CENTRAL UNIVERSITY OF HARYANA

19th Meeting of the Academic Council

06th February, 2016 (04:00 P.M.)

The 19th meeting of the Academic Council of the Central University of Haryana was held on 6th February, 2016, at 04:00 P.M in the Conference Room of the Transit Office, Gurgaon.

The following members were present:

1. **Prof. R.C. Kuhad,** — **Chairperson**
   Vice Chancellor, Central University of Haryana.
2. **Prof. G.L. Sharma** — Member
   Professor and Dean (Admn.),
   Lal Bahadur Shastri Institute of Management (LBSIM), New Delhi
3. **Prof. M.C. Sharma** — Member
   School of Education,
   Indira Gandhi National Open University (IGNOU), New Delhi
4. **Prof. K.S. Sangwan(Retd)** — Member
   Dept. of Sociology, MDU Rohtak
5. **Prof. H.J. Ghosh Roy** — Member
   Director, IMSAR, Maharshi Dayanand University, Rohtak
6. **Dr. (Mrs.) Pawan Sharma**, Joint Secretary — Member
   Law Commission of India, New Delhi
7. **Prof. Nikhilesh Yadav,** — Member
   Head, Department of English,
   Indira Gandhi University, Meerpur, Rewari
8. **Prof. Anup Beniwal** — Member
   Professor & Dean, School of Humanities & Social Sciences,
   G.G.S. Indraprastha University, New Delhi.
9. **Dr. Pardeep S. Chauhan** — Member
   Department of Economics, Kurukshetra University, Kurukshetra
10. **Dr. B.K. Mohapatra** — Member
    Registrar, Shri Lal Bahadur Shastri Rashtriya Sanskrit Vidyapeeth,
    New Delhi

11. **Prof. Ashish Dahiya,** Member
    Dean , School of Language, Linguistics, Culture and Heritage, CUH

12. **Dr. Sarika Sharma** Member
    Proctor & Head, Department of Education, CUH.

13. **Dr. Aditya Saxena** Member
    Head, Department of Physics, CUH.

14. **Dr. Pardeep Singh** Member
    Assistant Professor, Dept. of Law, CUH.

15. **Dr. Suman** Member
    Assistant Professor, Dept. of Commerce, CUH.

16. **Sh. Ram Dutt** **Secretary**
    Registrar, CUH.

The following members could not attend the meeting:

1. **Dr. Sahid Ashraf**
   Registrar, Jamia Millia Islamia, New Delhi.

2. **Prof. Vijay Kumar**
   M.D. University, Rohtak, Haryana

3. **Prof. S.S. Sangwan,**
   Dept. of English, M.D. University, Rohtak, Haryana

4. **Prof. J.P. Khurana**
   Head Department of Plant Molecular Biology & Biotechnology,
   University of Delhi

5. **Dr. Bir Singh Yadav, Associate Professor,**
   Department of English CUH,
   Mahendergarh

6. **Dr. Sanjiv Kumar**
   Head of Department English, CUH, Mahendergarh

The Vice Chancellor welcomed the members of the Academic Council and briefed them about the following academic and other activities carried out by the University during the last four months:

- **The University published its self-study report for the purpose of NAAC accreditation, uploaded it on the University website and submitted to NAAC. Fresh Letter of Intent has also been submitted to NAAC.**

- **The University organized second Convocation on 11th January, 2016 Smt. Smriti Zubin Irani, the Hon'ble Union Minister for Human Resource Development, Govt. of India was the Chief Guest on the occasion and Sh. Ram Bilas Sharma, Education Minister, Govt. of Haryana was Guest of Honour..**
- **Results of all first semester examinations have been declared and that the results of third semester examinations would be declared shortly.**
- **The University conducted interviews for appointment to the teaching positions in Eight Departments (Chemistry, Economics, Management Studies, Microbiology, Nutrition Biology, Sociology, Biotechnology and Biochemistry) and recommendations of the Selection Committees (except Biotechnology and Biochemistry because of Court Case) would be placed before the Executive Council for approval in its forth coming meeting scheduled to be held on 9th February, 2016.**
- **Republic day was celebrated on the University campus.**

Thereafter, the agenda items were taken up in the following manner:

<table>
<tr><th>Resolution No.</th><th>Resolution Passed</th></tr>
<tr><td>1</td><td>Confirmed the minutes of the 18th Academic Council Meeting held on 07th October, 2015.</td></tr>
<tr><td>2</td><td>The actions taken on the resolutions of the 18th meeting of the Academic Council held on 07th October, 2015, were reported, recorded and confirmed. (Vide Annexure-1)</td></tr>
<tr><td colspan="2">(A) REPORTING ITEMS</td></tr>
<tr><td>3.</td><td>The action taken by the Vice Chancellor in approving the formation of Students Council for the session 2015-16 as under was reported, recorded and confirmed.
<table>
<tr><th>Sr. No.</th><th>Department</th><th>Name of the Student</th><th>Nominated/Elected</th></tr>
<tr><td>1</td><td>Biochemistry</td><td>Poonam Yadav, 6648</td><td>Nominated</td></tr>
<tr><td>2</td><td>Biotechnology</td><td>City, 6678</td><td>Nominated</td></tr>
<tr><td>3</td><td>Chemistry</td><td>Mandeep, 5176</td><td>Nominated</td></tr>
<tr><td>4</td><td>Commerce</td><td>Shaifali, 5356</td><td>Nominated</td></tr>
<tr><td>5</td><td>Computer Science</td><td>Rahul Yadav, 4167</td><td>Nominated</td></tr>
<tr><td>6</td><td>Economics</td><td>Altaf Ahmed, 5321
Vikas Chaudhary, 5335</td><td>Elected
Nominated</td></tr>
<tr><td>7</td><td>Education</td><td>Raj Kumar, 5306
Vikram, 5311</td><td>Elected
Nominated</td></tr>
<tr><td>8</td><td>English</td><td>Pawan Kumar, 5128
V.Sarika, 5134</td><td>Elected
Nominated</td></tr>
<tr><td>9</td><td>Environmental Science</td><td>Ramphal Singh, 6111
Sunil Kumar, 5556</td><td>Elected
Nominated</td></tr>
<tr><td>10</td><td>Geography</td><td>Narender, 5236
Jitender Yadav, 6402</td><td>Elected
Nominated</td></tr>
</table></td></tr>
</table>

11	Hindi	Drishan Kumar, 6325 Ekta, 5144	Elected Nominated
12	History & Archaeology	Apitu, 6533 Liaqat Hussian, 5386	Elected Nominated
13	Journalism & Mass Communication	Sai Kumar, 6362 Shilpa Shaji, 5531	Elected Nominated
14	Law	Priyanka, 5259 Abhinav Kumar, 6379	Elected Nominated
15	Library & Information Science	Nikhil, 6555 Neha, 6566	Elected Nominated
16	Management	Rohit Sharma, 5444 Sahil, 6466	Elected Nominated
17	Mathematics	Bhawna Dangi, 6481 Yogesh Kumar, 5300	Elected Nominated
18	Microbiology	Bheem Singh, 6662 Priyanka, 6656	Elected Nominated
19	Nutrition Biology	Vipin Kumar, 6631	Elected
20	Physics	Deepak Kumar, 6155 Arun Kumar, 5202	Elected Nominated
21	Political Science	Raj Kumar, 6008	Elected
22	Psychology	Gautam Budh, 5361	Elected
23	Sociology	Ram Prakash, 6603	Elected
24	Statistics	Aroma Yadav, 5501	Elected
25	Tourism & Hotel Management	Gunjan Shekhawat, 6616	Elected

4 **The action taken by the Vice Chancellor in approving the Academic Calendar for the session 2016-17 as under was reported, recorded & confirmed.**

		No of Teaching Days
Classes to begin for the odd semesters	15/07/2016 (Friday)	90 Days
Dispersal of Classes for the odd semesters	29/11/2016 (Tuesday)	
Preparation and conduct of Examination for the odd semesters	30/11/2016 – 23/12/2016 (Wednesday) (Friday)	
Winter Break	24/12/2016 – 03/01/2017 (Saturday) (Tuesday)	
Classes begin for the even semesters	04/01/2017 (Wednesday)	

	Dispersal of classes for the even semesters	16/05/2017 (Tuesday)	90 days
	Preparation and conduct of Examination for the even semesters	17/05/2017 – 16/06/2017 (Wednesday) (Friday)	
	Summer vacation	17/06/2017 – 14/07/2017 (Saturday) (Friday)	

5	The action taken by the Vice Chancellor in approving the signing of MOU between Central University of Haryana, Mahendergarh and CSIR-Central Electronics Engineering Research institute (CSIR-CEERI), Pilani (Rajasthan) was reported, recorded and confirmed. **(Vide Annexure-2)**
6	The action taken by the Vice Chancellor in approving the signing of MOU between Central University of Haryana, Mahendergarh and Liberty Shoes Ltd. Haryana was reported, recorded and confirmed. **(Vide Annexure- 3)**
(B) CONSIDERATION ITEMS	
7	Considered the syllabi for the following B.Voc programmes:- (i) Retail and Logistics Management (ii) Bio Biomedical Sciences (iii) Industrial Waste Management **Resolved that the syllabi prepared by the experts committee be approved. (Vide Annexure- 4)**
8	**Considered the following admission rules to be followed for admission to various programmes of study of the University and resolved that the same be approved.** **1. ADMISSION COMMITTEE** i) There will be an Admission Committee in each department consisting of the following which will be responsible for making admissions to the respective department in accordance with the University rules: a) Head of the Department/Teacher In Charge - Convener b) Three teachers to be nominated by the Head of the Department c) One representative (teacher) belonging to the SC/ST/OBC/PWD/Woman from any department if any of the members does not belong to any of these categories. ii) Each Department will be responsible for performing all admission related work of the Department. iii) There will be a Standing Committee (Admissions), consisting of the following which will make recommendations to the Academic Council/the Vice Chancellor on issues concerning Admission Policies, eligibility criteria and other related issues referred to it: a) One of the Deans to be nominated by the Vice Chancellor - Chairman b) Deans of all the Schools

c) Two Members of Academic Council nominated by the Vice Chancellor
d) Proctor
e) Dean Students' Welfare (DSW)
f) Heads of the concerned Departments whose matter/s are listed on the agenda
g) One representative of SC/ST/OBC/PWD/Woman if any of the members does not belong to any of these categories.

2. AGE

There will be no minimum or maximum age bar for admission to any programme of study in the University except in the courses where the respective regulatory bodies (such as Medical Council of India (MCI), Dental Council of India (DCI), Bar Council of India (BCI), National Council for Teacher Education (NCTE), All India Council of Technical Education (AICTE) etc.) have prescribed any such rule in this regard.

3. RELAXATIONS/CONCESSIONS

(a) Scheduled Caste/Scheduled Tribe (SC/ST)

i) The minimum eligibility requirement for the Scheduled Caste/Scheduled Tribe candidates will be that they must have passed the qualifying school/degree examination. Provided that the minimum eligibility for admission to post-graduate programmes be the minimum pass marks of the qualifying examination concerned of the Central University of Haryana or the marks should not be less than 40%.

ii) Where the admission is based on screening/written test, the Scheduled Caste/Tribe candidates would also be required to take the test but their merit list will be drawn separately.

iii) However, for admission to the M.Phil. and Ph.D. Programmes, the SC/ST candidates shall be given only 5% relaxation in the minimum eligibility marks.

(b) Other Backward Classes (OBC)

i) The OBC candidates shall be given a relaxation in the minimum eligibility in the qualifying examination and in the minimum eligibility (if any) in the admission entrance test to the extent of 10% of the minimum eligibility marks prescribed for the General Category candidates. For example, if the minimum eligibility for admission to a programme is 50% for the General Category candidates, the minimum eligibility for the OBCs would be 45% i.e. (50% less 10% of 50%).

ii) All those OBC candidates who meet the minimum eligibility marks in the qualifying examination and the minimum eligibility marks (if any) in the entrance test shall be eligible for admission in the order of their merit, keeping in view the availability of seats reserved for them.

iii) The OBC candidates who belong to the '**Non-Creamy Layer**' and whose castes appear in the **Central List** of the OBCs only shall be eligible to be considered for admission under the OBC Category.

(c) Persons With Disabilities (PWD)

The PWD candidates with not less than 40% disability shall be given a relaxation in the minimum eligibility in the qualifying examination and in the minimum eligibility (if any) in the admission entrance test to the extent of 5%.

(d) Children/Widows of the eligible Armed Forces Personnel (CW Category)

A concession of 5% marks in the minimum eligibility requirements in the qualifying examinations will be given to these candidates.

(e) The candidates belonging to the Scheduled Caste, Scheduled Tribe, and Persons with Physical Disability shall be charged the admission form/entrance examination fee at concessional rates.

4. RESERVATIONS

(a) Scheduled Caste/Scheduled Tribe/Other Backward Classes

i) Reservation of seats in admissions to various programmes of study shall be in the following manner:

Scheduled Caste	=15% of total intake in each programme
Scheduled Tribe	=7 ½ % of total intake in each programme
Other Backward Classes	=27% of total intake in each programme

ii) The seats reserved for the SC/ST shall be filled by the SC/ST candidates only. However, in the case of non-availability of the eligible candidates the reserved seats may be interchanged between the SC & ST. If still any seat remains unfilled due to non-availability of eligible candidates of either Scheduled Caste or Scheduled Tribe or both, may be thrown open to the general category in that year provided this has been notified to the National Commission for Scheduled Castes/Tribes; University Grants Commission and the Ministry of Human Resource Development and concurrence has been obtained, failing which the seat will be left vacant.

iii) The seats reserved for the OBCs shall be filled with the OBC candidates only. Only if OBC candidates possessing the minimum eligibility marks are not available in the OBC category then the vacant OBC seats shall be converted into General Category seats in accordance with the admission schedule notified by the University.

(b) Supernumerary seats:

(i) Persons with Disabilities (PWD) =3% of total intake in each programme shall be reserved for the PWD (1% each for the persons with low vision or blindness, hearing impaired and loco motor disability or cerebral palsy (interchangeable in case of non-availability of candidates in the sub-categories).

(ii) Children/Widows of the eligible Armed Forces Personnel

(CW Category) =5% of the seats in each programme shall be reserved for these candidates.

Admission of candidates belonging to CW categories shall be made in the following order of priorities:

I. Widows/Wards of Defence personnel killed in action;
II. Wards of serving personnel and ex-servicemen disabled in action;
III. Widows/Wards of Defence personnel who died in peace time with death attributable to military service;
IV. Wards of Defence personnel disabled in peace time with disability attributable to the military service; and
V. Wards of Ex-servicemen personnel/serving personnel including personnel of police forces who are in receipt of Gallantry Awards;

Category-V (Gallantry Awards) include: Param Vir Chakra, Ashok Chakra, Sarvottam Yudh Seva Medal, Maha Vir Chakra, Kirti Chakra, Uttam Yudh Seva Medal,Vir Chakra, Shaurya Chakra, Yudh Seva Medal ,Sena, Nau Sena,-Vayusena Medal, Mention-in-Despatches, President's Police Medal for Gallantry, Police Medal for Gallantry.

Authorities Competent to issue educational concession certificates under CW category:-

- Secretary, Kendriya, Sainik Board, Delhi
- Secretary, Rajya Zila Sainik Board
- Officer-in-Charge, Records Office
- Competent Authority of Ministry of Defence
- Ministry of Home Affairs (for Police personnel in receipt of Gallantry Awards)

(iii) Foreign Nationals=5% seats in each programme in each Department.

(iv) Sports/Extra Curricular Activities (ECA)

a)For undergraduate courses:

Sports/ECA Persons=upto 5% of total intake in each undergraduate programme may be offered to the candidates on the basis of Sports and ECA on the recommendations of a Committee consisting of the following:

1. Dean of the concerned School - Chairman
2. Head of the concerned Department
3. One External Expert to be nominated by the Vice Chancellor
4. Director, Physical Education
5. Dean Students' Welfare (Convener)

b) For postgraduate courses:

Sports= upto 5% of total intake in each postgraduate programmes may be offered to the candidates on the basis of Sports on the recommendations of the Committee constituted under Clause (a) above.

5. Permission to students to apply under General/SC/ST/OBC Category as well as CW, PWD Category etc.

The candidates applying for admission to various courses shall be permitted to apply simultaneously under Gen/SC/ST/OBC Category as well as Children of War Widows, Person with Disability and other categories for which reservation/concession is admissible. The application forms should, therefore, contain appropriate columns for mentioning such categories.

6. Registration /Admission of foreign nationals

i) The foreign nationals seeking admission in the University shall have to get themselves registered with the office of the Dean Students' Welfare (DSW) in compliance with the schedule notified by the University. No Foreign student will be admitted directly by any Department/School. They will be registered only on the recommendations of their respective High Commissions/Embassies.

ii) Foreign nationals shall be exempted from appearing in Admission Entrance Test conducted for admission to various Under-Graduate and Post-Graduate programmes including Professional Courses. Foreign nationals who are stationed in India and have passed their last examination from Board/University in India shall also be exempted from appearing in entrance test.

iii) All the categories of foreign students shall come under the same category of 5% quota for foreign nationals for admission to various programmes. This shall include foreign nationals with qualifications attained either from Indian Board /University or Foreign Board/University.

iv) All admissions in Foreign Students' category shall be done on individual merit and a single merit list of foreign students, both with Indian and foreign qualifications shall be prepared for admission in various programmes.

v) At least one seat shall be reserved for foreign nationals in all the programmes wherever the total numbers of seats for admission is less than 20.

vi) Foreign Nationals admitted to the Central University of Haryana will be required to get medical insurance which is mandatory.

vii) The foreign students shall have to pay annual fee at the following rates:

a. Postgraduate/Master's programmes excluding professional programmes	- 1200 US Dollars
b. All Professional programmes	- 1350 US Dollars
c. M.Phil./Ph.D.	-1500 US Dollars
d. Undergraduate programmes	-1050 US Dollars

The above fee does not include hostel/mess fee.

7. The departments, if they decide to also hold Group Discussion (GD) or interview in addition to the admission entrance test, shall not assign more than 20% marks to the GD or interview.

8. The merit list for the general category seats will comprise of all the candidates in the order of merit including SC/ST/OBC, if they come under the general category merit. No one will be excluded from the same. In other words, it will also include SC/ST/OBC candidates if they come in the general merit. All such reserved category candidates shall be entitled to be considered under the general category, as well as under the reserved category. Admission to open category seats will be strictly in the order of merit without excluding SC/ST/OBC candidates.

9. The details of the seats of General and reserved categories will have to be notified by the Departments concerned before beginning of the admission process.

10. All those programmes wherein admissions are based on the rank in the entrance examination, the candidates will be eligible for admission only after the result of the qualifying examination has been declared and the candidates meet the minimum eligibility criteria. However, the candidates whose results of the qualifying examinations are awaited, may be offered provisional admission, subject to submission of their results latest by 30th August, failing which their provisional admission will be cancelled. Such candidates shall submit an undertaking to this effect.

11. All admissions shall have to be finalized by the Departments in strict compliance with the schedule of admission notified by the University and in no case admission shall be allowed beyond the last date of admission.

12. The Departments shall get the relevant certificates submitted for availing the benefit of reservation verified from the respective issuing authorities.

13. No student of the University shall be permitted to pursue two degree courses or other full time courses simultaneously either from the Central University of Haryana or from other University except the part-time or weekend diploma/certificate courses.

14. For admission to the courses which are governed by the Regulations of the regulatory bodies, like Medical Council of India (MCI), Dental Council of India (DCI), Bar Council of India (BCI), National Council for Teacher Education (NCTE), All India Council of Technical Education (AICTE), etc., the admissions and other rules prescribed under their respective regulations shall be followed.

15. In case any information/document furnished by the candidates in their applications for admission is found to be incorrect/fake at any time after admission, the admission of such candidates shall be liable to be cancelled by the Head of the Department immediately, besides initiating other action in accordance with the University rules.

16	**(C) Any other items** Considered and resolved that the recommendation of the committee constituted by the Vice Chancellor for prescribing the following fee to be charged from the students of B.Voc programmes, be approved and recommended to the Executive Council for approval. **Fee = Rs. 5000/- per semester** **One time security (Refundable) Rs. 2000/-**
17	Considered and resolved that the request of Department of Chemistry to introduce Ph.D programme in the department be approved and consequential amendment to Ordinance XV as under be also recommended for approval of the Executive Council:- Add Chemistry after Physics under clause 1.9 (a) (i) of Ordinance-XV **Further resolved to recommend that the Vice Chancellor be authorized to allow such requests of the Departments for starting Ph.D in their respective Departments keeping into consideration the availability of infrastructure and faculty in the Department.**
18	Resolved that a Standing Committee of the Academic Council be constituted by the Vice Chancellor to examine the agenda items of the Academic Council pertaining to syllabi, introduction of new programmes and any other items of the agenda referred to it by the Vice Chancellor so that such items could be placed before the Academic Council along with the recommendations of the Standing Committee.
	The meeting ended with a vote of thanks to the Chair.

VICE CHANCELLOR

REGISTRAR

ACTION TAKEN REPORT

18th MEETING OF THE ACADEMIC COUNCIL

The 18th Meeting of the Academic Council of Central University of Haryana was held on 07th October, 2015 at 11:00 AM in the Conference Room of Transit/ Camp Office of the Central University of Haryana at 3113, DLF Phase III, Gurgaon-122010.

Resolution No.	Resolution Passed	Action Taken
1	The minutes of the 17th meeting of the Academic Council held on 22nd July, 2015 were confirmed.	Noted
2	The actions taken on the minutes of the 17th meeting of the Academic Council held on **22nd July, 2015**, were reported, recorded and confirmed. **(Vide Appendix-I)**	Noted
REPORTING ITEMS		
3.	Receipt of UGC letter.No.F.1-1/2013(CU) dated 25.8.2015 conveying its approval for introduction of following five new departments with effect from the academic session 2015-16 in addition to twenty departments earlier approved by the UGC was reported, recorded and confirmed. **(Vide Appendix-II)** i. Department of Biotechnology ii. Department of Biochemistry iii. Department of Nutrition Biology iv. Department of Microbiology v. Department of Tourism and Hotel Management.	Noted. All the Departments are now functional.
3.a	The action taken by the Vice Chancellor in signing of an MOU with Technology Applications Service (TAS) New Delhi and National Cooperative Union of India (NCUI) New Delhi was reported, recorded and confirmed. **(Vide Appendix-III)**	Noted. A copy of resolution has been sent to the concerned departments/office.
4	The action taken by the Vice Chancellor in Constituting an Internal Quality Assurance Cell (IQAC) NAAC cum Steering Committee consisting of the following was reported, recorded and confirmed 1. **Prof. R.C. Kuhad**, Chairman Vice-Chancellor, CUH	Noted. Self-Study Report of the University has been uploaded on the University website. Fresh Letter of Intent has been submitted to

	2. **Prof. Ashish Dahiya** Director Dept. of THM, CUH 3. **Prof. D.P.S. Varma** External Member University of Delhi, Delhi 4. **Prof. Vinay Kumar Gupta** External Member University of Delhi, Delhi 5. **Prof. Karam Pal Narwal** External Member Dept. of Management, GJUS&T, Hisar 6. **Prof. Anup S. Mann** External Member Dept. of Physics, MDU, Rohtak 7. **Dr. Sanjiv Kumar** Member Dept. of English, CUH 8. **Dr. Chanchal Kumar Sharma** Member Dept. of Pol. Sc., CUH 9. **Dr. Sunita Tanwar** Member Dept. of Management Studies, CUH 10. **Dr. Dinesh Chahal** Member Dept. of Education, CUH 11. **Mr. Vijay Kumar** Member Assistant Registrar, CUH 12. **Dr. Samiksha Godara** Member Dept. of Law, CUH 13. **Dr. Arvind Tejawat** Member Dept. of Hindi, CUH 14. **Dr. Ranjan Aneja** Member Dept. of Economics, CUH 15. **Dr. Suman** Member Dept. of Commerce, CUH 16. **Ms. Divya** Member Dept. of Management Studies, CUH Members mentioned at Sl. No. 2 & 7 to 16 will act as NAAC Steering Committee.	the NAAC.
ITEMS FOR CONSIDERATION		
5	Considered the changes in The University Logo with latest 3D technique to be carried out through some specialized professional agency. The slant/ angle of book as displayed	Copy of resolution sent to the concerned office. Artists and Academicians are being consulted.

	in the University logo was required to be modified to make it straight. ***Resolved to recommend to the Executive Council that the proposed modification in the logo may be approved with a suggestion that further modification may be considered, if needed, in consultation with the Artist/Designers and Academicians. Till then, the logo being recommended now shall be use*** **. (Vide Appendix-IV)**	
6	**Resolved that the following amendments to Ordinances of the University may be recommended to the Executive Council for approval.** **1. Add Ordinance IV (A) and IV (B) after Ordinance III.** **Ordinance IV (A): Qualifications for appointment to the teaching and other posts:** The qualifications for appointment to the following posts shall be those as prescribed under the UGC Regulations 2010, as amended from time to time: 1. Professor 2. Associate Professor 3. Assistant Professor 4. Librarian/ Dy. Librarian/ Assistant Librarian 5. Director/ Deputy Director/ Assistant Director of Physical Education & Sports. 6. Any other post/s qualifications for which are prescribed under the UGC Regulations. Provided that the University may prescribe specialized and desirable qualifications, whenever needed. Provided further that the Executive Council of the University may prescribe guidelines for short listing of candidates for appointment to the posts of Assistant Professor/ Assistant Librarian/ Assistant Director of Physical Education & Sports. **Ordinance IV (B): Career Advancement Scheme (CAS)-2010.** **1 (a)** The teachers of the University shall be eligible to be considered for up gradation/ promotion under the Career Advancement Scheme (CAS)-2010 of the University Grants Commission, as amended from time to time. **(b)** The Selection Committee for considering promotion as Professor, Associate Professor under CAS-2010 shall be the same as prescribed under Statute 18 of the Statutes of the University for appointment to these posts. Provided that the Screening-Evaluation Committee/ Selection Committee for promotion of an Assistant Professor from one Academic Grade Pay (AGP) to the next AGP shall consist of the following: 1. The Vice-Chancellor or his nominee -Chairperson	Noted. Copy of resolution and amended Ordinance sent to concerned Office and also submitted to the Visitor.

