GANGA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, JHAJJAR
An Autonomous Institute| NAAC 'A' Grade Institute | Affiliated to MDU, Rohtak

2nd MEETING OF THE ACADEMIC COUNCIL
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Ref. No. **GITAM/AC/002/2025/** 051-074 Dated: 14/01/2025

To

All the members of the
Academic Council,
Ganga Institute of Technology and Management, Jhajjar

Subject: Agenda for the 2nd meeting of the Academic Council

Sir/Madam,

It is to inform you that 2nd meeting of the Academic Council will be held on 25th January, 2025 at 02:00 P.M. in the Board Room of the Institute. A copy of the agenda is enclosed.

You are requested kindly to make it convenient to attend the meeting.

Encl: As above.

Member Secretary
Academic Council

Endst. No. GITAM/AC/002/2025/ 075 Dated: 14/01/2025

Copy to

- Website In-charge to upload on the website

Member Secretary
Academic Council

GANGA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, JHAJJAR
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AGENDA OF THE 2ND MEETING OF THE ACADEMIC COUNCIL TO BE HELD ON 25th JANUARY, 2025 AT 2:00 PM IN THE BOARD ROOM OF THE INSTITUTE

AC 2.1 **Confirmation of the Minutes of 1st Meeting of the Academic Council held on 27th December, 2024.**

To confirm the minutes of the 1st Meeting of the Academic Council held on 27th December, 2024 (Annexure AC 2.1, Pages 1-2).

AC 2.2 **Follow-up action report on the decisions taken by the Academic Council in its 1st Meeting held on 27th December, 2024.**

To note the follow-up action report on the decisions taken by the Academic Council in its 1st Meeting held on 27th December, 2024 (Annexure AC 2.2, Page 3).

AC 2.3 **Consideration of the recommendations of the Board of Studies of Applied Science and Humanities Department vide Resolution No. 2 regarding approval of the Ordinance, Scheme of Studies & Examinations and Syllabi of B.Tech 1st Year (Common to all Branches) of its meeting held on 10.01.2025 (Annexure AC 2.3 pages 4-6, already circulated).**

The Board of Studies of Applied Science and Humanities Department recommended the Ordinance, Scheme of Studies & Examinations and Syllabi of B.Tech 1st Year (Common to all Branches) vide Resolution No. 2 of its meeting held on 10.01.2025 **(Annexure AC 2.4 pages 7-85, already circulated).**

The Academic Council may consider the above for approval.

AC 2.4 **Consideration of the recommendations of the Board of Studies of Mechanical Engineering Department vide Resolution No. 2 of its meeting held on 30.12.2024 (Annexure AC 2.5 pages 86-87, already circulated).**

The Board of Studies of Mechanical Engineering vide Resolution No. 2 of its meeting held on 30.12.2024 recommended the Scheme of Studies & Examinations and Syllabi of M.Tech 1st Year (Machine Design) and M.Tech.1st Year (Manufacturing and Automation) **(Annexure AC 2.6 pages 88-164, already circulated).** The matter was considered by the Director and further ordered to place the same before the Academic Council.

The Academic Council may consider the above for approval.

AC 2.5 **Consideration of the recommendations of the Board of Studies of Computer Science and Engineering Department vide Resolution No. 2 and 3 of its meeting held on 04.01.2025 (Annexure AC 2.7 pages 165-166, already circulated).**

The Board of Studies of Computer Science and Engineering recommended the Scheme of Studies & Examinations and Syllabi of M.Tech 1st Year (Computer Science and Engineering) and M.Tech.1st Year (Cyber Forensics and Information Security) vide Resolution No. 2 of its meeting held on 04.01.2025 **(Annexure AC 2.8 pages 167-252, already circulated).**

The matter was considered by the Director and further ordered to place the same before the Academic Council.

The Academic Council may consider the above for approval.

AC 2.6 **Consideration of the recommendations of the Board of Studies of Electronics and Communication Engineering Department vide Resolution No. 2 of its meeting held on 04.01.2025 (Annexure AC 2.9 pages 253-255, already circulated).**

The Board of Studies of Electronics and Communication Engineering Department recommended the Scheme of Studies & Examinations and Syllabi of M.Tech 1st Year (Electronics and Communication Engineering) vide Resolution No. 2 of its meeting held on 04.01.2025 **(Annexure AC 2.10 pages 256-295, already circulated).**

The matter was considered by the Director and further ordered to place the same before the Academic Council.

The Academic Council may consider the above for approval.

AC 2.7 **Consideration of the recommendations of the Board of Studies of Electrical Engineering Department vide Resolution No. 2 of its meeting held on 02.01.2025 (Annexure AC 2.11 pages 296-297, already circulated).**

The Board of Studies of Electrical Engineering Department recommended the Scheme of Studies & Examinations and Syllabi of M.Tech 1st Year (Electrical Power Systems) vide Resolution No. 2 of its meeting held on 02.01.2025 **(Annexure AC 2.12 pages 298-341, already circulated).**

The matter was considered by the Director and further ordered to place the same before the Academic Council.

The Academic Council may consider the above for approval.

AC 2.8 **Consideration of the recommendations of the Board of Studies of Civil Engineering Department vide Resolution No. 2 of its meeting held on 03.01.2025 (Annexure AC 2.13 pages 342-343, already circulated).**

The Board of Studies of Civil Engineering Department recommended the Scheme of

Studies & Examinations and Syllabi of M.Tech 1st Year (Structural Design) vide Resolution No. 2 of its meeting held on 03.01.2025 **(Annexure AC 2.14 pages 344-387, already circulated).**

The matter was considered by the Director and further ordered to place the same before the Academic Council.

The Academic Council may consider the above for approval.

AC 2.9 Consideration of the recommendations of the Board of Studies of Computer Science and Applications Department vide Resolution No. 2 and 3 of its meeting held on 10.01.2025 (Annexure AC 2.15 pages 388-390, already circulated).

The Board of Studies of Computer Science and Applications Department recommended the following

(A) Scheme of Studies & Examinations and Syllabi of MCA 1st Year vide Resolution No. 2 of its meeting held on **10.01.2025 (Annexure AC 2.16 pages 391-463, already circulated).**

(B) Scheme of Studies & Examinations and Syllabi of BCA 1st Year vide Resolution No. 2 of its meeting held on **10.01.2025** (Annexure AC 2.17 pages **464-540**, already circulated).

The Academic Council may consider the above for approval.

AC 2.10 Consideration of the recommendations of the Board of Studies of Management Department vide Resolution No. 2 and 3 of its meeting held on 30.12.2024 (Annexure 2.18 pages 541-543, already circulated).

The Board of Studies of Management Department recommended the following

(A) Scheme of Studies & Examinations and Syllabi of BBA 1st Year vide Resolution No. 2 of its meeting held on 30.12.2024 **(Annexure 2.19 pages 544-605, already circulated)**.

(B) Scheme of Studies & Examinations and Syllabi of MBA 1st Year vide Resolution No. 3 of its meeting held on 30.12.2024 **(Annexure 2.20 pages 606-650, already circulated)**.

The Academic Council may consider the above for approval.

AC 2.11 Consideration of the approval of Multidisciplinary Open Elective Courses and Foundation Elective Courses recommended by various Board of Studies in their meeting held on as mentioned at item AC 2.3 to AC 2.10.

The Multidisciplinary Open Elective Courses and Foundation Elective Courses recommended by various Board of Studies in their meeting held on as mentioned at item AC 2.3 to AC 2.10 **(Annexure 2.21 Pages 651-693).**

The matter was considered by the Director and further ordered to place before the Academic Council for approval.

The Academic Council may consider the above for approval.

AC 2.12 **Any other item with the permission of the Chair.**

No other item was discussed and the meeting ended with thanks to the Chair.

Member Secretary

Annexure 2.1

GANGA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, JHAJJAR
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MINUTES OF THE 1ST MEETING OF THE ACADEMIC COUNCIL HELD ON 27.12.2024 AT 11:00 AM IN THE BOARD ROOM OF THE INSTITUTE

Members Present

1.	Prof. Aman Aggarwal	Chairperson Director, GITAM
2.	Prof. Yudhvir Singh	Member (University Nominee)
3.	Prof. Rajeev Kumar	Member (University Nominee)
4.	Prof. Seema Singh	Member (University Nominee)
5.	Dr. Anurag Jain	Member
6.	Dr. Punam Devi	Member
7.	Dr. Rakesh Joon	Member
8.	Dr. Nitin Kumar	Member
9.	Dr. Jitender Kumar	Member
10.	Mr. Joginder Singh	Member
11.	Mr. Vivek	Member
12.	Mr. Jitender Singh	Member
13.	Mr. Virender Singh Rana	Member
14.	Ms. Suman Singh	Member
15.	Dr. Dipika	Member
16.	Dr Hari Parshad	Member
17.	Ms. Upasna	Member
18.	Mr. Parvesh	Member
19.	Dr. Hitanshu Saluja	Member
20.	Dr. Vivek Arora	Member Secretary

Leave of Absence

1. Prof. Gian Bhushan, Professor NIT Kurukshetra, Member Academician
2. Sh. Rajesh Sharma, Industry Expert

At the outset, the Director, GITAM welcomed University Nominees and all other members to the 1st Meeting of the Academic Council of the Institute. After that, with due permission of the chair, the agenda was taken up by the Member Secretary.

AC 1.1 **Nomination of Outside Experts for the Board of Studies (BoS) of Various Departments (Two Experts Each) Outside the Parent University**

The Academic Council considered the proposal to nominate two outside experts for the Board of Studies (BoS) of each department from institutions other than the parent university, in accordance with the UGC (Conferment of Autonomous Status upon Colleges and Measures for Maintenance of Standards in Autonomous Colleges) Regulations, 2023.

The Council deliberated on the composition of the Board of Studies for each department and emphasized that preference should be given to Professors while

nominating outside experts. In cases where Professors in the required specialization are not available, Associate Professors or Assistant Professors may be considered.

The Academic Council considered the above and deliberated on the composition of the Board of Studies (BOS) for each department and emphasized the importance of giving first preference to Professors. In cases where Professors in certain specializations are unavailable, only then may Associate Professors, Assistant Professors or expert from the industry may be included in the Board of Studies. The names of the experts as submitted by the Heads of the Departments were read out by the Registrar and with the approval of the Council, certain names were added.

RESOLVED THAT THE OUTSIDE EXPERTS FOR THE BOARD OF STUDIES OF VARIOUS DEPARTMENTS (TWO EXPERTS EACH) OUTSIDE THE PARENT UNIVERSITY BE NOMINATED (ANNEXURE 1.1, PAGES 1-2).

AC 1.2 **Any other item with the permission of Chair**

No other item was discussed and the meeting was concluded with the vote of thanks to the Chair.

Member Secretary

APPROVED

Annexure 2.2

GANGA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, JHAJJAR
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Report of the follow-up action on the decisions taken by the Academic Council in its 1st meeting held on 27.12.2024.

Reso. No.	Particulars	Follow-up action taken
AC 1.1	Nomination of Outside Experts for the Board of Studies (BoS) of Various Departments (Two Experts Each) Outside the Parent University	The Nomination of the Outside experts for the Board of Studies conveyed to all concerned.

Annexure 2.3

Ganga Institute of Technology and Management, Kablana

(An Autonomous Institute under Maharshi Dayanand University, Rohtak)

Minutes of 1st meeting of Board of Studies of Department of Applied Science & Humanities

The Board of Studies meeting was held on 10.01.2025 at 11:00 A.M in the Board Room of the Institute.

Members Present:

Sr. No	Name	Affiliation/Organization	Designation within Board of Studies
1	Prof. Anurag Jain	Professor and Head, Department of Applied Science and Humanities GITAM, Kablana	Chairperson
2	Prof. S.P. Khatkar	Professor, Emeritus, Department of Chemistry, M.D. University, Rohtak	University Nominee
3	Prof. Phool Singh	Professor, Department of Mathematics under SoET, Central University of Haryana, Mahendergarh	Subject Expert, Outside Parent University
4	Prof. Kulvinder Singh	Professor, Department of Physics, Deen Dayal Upadhyay College, Delhi University	Subject Expert, Outside Parent University
5	Prof. Divyajyoti Singh	Professor, Department of Literature and Languages, JC Bose University of Science and Technology, YMCA, Faridabad	Subject Expert, Outside Parent University(Online mode)
6	Prof. Aman Aggarwal	Director, GITAM, Kablana,	Special Invitee
7	Dr. Sweta Chauhan	Professor, Physics, GITAM, Kablana	Member
8	Dr. Suman Devi	Professor, English, GITAM, Kablana	Member
9	Dr. Prem Ballabh	Associate Professor, Chemistry, GITAM, Kablana	Member
10	Dr. Ankita Saini	Assistant Professor, Chemistry, GITAM, Kablana	Member
11	Dr. Aarti	Assistant Professor, Chemistry, GITAM, Kablana	Member
12	Mr. Aseem Harit	Assistant Professor, Mathematics, GITAM, Kablana	Member
13	Mr. Kuldeep	Assistant Professor, Mathematics, GITAM, Kablana	Member

1.

14	Ms. Kshitij Upadhyay	Assistant Professor, Physics, GITAM, Kablana	Member
15	Ms. Suman Singh	Assistant Professor, English, GITAM, Kablana	Member
16	Ms. Aditi Kashyap	Assistant Professor, English, GITAM, Kablana	Member
17	Ms. Supriya	Assistant Professor, Mathematics, GITAM, Kablana	Member
18	Mr. Arjun	Assistant Professor, Mathematics, GITAM, Kablana	Member
19	Ms. Vidhi	Assistant Professor, Mathematics, GITAM, Kablana	Member
20	Mr. Naveen	Assistant Professor, Mathematics, GITAM, Kablana	Member
21	Dr. Ekta	Assistant Professor, Physics, GITAM, Kablana	Member
22.	Dr. Jitender Kumar	HOD (FTS), GITAM, Kablana	Special Invitee

Members on leave/Absentees

1. Prof. Paramjeet Sangwan, Member
2. Ms. Manisha, Member
3. Ms. Ritu, Member
4. Mr. Mahender Pal, Member
5. Mr. Nikhil Gupta, Member
6. Mr. Abhishek Tyagi, Member

Agenda of the Meeting:

1. Introduction of the Members of the Board of Studies.

2. Review and approval of the Ordinance, Scheme of Examination and Syllabi Prescribed for B. Tech 1st year under Autonomous Status of B. Tech Program. Already circulated as Annexure-1.1 Pages 1-79.

3. Approval of Panel of Examiners for Theory and Practical Exams of B. Tech 1st Year Program. Already circulated as Annexure-1.2 Pages 80-87.

4. Any other item with the permission of the chair.

Agenda Items Discussed:

1. Introduction of the Members of the Academic Council

The meeting began with a warm welcome by Prof. Anurag Jain, Chairperson, BOS, Applied Science & Humanities and introduced all the members of the Board of Studies with them. The members shared their affiliations and roles within the BOS.

2. Review and approval of the Ordinance, Scheme of Examinations and Syllabi Prescribed for 1st Year under Autonomous Status of B. Tech Program.

Resolved that The Ordinance, Scheme of Examination and Syllabi prescribed for 1st year under Autonomous status of B.Tech is approved and recommended to Academic Council for approval Annexure-1.1 Pages 1-79.

3. Panel of Examiners for Theory and Practical Exams of B. Tech 1st year Program.

Panel of Examiners for the Theory and Practical exams for B.Tech 1st year Program is approved Annexure-1.2 Pages 80-87.

The meeting concluded with the Chairperson thanking all members for their presence and insights.

Anurag

Chairperson,
BOS, Department of Applied Science and Humanities

ORDINANCE
BACHELOR OF TECHNOLOGY
(From the Academic Session 2024-25)

1 Preliminaries

1.1 This ordinance shall apply to B. Tech. Programs offered by this Institute under Autonomous Status as notified by UGC and M D University Rohtak from session 2024-25.

Program	Regular Duration	Extended duration
B. Tech.	Four Years (08 semesters)	Seven Years
	Three years (3rd to 8th sem. for Lateral Entry Students)	Six years

An academic year shall consist of two semesters (odd & even) each of approximately 18 weeks or 90 working days duration inclusive of the period of examination and semester break. The eligibility criteria for admission to each program, fee structure, academic calendar, scheme of studies and examinations, examination schedule, Co-Curricular/Extra Curricular activity calendar etc. for the academic year shall be published in the prospectus/Institute website.

2. ORDINANCE: BACHELOR OF TECHNOLOGY

Notwithstanding anything contained in any other ordinance with regard to the matter hereunder, the courses of study for the Degrees of Bachelor of Technology and the conditions for admission thereto shall be as under:

This ordinance shall be applicable along with other rules related to Re-evaluation, Punishment rules in case of UMC, Rules to award medals, Examination rules etc. amended from time to time.

2.1 The Bachelor of Technology Degree courses shall extend over a minimum period of four academic years. However students will be admitted on the basis of 3 years diploma directly in the 3rd semester under the Lateral entry scheme (These candidates are exempted from 1st year courses). Teaching in each academic year shall be divided into two semesters, each semester extending to 18 weeks or 90 working days including practical, semester examination and semester break. Teaching for odd semesters will normally be from August to December and for even semesters from January to May.

2.2 At the end of the each semester, there shall be an examination wherein candidates shall be examined in the courses studied by them in that semester. Each semester examination shall be designated as First Semester Examination, Second Semester Examination, and Third Semester Examination and so on.

2.3 The end semester examinations of odd semesters will normally be held in December/January and that of even semesters will normally be held in May/June except students having reappear in 7th semester may be allowed to appear along with main examination of 8th semester and Vice-versa on such dates as may be fixed by the Controller of Examinations as per the schedule provided by the Institute. The date(s) of commencement of examination as well as the last date(s) for the receipt of the examination forms and fees shall also be notified by the Controller

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of Examinations to the concerned teaching departments The concerned teacher should ensure that 100% syllabus is covered in his/her course before the start of semester examinations.

2.4 The Courses of the study and the Scheme of examinations shall be as approved by the Academic Council from time to time. The medium of instructions and Examination shall ordinarily be English except otherwise decided by the Academic Council. The question paper will be set in English, except otherwise decided by the Board of Studies concerned and approved by the Academic Council. Every candidate shall be examined in the courses/subjects as laid down in the syllabus approved by the Academic Council from time to time. The credits for each subject/ course and also the contact hours per week will be mentioned in the scheme of studies approved by the Academic Council.

