR* using free and open source software (FOSS) systems* which support the Open Archives Initiative Protocol for Metadata Harvesting (OAI-PMH) and Open Archives Initiative- Object Reuse and Exchange (OAI-ORE) protocols for public good.

1.1.b. The University shall register its IDR/ repository in OpenDOAR* and similar platforms* for more discoverability of the scholarly outputs, its availability and accessibility to the public.

1.1.c. The University shall also set up a central harvester** using the OAI-PMH to harvest the publications of CUH researchers, faculty and students from the World Wide Web for the wider accessibility of the shared resources.

1.2. It is advised that all the archives, current/ future scholarly and grey literature viz., research articles, popular articles, book chapters, books, monographs, catalogues, conference proceedings, success stories, case studies, project reports, class/lecture notes, presentation slides, photos, videos, speeches, keynote addresses, patent grant publications, data sets etc., produced by the University or by the faculty/researchers/ students with CUH affiliation are to be made available in CUH-IDR.

1.3. Following funders' mandates (Eg. DST, DBT, etc.) or mandates of statutory bodies (Eg. UGC, AICTE, etc.), if any researchers/ students and faculty members of CUH have/had deposited their work/s in any open access repositories before the implementation of this policy, they are advised to deposit such works in the CUH-IDR.

1.4. In case of any copyright/ intellectual property rights issue/s with the data, information, or materials to be patented or commercialized, or where the promulgations would infringe a legal commitment by the University and/or the author, such data, information, or materials may be exempted from this Policy. However, after an embargo period once they are available in public domain/ open sharing/ archiving, the work/s is/are to be made accessible to the public via CUH-IDR.

**already complied and Gyan Pravah (IDR) is in place; ** in progress*

1.5. All institutional publications of the University, journal articles, educational resources (text-books), edited books, book chapters, working papers, policy briefs, memorial lectures, research datasets, scientific data, final reports of sponsored projects, conference/ seminar proceedings, conference reports, information bulletins, newsletters, annual reports, audited annual accounts (which can be made public), booklets, convocation souvenirs and any other documents of institutional importance are to be made available in the CUH-IDR.

1.6. Preferably, the institutional publications such as journals, text books, proceedings, etc. may be published with open licenses. The authors of the publications may retain copyright of the work/s.

1.7. The University's open access contents/ documents shall be licensed for public use under the Creative Commons Attribution NonCommercial 4.0 International (CC-BY-NC-4.0) and the same shall be registered with SHERPA/RoMEO (https://v2.sherpa.ac.uk/romeo/) database. The faculty members, researchers and students are advised to refer to SHERPA/ RoMEO to know about publishers' policies on copyright and self-archiving.

1.8. Final reports of the completed/ awarded research projects, theses, dissertations, viz. Doctoral, Post-Doctoral, Minor/Major Research Projects, etc. produced in the University are to be deposited in the CUH-IDR and full-texts be made available after an embargo period (not later than 12 months). The UGC mandate of depositing of doctoral theses/ dissertations in INFLIBNET's ShodhGanga database shall also continue*.

1.9. All the faculty, researchers, and students are encouraged to publish in open access journals which do not charge any article submission or processing charges. They are advised to publish their research outputs in those journals which allow self-archiving.

1.10. All the faculty, researchers, and students are advised to use 'Author's Addendum' at the time of acceptance and while signing the publishers' copyright agreements mentioning the University's Open Access Policy to deposit the publicly funded research outputs publicly available. Therefore, the publishers should allow the final version of the author's peer-reviewed manuscript to be made available via CUH-IDR. And in case of any embargo, it should not be later than 6-8 months from publication date for making the deposits open to the public.

**already complied/ in place; ** in progress*

2. Rights and Permissions

2.1. The University's website content (meant for public access), print/ digital publications published with open licence, meta-data and full-texts deposited in repositories are recommended to be licensed for public use under the Creative Commons Attribution NonCommercial 4.0 International (CC-BY-NC-4.0) and unless otherwise noted, the users are free to copy, duplicate or reproduce, and distribute, display, or transmit without permission, and to make translations, adaptations or other derivative works, and to make non-commercial use of work under the following condition:
Attribution — Users must attribute the work in the manner specified by the author or licensor (but not in any way that suggests that they endorse you or your use of the work).

3. Implementation and Coordination

3.1. This modest policy is the first step in the journey towards declaration of openness. So *in the first phase, this policy acts as 'an advisory document' for the faculty and researchers/students* to support and actively participate in open access publishing, archiving and sharing as advised/ directed in this policy. In the second phase, in future, this policy shall be made fully operational and all concerned shall comply accordingly.

3.2. The Central Library of the University shall serve as the Nodal Office for the effective implementation of this Open Access Policy by coordinating with all concerned.

4. Advocacy

4.1. Open sharing of the scholarly output is not a one-time event as it requires advocacy and capacity building and compliance by all the concerned stakeholders. The Central Library, Publication Division, and all relevant Departments/ Cells shall organize advocacy workshops/events periodically and take up collaborative work and capacity building programmes for faculty, researchers, repository administrators and all concerned on open access repositories, open access journals, application and usage of FOSS, open metrics in scholarly communication ecosystem, etc.

4.2. The Central Library shall join all Schools, Departments and relevant Cells in leading the open access advocacy/movement and take on board other universities/ organizations/ open access advocates to influence and encourage sharing of publicly funded research for the larger benefit of all.

5. Amendments/ revisions

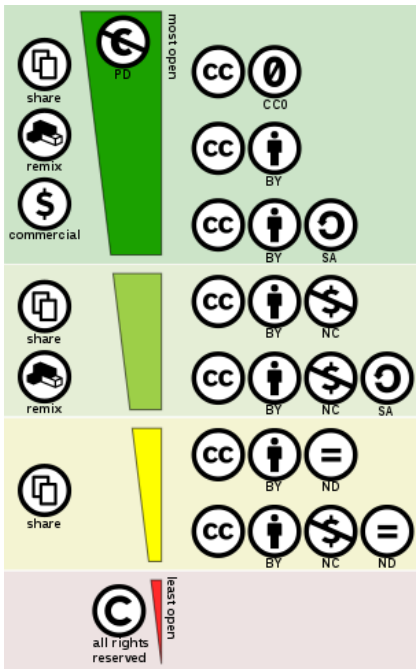
5.1. To make this policy meaningful and relevant, the policy shall be revised/ amended from time to time based on the new public policies as and when finalized (by the relevant bodies), such as India's 5th Science, Technology and Innovation Policy (5th STIP), Biological Data Storage, Access and Sharing Policy of India (draft), UNESCO Recommendation on Open Science, 2021, etc.

5.2. In case of any ambiguity, relevant rules/guidelines/statutes/others and the directions of the competent authority shall prevail and binding. In case of any clash in the domain of responsibilities contained in this policy, the competent authority shall take appropriate decision on case to case basis. In case of any inadvertent discrepancy/error is observed (although every care has been taken to avoid any sort of ambiguity/discrepancy) in this policy, the same may be brought to the notice of the competent authority/concerned branch/department for necessary action.

* * * * *

Note: *Various information sources are referred and consultations were made while preparing this draft policy document (notable among them are: Open Access India, ICAR, CSIR, IGIDR and JNU).*

Glossary terms and concepts~

Creative Commons License/ Open Licenses	*A Creative Commons (CC) license is one of several public copyright licenses that enable the free distribution of an otherwise copyrighted "work". A CC license is used when an author wants to give other people the right to share, use, and build upon a work that the author has created. CC provides an author flexibility (for example, they might choose to allow only non-commercial uses of a given work) and protects the people who use or redistribute an author's work from concerns of copyright infringement as long as they abide by the conditions that are specified in the license by which the author distributes the work.* *https://creativecommons.org/licenses/* *Types of CC licenses:*  *Creative commons license spectrum between public domain (top) and all rights reserved (bottom). Left side indicates the use-cases allowed, right side the license components. The dark green area indicates Free Cultural Works compatible licenses, the two green areas compatibility with the Remix culture.*
Creative Commons Attribution 4.0 (CC-BY 4.0) Unported License	*One of the Creative Commons licences: Using this license, you are free to: Share — copy and redistribute the material in any medium or format Adapt — remix, transform, and build upon the material* *The licensor cannot revoke these freedoms as long as you follow the license terms.*

Embargo	*In academic publishing, an embargo is a period during which access to academic journals is not allowed to users who have not paid for access (or have access through their institution). The purpose of this is to ensure publishers have revenue to support their activities, although the impact of embargoes on publishers is hotly debated, with some studies finding no impact while publisher experience suggests otherwise. A 2012 survey of libraries by the Association of Learned, Professional, and Society Publishers on the likelihood of journal cancellations in cases where most of the content was made freely accessible after six months suggests there would be a major negative impact on subscriptions, but this result has been debated.* *Various types exist:* ▪ *A 'moving wall' is a fixed period of months or years.* ▪ *A fixed date is a particular time point that does not change.* ▪ *A current year (or other period) is setting a time point on Jan. 1 of the current year, so that all material earlier than that is available. Although fixed during the year, it will change each year*
Free and open source software (FOSS)	*is software that is both free software and open-source software where anyone is freely licensed to use, copy, study, and change the software in any way, and the source code is openly shared so that people are encouraged to voluntarily improve the design of the software.*
Grey literature	*is materials and research produced by organizations outside of the traditional commercial or academic publishing and distribution channels. Common grey literature (or gray literature) publication types include reports (annual, research, technical, project, etc.), working papers, government documents, white papers and evaluations. Organizations that produce grey literature include government departments and agencies, civil society or non-governmental organizations, academic centres and departments, and private companies and consultants.*
Institutional repository/ Institutional Digital repository/	*is an archive for collecting, preserving, and disseminating digital copies of the intellectual output of an institution or the people therein.*
Metadata	*is "data that provides information about other data", but not the content of the data, such as the text of a message or the image itself. There are many distinct types of metadata, including: Descriptive metadata — the descriptive information about a resource. It is used for discovery and identification.*
Metadata harvesting	*is the automated collection of metadata descriptions from different sources to create useful aggregations of metadata and related services.*
Open access	*is a set of principles and a range of practices through which research outputs are distributed online, free of cost or other access barriers.*

Open access repository	*is an open platform for archiving, preserving, and disseminating digital copies of the intellectual output of an institution or the people therein.*
Open Archives Initiative-Object Reuse and Exchange (OAI-ORE)	*Open Archives Initiative Object Reuse and Exchange (OAI-ORE) defines standards for the description and exchange of aggregations of Web resources. These aggregations, sometimes called compound digital objects, may combine distributed resources with multiple media types including text, images, data, and video. The goal of these standards is to expose the rich content in these aggregations to applications that support authoring, deposit, exchange, visualization, reuse, and preservation.*
Open Archives Initiative Protocol for Metadata Harvesting (OAI-PMH)	*is a protocol developed for harvesting metadata descriptions of records in an archive so that services can be built using metadata from many archives. An implementation of OAI-PMH must support representing metadata in Dublin Core, but may also support additional representations. The protocol is usually just referred to as the OAI Protocol.*
OpenDOAR	*is the quality-assured, global Directory of Open Access Repositories. You can search and browse through thousands of registered repositories based on a range of features, such as location, software or type of material held.*
SHERPA/ RoMEO	*is an online resource that aggregates and analyses publisher open access policies from around the world and provides summaries of publisher copyright and open access archiving policies on a journal-by-journal basis.* *Eg.: https://v2.sherpa.ac.uk/id/publication/7405*
ShodhGanga	*Is an online platform for research students to deposit their Ph.D. theses and make them available to the entire scholarly community in open access. For more details: https://shodhganga.inflibnet.ac.in.* *Already uploaded theses of CUH:* *https://shodhganga.inflibnet.ac.in/handle/10603/186055*

~ Courtesy: Wikipedia and other online sources

Further reading/ reference

- List of Indian open access institutional repositories registered on OpenDOAR https://v2.sherpa.ac.uk/view/repository_by_country/India.html
- List of Open Access Policies of Indian institutions: http://roarmap.eprints.org/view/country/356.html
- National Data Sharing and Accessibility Policy (2012) https://data.gov.in/sites/default/files/NDSAP.pdf
- Open Access India. (2017, February 12). National Open Access Policy of India (Draft) Ver. 3. Zenodo. http://doi.org/10.5281/zenodo.1002618
- CSIR open access Mandate http://www.csircentral.net/mandate.pdf
- DBT-DST open access Policy (2014) http://www.dbtindia.nic.in/wp-content/uploads/APPROVED-OPEN-ACCESS-POLICY-DBTDST12.12.2014.pdf
- Government Open Data License – India (2016) https://data.gov.in/sites/default/files/NDSAP_OpenDataLicense.pdf
- ICAR open access Policy http://icar.org.in/en/node/6609
- National Data Sharing and Accessibility Policy (2012) https://data.gov.in/sites/default/files/NDSAP.pdf
- Open access overview http://legacy.earlham.edu/~peters/fos/overview.htm
- Know Your Rights as the Author; Scrutinized the Publication Agreement; A Balanced Approach to Copyright Management https://sparcopen.org/our-work/author-rights/brochure-html/
- Open Access Policy Guidelines and Template for Funders (2015) http://www.pasteur4oa.eu/sites/pasteur4oa/files/resource/FUNDERS_POLICY%20GUIDELINES%20FINAL.pdf)
- Open Access policy implementation in Spain (2014) http://recolecta.fecyt.es/sites/default/files/contenido/documentos/Implantacion_Art37_AccesoAbierto_INGLES.pdf
- San Francisco Declaration on Research Assessment (DORA) http://www.ascb.org/files/SFDeclarationFINAL.pdf
- Science, Technology and Innovation Policy (2013) http://www.dst.gov.in/sites/default/files/STI%20Policy%202013-English.pdf
- The academic, economic and societal impacts of open access: an evidence-based review. https://f1000research.com/articles/5-632/v3
- UNESCO adopts Open Access policy for its publications http://openaccessindia.org/unesco-to-make-its-publications-available-free-of-charge-as-part-of-a-new-open-access-policy/

हरियाणा केंद्रीय विश्वविद्यालय
CENTRAL UNIVERSITY OF HARYANA
Jant-Pali, Mahendergarh (Haryana) – 123 031

NIRF (OVERALL) COMMITTEE

MINUTES OF MEETING

The first meeting of the reconstituted NIRF (Overall) Committee was held on 28th Sept. 2021 at 04:00 pm in the Conference Room, New Administrative Block, Central University of Haryana. Hon'ble Vice Chancellor chaired the meeting.

The following members were present:

1.	Prof. Tankeshwar Kumar	Vice Chancellor and Chairperson
2.	Dr. Santosh C. Hulagabali	Convener and Nodal Officer, NIRF (Overall)

NIRF (Overall) parameterwise Coordinators and Members:

A. Teaching, learning and resources:

3.	Dr. Manoj Kumar Singh	Coordinator
4.	Dr. Prakash Kanoo	Member
5.	Mr. Naresh Kumar	Member

B. Research and professional practice:

6.	Dr. Pawan Maurya	Coordinator
7.	Dr. Jaswant Kumar	Member
8.	Dr. Amit Kumar	Member
9.	Dr. Usha Nagarajan	Member

C. Graduation Outcomes:

10.	Dr. Rajesh Kumar Dubey	Coordinator
11.	Dr. Manish Kumar	Member

D. Outreach and inclusivity:

12.	Dr. Ajay Pal	Coordinator
13.	Dr. Youdvir Singh	Member

E. Perception:

14.	Dr. Payal Chandel	Coordinator
15.	Dr. Ajay Bagarsa	Member
16.	Mr. Shailender Singh	Member

Dr.Renu Yadav (Member, Parameter-D) and Dr.Pradeep Singh (Member, Parameter-C) could not attend the meeting.

The Convener welcomed the Hon'ble Vice Chancellor, Coordinators and Members of the NIRF (Overall) Committee. The Convener shared that the objective of the meeting was to have a focused discussion on systematically preparing for NIRF

(Overall) to get a good rank for the University. The Convener presented an overview of NIRF to make the new members get oriented to the purpose and procedures of going for NIRF ranking.

The Chairperson expressed that the parameterwise constituted NIRF (Overall) Committee would work in close association with the stakeholders to prepare the University for NIRF. The Chairperson shared his experiences, thoughts and ideas as to how systematically, methodologically and strategically the University could plan for the ranking process keeping in view of the University's NEP 2020 Implementation Plan, latest UGC guidelines, preparations for NAAC 2nd Cycle, past NIRF performance and also resolutions passed in the meeting of recently constituted Research Promotion Board.

Further, the Chairperson reiterated that the administration has been bringing out necessary reforms in teaching, learning, research, outreach, administration, etc. and thus taking all the required steps through various committees/platforms. He applauded the efforts of all the faculty and staff for their dedication and commitment to work towards achieving them. He further stressed on the fact that the University is doing remarkable work on many fronts and the same needs to be communicated to our stakeholders on appropriate platforms.

To strengthen the working of NIRF (Overall) Committee, the Chairperson suggested the Convener to co-opt the representative/s of Placement Cell, IPR Cell and Alumni Association. Later, the Convener and each member deliberated at length and shared their suggestions.

The following **resolutions** were passed (concerning the five parameters stated above and allied aspects of NIRF (Overall)) which may be considered and put into action on high priority basis by the administration, all concerned deans, heads, faculty, officials, staff and NIRF (Overall) Committee.

1. The resolutions passed in the first meeting of Research Promotion Board may be considered as relevant (to NIRF) while preparing for NIRF and therefore necessary steps/actions may be initiated by the NIRF (Overall) Committee to achieve necessary targets/goals.
   Action: NIRF (Overall) Committee

2. Media coverage/ reports should not only cover the academic events/ programmes but also preferably cover the University's all important initiatives, activities, staff/students' achievements, best practices, etc. It should be the paramount priority to make the news appear in English dailies too. Further, opportunities may be explored to appear in radio shows and TV shows of academic/ research importance where academic and research solutions, ideas and achievements of our faculty/students may be shared. Press meets with

journalists and particularly our alumni working in media houses may be organized periodically.
Action: PRO Office, Dept. of Mass Communication and Journalism and members of Parameter-E: Perception

3. All faculty members need to create or update their social media account/s and actively share the individual, departmental and University's initiatives/ activities/ achievements. To orient the faculty to do so, necessary innovative/ awareness activities/ campaigns may be organized.
Action: All faculty members, PRO Office, ICT Section, Publication Division, Central Library, and members of Parameter-E: Perception

4. Keeping in view of enhancing skill-oriented initiatives, more training programmes/ workshops (offline/online) may be organized to make the University one of the best universities in training/ upskilling activities. Short-term training programmes or courses of 3-day, 5-day, 7-day, etc. may be devised and introduced on pertinent topics/ themes for not only the University community but also any learner from any organization/place and thus generate revenue which may be best utilized for the development of the Department/Branch/University, etc.
Action: All Deans, Heads, TICs, Branch Heads and members of Parameter-C: Graduation Outcomes

5. As one of the community involvement initiatives, a systematic plan/proposal may be prepared to arrange symposia/ conclave/ competitions for the research scholars/ research supervisors of various universities/ academic institutes of Haryana (other than CUH) to exchange ideas, provide necessary support/ guidance and award for the outstanding researchers. Such platforms may be developed for the larger interest of the research community of the state.
Action: Dean, Research and members of Parameter-D: Outreach and inclusivity

6. With the equal focus to both 'quality and quantity' of research papers, research scholars should be guided to publish papers in leading journals and they may be advised to represent our University to participate in the academic/research programmes organized by prestigious/recognized institutes.
Action: All faculty members and members of Parameter-B: Research and professional practice

7. Open Access Policy of our University may be developed keeping in view of promoting publications in open access journals.
Action: Central Library, Publication Division, Research Promotion Board, and members of Parameter-A: Teaching, learning and resources

8. To put all the institutional/ faculty publications on one single platform, the Central Library is developing Institutional Digital Repository. This may be made

accessible on internet/ cloud 24x7 and the same may preferably include those faculty papers whose sharing right/s is/are availed by the faculty and also those papers that are already available in open access domain/platforms.
Action: Central Library, ICT Section and members of Parameter-A: Teaching, learning and resources

9. Apart from publishing research papers/articles, preference may be given to writing working papers, publishing popular articles in magazines, newspapers and also on blogs. All possible ways may be explored while publishing research papers to file for patent so that ideas/findings may be converted into technology and technology into sellable products.
Action: All faculty members, IPR Cell and members of Parameter-B: Research and professional practice

10. All departments may offer PhD programmes and research supervisors may admit maximum number of students as per the quota/rules. The JRF candidates may be preferred for admission to PhD programme.
Action: Deans, Heads of Departments and members of Parameter-A: Teaching, learning and resources

11. The availability of basic and necessary facilities for the physically challenged and socially backward communities needs to be checked and wherever further improvements, if any required, the concerned Branch/Section may approach the administration for doing the needful. For providing/placing wheel chairs and other required things for physically challenged students/staff, social organizations such as Red Cross may also be approached through proper channel.
Action: Concerned Branch/Section and members of Parameter-D: Outreach and inclusivity

12. To avail expert guidance, industry-based consultations, etc. senior academic professionals/ faculty (preferably retired) may be inducted as Adjunct Faculty/ Professor either Schoolwise/ Departmentwise (wherever necessary) for a specified period. Such requirement/ proposal with proper justification may be submitted through proper to the competent authority. The departments may form Industry-Academia Advisory Board and also invite industry experts in guest lectures/ sessions, etc.
Action: Deans, Heads, TICs, and members of Parameter-A: Teaching, learning and resources

13. Availing/subscribing to institutional membership and establishing collaboration with professional bodies, research/academic institutes and other relevant societies/bodies in the form of MoUs/ exchange programmes/ collaborative initiatives, etc. may be explored. Detailed proposal/s may be submitted to the competent authority for necessary consideration.

Action: Deans, Statutory Officers, Heads, TICs, concerned faculty/staff and members of Parameter-A: Teaching, learning and resources

14. The preference may be given for developing increased sports facilities, and working on improving performances in sports and extra-curricular activities. NCC Unit may be established in the University.
Action: Dean SOE, Dept. of Physical Education and Sports, concerned clubs/ cells and members of Parameter-A: Teaching, learning and resources

15. The current status of functioning of Earn While You Learn, Equal Opportunities Cell, IPR Cell, Alumni Association, I-STEM, research projects section may be communicated to the competent authority for necessary improvements, if any.
Action: All concerned faculty/officials

The meeting ended with vote of thanks to the Chairperson and members of the Committee.