	2. The Dean of the concerned School 3. The Head of the concerned Department 4. One Subject Expert drawn from a panel approved by the Academic Council. 5. An academician representing SC/ST/OBC/PWD/Minority/Women to be nominated by the Vice-Chancellor, if any of the candidates representing these categories is an applicant and if any of the above members of the Selection Committee does not belong to that category. Three members including the Chairperson and the expert shall form the quorum. **2(a)** The Assistant/ Deputy Librarian and Assistant/ Deputy Director of Physical Education & Sports shall be eligible to be considered for promotion under the Career Advancement Scheme (CAS)-2010 of the University Grants Commission as amended from time to time. **(b)** The Screening-Evaluation Committee/ Selection Committee for considering promotion of Assistant/ Deputy Librarian and Assistant/ Deputy Director of Physical Education & Sports, shall consist of the following: 1. The Vice-Chancellor or his nominee - Chairperson 2. Two experts nominated by the Vice-Chancellor from amongst a panel approved by the Academic Council. 3. An academician representing SC/ST/OBC/PWD/Minority/Women to be nominated by the Vice-Chancellor, if any of the candidates representing these categories is an applicant and if any of the above members of the Selection Committee does not belong to that category. Three members including the Chairperson and at least one expert shall form the quorum. Provided that while considering the candidates under both the categories 1 & 2 above: (i) In case the Selection Committee finds that a candidate is not suitable for promotion, it may consider him/her for promotion after one year. In such a case, his/her eligibility for promotion shall be deferred by one year. (ii) Every candidate will be required to appear for interview before the Selection Committee unless on a request from any candidate the Selection Committee agrees to consider him/her in absentia.	

(iii) In case of any dispute with regard to information given by the candidate in his/her self-assessment proforma, the decision of the Selection Committee shall be final.

2. Amendments to Ordinance IV: Selection Committee Procedure.

Existing	Proposed
Ordinance-IV	Ordinance-IV(C)
Clause 2- The Registrar, and while the Office of the Registrar is vacant, the Deputy Registrar nominated by the Vice-Chancellor for the purpose , shall be the ex-officio Secretary to the Selection Committee, but shall not be deemed to be a member thereof.	To be deleted
Clause 20- The Chairman-Convenor shall have the power to lay down the procedure in respect of any matter not mentioned in the Act/ Statute/ Ordinance.	No Change
Clause 22- The statutory provision of relaxing of age, minimum qualification, experience etc. prescribed in case of the candidates belonging to SC/ST/OBC/PWD categories will be made applicable to them.	To be deleted
Clause 23- If any candidate is recommended by the Selection Committee for appointment in relaxation of any of the prescribed conditions relating to qualifications, age, experience etc., shall be so stated and recorded.	To be deleted

7	**Resolved that the following amendments to Ordinance V of the Ordinances of the University may be recommended to the Executive Council for approval.** **(I) To add the following as Clause-1:** **1. Designation & Pay Scales** The designation, pay & allowances and other service conditions of the University teachers and other staff shall be those as prescribed by the University Grants Commission (UGC) from time to time. **(II) To amend the serial numbers of the Clauses consequent to the above addition** **2. Teachers to be a whole-time employees** (No change) **3. Nature of Duties** (No change) **4. Probation** (No change) **5. Increment** (No change) **6. Age of Superannuation**	Copy of resolution sent to the concerned office. A circular has been issued to all departments for informing the teachers to submit the Form of Agreement of Service for University Teachers as per format approved by the Executive Council. The Ordinance has also been submitted to the Visitor.

6.1 Every teacher in the service of the University shall superannuate from service on the afternoon on the last date of the month in which he/she attains the age as prescribed by the University Grants Commission/ Government of India from time to time.

6.2 in place of 5.2	No Change
6.3 in place of 5.3	No Change
6.4 in place of 5.4	No Change

7. Resignation (No change)

8. Voluntary Retirement (No change)

9. Superannuation Benefits (No change)

10. Variations in Terms and Conditions of Service (No change)

11. Fixation of Pay of Re-employed Teachers (No change)

12. Contract

The written contract between a teacher and the University required to be entered into under Clause (3) of Statute (22) shall be in the prescribed form. The teacher shall be bound by the terms and conditions enumerated in the

"Form of Agreement of Service for University Teachers", vide Annexure to this Ordinance.

13. Special Contracts (No change)

(III) To add the following after Clause-13 in pursuance of the UGC Regulations, 2010:

14. CODE OF PROFESSIONAL ETHICS

I. TEACHERS AND THEIR RESPONSIBILITIES:

Whoever adopts teaching as a profession assumes the obligation to conduct himself / herself in accordance with the ideal of the profession. A teacher is constantly under the scrutiny of his students and the society at large. Therefore, every teacher should see that there is no incompatibility between his precepts and practice. The national ideals of education which have already been set forth and which he/she should seek to inculcate among students must be his/her own ideals. The profession further requires that the teachers should be calm, patient and communicative by temperament and amiable in disposition.

Teachers should:

(i) Adhere to a responsible pattern of conduct and demeanor expected of them by the community;

(ii) Manage their private affairs in a manner consistent with the dignity of the profession;

(iii) Seek to make professional growth continuous through study and research;

(iv) Express free and frank opinion by participation at professional meetings, seminars, conferences etc. towards the contribution of knowledge;

(v) Maintain active membership of professional organizations and strive to improve education and profession through them;

(vi) Perform their duties in the form of teaching, tutorial, practical, seminar and research work conscientiously and with dedication;

(vii) Co-operate and assist in carrying out functions relating to the educational responsibilities of the Department, college and the University such as: assisting in appraising applications for admission, advising and counseling students as well as assisting the conduct of university and college examinations, including supervision, invigilation and evaluation; and

(viii) Participate in extension, co-curricular and extra-curricular activities including community service.

II. TEACHERS AND THE STUDENTS

Teachers should:

(i) Respect the right and dignity of the student in expressing his/her opinion;

(ii) Deal justly and impartially with students regardless of their religion, caste, political, economic, social and physical characteristics;

(iii) Recognize the difference in aptitude and capabilities among students and strive to meet their individual needs;

(iv) Encourage students to improve their attainments, develop their personalities and at the same time contribute to community welfare;

(v) Inculcate among students scientific outlook and respect for physical labour and ideals of

democracy, patriotism and peace;

(vi) Be affectionate to the students and not behave in a vindictive manner towards any of them for any reason;

(vii) Pay attention to only the attainment of the student in the assessment of merit;

(viii) Make themselves available to the students even beyond their class hours and help and guide students without any remuneration or reward;

(ix) Aid students to develop an understanding of our national heritage and national goals; and

(x) Refrain from inciting students against other students, colleagues or administration.

III. TEACHERS AND COLLEAGUES

Teachers should:

(i) Treat other members of the profession in the same manner as they themselves wish to be treated;

(ii) Speak respectfully of other teachers and render assistance for professional betterment;

(iii) Refrain from lodging unsubstantiated allegations against colleagues to higher authorities; and

(iv) Refrain from allowing considerations of caste, creed, religion, race or sex in their professional endeavor.

IV. TEACHERS AND AUTHORITIES:

Teachers should:

(i) Discharge their professional responsibilities according to the existing rules and adhere to procedures and methods consistent with their profession in initiating steps through their own institutional bodies and/or professional organizations for change of any such rule detrimental to the professional interest;

(ii) Refrain from undertaking any other employment and commitment including private tuitions and coaching classes which are likely to interfere with their professional responsibilities;

(iii) Co-operate in the formulation of policies of the institution by accepting various offices and discharge responsibilities which such offices may demand;

(iv) Co-operate through their organizations in the formulation of policies of the other institutions and accept offices;

(v) Co-operate with the authorities for the betterment of the institutions keeping in view the interest and in conformity with dignity of the profession;

(vi) Should adhere to the conditions of contract;

(vii) Give and expect due notice before a change of position is made; and

(viii) Refrain from availing themselves of leave except on unavoidable grounds and as far as practicable with prior intimation, keeping in view their particular responsibility for completion of academic schedule.

V. TEACHERS AND NON-TEACHING STAFF:

(i) Teachers should treat the non-teaching staff as colleagues and equal partners in a cooperative undertaking, within every educational institution; and

(ii) Teachers should help in the function of joint staff-councils covering both teachers and the non-teaching staff.

VI. TEACHERS AND GUARDIANS

Teachers should:

(i) Try to see through teachers' bodies and organizations, that institutions maintain contact with the guardians, their students, send reports of their performance to the guardians whenever necessary and meet the guardians in meetings convened for the purpose for mutual exchange of ideas and for the benefit of the institution.

VII. TEACHERS AND SOCIETY

Teachers should:

(i) Recognize that education is a public service and strive to keep the public informed of the educational programmes which are being provided;

(ii) Work to improve education in the community and strengthen the community's moral and intellectual life;

	(iii) Be aware of social problems and take part in such activities as would be conducive to the progress of society and hence the country as a whole; (iv) Perform the duties of citizenship, participate in community activities and shoulder responsibilities of public offices; (v) Refrain from taking part in or subscribing to or assisting in any way activities which tend to promote feeling of hatred or enmity among different communities, religions or linguistic groups but actively work for National Integration. ***Note: All provisions of the amended Ordinance V shall, mutatis-mutandis, also be applicable to the Teachers appointed prior to the amendment of this Ordinance.***	
8	**Resolved that the following amendments to the Ordinances of the University may be recommended to the Executive Council for approval.** **To add the following after Ordinance XV:** **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/herself by the production of a certificate of a competent authority that he/she 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	Copy of resolution sent to the concerned office and the Ordinance has been submitted to the Visitor. The Ordinance has been circulated to all the departments of the University and has also been uploaded on the University website.

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. (1) Application for admission to examinations shall be accompanied by the prescribed fees.

(2) A candidate who due to sickness or other cause is unable to present himself/herself for any examination shall not be entitled to claim a refund of his fees. but such a candidate may be permitted to present himself/herself at the next ensuing examination without payment of a further fee.

3. (1) 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 given an admission ticket showing the name of the candidate and the roll number assigned to him for admission to the examination.

(2) The ticket shall be sent to the HoD/Dean of the School concerned, who will give it to the candidate after obtaining his/her signature on the ticket.

4. A candidate may not be admitted into the examination hall, if he/she 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.

5. 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.

6. 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.

7. 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.

8. Notwithstanding anything contained expressly or impliedly in these rules, the Vice-Chancellor may, on being satisfied after such enquiry as he/she 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.

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.

9. 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.

Ordinance-XV-B: Disorderly conduct and use of unfair means in examination.

1. For the purposes of this Ordinance -

a) Examination means an examination conducted by the University.

b) The year means the academic year;

c) Candidate includes an examinee taking any examination in a particular year and wherever the context so permits, every student on the rolls of the University;

d) The use of dishonest or unfair means in the examination

include:

(i) assisting in any manner whatsoever any other candidate in answering the question paper during the course of the examination;

(ii) taking assistance from any other candidate or any other person or from any book, paper, notes or other material in answering the question paper during the course of the examination;

(iii) carrying into the examination room any book, paper, notes, or other material whatsoever likely to be used directly or indirectly by the candidate in connection with the examination;

(iv) smuggling in an answer book or a continuation sheet;

(v) taking out or arranging to send out an answer book or its any page or a continuation sheet;

(vi) replacing or getting replaced an answer book or its any page or continuation sheet during or after the examination;

(vii) getting impersonated by any person in examination;

(viii) deliberately disclosing one's identity or making any distinctive mark in the answer book for that purpose;

(ix) communicating with or talking to any other candidate or unauthorised person in or around the examination room during the course of the examination;

(x) communicating or attempting to communicate directly or through a relative, guardian and friend with an examiner with the object of influencing him in the award of marks;

e) Disorderly conduct in the examination includes:

(i) misbehaviour in connection with the examination, with the Superintendent, the Invigilator on duty or the other staff working at the Examination Centre, or with any other candidate, in or around the examination centre, before, during or after the examination hour;

(ii) leaving the examination room before the expiry of the stipulated time or without handing over the answer book to the Invigilator-in-charge or without signing the attendance sheet;

(iii) intentionally tearing off the answer book or a part thereof or a continuation sheet;

(iv) disturbing or disrupting the examination;

(v) inciting others to leave the examination room or to disturb or disrupt the examination;

(vi) Carrying into the examination centre any weapon of offence.

2. No candidate shall make use of any dishonest or unfair means or indulge in disorderly conduct in the examination.

3. A candidate found guilty of the use of dishonest or unfair means

or disorderly conduct in the examination may be disqualified from passing the examination for which he/she was a candidate, and may, in addition, be debarred from appearing at any future examination of the University for a further period to be stated or be expelled from the University and declared not a fit and proper person to be admitted to any further examination of the University.

4. (a) Any candidate who, in the opinion of the Invigilator on duty or the Examiner conducting a practical or oral examination or the Superintendent of the Examination Centre, contravenes or is suspected of contravening the provisions of clause 2 in the examination room, shall be forthwith challenged by such Invigilator, Examiner or Superintendent who shall ask for a signed statement from the candidate.

The candidate may be subjected to a search of his/her person to recover any incriminating material from him/her by the examination staff on duty.

(b) Without prejudice to the provision contained in sub-clause (a) above the Superintendent of an Examination Centre or the Examiner conducting practical or oral examination shall also have the power to expel a candidate who in his opinion, has contravened the provisions of clause 2, from the examination centre for the remaining duration of the paper.

5. (a) The Superintendent of the Examination Centre or the Examiner or any Officer of the University, as the case may be, shall report in writing to the Controller of Examinations the case of every student who has contravened the provision of clause

(b) The reporting authority shall give full facts of the case in his report and forward with it the statements. if any, made on the occasion by the candidate and the Invigilator on duty and papers, books and other material recovered from the candidate, if any.

6. There shall be one or more Examination Disciplinary Committees. Each such Committee, hereinafter referred to as the Examination Disciplinary Committee shall be constituted as under:

(a) On the recommendation of the Vice-Chancellor the Executive Council shall, at the beginning of each year, draw up a panel of teachers of the University to be nominated on the Examination Disciplinary Committee.

(b) Each Examination Disciplinary Committee shall comprise of two teachers to be nominated by the Vice-Chancellor from amongst the panel, one of them being of the status of at least an Associate Professor.

(c) The Controller of Examinations or any person authorised by him, of the rank of not less than an Assistant Controller of Examinations/Assistant Registrar will function as non-member Secretary of the Examination Disciplinary Committee.

7. The Vice-Chancellor shall determine from time to time the number of Examination Disciplinary Committees.

8. (a) The Controller of Examinations or any person authorised by him/her in this behalf shall communicate to the candidate, in respect of whom a report has been received pursuant to clause 5(a), the

	precise nature of allegations against him and shall require him/her to furnish his written explanation within a stipulated period. (b) On receipt of the explanation from the candidate or on the expiry of the period stipulated for submitting explanation if no explanation is received from him the Vice-Chancellor shall assign his case for consideration to the Examination Disciplinary Committee and, where there are more Committees than one, such Examination Disciplinary Committee as he may deem fit. 9. After considering all the material on record including the explanation, if any, submitted by the candidate, the Examination Disciplinary Committee if satisfied that the candidate is guilty of the use of dishonest or unfair means or disorderly conduct in the examination, shall recommend to the Executive Council the punishment that may be imposed on the candidate under clause 3 according to the nature of the offence. 10. The Executive Council may, after considering the report, of the Examination Disciplinary Committee take such action against the candidate under clause 3 as it may deem fit. 11. A candidate on whom may any punishment has been imposed under clause 3 may, within 15 days from the date of the receipt of the communication in that behalf, make a representation to the Vice-Chancellor for review of his case and the Vice-Chancellor, if satisfied that the case is fit for reconsideration refer the same to the Executive Council. The Executive Council may thereupon review the case and pass such orders as it may consider fit. 12. In the case of a candidate who has been expelled from the University in terms of provisions of Clause 3, the Executive Council may, on the recommendation of the Vice-Chancellor, on the expiry of three years after such expulsion including the examination in connection with which he was punished, exempt a candidate from further operation of the punishment awarded. 13. If within four months of the publication of the results, it is brought to the notice of the Controller of Examinations that a candidate was guilty of the use of dishonest or unfair means at the examination in respect of which his result was declared, the provisions of this Ordinance shall apply mutatis mutandis to the case of such a candidate provided that before imposing any penalty including the penalty of cancellation of his result, he shall be given another opportunity, to show cause against the proposed punishment and his explanation, if any, shall be considered by the Executive Council. 14. A candidate against whom an enquiry is pending about his allegedly having resorted to the use of dishonest or unfair means or disorderly conduct in the examination or against whom action is initiated under the provisions of the preceding clause shall, if he takes or has taken any subsequent examination, be deemed to have been only provisionally admitted to that subsequent examination. That examination will stand cancelled and his result thereof would not be declared if on account of the punishment imposed on him as a result of the said enquiry or action, he would not have been entitled to take	

	that examination but for his provisional admission thereto. 15. If a person, not otherwise covered by these provisions, is found guilty of having impersonated a candidate or of having written, outside the examination hall, an answer book or its any page or a continuation sheet which he knows or has reason to believe will be smuggled into the examination hall for the benefit of any candidate, or of having managed otherwise to replace the answer book or its any page of the candidate after the examination, he shall be disqualified from appearing in any University examination for a period to be stated. The provisions of this Ordinance relating to the manner of imposition of penalty shall, in so far as they may be applicable, apply to the case of such a person. **Ordinance-XV-C: Withholding Conferment of any Degree/Diploma or Award of any Certificate.** Notwithstanding anything contained in Ordinance X-A or in any other Ordinance, the Executive Council may, on the recommendation of the Vice-Chancellor, by a resolution passed with the concurrence of not less than two thirds of the members voting, withhold for such period as they may deem fit, conferment of any Degree/Diploma or Award of any Certificate to any successful candidate at an examination of the University, for reasons, which, in their opinion, justify such withholding e.g., unruly or disorderly conduct, or violence on the campus or in a College, or conviction for an offence involving violence or moral turpitude.	
9	**Resolved that the following amendments to the Ordinance XV relating to Award of P.G. Degree/Diplomas of the Ordinances of the University may be recommended to the Executive Council for approval.** **I. To add Clause 1.9 after Clause 1.8:** a. The following courses of study shall be offered by the University: (i) Doctor of Philosophy (Ph.D.) in – Economics, Education, English, Hindi, Political Science, Microbiology, Biochemistry, Biotechnology, Nutrition Biology, Tourism & Hotel Management, Management Studies and Physics. (ii) Master of Philosophy (M.Phil.) of one year's duration in – Economics, Education, English, Hindi and Political Science. (iii) Master's Degree Programmes:	Copy of resolution sent to the concerned office and the Ordinance has been submitted to the Visitor. The Ordinance has been circulated to all the departments of the University and has also been uploaded on the University website.

Name of Programme	Duration
M.A. (Economics)	Two Years
M.B.A.	Two Years
M.Com.	Two Years
M.Sc. (Mathematics)	Two Years
M.Sc. (Statistics)	Two Years
M.C.A.	Three Years
M.Sc. (Environmental Science)	Two Years

M.Sc. (Geography)	Two Years
M.Sc. (Chemistry)	Two Years
M.Sc. (Physics)	Two Years
M.A. (History)	Two Years
M.A. (Political Science)	Two Years
M.A. (Psychology)	Two Years
M.A. (Sociology)	Two Years
M.A. (Journalism and Mass Communication)	Two Years
M.A. (Education)	Two Years
M.A. (English)	Two Years
M.A. (Hindi)	Two Years
LL.M.	Two Years
M.Lib.	Two Years
M.Sc. (Microbiology)	Two Years
M.Sc. (Biochemistry)	Two Years
M.Sc. (Biotechnology)	Two Years
M.Sc. (Nutrition Biology)	Two Years
Master of Hotel Management & Catering Technology	Two Years

(iv) Bachelor in Vocational Studies (B.Voc)

(v) Post-graduate Diploma Programmes.

(vi) Certificate Courses.

II. To add Clause-17 after Clause-16:

Clause-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 practical 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 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/practical/ 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. 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. ***Clause 17 of the Ordinance relating to attendance will be implemented from Academic Session 2015-16.***	
10	**Resolved that the following amendments to the Ordinances of the University may be recommended to the Executive Council for approval.** **To add the following after Ordinance XIX:** **<u>Ordinance-XIX-A: Prohibition of and punishment for Ragging</u>** 1) Ragging in any form is strictly prohibited within the premises of the University and/or outside the University Campus as well as on public transport. 2) Complaints against ragging shall be dealt in accordance with	Copy of resolution sent to the concerned office. The Ordinance has been circulated to all the departments, uploaded on the University website and submitted to the Visitor

	the **'UGC Regulations on Curbing the Menace of Ragging in Higher Educational Institutions, 2009 as amended from time to time. (Vide Appendix-V)**	
11	**Resolved that the following rules for refund of various kinds of fee paid by the students may be recommended to the Executive Council for approval.** **PROPOSED RULES FOR REFUND OF VARIOUS KINDS OF FEE** **A. ADMISSION FEE: REGULAR DEPARTMENTS OF THE UNIVERSITY**	Copy of resolution sent to the concerned office.

Sr. No.	Reasons for seeking refund	Quantum of fee to be refunded
a)	When a student applies for withdrawal of admission 15 days before the last date of admission fixed by the University.	Full fee after deduction of Rs. 500/- and full Examination fee.
b)	When a student applies for withdrawal of admission, three working days before the last date of admission (including the last day of admission)	Full fee after deduction of Rs. 1000/- and full examination fee. No fee will be refunded thereafter.
c)	When admission is made inadvertently due to error/omission/commission on the part of the University	Full fee and full examination fee
d)	When cancellation of admission is due to concealment/falsification of facts, submission of false/fake certificate(s), non-submission of the required documents, providing misleading information by the student or for any error/mistake on the part of the student	No fee will be refunded
e)	When a student of self-financing programme applies for the withdrawal of admission on or before the last date of admission	Full fee after deduction of Rs. 1000/- and full examination fee
f)	If a student provisionally admitted to a programme	Full fee after deduction of Rs. 1000/- provided that

	on declaration of the result of his/her qualifying examination/compartmental examination becomes ineligible for admission and his/her admission is cancelled	he/she applies for refund in the same financial year	
g)	In case a student, after his/her admission, expires within one month of the last date of admission	Full fee including examination fee will be refunded to his/her parents	
h)	In case an M.Phil. or Ph.D. student applies for withdrawal of admission within seven days of the date of admission	Full fee after deduction of Rs. 500/-	
i)	If an M.Phil. or Ph.D. student, pursuing the programme, discontinues his/her study or withdraws his/her admission after seven days of the date of admission	50% of the total fee	
j)	In case admission to the Ph.D. programme is offered at a later date and the student withdraws his/her admission within one month	50% of the total fee	
k)	When a student has been allowed to change the programme of study within the departments of the University	After adjustment of fees already paid the student will be required to pay the remaining amount due as prescribed for the new programme. In case the amount paid by the student in the previous programme is more than the amount due for the second programme, the excess amount will be refunded or adjusted towards further month(s) fee	

B. <u>REFUND OF EXAMINATION FEE</u>

Sr. No.	Reasons for seeking refund	Quantum of fee to be refunded
a)	In the event of student's inability to continue his/her studies at least one month before the commencement of the examination duly certified by the Head of the Department/Dean of the School	Full Fee after deduction of Rs. 200/-
b)	If on rechecking of the result, any error or omission is discovered in respect of the marks originally awarded by the examiner concerned or in the record of results prepared by the University	Full re-checking fee deposited by the candidate for the purpose shall be refunded to the candidate

C. **REFUND OF FEE PAID FOR STATEMENT OF MARKS/MIGRATION CERTIFICATE/ PROVISIONAL CERTIFICATE/ SPECIAL CERTIFICATE/ OFFICIAL TRANSCRIPT/ DUPLICATE CERTIFICATE, ETC.**

Sr No	Reasons for seeking refund	Quantum of fee to be refunded
a)	If a candidate applies for supply of any of the above documents but does not avail it or withdraws the application.	No fee will be refunded.