2.5. Evaluation Process:

(i) End Semester Examinations (Theory Examination):

Questions papers for the end semester examination shall be set by paper setters appointed by Controller of Examinations in consultation with Chairperson of the Examination Committee i.e. Director of the Institute from a panel of examiners submitted by the Chairman of the Board of Studies. In case a question paper is not received in time from a paper setter COE shall get the paper set from an alternate examiner who is otherwise competent to do so from the panel approved by BOS. The evaluation of answer scripts shall be done as per procedure laid down by the Examination Committee.

(ii) Practical Examination:

Examination in Practical and viva-voce shall be conducted jointly by the two examiners. One examiner shall be appointed by the Controller of Examinations from a panel of examiners submitted by Chairman of B.O.S. of respective departments and one examiner by Head of the department.

(iii) Sessional (Internal Assessment):

Sessional works shall be evaluated by the teachers of the various subject/courses based on the work done during semester on the basis of the following weightage:

I. For Theory subjects:

i) Sessional Test –I	60% of the weightage of the Internal Marks
ii) Sessional Test-II	considering best two of three sessional tests
iii) Sessional Test-III	
iv) Assignments/Classwork	20% of the weightage of the Internal Marks
v) Attendance	20% of the weightage of the Internal Marks

The marks for attendance will be awarded as per below mentioned criteria

S. No	Range	%age (Weightage)	Out of 8	Out of 5
1	Above 90%	100	8	5
2	85-89.99 %	80	6	4
3	80-84.99%	60	5	3
4	75-79.99%	40	4	2
5	65-75%	20	2	1
6	Less than 65	0	0	0

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II. For Practical/Project/Seminar/Drawing:

i) Viva-Voce/ Test	20% of the weightage of the practical
ii) Laboratory Record/ Project Report/Seminar Report/Drawing Sheet	48% of the weightage of the practical
iii) Attendance	32% of the weightage of the practical

Every student has to appear in minimum two Sessional tests and if a student appears in all three tests then best 2 of all three will be considered for award of internal marks. If a student does not take a Sessional test, he/she shall be awarded zero marks in that test. The marks obtained in sessional/practical/theory/drawing are to be submitted to the Examination Branch duly signed by the Head of the Department before the close of semester examination or marks can be uploaded on the examination portal before a date fixed by the COE. The examination branch shall convert the marks in to equivalent grades as per the grading procedure.

2.6 The examination shall be open to a candidate who:

(i) has attended regularly the prescribed courses of studies for the relevant semester examination in the department for the degree of Bachelor of Technology.

(ii) has his/her name submitted to the Controller of Examinations by the Head of the Department.

(iii) has a good moral character.

(iv) Unless otherwise stated in the Ordinance, a student must have a minimum of 75% attendance in each course/subject individually for the semester. Relaxation in shortage of Lectures up to 20% will be allowed by the Director of the Institute on following grounds.

i. Self-illness
ii. Illness/Death of Parents, Brother, Sister or any other close family member.
iii. Any other reason beyond the control of the student to the satisfaction of the Director.
iv. A student who actively appears in the sessional test(s) shall be granted corresponding attendance.

Students participating in sports, games, cultural, co-curricular activities, hackathons, or similar competitions (as certified by the concerned HOD) will be treated as 'on duty' for the time spent, including travel. Attendance will be granted as follows:

State/National/Inter-University Level: Up to 15% by the Director, with reasons recorded.
International Level: Up to 20% by the Director, with reasons recorded.
Exceptional: Attendance up to 75% may be granted by the Director, on Committee recommendation, for rare brilliance or outstanding performance.

(v) The percentage of attendance of a candidate shall be calculated from the date of admission of the candidate or first day of start of semester.

2.7 Registration/Continuous Absence/Re-admission

(i) Every student has to register himself/herself at the starting of each semester. Teaching Department/Institution shall make the provision of Registration.

(ii) If a student is continuously absent during entire semester without any intimation and did not deposit requisite fee of the semester, his registration/admission shall be cancelled & Re-admission will not be allowed.

(iii) If candidate has registered himself/herself and requisite fee has been deposited & candidate is absent during a semester to the extent that he/she is unable to fulfill the

HOD AS

requirement of attendance as per rules, then he/she will be detained in that semester. Re-admission will be allowed in the same semester of next academic year.

(iv) Detention/Admission cancellation order will be issued by Director.

(v) Re-admission will be allowed by Director. Candidate has to apply 15 days before the start of semester & will deposit the requisite fee along with other regular students. Otherwise Registration/admission shall be cancelled.

2.8 If a candidate, after attending the classes for the course of studies in the Department/Institute either not appeared or having appeared in any semester examination has failed in one or more paper(s) for that examination, he/she can appear for such paper(s) at subsequent examinations without attending a fresh course of studies for that semester. Such a candidate may, in the meantime, prosecute his / her studies for the next semester(s) and appear in the examination(s) for the same along with the examination for the lower semester(s).

2.9 The student will be automatically eligible for promotion to the next semester provided he/she fulfils the other essential eligibility criterion for promotion as mentioned in the ordinance of MDU, Rohtak. A candidate who is unable to pass the Bachelor of Technology Program within a maximum of seven (for B.Tech 4 years) and six (for B.Tech students admitted through Lateral Entry Scheme) consecutive academic years from the date of his/her admission shall lose the right to pursue the degree program. In exceptional cases, mercy chance can be given by the Director to a candidate if he/she applies.

2.10 The minimum passing marks/grade for passing any semester Examination shall be:

i. A candidate must secure at least 40% marks in the aggregate of Assessment (Refer 2.5 (iii)) and end semester examinations for each theory and practical course/subject. Additionally, obtaining a minimum of 40% marks in the end semester examination is mandatory. If a candidate fails to meet the required aggregate marks, they will need to reappear in the respective courser course/subject during subsequent theory/practical examinations, as per clause 2.3. However, such candidates are not required to repeat the sessional (internal assessment) work.

ii. Minimum pass grade in each course is 'P' grade. Grade will be awarded after adding the marks of sessional and major test/practical examination i.e. SGPA of 4.0

iii. Where a course is evaluated on the basis of Assessment marks only i.e. there is no end-semester examination, the candidate will be required to secure at least 40% marks to pass the course.

iv. 1% of total marks including sessional of the scheme of a semester of those theory courses/subjects whose examinations are conducted in the end of the semester (i.e. May/June and November/December examinations) shall be awarded as grace marks to pass in one or more courses/subjects of that semester.

v. Students enrolled in final semester and those who have completed all semester of academic program shall be allowed a special sessional examination of weightage 40% of the maximum sessional marks. This examination will be conducted by the Department/College/Institution only for those students who have scored less than 40% marks in the sessional and got re-appear due to deficiency in sessional awards. It is further clarified that this special sessional examination is not for improvement of marks. Out of total awards secured by the candidate in this special sessional examination only the marks required to pass the course/subject shall be considered towards the final score.

A candidate who fails to obtain the requisite marks/grade in any course shall be required to appear in the concerned course in the subsequent examination(s) as per the clause 2.3, 2.7 & 2.8.

2.11 If a candidate has completed his/her degree by passing all the courses and he/she wants to improve his/her grade, he/she may be allowed to improve by depositing the requisite fee as per

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the Institute Rules. He/she is allowed to appear in at the most half of the theory papers only of a semester along with the regular candidates of that semester and the sessional (internal assessment) part will be retained. Such opportunity of improvement shall be given only during the extended duration of academic program applicable. If the improved CGPA is less than the original, then the original will be retained.

2.12 The result of a student at the end of each semester Examination and after completion of course shall be declared on the basis of the SGPA & CGPA (cumulative grade point average) obtained by the student. However result of a student admitted through Lateral Entry Scheme for the diploma holders will be declared on the basis of CGPA of the grades obtained by him/ in this Institute only.

2.13 At the end of each semester examination, the COE shall publish the result, provided that in a case where candidate who was permitted to take examination for higher semester but has not cleared the lower semester examination his result for the higher semester examination will be declared provisionally. Each successful candidate shall be issued a Detailed Marks Card of the result on having passed the semester examination.

2.14 There shall be an examinations Grievances Committee regarding end semester theory examinations comprising:-

1.	Director	Chairman
2.	Head of the Department offering the course	Member
3.	Nominee of Director	Member
4.	Controller of Examinations	Member-Secretary

The Complaint regarding question paper of end semester theory examination, if any, shall be submitted by the student(s)/teacher through Head of the Department within 7 days of the examination to the office of Controller of Examinations. The Committee shall examine and submit the report with specific recommendation regarding re-examination or award of grace marks with justification to the Controller of Examinations within 7 days. The Director shall be the final authority to take decision on the recommendation of the Committee.

2.15 Notwithstanding the integrated nature of the course wherever it is spread over more than one academic year, the Ordinance in force at the time a student joins the course shall hold good only for the examination held during or at the end of the semester and nothing in this Ordinance shall be deemed to debar the Institute from amending the Ordinance and the amended Ordinance, if any, shall apply to all students whether old or new as per the decision of Academic Council.

3. SCHOLARSHIP:

Scholarship may be awarded to students as per the terms and conditions stipulated by Governing Body of the Institute.

4. CREDIT SYSTEM:

The Institute has introduced credit system for all the students admitted in the Bachelor of Technology Degree courses from the Academic Year 2024-25. The prominent features of this system are the process of continuous evaluation of a student's performance, and a flexibility to allow the student to progress at an optimum pace.

Each Academic Program has a certain number of credits which describe its weightage to get under graduate degree in Engineering as prescribed in the scheme of studies and examinations.

A student will be eligible to get under graduate degree with Honours or additional Minor Engineering, if he/she completes an additional 20 credits in any specific subject. These could be acquired through Massive Open Online Courses (MOOC'S).

A student's performance is measured by the number of credits that he/she has completed satisfactorily. A minimum grade point average is required to be maintained for satisfactory progress.

Each subject/course (component of subject/course) has a certain number of credits which reflect its weightage and is normally decided on the basis of effective contacts hours. It is mentioned in the scheme of studies and examinations.

4.1 The sessional examinations will be conducted centrally by the Examination Committee. Evaluation of the answer scripts will be carried out by the faculty members of the respective departments. After completing the evaluation, the marks must be submitted to the office of the Controller of Examinations. In case of any grievance, it may be submitted to the Head of the Department, who will arrange for the answer book to be rechecked and address the issue in the best interest of the student.

4.2 The marks/grade awarded to a student in any particular subject will be based on the performance of the student evaluated throughout the semester. The syllabus of the Sessional Test will be what is covered in that particular term. The Semester Examination will be based on the entire syllabus.

4.3 The Head of the Department shall forward the assessment awards/grades to the Examination Wing within 10 days after the semester ends and examination process starts. The evaluated answer sheets of sessional test are to be kept by the examination wing for at least four months of declaration of results. The Examination wing will keep the evaluated answer sheets/Dissertation/Project Report of the end semester examination for at least four months after the declaration of results.

5. GRADING SYSTEM:

For the award of grades in a course/subject, all component-wise evaluation shall be done in marks. The marks would be converted to grades as per the guidelines given below:

5.1 Letter Grades and Grade Points:

The Semester Grade Point Average (SGPA) is computed from the grades as a measure of the student's performance in a given semester. The SGPA is based on the grades of the current term, while the Cumulative GPA (CGPA) is based on the grades in all courses taken after joining the programme of study. The HEIs may also mention marks obtained in each course and a weighted average of marks based on marks obtained in all the semesters taken together for the benefit of students.

Marks (%)	Letter Grade	Grade Point
>=90 AND <100	O+ (Exemplarily Outstanding)	10
>=80 AND <90	O (Outstanding)	9
>=70 AND <80	A+ (Excellent)	8
>=60 AND <70	A (Very good)	7
>=55 AND <60	B+ (Good)	6
>=50 AND <55	B (Above average)	5.5
>=40 AND <50	C (Average)	5
=40	P (Pass)	4
Below 40	F (Fail)	-

ABSENT	13	-

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

$$SGPA\ (S_i) = \frac{\sum(C_i \times G_i)}{\sum C_i}$$

Where C_i is the number of credits of the ith course and G_i is the grade point scored by the student in the ith course.

Example for Computation of SGPA

Semester	Course	Credit	Letter Grade	Grade Point	Credit Point
I	Course 1	3	A+	8	3X8=24
I	Course 2	4	A	7	4X7=28
I	Course 3	3	B+	6	3X6=18
I	Course 4	3	O+	10	3X10=30
I	Course 5	3	C	5	3X5=15
I	Course 6	4	B+	6	4X6=24
		20			**139**
	SGPA				139/20=**6.95**

The Cumulative Grade Point Average (CGPA) is also calculated in the same manner taking into account all the courses undergone by a student in all the semesters of a programme, i.e.

$$CGPA = \frac{\sum(C_i \times S_i)}{\sum C_i}$$

Where, S_i is the SGPA of the ith semester and C_i is the total number of credits in that semester.

Example for Computation of CGPA

Semester 1	Semester 2	Semester 3	Semester 4	Semester 5	Semester 6
Credit: 21 SGPA: 6.9	Credit: 22 SGPA:7.8	Credit: 25 SGPA: 5.6	Credit: 26 SGPA: 6.0	Credit: 26 SGPA: 6.3	Credit: 25 SGPA: 8.0
CGPA = 6.73 (21X6.9+22X7.8+25X5.6+26X6.0+26X6.3+25X8.0)/145					

The SGPA and CGPA shall be rounded off to 2 decimal points and reported in the transcripts.

(i) While calculating percentage of marks to award grades, 0.5 or higher fraction may be raised to the next higher whole number.

(ii) The awards/grades shall be submitted by the evaluator concerned to the office of Controller of Examination immediately after the evaluation.

(iii) The procedure for evaluation and award of grades for summer internship training in industries or other options shall be decided by the Controller of Examinations (or a committee constituted by Director of the Institute) as per their scheme of examinations. The candidate shall be required to submit a comprehensive report within one month of completion of training/project. Report will be completed under the supervision of the officer of the company/Institution under whose guidance and supervision the training/project was completed by the candidate in that company/Institute. The candidate will add supervisor's certificate in the beginning of the report

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stating that the report is an out-come of work done by the candidate during his/her training/project.

5.2 **Computation of Division**

Marks (%)	Division
>=75%	1st Division with Distinction
>=60% AND <75%	1st Division
>=50% AND <60%	2nd Division
>=40% AND <50%	3rd Division

6. Power to Remove Difficulties:

If any difficulty arises in giving effect to the provisions of this Ordinance, the Director of the Institute may, by order, make such provisions not inconsistent with the Act, Statutes, Ordinances or other Regulations, as appears to be necessary or expedient to remove the difficulty, however subject to ratification of such order by the Statutory bodies of the Institute.

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GANGA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, KABLANA
(JHAJJAR)
An Autonomous Institute

'A' GRADE ACCREDITED BY NAAC

Evaluation Scheme & Syllabus For
Bachelor of Technology First Year
(Effective from the Session: 2024-25)

APPROVED BY AICTE, NEW DELHI AND AFFILIATED TO MDU, ROHTAK

1. DEFINITION OF CREDIT

1	1 Lecture (L) per week	1 Credit
2	1 Tutorial (T) per week	1 Credit
3	1 Practical (P) per week	0.5 Credit
4	2 Practical (Lab) per week	1 Credit

2. RANGE OF CREDIT

A range of credits from 160 to 170 for a student to be eligible to get Under Graduate degree in Engineering. A student will be eligible to get Under Graduate degree with Honours or additional Minor Engineering, if he/she completes an additional 18-20 credits. These could be acquired through MOOCs.

3. STRUCTURE OF UNDERGRADUATE ENGINEERING PROGRAM (B.TECH)

Sr. No.	Category	Breakup of Credits
1	Basic Science Courses	20*
2	Engineering Science Courses	15*
3	Professional Core Courses	66*
4	Professional Elective Courses (Relevant to chosen specialization/branch)	26*
5	Indian Knowledge System	2*
6	Multidisciplinary Open Electives Courses	15*
7	Humanities and Social Sciences including Management courses	6*
8	Project work, seminar and internship in industry or appropriate work place/ academic and research institutions in India/abroad	16*
9	Mandatory Non Credit Courses – Audit Course	(Non-Credit)
	Total Credits	**166***

**Minor variation is allowed as per need of the respective disciplines.*

4. COURSE CODE AND DEFINITIONS

Sr. No.	Category	Course Code
1	Basic Science Courses	BSC
2	Engineering Science Courses	ESC
3	Professional Core Courses	PCC
4	Professional Elective Courses (Relevant to chosen specialization/branch)	PEC
5	Indian Knowledge System	IKS
6	Multidisciplinary Open Electives Courses	MOEC
7	Humanities and Social Sciences including Management courses	HSMC
8	Laboratory Courses	LC
9	Mandatory Non-Credit Courses – Audit Course	MAU
10	Project	PR
11	Internship	INT



GANGA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, KABLANA, JHAJJAR (HR.)