(Prof. Tankeshwar Kumar) (Dr. Santosh C. Hulagabali)

(Dr. Manoj Kumar Singh) (Dr. Prakash Kanoo) (Mr. Naresh Kumar)

(Dr. Pawan Maurya) (Dr. Jaswant Kumar) (Dr. Amit Kumar)

(Dr. Usha Nagarajan) (Dr. Rajesh Kumar Dubey) (Dr. Manish Kumar)

(Dr. Ajay Pal) (Dr. Youdvir Singh) (Dr. Payal Chandel)

(Dr. Ajay Bagarsa) (Mr. Shailender Singh)

Annexure-XV

EC No. / Item No./ Institution Name /ID/ Course	Examining Authority / Hospital	Decisions of 370 EC (25.7.2022)
B.Pharm		
371EC/930 HR-116 / 2022-2023 **HARYANA** Maa Saraswati College Of Pharmecy, BHAVDEEN, SIRSA 125054 PCI – 3083 D.Pharm	**D.Pharm** The Secretary, Haryana State Board of Technical Education Bays No. 7-12, Sec – 4, Panchkula – 134 112 **B.Pharm** The Registrar Pt B D Sharma University of Health Sciences Rohtak	930.1 **D.Pharm** Extend approval upto 2022-2023 academic session for 60 admissions for D.Pharm course. 930.4 **B.Pharm** It was noted that institution has failed to submit NOC of State Government for B.Pharm course. In view of above it was decided to reject the application for B.Pharm course.
371EC/931 HR-117 / 2022-2023 **HARYANA** Central University Of Haryana, Village Jant Pali, District Mahendragarh 123031 PCI – 4512 M.Pharm	**M.Pharm** Controller of Examination Central University of Haryana Mahendergarh Haryana	931. **M.Pharm** M.Pharm (Pharmacology) – Nil M.Pharm (Pharmacognosy)-06
371EC/932 HR-118 / 2022-2023 **HARYANA** School of Pharmacy, Lingaya's Vidyapeeth , Nachauli, Jasana – Old Faridabad Road, Faridabad-121002. PCI – 461 D.Pharm B.Pharm M.Pharm (New)	**D.Pharm & B.Pharm** The Registrar Lingayas University Nachauli Old Faridabad Jasana Road Faridabad	932.1 **D.Pharm** D.Pharm course is already approved upto 2022-2023 academic session for 60 admissions. 932.2 **B.Pharm** B.Pharm course is already approved upto 2022-2023 academic session for 60 admissions.

CS and IT <hodcomputerscience@cuh.ac.in>

School Board Meeting on 12-09-2022 at 10:30 A.M. onwards

Dean School Of Basic Sciences <deansobs@cuh.ac.in> Tue, Sep 13, 2022 at 9:12 AM
To: bonnie_kahlon@yahoo.com, talk2pawan@gmail.com, ckjaggi@gmail.com, sukhdeepsingh.cse@dcrustm.org, amitach1@yahoo.com, Amita Chandra <achandra@physics.du.ac.in>, HoD Maths <hodmaths@cuh.ac.in>, HOD Physics <hodphysics@cuh.ac.in>, HOD Statistics <hodstatistics@cuh.ac.in>, CS and IT <hodcomputerscience@cuh.ac.in>, hodgeography@cuh.ac.in, hodchemistry@cuh.ac.in, ssunita@cuh.ac.in, "Dr. Suneel Kumar" <suneelkumar@cuh.ac.in>, harishkumar@cuh.ac.in, Rajeshgupta@cuh.ac.in, mkgupta@cuh.ac.in, keshav@cuh.ac.in, Suraj Arya <surajarya@cuh.ac.in>, jitendra@cuh.ac.in, "Dr. Manish Kumar" <manish.ks@cuh.ac.in>, arunkajla@cuh.ac.in, "Dr. Rakesh Kumar" <rks@cuh.ac.in>, kapilstats@cuh.ac.in, kahlon_s@pu.ac.in, "Dr. Vinod Kumar" <vinodkumar@cuh.ac.in>, akyadav@cuh.ac.in, "Dr. Devendra Kumar" <devendrastats@cuh.ac.in>

Respected Madam/Sir,
First of all I would like to thank all esteemed members of the School Board for attending the meeting. Specially, I would like to pay sincere regards and gratitude to our External Subject Experts for giving valuable suggestions and guidance.
Please find herewith the minutes of the meeting of the School Board held on 12-09-2022 for your kind consideration and approval.

Minutes of Meeting of the School Board of School of Basic Sciences held on 12.09.2022

A meeting of the **School Board of School of Basic Sciences**, Central University of Haryana, Mahendergarh was held on **12.09.2022** at **10:30 A.M.** onwards via offline and online (https://meet.google.com/rvh-ukja-fwm) mode in the office of the Dean, School of Basic Sciences, Central University of Haryana.

The following members were present in the meeting:

1. **Dr. Vinod Kumar** (Chairman)
   Dean, School of Basic Science
   Head, Department of Chemistry
   Central University of Haryana, Mahendergarh
2. **Dr. Keshav Singh Rawat** (Member)
   Head, Department of Computer Science and IT
   Central University of Haryana, Mahendergarh
3. **Dr. Jitendra Kumar** (Member)
   Head, Department of Geography
   Central University of Haryana, Mahendergarh
4. **Dr. Rajesh Kumar Gupta** (Member)
   Head, Department of Mathematics
   Central University of Haryana, Mahendergarh
5. **Dr. Suneel Kumar** (Member)
   Head, Department of Physics & Astrophysics
   Central University of Haryana, Mahendergarh
6. **Prof. Harish Kumar** (Member)
   Department of Chemistry
   Central University of Haryana, Mahendergarh
7. **Prof. Sunita Shrivastava** (Member)
   Department of Physics & Astrophysics
   Central University of Haryana, Mahendergarh
8. **Dr. Manoj Kumar Gupta** (Member)
   Department of Chemistry
   Central University of Haryana, Mahendergarh
9. **Dr. Suraj Arya** (Member)

Department of CS & IT
Central University of Haryana, Mahendergarh

10. **Dr. Manish Kumar** (Member)

Department of Geography
Central University of Haryana, Mahendergarh

11. **Dr. Arun Kajla** (Member)

Department of Mathematics
Central University of Haryana, Mahendergarh

12. **Prof. Pawan Kumar Sharma** (External Subject Expert)
Professor, Department of Chemistry
Kurukshetra University, Kurukshetra, Haryana

13. **Prof. Chandra K. Jaggi** (External Subject Expert)
Professor, Department of Operational Research
Faculty of Mathematical Sciences, DU, Delhi

14. **Prof. Sukhdeep Singh** (External Subject Expert)
Professor, Department of Computer Science & Engg.
DCRUST, Murthal, Sonipat

15. **Prof. Amita Chandra** (External Subject Expert)
Professor, Department of Physics & Astrophysics Joined online
North Campus, DU, Delhi

16. **Prof. Simrit Kahlon** (External Subject Expert)
Professor, Department of Geography
Panjab University, Chandigarh

17. **Prof. Anil Kumar Yadav** (Special Invitee)
Department of Mathematics
Central University of Haryana, Mahendergarh

18. **Dr. Jitendra Kumar** (Special Invitee)
Department of Mathematics
Central University of Haryana, Mahendergarh

19. **Dr. Devendra Kumar** (Special Invitee)
TIC, Department of Statistics
Central University of Haryana, Mahendergarh

At the outset, the Chairman welcomed all the members. The Chairman briefed all members about the past activities and agenda items to be discussed in the meeting.

In the meeting, the following agenda items were deliberated in detail and resolved:

Item No	Description and Recommendation	Annexure
1	Confirmation of the minutes of the meeting of the School Board of School of Basic Sciences held on 14-05-2022.	
	The minutes of the meeting of the School Board of School of Basic Sciences held on 14-05-2022 were confirmed.	**Annexure-1-SOBS**
2	To consider and approve the minutes of the meeting of the Board of Studies (BOS) of the Department of Chemistry, School of Basic Sciences held on 06-09-2022.	
	Resolved that the minutes of the meeting of the Board of Studies	**Annexure-1**

	(BOS) of the Department of Chemistry, School of Basic Sciences held on 06-09-2022, be approved.	
2a	To consider and approve the Scheme and Syllabi of M.Sc. (Chemistry), two-year Programme (w.e.f. Academic Session 2022-2023) as approved in BOS meeting of Department of Chemistry held on 06-09-2022 and to recommend the same to the Academic Council for consideration and approval.	
	Resolved that a revised and updated Scheme and Syllabi of M.Sc. (Chemistry), two-year Programme (w.e.f. Academic Session 2022-2023) as approved in BOS meeting of Department of Chemistry held on 06-09-2022, be approved and recommended the same to Academic Council for consideration and approval.	**Annexure-I-CH**
2b	To consider and approve the Scheme for first three years and Syllabi for second year of Integrated B.Sc.-M.Sc. (Chemistry), a five-year Programme for the batch 2021-2026 as approved in the BOS meeting of Department of Chemistry held on 06-09-2022 and to recommend the same to the Academic Council for consideration and approval.	
	The board noted that the scheme and syllabi for the Integrated B.Sc.-M.Sc. programme was introduced for the first time in the academic session 2021-2022. Based on the feedback from the stakeholders, the scheme is being modified to a minor extent for the purpose of giving a wider choice to the students for opting GE/AECC course which is also in line with the UGC-LOCF 2020. **It was also found that students wanted a wider choice of GE/AECC courses in I-IV semesters which was slightly deviating from the approved scheme. Considering the interest of the students supreme in line with NEP-2020, the students were practically allowed to opt for different GE/AECC courses. Therefore, the same should reflect in the scheme for the students enrolled in the session 2021-2026. Accordingly, the scheme for semesters I-IV is modified with courses categorized and should replace any previously approved scheme.** **Resolved that the Scheme for first three years (with minor modifications in first and second year) and Syllabi for the second year of Integrated B.Sc.-M.Sc. (Chemistry), a five-year Programme for the batch 2021-2026 as approved in BOS meeting of Department of Chemistry held on 06-09-2022, be approved and recommended the same to Academic Council for consideration and approval.**	**Annexure-II-CH**
2c	To consider and approve the Scheme and Syllabi for first three years of integrated B.Sc.-M.Sc. (Chemistry), a five-year Programme (w.e.f. Academic Session 2022-2023) as approved in BOS meeting of Department of Chemistry held on 06-09-2022 and to recommend the same to the Academic Council for consideration and approval.	
	In the light of UGC-LOCF curriculum framework 2020 coupled with the fact that the students at CUH should not be at disadvantage compared to the curriculum being adopted at the national stage, the	**Annexure-III-CH**

	scheme and syllabi of the Integrated B.Sc.-M.Sc. programme have been designed. **Resolved that the Scheme and Syllabi for the first three years of integrated B.Sc.-M.Sc. (Chemistry), a five-year Programme (w.e.f. Academic Session 2022-2023) as approved in the BOS meeting of the Department of Chemistry held on 06-09-2022, be approved and recommended the same to Academic Council for consideration and approval.**	
3.	To consider and approve the minutes of the meetings of the Board of Studies (BOS) of the Department of Computer Science & Information Technology, School of Basic Sciences held on 31-08-2022.	
	Resolved that the minutes of the meeting of the Board of Studies (BOS) of the Department of Computer Science & Information Technology, School of Basic Sciences held on 31-08-2022, be approved.	**Annexure-B**
3a	To consider and approve the Scheme and Syllabi of M.Sc. Data Science, two-year PG Programme (w.e.f. Academic Session 2022-2023) as approved in the BOS meeting of the Department of Computer Science & Information Technology, held on 31-08-2022, and to recommend the same to the Academic Council for consideration and approval.	
	Discussed in detail and suggested the improvement in the course title of Programming for Data Science as "Programming for Data Science using python" in the Scheme and Syllabi of M.Sc. Data Science, two-year PG Programme (w.e.f. Academic Session 2022-2023). **Resolved that the first semester Scheme and Syllabi of M.Sc. Data Science, two-year PG Programme (w.e.f. Academic Session 2022-2023) as approved in the BOS meeting of the Department of Computer Science & Information Technology, held on 31-08-2022, with minor changes as mentioned above be approved and recommended the same to the Academic Council for consideration and approval.**	**Annexure-I-CS**
3b	To consider and approve the Scheme and Syllabi of the Diploma in Computer Hardware & Networking (one-year diploma) (w.e.f. Academic Session 2022-2023) as approved in the BOS meeting of the Department of Computer Science & Information Technology held on 31-08-2022 and to recommend the same to the Academic Council for consideration and approval.	
	Discussed in detail and the board suggested that the Diploma in Computer Hardware & Networking may be offered after the amendments in the university ordinance regarding guidelines of credits for the 12th (10+2)/ UG degree level diploma with updated syllabi.	**Annexure-II-CS**
4.	To consider and approve the minutes of the meeting of the Board	

	of Studies of the Department of Physics and Astrophysics, School of Basic Sciences held on 08-08-2022.	
	Resolved that the minutes of the meeting of Board of Studies of Department of Physics and Astrophysics, School of Basic Sciences held on 08-08-2022, be approved	**Annexure-C**
4a	To consider and approve the scheme and syllabi of M.Sc. (Physics), two-year programme (w.e.f. Academic Session 2022-2023) as approved in BOS meeting of Department of Physics and Astrophysics held on 08-08-2022 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 2022-2023) as approved in BOS meeting of Department of Physics and Astrophysics held on 08-08-2022, be approved and recommended the same to Academic Council for consideration and approval after the incorporation of suggested corrections given below: **i) The name of the course "Solar Energy and Physics of Voltaic" is to be changed as "Fundamentals of Solar Energy".** **ii) In case of "Dissertation" offered to students in Semester IV, it should be explicitly mentioned that a continuous monitoring is required to be done. For that purpose, a minimum of two presentations are to be presented by students during the semester.** **iii) The statement "This scheme supersedes the earlier available schemes before this date" should be added in the Syllabi of M.Sc. (Physics) 2021-23 batch.**	**Annexure-I-PH**
4b	To consider and approve the Scheme and Syllabi of integrated B.Sc.-M.Sc. (Physics), a five-year Programme (w.e.f. Academic Session 2022-2023) as approved in BOS meeting of Department of Physics and Astrophysics held on 08-08-2022 and to recommend the same to Academic Council for consideration and approval.	
	Discussed in detail the Schemes and Syllabi of integrated B.Sc.-M.Sc. (Physics), a five-year Programme w.e.f. Academic Session 2022-2023 (Annexure-IIB-PH)and for 2021-26 batch (Annexure-IIA-PH). **Resolved that the Scheme and Syllabi of integrated B.Sc.-M.Sc. (Physics), a five-year Programme (w.e.f. Academic Session 2022-2023) and for 2021-26 batch as approved in BOS meeting of Department of Physics and Astrophysics held on 08-08-2022, be approved and recommended the same to Academic Council for consideration and approval with subject to implementation of below-mentioned changes:** **i) The number of practical lectures for DSE, mentioned in the schemes of Semester V and Semester VI should be four instead of two.**	**Annexure-IIA-PH** **Annexure-IIB-PH**

	ii) In case of "Dissertation" offered to students in Semester X, it should be explicitly mentioned that a continuous monitoring is required. For that purpose, a minimum of two presentations by each student are required during the semester. **iii) A course related to "Soft Skills" may be added in the list of Ability Enhancement courses that can be offered by Department of Psychology, or Department of Education or Department of English Studies** **iv) The statement "This scheme supersedes the earlier available schemes before this date" should be added in the Syllabi of Integrated B.Sc. M.Sc (Physics) for 2021-26 batch.**	
4c	To consider and approve the Scheme and Syllabi of PhD (Physics), Programme (w.e.f. Academic Session 2022-2023) as approved in BOS meeting of Department of Physics and Astrophysics held on 08-08-2022 and to recommend the same to Academic Council for consideration and approval.	
	Resolved that the Scheme and Syllabi of PhD (Physics), Programme (w.e.f. Academic Session 2022-2023) as approved in BOS meeting of Department of Physics and Astrophysics held on 08-08-2022, be approved and recommended the same to Academic Council for consideration and approval with subject to incorporation of below-mentioned changes: **i) The number of DCEC courses for the PhD (Physics) course work should be three. Therefore, it was decided unanimously to remove the course of "Nanotechnology and Ion Beam".**	**Annexure-III-PH**
5.	To consider and approve the minutes of the meeting of Board of Studies of Department of Mathematics, School of Basic Sciences held on 16-3-2022, 10-05-2022 and 06-09-2022	**Annexure-D1, D2, D3**
	Resolved that the minutes of the meeting of the Board of Studies of Department of Mathematics, School of Basic Sciences held on 16-3-2022, 10-05-2022 and 06-09-2022 be approved.	
5a	To consider and approve the Scheme and Syllabi of 5-years integrated B.Sc.-M.Sc. Mathematics for batch 2021-26 (3-6 Semesters) as approved in BOS meeting of Department of Mathematics held on 10-05-2022 and to recommend the same to the Academic Council for consideration and approval.	
	Resolved that the Scheme and Syllabi of 5-years integrated B.Sc.-M.Sc. Mathematics for batch 2021-26 (3-6 Semesters) as approved in BOS meeting of Department of Mathematics held on 10-05-2022 and 06-09-2022, be approved and recommended the same to Academic Council for consideration and approval.	**Annexure-I-MT**
5b	To consider and approve the Scheme and Syllabi of 5-years integrated B.Sc.-M.Sc. Mathematics for batch 2022-27 (1-6 Semesters) as approved in BOS meeting of Department of	**Annexure-II-MT**

	Mathematics held 10-05-2022 and to recommend the same to the Academic Council for consideration and approval.	
	Resolved that the Scheme and Syllabi of 5-years integrated B.Sc.-M.Sc. Mathematics w.e.f Academic Session 2022-23, as approved in BOS meeting of Department of Mathematics held on 10-05-2022 and 06-09-2022, be approved, and recommended the same to Academic Council for consideration and approval.	
5c	Recommendation on the application dated 07-01-2022 received from Mr. Manish Kumar (Roll no. 191217), Research Scholar, on the recommendation of DRC (**Annexure–III-MT**), Department of Mathematics dated 13-01-2022 and BoS (16-03-2022, **Annexure-D1**).	**Annexure-III-MT**
	The case of Mr. Manish Kumar (Roll no. 191217), Research Scholar was discussed in detail. He got admission in Ph.D. programme on 09-08-2019 and the topic of his research was approved on 19-11-2020 in a meeting of Board of Studies. **After detailed discussion it is resolved that Mr. Manish Kumar (Roll no. 191217), Research Scholar is required to complete a minimum residency period of two years after his topic approval date as per clause no 7.10 and 9f of Ordinance-II(A) 2019 for Ph.D. It is further resolved that the remaining residency period of 10 months 13 days should be completed in one go by Mr. Manish Kumar as per relevant ordinance. This resolution is considered as a special case and will not be treated as a precedence. The board recommends the same to the academic council for further consideration and approval.**	
6.	To consider and approve the minutes of the meeting of the Board of Studies (BOS) of the Department of Statistics, School of Basic Sciences held on 10-05-2022.	
	Resolved that the minutes of the meeting of the Board of Studies (BOS) of Department of Statistics, School of Basic Sciences held on 10-05-2022 be approved.	**Annexure-E**
6a	To get approval for changing the instructions/notes in the course for setting the question papers as approved in minutes of the meeting of BOS of Department of Statistics, School of Basic Sciences held on 10-05-2022.	
	Resolved that changing the instructions/notes in the courses for setting the question papers as approved in minutes of the meeting of BOS of Department of Statistics, School of Basic Sciences held on 10-05-2022, be approved and recommended the same to the Academic Council for consideration and approval.	**Annexure-E**
6b	To consider and approve the Scheme and Syllabi of M.Sc. Data Science, two year Programme (w.e.f. Academic Session 2022-2023)	

	as approved in BOS meeting of Department of Statistics, held on 10-05-2022 and to recommend the same to the Academic Council for consideration and approval.	
	<u>The agenda item 6b is withdrawn</u> as the similar programme i.e. M.Sc. Data Science has been offered by the Department of Computer Science & Information Technology under the same School. **After detailed discussion, the board suggested that the Department of Statistics and Department of Computer Science & Information Technology may start some collaborative and common programmes in near future as per the availability of the faculty members and resources.**	**Annexure-I-ST**
6c	To consider and approve the Scheme and Syllabi of Ph.D. (Statistics) course work (w.e.f. Academic Session 2022-2023) as approved in BOS meeting of Department of Statistics held on 10-05-2022 and to recommend the same to the Academic Council for consideration and approval.	
	Resolved that the revised and updated Scheme and Syllabi of Ph.D. (Statistics) course work (w.e.f. Academic Session 2022-2023) as approved in BOS meeting of Department of Statistics held on 10-05-2022, be approved and recommended the same to Academic Council for consideration and approval.	**Annexure-II-ST**
7.	To consider and approve the Minutes of the Board of Studies (BoS) of the Department of Geography held on 11-05-2022 (Annexure-F1), 23-07-2022 (Annexure-F2) and 24-08-2022 (Annexure-F3).	
	Resolved that the Minutes of the Board of Studies (BoS) of the Department of Geography held on 11-05-2022 (Annexure-F1), 23-07-2022 (Annexure-F2) and 24-08-2022 (Annexure-F3) be approved.	**Annexure-F1, F2, F3**
7a	To consider and approve the syllabus of M.Sc. Geoinformatics programme in the Department of Geography.	
	Resolved that Scheme and Syllabi of M.Sc. Geoinformatics, two-year Programme (w.e.f. Academic Session 2022-2023) as approved in BOS meeting of Department of Geography held on 24-08-2022, be approved and recommended the same to Academic Council for consideration and approval.	**Annexure-I-Geog**
7b	To consider the request of Mr. Sourabh Yadav to continue his Ph.D. program after joining a regular job as recommended by Departmental Research Committee (DRC) held on 20-04-2022 and Board of Studies (BoS) meeting held on 11-05-2022 and to recommend the case for Academic Council.	
	The case of Mr. Sourabh Yadav (Roll no. 200785), Research Scholar was discussed in detail. He got admission in Ph.D. programme on 29-11-2020 and the topic of his research was approved on 26-10-2021 in a meeting of Board of Studies.	**Annexure-II-Geog**

	After detailed discussion it is resolved that Mr. Sourabh Yadav (Roll no. 200785), Research Scholar is required to complete a minimum period of two years after his topic approval date as per clause no 9e and 9f of Ordinance-II(A) for Ph.D 2020. It is further resolved that the remaining period of 1 year 10 months 27 days should be completed in one go by Mr. Sourabh Yadav as per relevant ordinance. This resolution is considered as a special case and will not be treated as a precedence. The board recommends the same to the academic council for further consideration and approval.	
8.	Any other item(s) with the permission of the Chair.	
	No item was discussed	

The meeting ended with thanks to the Chair.