D. **REFUND OF HOSTEL FEE:**

Sr No	Reasons for seeking refund	Quantum of fee to be refunded
a)	If a student leaves the hostel within 30 days of the date of his/ her admission for any reason	Full fee paid by him/ her except the monthly charges will be refunded
b)	If a student withdraws his/ her admission after 30 days of his/ her admission for any reason.	No fee will be refunded.

E. In all cases, security deposit/caution money (if any) shall be refunded after submission of clearance from the relevant quarters, provided he/she applies for refund of the same within a period of one year from the date of leaving the institution.

These rules shall be implemented from the Academic Session

	2015-16 and will supersede all previous rules in this regard if any.	
12	**Resolved that the amendments to Ordinance II (A) relating to Ph.D degree of the University may be recommended to the Executive Council for approval. (Vide Appendix VI)** ***Further resolved that the Vice Chancellor be authorised to constitute a committee to design the mode & syllabus for the conduct of entrance examination for admission to Ph.D.***	Copy of resolution sent to the concerned office. The Ordinance has been circulated to all the departments, uploaded on the University website and submitted to the Visitor.
13	Resolved that the amendments to Ordinance II relating to M.Phil degree of the University may be recommended to the Executive Council for approval. (Vide Appendix VII)	Copy of resolution sent to the concerned office. The Ordinance has been circulated to all the departments, uploaded on the University website and submitted to the Visitor.
Supplementary Agenda Items		
14	**Resolved that the recommendations of Board of Studies (expert committee) of the Department of Biotechnology made in its meeting held on 17th September, 2015 to review the syllabi of M.Sc. Biotechnology 1st to 4th Semesters be approved. (Vide Appendix VIII)**	Copy of resolution sent to the concerned department. Syllabus as approved by the Academic Council has been uploaded on the University website
15	**Resolved that the recommendations of Board of Studies of the Department of English and Foreign Languages made in its meeting held on 5th October, 2015 to review the syllabi of MA (English) 1st Semester be approved. (Vide Appendix IX)**	Copy of resolution sent to the concerned department. Syllabus as approved by the Academic Council has been uploaded on the University website
16	**Resolved that the recommendations of Board of Studies of the Department of Microbiology made in its meeting held on 27th September, 2015 to review the syllabi of M.Sc. (Microbiology) 1st to 4th Semesters be approved. (Vide Appendix X)**	Copy of resolution sent to the concerned department. Syllabus as approved by the Academic Council has been uploaded on the University website

REGISTRAR

Annexure-2

MEMORANDUM OF UNDERSTANDING (MoU)

Between

CENTRAL UNIVERSITY OF HARYANA, MAHENDERGARH (HARYANA)

&

CSIR-CENTRAL ELECTRONICS ENGINEERING RESEARCH INSTITUTE

(CSIR-CEERI), PILANI (RAJASTHAN)

PREAMBLE

This Agreement is undertaking between the CENTRAL UNIVERSITY OF HARYANA (hereafter called CUH), MAHENDERGARH as one party and the (CSIR-CEERI), PILANI (RAJASTHAN) as the second party. Both the organizations wish to collaborate to promote and accelerate programme of research and training in the Department of Physics.

AREAS OF COLLABORATION

The CUH, Mahendergarh and CSIR-CEERI hereby entre into an Agreement in the following areas of academics and research:

1) Registration of CSIR-CEERI sponsored candidates to Ph.D. programme offered by CUH under the joint supervision/guidance of faculty member(s) of Department of Physics, CUH, Mahendergarh and scientists of CSIR-CEERI, Pilani. The CSIR-CEERI sponsored candidates will be governed under the CUH rules for super-numerary candidates and a maximum of two candidates can be registered in one academic session.
2) Sharing of laboratory infrastructure facilities and human resources.
3) Exchange of faculty from Department of Physics and CSIR-CEERI Pilani Scientists.
4) Mutual co-operations in the research projects, seminars and workshops.
5) CSIR-CEERI, Pilani shall provide project work guidance and facilities in their laboratory to the M.Sc. final year students (three to five) towards part fulfillment of the M.Sc. degree requirement at the cost of the University/students.

ACTION PLAN

Collaboration in the above mentioned academic activities shall be implemented as follows:

1) Establishment of a joint team with the representatives from both the organizations to work out the practical details to ensure proper and effective implementation of the MoU.
2) The joint team will meet at least twice a year alternatively at Mahendergarh and Pilani to follow up the implementation of the MoU and to suggest necessary measure for its acceleration.

THE TERMS OF AGREEMENT

1) The intellectual property rights, wherever involved, shall be shared equally by both the organizations.
2) The joint research findings shall be published upon mutual agreement. The publication may be joint or separate as determined in each specific case, except in the case of annual reports.
3) Expenses on account of meetings and accommodation only of faculty members/scientists shall be meet by CSIR-CEERI and by CUH, Mahendergarh.
4) The MoU may, by mutual consent, add, modify, amend or delete any word, phrase, sentence, or article in this MoU.
5) The MoU shall be effective from the date of its signing by both the organizations for the period of five years and may be extended further on the consent of both the institutions.

In witness, the two organizations have accepted and signed this Memorandum of Understanding.

FOR AND ON BEHALF OF 29/10/15

Professor
Department of Physics
Central University of Haryana
CENTRAL UNIVERSITY OF HARYANA
MAHENDERGARH (HARYANA)

WITNESS

29-10-15

Date: 29-10-15
Place: CSIR-CEERI Pilani

29/X/15

FOR AND ON BEHALF OF

डॉ. चंद्रशेखर/Dr. CHANDRA SHEKHAR
निदेशक/Director
केन्द्रीय इलेक्ट्रॉनिकी इंजी. अनु. संस्थान
CSIR-Central Electronics Engg. Res. Institute
सीएसआईआर-सीरी, पिलानी (राजस्थान)
CSIR-CEERI, PILANI (RAJASTHAN)

WITNESS

29/10/2015

Date: 29-10-2015
Place: CSIR-CEERI Pilani

Annexure-3

Memorandum of Understanding (MOU)

Between

Liberty Shoes Ltd., Haryana

&

Central University of Haryana (CUH), Mahendergarh, Haryana

Dated: 21.10.2015

Place: Liberty Shoes Ltd.
2nd Floor, Building No.8 Tower -B,
DLF Cyber City, Phase -2,
Gurgaon- 122 002 Haryana

Memorandum of Understanding

This Memorandum of Understanding is signed between Liberty Shoes Ltd Karnal Haryana (Herein after called Liberty) and Central University of Haryana, Mahendergarh, Haryana (Herein after called as CUH) on 21st October, 2015 at the Liberty Shoes Corporate Office 2nd Floor, Building No. 8, Tower-B, DLF Cyber City Phase-II, Gurgaon, Haryana

That Liberty, is a leading leather foot wear manufacturing organization currently with an annual turnover exceeding INR 600 Crore (U.S. $150 million), and figure amongst the top 5 manufacturers of leather footwear of the world producing more than 50,000 pairs a day using a capacity of more than 3 lakh square feet of leather per month. Helping us dress up the feet of the fashion-driven and quality-seeking customers in more than 25 countries, which includes major international fashion destinations like France, Italy and Germany, distribution network of 150 distributors, 600 exclusive showrooms and more than 6000 multi-brand outlets.

That Central University of Haryana, Mahendergarh, Haryana is a Central University established by an Act of Parliament in 2009 to provide learning environment for the growth and development of students and faculty through innovative programmes- by pursuing cutting-edge research, scholarly inquiry, and creative endeavors. Currently CUH is offering various degree and diploma courses to students under recognition from University Grants Commission.

I. CUH and Liberty common interests and objectives

By reason of their very essence as contributors to the development of nation, CUH & Liberty share interests and objectives via contribution to academic development, governance, outreach activities and other related research matters. Both institutions are interested in establishing academic cooperation agreements with institutions of similar nature in order to assist in the achievement of their goals and objectives in such matters.

II. Purpose of the MOU

The purpose of this MOU is to develop linkages between academia & industry institutions in the shared conviction that such exchanges contribute to development of nation and understanding and promote global awareness among collaborative activities students from the two participating institutions

This includes key areas such as,

1. Collaborative Programmes
2. Curriculum Design & Development
3. Students Internship & Placement
4. Good Governance
5. Out Reach Activities

Additional activities such as contribution to society and other such programmes under corporate social responsibility and financial funding / research/ Chairs under CUH may be carried out under this MOU and will be stated in corresponding specific sub-agreements. Such specific sub-agreements, once approved by both parties, will be attached as annexes to this MOU

By signing this MOU, both the parties have agreed to put their basic decision in writing however the detailed objectives & obligations of both the parties would be worked out in detail later on

III. Term and Termination

This MOU will be effective on the date it has been signed by both parties, and it will be in effect for a period of five (5) years The agreement can be renewed for

additional five (5) year periods by mutual consent of the parties to the MOU Both parties reserve the right to terminate this MOU upon written notice given three months prior to the termination date becoming effective. However, notwithstanding the termination of the MOU, both the parties shall continue to remain responsible for the respective obligations in respect of all the activities which might have already been undertaken prior to the termination or then going-on.

IV. Publicity of Information:

CUH will not use the name of Liberty, nor of any employee of Liberty, in any advertising, news release or other promotional activity without the prior written approval of an authorized representative of the Liberty and similarly Liberty will not use the name of CUH, nor of any employee of CUH, in any advertising, news release or other promotional activity without the prior written approval of an authorized representative of the CUH. Nothing herein shall restrict either party's right to disclose the existence of this MOU, the identity of the parties, or the purpose of this MOU

V. Disputes & Jurisdiction:

Any dispute arising in the course of the MOU shall be settled amicably and as per the provision of Arbitration Laws in which CEO Liberty and Vice-Chancellor, CUH, Mahendergarh, Haryana will be the joint arbitrators. The dispute for all such cases shall be in the jurisdiction of Haryana

VI. Coordination and Follow-up

Administration of the Cooperative Agreement shall be the responsibility of the Officer Appointed/ Entrusted with the responsibilty by the Vice Chancellor for such programmes at CUH and the Officer Appointed/ Entrusted with the

responsibility by CEO - Liberty. Any additions, changes, or deletions must be approved by these representatives of both universities. All notices shall be in writing and shall be directed to these individuals as follows:

TO CUH: Registrar
Central University of Haryana
Mahendergarh, Haryana
E mail: xxx@cuh.ac.in

TO Liberty: Liberty Shoes Ltd
2nd Floor, Building No. 8, Tower-B,
DLF Cyber City, Phase-II,
Gurgaon -122002 Haryana
ceo-office@libertyshoes.com

APPROVED FOR
Central University of Haryana:

(RAM DUTT)
REGISTRAR

Date 21.10.2015

APPROVED FOR
Liberty Shoes Ltd.:

(MUNISH KAKRA)
CFO & COMPANY SECRETARY

Date 21.10.2015

Annexure-4

CENTRAL UNIVERSITY OF HARYANA

B Voc. (Retail and Logistic Management)
Course Structure -Semester-I

S. No.	Course title	Nature of Course	L	T	P	Credit
1.	Principles of Management	CCC	2	1	2	4
2.	Fundamentals of Retailing	CCC	2	1	2	4
3.	Business Statistics	DSC	2	1	2	4
4.	Business communication -I	AEC	2	1	2	4

B Voc. (Retail and Logistic Management)
Course Structure -Semester-II

S. No.	Course title	Nature of Course	L	T	P	Credit
1.	Supply Chain and Logistic Management	CCC	2	1	2	4
2.	Principles of Marketing	CCC	2	1	2	4
3.	Legal Aspect of Business	DSC	2	1	2	4
4.	Business communication -II	AEC	2	1	2	4

Six Weeks Summer training project during vacation after Second Semester.

B Voc. (Retail and Logistic Management)
Course Structure -Semester-III

S. No.	Course title	Nature of Course	L	T	P	Credit
1.	Management of Retail Business	CCC	2	1	2	4
2.	Advertisement and Sales Promotion	CCC	2	1	2	4
3.	Business Environment	DSC	2	1	2	4
4.	Business Communication :III	GE	2	1	2	4

B Voc. (Retail and Logistic Management)
Course Structure -Semester-IV

S. No.	Course title	Nature of Course	L	T	P	Credit
1.	Human Resource Management for Retail business	CCC	2	1	2	4
2.	Fundamentals of Financial Management	CCC	2	1	2	4
3.	IT Skills for business management	SEC	2	1	2	4
4.	Personality Development	GE	2	1	2	4

B Voc. (Retail and Logistic Management)
Course Structure -Semester-V

S. No.	Course title	Nature of Course	L	T	P	Credit
1.	E Business	CCC	2	1	2	4
2.	Management of Small and Medium Enterprise	CCC	2	1	2	4
3.	Negotiation Skills for business	SEC	2	1	2	4
4.	Contemporary issues in Retail Business	DSC	2	1	2	4

B Voc. (Retail and Logistic Management)
Course Structure -Semester-VI

S. No.	Course title	Nature of Course	L	T	P	Credit
1.	Entrepreneurship Development	CCC	2	1	2	4
2.	Values and Ethics in Business	DSE	2	1	2	4
3.	Project Report	SEC	2	1	2	4

B Voc. (Retail and Logistic Management)
(Semester – I)

Course– Principles of Management **Credit:** 4

Objective

The objective of this course is to acquaint the students with basic principles of Management and how a manager takes decisions.

Contents

Meaning and Nature of Management; Management an art and Science, Management and related disciplines, Role of professional managers in business, society and government.

Evolution of Management– Taylors' Scientific Management approcah, Fayol's principles of Management, , Elton Mayo's Human Relations School, System's Approach to Management; Management as Science and Art.

Functions of Management - Planning, Organizing, Staffing, Directing and Controlling; Delegation and Decentralization. Co-ordination as essence of management.

Process of planning, Organization Structure & Design; types of organization, factors affecting decision related to structure. Tools of controlling, Leadership and styles of leadership.

Suggested Readings:

1. Koontz, H., & Weihrich, H. (2012). *Essentials of Manaagement: International and Leader Perspective* (9 ed.). New Delhi: Tata McGraw Hill.
2. Robbins, S. P., DeCenzo, D., Agarwal, M. N., & Bhattacharyya, S. (2011). *Essentials of Management* (6 ed.). New Delhi: Pearson Edcuation.
3. Robbins, S. P., Judge, T., & Vohra, N. (2013). *Organizational Behavior* (15 ed.). New Delhi: Pearson Education

Note: The list of cases, references and relevant articles will be provided by the faculty in the class.

Course – FUNDAMENTALS OF RETAILING **Credit:** 4

Objective

The objective of this course is to acquaint the students with basic principles of Retailing as a format of business.

Contents

Concept of retailing, Functions of retailing, Terms & Definition, Retail formats and types, Retailing Channels, Retail Industry in India, Importance of retailing, changing trends in retailing.

Retail consumer behavior, Factors influencing the Retail consumer, Customer decision making process, Types of decision making, Market research for understanding retail consume

Importance of Retail locations, Types of retail locations, Factors determining the location decision, Steps involved in choosing a retail locations, Measurement of success of location

Suggested Readings

1. Madan K.V.S (2009). Fundamental of Retailing. New Delhi. Tata Mcgraw-Hill
2. Cox, Roger., & Brittan, Paul. (2008). Retailing – An Introduction Management. New Delhi: Pearson Education

Course – BUSINESS STATISTICS **Credit:** 4

Objectives:

To get the students acquainted with the tools and techniques of applied statistics useful in business decision making.

Course Contents

Introduction to Statistics. Importance of statistics in business decision making. Limitations of statistics.

Collection of data and formation of frequency distribution. Graphic presentation of frequency distribution – graphics, Bars, Histogram, Diagrammatic.

Measures of central tendency – mean, median and mode, partition values – quartiles, deciles and percentiles. Measures of variation – range, IQR, quartile, deciles and percentiles.

Measures of variation – range, IQR, quartile deviation and standard deviation and Lorenz Curve.

Correlation Analysis: Correlation Coefficient; Assumptions of correlation analysis; coefficients of determination and correlation; measurement of correlation- Karl Person's Methods; Spearman's rank correlation; concurrent deviation the correlation coefficient.

Suggested Readings:

1. Levin, R. I., & Rubin, D. (1998). Statistics for Management (7 ed.). USA: Prentice Hall.

2. Gupta, S.P. and Gupta,P.K.(2009) Quantitative Techniques and Operations Research, Sultan Chand &Sons

3. Gupta, S.P.(2009) Statistical Methods, New Delhi : Sultan Chand &Sons.

Course – BUSINESS COMMUNICATION-I **Credit:** 4

Objective

The aim of the course is to develop skills and competencies in students to be able to communicate effectively through the written and oral medium.

Contents

Conceptual Issues in communication: Model of Communication; Barriers and Facilitators in Communication.

Aspects of Verbal and non-verbal Communication. Principles of Written Communication: 7 C.s of written communication. Deductive, Inductive & AIDA approach to writing business letters

Writing for: Inquiries, Claims, Invitations, Reservations and Orders .Refusal & Collection Letters. Sales Letters; Inter-office Memos; Report Writing: Long & Short Business Reports and Business Proposal.

Suggested Readings

1. Lesikar, R. V., & Petit, J. D. (2007). Business communication. London (7th ed.). Homewood: Richard D. Irwin

2. Murphy, H. A., & Hildebrandt, W. (2007). Effective business communications. New Delhi: McGraw Hill.

Note: The list of cases, references and relevant articles will be provided by the faculty in the class

B Voc. (Retail and Logistic Management)
(Semester – II)

Course- Supply Chain and Logistic Management **Credit:** 2

Objective

The objective of this course is to enable students understand basic concepts of supply chain and logistics as an important part of business.

Contents

Supply Chain Management: basic concept, objectives, significance, Process view of a supply chain, components of supply chain–Facilities, Inventory, Transportation, Information, Material Handling, Achieving tradeoff between customer service and cost

Physical distribution : Definition, Importance, participants in physical distribution process, Marketing Channels – Definition and Importance, Different forms of channels - Unconventional channels - Channels for Consumer goods, Industrial Goods & Services – Integrated Marketing Channels – Horizontal, Vertical, channel , Functions of Marketing Channels

Channel Management – Channel Selection Process & criteria, Performance appraisal of Channel Members - Channel Conflicts & Techniques to resolve channel conflicts

Suggested Readings :

1. Supply Chain Management Best Practices by David Blanchard
2. Channel Management & Retail Management by Meenal Dhotre

Course-PRINCIPLES OF MARKETING **Credit:** 4

Objective

The objective of this course is to equip the students with knowledge and skills required in marketing management.

Contents

Marketing and Marketing Management: Nature, role, scope and concepts of marketing; Marketing environment and Environment scanning; Marketing information system and Marketing research.

Understanding consumers; Market segmentation: Targeting and positioning; Product decisions: Product mix, Product life cycle, New product development.

Branding and packaging decisions; Pricing methods and strategies; Promotion decisions: promotion mix, advertising, sales promotion, publicity and personal selling.

Channel management: Types and functions, Selection, Cooperation and conflict management, Marketing Logistics;

New issues in marketing: Globalization, Consumerism, Green marketing, Direct Marketing, Network Marketing, Event Marketing, e-marketing, Guerilla marketing,

Suggested Readings:

1. Etzel, M., Walker, B., Stanton, W., & Pandit, A. (2009). *Marketing* (14 ed.). New Delhi: Tata MCGraw Hill.
2. Kotler, P., Armstrong, G., Agnihotri, P., & Haque, E. (2013). *Principles of Marketing: A South Asian Perspective* (13 ed.). New Delhi: Pearson Education.
3. Kotler, P., Keller, K., Koshy, A., & Jha, M. (2013). *Marketing Management: A South Asian Perspective* (14 ed.). New Delhi: Pearsonn Education.

Note: The list of cases, references and relevant articles will be provided by the faculty in the class.

Course- LEGAL ASPECTS OF BUSINESS **Credit: 2**

Objective

The objective is to enable students understand legal and regulatory framework for doing business in India. The emphasis will be on application rather than principles of laws.

Contents

Indian Contract Act, 1872: Fundamental terms definition and meaning, Kinds of Contract and Agreement, Contract vs. Agreement, Essentials of a valid contract, Consequences of Breach of Contract.

Sale of Goods Act, 1930: Contract of Sale, Conditions and Warranties, Transfer of Ownership, Performance of the Contract- Delivery and Payment, Rights of unpaid seller.

Negotiable Instruments Act - 1881: Negotiable Instruments- Promissory Note, Bills of Exchange, & Cheque, and their definitions and characteristics,

Consumer Protection Act, 1986: Aims and Objects of the Act, Redressal Machinery under the act and Procedure for complaints under the act, Remedies, Appeals, Enforcement of orders and Penalties.

Company Act 2013: Key definitions and Concept, Setting of the Company, Management and administration, Directors, Accounts and Audit, Meetings, Winding up of a company: Meaning, types of winding up, grounds of compulsory winding up

Suggested Readings:

1. Kuchhal, M. C.; Business Law, Vikas Publishing House, New Delhi, 2004.
2. Kapoor, N. D.; Elements of Mercanlite Law, Sultan Chand & Sons, New Delhi,2003

3. Tulsian P C (2014). *Mercantile Law* , New Delhi: Sultan Chand and Sons

Note: The list of cases and specific references will be announced in the class by the faculty.

Course – BUSINESS COMMUNICATION-II **Credit:** 4

Objective

The aim of the course is to develop skills and competencies in students to be able to communicate effectively through the written and oral medium.

Contents

Making Effective Oral Presentations; Conducting Business Meetings& Effective Interviews. Negotiating for Business: Strategy & Tactics.

Technology and Business communication: Office Automation; Telephone Culture; Video Conferencing; NET Etiquette.

Legal Aspects of Business Communication. Corporate Communication; Global Business Etiquette & Cross Cultural communication.

Case studies in real life business situation in communication.

Suggested Readings

1. Lesikar, R. V., & Petit, J. D. (2007). Business communication. London (7th ed.). Homewood: Richard D. Irwin

2. Murphy, H. A., & Hildebrandt, W. (2007). Effective business communications. New Delhi: McGraw Hill.

Note: The list of cases, references and relevant articles will be provided

CHOICE BASED CREDIT SYSTEM COURSE DETAILS
(Draft syllabus for Academic Committee Approval)

B.Sc. (VOCATIONAL) BIOMEDICAL SCIENCE

DEEN DAYAL UPADHYAY KAUSHAL KENDRA,
CENTRAL UNIVERSITY OF HARYANA,
MAHENDERGARH,
HARYANA

Meenakshi

Nandlal

Umesh

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CHOICE BASED CREDIT SYSTEM (CBCS):

The CBCS provides an opportunity for the students to choose courses from the prescribed courses comprising core, elective or skill based courses. The courses can be evaluated following the grading system, which is considered to be better than the conventional marks system. Therefore, it is necessary to introduce uniform grading system in the entire higher education in India. This will benefit the students to move across institutions within India to begin with and across countries. The uniform grading system will also enable potential employers in assessing the performance of the candidates. In order to bring uniformity in evaluation system and computation of the Cumulative Grade Point Average (CGPA) based on student's performance in examinations, the UGC has formulated the guidelines to be followed.