Scheme of Studies and Examination

B.Tech – 1st Semester

w.e.f. 2024-25

Sr. No.	Category	Notations	Course Code	Course Title	Hours per week			Total Load Per Week	Credits	Examination Scheme (Marks)				Exam Duration in H
					Lecture (L)	Tutorial (T)	Practical (P)			Assessment	End Semester Examination		Total	
											Theory	Practical		
1	Basic Science Courses	C	BSC-MAT-101A	Engineering Mathematics-I	3	1	0	4	4	40	60		100	3
2	Basic Science Courses	A	Refer Table-I	Engineering Physics	3	1	0	4	4	40	60		100	3
		B	Refer Table-II	Engineering Chemistry	3	0	0	3	3	40	60		100	3
3	Engineering Science Courses	A	ESC-ME-101A	Manufacturing Process	3	0	0	3	3	40	60		100	3
		B	ESC-CSE-101A	Programming for Problem Solving	3	0	0	3	3	40	60		100	3
4	Engineering Science Courses	A	ESC-EE-101A	Basics of Electrical Engineering	3	1	0	4	4	40	60		100	3
	Humanities and Social Sciences including Management courses	B	HSMC-ENG-101A	Communication Skills for Professionals	2	0	0	2	2	40	60		100	3
5	Engineering Science Courses	A	LC-ME-102A	Engineering Graphics and Design	0	0	4	4	2	50		50	100	3
	Humanities and Social Sciences including Management courses	B	HSMC-ASH-103A	Human Values and Ethics	3	0	0	3	3	40	60		100	3
6	Basic Science Courses	A	Refer Table-III	Engineering Physics Lab	0	0	2	2	1	25		25	50	3
		B	Refer Table - IV	Engineering Chemistry Lab	0	0	2	2	1	25		25	50	3

7	Engineering Science Courses	A	LC-ME-103A	Workshop Practice	0	0	2	2	1	25		25	50	3
		B	LC-CSE-102A	Programming for Problem Solving Lab	0	0	2	2	1	25		25	50	3
8	Engineering Science Courses	A	LC-EE-102A	Basics of Electrical Engineering Lab	0	0	2	2	1	25		25	50	3
	Humanities and Social Sciences including Management courses	B	LC-ENG-102A	Language Lab	0	0	2	2	1	25	-	25	50	3
9	Value Added Course	C	LC-VAC-101A	Soft Skills and Personality Development	0	0	2	2	1	50		-	50	3
10	Mandatory Non Credit Courses – Audit Course	C	Refer Table - V	----------	0	0	2	2	-	-	-	-	-	-
TOTAL CREDITS									**21/19**				**700**	

Note: The marks of Mandatory Non Credit Courses – Audit Course are not included in the total marks.



GANGA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, KABLANA, JHAJJAR (HR.)

Scheme of Studies and Examination

B.Tech – 2nd Semester

w.e.f. 2024-25

Sr. No.	Category	Notations	Course Code	Course Title	Hours per week			Total Load Per Week	Credits	Examination Schedule (Marks)				Exam Duration in H
					L	T	P			Assessment	End Semester Examination		Total	
											Theory	Practical		
1	Basic Science Courses	C	Refer Table-VI	Engineering Mathematics-II	3	1	0	4	4	40	60		100	3
2	Basic Science Courses	A	Refer Table-II	Engineering Chemistry	3	0	0	3	3	40	60		100	3
		B	Refer Table-I	Engineering Physics	3	1	0	4	4	40	60		100	3
3	Engineering Science Courses	A	ESC-CSE-101A	Programming for Problem Solving	3	0	0	3	3	40	60		100	3
		B	ESC-ME-101A	Manufacturing Process	3	0	0	3	3	40	60		100	3
4	Humanities and Social Sciences including Management courses	A	HSMC-ENG-101A	Communication Skills for Professionals	2	0	0	2	2	40	60		100	3
	Engineering Science Courses	B	ESC-EE-101A	Basics of Electrical Engineering	3	1	0	4	4	40	60		100	3
5	Humanities and Social Sciences including Management courses	A	HSMC-ASH-103A	Human Values and Ethics	3	0	0	3	3	40	60		100	3
	Engineering Science Courses	B	LC-ME-102A	Engineering Graphics and Design	0	0	4	4	2	50		50	100	3
6	Engineering Science Courses	C	ESC-ME-104A	Engineering Fundamentals	3	0	0	3	3	40	60		100	3



7	Basic Science Courses	A	Refer Table -IV	Engineering Chemistry Lab	0	0	2	2	1	25		25	50	3
		B	Refer Table - III	Engineering Physics Lab	0	0	2	2	1	25		25	50	3
8	Engineering Science Courses	A	LC-CSE-102A	Programming for Problem Solving Lab	0	0	2	2	1	25		25	50	3
		B	LC-ME-103A	Workshop Practice	0	0	2	2	1	25		25	50	3
9	Humanities and Social Sciences including Management courses	A	LC-ENG-102A	Language Lab	0	0	2	2	1	25	-	25	50	3
	Engineering Science Courses	B	LC-EE-102A	Basics of Electrical Engineering Lab	0	0	2	2	1	25		25	50	3
10	Mandatory Non Credit Courses – Audit Course	C	Refer Table -V	----------	0	0	2	2	-	-	-	-	-	-
TOTAL CREDITS									**21/23**				**750**	

Notes:

- The marks of Mandatory Non Credit Courses – Audit Course are not included in the total marks.
- Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts (preferably 2 from each unit/section) of 1.5 marks each and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Important Notes: Significance of the Notations used in this scheme

- C = These courses are common to both the groups (Group-A and Group –B).
- A = Other compulsory courses for Group-A.
- B = Other compulsory courses for Group-B.

Table I

Courses	Remarks
BSC-PHY-101A: Mechanics, Optics and Superconductors BSC-PHY-102A: Introduction to Electromagnetism and Optics BSC-PHY-103A: Semiconductor Physics and Optics	**BSC-PHY-101A: Mechanics, Optics and Superconductors** for Mechanical, Civil and Fire Technology and Safety **BSC-PHY-102A: Introduction to Electromagnetism and Optics** for Electrical Engineering and Electronics and Communication Engineering **BSC-PHY-103A: Semiconductor Physics and Optics** for Computer Science Engineering, CSE-AI& ML, CSE-Data Science

Table II

Courses	Remarks
BSC-CH-101A: Engineering Chemistry -I BSC-CH-102A: Engineering Chemistry -II	**BSC-CH-101A: Engineering Chemistry -I** for Mechanical, Civil and Fire Technology and Safety **BSC-CH-102A: Engineering Chemistry -II** for Electrical, Electronics and Communication Engineering, Computer Science Engineering, CSE-AI&ML, CSE-Data Science

Table III

Courses	Remarks
LC-PHY-101A Mechanics, Optics and Superconductors Lab LC-PHY-102A Introduction to Electromagnetism and Optics Lab LC-PHY-103A Semiconductor Physics and Optics Lab	**LC-PHY-101A Mechanics, Optics and Superconductors Lab** for Mechanical, Civil and Fire Technology and Safety **LC-PHY-102A Introduction to Electromagnetism and Optics Lab** for Electrical and Electronics and Communication Engineering **LC-PHY-103A Semiconductor Physics and Optics Lab** for Computer Science Engineering, CSE-AI & ML, CSE-Data Science

Table IV

Courses	Remarks
LC-CH-101A: Engineering Chemistry Lab -I LC-CH-102A: Engineering Chemistry Lab -II	**LC-CH-101A: Engineering Chemistry Lab -I** for Mechanical, Civil and Fire Technology and Safety **LC-CH-102A: Engineering Chemistry Lab -II** for Electrical, Electronics and Communication Engineering, Computer Science Engineering, CSE-AI&ML, CSE-Data Science

Table V

Courses	Remarks
MAU-101A: Yoga and Sports MAU-102A: Fire Ground Operation-I MAU-103A: Design Thinking MAU-104A: Fire Ground Operation-II	**MAU-101A:** Yoga and Sports for the students of B.Tech other than B.Tech Fire Technology and Safety. **MAU-102A:** Fire Ground Operation-I for the students of B.Tech Fire Technology and Safety (First Semester) **MAU-103A:** Design Thinking for the students of B.Tech other than B.Tech Fire Technology and Safety. **MAU-104A:** Fire Ground Operation-II for the students of B.Tech Fire Technology and Safety (Second Semester)

Note: Refer Table V, Students who opt for MAU-101A in the first semester must choose MAU-103A in the second semester, and vice versa.

Table VI

Courses	Remarks
BSC-MAT-102A:Engineering Mathematics-II BSC-MAT-103A: Engineering Mathematics-II	**BSC-MAT-102A:Engineering Mathematics-II** for Computer Science and Engineering, CSE-AI&ML, CSE- Data Science **BSC-MAT-103A: Engineering Mathematics-II** for Mechanical, Civil, Electrical, Electronics and Communication Engineering, Fire Technology and Safety.

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Course Code	**BSC-MAT-101A**				
Category	Basic Science Courses				
Course Title	**Engineering Mathematics-I**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I**
	3	1	0	4	
Course Objectives	The objectives of this course are • To develop understanding of matrices, multivariable calculus, and ordinary differential equations concepts and applications. • To equip students with skills to apply linear algebra, calculus, and differential equations in real-world scenarios.				
Course Pre-requisite	Mathematics upto 12th Standard, Basic Knowledge of Mathematics				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Recall the basics of linear algebra, differential calculus and differential equations.	Level 1: Remember
CO2	Explain the properties and applications of linear algebra, differential calculus and differential equations.	Level 2: Understand
CO3	Solve mathematical problems using the concepts of matrices, multivariable calculus and differential equations.	Level 3: Apply
CO4	Analyze mathematical problems and systems to identify patterns, validate properties and interpret solutions in applied contexts.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts (preferably 2 from each unit/section) of 1.5 marks each and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Linear Algebra-Matrices: Elementary matrices, elementary transformations, Rank of a matrix, inverse using elementary transformations, system of linear equations, linear and orthogonal transformations, eigen values and eigen vectors, properties of eigen values, Cayley-Hamilton theorem, diagonalization of matrices, Applications of matrices.

Unit-II

Multivariable Differential Calculus: Limit, Continuity and Partial derivatives, Homogeneous functions, Euler's Theorem, Total differential, Composite functions, Jacobians, Taylor's and Maclaurin's expansion for the functions of two variables, Maxima and Minima, Lagrange's method of undetermined multipliers.

Unit-III

Ordinary Differential Equations of First Order: Linear and Bernoulli's equations, Exact differential equations, Equations reducible to exact differential equations, Applications of differential equations of first order and first degree to simple electric circuits, Newton's law of cooling, Heat flow and Orthogonal trajectories.

Unit-IV

Ordinary Differential Equations of Second and Higher Order: Linear differential equations of second and higher order, Complete solution, Complementary function and Particular integral, Method of variation of parameters to find particular integral, Cauchy's and Legendre's linear equations, Power series solutions, Legendre's and Bessel's functions.

Suggested Readings:

- Higher Engineering Mathematics by B. V. Ramana, Tata McGraw-Hill Publishing Company Limited.
- Higher Engineering Mathematics by B. S. Grewal, Khanna Publishers.
- Advanced Engineering Mathematics by Erwin Kreyszig, John Wiley & Sons.
- A textbook of Engineering Mathematics (Calculus & Linear Algebra) by H. Arora, S. K. Kataria & Sons.
- Advanced Engineering Mathematics by H.K. Dass, S. Chand.
- A textbook of Engineering Mathematics by N. P. Bali and Manish Goyal, Laxmi Publications.
- Engineering Mathematics by P. Sangwan, Vayu Education of India.
- Engineering Mathematics for first year by T. Veerarajan, Tata McGraw-Hill Publishing Company Limited.

Useful Video links:

Unit No.	Topics	Links
Unit-I	Rank of a matrix	https://youtu.be/_RDF7My0Lfg?si=jKIVC67ONrJgcgCK
	Eigen values & Eigen vectors	https://youtu.be/h5urBuE4Xhg?si=B-bpVVFJMbxJAFwq
		https://youtu.be/LB-itmKrXag?si=0K4uF63wqZXDGC9y
		https://youtu.be/ATUN2BuukSs?si=G3bONxeV6JBvBFSt
	Eigen values & Eigen vectors: Diagonalization	https://youtu.be/k7rjICzxJ24?si=bonLfqlueLjjNy_n
Unit-II	Limit of function of two variables	https://youtu.be/ZBfu5_I-6mA?si=blx1gTuXOlpAu1TR
		https://youtu.be/Nz1EJQtFsG4?si=G6HFeprXNTCMcqc6
	Continuity of function of two variables	https://youtu.be/_98Di71evws?si=BTZpJB_Ti-QJr2jH
	Partial Derivatives-I	https://youtu.be/6tQTRIbkbc8?si=onT7x_3JAVV_8OcJ
	Partial Derivatives-II	https://youtu.be/8ZAucbZscNA?si=kSnabqSiT9PsKpRL
	Composite and Homogeneous Functions	https://youtu.be/qCQQT2P5ojY?si=dgUqT2iXA0epoprK
	Taylor's Theorem for functions of two variables	https://youtu.be/r6lDwJZmfGA?si=q8lockcYhAgTzhkO
Unit-III	Linear and Bernoulli's equations	https://youtu.be/QC3z-NUkOcE?feature=shared
	Exact Differential Equations	https://youtu.be/6r5jfT8xrXM?si=bOrUJM-thhDIgfNF
		https://youtu.be/Wx19LXs77mM?si=AdeHPdSOSengepml
	Equations reducible to exact differential equations	https://youtu.be/dtblHtoh_M0?feature=shared https://youtu.be/SxY17EzLVDA?feature=shared
Unit-IV	Linear Differential Equations (First Order)	https://youtu.be/AEHTsXRaQmE?si=vuiCdUZ41dsKjcED
	Higher Order Linear Differential Equations	https://youtu.be/btOCUmJkrrg?si=r184ISpfnBQd1Kc7
	Cauchy-Euler Equations	https://youtu.be/b5io9_bJvEM?si=lZUGRuhLjGkphfQ2
	Power Series Solutions	http://sdnbvc.digimat.in/nptel/courses/video/111106100/L24.html
	Bessel Differential Equation	http://sdnbvc.digimat.in/nptel/courses/video/111106100/L28.html

Course Code	**BSC-PHY-101A**				
Category	Basic Science Courses				
Course Title	**Mechanics, Optics and Superconductors**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I/II**
	3	1	0	**4**	
Course Objectives	The objectives of this course are • To make the students familiarize with the concepts and techniques of Mechanics, optics and Superconductors. • To enhance the ability of students to solve the complex engineering problems of their discipline using the principles and methods of Physics.				
Course Pre-requisite	Physics of 12th Standard, Basic Knowledge of Physics				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Recall the basic concepts of mechanics, thermal physics, wave optics and superconductors.	Level 1: Remember
CO2	Explain the concepts of mechanics, thermal physics, wave optics and superconductors.	Level 2: Understand
CO3	Solve engineering problems by using the methods and techniques of Mechanics, wave optics, superconductivity and magnetization.	Level 3: Apply
CO4	Analyze different engineering problems related to mechanics, thermal physics, optics, magnetic materials and superconductors.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts (preferably 2 from each unit/section) of 1.5 marks each and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Force and its effects: Newton's laws of motion - mass, inertia and force, units and measurement of force, application of Newton's second and third laws in two dimensions, free body diagram, velocity and acceleration vectors in two dimensions, characteristics of force vector representation, Bow's notation, types of forces in nature.

Force Systems: Space force systems, Coplanar, concurrent and non-concurrent forces, Resultant and components of forces, concept of equilibrium, parallelogram law of forces, super-position and transmissibility of forces, Lami's theorem.



Unit-II

Thermal Physics: Temperature and its measurement, heat, specific heat, latent heat, introduction to modes of heat transfer, thermal expansion, wavelength distribution of Black body radiation, Planck's constant, Stefan Boltzmann Law, Wien Displacement law, Kirchhoff's Law.

Phonons: Lattice vibration heat transfer, specific heat of solids, classical, Einstein and Debye Model, Ideal quantum gases: Maxwell-Boltzmann, Bose-Einstein, Fermi-Dirac statistics.

Unit-III

Interference: Coherent sources, conditions for sustained interference, Interference due to Division of wave-front and Division of Amplitude, Interference in Parallel thin Films and wedge-shaped films, Necessity of an extended source, Newton's Rings and its applications to determine wavelength and refractive index.

Diffraction: Difference between interference and diffraction, Fraunhofer and Fresnel diffraction. Fraunhofer diffraction through a single slit, Diffraction grating, absent spectra, Rayleigh's criterion of resolution, Resolving power and dispersive power of grating.

Unit-IV

Magnetic Materials and Superconductors: Smart Materials, Magneto-rheology, Orbital diamagnetism, Magnetic moments, orbital diamagnetism, Classical theory of Para magnetism, Ferromagnetism, molecular field theory and domains, applications of magnetic materials, Type I and II Superconductors, Meissener Effect, BCS theory, London equation, Applications of superconductivity.

Suggested Readings:

- Concepts of Modern Physics by Arthur Beiser, Shobhit Mahajan and S. Rai Choudhury 7th Edition, McGraw Hill Education India Private Limited.
- Engineering Physics, Second edition by H. K. Malik and A.K Singh, McGraw Hill Education India Private Limited.
- Modern Physics for Engineers by S. P. Taneja, R. Chand & CO, New Delhi.
- Applied Physics for Engineers by Neeraj Mehta, PHI Learning private Limited, New Delhi.
- Mechanics by D.S. Mathur, S. Chand Publishing.
- Optics by Ajoy K. Ghatak7th Edition, McGraw Hill Education India Private Limited.
- A Text Book of Optics by Brijlal & Subramanian, S. Chand Publishing.
- A Textbook of Engineering Physics by M N Avadhanulu, P G Kshirsagar and TVS Arun Murthy.

Useful Video Links:

Unit No.	Topics	Links
Unit-I	Free Body Diagram	https://www.youtube.com/watch?v=9Yzsl05LGtw
	Force Systems-I	https://www.youtube.com/watch?v=6u_rjLjv-MY&t=153s
	Force Systems – II	https://www.youtube.com/watch?v=Fudcc0JoXdo
Unit-II	Wein's Law, Stephen Boltzmann Law, Blackbody Radiation Function	https://www.youtube.com/watch?v=TIFGm-QusM4
	Thermal Expansion	https://www.youtube.com/watch?v=Lzrjqy4PlmE
	Kirchhoff's Law	https://www.youtube.com/watch?v=5o91GiS5uHE
	Phonons	https://www.youtube.com/watch?v=J4CwGFpgtII
Unit-III	Coherence	https://www.youtube.com/watch?v=5Za948EKAes
	Interference	https://www.youtube.com/watch?v=_vuEfLfXxIs

	Interference due to Division of wave-front	https://www.youtube.com/watch?v=P01aKhKxdx8
	Interference due to Division of Amplitude	https://www.youtube.com/watch?v=n65gZGwiZtk
	Diffraction	https://www.youtube.com/watch?v=rZATW8dpiQA
Unit-IV	Superconductors	https://www.youtube.com/watch?v=SHoGV-sezNI&list=PLwdnzlV3ogoU1IvWa-_5u9iGVimN2uT3h
	London Equation	https://www.youtube.com/watch?v=QQzvQooUtJo&list=PLwdnzlV3ogoU1IvWa-_5u9iGVimN2uT3h&index=7



Course Code	**BSC-PHY-102 A**				
Category	Basic Science Courses				
Course Title	**Introduction to Electromagnetism and Optics**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I/II**
	3	1	0	**4**	
Course Objectives	The objectives of this course are • To familiarize the students with concepts and techniques of electromagnetism and optics. • To enhance the ability of students to apply physics fundamentals to various modern applications in their discipline.				
Course Pre-requisite	Physics of 12th Standard, Basic Knowledge of Physics				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Recall the basic concepts of optics, laser, electromagnetism, semiconductors and superconductors.	Level 1: Remember
CO2	Explain the concepts of optics, laser, electromagnetism, semiconductors and superconductors.	Level 2: Understand
CO3	Solve engineering problems using the principles and techniques of optics, Laser, electromagnetism, semiconductors and superconductors.	Level 3: Apply
CO4	Analyze different engineering problems related to optics, laser, optical fiber, electromagnetism, semiconductors and superconductors.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts (preferably 2 from each unit/section) of 1.5 marks each and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Interference: Coherent sources, conditions for sustained interference, Interference due to Division of wave-front and Division of Amplitude, Interference in Parallel thin Films and wedge-shaped films, Necessity of an extended source, Newton's Rings and its applications to determine wavelength and refractive index.