Prof. Vinod Kumar	**Prof. Pawan Kumar Sharma**	**Prof. Chandra K. Jaggi**
Prof. Sukhdeep Singh	**Prof. Amita Chandra**	**Prof. Simrit Kahlon**
Prof. Rajesh Kumar Gupta	**Prof. Suneel Kumar**	**Prof. Harish Kumar**
Prof. Sunita Shrivastava	**Prof. Anil Kumar Yadav**	**Dr. Jitendra Kumar**
Dr. Keshav Singh Rawat	**Dr. Jitendra Kumar**	**Dr. Manoj Kumar Gupta**
Dr. Manish Kumar	**Dr. Arun Kajla**	**Dr. Devendra Kumar**
Dr. Suraj Arya		

Final School Board 2022 Sep.zip

With Warm Regards

अधिष्ठाता / **Dean**
मौलिक विज्ञान पीठ / **School of Basic Sciences**

शैक्षणिक खंड-1, प्रथम मंज़िल / **Academic Block-1, 1st Floor**
हरियाणा केंद्रीय विश्वविद्यालय / **Central University of Haryana**
महेंद्रगढ़ (हरियाणा), भारत १२३०३१ / **Mahendergarh (Haryana), INDIA 123031**

On Mon, Sep 12, 2022 at 9:42 AM Dean School Of Basic Sciences <deansobs@cuh.ac.in> wrote:

Respected Members,
If you are not able to come physically, you may attend the meeting online through the given link at 10:30 AM today:
To join the video meeting, click this link: https://meet.google.com/rvh-ukja-fwm
Otherwise, to join by phone, dial +1 574-217-0888 and enter this PIN: 190 458 039#

Best Regards
अधिष्ठाता / **Dean**
मौलिक विज्ञान पीठ / **School of Basic Sciences**
शैक्षणिक खंड-1, प्रथम मंज़िल / **Academic Block-1, 1st Floor**
हरियाणा केंद्रीय विश्वविद्यालय / **Central University of Haryana**
महेंद्रगढ़ (हरियाणा), भारत १२३०३१ / **Mahendergarh (Haryana), INDIA 123031**

On Tue, Sep 6, 2022 at 7:26 PM Dean School Of Basic Sciences <deansobs@cuh.ac.in> wrote:

Respected Sir/Madam,
Please find attached herewith the agenda items and related documents for your kind consideration and further necessary action.
Annexures from item no 2 to 2c will be shared shortly.
With Regards

School Board Annexures.zip

अधिष्ठाता / **Dean**
मौलिक विज्ञान पीठ / **School of Basic Sciences**
शैक्षणिक खंड-1, प्रथम मंज़िल / **Academic Block-1, 1st Floor**
हरियाणा केंद्रीय विश्वविद्यालय / **Central University of Haryana**
महेंद्रगढ़ (हरियाणा), भारत १२३०३१ / **Mahendergarh (Haryana), INDIA 123031**

On Sat, Sep 3, 2022 at 2:14 PM Dean School Of Basic Sciences <deansobs@cuh.ac.in> wrote:

Esteemed Members of the School Board
School of Basic Sciences
Central University of Haryana
Mahendergarh, Haryana

Respected Sir/Madam,
Greetings from the School of Basic Sciences, Central University of Haryana, Mahendergarh!
I hope you and your family members are safe and sound.
A meeting of **School Board** of the School of Basic Sciences, Central University of Haryana (CUH) is scheduled to be held on **12-09-2022 (Monday)** at **10:30 A.M. onwards** in the office of the undersigned, first floor, Academic Block-1, Central University of Haryana, Mahendergarh. Agenda items of the meeting will be shared shortly via email for your kind consideration.

All members are requested to kindly make it convenient to attend the meeting.

Dr. Kesha Singh Rawat (Head, Department of Computer Science & Informatics) is requested to help in preparing the minutes of the meeting.

All External Experts are requested to share the visit plan so that necessary arrangements can be made accordingly.
TA with Honorarium Bill Form (unfilled) is attached herewith for your kind information.

With Sincere Regards
अधिष्ठाता / **Dean**
मौलिक विज्ञान पीठ / **School of Basic Sciences**
शैक्षणिक खंड-1, प्रथम मंज़िल / **Academic Block-1, 1st Floor**
हरियाणा केंद्रीय विश्वविद्यालय / **Central University of Haryana**
महेंद्रगढ़ (हरियाणा), भारत १२३०३१ / **Mahendergarh (Haryana), INDIA 123031**

CENTRAL UNIVERSITY OF HARYANA
Mahendergarh

Department of Computer Science & Information Technology

Date: 31/08/2022

MINUTES OF MEETING OF THE BOARD OF STUDY OF COMPUTER SCIENCE & INFORMATION TECHNOLOGY HELD ON 31/08/2022

The meeting of the **Board of Study of the department of Computer Science & Information Technology**, Central University of Haryana, Mahendergarh was held on **31/08/2022** at **11:30 am** in the office of the Head, Department of Computer Science and IT.

The following members were present in the meeting:

1. **Dr. Keshav Singh Rawat** (Chairman & HoD)
   Head, Department of Computer Science and IT
   Central University of Haryana, Mahendergarh
2. **Prof. Sonal Chawla** (External Expert)
   Professor, Department of Computer Science & Applications
   Panjab University, Chandigarh
3. **Prof. Yogesh Chaba** (External Expert)
   Professor, Department of Computer Science & Engg.
   Guru Jambheshwar University of Science and Technology,
   Hisar, Haryana
4. **Dr. Suraj Arya** (Special Invitee)
   Assistant Professor, Computer Science and IT
   Central University of Haryana, Mahendergarh

The Chairman welcomed all the members and briefed them about the past activities and also about the agenda items to be discussed in the meeting.

AGENDA ITEM NO:1

To place before the Board of Studies for confirmation the minutes of the meeting of the Board of Studies of the Department of Computer Science & Information Technology Scheduled on 03.05.2022 at 11.00 AM. (Annexure-1)

Decision:

The Minutes of the meeting of the Board of Studies were confirmed. (Annexure-1)

AGENDA ITEM NO:2

To place before the Board of studies for approval to start M.Sc. Data Science (Two-year Post-graduate programme) in the Computer Science & Information Technology department. The Scheme and Syllabi of the M.Sc. Data Science has been prepared as per the university ordinance and attached for approval in annexure-2.

31.08.2022 31/08/2022 31/8/22 31.08.2022

Decision:

The Board of studies appreciated the effort made by the department for starting the M.Sc. Data Science and approved the Scheme and Syllabi of the M.Sc. Data Science (Two-year Post-graduate programme). Subject Experts were of the opinion that the revisions made by the department from time to time in the Scheme and Syllabi **of different courses of the M.Sc. Data Science and should report to the upcoming BOS meetings.**

(Annexure-2)

AGENDA ITEM NO:3

To place before the Board of studies for approval to start a one-year PG Diploma in Computer Hardware & Networking in the Computer Science & Information Technology department. The Scheme and Syllabi of the One-year Diploma in Computer Hardware & Networking have been prepared and attached for approval in annexure-3.

Decision:

The Board of studies approved the Scheme and Syllabi of the One-year Diploma in Computer Hardware & Networking in the department of Computer Science & Information Technology as per Annexure -3.

AGENDA ITEM NO:4

To place before the Board of studies for approval the minutes of the meeting of DRC (Departmental Research Committee) of Computer Science & Information Technology held on 18/08/2022. The faculty members of Computer Science & Information Technology have been approved by the DRC (Departmental Research Committee) as per university ordinance as Ph.D. supervisors to guide Ph.D. in the Department of Computer Science & Information Technology as per Annexure-4.

Decision:

The Board of studies approved the minutes of the meeting of the DRC (Departmental Research Committee) of Computer Science & Information Technology held on 18/08/2022 and approved the faculty members of Computer Science & Information Technology to guide Ph.D. in the department as per Annexure-4.

AGENDA ITEM NO:5

Any other item with the permission of the chair

No item was discussed.

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

31.08.2022

Dr. Suraj Arya
(Special Invitee)

Prof. Yogesh Chaba
(External Expert)

31/08/2022

Prof. Sonal Chawla
(External Expert)

31.08.22

Dr. Keshav Singh Rawat
(Chairman & HoD)

CENTRAL UNIVERSITY OF HARYANA
(*Established under the Central Universities Act, 2009*)
(NAAC Accredited 'A' Grade)



CBCS Based
Curriculum and Syllabi
of
M.Sc. Data Science
(Two-Year Post-Graduate Program)
(w.e.f. August, 2022)

DEPARTMENT OF COMPUTER SCIENCE AND INFORMATION TECHNOLOGY

SCHOOL OF BASIC SCIENCES

CENTRAL UNIVERSITY OF HARYANA

SCHOOL OF BASIC SCIENCES

DEPARTMENT OF COMPUTER SCIENCE AND INFORMATION TECHNOLOGY

Scheme & Syllabi of M.Sc. Data Science (Two-Year PG Programme)

Total Credit = 100

Semester Wise Distribution of Credits: 26 + 26 + 24 +24

Eligibility for Admission:

Passed B.C.A/ B.Sc. (Computer Science)/ B.Sc. (IT) / B.E. (CSE)/ B.Tech. (CSE) / B.E. (IT) / B.Tech. (IT) or equivalent Degree.

OR

Passed any graduation degree (e.g.: B.E. / B.Tech. / B.Sc / B.Com. / B.A./ B. Voc./ etc.,) with Mathematics at 10+2 level or at Graduation Level Obtained at least 50% marks (45% marks in case of candidates belonging to reserved category) in the qualifying examination. (The students admitted with this eligibility will have to simultaneously undertake additional Bridge Course(s) as prescribed by the University during the first year).

* *Reservation policy, Fee etc as per CU Haryana rules.*

Intake: 30

Category-wise Credit distribution

Category	Credits
• Programme core	80
• Departmental elective	12
• General elective	08

Bridge Course (0-credit)

Sr. No	Course No	Course Name	Course Code	Course Type	Credit
1.	CSP-BC01	Fundamentals of Computer Science	SBS CS 030120 C 3014	Bridge Course	0
2.	CSP-BC02	C Programming	SBS CS 030121 C 3014	Bridge Course	0
3.	CSP-BC03	C Programming Lab	SBS CS 030122 C 0042	Bridge Course	0

Note: It is compulsory for each student of **non-computer background** to pass out Bridge Course(s) during the first year only (Two additional theory papers and one practical as prescribed in the scheme of Bridge Course). Papers under Bridge Course will be taught only in the 1st semester.

Semester: Ist

						Total 100	
Sr. No	**Course No**	**Course Name**	**Course Code**	**Course Type**	**Credit**	**Internal Marks**	**External Marks**
1.	CSP-01	Linear Algebra and Statistical Techniques	SBS CS 030101 C 3014	Core	**4**	30	70
2.	CSP-02	Data Structures and Algorithms	SBS CS 030102 C 3014	Core	**4**	30	70
3.	CSP-03	Programming for Data Science using Python	SBS CS 030103 C 3014	Core	**4**	30	70
4.		General Elective Course-II (To be taken from another department)		Elective	**4**		
5.		Departmental Elective		Elective	**4**	30	70
6.	CSP-04	Inferential Statistics Lab	SBS CS 030104 C 0042	Core	**2**	15	35
7.	CSP-05	Data Structures and Algorithms Lab	SBS CS 030105 C 0042	Core	**2**	15	35
8.	CSP-06	Programming for Data Science using Python Lab	SBS CS 030106 C 0042	Core	**2**	15	35
					Total Credit = 26		

Semester IInd

						Total 100 (70+30) Total=50 (35+15)	
Sr. No	**Course No**	**Course Name**	**Course Code**	**Course Type**	**Credit**	**Internal Marks**	**External Marks**
1.	CSP-07	Big Data Analytics	SBS CS 030207 C 3014	Core	**4**	30	70
2.	CSP-08	Scalable Database Systems	SBS CS 030208 C 3014	Core	**4**	30	70
3.	CSP-09	Machine Learning	SBS CS 030209 C 3014	Core	**4**	30	70
4.		General Elective Course-II (To be taken from another department)		Elective	**4**	30	70
5.		Departmental Elective		Elective	**4**		
6.	CSP-10	Scalable Database Systems Lab	SBS CS 030210 C 0042	Core	**2**	15	35
7.	CSP-11	Big Data Analytics Lab	SBS CS 030211 C 0042	Core	**2**	15	35
8.	CSP-12	Machine Learning Lab	SBS CS 030212 C 0042	Core	**2**	15	35
					Total Credit = 26		

Semester: IIIrd

						Total 100 (70+30) Total=50 (35+15)	
Sr. No	**Course No**	**Course Name**	**Course Code**	**Course Type**	**Credit**	**Internal Marks**	**External Marks**
1.	CSP-13	Time Series Analysis and Forecasting	SBS CS 030313 C 3014	Core	**4**	**30**	**70**
2.	CSP-14	Data Visualization & Reporting	SBS CS 030314 C 3014	Core	**4**	**30**	**70**
3.	CSP-15	Data Warehousing and Data Mining	SBS CS 030315 C 3014	Core	**4**	**30**	**70**
4.		Departmental Elective		Elective	**4**	**30**	**70**
5.	CSP-16	Time Series Analysis Lab	SBS CS 030316 C 0042	Core	**2**	**15**	**35**
6.	CSP-17	Data Visualization Lab	SBS CS 030317 C 0042	Core	**2**	**15**	**35**
7.	CSP-18	Pre-Dissertation	SBS CS 030318 C 0042	Core	**4**	**30**	**70**
	Total Credit = 24						

Semester: IVth

						Total marks 600	
Sr. No	**Course No**	**Course Name**	**Course Code**	**Course Type**	**Credit**	**Internal Marks**	**External Marks**
1.	CSP-20	Dissertation	SBS CS 030419 C 002424	Core	24	240	360
	Total Credit = 24						

List of Departmental Elective Courses of Ist semester:					
S.No	**Course Name**	**Course Code**	**Credit**	**Internal Marks**	**External Marks**
1.	Queuing Theory and Network Analysis	SBS CS 030101 E 3014	**4**	**30**	**70**
2.	Graph Theory & Stochastic Processes	SBS CS 030102 E 3014	**4**	**30**	**70**
3.	Artificial Intelligence	SBS CS 030103 E 3014	**4**	**30**	**70**
4.	Software Engineering	SBS CS 030104 E 3014	**4**	**30**	**70**
	List of Departmental Elective Courses of IInd Semester				
5.	Statistical NLP	SBS CS 030205 E 3014	**4**	**30**	**70**
6.	Data science for Deep learning	SBS CS 030206 E 3014	**4**	**30**	**70**
7.	Neural Networks and Fuzzy systems	SBS CS 030207 E 3014			
8.	Data Science for Internet of Things	SBS CS 030209 E 3014	**4**	**30**	**70**
	List of Departmental Elective Courses of IIIrd Semester				
9.	Management Information System	SBS CS 030310 E 3014	**4**	**30**	**70**
10.	Optimization Techniques	SBS CS 030311 E 3014	**4**	**30**	**70**
11.	Quantum Computing	SBS CS 030313 E 3014			
12.	Distributed System	SBS CS 030314 E 3014	**4**	**30**	**70**

Bridge course

<table>
<tr><td rowspan="2">Scheme Version:

2022-2023</td><td rowspan="2">Name of the Subject:

Fundamental of Computer Science (Bridge course)</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>-</td><td>0</td><td>Total Hours:46</td></tr>
<tr><td rowspan="2">Subject Code: SBS CS 030120 C 3014</td><td rowspan="2">Applicable to Programs:

M.Sc. Data Science</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:Basic Fundamentals of Computer Science.</td></tr>
<tr><td>Course Description</td><td colspan="7">To introduce knowledge on basics of fundamental of computer science and various aspects of computational theory, programming, algorithm design, andoptimization, network and database management, mobile technologies, electronics and mathematics.</td></tr>
<tr><td>Course Objectives</td><td colspan="7">This course aims to give students an in-depth understanding of why computers are essential components in business, education and society. This course will provide hands-on use of Microsoft Office applications Word, Excel, Access and PowerPoint.</td></tr>
<tr><td>Course Outcomes:</td><td colspan="7">Upon successful completion of the course students will be able to:

COB010101.1 Learn about the fundamental concepts of computer.</td></tr>
</table>

	COB010101.2 To understand the role of Internet and IPV4 and IPV6. COB010101.3 Apply the binary logics to solve the problems. COB010101.4 Analyse Boolean logics and truth table. COB010101.5 Evaluate tasks like compose, format and edit a word document and other office software	
	COURSE SYLLABUS	
Unit No.	Content of Each Unit	Hours of Each Unit
1.	Overview of Computer System: [Course Outcome (s): COB010101.1] Evolution of Computer Systems, Generations of Computers, Parts of Computer System, Categories of Computers, Computer System Characteristics, Computer Hardware. Working of input & output devices: keyboard, mouse, trackball, pen, touch screens, scanner, digital camera, monitor, and printer. Working of storage devices: magnetic tape, magneticdisk, CD, DVD. Software- System & Application.	11
2.	The Internet: [Course Outcome (s): COB010101.2] Introduction to networks and internet, history, Working of Internet, Internet Congestion, Modes of Connecting to Internet, Internet Service Providers (ISPs), Internet addressing, comparison of IPv4 and IPv6.	10
3.	Information Representation: [Course Outcome (s): COB010101.3 & COB010101.4] Number systems,BCD codes, character codes, error detecting and correcting codes, fixed-point and floating-point representation of information. Binary arithmetic operations, Booths multiplication. Binary Logic: Boolean algebra, Boolean functions, Truth Tables, Canonical and Standard forms, Simplification of Boolean functions, Digital logic gates.	12

4.	Office Automation Tools Word Processing: [Course Outcome (s): COB010101.5] Editing features, formatting features, saving, printing, table handling, page settings, spell-checking, macros, mail-merge, and equation editors. Excel/Access Power Point Slides: Templates, views, formatting slide, slides with graphs, animation, using special features, presenting slide shows.	13

REFERENCE BOOKS

1. Norton, P., *Introduction to Computers*, Mc-Graw-Hill, 2017.

2. Raja, Raman V., *Fundamental of Computers*, Prentice Hall of India, 2014.

3. Sanders, D. H., *Computer Today*, Mc-Graw Hill, 1988.

4. Sinha, P.K. and Sinha, P., *Computer fundamentals*, BPB Publications, 2010.

5. Vermaat, M.E., *Discovering Computers & Microsoft Office 2013: A Fundamental Combined Approach*, Cengage Learning, 2013.

<table>
<tr><td rowspan="2">Scheme Version:

2022-2023</td><td rowspan="2">Name of the Subject:

Programming using C

(Bridge Course)</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>0</td><td>Total Hours:46</td></tr>
<tr><td rowspan="2">Subject Code: SBS CS 030121 C 3014</td><td rowspan="2">Applicable to Programs:

M.Sc Data Science</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:Basic Operating System and Shell Programming.</td></tr>
<tr><td>Course Description</td><td colspan="7">To introduce knowledge on basics of fundamental of computer science and various aspects of computational theory, programming, algorithm design, andoptimization, network and database management, mobile technologies, electronics and mathematics</td></tr>
<tr><td>Course Objectives</td><td colspan="7">The course is designed to provide knowledge of C language. Students will be able to develop logics which will help them to create programs, applications in C. Also by learning the basic programming constructs they can easily switch over to any other language in future. Student will learn the fundamental programming concepts and methodologies.</td></tr>
</table>

Course Outcomes:	Upon successful completion of the course students will be able to: COB010103.1 Learn the basic concepts of programs connecting decision structures, loops and functions. COB010103.2 Understand the difference between call by value and call by address. COB010103.3 Apply the dynamic behaviour of memory by the use of pointers. COB010103.4 Analyse the arrays and difference between structure and union. COB010103.5 Evaluate the result based on array, structure and union.	
	COURSE SYLLABUS	
Unit No.	Content of Each Unit	Hours of Each Unit
1.	Elements of C: [Course Outcome (s): COB010103.1] character set identifier and keywords, data type, declaration and definition. Operators: arithmetic, relational, logical, bit wise, unary, assignment and conditional operators their hierarchy arid associativity.	10
2.	Control statements: [Course Outcome (s):COB010103.2] sequencing, selection, if and switch statement; repetition / loop statements: for, while, and dowhile loops; break, continue and goto statements.	12
3.	Function: [Course Outcome (s): COB010103.2] definition, declaration, and calling, call by value, call by reference prototype, passing parameters, actual and formal parameters, recursion.	10

4.	Data Structures: [Course Outcome (s): COB010103.4 & COB010103.5] arrays, structure, structure members, access to structure members union, string, data files. Pointer: declaration, operation of pointers, array to pointers, pointers to arrays.	14

REFERENCE BOOKS

1. *E. Balagurusamy, "Programming with ANSI-C", Fourth Edition,2008, Tata McGraw Hill.*

2. Gottfried, B.S., *Programming with C*., McGraw Hill Education, 2018.

3. Hanly, J. R., Koffman, E.B. , *Problem Solving and Program Design in C*, 8th edition., Pearson Publications, 2015.

4. Kanetkar, Y., *Let Us C*, 16th Edition, BPB Publication, 2017.

5. Kelley, A., Pohl, I., *A Book on C: Programming in C*, Addison Wesley, 2000.

6. Kernighan, B.W. and Ritchie D., *The C Programming Language,* Pearson Publications, 2015.

Semester: Ist

Scheme Version: 2022-2023	Name of the Subject: Linear Algebra and Statistical Techniques	L	T	P	C	Semester: (Year)	Contact hours per week: 4
		4	0	-	0		Total Hours:46
SBS CS 030101 C 3014	Applicable to Programs: M.Sc Data Science	Evaluation (Total Marks): 100	CIE	30 Marks	Examination Duration: 3hours		
			TEE	70 Marks	Pre-requisite of course:		

	COURSE SYLLABUS	
Unit No.	Content of Each Unit	Hours of Each Unit
1.	Vector Spaces and Subspaces, Basis and dimension of a vector space, Determinants, Properties of the Determinant. Eigenvalues and eigenvectors, Diagonalization of a Matrix, Complex Matrices, Similarity Transformation, Test for positive definiteness, Singular Value Decomposition.	10
2.	Errors in Computations, Computing Norm, Inner product and solution of Triangular System, Efficiency and stability of an Algorithm, Conditioning, Perturbation Analysis. LU Factorization Methods, Effects of the condition number on accuracy, computing and estimating the condition number QR factorization.	10
3	Axioms of Probability, Conditional Probability & Independence, Random Variables, Continuous Random Variables, Survey Sampling.	10

4	Estimation of Parameters & Fitting of Probability Distributions, measures of central tendency and dispersion. Covariance, correlation, regression etc. Testing Hypotheses & Assessing Goodness of Fit, The Analysis of Variance using F test, The Analysis of Categorical Data using Fisher's exact test and the Chi-square test of homogeneity and independence.	10

REFERENCE BOOKS

1. Gilbert Strang, Introduction to linear algebra, 5/e., Wellesley-Cambridge, 2016.
2. David C. Lay, Linear Algebra and Its Applications, Pearson, 5/e 2019.
3. Nick Fieller, "Basics of Matrix Algebra for Statistics with R", published in 2015, CRC Press
4. S. Ross, A First Course in Probability, 8th Edition, Pearson Education, 2010.
5. J. A. Rice, Mathematical Statistics and Data Analytics, 3rd Edition, Cengage Learning, 2013.
6. Nabil Nassif, Jocelyne Erhel, Bernard Philippe, Introduction to Computational Linear Algebra, CRC press, 2015.