Outline of Choice Based Credit System:

1. **Core Course:** A course, which should compulsorily be studied by a candidate as a core requirement is termed as a Core course.
   1.1 **Common Core Courses (CCC-1 to CCC-11):** These core courses should compulsorily be studied by students of all B. Voc. Programmes in Biological Sciences.
   1.2 **Discipline Specific Core courses (DSC-1 to DSC-04):** There would be four Discipline Specific Core courses (specific for each B. Voc. Program). These should compulsorily be studied by students of the respective B. Voc. Disciplines.

2. **Elective Course:** Generally a course which can be chosen from a pool of courses and which may be very specific or specialized or advanced or supportive to the discipline/ subject of study or which provides an extended scope or which enables an exposure to some other discipline/subject/domain or nurtures the candidate's proficiency/skill is called an Elective course.
   2.1 Discipline Specific Elective (DSE) Course: Elective courses may be offered by the main discipline/subject of study is referred to as Discipline Specific Elective. The University/Institute may also offer discipline related Elective courses of interdisciplinary nature (to be offered by main discipline/subject of study).
   2.2 Generic Elective (GE) Course: An elective course chosen generally from an unrelated discipline/subject, with an intention to seek exposure is called a Generic Elective.
   P.S.: A core course offered in a discipline/subject may be treated as an elective by other discipline/subject and vice versa and such electives may also be referred to as Generic Elective.

3. **Ability Enhancement Courses (AEC)/ Skill Development Courses:** The Ability Enhancement (AE) Courses may be of two kinds: AE Compulsory Course (AECC) and AE Elective Course (AEEC). "AECC" courses are the courses based upon the content that leads to Knowledge enhancement. They [(i) English Communication, (ii) Environmental Science] are mandatory for all disciplines. AEEC courses are value-based and/or skill-based [(Skill enhancement Courses (SEC-1 to SEC-3)] and are aimed at providing hands-on-training, competencies, skills, etc.

3.1 AE Compulsory Course (AECC):

AECC-1: Environmental Science,
AECC-2: English Communication.
AECC-3 & 4: Industrial on-job Training
(upto 2-months' of summer training after 1st yr. (IInd Semester) & 2nd Yr. (IVth Sem.)

3.2 AE Elective Course/ Skill Enhancement Course (SEC): These courses may be chosen from a pool of courses designed to provide value-based and/or skill-based instructions.

4. **Dissertation Project**: [Practical/ hands on work experience course to be completed in the VIth Semester]
A course designed to acquire special/advanced knowledge, such as supplement study/support study to a project work, and a candidate studies such a course on his own with an advisory support by a teacher/faculty member is called dissertation/project.
Dissertation Project work is considered as a special course involving application of knowledge in solving / analyzing /exploring a real life situation / difficult problem.
Dissertation Project/work would be of 6 credits.

Details of courses under B.Sc. (Voc.) Biomedical Science
Each Course has Theory (4 Credits)+ Practicals (2 Credits)

Total Number of Courses: 26

I. Core Courses: 20

a. Compulsory Core Courses: 11 (CCC-01 to CCC-11)

b. Ability Enhancement Compulsory Courses: 4 (AECC-01 to AECC-04)

c. Discipline Specific Compulsory Courses: 4 (DSC-01 to DSC-04)

d. Dissertation Project: 1

II. Elective Courses: 6

a. Skill Enhancement Courses: 3 (SEC-01 to SEC-03)
(Students will choose any three Skill Enhancement Courses courses out of the five Skill Enhancement Courses offered)

b. Discipline Specific Elective Course: 1 (DSE-01)

(Students will choose any one Discipline Specific Elective course out of the three Discipline Specific Elective Courses offered)

c. General Elective Courses: 2 (GE-01 to GE-02)

(Students will choose any two General Elective courses from the various General Elective courses offered by the B.Sc. Programmes in the following five Departments of the Central University of Haryana, Mahendergarh:

- Department of Biotechnology
- Department of Microbiology
- Department of Biochemistry
- Department of Nutrition Biology
- Department of Environmental Science

Details of courses under 1-Year "Graduate Diploma in Biomedical Science"
This is a 1-year programme spanning two semesters and an Industrial training before final evaluation for the award of 1-Year "Graduate Diploma in Biomedical Science"
Each Course has Theory (4 Credits) + Practicals (2 Credits)

Total Number of Courses: 9

I. Compulsory Core Courses : 4 (CCC-01 to CCC-04)

II. Ability Enhancement Compulsory Courses : 3 (AECC-01 to AECC-03)

III. Discipline Specific Compulsory Course : 1 (DSC-01)

IV. Ability Enhancement Elective Course/ Skill Enhancement Course : 1 (SEC-01)
(Students will choose any one Skill Enhancement Course out of the five Skill Enhancement Courses offered)

Details of courses under 2-Year "Advanced Graduate Diploma in Biomedical Science"
This is a 2-year programme spanning two semesters and two Industrial trainings before final evaluation for the award of 2-Year "Advanced Graduate Diploma in Biomedical Science"
Each Course has Theory (4 Credits) + Practicals (2 Credits)

Total Number of Courses: 18

I. Compulsory Core Courses : 8 (CCC-01 to CCC-08)

II. Ability Enhancement Compulsory Courses : 4 (AECC-01 to AECC-04)

III. Discipline Specific Compulsory Courses : 2 (DSC-01 & DSC-02)

IV. Ability Enhancement Elective Courses/ Skill Enhancement Courses : 2 (SEC-01 & SEC-02)
(Students will choose any two Skill Enhancement Courses (one each in Sem. II & Sem. IV) out of the five Skill Enhancement Courses offered)

V. General Elective Courses : 2 (GE-01 to GE-02)
(Students will choose any two General Elective courses (one each in Sem.III & Sem. IV) from the various General Elective courses offered by the B.Sc. Programmes in the following five Departments of the Central University of Haryana, Mahendergarh:

- Department of Biotechnology
- Department of Microbiology
- Department of Biochemistry
- Department of Nutrition Biology
- Department of Environmental Science

I.

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Core Courses

(A) **Compulsory Core Courses (CCC-01 to CCC-11) [Two courses per semester]**

[Common Lectures for students of all three B.Sc. (Vocational) disciplines (Biomedical Science, Industrial Waste Management & Biochemical Techniques)]

CCC-01: Introductory Biology

CCC-02: Concepts in Chemistry

CCC-03: Biosafety & Bioethics

CCC-04: Instrumentation & Techniques

CCC-05: Microbiology

CCC-06: Bioprocess Technology

CCC-07: Genetics & Genetic Engineering

CCC-08: Bioinformatics

CCC-09: Scientific Communication & Technical writing Skills

CCC-10: Biostatistics

CCC-11: Research Methodology & Intellectual Property Rights in Biotechnology

(B) **Ability Enhancement Compulsory Courses (AECC-01 to AECC-04)**

[One course each in Sem. I & II; One Industrial Training Course each after Sem. II & IV) during summer vacations

[Common Lectures for students of all three B.Sc. (Vocational) disciplines (Biomedical Science, Industrial Waste Management & Biochemical Techniques)]

AECC-01: English Communication

AECC-02: Environmental Science

AECC-03: Industrial Training Course (Upto 2 Months' duration) [to be completed in an Industry/ Research Institute during Year-end break after IInd Semester]

AECC-04: Industrial Training Course (Upto 2 Months' duration) [to be completed in an Industry/ Research Institute during Year-end break after IVth Semester]

(C) **Discipline Specific Compulsory Courses (DSC-1 To DSC-4)**

[One course each (DSC-01 & DSC-02) to be studied in Sem. I & III respectively; while two courses (DSC-03 & DSC-04) to be taken in Sem. V]

(Compulsory courses for all students of B.Sc. (Voc) Biomedical Science)

BMS-DSC-01: Clinical Biochemistry

BMS-DSC-02: Human Physiology

BMS-DSC-03: Biomaterials

BMS-DSC-04: Pharmacology & Toxicology

(D) **Dissertation Project** [Compulsory Course for all B.Sc. (Voc) Biomedical Science students to be undertaken in Sem.VI]

II. **Elective Courses**

(A) Ability Enhancement Elective Courses
or
Skill Enhancement Courses: 3 (SEC-01 to SEC-03)

(Students will choose any three Skill Enhancement Courses out of the five Skill Enhancement Courses offered)

SEC-01/ SEC-02/ SEC-03:

BMS-MLD:	Medical lab Diagnostics /
BMS-TBW:	Technology for Biomedical Waste Management /
BMS-EDA:	Epidemiology & Epidemiological Data Analysis /
BMS-PCA:	Pharmaceutical Chemistry & Applications
BMS-BI:	Biomedical Instrumentation

(B) Discipline Specific Elective Courses (DSE-01)

[Students can choose any one Discipline Specific Elective Course in Semester VI from a list of three Discipline specific elective Courses offered]

DSE-01- BMS-DDV	: Drug Discovery & Vaccine Development /
DSE-01- BMS-MB	: Medical Biotechnology/
DSE-01- BMS-PCD	: Public Health, Clinical Nutrition & Dietics

(C) General Elective Courses: 2 (GE-01 to GE-02)

(Students will choose any two General Elective courses from the various General Elective courses offered by the B.Sc. Programmes in the following five Departments of the Central University of Haryana, Mahendergarh:

- Department of Biotechnology
- Department of Microbiology
- Department of Biochemistry
- Department of Nutrition Biology
- Department of Environmental Science

Semester-wise Distribution & the list of Courses to be offered for B.Sc. (Vocational) "Biomedical Science"

Semester-I	**Semester-II**
CCC-01: Introductory Biology	CCC-03: Biosafety & Bioethics
CCC-02: Concepts in Chemistry	CCC-04: Instrumentation & Techniques
DSC-01: Clinical Biochemistry	SEC-1/ SEC-2/ SEC-3: Medical Lab Diagnostics / Technology for Biological Waste Management / Epidemiology & Epidemiological Data Analysis / Pharmaceutical Chemistry & Applications/ Biomedical Instrumentation (Students have to choose three out of the above five SEC Courses, One each in Sem. II, Sem. IV & Sem. V)
AECC-01: English Communication ,	AECC-02: Environmental Science
AECC-03: Industrial Training (upto two months' duration) (To be Completed During Year-end break after IInd Sem. Examinations)	
Semester-III	**Semester-IV**
CCC-05: Microbiology	CCC-07: Genetic Engineering
CCC-06: Bioprocess Technology	CCC-08: Bioinformatics
DSC-02: Human Physiology	SEC-1/ SEC-2/ SEC-3: Medical Lab Diagnostics / Technology for Biological Waste Management / Epidemiology & Epidemiological Data Analysis / Pharmaceutical Chemistry & Applications/ Biomedical Instrumentation (Students have to choose three out of the above five SEC Courses, One each in Sem. II, Sem. IV & Sem. V)
GE-01: General Elective (to be chosen from other Departments' General Elective Courses)	GE-02: General Elective (to be chosen from other Departments' General Elective Courses)
AECC-03: Industrial Training (upto two months' duration) (To be Completed During Year-end break after IVth Sem. Examinations)	
Semester-V	**Semester-VI**
CCC-09: Scientific Communication & Technical writing Skills	CCC-11: Research Methodology & Intellectual Property Rights in Biotechnology
CCC-10: Biostatistics	DSE-01: Drug Discovery & Vaccine Development / Medical Biotechnology / Public Health, Clinical Nutrition & Dietics
DSC-03: Biomaterials	**Dissertation Project**
SEC-1/ SEC-2/ SEC-3: Medical Lab Diagnostics / Technology for Biological Waste Management/ Epidemiology & Epidemiological Data Analysis / Pharmaceutical Chemistry & Applications/ Biomedical Instrumentation (Students have to choose three out of the above five SEC Courses, One each in Sem. II, Sem. IV & Sem. V)	
DSC-04: Pharmacology & Toxicology	

Credit-Based Grading System

Credit-Based Grading System will be followed for the B.Sc. (Vocational) programmes to be started under the DDU KAUSHAL KENDRA from the academic session 2016-2017.
The curriculum in a given subject would include such ingredients as may be required to upgrade the standards of teaching such would be specified in terms of courses, with each as classroom lectures, laboratory techniques, seminars, field study assignments, discussions, project and training etc. These ingredients course having credits depending on the workload it involves.

1. Semester System

The academic programmes shall be based on semester system:

Spring semester: January to June
Autumn semester: July to December

2. Course Evaluation

The students would be continuously evaluated during the conduct of each course on the basis of their performance as follows:

Examination (Theory)	**Syllabus to be covered in the examination**	**Time allotted for the examination**	**%Weightage (Marks)**
Minor Test I	Upto 33%	1 hour	20
Minor Test II	33% to 66%	1 hour	20
Quizes/Group Discussion/Case discussion etc.		10	
Major Test	100% syllabus	3 hours	50
Total		**100**	
(Practical)			
Daily evaluation of practical records/ Assignment/Viva Voce etc.			50
Final Practical Performance + Viva Voce	100% syllabus		50
Total		**100**	

3. Award of Grades

Grades will be awarded by the Board of Control, with all teachers teaching that class to be invited as special invitees, if they are not members of the Board of Control.

4. Grading System

The Grading will follow Credit-Based System, the details of which are given below:
While undertaking the course work, the following terms are defined:
'Course' means a semester.
'Credit' means weightage assigned to a course
'Grade' means a letter grade assigned to a student on a 10 point scale.
'Grade' point means points assigned to a letter grade.
'Semester Grade Point Average' (SGPA) means weighted average of grades in a semester.

$$SGPA = \sum_{i}^{m} (G_i \times C_i) / \Sigma C_i$$

Where G_i are the grade points in the i_{th} course and C_i are the credits registered for the i_{th} course, for all the 'm' number of courses in a particular semester.

$\Sigma (G_i \times C_i)$ = Total grade points obtained by a student in a semester,

ΣC_i = Total credits registered by the student in that semester.

Or

$SGPA = [(G_1 \times C_1) + (G_2 \times C_2) + (G_3 \times C_3) + \ldots + (G_m \times C_m)] / (C_1 + C_2 + C_3 + \ldots + C_m)$,

'Cumulative Grade Point Average' (SGPA) means weighted average of grades in all the semesters, at the end of any semester or at the end of the course completion.

$$CGPA = \sum_{i}^{n} (G_i \times C_i) / \Sigma C_i$$

$= [(G_1 \times C_1) + (G_2 \times C_2) + (G_3 \times C_3) + \ldots + (G_n \times C_n)] / (C_1 + C_2 + C_3 + \ldots + C_n)$,

Where G_i are the grade points in the i_{th} course and C_i are the credits registered for the i_{th} course, for all the 'n' number of courses in all the semesters.

SGPA and CGPA shall be calculated up to two decimal places, after rounding off the third decimal to the nearest second place integer decimal, hence 0.005 to be increased to 0.01

Grades shall be awarded as per the following table:

Credit Courses			
Academic performance	**Grade**	**Grade Points**	**Percent score in absolute marking system**
Outstanding	A+	10	81-100
Excellent	A	9	As per bunching system
Very Good	B+	8	
Good (Average)	B	7	
Fair	C+	6	
Marginal	C	5	
Deficient	D	4	
Poor	E	2	21 to30
Very Poor	F	0	0 to 20

a) A student shall be required to maintain a minimum of 4.5 CGPA at the end of the even semester of each academic session. If his/her CGPA falls below 4.5 at the end of second semester of any year, the student will be declared as having failed in that year and will have to seek readmission to the first semester of that year.

b) A student getting 'E' or lower Grade in any course will be treated as having failed in that course. If he/she fails in a core course, he/she will have to repeat the core course and if he/she fails in elective/interdisciplinary course, he/she will have the option to repeat the same course or opt a different elective/interdisciplinary course in the same category with the approval of the Board of Control, and will have to obtain at least 'D' Grade in that course within the maximum period defined to complete the degree for that course.

c) If a student maintains CGPA of 4.5 at the end of the even semester of the session, but fails in a maximum of two courses during the two semesters of that year, he/she will be promoted to the

next year. However he/she will be required to clear these courses during the subsequent semesters within the duration of the maximum period specified to complete the degree. For such candidates, repeat (Minor-I, Minor-II, Quiz as well as Major) examination for an odd semester shall be conducted alongwith the next odd semester and even semester alongwith the next even semester. They should register for these (repeat) course/s in the beginning of that semester but need not to attend the classes again. However, they may consult the concerned teacher for guidance.

d) If a student maintains CGPA of 4.5 at the end of the even semester of the session, but fails in three or more courses during all the preceding semesters taken together, at the end of the session, he/she will be declared as having failed in that year and will have to seek readmission to the first semester of that year.

e) It will be compulsory for a student to appear in the Major Test. A student who does not appear in the Major Test will be treated as having failed in that course and will be awarded 'F' Grade, even if he/she has already scored pass marks on the basis of previous tests and quizes.

f) If in a particular semester a student falls short of attendance in a maximum of two courses, he/she would be permitted to appear in the Major Tests of the papers in which he/she fulfills the attendance requirements. The courses in which the student does not fulfill the minimum attendance requirements, he/she will not be permitted to appear in the Major Tests of these courses and shall be awarded 'F' Grade.

5.**'Incomplete' Grade**
This Grade (I Grade) shall be awarded for incomplete Project/Dissertation work/or any other course, other than theory or practical courses. This grade will be converted to a regular Grade on the completion of the evaluation of the course.

6. **Withdrawal from a Course**
A student may be allowed to withdraw from an optional course within 15 days of the start of the semester, and opt another optional course in lieu of it. In such a case, attendance of the student in the first course shall be added to the attendance in the new course.

7. **Earned Minimum Credits, and Minimum CGPA for the Degree**
The credits for the courses in which a student has obtained 'D' (minimum passing Grade for a course) or higher shall be counted as Credits earned by him/her. A student shall have to earn a minimum of such number of Credits as may be required for the award of a degree in a particular course/discipline. A student who has obtained a minimum CGPA of 4.5 and earned a minimum number of Credits as specified for the programme, shall be eligible for the award of the respective degree.
A student, who has earned the minimum Credits required for a degree, but fails to obtain the minimum specified CGPA for this purpose, shall take additional courses till the minimum CGPA is attained within the maximum time limit for the programme. No grace marks will be awarded to pass a course or improve division. If a student offers courses for more than the required minimum Credits, the SGPA or CGPA shall be calculated on the basis of total number of Credits registered. Maximum time allowed to pass a course is given below:

Course duration	Maximum time to complete the Degree/ Diploma
Three Years	Four and half years
Two years	Three years
One year	Two years

8. Audit Courses:
In addition to the Credit courses, a student on the approval of Board of Control can take up Audit course/s from his/her Department, or any other Department or other University or institute of higher education/research. The Grade awarded for this course shall be Satisfactory ('S') or Not Satisfactory ('U'). A Grade equivalent to 'D' or above will be treated as satisfactory for Audit courses. The Audit course/s cleared by a student will not be counted towards his/her SGPA/CGPA

9. Make-up Examination
If a student is absent from a Major/Minor Test/quiz of the course due to the death of his/her first blood relation (Mother/Father/Sister/Brother/Daughter/Son) on the day of the examination, or at the most two weeks prior to the test, or on medical grounds, or participates in sports/cultural activities with the permission of the Board of Control, the Board of Control may permit the student for the make-up Examination within two weeks of the date of the test from which the student absented, provided further that the quiz/Minor Test shall be based on the syllabus covered till date. Under similar conditions, if a student is making up for Major Test then permission of the Dean Academic Affairs will be required.

10. Conversion from CGPA to Percentage:
A CGPA of 6.75 will be considered equivalent to 60% marks. The conversion of CGPA to Percent Score will be carried out by multiplication of respective CGPA by a factor of 8.9. The equivalence between important percentages in absolute marks system and CGPA is as follows:

Percentage	40	45	50	55	60	70	75
CGPA	4.50	5.06	5.62	6.18	6.75	7.87	8.43

1st YEAR	SEMESTER-I

CCC-01: INTRODUCTORY BIOLOGY

THEORY

Total Hours: 60 **Credits: 4**

Unit 1: Introduction to Biology **(6 Hours)**

Life and living systems; Themes in the study of biology; ecosystems; The process of Science; Biology and everyday life

Unit 2: Biodiversity and evolution **(14 Hours)**

Biological classification –Prokaryotes, Eukaryotes, Archaea, Viruses, viroids and lichens., Kingdoms of Life: Five kingdoms- Monera, Prostita, Fungi, plantae and animalia.

Animal kingdom - Classification and its basis; General survey of Animal Kingdom. Structure and life history of parasites as illustrated by amoeba, Entamoeba, Plasmodium . General structure and life history of insects like mosquito/ mite and silk worm.

Plant kingdom – Algae, Gymnosperms, Angiosperms. .

Evolution – Origin of earth and life; Major events in the history of life; theory of evolution of life forms, Darwin's theory of evolution, The evolution of populations.

Unit 3: Introduction to Biochemistry **(10 Hours)**

Structure and function of biomolecules: Water, Carbohydrates, Lipids, Proteins, Nucleic acids, Enzymes and cofactors , their classification , chemistry, mechanism of action and factors affecting enzyme activity.

Unit 4: Organisation of Living systems **(15 Hours)**

A living cell; Cell- the unit of life. Cell cycle and cell division, stages of mitosis and meiosis, and their significance.

Histology: Plant and animal tissues and organ systems;

Grouping of organisms based on energy need; Mineral Nutrition of Plants & Animals;

Transport in plants: Plant water relations, Transpiration, uptake of water & minerals, Translocation of organic solutes; Transport in animals: Blood vascular system,

Unit 5: Genetics & Molecular Biology **(15 Hours)**

Patterns of inheritance and question of biology; Mendel's Law & its Variations; The molecular basis of genetic information; DNA Replication, Transcription & Translation; Genetic code, regulation of gene expression.

INTRODUCTORY BIOLOGY:

PRACTICALS **Credits: 2**

(Whereever wet lab experiments are not possible the principles & concepts can be demonstrated through any other materials or medium including videos/ virtual labs etc.

1. To Learn the use of pipettes/ micropipettes
2. Preparation of Normal, molar and standard solutions, serial dilutions.
3. To learn the principles of fixation and staining
4. To perform gram staining of bacteria.
5. To study the cytochemical distribution of nucleic acids and mucopolysaccharides with in cells/tissues from permanent slides.
6. Separation of chloroplast pigments by thin layer chromatography.
7. To separate sugars by thin layer chromatography.

SUGGESTED BOOKS

1. Campbell, N.A. and Reece, J.B. (2008) Biology 8th edition, Pearson Benjamin Cummings, San Francisco.
2. Raven, P.H et al (2006) Biology 7th edition Tata McGrawHill Publications, New Delhi
3. Griffiths, A.J.F et al (2008) Introduction to Genetic Analysis, 9th edition, W.H. Freeman & Co. NY

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1st YEAR	SEMESTER-I

CCC-02: CONCEPTS IN CHEMISTRY

THEORY

Total Hours: 60 **Credits: 4**

Unit 1: **(19 Hours)**

Periodic Table: Atomic, ionic and covalent radii, ionization energy, electro negativity and its scales, electron affinity, Lanthanide contraction, Inert pair effect, Slater rules.

Chemical bonds and molecules: Recapitulation of general characteristics of ionic & covalent bonds and shapes of molecules, Van der Waal forces of attraction (ion-dipole, dipole-dipole, dipole-induced dipole, and dispersion forces), polar covalent bond, hydrogen bond, effects of hydrogen bonding on physical properties, structure of water. metallic bond, lattice energy, Born Haber cycle, Fajan's rule, bond length, bond angle.

Acid and Bases: Bronsted-Lowry theory, concept of leveling and differentiating solvents. Lewis- concept of acids and bases, Relative strength of lewis acids and bases and the effect of substituents.

Unit 2: **(19 Hours)**

Organic reactions and their mechanisms, types of reactions - Mechanism of SN1 and SN2 reactions (stereochemistry, nature of substrate, nucleophile and leaving group). Keto-enol tautomerism and its distinction from resonance. Structure and stability of reactive carbon species - carbonium ion, carbanion, free radical, carbenes. Electronic effects in molecules (inductive, hyperconjugation and resonance effects); cleavage of covalent bonds – homolysis and heterolysis. Electrophilic substitution in benzene. Reaction mechanisms of Aldol condensation, Hoffman bromamide rearrangement, Cannizzaro reaction, Friedel Craft reaction, Pinacolpinacolone rearrangement, Beckmann rearrangement.

Pharmaceuticals: Synthesis of aspirin, paracetamol, sulphanilamide, their uses and drug action.

Reagents for organic synthesis: Active methylene compounds - preparation, properties and synthetic applications of ethylacetoacetate and diethylmalonate, Grignard reagents – preparation and reactions.