Diffraction: Difference between interference and diffraction, Fraunhofer and Fresnel diffraction. Fraunhofer diffraction through a single slit, Diffraction grating, absent spectra, Rayleigh's criterion of resolution, Resolving power and dispersive power of grating.

Unit-II

Polarization: Polarized and un-polarized light, Malu's Law, Brewster Law, Double Refraction, Nicol Prism, quarter and half wave plate, Production and detection of Plane, Elliptically and Circularly polarized light, Application of polarization, Optical activity and specific rotation.

Laser: Interaction of radiation with matter, Einstein's coefficients, Laser action, Characteristics of Laser, Spatial and temporal coherence, Ruby Laser, He-Ne Laser, Recent applications of Laser in engineering and technology.

Unit-III

Basic laws of electricity and magnetism: Gradient, Divergence and Curl (Electric field and Magnetic field), line, surface and volume charge distribution, Gauss divergence theorem, Stoke's theorem (No derivation), Continuity equation for current density, Displacement current, Dielectrics, Electric polarization, Relation between three electric vectors, Maxwell's equation in differential and integral form (vacuum and non-conducting medium), their derivation and physical significance, Energy in an electromagnetic field, Poynting vector and Poynting theorem.

Unit-IV

Type of electronic materials: Metals, Semiconductor and Insulators, Intrinsic and Extrinsic semiconductors, Fermi level and Fermi Energy, Dependence of Fermi level on carrier concentration and temperature, carrier generation and recombination, carrier transport: diffusion and drift, P-N Junction, Semiconductor materials of interest for optoelectronics devices.

Superconductors: Introduction to superconductors, temperature dependence of resistivity, Type I and Type II superconductors, Meissner effect, London equations, BCS theory (elementary idea), Application of superconductors.

Fiber Optics: Optical fiber, Acceptance angle, Numerical aperture-number, Classification of optical fibers, Attenuation and Dispersion in optical fibers, Applications of optical fiber.

Suggested Readings:

- A Text Book of Optics by Brijlal & Subramanian, S. Chand Publishing.
- Modern Physics for Engineers by S. P. Taneja, R. Chand & CO, New Delhi.
- Applied Physics for Engineers by Neeraj Mehta, PHI Learning private Limited, New Delhi.
- Optics by Ajoy K. Ghatak 7th Edition, McGraw Hill Education India Private Limited.
- Concepts of Modern Physics by Arthur Beiser, Shobhit Mahajan and S. Rai Choudhury 7th Edition, McGraw Hill Education India Private Limited.
- Introduction to Electrodynamics, D.J. Griffith, 4thEdition, Pearson Education India Learning Private Limited.
- Engineering Physics, Second edition by H. K. Malik and A. K Singh, McGraw Hill Education India Private Limited.

Useful Video Links:

Unit No.	Topics	Links
Unit-I	Coherence	https://www.youtube.com/watch?v=5Za948EKAes
	Interference	https://www.youtube.com/watch?v=_vnEfLfXxIs
	Interference due to Division of wave-front	https://www.youtube.com/watch?v=P01aKhKxdx8
	Interference due to Division of Amplitude	https://www.youtube.com/watch?v=n65gZGwiZtk
	Diffraction	https://www.youtube.com/watch?v=rZATW8dpiQA
Unit-II	Malu's Law, Brewster Law	https://www.youtube.com/watch?v=cmCB_FOEstQ
	Double Refraction	https://www.youtube.com/watch?v=Pt5wvYyguq0

	Einstein Coefficients	https://www.youtube.com/watch?v=PQTMBlHhCY8&list=PLU0oJASIjGxdZMtypwhvGrnmuzNnNdcKt&index=4
Unit-III	Gradient, Divergence and Curl	https://www.youtube.com/watch?v=v3ZC4Mo1fS0
	Stoke's Theorem	https://www.youtube.com/watch?v=QPw4GYz5Unc
	Electric Polarization	https://www.youtube.com/watch?v=GJNynbp5bxk
	Maxwell Equations	https://www.youtube.com/watch?v=XUR-dnDa7eI
Unit-IV	Semiconductors	https://www.youtube.com/watch?v=JA3sCmrv11M&list=PLgMDNELGJ1CaNcuuQv9xN07ZWkXE-wCGP&index=2
	London Equation	https://www.youtube.com/watch?v=QQzvQooUtJo&list=PLwdnzlV3ogoU1IvWa-_5u9iGVimN2uT3h&index=7
	Superconductors	https://www.youtube.com/watch?v=SHoGV-sezNI&list=PLwdnzlV3ogoU1IvWa-_5u9iGVimN2uT3h
	Introduction to Optical Fiber, Numerical Aperture	https://www.youtube.com/watch?v=LOVvUFZmRCg



Course Code	BSC-PHY-103 A				
Category	Basic Science Courses				
Course Title	**Semiconductor Physics and Optics**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I/II**
	3	1	0	**4**	
Course Objectives	The objectives of this course are • To familiarize the students with concepts and techniques of semiconductor physics and optics. • To enhance the ability of students to apply physics fundamentals to various modern applications in their discipline.				
Course Pre-requisite	Physics of 12th Standard, Basic Knowledge of Physics				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Recall the basic concepts of quantum mechanics, semiconductor physics, fiber optics and laser.	Level 1: Remember
CO2	Describe the concepts of quantum mechanics of electrons in solid, semiconductor physics, fiber optics and lasers.	Level 2: Understand
CO3	Apply methods and techniques of semiconductor physics, quantum mechanics, fiber optics and Laser to solve engineering problems.	Level 3: Apply
CO4	Analyze different engineering problems related to quantum theory, semiconductors, optical fiber and lasers.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts (preferably 2 from each unit/section) of 1.5 marks each and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Quantum Theory: Introduction to wave-particle duality, De-Broglie matter waves, Heisenberg's uncertainty principle and its applications, Phase and Group velocity, Wave function and its significance, normalization of wave function, Time-dependent and time-independent Schrödinger's wave equations, Eigen functions and Eigen values, Expectation Value, Particle in one-dimensional rigid box, Basics of Bose-Einstein and Fermi-Dirac distribution.

Unit-II

Free Electron theory: Classical and Quantum free electron theory, Density of states, Fermi level and Fermi energy, Fermi-Dirac probability distribution function, Kronig-Penney Model, E-K Diagrams, Effective Mass, and Classification of materials on the basis of energy band, concept of phonons, Direct and indirect band gaps.

Unit-III

Physics of Semiconductors: Intrinsic and extrinsic semiconductor, carrier concentration in intrinsic and extrinsic semiconductors, dependence of Fermi level on carrier concentration and temperature, carrier transport (diffusion and drift), P-N Junction diode, Energy band diagram, V-I Characteristics; Construction and Working of Photodiode, LED & Solar cell, Semiconductor materials of interest for optoelectronics devices, Hall Effect and its Applications.

Unit-IV

Fiber Optics: Introduction to fiber optics, Acceptance angle, Numerical aperture, Normalized frequency, Classification of fiber, Attenuation and Dispersion in optical fibers, Applications of optical fiber in communication and other fields.

Laser: Interaction of radiation with matter, Einstein's coefficients, Requisites of Laser, Elements of a laser, Ruby Laser, He-Ne Laser, Recent applications of Laser in Engineering and Technology.

Suggested Readings:

- Introduction to Quantum Mechanics by David J. Griffiths, Pearson Education.
- A Text Book of Optics by Brijlal & Subramanian, S. Chand Publishing
- Applied Physics for Engineers by Neeraj Mehta, PHI Learning private Limited, New Delhi
- Semiconductor Optoelectronic Devices by Bhattacharya, Prentice hall of India.
- Modern Physics for Engineers by S. P. Taneja, R. Chand & CO, New Delhi.
- Semiconductor Devices: Physics and Technology by S. M. Sze, Wiley.
- Engineering Physics, Second edition by H. K. and A.K Singh Mc Graw Hill Ed.

Useful Video Links:

Unit No.	Topics	Links
Unit-I	Wave Particle Duality	https://www.youtube.com/watch?v=Yf_4Qv-A55Q
	Heisenberg's uncertainty principle	https://www.youtube.com/watch?v=TcmGYe39XG0
	Phase Velocity and Group Velocity	https://www.youtube.com/watch?v=yZW4dmn5kvM
	Eigen functions and Eigen values	https://www.youtube.com/watch?v=qp5X9sKDgAE
	Schrodinger Equation: Particle in a One Dimensional Box	https://www.youtube.com/watch?v=vy-qStGSy0g&t=10s
Unit-II	Free Electron Theory	https://www.youtube.com/watch?v=L-eOdZFt9BY
	Kronig-Penney Model	https://www.youtube.com/watch?v=ZemvjQdLffo
	Direct and indirect band gaps	https://www.youtube.com/watch?v=-ga2S2LOtjs
	Phonons	https://www.youtube.com/watch?v=J4CwGFpgt1I
Unit-III	Semiconductors	https://www.youtube.com/watch?v=JA3sCmrv11M&list=PLgMDNELGJ1CaNcuuQv9xN07ZWkXE-wCGP&index=2
	Carrier Concentration of Intrinsic Semiconductors	https://www.youtube.com/watch?v=PxzXP4URY8s
	Charge carrier density in n-type and p-type semiconductors	https://www.youtube.com/watch?v=qvJr4N2s3Ro
	Hall Effect	https://www.youtube.com/watch?v=Tt8zwiniSPc
Unit-IV	Introduction to Optical Fiber, Numerical Aperture	https://www.youtube.com/watch?v=LOVvUFZmRCg
	Einstein Coefficients	https://www.youtube.com/watch?v=PQTMBlHhCY8&list=PLU0oJASIjGxdZMtypwhvGrnmuzNnNdcKt&index=4

HOD AS

Course Code	**BSC-CH-101 A**				
Category	Basic Science Courses				
Course Title	**Engineering Chemistry-I**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I/II**
	3	0	0	**3**	
Course Objectives	The objectives of this course are • To impart the knowledge of fundamentals of water and soil chemistry and its associated properties. • To provide the basic understanding on corrosion and the importance of green chemistry. • To introduce the students with the concept, classifications and applications of different fuels, lubricants, ceramics and polymers. • To develop the student's ability to apply knowledge of different instrumental methods for chemical analysis.				
Course Pre-requisite	Chemistry of 12th Standard, Basic Knowledge of Chemistry				
Assessment	40 Marks				
End Semester Exam	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Recall the basic concepts of applied and engineering chemistry.	Level 1: Remember
CO2	Explain the water treatment, soil composition, green technology, corrosion, engineering materials and analytical techniques.	Level 2: Understand
CO3	Solve the engineering problems by applying the methods and techniques of engineering chemistry.	Level 3: Apply
CO4	Analyze different engineering problems to address the real life issues.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts (preferably 2 from each unit/section) of 1.5 marks each and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Water Chemistry: Physical and chemical properties of water, Introduction to hardness and its types, DO, COD, BOD, TDS, BIS and WHO standards, Methods of water softening (Lime soda process, Zeolite Process, Demineralization process), Sewage treatment plant process.

Soil Chemistry: Chemical composition of soils, Soil components, types and properties of soil colloids, Mechanism- diffused double layers, sorption processes, cation and base exchange.

Unit-II

Corrosion: Introduction, Pilling Bedworth rule, Types and mechanism of dry and wet corrosion, Forms of corrosion, Pourbaix diagram (Iron-water system), Factors affecting corrosion and methods of prevention-Design of material, Anodic and Cathodic Protection, Protective surface coating, Overview to Chemical and Electrochemical Surface Treatment.

HOD AS

Green Chemistry: Introduction, 12 Principles with their explanations and examples, Green Solvents (Water, Ionic liquids, Supercritical carbon dioxide, Bio-based solvents), Importance of green synthesis, Examples of Microwave and Ultrasound Assisted reactions.

Unit-III

Fuel: Introduction to fuel and its properties, Calorific value, LCV, HCV, Determination of calorific value (Bomb's Calorimeter), Characteristic of good fuel, Knocking and chemical constitution of fuel, Octane and Cetane number, Overview on Gaseous Fuel: LPG, CNG, H_2, Syngas, Bio-diesel, Biogas and Landfill Gas.

Combustion: Chemistry of combustion, Introduction to explosive and flammable hazards and flame retardants chemicals.

Lubricants: Introduction to Lubricant, Classification (Liquid Lubricants, Solid Lubricants, Semi-solid Lubricants), Properties, Mechanism of Lubrication (Hydrodynamic Lubrication, Boundary Lubrication and Extreme Pressure Lubrication), Application of Lubricants.

Unit-IV

Ceramics: Introduction, Types of Ceramics, Cement and Glass-Chemical composition, Types, Properties, Manufacture and overview of technological applications.

Polymers: Introduction to Polymers, Classification of polymers, Types of polymer composites and engineering application of Thermoplastic (PVC, Polystyrene, Teflon), Thermosetting Plastics (Phenoplasts, Polyurethanes), Conducting and biodegradable Polymers.

Analytical techniques: Principle and Applications of Volumetric Titrimetry (Acid-base, complexometry, pH-metry), Thermogravimetry - TGA, and UV-Visible spectroscopy.

Suggested Readings:

- Essentials of Analytical Chemistry by Shobha Ramakrishnan and Banani Mukhopadhyay, Pearson Publications, 2018
- Engineering Chemistry by K. Sesha Maheshwaramma, Mridula Chugh. Pearson Publications, 2016
- Engineering Chemistry (NPTEL Web-book) by B. L. Tembe, Kamaluddin and M. S. Krishnan
- Introduction to polymer chemistry by G. S. Misra, New Age International Publishers, 2008
- New Trends in Green Chemistry by V. K. Ahluwalia, and M. R. Kidwai, Anamalaya Publishers, 2005
- Chemistry of Soils by G. Sposito, Oxford University Press, 2008
- Fuels and Combustion by Samir Sarkar, Universities Press, 2009

Useful Video links:

Unit No	Topics	Links
Unit-I	Water Chemistry	http://ecoursesonline.iasri.res.in/mod/page/view.php?id=124277
		https://archive.nptel.ac.in/courses/105/107/105107207/
		https://youtu.be/d__0Peuu6wI?si=0n45O3_MjSl61DXI
	Soil Chemistry	https://archive.nptel.ac.in/noc/courses/noc20/SEM2/noc20-ar05/
Unit-II	Corrosion	https://nptel.ac.in/courses/113104082
	Green Chemistry	https://www.youtube.com/watch?v=0LtMaJvVt0s
Unit-III	Fuel, Combustion and Lubricants	https://archive.nptel.ac.in/courses/103/105/103105110/
		https://www.youtube.com/watch?v=7mH3jmdemlA
		https://www.youtube.com/watch?v=p8XQeKQd6rA
		https://www.youtube.com/watch?v=HTIzwP8BKC8

Unit-IV	Material Chemistry	https://www.youtube.com/watch?v=LtlxTDOcbX1
		https://nptel.ac.in/courses/113105028
		https://nptel.ac.in/courses/104103071
		https://nptel.ac.in/courses/104103019
		https://www.youtube.com/watch?v=xT9zzPR2dI0
		https://www.youtube.com/watch?v=XMGmnAc4KBs
	Titrimetry	https://www.youtube.com/watch?v=AvqYHCuOxLU
	TGA	https://nptel.ac.in/courses/115103030
		https://www.youtube.com/watch?v=h8g1K2z1yBw
	Ultraviolet and Visible Spectrophotometry	https://youtu.be/m33OcLsp8o0?si=PYpoSDyMYtjsJUpw
		https://nptel.ac.in/courses/104101130



Course Code	BSC-CH-102 A				
Category	Basic Science Courses				
Course Title	**Engineering Chemistry-II**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I/II**
	3	0	0	**3**	
Course Objectives	The objectives of this course are • To provide the students the knowledge of atomic-molecular structure, electrochemistry and their associated theories and applications. • To provide fundamental understanding and importance of green chemistry and e-waste recycling approaches. • To lay the foundation for concept, classifications and applications of different nanomaterials and polymers. • To develop the student's ability to apply knowledge of different instrumental methods for chemical analysis.				
Course Pre-requisite	Chemistry of 12th Standard, Basic Knowledge of Chemistry				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Recall the basic concepts of applied and engineering chemistry.	Level 1: Remember
CO2	Explain atomic and molecular structure, electrochemical process, green technology, e-waste, engineering materials and analytical techniques.	Level 2: Understand
CO3	Solve the engineering problems by applying the methods and techniques of engineering chemistry.	Level 3: Apply
CO4	Analyze different engineering problems to address the real life issues.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts (preferably 2 from each unit/section) of 1.5 marks each and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Atomic and Molecular Structure: Overview of Electromagnetic radiation, Photoelectric Effect, De Broglie Equation, Schrodinger wave equation, Quantum numbers and Atomic orbitals, Molecular orbital energy level diagrams of diatomic molecules (N_2, O_2, F_2, CO, NO, CN), Pi-molecular orbitals of butadiene, Crystal field splitting energy diagram for octahedral and tetrahedral complexes, Band structures of solids and semiconductor doping, Band theory of Semiconductors.