Scheme Version: 2022-2023	Name of the Subject: Data Structures & Algorithms	L	T	P	C	Semester: I(1st Year)	Contact hours per week: 4
		3	1	-	0		Total Hours:46
SBS CS 030102 C 3014	Applicable to Programs: M.Sc. (Data Science)	Evaluation (Total Marks): 100	CIE	30 Marks	Examination Duration: 3 hours		
			TEE	70 Marks	Pre-requisite of course: knowledge of programming languages and basics of mathematics		

	COURSE SYLLABUS	
Unit No.	Content of Each Unit	Hours of Each Unit
1.	Basics and Introduction To Data Structure: [Course Outcome (s): COB030102.1] Basics: Algorithm Specifications: Performance Analysis and Measurement (Time and space analysis of algorithms-Average, best and worst case analysis). Introduction: Basic Terminology, Data structures and its classification, Representation and Analysis of Arrays, Single and Multidimensional Arrays, Address calculation, Linear Search, Binary Search of Array, Traversing, Insertion & deletion in array, Sparse Matrices, Sorting.	10
2.	Linear Data Structure: [Course Outcome (s): COB030102.2] Linked List Introduction, Representation of linked list in to memory, Memory allocation -Garbage Collection, Traversing & Searching in Linked List, Insertion into linked list- at beginning of list &	10

	at given location, Deletion in linked list- from starting of list & given location of node, Header Linked List, two way List, Input & output restricted liked list, Circular Header Linked List, Representation of Polynomials using linked List.	
3	Nonlinear Data Structure [Course Outcome (s): COB030102.3] Stack, Array Implementation of stack, Linked Representation of Stack, Application of stack: Conversion of Infix to Prefix and Postfix Expressions and Expression evaluation. Queue, Array and linked implementation of queues, Circular queues, D-queues and Priority Queues.	08
4	Sorting, Searching, Hashing and File Structures [Course Outcome (s): COB030102.4] Trees: Basic terminology, Binary Trees, algebraic Expressions, Complete Binary Tree, Extended Binary Trees, Array and Linked Representation of Binary trees, Traversing Binary trees, Threaded Binary trees, Binary Search Tree (BST), AVL Trees, B-trees. Graphs: Introduction, Sequential Representations of Graphs, Adjacency Matrices, Traversal, Connected Component and Spanning Trees, Minimum Cost Spanning Trees. Searching & Hashing: Sequential search, binary search, Hash Table, Hash Functions, Collision Resolution Strategies.	12

REFERENCE BOOKS

1. Lipschutz: Data Structures (Schaum's Outline Series), Tata McGraw-Hill.
2. Horowitz and Sahani, "Fundamentals of data Structures", Galgotia Publication Pvt. Ltd., N Delhi.
3. A.M. Tenenbaum, "Data Structures using C & C++", Prentice-Hall of India Pvt. Ltd., New Delhi.
4. Trembley and Sorenson, "Data Structures", TMH Publications

Scheme Version: 2022-2023	Name of the Subject: Programming for Data Science	L	T	P	C	Semester: I(1st Year)	Contact hours per week: 4
		3	1	-	0		Total Hours:46
SBS CS 030103 C 3014	Applicable to Programs: M.Sc. (Data Science)	Evaluation (Total Marks): 100	CIE	30 Marks	Examination Duration: 3 hours		
			TEE	70 Marks	Pre-requisite of course: Understanding of Data, Algorithms, Programming Language		

	COURSE SYLLABUS	
Unit No.	Content of Each Unit	Hours of Each Unit
1.	Getting Started with Python: Introduction, Basic data types, Variables, Integers, Floating Points, Boolean types and Strings; Control Structures: if, if-elif-else, for, while, break, continue. Data Structures: Lists, Tuples, Sets, and Dictionaries; Functions: Defining functions, Calling functions, Passing arguments, Keyword arguments, Default arguments, Variable-length arguments, Anonymous functions, Function returning values, Scope of the variables in a function, User defined functions.	12 Hours
2.	Object Oriented Programming: Features, classes and objects, creating class and object, Using a class & its methods; Exception Handling: Errors, Types of exception, try, except and finally, assertion.	8 Hours
3	Modules & Packages: Creating modules, Import statement, from ... import statement, name spacing; Creating user defined packages; Numpy: Introduction, Creating of arrays and matrices; File Handling: Handling of csv file.	10 Hours

4	Introduction to Panda: Creating a data frame, Dealing with row & columns, Indexing & selection data, Working with missing data, Iterating over rows and columns; Merging and joining DataFrame objects, Concatenation, Reshaping DataFrame objects, Pivoting, Data transformation, permutation & sampling, Data aggregation and GroupBy operations; Creating data frame from CSV file; Introduction to scikit-learn: Fundamental of scikit-learn; Loading data set, Splitting of data set; Matplotlib: Creating effective visual representations of your data, Avoiding common pitfalls.	10 Hours

REFERENCE BOOKS

1. J. V. Guttag, Introduction to CoMputation and PrograMMing Using Python, with Application to Understanding Data, 2nd Edition, PHI Learning, 2016.
2. W. McKinney, Python for Data Analysis: Data Wrangling with Pandas, NuMPy, and Ipython, 2nd Edition, O'Reilly Media, 2017.
3. R. N. Rao, Core Python PrograMMing, 2nd Edition, Dreamtech Press, 2018.

Semester: IInd

Scheme Version: 2022-2023	**Name of the Subject:** Big Data Analytics	**L**	**T**	**P**	**C**	**Semester:** Ist Semester	**Contact hours per week:** 4
		4	**0**	**-**	**0**		**Total Hours:**46
Subject Code: SBS CS 030207 C 3014	**Applicable to Programs:** M.Sc Data Science	**Evaluation (Total Marks):** 100	**CIE**	**30 Marks**	**Examination Duration: 3 hours**		
			TEE	**70 Marks**	**Pre-requisite of course:** Knowledge of relational database management system		

	COURSE SYLLABUS	
Unit No.	**Content of Each Unit**	**Hours of Each Unit**
1.	Big Data Analytics Introduction to Big Data: Platform – Traits of Big data -Challenges of Conventional Systems - Web Data – Evolution of Analytic Scalability - Analytic Processes and Tools - Analysis vs Reporting - Modern Data Analytic Tools - Statistical Concepts: Sampling Distributions - ReSampling - Statistical Inference - Prediction Error.	**10**
2.	Data Analysis: Regression Modeling - Multivariate Analysis - Bayesian Modeling - Inference and Bayesian Networks - Support Vector and Kernel Methods - Analysis of Time Series: Linear Systems Analysis - Nonlinear Dynamics - Rule Induction - Neural Networks: Learning And Generalization - Competitive Learning - Principal Component Analysis and Neural Networks - Fuzzy Logic: Extracting Fuzzy Models from Data - Fuzzy Decision Trees - Stochastic Search Methods.	**10**

3	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. Frequent Itemsets And Clustering: Mining Frequent Item sets - Market Based Model – Apriori Algorithm – Handling Large Data Sets in Main Memory – Limited Pass Algorithm – Counting Frequent Itemsets in a Stream – Clustering Techniques – Hierarchical – K-Means – Clustering High Dimensional Data – CLIQUE and PROCLUS – Frequent Pattern based Clustering Methods – Clustering in NonEuclidean Space – Clustering for Streams and Parallelism.	**10**
4	Frameworks And Visualization: MapReduce – Hadoop, Hive, MapR – Sharding – NoSQL Databases - S3 - Hadoop Distributed File Systems – Visualizations - Visual Data Analysis Techniques - Interaction Techniques; Systems and Analytics Applications - Analytics using Statistical packages-Approaches to modeling in Analytics – correlation, regression, decision trees, classification, association Intelligence from unstructured information-Text analyticsUnderstanding of emerging trends and technologies-Industry challenges and application of Analytics.	**10**

REFERENCE BOOKS

1. Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer, 2007.
2. AnandRajaraman and Jeffrey David Ullman, "Mining of Massive Datasets", Cambridge University Press, 2012.
3. Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", John Wiley & sons, 2012.
4. Glenn J. Myatt, "Making Sense of Data", John Wiley & Sons, 2007
5. Pete Warden, "Big Data Glossary", O'Reilly, 2011.

<table>
<tr><td rowspan="2">Scheme
Version:

2022-2023</td><td rowspan="2">Name of the Subject:
Scalable Database System</td><td>L</td><td>T</td><td>P</td><td>C</td><td rowspan="2">Semester:

(Year)</td><td>Contact hours per week: 4</td></tr>
<tr><td>4</td><td>0</td><td>-</td><td>0</td><td>Total Hours:46</td></tr>
<tr><td rowspan="2">SBS CS 030208 C 3014</td><td rowspan="2">Applicable to Programs:
M.Sc Data Science</td><td rowspan="2">Evaluation (Total Marks): 100</td><td>CIE</td><td>30 Marks</td><td colspan="3">Examination Duration: 3hours</td></tr>
<tr><td>TEE</td><td>70 Marks</td><td colspan="3">Pre-requisite of course:</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">Managing Data - A Historical Perspective - File System versus DBMS Advantages of a DBMS - Describing and Storing data in a DBMS - Queries in a DBMS - Transaction Management - Structure of a DBMS.</td><td colspan="2">11</td></tr>
<tr><td>2.</td><td colspan="5">Database Design & ER diagrams - Entities, Attributes and Entity Sets - Relationships and Relationship Set - Additional features of the ER model - Conceptual Database design with ER Model.</td><td colspan="2">13</td></tr>
<tr><td>3</td><td colspan="5">Relational Model: Introduction - Integrity Constraints Over Relations - Enforcing Integrity Constraints on Relational Data - Logical Database Design: ER to Relational - Introduction to Views - Destroying / Altering Tables and Views - Relational Algebra and Calculus.</td><td colspan="2">12</td></tr>
</table>

4	SQL Queries, Constraints, Triggers: The form of a Basic SQL Query - UNION, INTERSECT and EXCEPT - Nested Queries - Aggregate Operators - Null Values - Complex integrity constraints in SQL - Triggers and Active Data bases – Query Evaluation. PL/SQL Programming: Functions and Procedures, Triggers, Queries, Forms, Reports, Cursors, Exceptions. Introduction to NoSQL – Types.	10

Reference Books:

1. Raghu Ramakrishnan and Johannes Gehrke (2003). Database Management System, Third edition, McGraw-Hill.

2. Abraham Silberschatz, Henry F. Korth and Sudarshan S (2005). Database System Concepts, 5/e, McGraw- Hill.

3.Date CJ (2003). An Introduction to Database Systems, 8/e, Pearson Education.

4.Michael Mclaughlin, (2010). Oracle Database 11g PL/SQL Programming, McGraw Hill.

Shashank Tiwari (2011). Professional NoSQL, John Wiley & Sons

Scheme Version: 2022-2023	Name of the Subject: Machine Learning	L	T	P	C	Semester: I(1st Year)	Contact hours per week: 4
		3	1	-	0		Total Hours:46
SBS CS 030209 C 3014	Applicable to Programs: M.Sc. Data Science	Evaluation (Total Marks): 100	CIE	30 Marks	Examination Duration: 3 hours		
			TEE	70 Marks	Pre-requisite of course: Linear algebra, Trigonometry, Calculus		

	COURSE SYLLABUS	
Unit No.	Content of Each Unit	Hours of Each Unit
1.	Introduction to Machine Learning: [Course Outcome (s): COB030108.1] Introduction, Types of machine learning, supervised learning-Basics, Over fitting the training data. Nearest Neighbor Methods, Validation: Nearest neighbor prediction, K-nearest neighbor methods, Weighted neighbor methods, the curse of dimensionality, Computational considerations, Connection to density estimation. Bayesian Classifiers, Naive Bayes classifier, Classifiers and Error Rates	12
2.	Linear and Logistic Regression: [Course Outcome (s): COB030108.2] Linear regression: Optimization, Increasing the number of features, Over fitting and method Selection, linear classification: Characterizing a linear classifier, Training a linear classifier Logistic regression: Model, Classification, Problem of over-fitting, Applications	10

3	Support vector machines and Decision Trees (s):[Course Outcome (s): COB030108.3] Support vector machines (SVMs), Linear SVM, Lagrangian optimization and duality, The soft margin SVM, The kernel Trick, VC dimension Decision Trees: Predictor form, Training Decision trees, Decision tree classifiers, Learning Decision trees, Decision stumps.	10
4	Ensemble Methods and Clustering (s): [Course Outcome (s):COB030108.4] Ensemble Methods: Stacking, Bagging and Boosting Clustering: K-means, Agglomerative, Gaussian Mixtures and EM	08

Reference Books

1. Hastie, Tibshirani, and Friedman, The Elements of Statistical Learning
2. Barber, Bayesian Reasoning and Machine Learning
3. Mitchell, Machine Learning
4. Chrisopher Bishap, Pattern Recognition and Machine Learning, Springer,2006

Semester IIIrd

<table>
<tr><td rowspan="2">Scheme Version:

2022-2023</td><td rowspan="2">Name of the Subject:
Time Series Analysis and Forecasting</td><td>L</td><td>T</td><td>P</td><td>C</td><td rowspan="2">Semester:

Ist Semester</td><td>Contact hours per week: 4</td></tr>
<tr><td>4</td><td>0</td><td>-</td><td>0</td><td>Total Hours:46</td></tr>
<tr><td rowspan="2">Subject Code: SBS CS 030313 C 3014</td><td rowspan="2">Applicable to Programs:
M.Sc Data Science</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: Knowledge of statistics Techniques.</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">Stochastic process and its main characteristics Stochastic process. Time series as a discrete stochastic process. Stationarity. Main characteristics of stochastic processes (means, autocovariation and autocorrelation functions). Stationary stochastic processes. Stationarity as the main characteristic of stochastic component of time series. Wold decomposition. Lag operator.</td><td colspan="2">11</td></tr>
<tr><td>2.</td><td colspan="5">Moving average models MA(q). Condition of invertability. Autoregressive models AR(p). Yull-Worker equations. Stationarity conditions. Autoregressive-moving average models ARMA (p,q).</td><td colspan="2">13</td></tr>
</table>

3	Coefficients estimation in autoregressive models. Coefficient estimation in ARMA (p) processes. Quality of adjustment of time series models. AIC information criterion. BIC information criterion. "Portmonto"-statistics. Box-Jenkins methodology to identification of stationary time series models.	**12**
4	The unit root problem. Spurious trends and regressions. Unit root tests (Dickey-Fuller). ADF test and the choice of the number of lags. Other unit root tests.	**10**

REFERENCE BOOKS

1. Econometric Views 4.0 User's Guide. Quantitative Micro Software, LLC.
2. Banerjee, A., J.J. Dolado, and D.V. Hendry. Co-Integration, Error Correction, and Econometric Analysis of Non-Stationary Data. Oxford University Press, 1993
3. Maddala, G.S. And Kim In-Moo. Unit Roots, Cointegration, and Structural Change. Cambridge University Press, 1998
4. P. J. Brockwell, R. A. Davis, Introduction to Time Series and Forecasting. Springer, 1996
5. J. Johnston, J. DiNardo. Econometric Methods. McGraw-Hill, 1997.

<table>
<tr><td rowspan="2">Scheme Version:

2022-2023</td><td rowspan="2">Name of the Subject:

Data Visualization and Reporting</td><td>L</td><td>T</td><td>P</td><td>C</td><td rowspan="2">Semester:

(Year)</td><td>Contact hours per week: 4</td></tr>
<tr><td>4</td><td>0</td><td>-</td><td>0</td><td>Total Hours:46</td></tr>
<tr><td rowspan="2">SBS CS 030314 C 3014</td><td rowspan="2">Applicable to Programs:

M.Sc Data Science</td><td rowspan="2">Evaluation (Total Marks): 100</td><td>CIE</td><td>30 Marks</td><td colspan="3">Examination Duration: 3hours</td></tr>
<tr><td>TEE</td><td>70 Marks</td><td colspan="3">Pre-requisite of course:</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">Introduction Context of data visualization: Definition, Methodology, Visualization design objectives. Key Factors: Purpose, visualization function and tone, visualization design options: Data representation, Data Presentation, Seven stages of data visualization, widgets, data visualization tools</td><td colspan="2">11</td></tr>
<tr><td>2.</td><td colspan="5">Visualizing Data Methods Mapping, Time series, Connections and correlations, Scatterplot maps, Trees, Hierarchies and Recursion, Networks and Graphs, Info graphics</td><td colspan="2">13</td></tr>
<tr><td>3</td><td colspan="5">Visualizing Data Process Acquiring data, Where to Find Data, Tools for Acquiring Data from the Internet, Locating Files for Use with Processing, Loading Text Data, Dealing with Files and Folders, Listing Files in a Folder, Asynchronous Image Downloads, Advanced Web Techniques, using a Database, Dealing with a Large Number of Files.</td><td colspan="2">12</td></tr>
</table>

4	Parsing data Levels of Effort, Tools for Gathering Clues, Text Is Best, Text Mark-up Languages, Regular Expression, Grammars and BNF Notation, Compressed Data, Vectors and Geometry, Binary Data Formats, Advanced Detective Work.	10

Reference Books:

1. "Interactive data visualization for the web", Scott Murray, O'Reilly Media, Inc., 2013.
2. "Visualizing Data", Ben Fry, O'Reilly Media, Inc., 2007.
3. "Security Data Visualization: Graphical Techniques for Network Analysis", Greg Conti, No Starch Press Inc, 2007.
4. Usama Fayyad, Georges G. Grinstein and Andreas Wierse, "Information visualization in Data Mining and Knowledge discovery", Morgan kaufmann publishers, 2002
5. Chun-houh Chen, Wolfgang Hardle and Antony Unwin,"Handbook of Data Visualization", Springer, 2008

<table>
<tr><td rowspan="2">Scheme Version:

2022-2023</td><td rowspan="2">Name of the Subject:

Data Warehouse and Mining</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>-</td><td>0</td><td>Total Hours:46</td></tr>
<tr><td rowspan="2"></td><td rowspan="2">Applicable to Programs:

M.Sc. (Data Science)</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: Understanding of Relational Databases and Data Modeling</td></tr>
</table>

	COURSE SYLLABUS	
Unit No.	Content of Each Unit	Hours of Each Unit
1.	Data Warehousing and Business Analysis : [Course Outcome (s):COB030114.1] Data warehousing Components, Building a Data warehouse, Data Warehouse Architecture, DBMS Schemas for Decision Support, Data Extraction, Cleanup, and Transformation Tools, Metadata reporting, Query tools and Applications, Online Analytical Processing (OLAP) – OLAP and Multidimensional Data Analysis.	06
2.	Data Mining : [Course Outcome (s): COB030114.2] Data Mining Functionalities, Data Preprocessing, Data Cleaning, Data Integration and Transformation, Data Reduction, Data Discretization and Concept Hierarchy Generation, Architecture Of A Typical Data Mining Systems- Classification Of Data Mining Systems. Association Rule Mining : Efficient and Scalable Frequent Item set Mining Methods, Mining Various Kinds of Association Rules, Association Mining to Correlation Analysis, Constraint-Based Association Mining.	10
3.	Classification and Prediction : [Course Outcome (s): COB030114.3] Issues Regarding Classification and Prediction, Classification by Decision Tree Introduction, Bayesian Classification, Rule Based Classification, Classification by Back propagation, Support Vector Machines, Associative Classification, Lazy Learners – Other Classification Methods Prediction : Accuracy and Error Measures, Evaluating the Accuracy of a Classifier or Predictor, Ensemble Methods, Model Section.	10
4.	Cluster Analysis and Mining Object, Spatial, Multimedia, Text and Web Data : [Course Outcome (s):COB030114.4 & COB030114.5] Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, Partitioning Methods, Hierarchical methods, Density-Based Methods, Grid-Based Methods, Model-Based Clustering Methods, Clustering High-Dimensional Data, Constraint-Based Cluster Analysis, Outlier Analysis. Multidimensional Analysis and Descriptive Mining of Complex Data Objects, Spatial Data Mining, Multimedia Data Mining, Text Mining, Mining the World Wide Web	14

REFERENCE BOOKS

1. Jiawei Han, Micheline Kamber and Jian Pei"Data Mining Concepts and Techniques", Third Edition, Elsevier, 2011.
2. Alex Berson and Stephen J. Smith "Data Warehousing, Data Mining & OLAP", Tata McGraw – Hill Edition, Tenth Reprint 2007.
3. K.P. Soman, Shyam Diwakar and V. Ajay "Insight into Data mining Theory and Practice", Easter Economy Edition, Prentice Hall of India, 2006.
4. G. K. Gupta "Introduction to Data Mining with Case Studies", Easter Economy Edition, Prentice Hall of India, 2006.
5. Pang-Ning Tan, Michael Steinbach and Vipin Kumar "Introduction to Data Mining", Pearson Education, 2007.

Departmental Elective Courses: Semester Ist

<table>
<tr><td rowspan="2">Scheme Version:

2022-2023</td><td rowspan="2">Name of the Subject:

Queuing Theory and Network Analysis</td><td>L</td><td>T</td><td>P</td><td>C</td><td rowspan="2">Semester:

Ist(1st Year)</td><td>Contact hours per week: 4</td></tr>
<tr><td>3</td><td>1</td><td>-</td><td>0</td><td>Total Hours:46</td></tr>
<tr><td rowspan="2">Subject Code:
SBS CS 030101 E 3014</td><td rowspan="2">Applicable to Programs:

M.Sc. Data Science</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:
Calculus-based Probability Theory</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">Introduction to queues, measures of system performance, characteristics of queueing systems, Little’s law and other general results; Transforms and generating functions, Stochastic processes overview, discrete-time Markov chains, classification and long-term behavior, Continuous-time Markov chain, birth-death processes, Poisson process and exponential distribution.</td><td colspan="2">10</td></tr>
<tr><td>2.</td><td colspan="5">Birth-death queueing systems: Single-server queues, multiserver queues, finite-capacity queues, Birth-death queueing systems: Loss systems, infinite-server queues, finite-source queues, state-dependent queues, queues with impatience, overview of transient analysis and busy period analysis, Non-birth-death Markovian queueing systems: Bulk input queues, bulk service queues, Erlangian models</td><td colspan="2">10</td></tr>
<tr><td>3.</td><td colspan="5">Priority queues, retrial queues, discrete-time queues, Queueing networks: Series, open Jackson networks, Queueing networks: Closed Jackson networks, cyclic queues, extensions of Jackson networks.</td><td colspan="2">10</td></tr>
</table>

4.	Renewal and semi-Markov processes; Semi-Markovian queues, Semi-Markovian queues: Single server and multiserver general service and general input models, General queueing models, queues with vacations	10

REFERENCE BOOKS

1. 1. D. Gross and C. Harris, Fundamentals of Queueing Theory, 3rd Edition, Wiley.

2. B. Cooper, Introduction to Queueing Theory, 2nd Edition, North-Holland.

3. L. Kleinrock, Queueing Systems, Vol. 1: Theory, Wiley & Vol. 2: Computer Applications, Wiley.

4. R. Nelson, Probability, Stochastic Processes, and Queueing Theory: The Mathematics of Computer Performance Modelling, Springer.

5. J. Medhi, Stochastic Models in Queueing Theory, 2nd Edition, Academic Press.

Scheme Version: 2022-2023	**Name of the Subject:** Graph Theory & Stochastic Processes	**L**	**T**	**P**	**C**	**Semester:** Ist Semester (Ist year)	**Contact hours per week:** 4
		4	**0**	**-**	**0**		**Total Hours:**46
Subject Code: SBS CS 030109 E 3014	**Applicable to Programs:** M.Sc Data Science	**Evaluation (Total Marks):** 100	**CIE**	**30 Marks**	**Examination Duration: 3 hours**		
			TEE	**70 Marks**	**Pre-requisite of course:**		

	COURSE SYLLABUS	
Unit No.	**Content of Each Unit**	**Hours of Each Unit**
1.	Graphs, Degrees, Graph Isomorphism, Trees, Cut-Vertices. Eulerian graphs and Hamiltonian graphs, Matchings, Planar graphs, Vertex coloring.	**10**
2.	Joint distribution, Independent random variables, Covariance and Correlation coefficient, Variance-Covariance matrix, Conditional distribution and conditional expectation.	**10**
3	Multivariate normal distribution, The weak law of large numbers, The strong law of large numbers, Central limit theorem, Stochastic processes - definitions and properties.	**10**

4	Discrete-Time Markov Chain, Classification of states, Measure of stationary probability, Continuous-Time Markov Chains, Poisson Process.	**10**

Reference Books:

1. Narsingh Deo, Graph Theory and its application to Science and Engineering, PHI
2. Castan˜eda, V. Arunachalam, and S. Dharmaraja, Introduction to Probability and Stochastic Processes with Applications, 1st Edition, Wiley-Blackwell, 2012.
3. Chartrand G., Zhang Ping, Introduction to Graph Theory, Tata McGraw-Hill
4. Douglas B. West, Introduction to Graph Theory 2nd Ed., Pearson Education
5. Ross, S., Stochastic Processes, second edition, John Wiley, 1996.
6. Goswami, A. and Rao, B. V., A Course in Applied Stochastic, Processes, Hindustan Book Agency, 2006.