Unit 3: **(12 Hours)**

Stereochemistry: Optical activity and optical isomerism, specific molar rotation, asymmetric carbon atom, chirality, enantiomerism, relative configuration (sequence rules, R/S nomenclature of chiral centres), absolute configuration (D/L designation in carbohydrates), geometrical isomerism (cis/trans and E/Z nomenclature in olefins) isomers of lactic acid and tartaric acid

Aromaticity: Concept of aromaticity, Huckle's rule as applied to benzene, naphthalene, anthracene, phenenthrene, thiophene, furan, pyrrole, pyridine, quinolene and cyclic cations & anions.

Unit 4: **(10 Hours)**

Chemical equilibrium: Reversible reactions, law of mass action, equilibrium constant, ionic equilibrium, theory of indicators, factors influencing equilibrium states, relation between Kp & Kc, buffer solution, hydrolysis of salt, pH, Ksp, common ion effect and its applications in mixture analysis.

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Electrochemistry; Standard electrode potential, electrochemical series, Nernst equation, Indicator and reference electrodes, pH and its measurement by glass electrode. Potentiometric determination of pH

Suggested Books:

1. J. D. Lee, Concise Inorganic Chemistry, ELBS.
2. J.E. Huheey, Inorganic Chemistry – Principles of Structure and Reactivity, Pearson Publication.
3. I.L. Finar, Volume I, II, Organic Chemistry, ELBS.
4. R.T. Morrison and R.N. Boyd, Organic Chemistry, Prentice Hall.
5. G.M. Barrow, Physical Chemistry, Tata McGraw-Hill.
6. G.W. Castellan, Physical Chemistry, Narosa Publishing House.
7. J. March, Advanced Organic Chemistry, Prentice Hall
8. F.A. Cotton and G. Wilkinson, Basic Inorganic Chemistry, John Wiley.
9. E.S. Gilreath, Fundamental Concepts of Inorganic Chemistry
10. W.L. Jolly, Modern Inorganic Chemistry, Longman.

CCC-02: CONCEPTS OF CHEMISTRY

PRACTICALS **Credits: 2**

1. To estimate iron (II) ions by titrating with potassium permanganate.
2. To determine melting points and boiling points of organic compounds.
3. To detect extra elements (N, S, Cl, Br, I) in organic compounds (containing not more than one extra element).
4. To analyze the following functional groups in the given organic compound: Carboxylic acids, alcohols, phenols, aldehydes & ketones, carbohydrates (monosaccharide's), amides, nitro compounds and primary amines.
5. To determine surface tension of a liquid using a stalagmometer.
6. To determine viscosity of a liquid using an Ostwald viscometer

1st YEAR	SEMESTER-I

BMS-DSC-01: CLINICAL BIOCHEMISTRY
THEORY
Total Hours: 60 **Credits: 4**

Unit 1: Introduction **(15 Hours)**
Organization of clinical laboratory, Introduction to instrumentation and automation in clinical Biochemistry; laboratories safety regulations and first aid, General comments on specimen collection, types of specimen for biochemical analysis, Precision, accuracy, quality control, precautions and limitations. Collection of blood and storage.

Unit 2: **(10 Hours)**
Biochemical symptoms associated with metabolic disease (diabetes), hormonal disease (T4 Hormone) and their evaluation. Explain biochemical profile.
Assessment of glucose metabolism in blood
Clinical significance of variations in blood glucose.
Lipid profile
Composition and functions of lipoproteins. Clinical significance of elevated cholesterol & lipoprotein (HDL & LDL).

Unit 3: Liver and kidney function tests **(15 Hours)**
Types of jaundice and clinical assesment, Acute and chronic liver diseases, cirrhosis, viral, metabolic and drug induced/toxic liver diseases, liver function tests, non-invasive investigations of liver function.
Glomrular filtration rate, Renal threshold and clearance values, disorders of kidney, renal failure and proteinuria, renal tubular disorders and renal stones Renal function tests, artificial kidney. Use of urine strip / dipstick method for urine analysis.

Unit 4: Blood **(4 Hours)**
Total and differential blood count, blood groups and Rh factor incompatibility, plasma proteins, types of anaemias, molecular basis of hemoglobinopathies.

Unit 4: Tests for cardiovascular diseases **(8 Hours)**
Ischemic heart disease, Role of enzymes in diagnostics of heart disease including aspartate transaminase, isoenzymes of creatine kinase and lactate dehydrogenase.
Hypertension – types and causes of hypertension, basis of drug therapy for hypertension.

Unit 5: Nutrition **(8 Hours)**
Major and minor nutrients, composition of food - calorific values, physiological fuel value, biological value and nitrogen balance. Protein calorie malnutrition, Kwashiorkar and Marasmus.
Nutrition in childhood, pregnancy and old age.

BMS-DSC-01: CLINICAL BIOCHEMISTRY

PRACTICALS **Credits: 2**

1. Preparation and storage of serum & blood plasma.
2. Estimation of blood glucose by glucose oxidase peroxidase method.
3. Estimation of triglycerides.
4. Estimation of bilirubin (direct and indirect).
5. Quantitative determination of serum creatinine and urea.
6. Estimation of creatine kinase MB / LDH.
7. Estimation of T4 by ELISA.

Suggested Readings:

1. Clinical Chemistry by Kaplan L.A. and Pesce A. J. C. V. Mosby, 1989
2. Clinical Biochemistry by W. J. Marshall and S. K. Bangert, Churchill Livinston N.Y. 1995
3. Practical Clinical Biochemistry (Varley) by Gowenlock
4. Biochemical Aspects of Human Diseases by Elkeles and Tavill

1st YEAR	SEMESTER-I

AECC-01: ENGLISH COMMUNICATION

THEORY

TOTAL HOURS: 40 **CREDITS: 2**

Unit 1: Introduction: **(8 hours)**

Theory of Communication, Types and modes of Communication

Unit 2: Language of Communication: **(8 hours)**

Verbal and Non-verbal (Spoken and Written) Personal, Social and Business Barriers and Strategies Intra-personal, Inter-personal and Group communication

Unit 3: Speaking Skills: **(8 hours)**

Monologue, Dialogue, Group Discussion, Effective Communication/ Mis- Communication, Interview, Public Speech

Unit 4: Reading and Understanding **(8 hours)**

Close Reading Comprehension, Summary, Paraphrasing Analysis and Interpretation, Translation (from Indian language to English and vice-versa), Literary/Knowledge Texts

Unit 5: Writing Skills **(8 hours)**

Documenting, Report Writing, Making notes, Letter writing

Recommended Readings:

1. Fluency in English - Part II, Oxford University Press, 2006.
2. Business English, Pearson, 2008.
3. Language, Literature and Creativity, Orient Blackswan, 2013.
4. Language through Literature (forthcoming) ed. Dr. Gauri Mishra, Dr Ranjana Kaul, Dr Brati Biswas

1st YEAR	SEMESTER-II

CCC-03: BIOSAFETY AND BIOETHICS

THEORY **CREDITS: 4**

Total Hours: 60

Unit 1: Principles of Biosafety & Bioethics **(5 Hours)**

Unit 2: Biosafety Regulations **(15 Hours)**

National and International Level Biosafety Regulations, Trials On-field, Hazardous Materials Used in Biotechnology—Handling and Disposal, Environmental Impact Assessment, Gene flow in natural & Artificial Ecologies, Good Manufacturing Practices, Good Laboratory Practices

Unit 3: Biosafety and Risk assessment issues **(15 Hours)**

Health aspects, toxicology, allergenicity, Ecological aspects, Regulations, National biosafety policy and law. Ecological risks of genetically modified plants. Regulatory framework in India governing GMOs- Brief Introduction to the following Commitees: Constitution & Mandate - Recombinant DNA Advisory Committee (RDAC), Institutional Biosafety Committee (IBC), Genetic Engineering Approval Committee (GEAC), State Biosafety Coordination Committee (SBCC), District Level Committee (DLC). Recombinant DNA Guidelines (1990), Revised Guidelines for Research in Transgenic Plants (1998), Seed Policy (2002), Prevention Food Adulteration Act (1955), The Food Safety and Standards Bill (2005), Plant Quarantine Order (2003), Regulation for Import of GM Products Under Foreign Trade Policy (2006-2007), National Environment Policy (2006). Rules for the manufacture, use/import/export and storage of hazardous microorganisms/genetically engineered organisms or cells (Ministry of Environment and Forests Notification,1989).

Unit 4: Bioethics: Fundamentals & Issues **(15 Hours)**

The legal and socioeconomic impacts of biotechnology - Public education of the process of biotechnology involved in generating new forms of life for informed decision-making – ethical concerns of biotechnology research and innovation. Foetal Sex Determination; The Indian Law on Abortion; Social Implications of the Act; Ethical Issues in MTP; Ethical Issues Leading to Legal Issues; Genetic Studies on Ethnic Races

Unit 5: Ethics of Stem Cells & Cloning **(10 Hours)**

Introduction ; Applications of Stem Cells; Ethics Involved in Stem-cell Research; Replacement; Use of Animals for Research and Testing; Animal Cloning; Ethics and Animal Cloning; Use of Cell-cultures as Alternatives to Use of Animals; Human Cloning; Why Cloning Humans is Ethically Unacceptable?; Controlling Someone Else's Genetic Makeup; Psychological Effect–Identity and Relationship; Physical Risk; Social Risk.

CCC-03: BIOSAFETY & BIOETHICS

PRACTICALS **Credits: 2**

1. Introduction to GLP & GCP guidelines.
2. Demonstration of experiments (to be done by students) using Good Laboratory Practices.
3. Understanding of Concepts of Good Clinical Practices using case studies of drug/ vaccine trials.
4. Discussion & Brainstorming of students (under the guidance of a faculty) on a case study of patenting in Biotechnology

SUGGESTED READINGS

1. Bioethics and Biosafety, 1st edition (2008), M. K Sateesh, I K International Pvt Ltd, ISBN-13: 978-8190675703.
2. The Cambridge Textbook of Bioethics, 1st edition (2008), Peter A. Singer and A. M. Viens; Cambridge University Press, ISBN-13: 978-0511545566.
3. Foundation of Bioethics, 2nd edition (1996), E. H Tristram; Oxford University Press, ISBN-13: 9780195057362.
4. Social science: An introduction to the study of society, 14th edition (2010), Hunt, E. F.,and Colander, D. C. ; Peason/Allyn and Bacon, Boston, ISBN-13: 978-020570271.
5. Principles of Biomedical Ethics, 6th edition (2011), Beauchamp TI, Childress JF; Oxford University Press, 2001. ISBN-13: 978-0195143317.
6. A Companion to Bioethics, 2nd edition (2012), Helga Kuhse, Peter Singer; John Wiley and Sons, ISBN-13: 978-1444350845.
7. Bioethics: An Introduction to the History, Methods, and Practice, 1st edition (1997), Nancy Ann Silbergeld Jecker, Albert R. Jonsen, Robert A. Pearlman; Jones and Bartlett Learning, ISBN-13: 978-0763702281.
8. Genetically Modified Organisms and biosafety, 1st edition (2004), Tomme Young. ISBN-13: 978-2831707983.
9. Environmental Safety of Genetically Engineered Crops, 1st edition (2011), Rebecca Grumet, James F. Hancock, Karim M. Maredia, CholaniWeebadde, Michigan State University Press ISBN-13: 978-1611860085.
10. Biosafety and Bioethics, 1st edition (2006), Rajmohan Joshi; Isha Books ISBN-13: 978-8182053779.
11. Bioethics and biosafety in biotechnology, 1st edition (2007), V. Sreekrishna; New Age International (P) Ltd., ISBN-13: 978-8122420852.

1st YEAR	SEMESTER-II

CCC-04: INSTRUMENTATION & TECHNIQUES

THEORY

Total Hours: 60 **Credits: 4**

Unit 1: Distillation of water **(2 Hours)**
Chemistry of water, physical properties. The process of Distillation

Unit 2: Sterilization Techniques **(4 Hours)**
Heat sterilization: Autoclave, Oven
Filter Sterilization, UV Sterilization

Unit 3: Microscopy **(4 Hours)**
Principles & Applications of Simple, Compound & Fluorescence Microscopes

Unit 4: Preparation of Solutions **(5 Hours)**
Use of Balances & pH meter, Nature of acids and bases, strong and weak acids, dissociation constant, pKa of an acid & its determination, concept of buffers, buffering capacity, preparation of a buffer, measurement of pH, working of a pH meter.

Unit 5: Spectrophotometer **(15 Hours)**
Principle of absorption spectroscopy. UV-Visible absorption spectrophotometry, Lambert's Law, Beer's Law. Working & applications of spectrophotometer. Working of a Spectrofluorimeter. Principle of fluorescence, intrinsic and extrinsic fluorescence, Uses of extrinsic and intrinsic fluors in Biology.

Unit 6: Centrifuge **(10 Hours)**
Principle of centrifugation, basic rules of sedimentation, sedimentation coefficient, various types of centrifuges- Table Top centrifuge, Refrigerated Centrifuge, Ultracentrifuge. Different types of rotors. Differential centrifugation, density gradient centrifugation.

Unit 7: Chromatography & Separation Techniques **(20 Hours)**
Basic Principles of Chromatography, Modes of Chromatography: TLC, Paper, Column, Gel-filtration, Ion-Exchange, Affinity Chromatography
Dialysis, Electrophoresis: Agarose Gel Electrophoresis, PAGE: SDS & native, IEF, Detection of nucleic acids & Proteins.

CCC-04: INSTRUMENTATION & TECHNIQUES

PRACTICALS **Credits: 2**

1. Determination of pKa value of acetic acid
2. Preparation of buffers
3. Verification of Beer's Law
4. Estimation of proteins by Lowry's method/Bradford's method
5. Separation of amino acids by paper chromatography/TLC
6. Agarose gel electrophoresis of DNA
7. Separation of proteins by SDS-PAGE

Suggested Readings

1. Physical Biochemistry: Applications to Biochemistry and Molecular Biology (1982) 2nd ed., Freifelder, D., W.H. Freeman and Company (New York).
2. An Introduction to Practical Biochemistry (1998) 3rd ed., Plummer D. T., Tata McGraw Hill Education Pvt. Ltd. (New Delhi)

1st YEAR	SEMESTER-II

AECC-2: ENVIRONMENTAL SCIENCE

THEORY

Total Hours: 60 **Credits: 4**

Unit 1: Introduction to environmental Science **(5 Hours)**
Multidisciplinary nature of environmental studies; Scope and importance; Need for public awareness.

Unit 2: Ecosystems **(8 Hours)**
What is an ecosystem? Structure and function of ecosystem; Energy flow in an ecosystem: food chains, food webs and ecological succession. Case studies of the following ecosystems: a) Forest ecosystem b) Grassland ecosystem c) Desert ecosystem d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Unit 3: Natural Resources **(10 Hours)**
Renewable and Non-renewable Resources, Land resources and land use change, Land degradation, soil erosion and desertification. Deforestation: Causes and impacts due to mining, dam building on environment, forests, biodiversity and tribal populations. Water: Use and over-exploitation of surface and ground water, floods, droughts, conflicts over water (international & inter-state). Energy resources: Renewable and non renewable energy sources, use of alternate energy sources, growing energy needs, case studies.

Unit 4: Biodiversity and Conservation **(10 Hours)**
Levels of biological diversity : genetic, species and ecosystem diversity; Biogeographic zones of India; Biodiversity patterns and global biodiversity hot spots India as a mega-biodiversity nation; Endangered and endemic species of India; Threats to biodiversity: Habitat loss, poaching of wildlife, man-wildlife conflicts, biological invasions; Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity. Ecosystem and biodiversity services: Ecological, economic, social, ethical, aesthetic and Informational value.

Unit 5: Environmental Pollution **(10 Hours)**
Environmental pollution : types, causes, effects and controls; Air, water, soil and noise pollution Nuclear hazards and human health risks; Solid waste management: Control measures of urban and industrial waste. Pollution case studies.

Unit 6: Environmental Policies & Practices **(7 Hours)**
Sustainability and sustainable development. Climate change, global warming, ozone layer depletion, acid rain and impacts on human communities and agriculture Environment Laws: Environment Protection Act; Air (Prevention & Control of Pollution) Act; Water (Prevention and control of Pollution) Act; Wildlife Protection Act; Forest Conservation Act. Nature reserves, tribal populations and rights, and human wildlife conflicts in Indian context.

Unit 7: Human Communities and the Environment **(5 Hours)**
Human population growth: Impacts on environment, human health and welfare. Resettlement and rehabilitation of project affected persons; case studies. Disaster management: floods, earthquake, cyclones and landslides. Environmental movements: Chipko, Silent valley, Bishnois of Rajasthan. Environmental ethics: Role of Indian and other religions and cultures in environmental conservation. Environmental communication and public awareness, case studies (e.g., CNG vehicles in Delhi).

Unit 8: Field work **(Equal to 5 Hours)**

Visit to an area to document environmental assets: river/ forest/ flora/fauna, etc. Visit to a local polluted site-Urban/Rural/Industrial/Agricultural. Study of common plants, insects, birds and basic principles of identification. Study of simple ecosystems-pond, river, Delhi Ridge, etc.

Suggested Readings:

1 Bharucha, E. 2003, Textbook for Environmental Studies, University Grants Commission, New Delhi and Bharati Vidyapeeth Institute of Environmental Education and Research, Pune. 361.
2 Carson, Rachel. 1962. Silent Spring (Boston: Houghton Mifflin, 1962), Mariner Books, 2002
3 Economy, Elizabeth. 2010. The River Runs Black: The Environmental Challenge to China's Future.
4 Gadgil, M. & Ramachandra, G. 1993. This fissured land: an ecological history of India. Univ of California Press.
5 Gleeson, B. and Low, N. (eds.) 1999. Global Ethics and Environment, London, Routledge.
6 Grumbine, R. Edward, and Pandit, M.K. Threats from India's Himalaya dams. Science 339.6115 (2013): 36-37.
7 Heywood V.H. & Watson, R.T. 1995. Global Biodiversity Assessment. Cambridge University Press.
8 McCully, P. 1996. Silenced rivers: the ecology and politics of large dams. Zed Books.
9 McNeill, John R. 2000. Something New Under the Sun: An Environmental History of the Twentieth Century.

ENVIRONMENTAL SCIENCE

PRACTICALS **Credits: 2**

1. Collection & Preservation of Water & Soil Samples (Field Practicals, to be carried out during field trips)

2. Determination of:
   a) pH of Water & Soil
   b) Electrical Conductivity of water
   c) Alkalinity of Water (wastewater) & Soil
   d) Total Hardness (Ca., Mg. Content) in Water
   e) Chlorides

3. Study of soil properties:
   a) Temperature, pH, EC
   b) Water holding capacity, Moisture content

4. Visit to natural Area/ Wildlife Sanctuary to study various Bioresources.

5. Visit to Weather station & understand Weather/ environmental Monitoring

1st YEAR	SEMESTER-II

SEC-01/ SEC-02/ SEC-03:

BMS-MLD: MEDICAL LAB DIAGNOSTICS (MLD)/
BMS-TBW: TECHNOLOGY FOR BIOLOGICAL WASTE MANAGEMENT /
BMS-EDA: EPIDEMIOLOGY & EPIDEMIOLOGICAL DATA ANALYSIS /
BMS-PCA: PHARMACEUTICAL CHEMISTRY & APPLICATIONS/
BMS-BI: BIOMEDICAL INSTRUMENTATION

(Each session has 3 Lectures)
Total Number of Sessions: 15

Students will choose any three of the above five SEC courses offered (one each in Sem-II, Sem-IV & Sem-V)

BMS-SEC-MLD: MEDICAL LAB DIAGNOSTICS (MLD)

THEORY& PRACTICALS
Total Hours: 45 **Credits: 4**

Unit I: Fundamentals of Clinical Diagnostics **(12 Hours)**
Laboratory 1: Sterilization Techniques: Physical methods and Chemical methods.
Laboratory 2: General overview of blood banking, blood typing, blood screening in transfusion medical lab.
Introduction to clinical laboratory principles and procedures. Concept of GLP and ISO labs, quality control and laboratory safety. Regulation of diagnostic labs and accreditation methods. Guidelines for collection transport, preservation processing and analysis of specimen. Setting up "Gold Standard" method, concepts of accuracy (efficiency), Precision, sensitivity, specificity, Prevalence positive predictive value and negative predictive value.
Overview of phlebotomy, immune-serology and clinical microbiology. Guidelines for proper discard of biological waste and chemical wastes.
Principles and applications of important instruments used in the diagnostic laboratory: biological safety cabinets (Class I, II, III), PCR machines, ELISA reader, Autoanalyser,

Unit II: Approaches to diagnosis of infectious diseases: (15 Hours)
Laboratory 3: Isolation of bacteria from mixed culture. Study of morphological, cultural, biochemical characteristics of common bacterial pathogen
Laboratory 4: To study composition and use of important differential media for identification of pathogenic bacteria EMB agar, McConkey agar, TCBS agar and Salmonella-Shigella agar and blood culture media **(any two)**
Laboratory 5 and 6: Enumerate the microbial load on the selected fresh produce from major outlets. Isolate and identify the common microorganisms present on their surface using microbiological, biochemical and PCR techniques.
Classification of culture media and quality control of culture media. Innoculation, incubation and purification methods in bacteriology. Preservation of bacterial culture. Rapid identification system, Continuous monitoring culture systems: BacT/ESP/BACTEC Use of conventional microbiological tools supplemented by most modern analytical techniques including PCR for enumeration, isolation and identification of microbes (mainly on fresh produce).

Unit III: Immunoserology: Principles and Application. (18 Hours)
Laboratory 7, 8 and 9:Antigen-antibody interaction and its use in diagnosis: Detection and diagnosis of common diseases: Widal and typhi dot for typhoid, Acylatedhaemoglobin in Diabetes, TSH levels in Thyroid condition, Malaria antigen in Malaria, NS1 antigen in Dengue (any three immune diagnostic tests).
Concepts of Immune response to be explained. Techniques to be discussed: ELISA - direct, indirect, competitive and sandwich ELISA.

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BMS-SEC-TBW : TECHNOLOGY FOR BIOMEDICAL WASTE MANAGEMENT

THEORY & PRACTICALS

Total Hours: 45 **Credits: 4**

Unit 1: Introduction to Biomedical Wastes & Management Practices (8 Hours)
Laboratory 1: Classifications of Biomedical hazardous wastes; Biomedical waste categorization and composition of Biomedical wastes. Specification of materials.
Laboratory 2: Colour coding and type of containers used for different categories of Biomedical wastes
Label for Biomedical waste containers/ Bags
Label for transport of biomedical waste containers/ Bags
Introduction to general and hazardous health care waste and diseases, Infectious waste, genotoxic waste, waste sharps. Color coding. Sources of Health care wastes, Hospitals and health care establishments & other sources.

Unit 3: Health impacts of biomedical wastes (5 Hours)
Direct & indirect hazards. Potential health hazards. Persons at risk. Basic information about infection? Infection agents on organizations spread of infection and Hospital acquired infection.

Unit 3: Standards for treatment and disposal of Biomedical wastes (7 Hours)
Laboratory 3: Standards for Waste Autoclaving, Standards for Liquid Waste, Standards for Micro Wave treatment, Standards for Deep Burial, Schedule for Waste Treatment

Unit 4: Policies and law regarding environment on Health care waste management. (10 Hours)
Infection control system. Legislation, Biomedical waste management and handling rules, 1998 and its amendment there after; Central pollution control board (CPCB) guidelines.
Some idea on safe disposal of Radioactive waste rules,1995 guideline of BARC;
World Health Organization guidelines on: Management of Pathological, microbiological and radiological wastes from Hospitals, Management of Hospital wastes in Developing countries

Unit 5: Practices on Segregation and Decontamination of Hazardous wastes. (5 Hours)
Laboratory 4: Poly bags collection, Bin, Autoclaving, Incineration, Labeling, Use, care & maintenance of Autoclave, Incinerator, Microwave, Hydropulbing, plasma torch.
Laboratory 5: Waste Segregation At the point of generation: Sharps Decontamination/Disinfection unit on container for autoclaving; Use of Sharp waste containers for storage and transportation, autoclaving/ shredding /incrimination /use of bio hazard symbols.