Unit-II

Electrochemistry and Energy Systems: Introduction, Electrode potential, Conductance, Overview to Nernst Equation, Electrochemical Cells (Galvanic and Concentration cells), Energy storage systems (Batteries: Primary and Secondary Cell, Super capacitors: EDLC, Pseudo and Hybrid), Energy conversion

devices (typical Inorganic and organic solar cells) and their materials, chemical reactions, working and applications.

Unit-III

Green Chemistry: Introduction, 12 Principles with their explanations and examples, Green Solvents (Water, Ionic liquids, Supercritical carbon dioxide, Bio-based solvents) Importance of green synthesis, Examples of Microwave and Ultrasound Assisted reactions.
E-Waste: Introduction, sources of e-waste, Composition and Characteristics. Toxic materials used in manufacturing electronic and electrical products, Different approaches of recycling (thermal treatments, hydrometallurgical extraction, pyrometallurgical methods).

Unit-IV

Nanomaterials: Introduction to Nanomaterial and its types, synthesis (vapor deposition, sol gel methods, combustion, microwave and ultrasound technique), classification- inorganic, semiconducting, carbon-based and quantum nanomaterials and their various applications.

Polymers: Introduction to Polymers, Classification of polymers, Types of polymer composites and engineering application of Thermoplastic (PVC, Polystyrene, Teflon), Thermosetting Plastics (Phenoplasts, Polyurethanes), Conducting and biodegradable Polymers.

Analytical techniques: Principle and Applications of Volumetric Titrimetry (Acid-base, complexometry, pH-metry), Conductometry and UV-Visible spectroscopy.

Suggested Readings:

- Essentials of Analytical Chemistry by Shobha Ramakrishnan and Banani Mukhopadhyay, Education Pearson, 2018
- Engineering Chemistry by K.Sesha Maheshwaramma, Mridula Chugh. Pearson Publications, 2016
- Engineering Chemistry (NPTEL Web-book) by B. L. Tembe, Kamaluddin and M. S. Krishnan
- Introduction to polymer chemistry by G. S. Misra, New Age International Publishers, 2008
- New Trends in Green Chemistry by V. K. Ahluwalia and M.R. Kidwai, Anamalaya Publishers 2005
- Introduction to Nanochemistry by Frank Owens Charles Poole, Wiley, 2010

Useful Video Links:

Unit No	Topics	Links
Unit-I	Atomic and Molecular Structure	https://archive.nptel.ac.in/courses/104/106/104106083/
		https://nptel.ac.in/courses/104106096
		https://nptel.ac.in/courses/104101130
Unit-II	Electrochemistry and Energy Systems	https://nptel.ac.in/courses/104106137
		https://archive.nptel.ac.in/courses/104/106/104106137/
		https://www.youtube.com/watch?v=nh2xbyOaERw
		https://archive.nptel.ac.in/courses/115/107/115107116/
Unit-III	Green Chemistry	https://www.youtube.com/watch?v=0LtMaJvVt0s
	E-Waste Management	https://nptel.ac.in/courses/105105169
Unit-IV	Material Chemistry	https://nptel.ac.in/courses/113105028
		https://nptel.ac.in/courses/104103019
	Titrimetry	https://www.youtube.com/watch?v=AvqYHCuOxLU
	Conductometry	https://www.youtube.com/watch?v=A4XzBj2zmUg
	Ultraviolet and Visible Spectrophotometry	https://youtu.be/m33OeLsp8o0?si=PYpoSDyMYtjsJUpw
		https://nptel.ac.in/courses/104101130



Course Code	**ESC-ME-101 A**				
Category	Engineering Science Courses				
Course Title	**Manufacturing Process**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I/II**
	3	0	0	**3**	
Course Objectives	The objectives of this course are • To gain a comprehensive understanding of various manufacturing processes and engineering materials with their applications in industrial production. • To acquire proficiency in cold and hot working techniques and select appropriate methods based on material properties and production needs. • To develop proficiency in casting and welding processes, identifying defects and applying suitable techniques for effective metal joining and fabrication.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Define terminologies related to manufacturing processes.	Level 1: Remember
CO2	Explain the manufacturing processes, safety measures in industries and plant layouts.	Level 2: Understand
CO3	Differentiate manufacturing processes, engineering materials on technical parameters.	Level 2: Understand
CO4	Use appropriate manufacturing processes based on material properties, design requirements, and production constraints.	Level 3: Apply

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts (preferably 2 from each unit/section) of 1.5 marks each and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Manufacturing Processes: Introduction to Manufacturing Processes and their Classification, Industrial Safety; Introduction, Types of Accidents, Causes and Common Sources of Accident, Methods of Safety, First Aid, Objectives of Layout, Types of Plant Layout and their Advantages.

Engineering Materials: General Properties and Applications of Engineering Materials, Mild Steel, Medium Carbon Steel, High Carbon Steel, High Speed Steel and Cast Iron.

HOD AS

Unit-II

Cold Working (Sheet Metal Work): Sheet Metal Operations, Measuring, Layout Marking, Shearing, Punching, Blanking, Piercing, Forming, Bending and Joining, Advantages and Limitations.

Hot Working Processes: Introduction to Hot Working, Principles of Hot Working Processes, Forging, Rolling, Extrusion, Wire Drawing.

Unit-III

Metal Casting: Principles and Basic Steps in Casting Processes, Pattern materials, types and allowance, Study of moulding, sand moulding, tools, moulding materials, classification of moulds, core, elements of gating system, casting defects, description and operation of cupola: special casting processes e.g. die-casting, permanent mould casting, centrifugal casting, investment casting.

Unit-IV

Welding: Introduction to welding, Classification of Welding Processes, GAS Welding- Oxy-Acetylene Welding, Resistance Welding- Spot and Seam Welding, Arc Welding- Metal Arc, TIG & MIG, Welding Defects and Remedies, Soldering & Brazing.

Suggested Readings:

- Manufacturing Engineering and Technology by S. Kalpakjian and S.R. Schmid, Pearson.
- Manufacturing Science by Amitabha Ghosh and A. K. Mallick East-West Press Pvt. Ltd. 2010.
- Manufacturing Technology (Foundation Forming & Welding) by P.N. Rao, Tata McGraw Hill.
- Principles of manufacturing materials and processes by J. S. Campbell, Tata McGraw Hill.
- Elements of Workshop Technology, Hajra & Choudhary, Media Promotors & Publishers Pvt. Ltd.
- Workshop Practices, H. S. Bawa, Tata Mc Graw Hill

Useful Video Links:

Unit No.	Topic	Link
Unit-I	Types of Plant Layout	https://www.youtube.com/watch?v=PRI0wNoUfqk
	Engineering Materials	https://www.youtube.com/watch?v=m9l1tVXyFp8
Unit-II	Hot and Cold Working	https://www.youtube.com/watch?v=dNbVsmVgOnM
Unit-III	Patterns and Allowances	https://www.youtube.com/watch?v=H78qWl4sf54
Unit-IV	Classification of Welding Processes	https://www.youtube.com/watch?v=NPi9L2fl4EI

Course Code	**HSMC-ASH-103A**				
Category	Humanities and Social Sciences including Management courses				
Course Title	**Human Values and Ethics**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I/II**
	3	0	0	**3**	
Course Objectives	The objective of this course is to inculcate human values to grow as responsible human beings with a proper personality.				
Course Pre-requisite	None				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Define various terms related human values and ethics.	Level 1: Remember
CO2	Explain the fundamental concepts, theories, policies, practices and responsibilities of the engineers etc.	Level 2: Understand
CO3	Solve real-life problems related to human behaviour based on his understanding of morals, values and ethics.	Level 3: Apply
CO4	Analyze essentials of human values and skills, the role of harmony in family, society and universal order, self-exploration, happiness and prosperity.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts (preferably 2 from each unit/section) of 1.5 marks each and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Introduction to Value Education: Understanding the need, basic guidelines, content and process for Value Education, Right Understanding; Relationship and Physical Facility; Understanding Value Education; Self-exploration as the Process for Value Education, Continuous Happiness and Prosperity -the Basic Human Aspiration-Current Scenario and Method to Fulfill the Basic Human Aspirations.

Unit-II

Harmony in the Human Being: Understanding Human being as the Co-existence of the Self and the Body, distinguishing between the Needs of the Self and the Body, The Body as an Instrument of the Self, Understanding Harmony in the Self, Harmony of the Self with the Body, Programme to ensure self-regulation and Health.

Unit-III

Harmony in the Family and Society and Nature: Harmony in the Family – the Basic Unit of Human Interaction; 'Trust' – the Foundational Value in Relationship; 'Respect' – as the Right Evaluation: Other Feelings, Justice in Human-to-Human Relationship; Understanding Harmony in the Society; Vision for the Universal Human Order; Understanding Harmony in the Nature; Interconnectedness, self-regulation and Mutual Fulfillment among the Four Orders of Nature.

Unit-IV

Introduction to Professional Ethics: Basic concepts, Governing Ethics, Personal & Professional Ethics, Ethical Dilemmas, Life Skill, Emotional Intelligence, Thoughts of Ethics, Dimensions of Ethics, Profession and Professionalism, Professional Association, Professional Risk, Professional Accountabilities, Professional Success, Ethics & Profession.

Suggested Readings:

- A Foundation Course in Human Values and Professional Ethics by R R Gaur, R Asthana, G P Bagaria, 2nd Revised Edition, Excel Books, New Delhi, 2019.
- Human Values by A.N. Tripathi, New Age International Publishers, New Delhi, 2004.
- Professional Ethics: R. Subramaniam, Oxford University Press.

Latest books can be suggested by the course faculty/coordinator.

Useful Video links:

Topics	Links
Different Approaches to Ethics	https://www.youtube.com/watch?v=gS9eZ9u153o
Moral Thinking: An Introduction to Values and Ethics	https://www.youtube.com/watch?v=YMD_sCcnT9w&t=2s https://nptel.ac.in/courses/109104206



Course Code	**ESC-EE 101 A**				
Category	Engineering Science Courses				
Course Title	**Basics of Electrical Engineering**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I/ II**
	3	1	0	**4**	
Course Objectives	The objectives of this course are • To impart basic knowledge of the DC and AC circuits and their applications. • To familiarize the students with the basic knowledge of measuring instruments, electrical machines and installations.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	**Skills Demonstrated**	**RBT Level**
CO1	Define the technical terms related to Basic Electrical Engineering.	Level 1: Remember
CO2	Explain the concept of DC & AC circuits, Measuring instruments, wiring and installations.	Level 2: Understand
CO3	Apply various laws and theorems for solving the real life problems.	Level 3: Apply
CO4	Analyze the characteristics and properties of circuits, instruments and electrical systems.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts (preferably 2 from each unit/section) of 1.5 marks each and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

DC Circuits: Kirchhoff's Law, Types of Sources, Current and voltage divide rule, Source Transformation, Mesh Analysis, Nodal Analysis, Star-Delta transformation.
Network Theorems: Superposition Theorem, Thevenin's Theorem, Norton's Theorem, and Maximum power transfer theorem.

Unit-II

AC Circuits: Generation of AC Voltage, Basic terminology, Average Value, RMS Value, Pure R, L & C Circuit, Impedance triangle, true power, apparent power, power factor, Series R-L, R-C & R-L-C circuits, series resonance, Concept of Phasor. Parallel R-L, R-C & R-L-C circuits, Parallel resonance.

Three Phase AC circuits: Relationship between Line voltage or current and phase voltage or current for star & delta circuit, measurement of power and power factor in three phase circuit using two watt-meter method.

Unit-III

Measuring Instruments: Construction and Working Principle of Moving coil and Moving iron type instruments, Construction and working Principle of Induction type Voltmeter, Ammeter and Wattmeter, and Energy Meter.

Elementary overview of Electrical Machines: Construction and working principle of DC machine, Synchronous Machine and three phase induction machine, construction and working principle of single phase transformer.

Unit-IV

Electrical Installation: Types of Wires and wiring systems, Advantages and Disadvantages of different wiring systems, Fuses: types of fuse, its need and importance, MCB, MCCB, ELCB, Power rating of household appliances, Concept of earthing and its types.

Suggested Readings:

- Fundamentals of Electric Circuits by C.K. Alexander and M.N.O. Sadiku; TATA McGraw-Hill.
- Principles of Electrical Engineering by V. Del Toro; Prentice Hall International.
- Electrical and Electronics Technology by Edward Hughes; Pearson.
- Basic Electrical Engineering by D P Kothari, I.J. Nagarath; Tata McGraw Hill
- Electrical Technology by B. L. Thareja and A. K. Thareja; S. Chand.
- Basic Electrical Engineering by Ritu Sahdev, Khanna Book Publishing
- Basic Electrical Engineering by Mittle & Mittal, Tata McGraw Hill
- Basic Electric Engineering, DC Kulshrehtra, Tata McGraw Hill

Useful Video links:

Unit No.	Topics	Links
Unit-I	Basic concepts and laws	https://archive.nptel.ac.in/courses/108/105/108105112/
Unit-II	Single Phase AC Circuits	https://archive.nptel.ac.in/courses/108/102/108102185/
Unit-III	Moving Coil Instruments	https://youtu.be/n1MinLtvnPY
	Moving Iron Instruments	https://youtu.be/ziFWOGRcExk
	Integrating Type Instruments	https://youtu.be/NBAhl2UxvW0
Unit-IV	Fuses and circuit breakers	https://youtu.be/QsGn7H_14VY?list=PLLy_2iUCG87BIJ6ZliVIRCx2Crf9_fJMB



Course Code	**HSMC-ENG-101A**				
Category	Humanities and Social Sciences including Management Courses				
Course Title	**Communication Skills for Professionals**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I/II**
	2	0	0	**2**	
Course Objectives	The objectives of this course are • To establish foundational communication skills by enhancing LSRW abilities. • To enhance self-presentation and interview techniques for success in academic and professional settings.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Describe the fundamental concepts and key components of effective communication.	Level 1: Remember
CO2	Explain the techniques for improving LSRW skills and overcoming communication barriers.	Level 2: Understand
CO3	Apply communication principles to enhance LSRW skills and expand vocabulary for effective professional communication.	Level 3: Apply
CO4	Apply self-presentation and interview skills to excel in professional interactions.	Level 3: Apply

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts (preferably 2 from each unit/section) of 1.5 marks each and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Fundamentals of Communication: Definition, Nature and Importance of Communication, Communication Process, Types of Communication-Verbal and Non-verbal, 7 C's of communication, Barriers to Effective Communication and overcoming strategies, Communication Networks.

Unit-II

Enhancing LSRW Skills (Listening, Speaking, Reading, and Writing): Listening Skills, Cognitive process of listening, Active Listening Techniques, Barriers to Effective Listening, Speaking Skills Effective Speaking Techniques, Public Speaking, Reading Skills, Reading Techniques, Comprehension Strategies, Writing Skills, Writing Techniques.



Unit-III

Basic Vocabulary: Vocabulary Building Techniques, Word Formation- Prefix Suffixes, Expanding Vocabulary- Antonyms-Synonyms, Homophones -Homonyms, Words often confused, One-word Substitutes, Idioms and Phrases.

Unit-IV

Effective Self-Presentation and Interview Skills: Self-Presentation Skills, Importance of self- image, Dress Code and Personal grooming, Effective Presentation Techniques, creating a Strong First Impression, Body Language, Strategies for building self-confidence, Interview Skills- Preparing for Interview Skills, Professional Etiquettes.

Suggested Readings:

- Business Communication by Shukla, Preeti, Mahaveer Publication, 2016.
- Word Power Made Easy by Norman Lewis, 2018, Goyal Publishers & Distributors Pvt Ltd.
- Business Communication by Magan, Sangeeta, International Book House, 2012.
- Business Communication by Meenakshi Raman and Prakash Singh, Oxford University Press.
- Effective Technical Communication by by M. Ashraf Rizvi, Tata McGraw-Hill Education, 2018.
- Business Communication Skills by Thakur Veera and Singh,Tripti, Thakur Publication, 2017.
- Communication Skills by Dr. F.C.Sharma, Mahavir Publishing Company, 2023-24.
- English for Professionals by Dr. Seema Miglani and Dr. Shikha Goel, Vayu Education of India, 2010.

Useful Video Links

Unit No.	Topic	Link
Unit-I	Barriers to Communication	https://www.youtube.com/watch?v=CQ6D_bxZyxg&list=PLbMVogVj5nJSZB8BV29_sPwwkzMTYXpaH&index=2
	Verbal and Non-verbal Communication	https://www.youtube.com/watch?v=p1-etClsXdk&list=PLbMVogVj5nJSZB8BV29_sPwwkzMTYXpaH&index=5
	Fundamentals of Communication	https://www.youtube.com/@rabianawaz5108
Unit-II	Reading and Listening	https://www.youtube.com/watch?v=PAISeBhtYqI&list=PLzf4HHlsQFwIQUeZq_ykEVB6qZrTRnJZn&index=5
	Types of listening	https://www.youtube.com/watch?v=mdE3thfUQ8Y&list=PLLy_2iUCG87CQhELCytvXh0E_y-bOO1_q&index=15
	Listening and Group Discussion	https://www.youtube.com/watch?v=JIKU_WT0Bls&list=PLbMVogVj5nJSZB8BV29_sPwwkzMTYXpaH&index=10
	Effective Speaking	https://www.youtube.com/watch?v=B53VM3FKag0&list=PLzf4HHlsQFwIQUeZq_ykEVB6qZrTRnJZn&index=16
	Public Speaking	https://www.youtube.com/watch?v=RB3MJt3dfrg
Unit-III	Vocabulary Building	https://www.youtube.com/watch?v=HATeh6e7Gv0

	Phrasal Verbs	https://www.youtube.com/watch?v=rUVEYAsVwVo&list=PLzf4HHlsQFwIQUeZq_ykEVB6qZrTRnJZn&index=21
	Word formation	https://www.youtube.com/watch?v=ht-rk26E0mw&list=PLzf4HHlsQFwIQUeZq_ykEVB6qZrTRnJZn&index=23
Unit-IV	Formal Presentation	https://www.youtube.com/watch?v=nK2NgiAp4VU&list=PLzf4HHlsQFwIQUeZq_ykEVB6qZrTRnJZn&index=17
	Interview Skills	https://www.youtube.com/watch?v=45uNWLmAZR8&list=PLPuC5CMHiqmuzq_KQ4aw0V9Q7xJY6aezb&index=7
	Presentation Skills	https://www.youtube.com/watch?v=z-ce7fcKe1E&list=PLbMVogVj5nJSZB8BV29_sPwwkzMTYXpaH&index=31
	Interview Skills	https://www.youtube.com/watch?v=45uNWLmAZR8&list=PLbMVogVj5nJSZB8BV29_sPwwkzMTYXpaH&index=22



Course Code	ESC-ME-102A				
Category	Professional Core Courses				
Course Title	**Engineering Graphics and Design**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I/II**
	0	0	4	**2**	
Course Objectives	The objectives of this course are • To understand techniques of drawings in various fields of engineering. • To enhance the graphic skills of students. • To develop skills in preparation of basic drawings. • To provide skills in reading and interpretation of engineering drawings.				
Assessment	50 Marks				
Practical Examination	50 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Define basic terminologies and concepts of engineering graphics & drawing.	Level 1: Remember
CO2	Explain the different types of engineering drawings, projections and standards.	Level 2: Understand
CO3	Apply principles of projection to solve the engineering problems related to design.	Level 3: Apply
CO4	Analyze the multi-view of orthographic projection to identify relationships between views.	Level 4: Analyze

Unit-I

Introduction to Engineering Drawing: Drawing instrument and their uses, lines, lettering and dimensioning, type of scale, plain and diagonal scale.