<table>
<tr><td rowspan="2">Scheme Version:

2022-2023</td><td rowspan="2">Name of the Subject:

Artificial Intelligence and Expert System</td><td>L</td><td>T</td><td>P</td><td>C</td><td rowspan="2">Semester:

Ist

(Ist 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:48</td></tr>
<tr><td rowspan="2">Subject Code:
SBS CS 030103 E 3014</td><td rowspan="2">Applicable to Programs:

M.Sc. Data Science</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">To introduce knowledge on basics of fundamental of computer science and various aspects of computational theory, programming, algorithm design, andoptimization, network and database management, mobile technologies, electronics and mathematics</td></tr>
</table>

Course Objectives	The primary objective of this course is to introduce the basic principles, techniques, and applications of Artificial Intelligence. Emphasis will be placed on the teaching of these fundamentals and labs for the hands-on approach for understanding, as well as a challenging avenue for exploration and creativity.	
Course Outcomes:	Upon successful completion of the course students will be able to: **CO010319.1** Choose problems that are amenable to solution by AI methods, and which AI methods may be suited to solving a given problem. **CO010319.2** Examine a given problem in the language/framework of different AI methods **CO010319.3** Apply basic AI algorithms (e.g., standard search algorithms or resolution) and solve problems. **CO010319.4** Analyse and carry out an empirical evaluation of different algorithms on a problem formalization.	
	COURSE SYLLABUS	
Unit No.	**Content of Each Unit**	**Hours of Each Unit**
1.	**Basic Concepts: [Course Outcome CO010319.1]** AI and its importance, history of AI, applications areas, AI approach for solving problems. Problem representation: State space representation, problem reduction representation, bounding functions. Propositional logic: syntax and semantics. First order predicate logic (FOPL): syntax and semantics, conversion to clausal form, inference rules, unification, resolution principle, proof procedure, refutation.	**10**

2.	**Search and Control Strategies: [Course Outcome CO010319.2]** Strategies for state space search, data driven and goal driven search; Search algorithms- uninformed search (depth first, breadth first, depthfirst with iterative deepening) and informed search (Hill climbing, best first, A, A*, AO algorithm, mini- max etc.), computational complexity, Properties ofsearch algorithms Admissibility, Monotonicity, Optimality, Dominance, etc., genetic algorithms.	**10**
3.	**Expert System Architecture: [Course Outcome CO010319.3]** Rule based architecture, non-production system architecture. Components of Expert Systems, Stages of expert system development, Expert systems applications, Building Expert System and Shell. Knowledge acquisition and validation.	**12**
4.	**Managing uncertainty in expert systems: [Course Outcome CO010319.4]** Bayesian probability theory, Stanford certainty factor algebra, No monotonic logic and reasoning with beliefs, Fuzzy logic, Dempster/Shaffer theory.	**8**

REFERENCE BOOKS

1. Patterson, D.W., Introduction to Artificial Intelligence and Expert Systems, Prentice-hall of India, 2007.

2. Nilsson, N.J., Principles of Artificial Intelligence, Morgan Kaufmann, 2014.

3. Luger, G.F. and Stubblefield, W.A., Artificial Intelligence and The Design of Expert Systems, Benjamin-Cummings Publishing Co. Inc., 2008.

4. Rich, E.K. and Nair, S.B., Artificial Intelligence, New Delhi, 2009.

5. Russell, S., and Norvig, P., Artificial Intelligence: A Modern Approach, Prentice Hall, 2015.

<table>
<tr><td rowspan="2">Scheme Version:

2022-2023</td><td rowspan="2">Name of the Subject:

Software Engineering</td><td>L</td><td>T</td><td>P</td><td>C</td><td rowspan="2">Semester:

Ist Semester</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: 46</td></tr>
<tr><td rowspan="2">Subject Code:
SBS CS 030104 E 3014</td><td rowspan="2">Applicable to Programs:

M.Sc. Data Science</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">To introduce knowledge on basics of fundamental of computer science and various aspects of computational theory, programming, algorithm design, and optimization, network and database management, mobile technologies, electronics</td></tr>
</table>

	and mathematics	
Course Objectives	The objective of this course is to provide a solid fundamental knowledge of software engineering. This course will help the students to utilize and exhibit strong communication and interpersonal skills, as well as professional and ethical principles when functioning as members and leaders of multi- disciplinary teams.	
Course Outcomes:	Upon successful completion of the course students will be able to: **CO010212.1** To interpret the problem statement for the software design. **CO010212.2** To understand the requirements of the software efficiently. **CO010212.3** Translate the requirements into the design model with modern tools and apply to solve problems. **CO010212.4** Write the test cases and analyse the software modules. **CO010212.5** Evaluation of software module test cases.	
	COURSE SYLLABUS	
Unit No.	**Content of Each Unit**	**Hours of Each Unit**
1	**Software and Software Engineering: [Course Outcome (s): CO010212.1]** software characteristics, software crisis, software engineering paradigms. Planning a Software Project: software cost estimation, project scheduling, personal planning, team structure	10
2	**Software Configuration Management: [Course Outcome (s): CO010212.2]** quality assurance, project monitoring, risk management. Software Requirement Analysis: structured analysis, object-oriented analysis and data modeling, software requirement specification, validation.	10

3	**Design and Implementation of Software: [Course Outcome (s): CO010212.3]** software design fundamentals, design methodology (structured design and object-oriented design), design verification, monitoring and control, coding. **Software Reliability:** metric and specification, fault avoidance and tolerance, exception handling, defensive programming.	10
4	**Testing: [Course Outcome (s): CO010212.4]** testing fundamentals, white box and black box testing,software testing strategies; unit testing, integration testing, validation testing, system testing, debugging Software **Maintenance:** maintenance characteristics, maintainability, maintenance side effects, CASE tools	10

REFERENCE BOOKS

1. Software Engineering, "K. K. Aggarwal&Yogesh Singh", 2E, New Age International, 2005
2. PankajJalote's, "Software Engineering", Wiley India
3. Roger S. Pressman, "Software Engineering- A Practitioner's Approach", Tata McGraw Hill
4. Rajib Mall, "Fundamentals of Software Engineering", PHI Learning Pvt. Ltd.

Departmental Elective Courses: Semester IInd

<table>
<tr><td rowspan="2">Scheme Version:

2022-2023</td><td rowspan="2">Name of the Subject:

Statistical NLP</td><td>L</td><td>T</td><td>P</td><td>C</td><td rowspan="2">Semester:

IInd Semester</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: 46</td></tr>
<tr><td rowspan="2">Subject Code: SBS CS 030205 E 3014</td><td rowspan="2">Applicable to Programs:

M.Sc. Data Science</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">To introduce knowledge on basics of fundamental of computer science and various aspects of computational theory, programming, algorithm design, and optimization, network and database management, mobile technologies, electronics</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">Introduction to NLP - Various stages of NLP –The Ambiguity of Language: Why NLP Is DifficultParts of Speech: Nouns and Pronouns, Words: Determiners and adjectives, verbs, Phrase Structure. Statistics Essential Information Theory : Entropy, perplexity, The relation to language, Cross entropy</td><td colspan="2">10</td></tr>
<tr><td>2</td><td colspan="5">Character Encoding, Word Segmentation, Sentence Segmentation, Introduction to Corpora, Corpora Analysis. Inflectional and Derivation Morphology, Morphological analysis and generation using Finite State Automata and Finite State transducer.</td><td colspan="2">10</td></tr>
</table>

3	Words: Collocations- Frequency-Mean and Variance – Hypothesis testing:The t test, Hypothesis testing of differences, Pearson's chi-square test, Likelihood ratios. Statistical Inference: n -gram Models over Sparse Data: Bins: Forming Equivalence Classes- N gram model - Statistical Estimators- Combining Estimators	10
4	Methodological Preliminaries, Supervised Disambiguation Bayesian classification, An informationtheoretic approach Dictionary-Based Disambiguation: Disambiguation based o sense, Thesaurusbased disambiguation, Disambiguatio based on translations in a second-language corpus.	10

REFERENCE BOOKS

1. NitinIndurkhya, Fred J. Damerau "Handbook of Natural Language Processing", Second Edition, CRC Press, 2010.

2. James Allen "Natural Language Understanding", Pearson Publication 8th Edition. 2012.

3. Chris Manning and HinrichSchütze, "Foundations of Statistical Natural Language Processing", 2nd edition, MITPress Cambridge, MA, 2003.

4. Hobson lane, Cole Howard, Hannes Hapke, "Natural language processing in action" MANNING Publications, 2019.

Scheme Version: 2022-2023	**Name of the Subject:** Data science for Deep learning	**L**	**T**	**P**	**C**	**Semester:** IInd Semester	**Contact hours per week:** 4
		3	**1**	**-**	**0**		**Total Hours:**48
Subject Code: SBS CS 030206 E 3014	**Applicable toPrograms:** M.Sc. (Data Science)	**Evaluation (Total Marks):** 100	**CIE**	**30 Marks**	**Examination Duration: 3 hours**		
			TEE	**70 Marks**	**Pre-requisite of course:** Basics of Artificial Intelligence and Machine Learning		

COURSE SYLLABUS

Unit No.	**Content of Each Unit**	**Hours of Each Unit**
1.	**Basics of artificial neural networks (ANN):** Artificial neurons, Computational models of neurons, Structure of neural networks, Functional units of ANN for pattern recognition tasks. **Feedforward neural networks:** Pattern classification using perceprton, Multilayer feedforward neural networks (MLFFNNs), Backpropagation learning, Empirical risk minimization, Regularization, Autoencoders.	**10**
2.	**Deep neural networks (DNNs):** Difficulty of training DNNs, Greedy layerwise training, Optimization for training DNNs, Newer optimization methods for neural networks (AdaGrad, RMSProp, Adam), Second order methods for training, Regularization methods (dropout, drop connect, batch	**10**

	normalization)	
3	**Convolution neural networks (CNNs):** Introduction to CNNs – convolution, pooling, Deep CNNs, Different deep CNN architectures – LeNet, AlexNet, VGG, PlacesNet, Training a CNNs: weights initialization, batch normalization, hyperparameter optimization, Understanding and visualizing CNNs.	**10**
4.	**Recurrent neural networks (RNNs):** Sequence modeling using RNNs, Back propagation through time, Long Short Term Memory (LSTM), Bidirectional LSTMs, Bidirectional RNNs, Gated RNN Architecture **Generative models:** Restrictive Boltzmann Machines (RBMs), Stacking RBMs, Belief nets, Learning sigmoid belief nets, Deep belief nets. **Applications:** Applications in vision, speech and natural language processing	**10**

REFERENCE BOOKS

1. Ian Goodfellow, Yoshua Bengio and Aaron Courville, Deep learning, In preparation for MIT Press, Available online: http://www.deeplearningbook.org, 2016.
2. S. Haykin, Neural Networks and Learning Machines , Prentice Hall of India, 2010
3. Satish Kumar, Neural Networks - A Class Room Approach, Second Edition, Tata McGraw-Hill, 2013
4. B. Yegnanarayana, Artificial Neural Networks, Prentice- Hall of India, 199
5. C.M. Bishop, Pattern Recognition and Machine Learning, Springer, 2006

Scheme Version: 2022-2023	**Name of the Subject:** Neural Networks and Fuzzy systems	**L**	**T**	**P**	**C**	**Semester:** IInd Semester	**Contact hours per week:** 4
		3	**1**	**-**	**0**		**Total Hours:**41
Subject Code: SBS CS 030207 E 3014	**Applicable to Programs:** M.Sc. (Data Science)	**Evaluation (Total Marks):** 100	**CIE**	**30 Marks**	**Examination Duration: 3 hours**		
			TEE	**70 Marks**	**Pre-requisite of course:** Basics of Neural Networks, Fuzzy Sets and Fuzzy Logic		

COURSE SYLLABUS

Unit No.	**Content of Each Unit**	**Hours of Each Unit**
1.	Relevance and importance of neural nets, fuzzy systems and combination of such systems in certain problem areas of IE & OR, involving combinatorial optimization, systems modeling, approximations, prediction, robust control and learning.	**10**
2.	Artificial neurons; network architectures; learning processes; single and multilayer perceptions; back propagation learning; radial basis function networks; Hopfield models, bi-directional associative memories and combinatorial optimization; Boltzmann machines; Mean Field theory; temporal processing using feed forward networks.	**10**

3.	Fuzzy sets; fuzzy rules and fuzzy reasoning; temporal fuzzy logic; fuzzy systems; fuzzy associative memories.	**08**
4.	fuzzy rule generation using neural net approaches; fuzzy inference systems; fuzzy neural networks; adaptive neuro-fuzzy inference systems (ANFIS); neuro-fuzzy control.	**12**

REFERENCE BOOKS

1. S. Haykin , (1999), 'Neural Networks: A comprehensive foundation,' 2nd Ed., Pearson Education Asia.
2. B. Kosko , (1994), 'Neural Networks and Fuzzy Systems: A dynamical systems approach to machine intelligence,' Prentice Hall India.
3. S.Y. Kung , (1993), 'Digital Neural Networks,' Prentice Hall India.
4. G.J. Klir and B. Yuan, (1997), 'Fuzzy Sets and Fuzzy Logic,' Prentice Hall India.
5. J.S.R.Jang, C. T. Sun and E. Mizutani, (1997), 'Neuro-Fuzzy and Soft Computing,' Prentice Hall India.

<table>
<tr><td rowspan="2">Scheme Version:

2022-2023</td><td rowspan="2">Name of the Subject:
Data Science for Internet of Things</td><td>L</td><td>T</td><td>P</td><td>C</td><td rowspan="2">Semester:
IInd Semester</td><td>Contact hours per week: 4</td></tr>
<tr><td>4</td><td>0</td><td>-</td><td>0</td><td>Total Hours:46</td></tr>
<tr><td rowspan="2">Subject Code:
SBS CS 030209 E 3014</td><td rowspan="2">Applicable toPrograms:
M.Sc Data Science</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></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">Introduction, Causality and Experiments, Data Preprocessing: Data cleaning, Data reduction, Data transformation, Data discretization. Visualization and Graphing: Visualizing Categorical Distributions, Visualizing Numerical Distributions, Overlaid Graphs, plots, and summary statistics of exploratory data analysis, Randomness, Probability, Introduction to Statistics, Sampling, Sample Means and Sample Sizes.</td><td colspan="2">11</td></tr>
<tr><td>2.</td><td colspan="5">Descriptive statistics – Central tendency, dispersion, variance, covariance, kurtosis, five point summary, Distributions, Bayes Theorem, Error Probabilities; Permutation Testing, Statistical Inference; Hypothesis Testing, Assessing Models, Decisions and Uncertainty, Comparing Samples, A/B Testing, P-Values, Causality.</td><td colspan="2">13</td></tr>
</table>

3	Estimation, Prediction, Confidence Intervals, Inference for Regression, Classification , Graphical Models, Updating Predictions.	**12**
4	Introduction to the Internet of Things (IoT), Technology and Business drivers for IoT, IoT Architectures and design considerations; IoT paradigms and frameworks; semantics, security, privacy, network and standardization issues; IoT Integration with Cloud technologies, big data, cyber-physical systems, components, network technologies; IoT application and device programming; Data analytics for IoT; Typical IoT applications, Trends and implications; Challenges and Opportunities with IoT.	**10**

REFERENCE BOOKS

1. Adi Adhikari and John DeNero, "Computational and Inferential Thinking: The Foundations of Data Science", e-book. REFERENCES:
2. Data Mining for Business Analytics: Concepts, Techniques and Applications in R, by Galit Shmueli, Peter C. Bruce, Inbal Yahav, Nitin R. Patel, Kenneth C. Lichtendahl Jr., Wiley India, 2018.
3. Rachel Schutt & Cathy O'Neil, "Doing Data Science" O' Reilly, First Edition, 2013.
4. Robert Stackowiak , Art Licht , Venu Mantha , Louis Nagode, Big Data and The Internet of Things: Enterprise Information Architecture for A New Age, APress, 2015
5. Peter Waher, Learning Internet of Things, Packt Publishing, 2015
6. Dirk Slama, Frank Puhlmann, Jim Morrish , Enterprise IOT, O'Reilly Publishers, 2015
7. Adrian McEwen, Hakim Cassimally, Designing the Internet of Things, John Wiley and Sons, 2014

Scheme Version: 2022-2023	**Name of the Subject:** Management of Information System and E-Commerce	**L**	**T**	**P**	**C**	**Semester:** IIIrd Semester	**Contact hours per week:** 4
		3	**1**	**0**	**4**		**Total Hours:**46
Subject Code: SBS CS 030310 E 3014	**Applicable to Programs:** M.Sc. Data Science	**Evaluation(Total Marks):** 100	**CIE**	**30 Marks**	**Examination Duration: 3 hours**		
			TEE	**70 Marks**	**Pre-requisite of course:**		

	COURSE SYLLABUS	
Unit No.	**Content of Each Unit**	**Hours of Each Unit**
1.	Introduction to the MIS concept- Definition, Role of the MIS, Impact of MIS, MIS and the user, Management as a control system, MIS support to the management, Management effectiveness and MIS, Organization as a system. MIS: organization effectiveness. Decision Making and DSS- Decision making concepts, decision-making process, decision- making by analytical modelling, Behavioral concepts in decision making, organizational decision-making, Decision structure, DSS components, Management reporting alternatives.	**11**
2.	Enterprise Business system- Introduction, cross-functional enterprise applications, realworld case, Functional business system, Introduction, marketing systems, sales force automation, CIM, HRM, Customer relationship management, ERP, Supply chain management. Client-Server Architecture and E-business Technology- Client-server architecture, implementation strategies, Introduction to E-business, the model of E-	**13**

	business, Internet and World Wide Web, Intranet/Extranet, Electronic, Impact of Web on Strategic management, MIS in Web environment.	
3	Introduction to e-commerce, E-commerce Business Models and Concepts, Ecommerce Infrastructure: The Internet and World Wide Web, Web design, JavaScript Internet Information Server (IIS); Personal Web Server (PWS), E-Commerce techniques and Issues- Introduction to Active Server Pages (ASP), Building an E-Commerce Web Site, E-Commerce Payment Systems, E-Commerce Marketing Techniques, Building product catalogue, Search Product catalogue, Web Spider and search agent, Ethical, Social and Political Issues in ECommerce.	**12**
4	Internet Communication- Transaction Systems, Shopping Carts, XML, E-Commerce Applications: Business-to-Consumer(B2C), Consumer-to-Consumer (C2C), Business- toBusiness (B2B), Digital Government, Marketplaces, and Communities, Security and Encryption, Web Security. technologies; IoT application and device programming; Data analytics for IoT; Typical IoT applications, Trends and implications; Challenges and Opportunities with IoT.	**10**

REFERENCE BOOKS

1. Jawadekar, W.S., Management Information Systems: Text and Cases: A Global Digital Enterprise Perspective, Tata McGraw-Hill Education, 2013.

2. Kalakota, R. and Whinston, A.B., Electronic Commerce: A Manager's Guide, AddisonWesley Professional, 1997.

3. Laudon, K.C. and Laudon, J.P., Management Information Systems, Pearson, 2018.

4. Laudon, K.C. and Traver, C.G., E-Commerce: Business, Technology, Society, Pearson, 2016.

5. Rayport, J.F. and Jaworski, B.J., Introduction to E-Commerce, McGraw-Hill, 2003

<table>
<tr><td rowspan="2">Scheme Version:

2022-2023</td><td rowspan="2">Name of the Subject:

Optimization Techniques</td><td>L</td><td>T</td><td>P</td><td>C</td><td rowspan="2">Semester IIIrd (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:46</td></tr>
<tr><td rowspan="2">Subject Code:
SBS CS 030311 E 3014</td><td rowspan="2">Applicable to Programs:

M.Sc. Data Science</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></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">Development, definition, characteristics and phases, types of operation research models, applications; Allocation: linear programming, problem formulation, graphical solution, simplex method, artificial variables techniques, two–phase method, big-M method.</td><td colspan="2">11</td></tr>
<tr><td>2.</td><td colspan="5">Transportation problem: Formulation, optimal solution, unbalanced transportation problem, Degeneracy; Assignment problem, formulation, optimal solution, variants of assignment problem, traveling salesman problem</td><td colspan="2">13</td></tr>
</table>

3	Sequencing: Introduction, flow, shop sequencing, n jobs through two machines, n jobs through three machines, job shop sequencing, and two jobs through "m" machines. Replacement: Introduction: Replacement of items that deteriorate with time, when money value is not counted and counted, replacement of items that fail completely, group replacement.	**12**
4	Introduction, Terminology, Single Channel, Poisson arrivals and exponential service times with infinite population and finite population models, Multichannel, Poisson arrivals and exponential service times with infinite population	**10**

Reference Books :

A. M. Natarajan, P. Balasubramani, A. Tamilarasi, "Operations Research", Pearson Education, 2013.

2.Maurice Saseini, Arhur Yaspan, Lawrence Friedman, "Operations Research: Methods & Problems", 1 st Edition, 1959.