Unit 6: Practices on Collection & Handling of waste. (10 Hours)
Needle sticks injury and other sharp injury and hospital policy for protection of health care workers. On site Pre-treatment of wastes,
Laboratory 6: Practice on -- Thermal chemical disinfections of (simulated) waste, Mechanical Treatment & Chemical Disinfections, storage & Off-site transportation; Different technologies for Liquid waste treatment; Practices on digging vats, Pits, trenches;
Laboratory 7: Conventional Treatment Technologies: a)Wet thermal technology, b) Incineration-different models, c) Alternative Treatment Technologies: Microwave Technology, Rotaclave system, Hydro clave system, Electro Thermal Reactivation Treatment Process (ETP), Electron beam Technology, Plasma Pyrolysis/Gasificaton systems.
Laboratory 8: Practices on a) Composting b) Vermi composting. Treatment of General/Non-infectious wastes a) Composting, Rotating jumbling system, French composting b) Vermi-composting;

Laboratory 9: Disposal Technologies: a) Sharp disposal pit, b) Deep-burial pit, c) Secured land fill ;
Demonstration in recycling Waste Minimization Recycling, Re-use
Occupational safety practices: Health & safety Practices, Usage of protective equipment,
Management of non-clinical support devices; Pretreatment of linen, laundry, Cental sterilization unit (CSSD); Practice of waste Audit: Estimate of various items of waste management based on no. of wards, no. of beds in each ward, other units like Laboratory, kitchen-waste Audit.

Suggested Reading

1. Medical Waste Management and Disposal, ISSN 0090-516X, Noyes Data Corporation, 1991
2. Infectious and medical waste management- by Peter A. Reinhardt, Judith G. Gordon - 1991
3. Medical waste disposal. By- Calvin R. Brunner- 1996.
4. Handbook for the Operation and Maintenance of Hospital Medical Waste Incinerators. DIANE Publishing Company, 1990

BMS-SEC-EDA: EPIDEMIOLOGY& EPIDEMIOLOGICAL DATA ANALYSIS

THEORY & PRACTICALS

Total Hours: 45 **Credits: 4**

Unit I: Understanding Epidemiological Data **(7 Hours)**
Laboratory 1: Analysis of data from National Cancer Registry Program (NCRP)
Laboratory 2: Understanding incidence, mortality (rates, ratios and proportions)
Components of epidemiology: disease frequency, distribution of disease and determinants of disease. Epidemiological approach and measurements- vital statistics (rates, ratios and proportions), measurements of health indicators (morbidity, mortality and fertility rates).

Unit II: Epidemiologic Methods and Survey **(10 Hours)**
Laboratory 3: Designing a questionnaire for survey of prevalence diabetes/ hypertension/ allergy/ respiratory disorders/etc.
Laboratory 4: Defining the parameters for ethical issues in a study
Laboratory 5: Determining the target and control populations
Laboratory 6: Surveying the population for the diseases mentioned above
Data collection: observational (descriptive and analytical) and experimental studies. Epidemiology study designs- case control and cohort studies (prospective and retrospective), techniques of sampling and matching, sources of bias.

Unit III: Data Organization and Presentation **(8 Hours)**
Laboratory 7: Introduction to „R" software
Laboratory 8: Analysis of data from NCRP data and survey conducted by the students
Basic principles of „R" software for tabulation and graphical representations (bar diagrams, histograms, pie charts, box plot, etc.), measures of central tendency (mean, mode, median and partition values), dispersion (range, standard deviation, coefficient of variance and covariance) and skewness.

Unit IV: Statistical Modeling and Analysis using 'R' on NCRP data and survey conducted by the students **(20 Hours)**
Laboratory 9: Correlation studies
Laboratory 10: Regression studies
Laboratory 11: Probabilistic distribution studies
Laboratory 12: Comparison of groups and ascertaining statistical significance of differences
Correlation analysis (scatter diagrams and Karl Pearsons coefficient of determination, standard and probable errors) and regression analysis. Inferential statistics: sampling distributions and standard error, null and alternate hypothesis, basic concept and illustrations of type I and type II errors, concept of confidence interval estimation, large sample tests for single mean and difference of means, single proportion and difference of proportions, students t-distribution (test for single mean, difference of means and paired t-test), chi-square distribution, F-distribution, one-way and two-way ANOVA, non parametric analysis (sign and rank tests), p-value.

SUGGESTED READINGS

1. Park's Textbook of Preventive and Social Medicine, 21st edition (2011), K. Park, M/s Banarsi Das Bhanot Publishers.
2. Primer of Biostatistics, 7th edition (2011), Stanton Glantz, McGraw-Hill Medical. ISBN-13: 978-0071781503.
3. Basic epidemiology,2nd edition (2006), R. Bonita, R. Beaglehole, TordKjellstrèom, Contributor; World Health Organization, illustrated, Publisher: World Health Organization, ISBN-13: 978-9241547079.
4. Robbins and Cotrans Pathologic Basis Of Disease, 7th Edition, Kumar, Abbas and Fausto, Elsevier Publication, 2004.
5. Biostatistics: A Foundation for Analysis in the Health Sciences, 10th edition (2013), Wayne W Daniel and Chad L. Cross, Wiley. ISBN-13: 978-1118302798.
6. Principles of Biostatistics,2nd edition (2000), Marcello Pagano and Kimberlee Gauvrean, Thompson learning. ISBN-13: 978-0534229023.
7. Biostatistical Analysis, 5th edition (2009), Jerrold H. Zar, Pearson. ISBN-13: 978-0131008465.

Website for 'R': www.r-project.org
Website for NCRP: http://www.ncrpindia.org/

BMS-SEC-PCA: PHARMARMACEUTICAL CHEMISTRY & ITS APPLICATIONS

THEORY & PRACTICALS

TOTAL HOURS: 45 **CREDITS: 4**

Unit 1: General Introduction of Pharmaceutics **(4 Hours)**
Definition and scope of Pharmacology and medicinal chemistry

Unit 2: Principles of drug design **(10 Hours)**
Strategies in the search for new lead compounds; Analogue synthesis versus rational drug design, Prodrugs

Unit 3: Physicochemical principles of drug action **(15 Hours)**
Partition coefficient, drug dissolution, acid-base properties, surface activity, bioavailablity

Unit 4: Macromolecular Structure **(8 Hours)**
Primary Through Quaternary Structure;
Covalent stereochemistry & Force fields
Non-bonded interactions & Force fields

Practical exercises to be prepared based on the concepts learnt from theory classes related to techniques. The practical records to be submitted for evaluation.

Unit 5: Visits to Pharmaceutical Industries to understand drug development **(8 Hours)** and Manufacturing process. Students will prepare report of industry visit with details of one case study and submit for evaluation

SUGGESTED READINGS

1. Introduction to Medicinal Chemistry, 4th edition (2009), Graham l. Patrick, Oxford University Press. ISBN-13: 978-0199234479.
2. The Organic Chemistry of Drug Design and Drug Action,2nd edition (2004), Richard B. Silvermann, Elsevier, Academic Press. ISBN: 978-0126437324.
3. Medicinal Chemistry: A Molecular and Biochemical Approach, 3rd edition (2005), Thomas Nogrady and Donal F. Weaver, Oxford University Press. ISBN-13: 978-0195104561.
4. Wilson Gisvold textbook of Organic Medicinal and Pharmaceutical Chemistry, 11th edition (2003), edited by Block and Beale, Baltimore, Lippincot. ISBN-13: 978-0781734813.
5. The Practice of Medicinal Chemistry, 2nd edition (2003), Camille G. Wermuth, Academic Press. ISBN-13: 978-0127444819.
6. Principles and Practice of Medicinal Chemistry, 2nd edition (2003), Frank. D. King. The Royal Society of Chemistry.ISBN-13: 978-0854046317.
7. Introduction to Medicinal Chemistry: How Drugs Act and Why, 1st edition (1996), Alex Gringauz, Wiley VCH. ISBN-13: 978-0471185451.

BMS-SEC-BI: BIOMEDICAL INSTRUMENTATION

THEORY & PRACTICALS

Total Hours: 45 **Credits: 4**

Unit 1: Bio Medical Equipment and Basics of Instrumentation **(8 Lectures)**

Static and dynamic characteristics *of Instrumentation*; Design criteria; Instrumentation Amplifiers; Generalized medical instrumentation block diagram.; Classification of Medical instruments based on: Application-- (diagnostic, therapeutic, Imaging, analytical).

Unit 2: Biomedical signals & Recorders **(15 Lectures)**

Medical electrodes -ECG, EEG, EMG, Defibrillator; Electrocardiograph (ECG) machine: Electrophysiology of the heart, Working principle of ECG, ECG block diagram, Bipolar and unipolar leads, Analysis of cardiac activity of the heart using ECG waveform with labels, Einthoven's triangle, Phono-cardiograph. Electroencephalograph (EEG): working principle of Electro encephalograph, 10-20 electrode placement system, EEG readout device. Pace Maker, Electro-myograph (EMG) machine: Bio-feedback Instrumentation

Unit 3: The Cardiovascular System & Measurement **(12 Lectures)**

The Heart and Cardiovascular System, The Heart, Blood Pressure, Characteristic of Blood Flow, Heart Sounds. Blood Flow and Cardiac Output, Plethysmography,Heart Sounds, Colour Doppler measurement

Unit 4: Patient Monitoring system: **(13 Lectures)**

Body temperature, Heart Rate Measurement, Pulse Rate Measurement, Respiration Rate Measurement, Blood Pressure Measurement, Thermodilution catheter, Microprocessor Applications in Patient Monitoring.

Principles & Applications of each Technique and theory & Demonstration for use & maintenance of all the instruments should be covered as lab practicals.

(Whereever wet lab experiments are not possible the principles & concepts can be demonstrated through any other materials or mewdium including videos/ virtual labs etc.

TEXT BOOKS

1. R.S.Khandpur, 'Hand Book of Bio-Medical instrumentation', McGraw Hill Publishing Co Ltd. 2003.
2. Leslie Cromwell, Fred J.Weibell, Erich A.Pfeiffer, 'Bio-Medical Instrumentation and Measurements', II edition, Pearson Education, 2002.
3. Introduction to Medicinal Chemistry: Graham l. Patrick, 3rd Edition, Oxford University Press, 2006.
4. The Organic Chemistry of Drug Design and Drug Action: Richard B. Silvermann, 2nd Edition, Elsevier, Academic Press, 2004.
5. Medicinal Chemistry: A Molecular and Biochemical Approach: Thomas Nogrady and Donal F. Weaver, 3rd Edition, Oxford University Press, 2004.

REFERENCES

1. M.Arumugam, 'Bio-Medical Instrumentation', Anuradha Agencies, 2003.
2. L.A. Geddes and L.E.Baker, 'Principles of Applied Bio-Medical Instrumentation', John Wiley & Sons, 1975.
3. J. Webster, 'Medical Instrumentation', John Wiley & Sons, 1995.
4. C. Rajarao and S.K. Guha, 'Principles of Medical Electronics and Bio-medical Instrumentation', Universities' press (India) Ltd, Orient Longman ltd, 2000.

After 1st YEAR	YEAR END BREAK
(MAXIMUM DURATION OF INDUSTRIAL TRAINING : 60 DAYS)	

AECC-03: Industrial Training (upto two months' duration)
(During Year–end break after IInd Sem. Examinations, The Industrial Training should be completed at a pharmaceutical Industry/ Research Lab working in the field of Biomedical Science)

CHOICE BASED CREDIT SYSTEM COURSE DETAILS
(Draft syllabus for Academic Committee Approval)

B.Sc. (VOCATIONAL) INDUSTRIAL WASTE MANAGEMENT

DEEN DAYAL UPADHYAY KAUSHAL KENDRA,
CENTRAL UNIVERSITY OF HARYANA,
MAHENDERGARH,
HARYANA

CHOICE BASED CREDIT SYSTEM (CBCS):

The CBCS provides an opportunity for the students to choose courses from the prescribed courses comprising core, elective or skill based courses. The courses can be evaluated following the grading system, which is considered to be better than the conventional marks system. Therefore, it is necessary to introduce uniform grading system in the entire higher education in India. This will benefit the students to move across institutions within India to begin with and across countries. The uniform grading system will also enable potential employers in assessing the performance of the candidates. In order to bring uniformity in evaluation system and computation of the Cumulative Grade Point Average (CGPA) based on student's performance in examinations, the UGC has formulated the guidelines to be followed.

Outline of Choice Based Credit System:

1. **Core Course:** A course, which should compulsorily be studied by a candidate as a core requirement is termed as a Core course.
   1.1 **Common Core Courses (CCC-1 to CCC-11):** These core courses should compulsorily be studied by students of all B. Voc. Programmes in Biological Sciences.
   1.2 **Discipline Specific Core courses (DSC-1 to DSC-04):** There would be four Discipline Specific Core courses (specific for each B. Voc. Program). These should compulsorily be studied by students of the respective B. Voc. Disciplines.

2. **Elective Course:** Generally a course which can be chosen from a pool of courses and which may be very specific or specialized or advanced or supportive to the discipline/ subject of study or which provides an extended scope or which enables an exposure to some other discipline/subject/domain or nurtures the candidate's proficiency/skill is called an Elective course.
   2.1 Discipline Specific Elective (DSE) Course: Elective courses may be offered by the main discipline/subject of study is referred to as Discipline Specific Elective. The University/Institute may also offer discipline related Elective courses of interdisciplinary nature (to be offered by main discipline/subject of study).
   2.2 Generic Elective (GE) Course: An elective course chosen generally from an unrelated discipline/subject, with an intention to seek exposure is called a Generic Elective.
   P.S.: A core course offered in a discipline/subject may be treated as an elective by other discipline/subject and vice versa and such electives may also be referred to as Generic Elective.

3. **Ability Enhancement Courses (AEC)/ Skill Development Courses:** The Ability Enhancement (AE) Courses may be of two kinds: AE Compulsory Course (AECC) and AE Elective Course (AEEC). "AECC" courses are the courses based upon the content that leads to Knowledge enhancement. They [(i) English Communication, (ii) Environmental Science] are mandatory for all disciplines. AEEC courses are value-based and/or skill-based [(Skill enhancement Courses (SEC-1 to SEC-3)] and are aimed at providing hands-on-training, competencies, skills, etc.

3.1 AE Compulsory Course (AECC):

AECC-1: Environmental Science,
AECC-2: English Communication.
AECC-3 & 4: Industrial on-job Training
(upto 2-months' of summer training after 1st yr. (IInd Semester) & 2nd Yr. (IVth Sem.)

3.2 AE Elective Course/ Skill Enhancement Course (SEC): These courses may be chosen from a pool of courses designed to provide value-based and/or skill-based instructions.

4. **Dissertation Project**: [Practical/ hands on work experience course to be completed in the VIth Semester]
A course designed to acquire special/advanced knowledge, such as supplement study/support study to a project work, and a candidate studies such a course on his own with an advisory support by a teacher/faculty member is called dissertation/project.
Dissertation Project work is considered as a special course involving application of knowledge in solving / analyzing /exploring a real life situation / difficult problem.
Dissertation Project/work would be of 6 credits. A Project/Dissertation work may be given in lieu of a discipline specific elective paper.

Details of courses under B.Sc. (Voc.) Industrial Waste Management
Each Course has Theory (4 Credits)+ Practicals (2 Credits)

Total Number of Courses: 26

I. Core Courses: 20

a. Compulsory Core Courses: 11 (CCC-01 to CCC-11)

b. Ability Enhancement Compulsory Courses: 4 (AECC-01 to AECC-04)

c. Discipline Specific Compulsory Courses: 4 (DSC-01 to DSC-04)

d. Dissertation Project: 1

II. Elective Courses: 6

a. Skill Enhancement Courses: 3 (SEC-01 to SEC-03)
(Students will choose any three Skill Enhancement Courses courses out of the five Skill Enhancement Courses offered)

b. Discipline Specific Elective Course: 1 (DSE-01)

(Students will choose any one Discipline Specific Elective course out of the three Discipline Specific Elective Courses offered)

c. General Elective Courses: 2 (GE-01 to GE-02)

(Students will choose any two General Elective courses from the various General Elective courses offered by the following five Departments of the Central University of Haryana, Mahendergarh:

- Department of Biotechnology
- Department of Microbiology
- Department of Biochemistry
- Department of Nutrition Biology
- Department of Environmental Science

Details of courses under 1-Year "Graduate Diploma in Industrial Waste Management"
This is a 1-year programme spanning two semesters and an Industrial training before final evaluation for the award of 1-Year "Graduate Diploma in Industrial Waste Management"
Each Course has Theory (4 Credits) + Practicals (2 Credits)

Total Number of Courses: 9

I. Compulsory Core Courses : 4 (CCC-01 to CCC-04)

II. Ability Enhancement Compulsory Courses : 3 (AECC-01 to AECC-03)

III. Discipline Specific Compulsory Course : 1 (DSC-01)

IV. Ability Enhancement Elective Course/ Skill Enhancement Course : 1 (SEC-01)
(Students will choose any one Skill Enhancement Course out of the five Skill Enhancement Courses offered)

Details of courses under 2-Year "Advanced Graduate Diploma in Industrial Waste Management"
This is a 2-year programme spanning two semesters and two Industrial trainings before final evaluation for the award of 2-Year "Advanced Graduate Diploma in Industrial Waste Management"
Each Course has Theory (4 Credits) + Practicals (2 Credits)

Total Number of Courses: 18

I. Compulsory Core Courses : 8 (CCC-01 to CCC-08)

II. Ability Enhancement Compulsory Courses : 4 (AECC-01 to AECC-04)

III. Discipline Specific Compulsory Courses : 2 (DSC-01 & DSC-02)

IV. Ability Enhancement Elective Courses/ Skill Enhancement Courses : 2 (SEC-01 & SEC-02)
(Students will choose any two Skill Enhancement Courses (one each in Sem. II & Sem. IV) out of the five Skill Enhancement Courses offered)

V. General Elective Courses : 2 (GE-01 to GE-02)
(Students will choose any two General Elective courses (one each in Sem.III & Sem. IV) from the various General Elective courses offered by the following five Departments of the Central University of Haryana, Mahendergarh:

- Department of Biotechnology
- Department of Microbiology
- Department of Biochemistry
- Department of Nutrition Biology
- Department of Environmental Science

Core Courses

(A) **Compulsory Core Courses (CCC-01 to CCC-11) [Two courses per semester]**

[Common Lectures for students of all three B.Sc. (Vocational) disciplines (Biomedical Science, Industrial Waste Management & Biochemical Techniques)]

CCC-01: Introductory Biology

CCC-02: Concepts in Chemistry

CCC-03: Biosafety & Bioethics

CCC-04: Instrumentation & Techniques

CCC-05: Microbiology

CCC-06: Bioprocess Technology

CCC-07: Genetics & Genetic Engineering

CCC-08: Bioinformatics

CCC-09: Scientific Communication & Technical writing Skills

CCC-10: Research Methodology & Intellectual Property Rights in Biotechnology

(B) **Ability Enhancement Compulsory Courses (AECC-01 to AECC-04)**

[One course each in Sem. I & II; One Industrial Training Course each after Sem. II & IV) during summer vacations

[Common Lectures for students of all three B.Sc. (Vocational) disciplines (Biomedical Science, Industrial Waste Management & Biochemical Techniques)]

AECC-01: English Communication
AECC-02: Environmental Science
AECC-03: Industrial Training Course (Upto 2 Months' duration)
(to be completed in an Industry/ Research Institute during University Holidays after IInd Semester)
AECC-04: Industrial Training Course (Upto 2 Months' duration)
(to be completed in an Industry/ Research Institute during University Holidays after IVth Semester)

(C) **Discipline Specific Compulsory Courses (DSC-1 To DSC-4)**

[One course each (DSC-01 & DSC-02) to be studied in Sem. I & III respectively; while two courses (DSC-03 & DSC-04) to be taken in Sem. V]

(Compulsory courses for all students of B.Sc. (Voc) Industrial Waste Management)

IWM-DSC-01: Industrial Wastes Management
IWM-DSC-02: Biofuels & Bioenergy from Wastes
IWM-DSC-03: Biodegradation & Bioremediation
IWM-DSC-04: Environmental Monitoring & Management

(D) **Dissertation Project** [Compulsory Course for all B.Sc. (Voc) Industrial Waste Management students to be undertaken in Sem.VI]

II. **Elective Courses**

(A) Ability Enhancement Elective Courses
or
Skill Enhancement Courses: 3 (SEC-01 to SEC-03)

(Students will choose any three Skill Enhancement Courses out of the five Skill Enhancement Courses offered)

SEC-01/ SEC-02/ SEC-03:

IWM-TWR: Technology for Waste Recycling & Reuse /
IWM-TER: Application of Biotechnology Tools in Environmental Remediation /
IWM-VAI: Value Addition to Industrial & Agricultural Wastes/
IWM-ENM: Entrepreneurship in Natural Resource Management
IWM-ERM: E-Waste & Radioactive Waste Management

(B) Discipline Specific Elective Courses (DSE-01)

[Students can choose any one Discipline Specific Elective Course in Semester VI from a list of three Discipline specific elective Courses offered]

IWM-DSE-1: Climate Change & Sustainable Development /
IWM-DSE-2: Solid Waste Management/
IWM-DSE-3: Environmental Laws & Policies

(C) General Elective Courses: 2 (GE-01 to GE-02)

(Students will choose any two General Elective courses from the various General Elective courses offered by the B.Sc. Programmes in the following five Departments of the Central University of Haryana, Mahendergarh:

- Department of Biotechnology
- Department of Microbiology
- Department of Biochemistry
- Department of Nutrition Biology
- Department of Environmental Science

Semester-wise Distribution & the list of Courses to be offered for B.Sc. (Vocational) "Industrial Waste Management"

Semester-I	**Semester-II**
CCC-01: Introductory Biology	CCC-03: Biosafety & Bioethics
CCC-02: Concepts in Chemistry	CCC-04: Instrumentation & Techniques
DSC-01: Industrial Wastes Management	SEC-1/ SEC-2/ SEC-3: Technology for Waste Recycling & Reuse / Application of Biotechnology Tools in Environmental Remediation / Value Addition to Industrial & Agrowastes / Entrepreneurship in Natural Resource Management / E-Waste & Radioactive Waste Management (Students have to choose three out of the above five SEC Courses, One each in Sem. II, Sem. IV & Sem. V)
AECC-01: English Communication	AECC-02: Environmental Science
AECC-03: Industrial Training (upto two months' duration) (During Holidays after IInd Sem. Examinations) Break between Ist & 2nd Year	
Semester-III	**Semester-IV**
CCC-05: Microbiology	CCC-07: Genetic Engineering
CCC-06: Bioprocess Technology	CCC-08: Bioinformatics
DSC-02: Biofuels & Bioenergy from Wastes	SEC-1/ SEC-2/ SEC-3: Technology for Waste Recycling & Reuse / Application of Biotechnology Tools in Environmental Remediation / Value Addition to Industrial & Agrowastes / Entrepreneurship in Natural Resource Management / E-Waste & Radioactive Waste Management (Students have to choose three out of the above five SEC Courses, One each in Sem. II, Sem. IV & Sem. V)
GE-01: General Elective (to be chosen from other Departments' General Elective Courses)	GE-02: General Elective (to be chosen from other Departments' General Elective Courses)
AECC-04: Industrial Training (upto two months' duration) (During Holidays after IVth Sem. Examinations) Break between 2nd & 3rd Year	
Semester-V	**Semester-VI**
CCC-09: Scientific Communication & Technical writing Skills	CCC-11: Research Methodology & Intellectual Property Rights in Biotechnology
CCC-10: Biostatistics	DSE-01: Climate Change & Sustainable Development / Solid Waste Management / Environmental Laws & Policies
DSC-03: Biodegradation & Bioremediation	**Dissertation Project**
SEC-1/ SEC-2/ SEC-3: Technology for Waste Recycling & Reuse / Application of Biotechnology Tools in Environmental Remediation / Value Addition to Industrial & Agrowastes / Entrepreneurship in Natural Resource Management / E-Waste & Radioactive Waste Management (Students have to choose three out of the above five SEC Courses, One each in Sem. II, Sem. IV & Sem. V)	
DSC-04: Environmental Monitoring & Management	

Credit-Based Grading System

Credit-Based Grading System will be followed for the B.Sc. (Vocational) programmes to be started under the DDU KAUSHAL KENDRA from the academic session 2016-2017.
The curriculum in a given subject would include such ingredients as may be required to upgrade the standards of teaching such would be specified in terms of courses, with each as classroom lectures, laboratory techniques, seminars, field study assignments, discussions, project and training etc. These ingredients course having credits depending on the workload it involves.