Projection: Introduction, principle of projection, method of projection, Planes of projection, Four quadrant, first and third angle projection, reference line, symbols for methods of projection, orthographic projection.

Unit-II

Projection of Point: Introduction, point situated in first, second, third & fourth quadrant.

Projection of lines: Introduction, line parallel to one or both the planes, line contained by one or both the planes, line perpendicular to one of the planes, line inclined to one plane and parallel to other, line inclined to both the planes, traces.

Unit-III

Projection of Planes: Introduction, types of planes, projection of planes, projection of planes perpendicular to both the reference planes, perpendicular to one plane and parallel to other plane, perpendicular to one plane and inclined to the other plane, Inclined to both planes.

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Projection of Solids: Introduction, type of solid, projections of solids in simple position, projection of solids with axes inclined to one of the reference planes and parallel to the other, projections of solids with axes inclined to both H.P. and the V.P.

Unit-IV

Section of Solids: Sectional planes, section of solids, true shape of section.
Development of Surfaces: Introduction, method of development, development of lateral surfaces of right solids, cube, prisms, cylinders, pyramids & cone.
Overview of Computer Graphics: Demonstrating the knowledge of CAD software such as: The Menu System, Toolbars (Standard, Object Properties, Draw, Modify and Dimension).

Suggested Readings:

- Elementary Engineering Drawing by Bhatt, N.D., Charotar Publishing Co.
- Engineering Graphics by K.L. Narayana and P. Kannaiah, Scitech Publications (India) Pvt.Ltd.
- Engineering Drawing by PS Gill, Katson Books.

Useful Video links:

Unit No.	Topics	Links
Unit I	Introduction to engineering graphics, Uses of drawing equipment's, Symbols, Types of lines, Lettering	https://archive.nptel.ac.in/courses/124/107/124107157/
Unit II	Projection of a point and line	https://drmcet.digimat.in/nptel/courses/video/112102304/L14.html
Unit III	Measures of Central Tendency	https://drmcet.digimat.in/nptel/courses/video/112102304/L17.html
Unit IV	Sectional views	https://drmcet.digimat.in/nptel/courses/video/112102304/L22.html
	Development of Surfaces	https://www.youtube.com/watch?v=GSCiOdybqv0



Course Code	**ESC-CSE-101A**				
Category	Engineering Science Courses				
Course Title	**Programming for Problem Solving**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I/II**
	3	0	0	**3**	
Course Objectives	The objectives of this course are • To understand different levels of programming languages, translators, and their functions in machine, assembly, and high-level languages. • To develop problem-solving skills using algorithms, pseudocodes, flowcharts, and approaches like top-down, bottom-up, and modular. • To learn C language concepts such as data types, control statements, functions, arrays, strings, and pointers. • To equip the skills in the students for file handling, dynamic memory allocation, structures, unions, debugging, and real-world applications of C programming.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

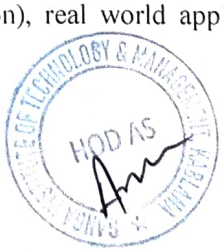
COs	Skills Demonstrated	RBT Level
CO1	Recall the fundamentals of C programming language.	Level 1: Remember
CO2	Understand the basic concepts of C programming language.	Level 2: Understand
CO3	Apply the concepts of C programming language and problem solving techniques to solve engineering problems.	Level 3: Apply
CO4	Analyze the performance of various elements in C language to solve programming problems.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts (preferably 2 from each unit/section) of 1.5 marks each and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Introduction to Programming Language: Different levels of Programming languages- Machine language, Assembly language, Low level & High Level languages; language translator- Assembler, Compiler, Interpreter, Debugger, Linker, Loader.

Problem Solving: Problem definition, Introduction to problem solving, Program Design- Program development life cycle, Problem Solving approaches (Top-down, bottom-up, modular), Problem-solving techniques (Algorithms, Pseudocodes and Flowcharts representation), real world applications of problem solving.



Unit-II

Overview of C: Introduction to C language, Data types, 'C' Tokens, Pre-processor, Header Files, Arithmetic expressions and precedence, I/O: Unformatted and formatted I/O functions in C, Types of errors, operators.
Control statements: if, if-else, nested if, switch case, Repetition / Iterations: entry and exit controlled loops, break, continue and go to statements.

Unit-III

Functions: Definition and Types of functions (built in & user defined functions), Working of a function, Declaring, Defining and Calling User defined functions, Call by value, Call by reference, Function as an argument, Recursive functions with examples.
Arrays: Definitions, types, initialization, processing an array, String handling functions, passing arrays to functions, returning arrays from functions.

Unit-IV

Structures and Unions: Definition, processing, passing to functions, and their uses.
Pointers: Idea of pointers, Definition, Dynamic memory allocation: calloc(), malloc(), free(), realloc(), basics of file handling.

Suggested Readings:

1. Programming in C: A Practical Approach by A. Mittal, Pearson Education.
2. Programming in ANSI C by E. Balaguruswamy, Tata McGraw-Hill
3. Let Us C by Y. Kanetkar, BPB Publication.
4. Schaum's Outline of Programming with C by B. Gottfried, McGraw-Hill
5. C: The Complete Reference by H. Schildt, McGraw Hill Education
6. The C Programming Language by B. W. Kernighan, D. Ritchie, Pearson Education India

Useful Video Links:

Unit No.	Topics	Links
Unit-I	Introduction to Programming Language	https://youtu.be/E6jtj-7xJoA?feature=shared
	Introduction to Language Translator	https://youtu.be/qcEBXrqFLe8?feature=shared
	Algorithms	https://youtu.be/5AHRXOtn9bY?feature=shared
	Flow Chart	https://youtu.be/O8vPR3zh5go?feature=shared
Unit-II	Introduction To C Programming	https://youtu.be/loT0zP4YlMk?feature=shared
	Data types in C	https://www.youtube.com/watch?v=0GJD1Cu4Koc
	Types of errors	https://www.youtube.com/watch?v=vzkcKq1e_yw
	Control Statements	https://youtu.be/kfZEZj1IOBE?feature=shared
Unit-III	Functions	https://www.youtube.com/watch?v=CUBwN0rHxvg
	Call By value & Call By reference	https://youtu.be/8mDj5h1Wwbg?feature=shared
	Recursion	https://www.youtube.com/watch?v=DxrhZJAwYY4
	Arrays	https://youtu.be/19828WOCEMg?feature=shared
	String	https://youtu.be/V7AZuMuJmXY?feature=shared
Unit-IV	Structures	https://youtu.be/Pg49AN6MvhQ?feature=shared
	Pointers	https://www.youtube.com/watch?v=vbqEsRYpSh8&list=PLEAYkSg4uSQ2k6GwNhpgSHodGT8wfvgwu&index=30
	File Handling	https://youtu.be/fWOnJFzOHYM?feature=shared
	Structures	https://youtu.be/Pg49AN6MvhQ?feature=shared

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Course Code	**LC-PHY-101A**				
Category	Basic Science Courses				
Course Title	**Mechanics, Optics and Superconductors Lab**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I/II**
	0	0	2	**1**	
Course Objectives	The objectives of this course are • To teach the fundamentals of physics essential for the development of new technologies to engineering. • To give exposure and training to handle different instruments used in various experiments of physics in technological field.				
Course Pre-requisite	Physics of 12th Standard, Basic Knowledge of Physics				
Assessment	25 Marks				
Practical Examination	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Describe the principles of Hooke's Law, torsional oscillation, sextant and other physics concepts to determine the spring constant, modulus of rigidity and other parameters.	Level 2: Understand
CO2	Apply experimental methods to calculate values such as frequency of oscillations and thermal conductivity from experimental data.	Level 3: Apply
CO3	Analyze the results obtained from various experiments such as diffraction grating, Hall coefficient, energy gap and hysteresis loss.	Level 4: Analyze
CO4	Evaluate the effectiveness of different experimental methods to find Planck's constant and wavelength of light and relate findings to theoretical concepts.	Level 5: Evaluate

List of Experiments:

Sr. No.	Contents
1	To determine the spring constant by Hooke's Law.
2	To determine modulus of Rigidity of the given wire using torsional oscillation method.
3	To determine the frequency of a simple pendulum or vibrating bar or turning fork.
4	To determine the wavelength of monochromatic light by Newton's rings.
5	To determine Planck's constant using photocell
6	To determine thermal conductivity of a metallic material
7	To determine the force applied to various objects using a spring balance and verify the unit of force (Newton).
8	To determine wavelength of light using diffraction grating.
9	To determine the specific rotation of sugar solution using polarimeter.

10	To determine the height of distant object using sextant.
11	To determine displacement and conducting currents through a dielectric.
12	To determine band gap of a semiconductor.
13	To determine Hysteresis loss of a ferromagnetic material
14	To study Hall Effect in semiconductors and measure the Hall coefficient.

Virtual Lab links:

Experiment Name	**Virtual Lab Links**
To determine Planck's constant	vlab.amrita.edu/index.php?sub=1&brch=195&sim=547&cnt=1
To determine the thermal conductivity of a metallic material.	https://vlab.amrita.edu/index.php?sub=1&brch=194&sim=801&cnt=1

Note: At least 10 experiments are to be performed by the students from the above list. The faculty members can add extra experiment if he/she feels important to add.



Course Code	**LC-PHY-102 A**				
Category	Basic Science Courses				
Course Title	**Introduction to Electromagnetism and Optics Lab**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I/II**
	0	0	2	**1**	
Course Objectives	The objectives of this course are • To teach the fundamentals of physics essential for the development of new technologies to engineering. • To give exposure and training to handle different instruments used in various experiments of physics in technological field.				
Course Pre-requisite	Physics of 12th Standard, Basic Knowledge of physics				
Assessment	25 Marks				
Practical Examination	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Describe the characteristics, working principle and applications of Semiconductor devices, solar cells and optical fibers.	Level 2: Understand
CO2	Apply experimental methods to study the forward and reverse characteristics of diodes, He-Ne laser and performance of solar cells.	Level 3: Apply
CO3	Analyze experimental data to calculate parameters such as planck's constant, Hall coefficient, Numerical aperture and energy gap and wavelength of light and specific rotation.	Level 4: Analyze
CO4	Evaluate the performance of semiconductor and optical devices in different practical scenarios and relate findings to theoretical concepts.	Level 5: Evaluate

List of Experiments:

Sr. No.	Contents
1	To study the forward and reverse characteristics of P-N junction diode.
2	To find thickness of hair using He-Ne laser.
3	To study the characteristics of Solar cell and find out the fill factor
4	To determine the wavelength of monochromatic light by Newton's rings.
5	To determine Planck's constant using photocell
6	To determine numerical aperture of an optical fiber.
7	To study Hall Effect in semiconductors and measure the Hall coefficient
8	To verify inverse square law with the help of a photovoltaic cell
9	To find capacitance of condenser using flashing and quenching experiment.

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10	To determine specific rotation of sugar solution using polarimeter .
11	To determine energy gap by four probe method
12	To determine wavelength of light using diffraction grating.

Virtual Lab links:

Experiment Name	Virtual Lab Links
To determine Planck's constant	vlab.amrita.edu/index.php?sub=1&brch=195&sim=547&cnt=1
To find thickness of hair using He-Ne laser	https://bop-iitk.vlabs.ac.in/exp/he-ne-laser-polarization/

Note: At least 10 experiments are to be performed by the students from the above list. The faculty members can add extra experiment if he/she feels important to add.



Course Code	**LC-PHY-103 A**				
Category	Basic Science Courses				
Course Title	**Semiconductor Physics and Optics Lab**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I/II**
	0	0	2	**1**	
Course Objectives	The objectives of this course are • To develop skills to measure various parameters using appropriate instruments. • To gain comprehensive knowledge of different electronic components and integrated circuits.				
Course Pre-requisite	Physics of 12th Standard, Basic Knowledge of Physics				
Assessment	25 Marks				
Practical Examination	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	**Skills Demonstrated**	**RBT Level**
CO1	Describe the characteristics, working principles, and applications of semiconductor devices, solar cells, transistors, and optical fibers.	Level 2: Understand
CO2	Apply experimental methods to study the forward and reverse characteristics of diodes, the performance of solar cells, and the behavior of transistors, JFETs, and capacitors.	Level 3: Apply
CO3	Analyze experimental data to calculate and interpret parameters such as Planck's constant, Hall coefficient, numerical aperture, and energy gap.	Level 4: Analyze
CO4	Evaluate the performance of semiconductor devices in different practical scenarios and relate findings to theoretical concepts.	Level 5: Evaluate

List of Experiments:

Sr. No.	**Contents**
1	To study the forward and reverse characteristics of P-N junction diode.
2	To describe the process of determining the thickness of hair using a He-Ne laser.
3	To investigate the performance characteristics of a solar cell and determine its fill factor.
4	To demonstrate the reverse characteristics of a Zener diode and its voltage regulation capabilities in a practical circuit setup.
5	To analyze the data obtained from the photoelectric effect experiment and interpret the results to calculate the value of Planck's constant.
6	To analyze Hall voltage, magnetic field and current to determine the hall coefficient and identify charge carrier.
7	To verify inverse square law with the help of a photovoltaic cell.
8	To find energy gap by four probe method.

9	To find numerical aperture of optical fiber.
10	To study common base and common emitter characteristics of PNP/NPN transistor
11	To study characteristics of JFET.
12	To determine capacitance of a capacitor by flashing and quenching.

Virtual Lab links:

Experiment Name	Virtual Lab Link
To determine Planck's constant	vlab.amrita.edu/index.php?sub=1&brch=195&sim=547&cnt=1
To find thickness of hair using He-Ne laser	https://bop-iitk.vlabs.ac.in/exp/he-ne-laser-polarization/

Note: At least 10 experiments are to be performed by the students from the above list. The faculty members can add extra experiment if he/she feels important to add.



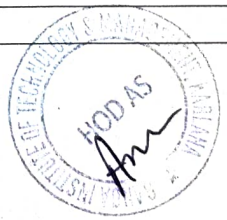
Course Code	**LC-CH-101A**				
Category	Basic Science Courses				
Course Title	**Engineering Chemistry Lab-I**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I/II**
	0	0	2	1	
Course Objectives	The objectives of this course are • To teach the fundamentals of chemistry essential for the development of new technologies to all branches of engineering. • To give exposure and training to handle different apparatus and instruments used in various experiments of chemistry in technological field.				
Course Pre-requisite	Chemistry of 12th Standard, Basic Knowledge of Chemistry				
Assessment	25 Marks				
Practical Examination	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Explain the use of various equipment, conditions and processes for performing chemistry experiments.	Level 2: Understand
CO2	Apply chemical principles and mathematical calculations using laboratory instruments and appropriate formulas.	Level 3: Apply
CO3	Examine the physical and chemical properties of various samples through laboratory experiments and measurements.	Level 4: Analyze
CO4	Analyze the different properties of water samples, oils and pigments.	Level 4: Analyze

List of Experiments

Sr. No.	Contents
1	To interpret the viscosity of different samples.
2	To calculate the surface tension of given liquids.
3	To prepare urea formaldehyde resin.
4	To estimate the total alkalinity of the water sample.
5	To determine the hardness of a given water sample by EDTA method.
6	To calculate the saponification value of a given oil sample.
7	To examine the amount of Fe (II) present in the given solution by volumetric titration.
8	To prepare the biodiesel from vegetable/waste cooking oil.
9	To analyze Flash and Fire Points of different oil samples.
10	To analyze Aniline Point of different petroleum samples.



Virtual Lab Links

Experiment Name	Virtual Lab Links
Experiment on calorimetry	https://media.pearsoncmg.com/bc/bc_0media_chem/chem_sim/calorimetry/Calor.php
Experiment on Spectrophotometry	https://vlab.amrita.edu/index.php?sub=2&brch=190&sim=338&cnt=1 https://biomodel.uah.es/en/lab/abs/espectro.htm
To find BOD	https://ee1-nitk.vlabs.ac.in/List%20of%20experiments.html
To determine COD	https://vlab.amrita.edu/index.php?sub=2&brch=193&sim=1548&cnt=1

Note: At least 10 experiments are to be performed by the students. Faculty members can add 2-3 extra experiment if they feel useful to add.