3 Optimization for Engineering Design by Kalyanmoy Deb, PHI Publishers

4. Genetic algorithms in Search, Optimization, and Machine learning – D.E.Goldberg, Addison-Wesley Publishers

5. Operations Research by Hillar and Liberman, TMH Publishers

<table>
<tr><td rowspan="2">Scheme Version:

2022-2023</td><td rowspan="2">Name of the Subject:
Quantum Computing</td><td>L</td><td>T</td><td>P</td><td>C</td><td rowspan="2">Semester:

IIIrd Semester</td><td>Contact hours per week: 3</td></tr>
<tr><td>3</td><td>1</td><td>0</td><td>4</td><td>Total Hours: 45</td></tr>
<tr><td rowspan="2">Subject Code:
SBS CS 030313 E 3014</td><td rowspan="2">Applicable to Programs:
M.Sc.Data Science</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">To introduce knowledge on basics of fundamental of computer science and various aspects of computational theory, programming, algorithm design, and optimization, network and database management, mobile technologies, electronics and mathematics.</td></tr>
<tr><td>Course Objectives</td><td colspan="7">This course aims to introduce the fundamentals of quantum computation. This course provides an interdisciplinary introduction to the emerging field of quantum computer science, explaining basic quantum mechanics, quantum entanglement, its structure and its physical consequences and introduces quits.</td></tr>
<tr><td>Course Outcomes:</td><td colspan="7">Upon successful completion of the course students will be able to:

CO010207.1 Learn the basic concept of complex vector spaces. CO010207.2 To understand the quantum mechanics in quantum computing.CO010207.3 Apply architecture the quantum algorithms and solve problem.CO010207.4 Analyse the fundamentals of quantum computation.
CO010207.5 Evaluation of the quantum computation.</td></tr>
<tr><td></td><td colspan="7">COURSE SYLLABUS</td></tr>
</table>

Unit No.	Content of Each Unit	Hours of Each Unit
1	**[Course Outcome (s): CO010207.1]** Overview of traditional computing , Church-Turing thesis , circuit model of computation , reversible computation , quantum physics , quantum physics and computation , Diracnotation and Hilbert Spaces , dual vectors , operators , the spectral theorem ,functions of operators , tensor products , Schmidt decomposition theorem. State of a quantum system , time evolution of a closed system , composite systems,measurement , mixed states and general quantum operations , quantum circuit model , quantum gates , universal sets of quantum gates , unitary transformations , quantum circuits	12
2	**[Course Outcome(s):CO010207.2]** Superdense coding , quantum teleportation , applications of teleportation , probabilistic versus quantum algorithms , phase kick-back , the Deutsch algorithm , the Deutsch-Jozsa algorithm , Simon's algorithm , Quantum phase estimation and quantum FourierTransform , eigenvalue estimation.	08
3	**[Course Outcome (s): CO010207.3]** Order-finding problem , eigenvalue estimation approach to order finding , Shor's algorithm for order finding , finding discrete logarithms , hidden subgroups , Grover's quantum search algorithm , amplitude amplification , quantum amplitude estimation , quantum counting , searching without knowing the success probability.	10
4	**[Course Outcome (s): CO010207.4]** Computational complexity , black-box model , lower bounds for searching , general black-box lower bounds , polynomial method , block sensitivity , adversary methods, classical error correction , classical three-bit code , fault tolerance , quantum error correction , three- and nine-qubit quantum codes , fault-tolerant quantum computation.	10

REFERENCE BOOKS

1. P. Kaye, R. Laflamme, and M. Mosca, "An introduction to Quantum Computing", Oxford University Press, 1999.
2. V. Sahni, "Quantum Computing", Tata McGraw-Hill Publishing Company, 2007.

<table>
<tr><td rowspan="2">Scheme Version:

2022-2023</td><td rowspan="2">Name of the Subject:

Distributed and Cloud Computing</td><td>L</td><td>T</td><td>P</td><td>C</td><td rowspan="2">Semester:

IIIrd Semester</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:</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>48</td></tr>
<tr><td rowspan="2">Subject Code:
SBS CS 030314 E 3014</td><td rowspan="2">Applicable to Programs:

M.Sc.Data Science</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">To introduce knowledge on basics of fundamental of computer science and various aspects of computational theory, programming, algorithm design, and optimization, network and database management, mobile technologies, electronics and mathematics</td></tr>
<tr><td>Course Objectives</td><td colspan="7">Cloud computing is a key distributed systems paradigm that has grown popular in the last few years. Cloud technologies are pervasive, touching our daily lives any time we access the world wide web, use a mobile app, or make a retail purchase. The objective of this course is to teach the fundamental concepts of how and why Cloud systems works, as well as Cloud technologies that manifest these concepts such as Amazon AWS, Microsoft Azure and OpenStack etc.. Students will learn distributed systems concepts like virtualization, data parallelism.</td></tr>
</table>

Course Outcomes:	Upon successful completion of the course students will be able to: **CO010414.1** Describe the basic concept of system models for distributed. **CO010414.2** Understanding the different cloud computing. **CO010414.3** Apply the cloud-enabling technologies, cloud mechanisms, andcloud architectures. **CO010414.4** Analyse the different virtualization techniques **CO010414.5** Evaluation of the cloud and data security.	
	COURSE SYLLABUS	
Unit No.	**Content of Each Unit**	**Hours of Each Unit**
1	**Introduction to Distributed System: [Course Outcome CO010414.1]** Models and Enabling Technologies, Computer Clusters for Scalable Parallel Computing, Virtual Machines and Virtualization of Clusters and Data centers.	**10**
2	**Introduction to Cloud Computing: [Course Outcome CO010414.2 & CO010414.3]** Cloud Computing in a Nutshell System Model for Distributed and Cloud Computing, Roots of Cloud Computing, Grid and Cloud, Layers and Types of Clouds, Desired Features ofa Cloud, Basic Principles, of Cloud Computing, Challenges and Risks, Service Models	**12**
3	**Virtual Machines and Virtualization of Cluster and Data Centres: [Course Outcome CO010414.4]**Levels of Virtualization, Virtualization structures/Tools and Mechanism, Virtualization of CPU, Memory and I/O Devices, Virtual Clusters and Resources Management, Virtualization Data- Centre Automation **Service Oriented Architecture for Distributed Computing:** Services & SOA, Message Oriented Middleware, Workflow in SOA.	**14**

4	**Cloud Security, Data Security in the Cloud: [Course Outcome CO010414.5]** An Introduction to the Idea of Data Security, The Current State of Data Security in the Cloud CryptDb: Onion Encryption layers- DET, RND, OPE, JOIN, SEARCH, HOM, and Homomorphism Encryption, FPE	**12**

REFERENCE BOOKS

1. Coulouris, G.F., Dollimore, J. and Kindberg, T., *Distributed Systems: Concepts and Design*, Pearson education, 2005.
2. Erl, T., Puttini, R. and Mahmood, Z., *Cloud Computing: Concepts, Technology, & Architecture*, Pearson Education, 2013.
3. Hwang, K., Dongarra, J. and Fox, G.C., *Distributed and Cloud Computing: From Parallel Processing to The Internet of Things*, Morgan Kaufmann, 2013.
4. Tanenbaum, A.S. and Van Steen, M., *Distributed systems: principles and paradigms*, Prentice-Hall, 2007.
5. Velte, T., Velte, A. and Elsenpeter, R., *Cloud Computing, A Practical Approach*, McGraw-Hill, Inc., 2009.

Annexure-XVII

Dean School Of Basic Sciences <deansobs@cuh.ac.in>

School Board Meeting on 12-09-2022 at 10:30 A.M. onwards

Dean School Of Basic Sciences <deansobs@cuh.ac.in> Wed, Sep 14, 2022 at 12:34 PM
To: "आचार्य पवन कुमार शर्मा Prof. Pawan K. Sharma" <talk2pawan@gmail.com>
Cc: bonnie_kahlon@yahoo.com, ckjaggi@gmail.com, sukhdeepsingh.cse@dcrustm.org, amitach1@yahoo.com, Amita Chandra <achandra@physics.du.ac.in>, HoD Maths <hodmaths@cuh.ac.in>, HOD Physics <hodphysics@cuh.ac.in>, HOD Statistics <hodstatistics@cuh.ac.in>, CS and IT <hodcomputerscience@cuh.ac.in>, Geography Department <hodgeography@cuh.ac.in>, "HoD, Chemistry" <hodchemistry@cuh.ac.in>, ssunita@cuh.ac.in, "Dr. Suneel Kumar" <suneelkumar@cuh.ac.in>, "Dr. Harish Kumar" <harishkumar@cuh.ac.in>, Rajeshgupta@cuh.ac.in, "Dr. Manoj Gupta" <mkgupta@cuh.ac.in>, keshav@cuh.ac.in, Suraj Arya <surajarya@cuh.ac.in>, jitendra@cuh.ac.in, "Dr. Manish Kumar" <manish.ks@cuh.ac.in>, arunkajla@cuh.ac.in, "Dr. Rakesh Kumar" <rks@cuh.ac.in>, "Dr. Kapil Kumar" <kapilstats@cuh.ac.in>, kahlon_s@pu.ac.in, "Dr. Vinod Kumar" <vinodkumar@cuh.ac.in>, akyadav@cuh.ac.in, "Dr. Devendra Kumar" <devendrastats@cuh.ac.in>, drjitendra@cuh.ac.in

Respected Madam/Sir,
Please find herewith the revised minutes (with minor modification in resolution for agenda no 3a and 3b) of the meeting of the School Board held on 12-09-2022 for your kind consideration and approval.
With Warm Regards

(Revised) Minutes of Meeting of the School Board of School of Basic Sciences held on 12.09.2022

A meeting of the **School Board of School of Basic Sciences**, Central University of Haryana, Mahendergarh was held on **12.09.2022** at **10:30 A.M.** onwards via offline and online (https://meet.google.com/rvh-ukja-fwm) mode in the office of the Dean, School of Basic Sciences, Central University of Haryana.

The following members were present in the meeting:

1.	**Dr. Vinod Kumar** Dean, School of Basic Science Head, Department of Chemistry Central University of Haryana, Mahendergarh	(Chairman)
2.	**Dr. Keshav Singh Rawat** Head, Department of Computer Science and IT Central University of Haryana, Mahendergarh	(Member)
3.	**Dr. Jitendra Kumar** Head, Department of Geography Central University of Haryana, Mahendergarh	(Member)
4.	**Dr. Rajesh Kumar Gupta** Head, Department of Mathematics Central University of Haryana, Mahendergarh	(Member)
5.	**Dr. Suneel Kumar** Head, Department of Physics & Astrophysics Central University of Haryana, Mahendergarh	(Member)
6.	**Prof. Harish Kumar** Department of Chemistry Central University of Haryana, Mahendergarh	(Member)
7.	**Prof. Sunita Shrivastava** Department of Physics & Astrophysics Central University of Haryana, Mahendergarh	(Member)
8.	**Dr. Manoj Kumar Gupta**	(Member)

	Department of Chemistry Central University of Haryana, Mahendergarh	
9.	**Dr. Suraj Arya** Department of CS & IT Central University of Haryana, Mahendergarh	(Member)
10.	**Dr. Manish Kumar** Department of Geography Central University of Haryana, Mahendergarh	(Member)
11.	**Dr. Arun Kajla** Department of Mathematics Central University of Haryana, Mahendergarh	(Member)
12.	**Prof. Pawan Kumar Sharma** Professor, Department of Chemistry Kurukshetra University, Kurukshetra, Haryana	(External Subject Expert)
13.	**Prof. Chandra K. Jaggi** Professor, Department of Operational Research Faculty of Mathematical Sciences, DU, Delhi	(External Subject Expert)
14.	**Prof. Sukhdeep Singh** Professor, Department of Computer Science & Engg. DCRUST, Murthal, Sonipat	(External Subject Expert)
15.	**Prof. Amita Chandra** Professor, Department of Physics & Astrophysics North Campus, DU, Delhi	(External Subject Expert) Joined online
16.	**Prof. Simrit Kahlon** Professor, Department of Geography Panjab University, Chandigarh	(External Subject Expert)
17.	**Prof. Anil Kumar Yadav** Department of Mathematics Central University of Haryana, Mahendergarh	(Special Invitee)
18.	**Dr. Jitendra Kumar** Department of Mathematics Central University of Haryana, Mahendergarh	(Special Invitee)
19.	**Dr. Devendra Kumar** TIC, Department of Statistics Central University of Haryana, Mahendergarh	(Special Invitee)

At the outset, the Chairman welcomed all the members. The Chairman briefed all members about the past activities and agenda items to be discussed in the meeting.

In the meeting, the following agenda items were deliberated in detail and resolved:

Item No	Description and Recommendation	Annexure
1	Confirmation of the minutes of the meeting of the School Board of School of Basic Sciences held on 14-05-2022.	
	The minutes of the meeting of the School Board of School of Basic Sciences held on 14-05-2022 were confirmed.	**Annexure-1-SOBS**
2	To consider and approve the minutes of the meeting of the Board of	

	Studies (BOS) of the Department of Chemistry, School of Basic Sciences held on 06-09-2022.	
	Resolved that the minutes of the meeting of the Board of Studies (BOS) of the Department of Chemistry, School of Basic Sciences held on 06-09-2022, be approved.	**Annexure-A**
2a	To consider and approve the Scheme and Syllabi of M.Sc. (Chemistry), two-year Programme (w.e.f. Academic Session 2022-2023) as approved in BOS meeting of Department of Chemistry held on 06-09-2022 and to recommend the same to the Academic Council for consideration and approval.	
	Resolved that a revised and updated Scheme and Syllabi of M.Sc. (Chemistry), two-year Programme (w.e.f. Academic Session 2022-2023) as approved in BOS meeting of Department of Chemistry held on 06-09-2022, be approved and recommended the same to Academic Council for consideration and approval.	**Annexure-I-CH**
2b	To consider and approve the Scheme for first three years and Syllabi for second year of Integrated B.Sc.-M.Sc. (Chemistry), a five-year Programme for the batch 2021-2026 as approved in the BOS meeting of Department of Chemistry held on 06-09-2022 and to recommend the same to the Academic Council for consideration and approval.	
	The board noted that the scheme and syllabi for the Integrated B.Sc.-M.Sc. programme was introduced for the first time in the academic session 2021-2022. Based on the feedback from the stakeholders, the scheme is being modified to a minor extent for the purpose of giving a wider choice to the students for opting GE/AECC course which is also in line with the UGC-LOCF 2020. **It was also found that students wanted a wider choice of GE/AECC courses in I-IV semesters which was slightly deviating from the approved scheme. Considering the interest of the students supreme in line with NEP-2020, the students were practically allowed to opt for different GE/AECC courses. Therefore, the same should reflect in the scheme for the students enrolled in the session 2021-2026. Accordingly, the scheme for semesters I-IV is modified with courses categorized and should replace any previously approved scheme.** **Resolved that the Scheme for first three years (with minor modifications in first and second year) and Syllabi for the second year of Integrated B.Sc.-M.Sc. (Chemistry), a five-year Programme for the batch 2021-2026 as approved in BOS meeting of Department of Chemistry held on 06-09-2022, be approved and recommended the same to Academic Council for consideration and approval.**	**Annexure-II-CH**
2c	To consider and approve the Scheme and Syllabi for first three years of integrated B.Sc.-M.Sc. (Chemistry), a five-year Programme (w.e.f. Academic Session 2022-2023) as approved in BOS meeting of Department of	

	Chemistry held on 06-09-2022 and to recommend the same to the Academic Council for consideration and approval.	
	In the light of UGC-LOCF curriculum framework 2020 coupled with the fact that the students at CUH should not be at disadvantage compared to the curriculum being adopted at the national stage, the scheme and syllabi of the Integrated B.Sc.-M.Sc. programme have been designed. **Resolved that the Scheme and Syllabi for the first three years of integrated B.Sc.-M.Sc. (Chemistry), a five-year Programme (w.e.f. Academic Session 2022-2023) as approved in the BOS meeting of the Department of Chemistry held on 06-09-2022, be approved and recommended the same to Academic Council for consideration and approval.**	**Annexure-III-CH**
3.	To consider and approve the minutes of the meetings of the Board of Studies (BOS) of the Department of Computer Science & Information Technology, School of Basic Sciences held on 31-08-2022.	
	Resolved that the minutes of the meeting of the Board of Studies (BOS) of the Department of Computer Science & Information Technology, School of Basic Sciences held on 31-08-2022, be approved.	**Annexure-B**
3a	To consider and approve the Scheme and Syllabi of M.Sc. Data Science, two-year PG Programme (w.e.f. Academic Session 2022-2023) as approved in the BOS meeting of the Department of Computer Science & Information Technology, held on 31-08-2022, and to recommend the same to the Academic Council for consideration and approval.	
	Discussed in detail and suggested the improvement in the course title of Programming for Data Science as "Programming for Data Science using python" in the Scheme and Syllabi of M.Sc. Data Science, two-year PG Programme (w.e.f. Academic Session 2022-2023). **Further, the board suggested that the Department of Computer Science and Department of Statistics should sit together and should try to come up with a Collaborative model for the M.Sc. Data Science programme. In view of that the board resolved that the first semester Scheme and Syllabi of M.Sc. Data Science, two-year PG Programme (w.e.f. Academic Session 2022-2023) as approved in the BOS meeting of the Department of Computer Science & Information Technology, held on 31-08-2022, with minor changes as mentioned above be approved and recommended the same to the Academic Council for consideration and approval.**	**Annexure-I-CS**
3b	To consider and approve the Scheme and Syllabi of the Diploma in	

	Computer Hardware & Networking (one-year diploma) (w.e.f. Academic Session 2022-2023) as approved in the BOS meeting of the Department of Computer Science & Information Technology held on 31-08-2022 and to recommend the same to the Academic Council for consideration and approval.	
	Discussed in detail and the board noted that the proposed one year Diploma Programme is of UG level and of 40 credits. However, the existing CUH ordinance allows the Diploma at PG level only with 52 credits(+-4). In view of that the board suggested that the Diploma in Computer Hardware & Networking (one-year diploma) (w.e.f. Academic Session 2022-2023) as approved in the BOS meeting of the Department of Computer Science & Information Technology held on 31-08-2022, may be offered after the amendments in the university ordinance regarding guidelines of credits for the UG degree level diploma with updated syllabi.	**Annexure-II-CS**
4.	To consider and approve the minutes of the meeting of the Board of Studies of the Department of Physics and Astrophysics, School of Basic Sciences held on 08-08-2022.	
	Resolved that the minutes of the meeting of Board of Studies of Department of Physics and Astrophysics, School of Basic Sciences held on 08-08-2022, be approved	**Annexure-C**
4a	To consider and approve the scheme and syllabi of M.Sc. (Physics), two-year programme (w.e.f. Academic Session 2022-2023) as approved in BOS meeting of Department of Physics and Astrophysics held on 08-08-2022 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 2022-2023) as approved in BOS meeting of Department of Physics and Astrophysics held on 08-08-2022, be approved and recommended the same to Academic Council for consideration and approval after the incorporation of suggested corrections given below: **i) The name of the course "Solar Energy and Physics of Voltaic" is to be changed as "Fundamentals of Solar Energy".** **ii) In case of "Dissertation" offered to students in Semester IV, it should be explicitly mentioned that a continuous monitoring is required to be done. For that purpose, a minimum of two presentations are to be presented by students during the semester.** **iii) The statement "This scheme supersedes the earlier available schemes before this date" should be added in the Syllabi of M.Sc. (Physics) 2021-23 batch.**	**Annexure-I-PH**
4b	To consider and approve the Scheme and Syllabi of integrated B.Sc.-M.Sc. (Physics), a five-year Programme (w.e.f. Academic Session	

	2022-2023) as approved in BOS meeting of Department of Physics and Astrophysics held on 08-08-2022 and to recommend the same to Academic Council for consideration and approval.	
	Discussed in detail the Schemes and Syllabi of integrated B.Sc.-M.Sc. (Physics), a five-year Programme w.e.f. Academic Session 2022-2023 (Annexure-IIB-PH)and for 2021-26 batch (Annexure-IIA-PH). **Resolved that the Scheme and Syllabi of integrated B.Sc.-M.Sc. (Physics), a five-year Programme (w.e.f. Academic Session 2022-2023) and for 2021-26 batch as approved in BOS meeting of Department of Physics and Astrophysics held on 08-08-2022, be approved and recommended the same to Academic Council for consideration and approval with subject to implementation of below-mentioned changes:** **i) The number of practical lectures for DSE, mentioned in the schemes of Semester V and Semester VI should be four instead of two.** **ii) In case of "Dissertation" offered to students in Semester X, it should be explicitly mentioned that a continuous monitoring is required. For that purpose, a minimum of two presentations by each student are required during the semester.** **iii) A course related to "Soft Skills" may be added in the list of Ability Enhancement courses that can be offered by Department of Psychology, or Department of Education or Department of English Studies** **iv) The statement "This scheme supersedes the earlier available schemes before this date" should be added in the Syllabi of Integrated B.Sc. M.Sc (Physics) for 2021-26 batch.**	**Annexure-IIA-PH** **Annexure-IIB-PH**
4c	To consider and approve the Scheme and Syllabi of PhD (Physics), Programme (w.e.f. Academic Session 2022-2023) as approved in BOS meeting of Department of Physics and Astrophysics held on 08-08-2022 and to recommend the same to Academic Council for consideration and approval.	
	Resolved that the Scheme and Syllabi of PhD (Physics), Programme (w.e.f. Academic Session 2022-2023) as approved in BOS meeting of Department of Physics and Astrophysics held on 08-08-2022, be approved and recommended the same to Academic Council for consideration and approval with subject to incorporation of below-mentioned changes: **i) The number of DCEC courses for the PhD (Physics) course work should be three. Therefore, it was decided unanimously to remove the course of "Nanotechnology and Ion Beam".**	**Annexure-III-PH**