1. Semester System
The academic programmes shall be based on semester system:
Spring semester: January to June
Autumn semester: July to December

2. Course Evaluation
The students would be continuously evaluated during the conduct of each course on the basis of their performance as follows:

Examination (Theory)	**Syllabus to be covered in the examination**	**Time allotted for the examination**	**%Weightage (Marks)**
Minor Test I	Upto 33%	1 hour	20
Minor Test II	33% to 66%	1 hour	20
Quizes/Group Discussion/Case discussion etc.		10	
Major Test	100% syllabus	3 hours	50
Total		**100**	
(Practical)			
Daily evaluation of practical records/ Assignment/Viva Voce etc.			50
Final Practical Performance + Viva Voce	100% syllabus		50
Total		**100**	

3. Award of Grades
Grades will be awarded by the Board of Control, with all teachers teaching that class to be invited as special invitees, if they are not members of the Board of Control.

4. Grading System
The Grading will follow Credit-Based System, the details of which are given below:
While undertaking the course work, the following terms are defined:
'Course' means a semester.
'Credit' means weightage assigned to a course
'Grade' means a letter grade assigned to a student on a 10 point scale.
'Grade' point means points assigned to a letter grade.
'Semester Grade Point Average' (SGPA) means weighted average of grades in a semester.

$$SGPA = \sum_{i}^{m} (G_i X C_i) / \Sigma C_i$$

Where G_i are the grade points in the i_{th} course and C_i are the credits registered for the i_{th} course, for all the 'm' number of courses in a particular semester.

$\Sigma (G_i X C_i)$ = Total grade points obtained by a student in a semester,

ΣC_i = Total credits registered by the student in that semester,

Or

$SGPA = [(G_1 X C_1) + (G_2 X C_2) + (G_3 X C_3) + \ldots + (G_m X C_m)] / (C_1 + C_2 + C_3 + \ldots + C_m)$,

'Cumulative Grade Point Average' (SGPA) means weighted average of grades in all the semesters, at the end of any semester or at the end of the course completion.

$$CGPA = \sum_{i}^{n} (G_i X C_i) / \Sigma C_i$$

$= [(G_1 X C_1) + (G_2 X C_2) + (G_3 X C_3) + \ldots + (G_n X C_n)] / (C_1 + C_2 + C_3 + \ldots + C_n)$,

Where G_i are the grade points in the i_{th} course and C_i are the credits registered for the i_{th} course, for all the 'n' number of courses in all the semesters.

SGPA and CGPA shall be calculated up to two decimal places, after rounding off the third decimal to the nearest second place integer decimal, hence 0.005 to be increased to 0.01

Grades shall be awarded as per the following table:

Credit Courses			
Academic performance	**Grade**	**Grade Points**	**Percent score in absolute marking system**
Outstanding	A+	10	81-100
Excellent	A	9	As per bunching system
Very Good	B+	8	
Good (Average)	B	7	
Fair	C+	6	
Marginal	C	5	
Deficient	D	4	
Poor	E	2	21 to30
Very Poor	F	0	0 to 20

a) A student shall be required to maintain a minimum of 4.5 CGPA at the end of the even semester of each academic session. If his/her CGPA falls below 4.5 at the end of second semester of any year, the student will be declared as having failed in that year and will have to seek readmission to the first semester of that year.

b) A student getting 'E' or lower Grade in any course will be treated as having failed in that course. If he/she fails in a core course, he/she will have to repeat the core course and if he/she fails in elective/interdisciplinary course, he/she will have the option to repeat the same course or opt a different elective/interdisciplinary course in the same category with the approval of the Board of Control, and will have to obtain at least 'D' Grade in that course within the maximum period defined to complete the degree for that course.

c) If a student maintains CGPA of 4.5 at the end of the even semester of the session, but fails in a maximum of two courses during the two semesters of that year, he/she will be promoted to the next year. However he/she will be required to clear these courses during the subsequent semesters within the duration of the maximum period specified to complete the degree. For such candidates, repeat (Minor-I, Minor-II, Quiz as well as Major) examination for an odd semester shall be conducted alongwith the next odd semester and even semester alongwith the next even semester. They should register for these (repeat) course/s in the beginning of that semester but need not to attend the classes again. However, they may consult the concerned teacher for guidance.

d) If a student maintains CGPA of 4.5 at the end of the even semester of the session, but fails in three or more courses during all the preceding semesters taken together, at the end of the session, he/she will be declared as having failed in that year and will have to seek readmission to the first semester of that year.

e) It will be compulsory for a student to appear in the Major Test. A student who does not appear in the Major Test will be treated as having failed in that course and will be awarded 'F' Grade, even if he/she has already scored pass marks on the basis of previous tests and quizes.

f) If in a particular semester a student falls short of attendance in a maximum of two courses, he/she would be permitted to appear in the Major Tests of the papers in which he/she fulfills the attendance requirements. The courses in which the student does not fulfill the minimum attendance requirements, he/she will not be permitted to appear in the Major Tests of these courses and shall be awarded 'F' Grade.

5.**'Incomplete' Grade**

This Grade (I Grade) shall be awarded for incomplete Project/Dissertation work/or any other course, other than theory or practical courses. This grade will be converted to a regular Grade on the completion of the evaluation of the course.

6. **Withdrawal from a Course**

A student may be allowed to withdraw from an optional course within 15 days of the start of the semester, and opt another optional course in lieu of it. In such a case, attendance of the student in the first course shall be added to the attendance in the new course.

7. **Earned Minimum Credits, and Minimum CGPA for the Degree**

The credits for the courses in which a student has obtained 'D' (minimum passing Grade for a course) or higher shall be counted as Credits earned by him/her. A student shall have to earn a minimum of such number of Credits as may be required for the award of a degree in a particular course/discipline. A student who has obtained a minimum CGPA of 4.5 and earned a minimum number of Credits as specified for the programme, shall be eligible for the award of the respective degree.

A student, who has earned the minimum Credits required for a degree, but fails to obtain the minimum specified CGPA for this purpose, shall take additional courses till the minimum CGPA is attained within the maximum time limit for the programme. No grace marks will be awarded to pass a course or improve division. If a student offers courses for more than the required

minimum Credits, the SGPA or CGPA shall be calculated on the basis of total number of Credits registered. Maximum time allowed to pass a course is given below:

Course duration	Maximum time to complete the Degree/ Diploma
Three Years	Four and half years
Two years	Three years
One year	Two years

8. Audit Courses:
In addition to the Credit courses, a student on the approval of Board of Control can take up Audit course/s from his/her Department, or any other Department or other University or institute of higher education/research. The Grade awarded for this course shall be Satisfactory ('S') or Not Satisfactory ('U'). A Grade equivalent to 'D' or above will be treated as satisfactory for Audit courses. The Audit course/s cleared by a student will not be counted towards his/her SGPA/CGPA

9. Make-up Examination
If a student is absent from a Major/Minor Test/quiz of the course due to the death of his/her first blood relation (Mother/Father/Sister/Brother/Daughter/Son) on the day of the examination, or at the most two weeks prior to the test, or on medical grounds, or participates in sports/cultural activities with the permission of the Board of Control, the Board of Control may permit the student for the make-up Examination within two weeks of the date of the test from which the student absented, provided further that the quiz/Minor Test shall be based on the syllabus covered till date. Under similar conditions, if a student is making up for Major Test then permission of the Dean Academic Affairs will be required.

10. Conversion from CGPA to Percentage:
A CGPA of 6.75 will be considered equivalent to 60% marks. The conversion of CGPA to Percent Score will be carried out by multiplication of respective CGPA by a factor of 8.9. The equivalence between important percentages in absolute marks system and CGPA is as follows:

Percentage	40	45	50	55	60	70	75
CGPA	4.50	5.06	5.62	6.18	6.75	7.87	8.43

1st YEAR	SEMESTER-I

CCC-01: INTRODUCTORY BIOLOGY

THEORY

Total Hours: 60 **Credits: 4**

Unit 1: Introduction to Biology **(6 Hours)**

Life and living systems; Themes in the study of biology; ecosystems; The process of Science; Biology and everyday life

Unit 2: Biodiversity and evolution **(14 Hours)**

Biological classification –Prokaryotes, Eukaryotes, Archaea, Viruses, viroids and lichens., Kingdoms of Life: Five kingdoms- Monera, Prostita, Fungi, plantae and animalia.

Animal kingdom - Classification and its basis; General survey of Animal Kingdom. Structure and life history of parasites as illustrated by amoeba, Entamoeba, Plasmodium . General structure and life history of insects like mosquito/ mite and silk worm.

Plant kingdom – Algae, Gymnosperms, Angiosperms. .

Evolution – Origin of earth and life; Major events in the history of life; theory of evolution of life forms, Darwin's theory of evolution, The evolution of populations.

Unit 3: Introduction to Biochemistry **(10 Hours)**

Structure and function of biomolecules: Water, Carbohydrates, Lipids, Proteins, Nucleic acids, Enzymes and cofactors , their classification , chemistry, mechanism of action and factors affecting enzyme activity.

Unit 4: Organisation of Living systems **(15 Hours)**

A living cell; Cell- the unit of life. Cell cycle and cell division, stages of mitosis and meiosis, and their significance.

Histology: Plant and animal tissues and organ systems;

Grouping of organisms based on energy need; Mineral Nutrition of Plants & Animals;

Transport in plants: Plant water relations, Transpiration, uptake of water & minerals, Translocation of organic solutes; Transport in animals: Blood vascular system,

Unit 5: Genetics & Molecular Biology **(15 Hours)**

Patterns of inheritance and question of biology; Mendel's Law & its Variations; The molecular basis of genetic information; DNA Replication, Transcription & Translation; Genetic code, regulation of gene expression.

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INTRODUCTORY BIOLOGY:

PRACTICALS **Credits: 2**

(Whereever wet lab experiments are not possible the principles & concepts can be demonstrated through any other materials or medium including videos/ virtual labs etc.

1. To Learn the use of pipettes/ micropipettes
2. Preparation of Normal, molar and standard solutions, serial dilutions.
3. To learn the principles of fixation and staining
4. To perform gram staining of bacteria.
5. To study the cytochemical distribution of nucleic acids and mucopolysaccharides with in cells/tissues from permanent slides.
6. Separation of chloroplast pigments by thin layer chromatography.
7. To separate sugars by thin layer chromatography.

SUGGESTED BOOKS

1. Campbell, N.A. and Reece, J.B. (2008) Biology 8th edition, Pearson Benjamin Cummings, San Francisco.
2. Raven, P.H et al (2006) Biology 7th edition Tata McGrawHill Publications, New Delhi
3. Griffiths, A.J.F et al (2008) Introduction to Genetic Analysis, 9th edition, W.H. Freeman & Co. NY

1st YEAR	SEMESTER-I

CCC-02: CONCEPTS IN CHEMISTRY

THEORY

Total Hours: 60 **Credits: 4**

Unit 1: **(19 Hours)**

Periodic Table: Atomic, ionic and covalent radii, ionization energy, electro negativity and its scales, electron affinity, Lanthanide contraction, Inert pair effect, Slater rules.

Chemical bonds and molecules: Recapitulation of general characteristics of ionic & covalent bonds and shapes of molecules, Van der Waal forces of attraction (ion-dipole, dipole-dipole, dipole-induced dipole, and dispersion forces), polar covalent bond, hydrogen bond, effects of hydrogen bonding on physical properties, structure of water, metallic bond, lattice energy, Born Haber cycle, Fajan's rule, bond length, bond angle.

Acid and Bases: Bronsted-Lowry theory, concept of leveling and differentiating solvents. Lewis- concept of acids and bases, Relative strength of lewis acids and bases and the effect of substituents.

Unit 2: **(19 Hours)**

Organic reactions and their mechanisms, types of reactions - Mechanism of SN1 and SN2 reactions (stereochemistry, nature of substrate, nucleophile and leaving group). Keto-enol tautomerism and its distinction from resonance. Structure and stability of reactive carbon species - carbonium ion, carbanion, free radical, carbenes. Electronic effects in molecules (inductive, hyperconjugation and resonance effects); cleavage of covalent bonds – homolysis and heterolysis. Electrophilic substitution in benzene. Reaction mechanisms of Aldol condensation, Hoffman bromamide rearrangement, Cannizzaro reaction, Friedel Craft reaction, Pinacolpinacolone rearrangement, Beckmann rearrangement.

Pharmaceuticals: Synthesis of aspirin, paracetamol, sulphanilamide, their uses and drug action.

Reagents for organic synthesis: Active methylene compounds - preparation, properties and synthetic applications of ethylacetoacetate and diethylmalonate, Grignard reagents – preparation and reactions.

Unit 3: **(12 Hours)**

Stereochemistry: Optical activity and optical isomerism, specific molar rotation, asymmetric carbon atom, chirality, enantiomerism, relative configuration (sequence rules, R/S nomenclature of chiral centres), absolute configuration (D/L designation in carbohydrates), geometrical isomerism (cis/trans and E/Z nomenclature in olefins) isomers of lactic acid and tartaric acid

Aromaticity: Concept of aromaticity, Huckle's rule as applied to benzene, naphthalene, anthracene, phenenthrene, thiophene, furan, pyrrole, pyridine, quinolene and cyclic cations & anions.

Unit 4: **(10 Hours)**

Chemical equilibrium: Reversible reactions, law of mass action, equilibrium constant, ionic equilibrium, theory of indicators, factors influencing equilibrium states, relation between Kp & Kc, buffer solution, hydrolysis of salt, pH, Ksp, common ion effect and its applications in mixture analysis.

Electrochemistry; Standard electrode potential, electrochemical series, Nernst equation, Indicator and reference electrodes, pH and its measurement by glass electrode. Potentiometric determination of pH

Suggested Books:

1. J. D. Lee, Concise Inorganic Chemistry, ELBS.
2. J.E. Huheey, Inorganic Chemistry – Principles of Structure and Reactivity, Pearson Publication.
3. I.L. Finar, Volume I, II, Organic Chemistry, ELBS.
4. R.T. Morrison and R.N. Boyd, Organic Chemistry, Prentice Hall.
5. G.M. Barrow, Physical Chemistry, Tata McGraw-Hill.
6. G.W. Castellan, Physical Chemistry, Narosa Publishing House.
7. J. March, Advanced Organic Chemistry, Prentice Hall
8. F.A. Cotton and G. Wilkinson, Basic Inorganic Chemistry, John Wiley.
9. E.S. Gilreath, Fundamental Concepts of Inorganic Chemistry
10. W.L. Jolly, Modern Inorganic Chemistry, Longman.

CCC-02: CONCEPTS OF CHEMISTRY

PRACTICALS **Credits: 2**

1. To estimate iron (II) ions by titrating with potassium permanganate.
2. To determine melting points and boiling points of organic compounds.
3. To detect extra elements (N, S, Cl, Br, I) in organic compounds (containing not more than one extra element).
4. To analyze the following functional groups in the given organic compound: Carboxylic acids, alcohols, phenols, aldehydes & ketones, carbohydrates (monosaccharide's), amides, nitro compounds and primary amines.
5. To determine surface tension of a liquid using a stalagmometer.
6. To determine viscosity of a liquid using an Ostwald viscometer

1st YEAR	SEMESTER-I

IWM-DSC-01: INDUSTRIAL WASTES MANAGEMENT
THEORY
Total Hours: 60 **Credits: 4**

UNIT-I: (6 Hours)
Types of Industrial Wastes
Biomedical Wastes, Agro-Industrial wastes, Liquid Wastes, Industrial Wastewaters

UNIT-II: (8 Hours)
Principles of Industrial waste treatment –
sources of pollution: physical, chemical, organic and biological properties- effects of waters on streams, sewers and treatment plants.

UNIT-III: (10 Hours)
Waste reduction Alternatives for raw materials, process changes, house keeping - pretreatment of wastes - collection of waste segregation - equalization - reduction in volume and strength by other methods - theories of neutralization - equalization and proportioning.

UNIT-IV: (10 Hours)
A review of the methods adopted for the removal of suspended colloidal and dissolved organic solids removal of in organic dissolved solids - disposal of sludge solids - selection of site for the plant.

UNIT-V: (14 Hours)
Manufacturing processes, flow sheets, characteristics and composition of wastes including waste reduction, treatment and disposal methods will be considered for some of the representative industries such as:

- Food Industries: Sugar, Fermentation, Meat, dairy and Rice- milling.
- Material Industries: Paper, Steel - Metal - plating and petroleum refineries.
- Miscellaneous Industries: Textile, Tanning, Fertilizers and Atomic energy plants

UNIT-VI: (12 Hours)
Integrated solid waste management, Waste characteristics, generation, handling, collection, and transfer; Waste minimization and processing; Biochemical waste conversion
Thermal waste transformation ; Waste disposal; Hazardous waste management; Hazardous waste treatment; Hazardous waste reutilization

IWM-DSC-01: INDUSTRIAL WASTES MANAGEMENT

PRACTICALS **Credits: 2**

Analysis of the characteristics of different wastes:

A. Liquid waste - pH, electrical conductivity, COD, BOD, total solids, total dissolved solids, total suspended solids, total volatile solids, chlorides, sulphates, oil & grease.
B. Solid waste- pH, electrical conductivity, total volatile solids, ash.
C. Standards as per MPCB.

1st YEAR	SEMESTER-I

AECC-01: ENGLISH COMMUNICATION

THEORY

TOTAL HOURS: 40 **CREDITS: 2**

Unit 1: Introduction: **(8 hours)**

Theory of Communication, Types and modes of Communication

Unit 2: Language of Communication: **(8 hours)**

Verbal and Non-verbal (Spoken and Written) Personal, Social and Business Barriers and Strategies Intra-personal, Inter-personal and Group communication

Unit 3: Speaking Skills: **(8 hours)**

Monologue, Dialogue, Group Discussion, Effective Communication/ Mis- Communication, Interview, Public Speech

Unit 4: Reading and Understanding **(8 hours)**

Close Reading Comprehension, Summary, Paraphrasing Analysis and Interpretation, Translation (from Indian language to English and vice-versa), Literary/Knowledge Texts

Unit 5: Writing Skills **(8 hours)**

Documenting, Report Writing, Making notes, Letter writing

Recommended Readings:

1. Fluency in English - Part II, Oxford University Press, 2006.
2. Business English, Pearson, 2008.
3. Language, Literature and Creativity, Orient Blackswan, 2013.
4. Language through Literature (forthcoming) ed. Dr. Gauri Mishra, Dr Ranjana Kaul, Dr Brati Biswas

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After 1st YEAR	YEAR END BREAK
(MAXIMUM DURATION OF INDUSTRIAL TRAINING : 60 DAYS)	

AECC-03: Industrial Training (upto two months' duration)
(During Year–end break after IInd Sem. Examinations, The Industrial Training should be completed at an Industry/ Research Lab working in the field of Waste Treatment/ Management Technologies)

1st YEAR	SEMESTER-II

CCC-03: BIOSAFETY AND BIOETHICS

THEORY **CREDITS: 4**

Total Hours: 60

Unit 1: Principles of Biosafety & Bioethics **(4 Hours)**

Unit 2: Biosafety Regulations **(15 Hours)**

National and International Level Biosafety Regulations; Trials On-field; Upscaling of Field Trials; Developing Countries; Coordination and Capacity Establishment; Screen–A Newsletter on Biosafety; Risks versus Benefits; Hazardous Materials Used in Biotechnology—Handling and Disposal; Good Manufacturing Practices; Good Laboratory Practices; Good Laboratory Practice Principles

Unit 3: Biosafety and Risk assessment issues **(10 Hours)**

Health aspects; toxicology, allergenicity; Ecological aspects; Regulations; National biosafety policy and law. Regulatory framework in India governing GMOs-Recombinant DNA Advisory Committee (RDAC), Institutional Biosafety Committee (IBC), Review Committee on Genetic Manipulation, Genetic Engineering Approval Committee (GEAC), State Biosafety Coordination Committee (SBCC), District Level Committee (DLC). Recombinant DNA Guidelines (1990), Revised Guidelines for Research in Transgenic Plants (1998), Seed Policy (2002), Prevention Food Adulteration Act (1955), The Food Safety and Standards Bill (2005), Plant Quarantine Order (2003), Regulation for Import of GM Products Under Foreign Trade Policy (2006-2007), National Environment Policy (2006). Rules for the manufacture, use/import/export and storage of hazardous microorganisms/genetically engineered organisms or cells (Ministry of Environment and Forests Notification,1989). The Cartagena Protocol on biosafety. The WTO and other international agreements; Cross border movement of germplasm; Risk management issues; Monitoring strategies and methods for detecting transgenics; Risks, benefits and impacts of transgenics to human health, society and the environment.

Unit 4: Bio-safety and bio-hazards **(10 Hours)**

general principles for the laboratory and environmental bio-safety; Environment Impact Assessment; Gene flow in natural and artificial ecologies; Sources of gene escape; Ecological risks of genetically modified plants. Implications of intellectual property rights, rights on the commercialization of biotechnology products.

Unit 5: Bioethics Fundamentals **(5 Hours)**

The legal and socioeconomic impacts of biotechnology - Public education of the process of biotechnology involved in generating new forms of life for informed decision-making – ethical concerns of biotechnology research and innovation.

Unit 6: Human Genome Project **(5 Hours)**

Ethical Issues of the Human Genome Project; The Human Genome Diversity Project; The Need for a Strategic Framework; Foetal Sex Determination; The Indian Law on Abortion; Social Implications of the Act; Ethical Issues in MTP; Ethical Issues Leading to Legal Issues; Genetic Studies on Ethnic Races.

Unit 7: Stem Cell Research **(6 Hours)**

Introduction ; Applications of Stem Cells; Ethics Involved in Stem-cell Research; Use of Cell-cultures as Alternatives to Use of Animals; Replacement; Use of Animals for Research and Testing; Animal Cloning; Ethics and Animal Cloning; Human Cloning; Why Cloning Humans is Ethically Unacceptable?; Controlling Someone Else's Genetic Makeup; Instrumentality; Infertility–An Exception to Instrumentality; Psychological Effect–Identity and Relationship; Physical Risk; Social Risk

Unit 8: Introduction to IPR & Patent laws **(5 Hours)**

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Intellectual property rights-TRIPS, GATT-International conventions patents and methods of application of patents-Legal implications-Biodiversity and farmer rights; Objectives of the patent system - Basic principles and general requirements of patent law-biotechnological inventions and patent law-Legal development-Patentable subjects and protection in biotechnology-The patenting living organisms.

CCC-03: BIOSAFETY & BIOETHICS

PRACTICALS **Credits: 2**

1. Introduction to GLP & GCP guidelines.
2. Demonstration of experiments (to be done by students) using Good Laboratory Practices.
3. Understanding of Concepts of Good Clinical Practices using case studies of drug/ vaccine trials.
4. Discussion & Brainstorming of students (under the guidance of a faculty) on a case study of patenting in Biotechnology

1st YEAR	SEMESTER-II

CCC-04: INSTRUMENTATION & TECHNIQUES

THEORY

Total Hours: 60 **Credits: 4**

Unit 1: Distillation of water **(2 Hours)**
Chemistry of water, physical properties. The process of Distillation

Unit 2: Sterilization Techniques **(4 Hours)**
Heat sterilization: Autoclave, Oven
Filter Sterilization, UV Sterilization

Unit 3: Microscopy **(4 Hours)**
Principles & Applications of Simple, Compound & Fluorescence Microscopes

Unit 4: Preparation of Solutions **(5 Hours)**
Use of Balances & pH meter, Nature of acids and bases, strong and weak acids, dissociation constant, pKa of an acid & its determination, concept of buffers, buffering capacity, preparation of a buffer, measurement of pH, working of a pH meter.

Unit 5: Spectrophotometer **(15 Hours)**
Principle of absorption spectroscopy. UV-Visible absorption spectrophotometry, Lambert's Law, Beer's Law. Working & applications of spectrophotometer. Working of a Spectrofluorimeter. Principle of fluorescence, intrinsic and extrinsic fluorescence, Uses of extrinsic and intrinsic fluors in Biology.

Unit 6: Centrifuge **(10 Hours)**
Principle of centrifugation, basic rules of sedimentation, sedimentation coefficient, various types of centrifuges- Table Top centrifuge, Refrigerated Centrifuge, Ultracentrifuge. Different types of rotors. Differential centrifugation, density gradient centrifugation.

Unit 7: Chromatography & Separation Techniques **(20 Hours)**
Basic Principles of Chromatography, Modes of Chromatography: TLC, Paper, Column, Gel-filtration, Ion-Exchange, Affinity Chromatography
Dialysis, Electrophoresis: Agarose Gel Electrophoresis, PAGE: SDS & native, IEF, Detection of nucleic acids & Proteins.