Course Code	**LC-CH-102A**				
Category	Basic Science Courses				
Course Title	**Engineering Chemistry Lab-II**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I/II**
	0	0	2	1	
Course Objectives	The objectives of this course are • To teach the fundamentals of chemistry essential for the development of new technologies to all branches of engineering. • To give exposure and training to handle different apparatus and instruments used in various experiments of chemistry in technological field.				
Course Pre-requisite	Chemistry of 12th Standard, Basic Knowledge of Chemistry				
Assessment	25 Marks				
Practical Examination	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Explain the use of various equipment, conditions and processes for performing chemistry experiments.	Level 2: Understand
CO2	Apply chemical principles and mathematical calculations using laboratory instruments and appropriate formulas.	Level 3: Apply
CO3	Examine the physical and chemical properties of various samples through laboratory experiments and measurements.	Level 4: Analyze
CO4	Analyze the different properties of water samples, oils and pigments.	Level 4: Analyze

List of Experiments:

Sr. No.	Contents
1	To interpret the viscosity of different samples.
2	To calculate the surface tension of given liquids.
3	To prepare urea formaldehyde resin.
4	To estimate the total alkalinity of the water sample.
5	To determine the hardness of a given water sample by EDTA method.
6	To calculate the saponification value of a given oil sample.
7	To examine the amount of Fe (II) present in the given solution by volumetric titration.
8	To calculate the strength of strong acid by conductometric titrating it with a strong base.
9	Photoreduction of benzophenone to benzopinacol in the presence of sunlight.
10	To extract copper from waste PCBs.

Virtual Lab Links:

Experiment Name	Virtual Lab Links
Experiment on calorimetry	https://media.pearsoncmg.com/bc/bc_0media_chem/chem_sim/calorimetry/Calor.php
Experiment on Spectrophotometry	https://vlab.amrita.edu/index.php?sub=2&brch=190&sim=338&cnt=1 https://biomodel.uah.es/en/lab/abs/espectro.htm

Note: At least 10 experiments are to be performed by the students. Faculty members can add 2-3 extra experiment if they feel useful to add.



Course Code	LC-ME-103 A				
Category	Engineering Science Courses				
Course Title	**Workshop Practice**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I/II**
	0	0	2	**1**	
Course Objectives	The objectives of this course are • To provide exposure to the students with hands on experience on machines and tools. • To have a study and hands-on-exercise on carpentry components. • To have a practice of welding, foundry and fitting operations, etc.				
Assessment	25 Marks				
End Semester Examination	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Describe various manufacturing methods, operations and machine tools used in manufacturing Industries.	Level 2: Understand
CO2	Prepare the job on the different machines.	Level 3: Apply
CO3	Analyze the dimensional accuracies and dimensional tolerances possible with different manufacturing processes.	Level 4: Analyze
CO4	Design and develop small products/elements of their interest by assembling different components.	Level 6: Create

List of Experiments:

Sr. No.	Contents
(A) General	
1	To study various measuring tools used in different shops.
2	To determine the least count of micrometer, Vernier caliper, screw gauge, height gauge etc.
(B) Manufacturing operations	
3	To study various manufacturing methods.
4	To study different machine tools used in manufacturing industries.
5	To prepare a job on a lathe involving facing, outside turning taper turning, step turning, radius making and parting-off. (Practice)
6	To prepare a job involving side and face milling on a milling machines. (Practice)
(C) CNC machining, Additive manufacturing	
7	To study basics of CNC Machine tool.
8	To study the basics of additive manufacturing.
9	To simulate CNC Part program for a CNC Milling machine.(Practice)
10	To simulate CNC Part program for a CNC Turning machine.(Practice)

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(D) Fitting operations	
11	To Study various Fitting operations and tools used in Fitting shop.
12	To make a V-groove and V-notch in MS flat. (Practice)
(E) Carpentry operations	
13	To study steps various tools used in Carpentry shop.
14	To make wooden halving joint (or Cross-Joint) of soft wood. (Practice)
(F) Metal Casting operations	
15	To study various components of Sand Mould and operations involved in the casting process used in Foundry shop.
16	To test different properties of Sand Mould. (Practice)
(G) Welding operations	
17	To study various processes and tools used in welding shop.
18	To make a Butt joint using the given two M.S pieces by arc welding. (Practice)
19	To make a Lap joint using the given two M.S pieces by arc welding. (Practice)

Note: *At least one experiment may be performed from each of the categories from A to G (Preferably from Practice type). In total at least 10 experiments need to be performed by the students.*



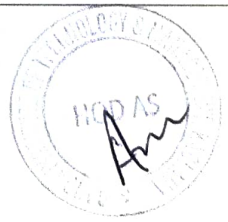
Course Code	**LC-CS-102A**				
Category	Engineering Science Courses				
Course Title	**Programming for Problem Solving Lab**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I/II**
	0	0	2	**1**	
Course Objectives	The objectives of this course are • To perform arithmetic calculations like addition and type conversions. • To solve problems with loops, decision-making, and mathematical computations. • To apply advanced concepts like arrays, pointers, structures, and recursion for data handling. • To develop modular programs using file handling, sorting, and searching techniques.				
Assessment	25 Marks				
End Semester Practical Examination	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Describe the usage of Turbo C IDE and basic C programming techniques.	Level 2: Understand
CO2	Apply Turbo C IDE, arithmetic operators, control statements, and functions for basic programming tasks.	Level 3: Apply
CO3	Implement arrays, strings, recursion, pointers, structures, unions, and file handling for efficient data manipulation.	Level 3: Apply
CO4	Analyze the applicability of control statement and iteration statements to implement linear search and bubble sorting.	Level 4: Analyze

List of Experiments

Sr. No.	Content
1	Introduction of Turbo C IDE and Programming Environment.
2	Apply the concept of Arithmetic operator to perform addition of two numbers which uses variables along with type conversion method.
3	Apply the concept of mathematical library functions to find roots of a quadratic equation.
4	Apply the concept of control statements (if else) to find the largest of three numbers.
5	Apply the concept of switch case to create arithmetic calculator.
6	Apply the concept of "for" loop to generate the Fibonacci series of n-terms.
7	Apply the concept of do--while loop to find the sum of first 5 natural numbers.
8	Apply the concept of 1-D array to read and write elements in an array.
9	Apply the concept of 2-D array to implement the addition of two matrices.
10	Apply the concept of strings to implement various library functions.
11	Apply the concept of Call by Value to Swap two numbers.



12	Apply the concept of recursion to find the factorial of a number.
13	Apply the concept of pointers to get memory address of an element.
14	Apply the concept of structure to read and write basic information of a student.
15	Apply the concept of union to read and write basic information of a student.
16	Apply the concept of file handling to read and write data into a text file.
17	Analyze the applicability of control statement and iteration statements to implement linear search.
18	Analyze the applicability of control statement and iteration statements to implement bubble sorting

Virtual Lab Links:

Experiment Name	**Virtual Lab Links**
Introduction of Turbo C IDE and Programming Environment.	https://www.youtube.com/watch?v=oyEjuHlOd58
Apply the concept of mathematical library functions to find roots of a quadratic equation	https://www.youtube.com/watch?v=3QiItmIWmOM&list=PLeCxvb23g7hrw27XlekHtfygUTQ0TmFfP&index=2
Apply the concept of switch case to create arithmetic calculator.	https://www.youtube.com/watch?v=HHuaYKKoMR4
Apply the concept of 2-D array to implement the addition of two matrices.	https://www.youtube.com/watch?v=ukA_X29Wy6c
Apply the concept of structure to read and write basic information of a student	https://www.youtube.com/watch?v=cCnYT5TSHSA&list=PLeCxvb23g7hrw27XlekHtfygUTQ0TmFfP&index=14
Apply the concept of file handling to read and write data into a text file.	https://www.youtube.com/watch?v=AHkkRS_VsRg

Note: At least 10 experiments are to be performed by the students. Faculty members can add 2-3 extra experiment if they feel useful to add.

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Course Code	**LC-EE-102 A**				
Category	Engineering Science Courses				
Course Title	**Basics of Electrical Engineering Lab**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I/II**
	0	0	2	**1**	
Course Objectives	The objectives of this course are • To teach the fundamentals of electrical engineering, essential for the development of new technologies to all branches of engineering. • To give exposure and training to handle different instruments used in various experiments of Electrical Engineering.				
Course Pre-requisite	Physics of 12th Standard				
Assessment	25 Marks				
End Semester Practical Examination	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Explain the usage of common electrical measuring instruments.	Level 2: Understand
CO2	Apply wattmeter and ammeter method for the power measurement and electrical wiring for household systems.	Level 3: Apply
CO3	Analyze the response of different AC and DC electrical circuits.	Level 4: Analyze
CO4	Verify KCL, KVL & different theorems.	Level 5: Evaluate

List of Experiments

Sr. No.	Contents
1	Basic Safety precautions, introduction and use of measuring instruments such as ammeter, voltmeter, wattmeter, practical resistors, capacitors, inductors, and multi-meter.
2	To verify Kirchhoff's voltage and current law.
3	To verify Thevenin's theorem.
4	To verify Norton's theorem.
5	To verify Superposition theorem.
6	To Verify Maximum Power Transfer Theorem.
7	To determine the resonant frequency in RLC series AC circuit.
8	To determine the resonant frequency in RLC parallel AC circuit.
9	To measure power in three phase balanced circuit using two watt-meter method
10	To measure power in three phase circuit using three voltmeter and three ammeter method.
11	To demonstrate the working of MCB and ELCB.
12	To prepare wiring for household systems with switch control.

Virtual Lab Links

Experiment Name	Virtual Lab Links
To verify Thevenin's theorem.	https://asnm-iitkgp.vlabs.ac.in/exp/verification-thevenin-theorem/
To verify Norton's theorem.	https://asnm-iitkgp.vlabs.ac.in/exp/verification-norton-theorem/
To verify Superposition theorem.	https://asnm-iitkgp.vlabs.ac.in/exp/verification-superposition-theorem/
To Verify Maximum Power Transfer Theorem.	https://asnm-iitkgp.vlabs.ac.in/exp/maximum-power-transfer-theorem/
To determine the resonant frequency in RLC series AC circuit.	https://asnm-iitkgp.vlabs.ac.in/exp/rlc-series-circuit/
To measure power in three phase balanced circuit using two watt-meter method.	https://asnm-iitkgp.vlabs.ac.in/exp/three-phase-power-measurement/

Note: At least 10 experiments are to be performed by the students. Faculty members can add 2-3 extra experiment if they feel useful to add.



Course Code	**LC-ENG-102 A**				
Category	Humanities and Social Sciences including Management courses				
Course Title	**Language Lab**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I/II**
	0	0	2	**1**	
Course Objectives	The objectives of this course are • To develop the ability to communicate effectively in social and professional contexts. • To improve the Pronunciation and Phonemic knowledge of the students.				
Assessment	25 Marks				
Practical Examination	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Explain the spoken language in various contexts and enhance overall comprehension skills.	Level 2: Understand
CO2	Describe the International Phonetic Alphabet and improve clarity and pronunciation.	Level 2: Understand
CO3	Apply their knowledge and skills to excel in Group Discussions, Debates, Extempore, Speeches and Presentations.	Level 3: Apply
CO4	Apply the communication strategies effectively in social and professional settings for impactful interactions.	Level 3: Apply

List of Experiments:

Sr. No.	Contents
1	Listening Comprehension
2	Recognition of Phonemes in the International Phonetic Alphabet
3	Self- Introduction and Introducing Others
4	Conversational Skills and Dialogues in Everyday Situations.
5	Workplace Communication
6	Telephonic Communication
7	Speeches for Special Occasions (Welcome Speeches, Introduction Speeches, Felicitation Speeches and Farewell Speeches)
8	Group Discussions
9	Debates
10	Presentation Skills

Suggested Readings:

- Communicative English for Engineers and Professionals by Nitin Bhatnagar and Mamta Bhatnagar, Pearson Education, 2013.
- Practical English Usage by Michael Swan, 3rd Edition OUP,1995.
- Practical Course in Spoken English, J. K. Gangal, PHI Learning, 2015.
- Communication Skills for Professionals by Nira Konar, PHI Learning, 2009.
- Spoken English by R.K. Bansal and J.B. Harrison, Orient Longman, 1983.
- Communication Skills for Engineers and Scientists, Sangeeta Sharma and Binod Mishra, PHI Learning, 2015.

Useful Video links:

Topics	Links
Listening Comprehension	https://www.youtube.com/watch?v=Q5WwWn7PD6o&list=PLLy_2iUCG87CQhELCytvXh0E_y-bOO1_q&index=7 https://www.youtube.com/watch?v=jiPxwFVA9lE&list=PLLy_2iUCG87CQhELCytvXh0E_y-bOO1_q&index=8
Phonemes and Allophones	https://www.youtube.com/watch?v=fAfl-UkMoVA
Self- Introduction and Introduction of others	https://www.youtube.com/watch?v=QgjkjsqAzvo https://www.youtube.com/watch?v=TwZ7LgrPwR0
Conversation and Dialogues in Everyday Situations	https://www.youtube.com/watch?v=H6n3iNh4XLI
Workplace Communication	https://www.youtube.com/watch?v=B53VM3FKag0&list=PLzf4HHlsQFwIQUeZq_ykEVB6qZrTRnJZn&index=16 https://www.youtube.com/watch?v=PAISeBhtYqI&list=PLzf4HHlsQFwIQUeZq_ykEVB6qZrTRnJZn&index https://www.youtube.com/watch?v=j4tCTRrYC1Q
Telephonic Communication	https://www.youtube.com/watch?v=xROJzUo5Apc
Speeches, Debates and Oral Presentation	https://www.youtube.com/watch?v=xG23Ufhkizs&list=PLLy_2iUCG87CQhELCytvXh0E_y-bOO1_q&index=47 https://www.youtube.com/watch?v=nK2NgiAp4VU&list=PLzf4HHlsQFwIQUeZq_ykEVB6qZrTRnJZn&index=17
Group Discussion	https://www.youtube.com/watch?v=1DVO_f2gk1A&list=PLLy_2iUCG87CQhELCytvXh0E_y-bOO1_q&index=42 https://www.youtube.com/watch?v=R6RyBAZe94w&list=PLLy_2iUCG87CQhELCytvXh0E_y-bOO1_q&index=43 https://www.youtube.com/watch?v=UcEq_RsCyxY&list=PLbMVogVj5nJSZB8BV29_sPwwkzMTYXpaH&index
Presentation Skills	https://www.youtube.com/watch?v=nK2NgiAp4VU&list=PLzf4HHlsQFwIQUeZq_ykEVB6qZrTRnJZn&index=17



Course Code	LC-VAC-101A				
Category	Value Added Courses				
Course Title	**Soft Skills and Personality Development**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I**
	0	0	2	1	
Course Objectives	The objectives of this course are • To prepare the students with stable mind, pleasing personality and determination in order to achieve the highest goal. • To make the students aware about leadership and time management. • To improve the communication skills. • To understand the team building and conflict.				
Assessment	50 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Identify the different skills required for becoming a person with good personality.	Level 1: Remember
CO2	Explain the importance of skills, personality, team, behaviour, managing time and stress.	Level 2: Understand
CO3	Demonstrate the knowledge, attitude and skills as a leader and/or as a team member.	Level 3: Apply
CO4	Analyze the personality, skills, factors affecting interpersonal relationships, roles and responsibilities of leadership and etiquettes.	Level 4: Analyze

Sr. No.	Contents
1	**Soft skills**: Introduction, Need for soft skills.
2	**Communication skills:** Introduction, Meaning, Purpose of communication, Process of communication, Key elements of communication, Characteristics of effective communication, Tools of communication, Verbal communication, Listening skills, Speaking skills, Non-verbal communication, Dealing with conflict Barriers to communication, Overcoming barriers.
3	**Writing:** Letter Format, Letter Writing, E-mail Writing, Paragraph Writing (Topic sentence, inductive and deductive logic), Essay Writing (Narrative, Descriptive, Expository and Persuasive), Resume Writing, Interview.
4	**MS Office:** Introduction of MS office tools.
5	**Presentation skills:** Introduction, Process Examples of presentation language, How to prepare the effective power point presentation.
6	**Personality Development:** Introduction, What is personality, Types of personality, Personality development, Elements of personality development, SWOT analysis, Goal setting Creativity Human values.
7	**Motivation:** Introduction to Motivation, Relevance and types of Motivation, Motivating the subordinates, Analysis of Motivation
8	**Interpersonal relationships:** Introduction, Importance of interpersonal relationship skills, Types of interpersonal relationships, Uses of interpersonal relationship skills, Factors affecting interpersonal relationships, How to accommodate different styles, Consequences of interpersonal relationships.

9	**Teambuilding:** Introduction, Importance of human relations, What is a team? Understanding behaviour, Comfort zones, Stepping stones to assertiveness, Getting to win/win, Assertiveness building blocks, Characteristics of high performance teams, Self-questionnaire.
10	**Leadership**: Introduction, Meaning of leadership, Importance of leadership, Leadership relationship, Approaches to leadership Task, team and individual functions, Functions and responsibilities of leadership, Styles of leadership.
11	**Time management:** Introduction, How do you manage time?
12	**Managing stress:** Introduction, What is stress Recognizing stress, Acknowledging stress, Common signs of stress Tackling the problem.
13	**Thinking skills**: Introduction Core thinking skills Categories of thinking.
14	**Problem solving**: Introduction, Need for problem solving, Skills for problem solving, Process of problem solving, Stages of problem solving, Methods of problem solving.
15	**Decision making:** Introduction, Features, Scope, Purpose, Types of Process.
16	**Workplace etiquette**: Introductions, Behaviour at work Personal etiquette, Using office utilities and resources, Travel etiquette.

Suggested Readings:

The course faculty can suggest the books/journals.



Course Code	**MAU-101A**				
Category	Mandatory Audit Courses				
Course Title	**Yoga and Sports**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I/II**
	2	0	0	-	
Course Objectives	The objective of this course are • To make the students understand the importance of sound health and fitness principles as they relate to better health. • To expose the students to a variety of physical and yogic activities aimed at stimulating their continued inquiry about Yoga, physical education, health and fitness. • To create a safe, progressive, methodical and efficient activity- based plan to enhance improvement and minimize risk of injury. • To develop among students an appreciation of physical activity as a lifetime pursuit and a means to better health.				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Recall the key concepts and terminologies of Physical Education	Level 1: Remember
CO2	Describe the importance of physical fitness, wellness, lifestyle changes, and the concept of positive lifestyle for improving health.	Level 2: Understand
CO3	Apply physical fitness, wellness, yoga techniques, first aid techniques and sports psychology strategies to manage emotions, stress, anxiety, sports injuries and enhance performance.	Level 3: Apply
CO4	Analyze the psychological aspects such as motivation, emotions, and stress to understand their impact on sports performance and athlete behavior.	Level 4: Analyze

Unit-I

Introduction to Physical Education: Meaning & definition of Physical Education, Aims & Objectives of Physical Education, Changing trends in Physical Education, Fundamentals of Anatomy & Physiology in Physical Education, Sports and Yoga.