5.	To consider and approve the minutes of the meeting of Board of Studies of Department of Mathematics, School of Basic Sciences held on 16-3-2022, 10-05-2022 and 06-09-2022	**Annexure-D1, D2, D3**
	Resolved that the minutes of the meeting of the Board of Studies of Department of Mathematics, School of Basic Sciences held on 16-3-2022, 10-05-2022 and 06-09-2022 be approved.	
5a	To consider and approve the Scheme and Syllabi of 5-years integrated B.Sc.-M.Sc. Mathematics for batch 2021-26 (3-6 Semesters) as approved in BOS meeting of Department of Mathematics held on 10-05-2022 and to recommend the same to the Academic Council for consideration and approval.	
	Resolved that the Scheme and Syllabi of 5-years integrated B.Sc.-M.Sc. Mathematics for batch 2021-26 (3-6 Semesters) as approved in BOS meeting of Department of Mathematics held on 10-05-2022 and 06-09-2022, be approved and recommended the same to Academic Council for consideration and approval.	**Annexure-I-MT**
5b	To consider and approve the Scheme and Syllabi of 5-years integrated B.Sc.-M.Sc. Mathematics for batch 2022-27 (1-6 Semesters) as approved in BOS meeting of Department of Mathematics held 10-05-2022 and to recommend the same to the Academic Council for consideration and approval.	**Annexure-II-MT**
	Resolved that the Scheme and Syllabi of 5-years integrated B.Sc.-M.Sc. Mathematics w.e.f Academic Session 2022-23, as approved in BOS meeting of Department of Mathematics held on 10-05-2022 and 06-09-2022, be approved, and recommended the same to Academic Council for consideration and approval.	
5c	Recommendation on the application dated 07-01-2022 received from Mr. Manish Kumar (Roll no. 191217), Research Scholar, on the recommendation of DRC (**Annexure–III-MT**), Department of Mathematics dated 13-01-2022 and BoS (16-03-2022, **Annexure-D1**).	**Annexure-III-MT**
	The case of Mr. Manish Kumar (Roll no. 191217), Research Scholar was discussed in detail. He got admission in Ph.D. programme on 09-08-2019 and the topic of his research was approved on 19-11-2020 in a meeting of Board of Studies. **After detailed discussion it is resolved that Mr. Manish Kumar (Roll no. 191217), Research Scholar is required to complete a minimum residency period of two years after his topic approval date as per clause no 7.10 and 9f of Ordinance-II(A) 2019 for Ph.D. It is further resolved that the remaining**	

	residency period of 10 months 13 days should be completed in one go by Mr. Manish Kumar as per relevant ordinance. This resolution is considered as a special case and will not be treated as a precedence. The board recommends the same to the academic council for further consideration and approval.	
6.	To consider and approve the minutes of the meeting of the Board of Studies (BOS) of the Department of Statistics, School of Basic Sciences held on 10-05-2022.	
	Resolved that the minutes of the meeting of the Board of Studies (BOS) of Department of Statistics, School of Basic Sciences held on 10-05-2022 be approved.	**Annexure-E**
6a	To get approval for changing the instructions/notes in the course for setting the question papers as approved in minutes of the meeting of BOS of Department of Statistics, School of Basic Sciences held on 10-05-2022.	
	Resolved that changing the instructions/notes in the courses for setting the question papers as approved in minutes of the meeting of BOS of Department of Statistics, School of Basic Sciences held on 10-05-2022, be approved and recommended the same to the Academic Council for consideration and approval.	**Annexure-E**
6b	To consider and approve the Scheme and Syllabi of M.Sc. Data Science, two year Programme (w.e.f. Academic Session 2022-2023) as approved in BOS meeting of Department of Statistics, held on 10-05-2022 and to recommend the same to the Academic Council for consideration and approval.	
	<u>The agenda item 6b is withdrawn</u> as the similar programme i.e. M.Sc. Data Science has been offered by the Department of Computer Science & Information Technology under the same School. **After detailed discussion, the board suggested that the Department of Statistics and Department of Computer Science & Information Technology may start some collaborative and common programmes in near future as per the availability of the faculty members and resources.**	**Annexure-I-ST**
6c	To consider and approve the Scheme and Syllabi of Ph.D. (Statistics) course work (w.e.f. Academic Session 2022-2023) as approved in BOS meeting of Department of Statistics held on 10-05-2022 and to recommend the same to the Academic Council for consideration and approval.	
	Resolved that the revised and updated Scheme and Syllabi of Ph.D. (Statistics) course work (w.e.f. Academic Session 2022-2023) as approved in BOS meeting of Department of Statistics	**Annexure-II-ST**

	held on 10-05-2022, be approved and recommended the same to Academic Council for consideration and approval.	
7.	To consider and approve the Minutes of the Board of Studies (BoS) of the Department of Geography held on 11-05-2022 (Annexure-F1), 23-07-2022 (Annexure-F2) and 24-08-2022 (Annexure-F3).	
	Resolved that the Minutes of the Board of Studies (BoS) of the Department of Geography held on 11-05-2022 (Annexure-F1), 23-07-2022 (Annexure-F2) and 24-08-2022 (Annexure-F3) be approved.	**Annexure-F1, F2, F3**
7a	To consider and approve the syllabus of M.Sc. Geoinformatics programme in the Department of Geography.	
	Resolved that Scheme and Syllabi of M.Sc. Geoinformatics, two-year Programme (w.e.f. Academic Session 2022-2023) as approved in BOS meeting of Department of Geography held on 24-08-2022, be approved and recommended the same to Academic Council for consideration and approval.	**Annexure-I-Geog**
7b	To consider the request of Mr. Sourabh Yadav to continue his Ph.D. program after joining a regular job as recommended by Departmental Research Committee (DRC) held on 20-04-2022 and Board of Studies (BoS) meeting held on 11-05-2022 and to recommend the case for Academic Council.	
	The case of Mr. Sourabh Yadav (Roll no. 200785), Research Scholar was discussed in detail. He got admission in Ph.D. programme on 29-11-2020 and the topic of his research was approved on 26-10-2021 in a meeting of Board of Studies. **After detailed discussion it is resolved that Mr. Sourabh Yadav (Roll no. 200785), Research Scholar is required to complete a minimum period of two years after his topic approval date as per clause no 9e and 9f of Ordinance-II(A) for Ph.D 2020. It is further resolved that the remaining period of 1 year 10 months 27 days should be completed in one go by Mr. Sourabh Yadav as per relevant ordinance. This resolution is considered as a special case and will not be treated as a precedence. The board recommends the same to the academic council for further consideration and approval.**	**Annexure-II-Geog**
8.	Any other item(s) with the permission of the Chair.	
	No item was discussed	

The meeting ended with thanks to the Chair.

Central University of Haryana
Department of Mathematics

Minutes of BOS Meeting held on 16.03.2022

A meeting of the Board of Studies (BOS) of the Department of Mathematics, School of Basic Sciences, Central University of Haryana, Mahendergarh was held on 16.03.2022 from 2:30 PM to 3:30 PM in online mode (link of the meeting: https://meet.google.com/ssy-iaiy-tjj).

The following members were present:

1. Prof. Kapil Kumar Sharma, (Department of Mathematics, South Asian University, New Delhi) External Expert
2. Prof. Dinesh Khurana, (Department of Mathematics, Panjab University, Chandigarh) External Expert
3. Prof. Rajesh Kumar Gupta (Department of Mathematics, CUH) Chairperson
4. Dr. Arun Kajla (Department of Mathematics, CUH) Member

Following agenda items were considered and resolved accordingly:

1. Reporting of the DRC minutes held on 10.12.2021 and 13.01.2022 for confirmation of admission, and approval of research topics to the research scholars of Mathematics Department.
2. Approval for Syllabi of 5-years integrated B.Sc.-M.Sc. Mathematics (III, IV, V and VI Semesters)
3. Discussion and Recommendation on the application dated 07-01-2022 received from Mr. Manish Kumar (Roll no. 191217), Research Scholar, on the recommendation of DRC, Department of Mathematics dated 13.01.2022.
4. Permission to Mr. Avanish Kumar Pandey (Roll No. 201285), student of M.Sc. Mathematics to continue his degree after one year break.
5. Any other matter with the permission of chair:

1. Reporting of the DRC minutes held on 10.12.2021 and 13.01.2022 for confirmation of admission, and approval of research topics to the research scholars of Mathematics Department.

The Departmental Research Committee (DRC) meeting of Mathematics department was held on 10.12.2021 (through offline mode) and 13.01.2022 (through online mode, link of the meeting: meet.google.com/dfh-oigp-rvr). The proposed titles of the Ph.D. research work finalized by DRC are given in the following table:

16/03/2022 16/03/2022

Candidate Name	Candidate Roll No.	Proposed Title	Supervisor
Aditya Robin Singh	201334	Insight into Etiology of Neurodegenerative Diseases of Basal Ganglia using Computational Models	Dr. Phool Singh
Poonam Yadav	201342	Exact Solutions and Conservation Laws of Nonlinear Mathematical Models of Physical and Biological Systems	Dr. Rajesh Kumar Gupta
Raman Yadav	201343	Development of Secure Image Encryption and Authentication Algorithm using Computational Imaging	Dr. Phool Singh
Jyoti	201337	Approximation by Certain Positive Linear Operators	Dr. Arun Kajla
Amit Raj	201335	A Study on Shortest Path Problems Using Nature-Inspired Algorithms	Dr. Pawan Kumar
Isha Sharma	201336	A Study of Ramsey Numbers and Graphoidal Covering Numbers for Various Graphs	Dr. Jagjeet
Parul Punia	201341	Applications of Nature-Inspired Algorithms to Optimization Problems	Dr. Pawan Kumar
Shahid Ahmed	201344	Numerical Solutions of Integral and Differential Equations using Various Wavelet Methods	Dr. Shah Jahan

All these eight research scholars have successfully completed the requirements of credits in their Course Work and the result is attached herewith. The BOS confirms their admission in Ph.D. programme and approved the above mentioned topics of thesis on the recommendations of DRC.

16/03/2022

16/03/2022

2. Approval for Syllabi of 5-years integrated B.Sc.-M.Sc. Mathematics (III, IV, V and VI Semesters)

The BOS suggested to modify the Syllabus for the course of 5-years integrated B.Sc.-M.Sc. Mathematics (III, IV, V and VI Semesters) as per UGC Curriculum Framework 2019.

3. Discussion and Recommendation on the application dated 07-01-2022 received from Mr. Manish Kumar (Roll no. 191217), Research Scholar, on the recommendation of DRC, Department of Mathematics dated 13.01.2022.

Mr. Manish Kumar (Roll no 191217), joined Department of Mathematics CUH as a research scholar under JRF scholarship on 09-08-2019 under the supervision of Prof. Rajesh Kumar Gupta. The research proposal of Mr. Manish Kumar was accepted in the DRC meeting held on 07-11-2020. He has been selected as Assistant Professor in Chhattisgarh State Govt. in 2021 and has joined on 12-01-2022. Before joining the job, Mr. Manish Kumar remains regular in the Department for 2 years 5 months.

DRC of Mathematics department was held on 13.01.2022 which discussed the case of Mr. Manish Kumar minutely and considered the recommendation of his PhD supervisor Professor Rajesh Kumar Gupta. Based on the suggestion of DRC, the BOS recommended that Mr. Manish Kumar should be allowed to continue his PhD in part-time mode.

4. Permission to Mr. Avanish Kumar Pandey (Roll No. 201285), student of M.Sc. Mathematics to continue his degree after one year break:

Mr. Avanish Kumar Pandey (Roll No. 201285) got admitted in M.Sc. Mathematics progamme in the session 2020-2022. He was selected for job in a bank on 27.01.2021. He has successfully passed three semester examination. He requested for a one year break from the department to enable him to continue his M.Sc. degree from 4th semester from the next session. The Board recommends his admission in 2023-24 as 4th semester student subject to his other eligibility condition as per University rules.

5. **Any other matter with the permission of chair**: Nil

(online consent)
Prof. Kapil Kumar Sharma

(online consent)
Prof. Dinesh Khurana

16/03/22
Prof. Rajesh Kumar Gupta

16/03/2022
Dr. Arun Kajla

Minutes of the meeting of BOS of the Department of Mathematics

3 messages

Mathematics Department <hodmaths@cuh.ac.in> Wed, Mar 16, 2022 at 4:37 PM
To: dkhurana <dkhurana@pu.ac.in>, Kapil Sharma <kapil.sharma@sau.ac.in>, arun kajla <arunkajla@cuh.ac.in>

Dear Sir,
Please find the attached minutes of the meeting of the Board of Studies (BOS) of the Department of Mathematics, CUH held on 16.03.2022 in online mode (link of the meeting: https://meet.google.com/ssy-iaiy-tjj) at 2.30 PM. All relevant documents are also attached.

Kindly approved the attached minutes of the meeting via reply email.

.....

Thanks and Regards

डॉ. राजेश कुमार गुप्ता / Dr. Rajesh Kumar Gupta
प्रोफेसर / Professor
गणित विभाग / Department of Mathematics
हरियाणा केन्द्रीय विश्वविद्यालय / Central University of Haryana
जंत-पाली / Jant-Pali, महेंद्रगढ़ / Mahendergarh -123031
हरियाणा / Haryana, भारत INDIA

6 attachments

- **Avanish Kumar Pandey.pdf**
  209K
- **DRC minutes on 10.12.2021.pdf**
  1243K
- **DRC minutes on 13.01.2022.pdf**
  1077K
- **Ph.D. Course work Result (Mathematics, Biochemisty & Education).pdf**
  265K
- **Final Syllabus and Scheme B.Sc- M.Sc. Integrated Mathematics(2021-22) October 13.pdf**
  1851K
- **Minutes of BOS meeting 16.03.2022.pdf**
  1207K

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dkhurana <dkhurana@pu.ac.in> Wed, Mar 16, 2022 at 5:10 PM
To: Mathematics Department <hodmaths@cuh.ac.in>
Cc: Kapil Sharma <kapil.sharma@sau.ac.in>, arun kajla <arunkajla@cuh.ac.in>

I approve the attached minutes.

Best wishes,

Dinesh Khurana

[Quoted text hidden]

Ryamut
21/03/22

Kapil Sharma <kapil.sharma@sau.ac.in>
To: Mathematics Department <hodmaths@cuh.ac.in>
Cc: dkhurana <dkhurana@pu.ac.in>, arun kajla <arunkajla@cuh.ac.in>

Mon, Mar 21, 2022 at 9:40 AM

The attached Minutes are approved.
Best regards
kapil
[Quoted text hidden]
--
Kapil K Sharma
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South Asian University
Akbar Bhavan, Chanakyapuri
New Delhi, India
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Rajamani
21/3/22

Central University of Haryana

Department of Mathematics

Minutes of DRC Meeting held on 13.01.2022

A meeting of the Departmental Research Committee (DRC) of the Department of Mathematics, School of Basic Sciences, Central University of Haryana, Mahendergarh was held online/offline on Thursday (13.01.2022) from 2:30 PM to 4:50 PM in online mode, link of the meeting: [illegible]

The following members were present:

1. Prof. Kapil Kumar, Professor and Chairperson, Department of Mathematics, Guru Jambheswar University of Science & Technology, Hisar, External Expert (online)
2. Dr. Rajesh Kumar Gupta, Professor and Head, Department of Mathematics, SBS, CUH, Member (offline)
3. Dr. Phool Singh, Professor, Department of Mathematics, SOET, CUH, Member (offline)
4. Dr. Arun Kajla, Assistant Professor, Department of Mathematics, SBS, CUH, Member (offline)
5. Dr. Jagjeet, Assistant Professor, Department of Mathematics, SBS, CUH, Member (on duty leave)
6. Dr. Shah Jahan, Assistant Professor, Department of Mathematics, SBS, CUH, Member (offline)
7. Dr. Pawan Kumar, Assistant Professor, Department of Mathematics, SBS, CUH, Member (offline)

Following agenda items were discussed:

1. To evaluate the research proposals of research scholars namely Mr. Amit Raj, Mrs. Isha Sharma, Ms. Parul Punia and Mr. Shahid Ahmed, of Mathematics Department.

2. Discussion and Recommendation on the application dated 07-01-2022 received from Mr. Manish Kumar (Roll no. 191217), Research Scholar, Department of Mathematics.

3. Any other item with the permission of chair

1. To evaluate the research proposals of the research scholars of the Mathematics Department: The RAC of the research scholars namely Mr. Amit Raj, Mrs. Isha Sharma, Ms. Parul Punia and Mr. Shahid Ahmed of the department was held in the last one month. These research scholars have done modifications and corrections in their research proposals as per their respective RAC suggestions. The

13/01/2022 13/01/2022 13/01/22

revised proposals were already sent to the DRC members through email along with an invitation to the DRC meeting.

Research proposals were presented by the research scholars namely Mr. Amit Raj, Mrs. Isha Sharma, Ms. Parul Punia and Mr. Shahid Ahmed of the department in this DRC meeting. During the presentation, the candidates replied to the queries raised by faculty members including external expert satisfactorily. The DRC discussed and deliberated in detail and advised some improvements in the research proposals of Mr. Amit Raj, Mrs. Isha Sharma, Ms. Parul Punia and Mr. Shahid Ahmed. The research proposals after incorporating the suggestions of DRC will be sent to DRC members for the final approval.

The proposed titles of the Ph.D. research work of Mr. Amit Raj, Mrs. Isha Sharma, Ms. Parul Punia and Mr. Shahid Ahmed as finalized by DRC are given below:

Candidate Name	**Candidate Roll No.**	**Proposed Title**	**Supervisor**
Amit Raj	201335	A Study on Shortest Path Problems Using Nature-Inspired Algorithms	Dr. Pawan Kumar
Isha Sharma	201336	A Study of Ramsey Numbers and Graphoidal Covering Numbers for Various Graphs	Dr. Jagjeet
Parul Punia	201341	Applications of Nature-Inspired Algorithms to Optimization Problems	Dr. Pawan Kumar
Shahid Ahmed	201344	Numerical Solutions of Integral and Differential Equations using Various Wavelet Methods	Dr. Shah Jahan

2. Discussion and Recommendation on the Application received (on 07-01-2022) from Mr. Manish Kumar (Roll no. 191217):

Mr. Manish Kumar (Roll no 191217), joined Department of Mathematics CUH as a research scholar under JRF scholarship on 09-08-2019. The research proposal of Mr. Manish Kumar was accepted in the DRC meeting held on 07-11-2020. He has been selected as Assistant Professor in Chhattisgarh State Govt. in 2021 and has joined on 12-01-2022. Before joining the job, Mr. Manish Kumar remains regular in the Department for 2 years 5 months.

13/01/2022 13/01/2022 13/01/22 13/01/2022

DRC has discussed the case of Mr. Manish Kumar minutely and considered the recommendation of his PhD supervisor Professor Rajesh Kumar Gupta (Report enclosed). Based on the recommendation of his supervisor and the research work done by Mr. Manish Kumar. DRC recommends that Mr. Manish Kumar should be allowed to continue his PhD in part-time mode.

3. Any other item with the permission of chair

Nil

Prof. Kapil Kumar

Dr. Rajesh Kumar Gupta 13-1-22.

Dr. Phool Singh 13/01/2022

Dr. Arun Kajla

Dr. Jagjeet On duty leave

Dr. Shah Jahan 13/01/2022

Dr. Pawan Kumar 13/01/23

Date: January 07th, 2022

To

HOD Mathematics,
Central University of Haryana, Mahendragarh.

Subject: Request for waiving-off my remaining residential period in PhD.

Respected Sir,

I, Manish Kumar, research scholar in Department of Mathematics, CUH, under the supervision of Dr. Rajesh Kumar Gupta want to bring to your kind attention that I got admitted in the department on 09 August, 2019 and have completed 02 years 05 month as a research scholar Department of Mathematics, CUH and got registered for PhD in the department on November 07, 2020. Sir, I want to bring to your kind notice that I have been selected as Assistant Professor in Chhattisgarh state govt. and want to join in the same on 12 January 2022. I have already submitted my resignation from SRF-UGC.

I humbly request you to kindly waive off my remaining residential period in the department so as to enable me to complete my PhD.

I shall be highly thankful to you.

Your's Sincerely

Manish Kumar
Reg. No. CUH19061191217
Roll No. 191217

Manish
07/01/2022

Forwarded & recommended. The matter may be put before DRC

Rajesh
08/01/2022

The work of Ms. Manish Kumar is theoretical and he has completed approximately 60% of his objectives. So, he can complete his remaining work part time. Therefore, he may be allowed to work part time for his Ph.D.

Rajesh
08/01/2022

Annexure-XVIII

Dean School Of Basic Sciences <deansobs@cuh.ac.in>

School Board Meeting on 12-09-2022 at 10:30 A.M. onwards

Dean School Of Basic Sciences <deansobs@cuh.ac.in> Wed, Sep 14, 2022 at 12:34 PM
To: "आचार्य पवन कुमार शर्मा Prof. Pawan K. Sharma" <talk2pawan@gmail.com>
Cc: bonnie_kahlon@yahoo.com, ckjaggi@gmail.com, sukhdeepsingh.cse@dcrustm.org, amitach1@yahoo.com, Amita Chandra <achandra@physics.du.ac.in>, HoD Maths <hodmaths@cuh.ac.in>, HOD Physics <hodphysics@cuh.ac.in>, HOD Statistics <hodstatistics@cuh.ac.in>, CS and IT <hodcomputerscience@cuh.ac.in>, Geography Department <hodgeography@cuh.ac.in>, "HoD, Chemistry" <hodchemistry@cuh.ac.in>, ssunita@cuh.ac.in, "Dr. Suneel Kumar" <suneelkumar@cuh.ac.in>, "Dr. Harish Kumar" <harishkumar@cuh.ac.in>, Rajeshgupta@cuh.ac.in, "Dr. Manoj Gupta" <mkgupta@cuh.ac.in>, keshav@cuh.ac.in, Suraj Arya <surajarya@cuh.ac.in>, jitendra@cuh.ac.in, "Dr. Manish Kumar" <manish.ks@cuh.ac.in>, arunkajla@cuh.ac.in, "Dr. Rakesh Kumar" <rks@cuh.ac.in>, "Dr. Kapil Kumar" <kapilstats@cuh.ac.in>, kahlon_s@pu.ac.in, "Dr. Vinod Kumar" <vinodkumar@cuh.ac.in>, akyadav@cuh.ac.in, "Dr. Devendra Kumar" <devendrastats@cuh.ac.in>, drjitendra@cuh.ac.in

Respected Madam/Sir,
Please find herewith the revised minutes (with minor modification in resolution for agenda no 3a and 3b) of the meeting of the School Board held on 12-09-2022 for your kind consideration and approval.
With Warm Regards

(Revised) Minutes of Meeting of the School Board of School of Basic Sciences held on 12.09.2022

A meeting of the **School Board of School of Basic Sciences**, Central University of Haryana, Mahendergarh was held on **12.09.2022** at **10:30 A.M.** onwards via offline and online (https://meet.google.com/rvh-ukja-fwm) mode in the office of the Dean, School of Basic Sciences, Central University of Haryana.

The following members were present in the meeting:

1.	**Dr. Vinod Kumar** Dean, School of Basic Science Head, Department of Chemistry Central University of Haryana, Mahendergarh	(Chairman)
2.	**Dr. Keshav Singh Rawat** Head, Department of Computer Science and IT Central University of Haryana, Mahendergarh	(Member)
3.	**Dr. Jitendra Kumar** Head, Department of Geography Central University of Haryana, Mahendergarh	(Member)
4.	**Dr. Rajesh Kumar Gupta** Head, Department of Mathematics Central University of Haryana, Mahendergarh	(Member)
5.	**Dr. Suneel Kumar** Head, Department of Physics & Astrophysics Central University of Haryana, Mahendergarh	(Member)
6.	**Prof. Harish Kumar** Department of Chemistry Central University of Haryana, Mahendergarh	(Member)
7.	**Prof. Sunita Shrivastava** Department of Physics & Astrophysics Central University of Haryana, Mahendergarh	(Member)
8.	**Dr. Manoj Kumar Gupta**	(Member)

	Department of Chemistry Central University of Haryana, Mahendergarh	
9.	**Dr. Suraj Arya** Department of CS & IT Central University of Haryana, Mahendergarh	(Member)
10.	**Dr. Manish Kumar** Department of Geography Central University of Haryana, Mahendergarh	(Member)
11.	**Dr. Arun Kajla** Department of Mathematics Central University of Haryana, Mahendergarh	(Member)
12.	**Prof. Pawan Kumar Sharma** Professor, Department of Chemistry Kurukshetra University, Kurukshetra, Haryana	(External Subject Expert)
13.	**Prof. Chandra K. Jaggi** Professor, Department of Operational Research Faculty of Mathematical Sciences, DU, Delhi	(External Subject Expert)
14.	**Prof. Sukhdeep Singh** Professor, Department of Computer Science & Engg. DCRUST, Murthal, Sonipat	(External Subject Expert)
15.	**Prof. Amita Chandra** Professor, Department of Physics & Astrophysics North Campus, DU, Delhi	(External Subject Expert) Joined online
16.	**Prof. Simrit Kahlon** Professor, Department of Geography Panjab University, Chandigarh	(External Subject Expert)
17.	**Prof. Anil Kumar Yadav** Department of Mathematics Central University of Haryana, Mahendergarh	(Special Invitee)
18.	**Dr. Jitendra Kumar** Department of Mathematics Central University of Haryana, Mahendergarh	(Special Invitee)
19.	**Dr. Devendra Kumar** TIC, Department of Statistics Central University of Haryana, Mahendergarh	(Special Invitee)

At the outset, the Chairman welcomed all the members. The Chairman briefed all members about the past activities and agenda items to be discussed in the meeting.