CCC-04: INSTRUMENTATION & TECHNIQUES

PRACTICALS **Credits: 2**

1. Determination of pKa value of acetic acid
2. Preparation of buffers
3. Verification of Beer's Law
4. Estimation of proteins by Lowry's method/Bradford's method
5. Separation of amino acids by paper chromatography/TLC
6. Agarose gel electrophoresis of DNA
7. Separation of proteins by SDS-PAGE

Suggested Readings

1. Physical Biochemistry: Applications to Biochemistry and Molecular Biology (1982) 2nd ed., Freifelder, D., W.H. Freeman and Company (New York).
2. An Introduction to Practical Biochemistry (1998) 3rd ed., Plummer D. T., Tata McGraw Hill Education Pvt. Ltd. (New Delhi)

1st YEAR	SEMESTER-II

AECC-2: ENVIRONMENTAL SCIENCE

THEORY

Total Hours: 60 **Credits: 4**

Unit 1: Introduction to environmental Science **(5 Hours)**

Multidisciplinary nature of environmental studies; Scope and importance; Need for public awareness.

Unit 2: Ecosystems **(8 Hours)**

What is an ecosystem? Structure and function of ecosystem; Energy flow in an ecosystem: food chains, food webs and ecological succession. Case studies of the following ecosystems: a) Forest ecosystem b) Grassland ecosystem c) Desert ecosystem d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Unit 3: Natural Resources **(10 Hours)**

Renewable and Non-renewable Resources Land resources and landuse change; Land degradation, soil erosion and desertification. Deforestation: Causes and impacts due to mining, dam building on environment, forests, biodiversity and tribal populations. Water : Use and over-exploitation of surface and ground water, floods, droughts, conflicts over water (international & inter-state). Energy resources: Renewable and non renewable energy sources, use of alternate energy sources, growing energy needs, case studies.

Unit 4: Biodiversity and Conservation **(10 Hours)**

Levels of biological diversity : genetic, species and ecosystem diversity; Biogeographic zones of India; Biodiversity patterns and global biodiversity hot spots India as a mega-biodiversity nation; Endangered and endemic species of India; Threats to biodiversity: Habitat loss, poaching of wildlife, man-wildlife conflicts, biological invasions; Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity. Ecosystem and biodiversity services: Ecological, economic, social, ethical, aesthetic and Informational value.

Unit 5: Environmental Pollution **(10 Hours)**

Environmental pollution : types, causes, effects and controls; Air, water, soil and noise pollution Nuclear hazards and human health risks; Solid waste management: Control measures of urban and industrial waste. Pollution case studies.

Unit 6: Environmental Policies & Practices **(7 Hours)**

Sustainability and sustainable development. Climate change, global warming, ozone layer depletion, acid rain and impacts on human communities and agriculture Environment Laws: Environment Protection Act; Air (Prevention & Control of Pollution) Act; Water (Prevention and control of Pollution) Act; Wildlife Protection Act; Forest Conservation Act. Nature reserves, tribal populations and rights, and human wildlife conflicts in Indian context.

Unit 7: Human Communities and the Environment **(5 Hours)**

Human population growth: Impacts on environment, human health and welfare. Resettlement and rehabilitation of project affected persons; case studies. Disaster management: floods, earthquake, cyclones and landslides. Environmental movements: Chipko, Silent valley, Bishnois of Rajasthan. Environmental ethics: Role of Indian and other religions and cultures in environmental conservation. Environmental communication and public awareness, case studies (e.g., CNG vehicles in Delhi).

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Unit 8: Field work **(Equal to 5 Hours)**

Visit to an area to document environmental assets: river/ forest/ flora/fauna, etc. Visit to a local polluted site-Urban/Rural/Industrial/Agricultural. Study of common plants, insects, birds and basic principles of identification. Study of simple ecosystems-pond, river, Delhi Ridge, etc.

Suggested Readings:

1 Bharucha, E. 2003, Textbook for Environmental Studies, University Grants Commission, New Delhi and Bharati Vidyapeeth Institute of Environmental Education and Research, Pune. 361.
2 Carson, Rachel. 1962. Silent Spring (Boston: Houghton Mifflin, 1962), Mariner Books, 2002
3 Economy, Elizabeth. 2010. The River Runs Black: The Environmental Challenge to China's Future.
4 Gadgil, M. & Ramachandra, G. 1993. This fissured land: an ecological history of India. Univ of California Press.
5 Gleeson, B. and Low, N. (eds.) 1999. Global Ethics and Environment, London, Routledge.
6 Grumbine, R. Edward, and Pandit, M.K. Threats from India's Himalaya dams. Science 339.6115 (2013): 36-37.
7 Heywood V.H. & Watson, R.T. 1995. Global Biodiversity Assessment. Cambridge University Press.
8 McCully, P. 1996. Silenced rivers: the ecology and politics of large dams. Zed Books.
9 McNeill, John R. 2000. Something New Under the Sun: An Environmental History of the Twentieth Century.

ENVIRONMENTAL SCIENCE

PRACTICALS **Credits: 2**

1. Collection & Preservation of Water & Soil Samples (Field Practicals, to be carried out during field trips)

2. Determination of:
   a) pH of Water & Soil
   b) Electrical Conductivity of water
   c) Alkalinity of Water (wastewater) & Soil
   d) Total Hardness (Ca., Mg. Content) in Water
   e) Chlorides

3. Study of soil properties:
   a) Temperature, pH, EC
   b) Water holding capacity, Moisture content

4. Visit to natural Area/ Wildlife Sanctuary to study various Bioresources.

5. Visit to Weather station & understand Weather/ environmental Monitoring

IWM-TWR: TECHNOLOGY FOR WASTE RECYCLING & REUSE

THEORY & PRACTICALS **Credits: 4**

Total Hours: 45

UNIT I: Sewage Treatment & Disposal **(5 Hours)**
Self purification of streams- BOD and its importance- treatment methods- primary, secondary and tertiary levels- disinfections of treated sewage effluent- septic tank design- effluent disposal methods- disposal on land, sewage sickness- disposal by dilution- design of biological treatment units- sludge characteristics, unit operations in sludge disposal, conventional and high rate digesters- disposal of sludge- gas utilization.

UNIT II: Water Treatment **(5 Hours)**
Methods of water purification, primary treatment- sedimentation- flotation, secondary (biological) treatment- design and principles in biological treatment facilities- activated sludge process- trickling filters – low cost waste treatment systems and their design, tertiary treatment.

UNIT III: Advanced Wastewater treatment & Bioreactors for wastewater treatment (5 Hours)
Introduction, removal suspended solids- removal of dissolved solids- Ammonia removal- phosphorus removal- chemical oxidation- recovery of materials from process effluents. Up Flow Anaerobic Sludge Blanket (UASB), Two-stage, Aerobic UNI Tank System (TSU-System, Route Zone Treatment, Submerged Aerobic Fixed Film (SAFF) Reactor, Fluidized Aerobic Bio – Reactor (FAB).

UNIT IV: Air Pollution & Control Strategies **(6 Hours)**
Sources- correction methods- -particulate emission control- gravitational settling chambers-cyclone separators- fabric filters-electrostatic precipitators-wet scrubbers- -control of gaseous emissions-adsorption by solids-absorption by liquids-combustion, condensation – control of SO2 emission – desulphurization of flue gases – dry methods – wet scrubbing methods. Control of nitrogen oxides-modification of operating conditions- modification of design conditions- effluent gas treatment methods-carbon monoxide control-control of hydrocarbons-mobile sources.

UNIT V: Soil Pollution, Phytoremediation & Bioremediation Technologies **(8 Hours)**
Impact of modern agriculture on soil, degradation of soil, Control of soil pollution, Phytoextraction, Phytostabilization, Phytostimulation, Phytotransformation, Rhizofiltration, Constructed Wetlands, Bioremediation Technologies: Bioaugmentation, Biostimulation, Bioreactors, Land-based Treatments, Fungal Remediation.

UNIT VI: Solid & Hazardous Waste treatment **(8 Hours)**
Sources and generation of solid waste – characterization, chemical composition and classification-dumping of garbage- commercial, Industrial, Agriculture, Mining and Power Plant discharges- Disposal methodsComposting, Incineration and others- biomedical waste management. HWT Technologies, Physical Treatment Methods, Chemical Treatment Methods, Stabilization and Fixation Systems.
Biomedical waste management: sources, classification, collection, segregation Treatment and disposal.
Radioactive waste management: Definition, Sources, Low level and high level radioactive wastes and their management, Radiation standard by ICRP and AERB
E-waste management: Waste characteristics, generation, collection, transport and disposal.

Nandlal

UNIT VII: Noise Control & Green Belt Development **(3 Hours)**
Standard Methods of Noise Control; Greenbelt Development: Advantage of Green Belt Development, Design of Green Belt, Rain Water Harvesting:

UNIT VIII: Remote Sensing & GIS **(5 Hours)**
Geospatial Requirements, Spatial Decision Support System (SDSS), GIS in Environmental Impact Assessment

IWM-TWR: TECHNOLOGY FOR WASTE RECYCLING & REUSE

PRACTICALS

1. Collection of Environmental Samples (Effluent samples) from Field Sites and their classification
2. Chemical & Physical Analyses of Industrial Wastewaters
3. Chemical & Physical Analyses of Industrial Sludge.
4. Use of Methods for Bioaugmentation of toxic wastes for their detoxification in the environment
5. Air pollution modeling, water pollution modeling and ecological modeling
6. Use of GIS lab. Softwares like ISCST3, Mod Flow, TWQM, Geopack, WQAM, etc.

SUGGESTED REFERENCES:

1. Text book of Environmental Science and Technology by Dr. M. Anji Reddy, BS Publications, 2010.
2. Bioremediation by Baker K H and Herson DS. Mc Graw Hill, Inc, New Delhi.
3. Biodegradation and Bioremediation, Martin Alexander, Academic press.
4. Waste water engineering, treatment and reuse by Metcalf & Eddy, fifth edition, Tata Mcgraw Hill.
5. Air Pollution, H.C.V. Rao, 1990, Mcgraw Hill Co.
6. Environmental Pollution control technologies, C.S. Rao, Wiley estern Ltd, 1993.
7. Air Pollution, M.N. Rao, Mcgraw Hill 1993.

IWM-TER: APPLICATION OF BIOTECHNOLOGICAL TOOLS FOR ENVIRONMENTAL REMEDIATION

THEORY & PRACTICALS **Credits: 4**

Total Hours: 45

Unit-I: **Status and Scope of Biotechnology in Environmental protection.** **(6 Hours)**
Nonconventional energy sources. Environment protection Act: Environmental laws, Environmental policies, Environmental ethics. UN declaration. Environmental protection and conservation. Environmental Impact Assessment, Ecoplanning and Sustainable Development

Unit-II: **Physicochemical and bacteriological analysis of soil and water** **(12 Hours)**
Problems associated with soil, alkali soils, sodic soils, and solid waste, Fate of insecticides fungicides, pesticides in soil, use of genetically modified (insect- , pest- and pathogen resistant) plants. Ecotoxicology of soil pollutants, Municipal solid waste treatment strategies.

Unit-III: **Waste water constituents, Analysis and selection of flow rates and loadings** **(12 Hours)**
Process Selection, Physical unit operations, Chemical unit operations, Fundamentals of biological treatment, Role of biotechnology in water purification systems. Types and kinetics of biological treatment, Advanced waste water treatment, Biological Processes for Industrial and domestic effluent, Treatment, Aerobic Biological Treatment, Anaerobic Biological Treatment.

Unit-IV: **Bioremediation-Biotechnology for clean environment** **(15 Hours)**
Biomaterials as substitutes for non-degradable materials, Metal microbe interactions: Heavy Metal Pollution and impact on environment, Microbial Systems for Heavy Metal Accumulation, Biosorption, molecular mechanisms of heavy metal tolerance
Bioindicators and biosensors for detection of pollution. Biotechnology for Hazardous Waste Management, Persistent organic pollutants, Xenobiotics, Biological Detoxification of PAH, Biotechniques for Air Pollution Control. Solid Waste Management

PRACTICALS

1. Soil & Water Sampling Methods
   (Field trips to Industries for sampling of contaminated samples)
2. Physicochemical and bacteriological analysis of soil and water
3. Trips to Wastewater treatment plants to understand the biological treatment processes of effluents and wastewater

Recommended Books

1. Amann, R.I. Stromley, J. Stahl : Applied & Environmental Microbiology
2. Dash : Concepts of Ecology
3. Chattergy : Environmental Biotechnology
4. Varma & Agarwal : Environmental Biology
5. B.K. Sharma : Environmental Chemistry
6. Peavy & Rowe : Environmental Pollution
7. Asthana & Asthana : Environment Problems & Solutions

IWM-VAI: VALUE ADDITION TO INDUSTRIAL & AGROWASTES

THEORY & PRACTICALS **Credits: 4**

Total Hours: 45

Technologies for generating value added products from Industrial Wastes (15 Hours)

Value added products from: Paper Mills Waste (paper sludge); Leather Skin Waste from the Leather processing industry; Steel Mills Slag; Herbs Industry Waste leftover after rose petals extraction; Ceramic Wastes generated by Marble industry

Conversion of waste carbon black produced by tyre industry into 1) activated carbon, 2) carbon black for low end rubber application or other high value products.

Technology for Reactivation of Waste Nickel Catalyst generated by food processing industries;

Polyester Recycling

Utilization of Agricultural wastes for value addition (15 Hours)

Types of Agricultural Wastes; Composting of Agricultural Residues; Recalcitrant Agroresidues and their mode of natural biodegradation; Problem of on-farm burning of recalcitrant agrowastes; Technologies for biosimplification & utilization of recalcitrant agrowastes.

Use of Agricultural wastes for production of animal feeds & fodder.

Bioaugmentation & Biovalorization for value addition to agroindustrial wastes (15 Hours)

Utilization of different agro-industrial wastes for sustainable bioproduction of citric acid, Lignocellulolytic enzymes such as Cellulase, Xylanase, Laccase and other Industrially important enzymes such as tannase, amylase etc. by bacterial/ Actifungal formulations.

Use of agro-industrial wastes for sustainable bioproduction of Biodiesel & Bioethanol

IWM-VAI: VALUE ADDITION TO INDUSTRIAL WASTES

PRACTICALS

1. Utilization of Agroresidues for manure preparation By dumping in Landfills
2. Use of Agroresidues for preparation of Compost formulations (free of any phytotoxicity)
   - Composting of agroresidues in aerated compost pits & regular monitoring for Physicochemical Parameters to test the compost maturtation
   - Methods for Testing Compost Maturity- Seed Germination test (use of Wheat/ Lepidium sativum seeds for seed germination test)

REFERENCE BOOKS FOR THEORY PAPER

Text Books:

1. Cassarett and Doull's Toxicology: The Basic Science of Poison by Curtis D. Klassen 7th Edition, McGraw Hill Publishers, 2007.

2. Cassarett and Doull's Essentials of Toxicology by Klassen and Whatkins, 1st Edition, McGraw Hill Publishers, 2003.

IWM-ENM: ENTREPRENEURSHIP IN NATURAL RESOURCES MANAGEMENT

THEORY & PRACTICALS

Total Hours: 45 **Credits: 4**

Entrepreneurship Development **(10 Hours)**

Entrepreneurship- concept, definition, need and significance of entrepreneurship; development in India, entrepreneurship growth process, barriers, entrepreneurship education model. Entrepreneur- their characteristics, types, gender issues, role demands and challenges. Entrepreneurial Motivation.
The Entrepreneur: Identifying new opportunities – from intentions to actions; An entrepreneurs' passion and characteristics; The psychology of entrepreneurship; Communicating your ideas – from elevator pitch to business plan; Entrepreneur's decision making tactics and persistence; The Founder's Dilemma; The Entrepreneurial Exit.
Entrepreneurship as an economic and social phenomenon; Creativity and innovation; The Start-Up Nation: past, present, future; Innovation and Entrepreneurship around the world; Entrepreneurship and Academia – the Technion case; What is social entrepreneurship?

The Entrepreneurial Organization (Company) **(10 Hours)**

Developing your Company: Origin and circulation of ideas: idea processing from new idea to a new firm; Firm development stages

- Market research and competitive analysis; market segmentation
- Revenue models and pricing, sales and distribution strategy
- Firm Development Instruments:
  - The Business Plan
  - The Executive Summary
  - The Business Plan Presentation
  - The Investor Pitch

Legal & tax aspects of the new venture; Innovative structures of entrepreneurial organizations; The lean start-up approach

Entrepreneurial Eco-System & Economy (Society) **(15 Hours)**

Economics of Entrepreneurship: Innovation, entrepreneurship and economic growth; Solow neoclassical economic growth model; Innovation as economic resource (Arrow 1962)
The economic constraints of start-up firms; New projects borrowing capacity; Entrepreneurs, investors and financial intermediaries
Financing Aspects of Entrepreneurship
Numerical illustration of investment model; Financial aspects of entrepreneurship
Financing mechanisms during firm life
Introduction venture capital investments; Venture cycle, VC performance
New financing instruments: crowd financing (and others); Simulation Lab: crowd funding campaign
Economic policy in innovation and entrepreneurship – Policy design models
The Israeli model of encouraging entrepreneurship (Chief Scientist)
Intellectual property models and policy
Technology Transfer

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Entrepreneurship in the Natural Resources Management **(10 Hours)**

1. Developing a project from idea to business plan in management of a particular Natural Resource keeping in view the environmental sustainability
2. An introduction to the business of green technologies (natural resources) and a description of the course of Business development
3. Introducing tools for brainstorming and 'design thinking'
4. The strategy and requirements for coming up with a good idea for a successful strategy to utilize the proposed natural resource for revenue generation while taking care of Resource conservation and optimization for environmental sustainability.
5. Going from bench to marketplace; Proof of concept; Product development; Product trials, etc.
6. Design the proof of concept (POC) to demonstrate that the concept/idea really works and can convince an investor to fund project commercialization
7. Describe the experiment/trials and work plan needed for proof of concept (POC); Describe the predicted experimental results in detail (assume that the POC is a success)
8. IP management and ways to protect your new invention

IWM-ENM: ENTREPRENEURSHIP IN NATURAL RESOURCES MANAGEMENT

PRACTICALS

1. SWOT analysis with respect to entrepreneurial competencies through case profiling of successful entrepreneurs and enterprises.
2. Achievement Motivation lab-development of entrepreneurial competencies
3. Survey of an institution facilitating entrepreneurship development in India.
4. Preparation of business plan. Introduction to concept and dimensions of sustainable development, major conferences and agreements on sustainable development - Power point presentation and group discussion
5. MDG's and challenges to sustainable development
   (Climate and Global Change, Energy, Water Resources, Population, Economic Development, etc.); (Case study approach)
6. Water/Air analysis - Lab testing and class presentation
7. Experiential learning through field visit: Sewage treatment plant/ Vermicomposting unit/ Air Monitoring Laboratory/ Environment Pollution Detecting Laboratory/ Rain Water Harvesting System/ Biogas Plant/ Green Building/ Ecotel Hotel/ CPCB/ Greenhouse/ Solid Waste Management Plant/ hydro/thermal power plants/ Environmental Agencies or National Parks/ Sanctuaries/ Biosphere Reserves.
8. Development of awareness programme on sustainable consumption practices for masses.
9. A Survey related to environmental issues amongst the citizens: Data to be collected and analyzed statistically with suggestions for environmental management Or Secondary data collection/Case profile of any one govt. or non-govt. organization that contributed to environmental protection in India.

Recommended Books:

1. Gundry Lisa K. & Kickul Jill R.,2007, Entrepreneurship Strategy: Changing Patterns in New Venture Creation, Growth, and Reinvention, SAGE Publications, Inc.
2. Taneja & Gupta, 2001, Entrepreneur Development- New Venture Creation, Galgotia Publishing Company
3. Koontz.H. and O'Donnel C., 2005, Management – A systems and contingency analysis of managerial functions. New York: McGraw-Hill Book Company
4. Kreitner. 2009, Management Theory and Applications, Cengage Learning: India
5. Rao V.S. and Narayana P.S., Principles and Practices of Management, 2007, Konark Publishers Pvt. Ltd.
6. Ganesha Somayaji and Sakarama Somayaji ,2009, Environmental concerns and sustainable development: some perspectives from India,
7. TERI Publication I. Sundar ,2006, Environment And Sustainable Development, Aph Publishing Corporation
8. UN Millennium Project, 2005. Innovation: Applying Knowledge in Development. Science, Technology and Innovation Task Force Report. 16
9. World Bank, 2006, Enhancing Agricultural Innovation: How to go beyond the strengthening of research systems, World Bank: Agriculture and Rural Development

IWM-ERM: E-WASTES & RADIOACTIVE WASTES MANAGEMENT

THEORY & PRACTICALS

TOTAL HOURS: 45 **CREDITS: 4**

Unit 1: Introduction & Overview of Electronic Wastes **(8 Hours)**

Introduction to types of E-wastes; WEEE (Waste Electrical & Electronic Equiment)-The scale of the Problem; Legislative influences on Electronics Recycling: Producer responsibility legislation, The WEEE directive, The RoHS directive; Treatment options for WEEE; Material Composition of WEEE; Socioeconomic Factors; Logistics of WEEE. Barriers to recycling of WEEE; Future Factors that may influence E-waste management.

Unit 2: E-wastes Disposal & Treatment strategies **(15 Hours)**

E-wastes disposal by Dumping, burning & Landfill; Recycling & recovery: Separation & Sorting, WEEE treatment strategies: Recycling & recovery technologies- Sorting/ Disassembly, Crushing/Diminution, Separation; Automated Disassembly, Comminution, Thermal treatments, Hydrometallurgical Extraction, Dry Capture technologies; Biotechnological Capture, Sensing Technologies, Design for recycling & Inverse manufacturing; Recycling of printed circuit boards, Characteristics of PCB Scrap, Emerging Technologies; Radio-frequency identification tags, Active disassembly.

Unit 3: Recycling of LCD devices **(10 Hours)**

Overview of Liquid Crystals: Molecular & Chemical Architecture, The Mesophase, Physical Properties of Liquid crystals, LCD Manufacturing Process, Toxicity of LCD constituents, Demanufacture & recycling strategies for LCD devices: Future outlook: LCD Panels, Smart Disassembly, Legislation

Unit 4: Introduction & Overview of Radioactive wastes **(8 Hours)**

Nuclear Fuel cycle & Power generation, Sources & Classification of radioactive wastes, Mixed wastes, Environmental Restoration, Waste Management Activities & Regulatory Agencies, Legislative involvement; Radiation sources, Exposure & Health effects

Unit 5: Spent Fuel Management & High-Level Waste Management **(8 Hours)**

Introduction, Spent nuclear fuel storage, Dry cask storage of Spent fuel at reactors, Legislative & Regulatory requirements concerning spent nuclear fuel; Spent fuel packaging for disposal, Transportation of spent fuel; Economic evaluation of Spent fuel management systems.

Fuel Reprocessing Methodology for Treatment of high radioactivity-level wastes, Treatment & Packaging of high level wastes.Transporting of High level wastes.

Disposal methods for Spent nuclear Fuel & High radioactivity level wastes

Unit 6: Management of Transuranic wastes & Low-level wastes **(8 Hours)**

Transuranic Wastes: Processing, storage & Transportation of Transuranic waste; Regulations & Standards for Transuranic Wastes, Waste isolation Pilot Plant.

Treatment & conditioning Processes for low radioactivity level wastes, Low-level waste packaging & transportation, Operational expenses with volume reduction systems, Shallow land disposal

Unit 7: Uranium Ore Mill Tailings Management **(6 Hours)**

Introduction, History & Current Management of tailings; Case studies of Management & disposal of Mill tailings & wastes

Unit 8: Mixed Wastes **(4 Hours)**

Sources, classification & Inventories, Regulations & Standards for mixed wastes, Waste minimization methodologies, Waste Packaging & disposal.

Unit 9: Environmental Restoration **(5 Hours)**

Description of the nuclear weapons complex, Waste inventories & Contamination at nuclear weapons complex sites, Laws & Department of Energy (DoE) orders that apply to weapons complex sites, DoE plans for environmental restoration, Environmental Restoration technologies. Decommissioning of Commercial Nuclear Power plants, Decontamination & Decommissioning Techniques & Technology Development.

Suggested Reading

1. Electronic Waste Management-Design, Analysis & Application. Vol.27; Editors: R.E. Hester & R.M. Harrison; Edited Book Series: Issues in Environmental Science & Technology, Royal Society of Cambridge Publications, 2009.
2. Radioactive Waste Management, 2nd Edition, Editors: James H. Saling & Audeen W. Fentiman, Taylor Francis, London, 2002.

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