In the meeting, the following agenda items were deliberated in detail and resolved:

Item No	Description and Recommendation	Annexure
1	Confirmation of the minutes of the meeting of the School Board of School of Basic Sciences held on 14-05-2022.	
	The minutes of the meeting of the School Board of School of Basic Sciences held on 14-05-2022 were confirmed.	**Annexure-1-SOBS**
2	To consider and approve the minutes of the meeting of the Board of	

	Studies (BOS) of the Department of Chemistry, School of Basic Sciences held on 06-09-2022.	
	Resolved that the minutes of the meeting of the Board of Studies (BOS) of the Department of Chemistry, School of Basic Sciences held on 06-09-2022, be approved.	**Annexure-A**
2a	To consider and approve the Scheme and Syllabi of M.Sc. (Chemistry), two-year Programme (w.e.f. Academic Session 2022-2023) as approved in BOS meeting of Department of Chemistry held on 06-09-2022 and to recommend the same to the Academic Council for consideration and approval.	
	Resolved that a revised and updated Scheme and Syllabi of M.Sc. (Chemistry), two-year Programme (w.e.f. Academic Session 2022-2023) as approved in BOS meeting of Department of Chemistry held on 06-09-2022, be approved and recommended the same to Academic Council for consideration and approval.	**Annexure-I-CH**
2b	To consider and approve the Scheme for first three years and Syllabi for second year of Integrated B.Sc.-M.Sc. (Chemistry), a five-year Programme for the batch 2021-2026 as approved in the BOS meeting of Department of Chemistry held on 06-09-2022 and to recommend the same to the Academic Council for consideration and approval.	
	The board noted that the scheme and syllabi for the Integrated B.Sc.-M.Sc. programme was introduced for the first time in the academic session 2021-2022. Based on the feedback from the stakeholders, the scheme is being modified to a minor extent for the purpose of giving a wider choice to the students for opting GE/AECC course which is also in line with the UGC-LOCF 2020. **It was also found that students wanted a wider choice of GE/AECC courses in I-IV semesters which was slightly deviating from the approved scheme. Considering the interest of the students supreme in line with NEP-2020, the students were practically allowed to opt for different GE/AECC courses. Therefore, the same should reflect in the scheme for the students enrolled in the session 2021-2026. Accordingly, the scheme for semesters I-IV is modified with courses categorized and should replace any previously approved scheme.** **Resolved that the Scheme for first three years (with minor modifications in first and second year) and Syllabi for the second year of Integrated B.Sc.-M.Sc. (Chemistry), a five-year Programme for the batch 2021-2026 as approved in BOS meeting of Department of Chemistry held on 06-09-2022, be approved and recommended the same to Academic Council for consideration and approval.**	**Annexure-II-CH**
2c	To consider and approve the Scheme and Syllabi for first three years of integrated B.Sc.-M.Sc. (Chemistry), a five-year Programme (w.e.f. Academic Session 2022-2023) as approved in BOS meeting of Department of	

	Chemistry held on 06-09-2022 and to recommend the same to the Academic Council for consideration and approval.	
	In the light of UGC-LOCF curriculum framework 2020 coupled with the fact that the students at CUH should not be at disadvantage compared to the curriculum being adopted at the national stage, the scheme and syllabi of the Integrated B.Sc.-M.Sc. programme have been designed. **Resolved that the Scheme and Syllabi for the first three years of integrated B.Sc.-M.Sc. (Chemistry), a five-year Programme (w.e.f. Academic Session 2022-2023) as approved in the BOS meeting of the Department of Chemistry held on 06-09-2022, be approved and recommended the same to Academic Council for consideration and approval.**	**Annexure-III-CH**
3.	To consider and approve the minutes of the meetings of the Board of Studies (BOS) of the Department of Computer Science & Information Technology, School of Basic Sciences held on 31-08-2022.	
	Resolved that the minutes of the meeting of the Board of Studies (BOS) of the Department of Computer Science & Information Technology, School of Basic Sciences held on 31-08-2022, be approved.	**Annexure-B**
3a	To consider and approve the Scheme and Syllabi of M.Sc. Data Science, two-year PG Programme (w.e.f. Academic Session 2022-2023) as approved in the BOS meeting of the Department of Computer Science & Information Technology, held on 31-08-2022, and to recommend the same to the Academic Council for consideration and approval.	
	Discussed in detail and suggested the improvement in the course title of Programming for Data Science as "Programming for Data Science using python" in the Scheme and Syllabi of M.Sc. Data Science, two-year PG Programme (w.e.f. Academic Session 2022-2023). **Further, the board suggested that the Department of Computer Science and Department of Statistics should sit together and should try to come up with a Collaborative model for the M.Sc. Data Science programme. In view of that the board resolved that the first semester Scheme and Syllabi of M.Sc. Data Science, two-year PG Programme (w.e.f. Academic Session 2022-2023) as approved in the BOS meeting of the Department of Computer Science & Information Technology, held on 31-08-2022, with minor changes as mentioned above be approved and recommended the same to the Academic Council for consideration and approval.**	**Annexure-I-CS**
3b	To consider and approve the Scheme and Syllabi of the Diploma in	

	Computer Hardware & Networking (one-year diploma) (w.e.f. Academic Session 2022-2023) as approved in the BOS meeting of the Department of Computer Science & Information Technology held on 31-08-2022 and to recommend the same to the Academic Council for consideration and approval.	
	Discussed in detail and the board noted that the proposed one year Diploma Programme is of UG level and of 40 credits. However, the existing CUH ordinance allows the Diploma at PG level only with 52 credits(+-4). In view of that the board suggested that the Diploma in Computer Hardware & Networking (one-year diploma) (w.e.f. Academic Session 2022-2023) as approved in the BOS meeting of the Department of Computer Science & Information Technology held on 31-08-2022, may be offered after the amendments in the university ordinance regarding guidelines of credits for the UG degree level diploma with updated syllabi.	**Annexure-II-CS**
4.	To consider and approve the minutes of the meeting of the Board of Studies of the Department of Physics and Astrophysics, School of Basic Sciences held on 08-08-2022.	
	Resolved that the minutes of the meeting of Board of Studies of Department of Physics and Astrophysics, School of Basic Sciences held on 08-08-2022, be approved	**Annexure-C**
4a	To consider and approve the scheme and syllabi of M.Sc. (Physics), two-year programme (w.e.f. Academic Session 2022-2023) as approved in BOS meeting of Department of Physics and Astrophysics held on 08-08-2022 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 2022-2023) as approved in BOS meeting of Department of Physics and Astrophysics held on 08-08-2022, be approved and recommended the same to Academic Council for consideration and approval after the incorporation of suggested corrections given below: **i) The name of the course "Solar Energy and Physics of Voltaic" is to be changed as "Fundamentals of Solar Energy".** **ii) In case of "Dissertation" offered to students in Semester IV, it should be explicitly mentioned that a continuous monitoring is required to be done. For that purpose, a minimum of two presentations are to be presented by students during the semester.** **iii) The statement "This scheme supersedes the earlier available schemes before this date" should be added in the Syllabi of M.Sc. (Physics) 2021-23 batch.**	**Annexure-I-PH**
4b	To consider and approve the Scheme and Syllabi of integrated B.Sc.-M.Sc. (Physics), a five-year Programme (w.e.f. Academic Session	

	2022-2023) as approved in BOS meeting of Department of Physics and Astrophysics held on 08-08-2022 and to recommend the same to Academic Council for consideration and approval.	
	Discussed in detail the Schemes and Syllabi of integrated B.Sc.-M.Sc. (Physics), a five-year Programme w.e.f. Academic Session 2022-2023 (Annexure-IIB-PH)and for 2021-26 batch (Annexure-IIA-PH). **Resolved that the Scheme and Syllabi of integrated B.Sc.-M.Sc. (Physics), a five-year Programme (w.e.f. Academic Session 2022-2023) and for 2021-26 batch as approved in BOS meeting of Department of Physics and Astrophysics held on 08-08-2022, be approved and recommended the same to Academic Council for consideration and approval with subject to implementation of below-mentioned changes:** **i) The number of practical lectures for DSE, mentioned in the schemes of Semester V and Semester VI should be four instead of two.** **ii) In case of "Dissertation" offered to students in Semester X, it should be explicitly mentioned that a continuous monitoring is required. For that purpose, a minimum of two presentations by each student are required during the semester.** **iii) A course related to "Soft Skills" may be added in the list of Ability Enhancement courses that can be offered by Department of Psychology, or Department of Education or Department of English Studies** **iv) The statement "This scheme supersedes the earlier available schemes before this date" should be added in the Syllabi of Integrated B.Sc. M.Sc (Physics) for 2021-26 batch.**	**Annexure-IIA-PH** **Annexure-IIB-PH**
4c	To consider and approve the Scheme and Syllabi of PhD (Physics), Programme (w.e.f. Academic Session 2022-2023) as approved in BOS meeting of Department of Physics and Astrophysics held on 08-08-2022 and to recommend the same to Academic Council for consideration and approval.	
	Resolved that the Scheme and Syllabi of PhD (Physics), Programme (w.e.f. Academic Session 2022-2023) as approved in BOS meeting of Department of Physics and Astrophysics held on 08-08-2022, be approved and recommended the same to Academic Council for consideration and approval with subject to incorporation of below-mentioned changes: **i) The number of DCEC courses for the PhD (Physics) course work should be three. Therefore, it was decided unanimously to remove the course of "Nanotechnology and Ion Beam".**	**Annexure-III-PH**

5.	To consider and approve the minutes of the meeting of Board of Studies of Department of Mathematics, School of Basic Sciences held on 16-3-2022, 10-05-2022 and 06-09-2022	**Annexure-D1, D2, D3**
	Resolved that the minutes of the meeting of the Board of Studies of Department of Mathematics, School of Basic Sciences held on 16-3-2022, 10-05-2022 and 06-09-2022 be approved.	
5a	To consider and approve the Scheme and Syllabi of 5-years integrated B.Sc.-M.Sc. Mathematics for batch 2021-26 (3-6 Semesters) as approved in BOS meeting of Department of Mathematics held on 10-05-2022 and to recommend the same to the Academic Council for consideration and approval.	
	Resolved that the Scheme and Syllabi of 5-years integrated B.Sc.-M.Sc. Mathematics for batch 2021-26 (3-6 Semesters) as approved in BOS meeting of Department of Mathematics held on 10-05-2022 and 06-09-2022, be approved and recommended the same to Academic Council for consideration and approval.	**Annexure-I-MT**
5b	To consider and approve the Scheme and Syllabi of 5-years integrated B.Sc.-M.Sc. Mathematics for batch 2022-27 (1-6 Semesters) as approved in BOS meeting of Department of Mathematics held 10-05-2022 and to recommend the same to the Academic Council for consideration and approval.	**Annexure-II-MT**
	Resolved that the Scheme and Syllabi of 5-years integrated B.Sc.-M.Sc. Mathematics w.e.f Academic Session 2022-23, as approved in BOS meeting of Department of Mathematics held on 10-05-2022 and 06-09-2022, be approved, and recommended the same to Academic Council for consideration and approval.	
5c	Recommendation on the application dated 07-01-2022 received from Mr. Manish Kumar (Roll no. 191217), Research Scholar, on the recommendation of DRC (**Annexure–III-MT**), Department of Mathematics dated 13-01-2022 and BoS (16-03-2022, **Annexure-D1**).	**Annexure-III-MT**
	The case of Mr. Manish Kumar (Roll no. 191217), Research Scholar was discussed in detail. He got admission in Ph.D. programme on 09-08-2019 and the topic of his research was approved on 19-11-2020 in a meeting of Board of Studies. **After detailed discussion it is resolved that Mr. Manish Kumar (Roll no. 191217), Research Scholar is required to complete a minimum residency period of two years after his topic approval date as per clause no 7.10 and 9f of Ordinance-II(A) 2019 for Ph.D. It is further resolved that the remaining**	

	residency period of 10 months 13 days should be completed in one go by Mr. Manish Kumar as per relevant ordinance. This resolution is considered as a special case and will not be treated as a precedence. The board recommends the same to the academic council for further consideration and approval.	
6.	To consider and approve the minutes of the meeting of the Board of Studies (BOS) of the Department of Statistics, School of Basic Sciences held on 10-05-2022.	
	Resolved that the minutes of the meeting of the Board of Studies (BOS) of Department of Statistics, School of Basic Sciences held on 10-05-2022 be approved.	**Annexure-E**
6a	To get approval for changing the instructions/notes in the course for setting the question papers as approved in minutes of the meeting of BOS of Department of Statistics, School of Basic Sciences held on 10-05-2022.	
	Resolved that changing the instructions/notes in the courses for setting the question papers as approved in minutes of the meeting of BOS of Department of Statistics, School of Basic Sciences held on 10-05-2022, be approved and recommended the same to the Academic Council for consideration and approval.	**Annexure-E**
6b	To consider and approve the Scheme and Syllabi of M.Sc. Data Science, two year Programme (w.e.f. Academic Session 2022-2023) as approved in BOS meeting of Department of Statistics, held on 10-05-2022 and to recommend the same to the Academic Council for consideration and approval.	
	<u>The agenda item 6b is withdrawn</u> as the similar programme i.e. M.Sc. Data Science has been offered by the Department of Computer Science & Information Technology under the same School. **After detailed discussion, the board suggested that the Department of Statistics and Department of Computer Science & Information Technology may start some collaborative and common programmes in near future as per the availability of the faculty members and resources.**	**Annexure-I-ST**
6c	To consider and approve the Scheme and Syllabi of Ph.D. (Statistics) course work (w.e.f. Academic Session 2022-2023) as approved in BOS meeting of Department of Statistics held on 10-05-2022 and to recommend the same to the Academic Council for consideration and approval.	
	Resolved that the revised and updated Scheme and Syllabi of Ph.D. (Statistics) course work (w.e.f. Academic Session 2022-2023) as approved in BOS meeting of Department of Statistics	**Annexure-II-ST**

	held on 10-05-2022, be approved and recommended the same to Academic Council for consideration and approval.	
7.	To consider and approve the Minutes of the Board of Studies (BoS) of the Department of Geography held on 11-05-2022 (Annexure-F1), 23-07-2022 (Annexure-F2) and 24-08-2022 (Annexure-F3).	
	Resolved that the Minutes of the Board of Studies (BoS) of the Department of Geography held on 11-05-2022 (Annexure-F1), 23-07-2022 (Annexure-F2) and 24-08-2022 (Annexure-F3) be approved.	**Annexure-F1, F2, F3**
7a	To consider and approve the syllabus of M.Sc. Geoinformatics programme in the Department of Geography.	
	Resolved that Scheme and Syllabi of M.Sc. Geoinformatics, two-year Programme (w.e.f. Academic Session 2022-2023) as approved in BOS meeting of Department of Geography held on 24-08-2022, be approved and recommended the same to Academic Council for consideration and approval.	**Annexure-I-Geog**
7b	To consider the request of Mr. Sourabh Yadav to continue his Ph.D. program after joining a regular job as recommended by Departmental Research Committee (DRC) held on 20-04-2022 and Board of Studies (BoS) meeting held on 11-05-2022 and to recommend the case for Academic Council.	
	The case of Mr. Sourabh Yadav (Roll no. 200785), Research Scholar was discussed in detail. He got admission in Ph.D. programme on 29-11-2020 and the topic of his research was approved on 26-10-2021 in a meeting of Board of Studies. **After detailed discussion it is resolved that Mr. Sourabh Yadav (Roll no. 200785), Research Scholar is required to complete a minimum period of two years after his topic approval date as per clause no 9e and 9f of Ordinance-II(A) for Ph.D 2020. It is further resolved that the remaining period of 1 year 10 months 27 days should be completed in one go by Mr. Sourabh Yadav as per relevant ordinance. This resolution is considered as a special case and will not be treated as a precedence. The board recommends the same to the academic council for further consideration and approval.**	**Annexure-II-Geog**
8.	Any other item(s) with the permission of the Chair.	
	No item was discussed	

The meeting ended with thanks to the Chair.

Minutes of Board of Studies (BoS) Meeting held on 11.05.2022 at 11:00 AM

4 messages

Geography Department <hodgeography@cuh.ac.in> Thu, May 12, 2022 at 5:12 PM
To: kahlon_s@pu.ac.in, subhash anand <sanandpv@yahoo.co.in>, "Dr. Manish Kumar" <manish.ks@cuh.ac.in>
Bcc: "Dr. Jitendra Kumar" <jitendra@cuh.ac.in>

Respected Madam/Sir

Minutes of Board of Studies (BoS) Department of Geography 11.05.2022

A meeting of the Board of Studies (BoS) of the Department of Geography was held on 11.05.2022 at 11:00 AM (Through online mode; Link: https://meet.google.com/rwe-wodb-iba) and the following members were present during the meeting:

1. Dr. Jitendra Kumar, Head, Department of Geography, School of Basic Sciences, Central University of Haryana, Mahendergarh (Chairperson).
2. Prof. Simrit Kahlon, Department of Geography, Panjab University, Chandigarh. (External Member).
3. Prof. Subhash Anand, Department of Geography, University of Delhi, Delhi (External Member).
4. Dr. Manish Kumar, Department of Geography, School of Basic Sciences, Central University of Haryana, Mahendergarh. (Internal Member)

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:

Agenda 1

To consider and approve the Minutes of the Departmental Research Committee (DRC) of the Department of Geography held on 20.04.2022 **(Enclosure-I).**

Resolution: The Board of Studies (BoS) considered and approved the Minutes of the Departmental Research Committee (DRC) of the Department of Geography held on 20.04.2022.

Agenda 2

To consider and approve the list of panels of examiners (external and internal) for M.Sc. Geography and Ph.D. Course Work for Odd and Even Semesters for Term End Examination, 2022 **(Enclosure-II).**

Resolution: The Board of Studies (BoS) considered and approved the list of panels of examiners (external and internal) for M.Sc. Geography and Ph.D. Course Work for Odd and Even Semesters for Term End Examination, 2022.

Agenda 3

Any other item(s) with the permission of the Chair.

Resolution: None

You are kindly requested to consider and approve items 1 & 2 of the agenda mentioned in the minutes of the Board of Studies (BoS) meeting held on 11.05.2022 at 11:00 AM (Through online mode).

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Regards
Dr. Jitendra Kumar
Head of the Department
Associate Professor
Department of Geography
School of Basic Sciences

Central University of Haryana
Jant-Pali, Mahendergarh
Haryana – 123031, INDIA
Alternate E-mail: jitendra@cuh.ac.in
Mobile/WhatsApp: +91-9812492229

2 attachments

Annexure-I_DRC Minutes_20-04-2022.pdf
2000K

Annexure_II_Panel of Examiner_2022.xlsx
27K

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kahlon_s <kahlon_s@pu.ac.in> Thu, May 12, 2022 at 5:45 PM
To: Geography Department <hodgeography@cuh.ac.in>

The minutes of the Board of Studies of Department of Geography held on May 11, 2022 are hereby approved

Simrit Kahlon

Professor

Department of Geography

Panjab University

Chandigarh

[Quoted text hidden]

Dr. Manish Kumar <manish.ks@cuh.ac.in> Fri, May 13, 2022 at 1:32 AM
To: Geography Department <hodgeography@cuh.ac.in>
Cc: kahlon_s@pu.ac.in, subhash anand <sanandpv@yahoo.co.in>

Approved Agenda 1 and 2

[Quoted text hidden]

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subhash anand <sanandpv@yahoo.co.in> Fri, May 13, 2022 at 8:46 AM
Reply-To: subhash anand <sanandpv@yahoo.co.in>
To: "Dr. Manish Kumar" <manish.ks@cuh.ac.in>, Geography Department <hodgeography@cuh.ac.in>
Cc: kahlon_s@pu.ac.in

Dear Dr Jitendra

I approved the minutes of all agenda

Thank you very much

Sent from Yahoo Mail on Android
[Quoted text hidden]

DEPARTMENT OF GEOGRAPHY

CENTRAL UNIVERSITY OF HARYANA

Jant-Pali, Mahendergarh (Haryana)-123031

Minutes of DRC meeting held on 20.04.2022

A meeting of Departmental Research Committee (DRC) was held on 20.04.2022 at 1.30 P.M. in the office of the Head, Department of Geography, Room No. 310, Academic Block-4.

Following members were present in the meeting:

1. Dr. Jitendra Kumar, Associate Professor & Head, Department of Geography, Central University of Haryana, Mahendergarh (Chairman)
2. Prof. S.P. Kaushik Department of Geography, Kurukshetra University, Kurukshetra (External Expert)
3. Dr. Manish Kumar, Assistant Professor, Department of Geography, Central University of Haryana, Mahendergarh (Member)
4. Dr. Kheraj, Assistant Professor, Department of Geography, Central University of Haryana, Mahendergarh (Member)

The following agenda were taken up and discussed in the meeting for consideration and approval of the Departmental Research Committee (DRC) of the Department of Geography, Central University of Haryana.

Agenda 1

To consider the request for allocation of a research supervisor to Mr. Kousik Das Malakar (Roll No. 200781). **(Annexure I).**

Agenda 2

To consider the request for allocation of a research supervisor to Mr. Mahendra Yadav (Roll No. 200782). **(Annexure-II).**

Resolution:

In reference to agenda 1&2: Owing to the resignation of Dr. Gloria Kuzur from CUH and shifting to IGNOU, New Delhi and while redistributing/reallocating the Supervisors to the already registered candidates (02 PhD students) earlier under her supervision, the allotment of Research Supervisor was finalized by DRC after going through the various options given by research scholars and subsequent deliberations, as given below-

Roll No	Registration No.	Name of the Research Scholar	Name of the allotted Supervisor
200781	CUH20067200781	Kousik Das Malakar	Dr. Manish Kumar
200782	CUH20067200782	Mahendra Yadav	Dr. Jitendra Kumar

20-04-2022 20.4.2022 20/04/2022 20/04/2022

The research scholars may modify their title in consultation with research supervisor and vice-versa.

Agenda 3
To consider the request of Dr. Gloria Kuzur as Co-supervisor. **(Annexure-III)**

Resolution
The DRC considered and approved Dr. Gloria Kuzur (Assistant Professor (Distance Education), Staff Training and Research Institute of Distance Education (STRIDE), IGNOU, New Delhi to act as Co-supervisor for Kousik Das Malakar (Roll No. 200781) and Mahendra Yadav (Roll No. 200782).

Agenda 4
To consider the request of Mr. Sourabh Yadav to continue his Ph.D. program after joining a regular job. **(Annexure-IV)**

Resolution

Mr. Sourabh Yadav (Roll No. 200785) Registration No. (CUH20067200785) has joined the PhD program on 29-11-2020 and resigned his fellowship on 01-12-2021 and joined the regular job on 01-12-2021 as a Lecturer Inter College, Jasrana, Firozabad (Uttar Pradesh Secondary Education Service Selection Board). DRC considered the case of Mr. Sourabh Yadav. It was recommended that candidate may be allowed to continue his PhD program subject to the condition to complete a residential period of two years (under Clause 9 (e) of PhD ordinance-II (A) of Central University of Haryana amended vide Resolution No-3(A) of the 45th meeting of the Executive Council dated 27.01.2020) by taking leave from his employer. However, candidate has submitted NOC, where it has been mentioned that no separate leave will be given to Saurav Yadav. The case may be submitted for consideration and approval to the competent authority.

Agenda 5
Any other item(s) with the permission of the Chair.

Resolution
None

The meeting ended with a vote of thanks.

Dr. Jitendra Kumar	Prof. S.P. Kaushik	Dr. Manish Kumar	Dr. Kheraj