Awards: Awards and Honours in the field of Sports in India (Dronacharya Award, Arjuna Award, Dhayanchand Award, Rajiv Gandhi Khel Ratna Award etc.)

Unit-II

Physical Fitness, Wellness and Lifestyle: Meaning & Importance of Physical Fitness & Wellness, Components of Physical fitness, Components of Health related fitness, Components of wellness, Preventing Health Threats through Lifestyle Change, Concept of Positive Lifestyle.

Yoga and Asana: Meaning & Importance of Yoga, Elements of Yoga, Introduction - Asanas, Pranayama, Meditation & Yogic Kriyas, Yoga for concentration, Relaxation Techniques for improving concentration - Yog-nidra, Asanas as preventive measures, Sukhasana, Tadasana, Padmasana, Shashankasana, Vajrasana, Pavan Muktasana, Ardha Chakrasana, Bhujangasana, Shavasana, Hastasana, Trikonasana, Ardh Matsyendrasana, Vakrasana, Shalabhasana, Paschimottasana, Chakrasana, Gomukhasana, Parvatasana, Matsyasana.

Unit-III

Psychology & Sports: Definition & Importance of Psychology in Physical Edu. and Sports, differentiate between growth & development, Adolescent problems & their Management.

Emotion: Concept, Type & Controlling of emotions, Meaning, Concept & Types of Aggressions in Sports, Psychological benefits of exercise, Anxiety & Fear and its effects on Sports Performance, Motivation, its type & techniques, Understanding Stress & Coping Strategies.

Unit-IV

Sports / Games: Following subtopics related to any one Game/Sport of choice of student out of: Athletics, Badminton, Basketball, Chess, Cricket, Kabaddi, Lawn Tennis, Swimming, Table Tennis, Volleyball, Yoga etc. History of the Game/Sport, Latest General Rules of the Game/Sport, Specifications of Play Fields and Related Sports Equipment, Important Tournaments and Venues, Sports Personalities, Proper Sports Gear and its Importance

Sports Medicine: First Aid – Definition, Aims & Objectives, Sports injuries: Classification, Causes & Prevention, Management of Injuries: Soft Tissue Injuries and Bone & Joint Injuries.

Note:

The evaluation of students will be conducted by the concerned instructor(s) or an examiner appointed by the Director/Controller of Examination/Head of Department at the end of the semester. Based on their performance, students will be awarded grades as follows: A (Excellent), B (Good), C (Satisfactory), and F (Not Satisfactory). A student who receives an 'F' grade is required to repeat the course.



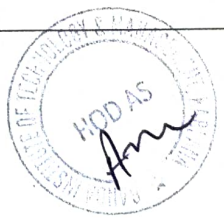
Course Code	**MAU-102A**				
Category	Mandatory Non-Credit Courses – Audit Course				
Course Title	**Fire Ground Operation-I**				
Scheme and Credits	L	T	P	**Credits**	Semester-**I** (For B.Tech Fire Tech & Safety Students)
	0	0	2	-	
Course Objectives	The objectives of this course are • To instill discipline and professionalism by teaching ground decorum, proper communication with superiors, and adherence to dress codes. • To provide a strong foundation in drill techniques, including the principles, history, and practical execution of various formations and movements. • To equip trainees with practical firefighting skills, focusing on the use of fire safety equipment such as fire extinguishers, hoses, and breathing apparatus. • To foster teamwork and leadership through group drills, enhancing coordination, following instructions, and executing synchronized movements.				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Recall key concepts of ground decorum, basic drill movements, fire extinguisher procedures, and firefighting equipment.	Level 1: Remember
CO2	Explain the principles, history, and instructional methods of drills, along with the purpose of various firefighting tools and equipment.	Level 2: Understand
CO3	Demonstrate proper interaction with senior officers, faculty members, and peers, as well as execute basic drill movements such as saluting and quick march.	Level 3: Apply
CO4	Analyze the sequence and coordination required for complex drill movements such as forming file from single file or changing direction by wheeling.	Level 4: Analyze

List of Experiments

Sr. No.	Contents
1	Introduction to ground decorum, talking with senior officers, faculty members, ground instructors and seniors, dress code.
2	To study the aim, principle, instruction method and history of drill.
3	To perform the positions of attention, stand at ease, stand easy, sizing, right dress, dismiss, step forward/backward march and side step.
4	To perform the dressing, open and close order march, forming up in three ranks, numbering, proving, sizing, dismissing and falling out.
5	To perform the position of march and pace, turning by numbers, mark time, the halt, marching in squad, quick march and the halt (on the move).



6	To perform the position of right (or left)- turn, changing direction by wheeling and changing steps on the march, forming file from single file and forming single file from file.
7	To study the tricks of parade inspection, how and whom to salute and perform the position of saluting.
8	To perform saluting at the halt, saluting on the march, marching off in single file, reforming three ranks.
9	To perform the fire extinguisher drill.
10	Introduction to the basic concept of Hose, Hydrant, Ladder, Knots & Lines, Pump, Foam, B. A set.

The evaluation of students will be conducted by the concerned instructor(s) or an examiner appointed by the Director/Controller of Examination/Head of Department at the end of the semester. Based on their performance, students will be awarded grades as follows: A (Excellent), B (Good), C (Satisfactory), and F (Not Satisfactory). A student who receives an 'F' grade is required to repeat the course.

<table>
<tr><td>Course Code</td><td colspan="5">BSC-MAT-102 A</td></tr>
<tr><td>Category</td><td colspan="5">Basic Science Courses</td></tr>
<tr><td>Course Title</td><td colspan="5">Engineering Mathematics-II</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td rowspan="2">Semester-II</td></tr>
<tr><td>3</td><td>1</td><td>0</td><td>4</td></tr>
<tr><td>Course Objectives</td><td colspan="5">The objectives of this course are
• To develop a comprehensive understanding of probability theory, discrete and continuous distributions, and statistical methods for analyzing data.
• To equip students with the skills to apply probability distributions, statistical analysis, and tests of significance in practical scenarios.
• To foster the ability to model real-world problems using probability and statistical techniques, including hypothesis testing and regression analysis.</td></tr>
<tr><td>Course Pre-requisite</td><td colspan="5">Mathematics upto 12th Standard and Engineering Mathematics-I</td></tr>
<tr><td>Assessment</td><td colspan="5">40 Marks</td></tr>
<tr><td>End Semester Examination</td><td colspan="5">60 Marks</td></tr>
<tr><td>Total</td><td colspan="5">100 Marks</td></tr>
<tr><td>Duration of Exam</td><td colspan="5">03 Hours</td></tr>
</table>

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Recall fundamental concepts, definitions, and theorems related to probability, random variables, distributions, and statistical measures.	Level 1: Remember
CO2	Explain the core concepts such as probability theorems, properties of distributions, and statistical methods for data analysis.	Level 2: Understand
CO3	Apply probability theory and statistical techniques to solve problems in real-world scenarios.	Level 3: Apply
CO4	Analyze statistical data and probability distributions to identify relationships between variables, evaluate assumptions, and interpret the implications of test results.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts (preferably 2 from each unit/section) of 1.5 marks each and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Basic Statistics: Definition, Scope and Application of Statistics, Measures of Central Tendency, Measures of Dispersion, Moments, Skewness and Kurtosis.

Correlation and Regression: Rank Correlation, Curve Fitting by the Method of Least Squares - Fitting of Straight lines, Second Degree Parabolas and more General Curves.



Unit-II

Basic Probability & Discrete Probability Distributions: Random Experiment, Sample Space, Events and its Types, Various Definitions of Probability, Addition Theorem, Multiplication Theorem, Conditional Probability, Bayes' Theorem.

Random Variables: Random Variables, Discrete Random Variable, Probability Mass Function, Expectation, Variance and Moments of Discrete Random Variables.

Discrete Probability Distributions: Bernoulli, Binomial and Poisson along with their Properties and Limiting/Approximation Cases.

Unit-III

Continuous Random Variables: Continuous Random Variables and their Properties, Distribution Functions, Probability Density Function, Expectation, Variance, Moments of Continuous Random Variables, Two Dimensional Random Variables- Joint, Marginal and Conditional Distributions of Random Variables.

Continuous Probability Distributions: Uniform, Normal and Exponential along with their Properties and Limiting/Approximation Cases.

Unit-IV

Applied Statistics: Test of Significance: Large Sample Test for Single Proportion, Difference of Proportions, Single Mean, Difference of Means, and Difference of Standard Deviations.

Small Samples: Test for Single Mean, Difference of Means and Correlation Coefficients; Test for Ratio of Variances, Chi-Square Test for Goodness of Fit and Independence of Attributes.

Suggested Readings:

- Higher Engineering Mathematics by B. V. Ramana, Tata McGraw-Hill Publishing Company Limited.
- Higher Engineering Mathematics by B. S. Grewal, Khanna Publishers.
- Advanced Engineering Mathematics by Erwin Kreyszig, John Wiley & Sons.
- Advanced Engineering Mathematics by H.K. Dass, S. Chand.
- A textbook of Engineering Mathematics by N. P. Bali and Manish Goyal, Laxmi Publications.
- Mathematical Statistics by P. Mukhopadhyay, Books and Allied Private Limited, Kolkata.
- Fundamentals of Mathematical Statistics by S.C. Gupta, and V. K. Kapoor, S. Chand & Sons, New Delhi.
- Business Statistics by T.R. Jain and S.C. Aggarwal, VK Global Publications Pvt. Ltd.
- R. E. Walpole, R. H. Myers, S. L. Myers, and K. E. Ye, Probability and Statistics for Engineers and Scientists, 9 edition. Pearson.

Useful Video links:

Unit No.	Topics	Links
Unit I	Measures of Central Tendency	https://youtu.be/XaHFNhHfXwQ?si=oir6QOmcf8ZQLpKa
	Correlation	https://youtu.be/TWd42yUBZkk?si=V6exlcl1CtbRwBEg
	Regression	https://youtu.be/_pbAib0He0Y?si=cG_TU71Js3Pq7jvq
Unit II	Introduction of Probability	https://youtu.be/60vHy2lA4o4
	Random Variables	https://youtu.be/2CP3m3EgL1Q

	Discrete Random variable & Probability Distribution	https://youtu.be/Sv9UYnp9tbs?si=eHqwSJETA5SO3NFI
Unit III	Continuous Probability distribution	https://youtu.be/o2LB3KQME3U?si=NWaP0TY_K8tPaAfu
	Bivariate Probability distribution	https://youtu.be/h-8hJN74O7g?si=K53Y3COL4g_qrWi-
	Probability distributions	https://youtu.be/Hw8KHNgRaOE
Unit IV	Testing of Hypothesis & Levels of significance	https://youtu.be/14PQawp_rjk
	Large Sample Test	https://auece.digimat.in/nptel/courses/video/111105090/L72.html
	Chi-Square Test	https://youtu.be/SlCsNb-VXds?feature=shared



Course Code	**BSC-MAT-103 A**				
Category	Basic Science Courses				
Course Title	**Engineering Mathematics-II**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	3	1	0	**4**	
Course Objectives	The objectives of this course are • To develop an understanding of multivariable integral calculus, vector calculus, Fourier series, Fourier transform and complex analysis. • To familiarize with the applications of engineering mathematics in engineering domain that would enhance their analytical thinking skills.				
Course Pre-requisite	Mathematics upto 12th Standard and Engineering Mathematics-I				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Recall fundamental concepts of multivariable integrals, vector calculus, Fourier series, Fourier transform and complex analysis.	Level 1: Remember
CO2	Explain the principles and applications of multivariable integrals, vector calculus, Fourier series, Fourier transform and functions of complex variables.	Level 2: Understand
CO3	Solve the problems using techniques of integrals, vector calculus, Fourier series expansions, Fourier transform and complex analysis.	Level 3: Apply
CO4	Analyze complex mathematical problems associated with multivariable integrals, vector calculus, Fourier series and transform and complex function theory.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts (preferably 2 from each unit/section) of 1.5 marks each and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Multivariable Integral Calculus: Evaluation of definite and improper integrals, double integrals, Evaluation of double integrals (Cartesian and polar coordinates), Change of order of integration, Change of variables between Cartesian, cylindrical and spherical polar co-ordinates, Applications of double integral to find area enclosed by plane curves, Triple integrals, Applications of triple integrals, Beta and Gamma functions.

Unit-II

Vector Calculus: Differentiation of vectors, scalar and vector point functions, Gradient of a scalar point function, Directional derivative, Curl and divergence, Statement of Green's, Stoke's and Gauss divergence theorems, Verification and evaluation of vector integrals using these theorems.

Unit-III

Fourier Series and Fourier Transforms: Euler's formulae, Dirichlet's conditions, conditions for a Fourier expansion, change of interval, Fourier expansion of odd and even functions, Fourier expansion of square wave, rectangular wave, saw-toothed wave, half and full rectified wave, half range sine and cosine series.

Fourier integrals, Fourier transforms, Shifting theorem (both on time and frequency axes), Fourier transforms of derivatives, Fourier transforms of integrals, Convolution theorem, Fourier transform of Dirac-delta function.

Unit-IV

Functions of Complex Variable–Differentiability and Analyticity, Cauchy-Riemann equations, necessary and sufficient conditions for a function to be analytic, polar form of the Cauchy-Riemann equations, Harmonic functions, Integration of complex functions, Cauchy-integral theorem and formula (without proof), Taylor's series, Laurent's series, Zeros of analytic functions, Singularities, Residues, Cauchy Residue theorem (without proof).

Suggested Readings:

- Higher Engineering Mathematics by B. V. Ramana, Tata McGraw-Hill Publishing Company Limited.
- Higher Engineering Mathematics by B. S. Grewal, Khanna Publishers.
- Advanced Engineering Mathematics by Erwin Kreyszig, John Wiley & Sons.
- Advanced Engineering Mathematics by H.K. Dass, S. Chand.
- A textbook of Engineering Mathematics by N. P. Bali and Manish Goyal, Laxmi Publications.
- Engineering Mathematics for first year by T. Veerarajan, Tata McGraw-Hill Publishing Company Limited.
- Engineering Mathematics- Calculus, Differential Equations and Linear Algebra by P. Sivaramakrishna Das, C. Vijayakumari, Pearson Education.

Useful Video links:

Unit No.	Topic	Link
Unit-I	Multiple Integrals	https://youtu.be/mleeVrv447s?si=ZxrHvWcK3RQTaOyp
	Change of order of integration	https://youtu.be/4rc3w1sGoNU?si=GmMACWg459ppFGyn
	Change of variables	https://youtu.be/wtY5fx6VMGQ?si=bSR0rySP3bqI6Ngh
Unit-II	Vector Differentiation	https://youtu.be/Qj0KM9Uh7xw?si=9gLE1lLBgoYnyi8v
	Gradient of a scalar field and Directional derivative	https://youtu.be/JTJXHcLrxgM?si=kuqQlxeT4Y0N9Xeo
	Gradient, Divergence and Curl	https://youtu.be/v_sTlDeCUdU?si=yf6yzC0hazmWzYEh
	Line integral	https://youtu.be/yCqLvRiVtng?si=iqbOrl9Bq28F9HIL
	Applications of Line integrals	https://youtu.be/mMBSb_dtkYU?si=rtFe1esglErwBr3b
	Green's Theorem	https://youtu.be/34aX-fNMS-c?si=v1hj0iSsVQ2ypsJp
	Divergence Theorem of Gauss	https://youtu.be/DtqTXJ5X3xo?si=J5KIjrjWImlSylNH
	Stoke's Theorem	https://youtu.be/q-fgRrPayJY?si=MI5sFHwamcF8gApa
Unit-III	Fourier series	https://youtu.be/ygOjw0_Kh8k?si=eSrcBHLRFtk4NemO
	Examples on Fourier series of a Periodic Signal	https://youtu.be/yQQH-3eftIE?si=ZdvDoXAk3UC8TSrQ
Unit-IV	Introduction to Complex Numbers	https://www.youtube.com/watch?v=gFjlBKW8aZU
	Analytic functions of a complex variable	https://youtu.be/b5VUnapu-qs?si=odZ34Xpop2x-xcob https://www.youtube.com/watch?v=q01b-lV6y5Q
	Calculus of residues (Part I)	https://youtu.be/o77UV7YrWvw?si=9T5nTlJ3krNNYKx4
	Calculus of residues (Part II)	https://youtu.be/Aq6K0lmv3Qw?si=rWyCcSJMlEVpimr6

Course Code	ESC-ME-104A				
Category	Engineering Science Courses				
Course Title	**Engineering Fundamentals**				
Scheme and Credits	L	T	P	**Credits**	**Semester- II**
	3	0	0	3	
Course Objectives	The objectives of this course are • To understand the engineering profession, its ethics, and the design process for solving real-world problems. • To apply engineering methods in product design, development, and effectively represent technical data using graphs and equations. • To develop skills in accurate measurement, statistical analysis, and estimation methods for precision in engineering applications. • To apply engineering economics principles for evaluating project feasibility using cost analysis, present/future worth, and depreciation.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Recall engineering principles, design processes, professional ethics, and responsibilities.	Level 1: Remember
CO2	Explain core concepts across engineering disciplines and economics.	Level 2: Understand
CO3	Apply engineering methods, design tools, statistical techniques, and economic analysis to solve real-world engineering problems.	Level 3: Apply
CO4	Analyze engineering data, design solutions, assess feasibility, cost- effectiveness, and sustainability for informed engineering decisions and improvements.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts (preferably 2 from each unit/section) of 1.5 marks each and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Engineering: Introduction, Engineering Profession, Engineering Career, Technology Team, Engineering Functions, Engineering Disciplines, Education for Engineering, Engineer as a professional, learning from Tragedy-Fukushima Disaster, Political influence, Ethics in Engineering Profession.

Engineering Design: Introduction, Design Process, Design and the Customer, Nature of Engineering Design, Experiencing the Design Process in Education, Design Opportunities and Challenges of the Future.

Unit-II

Product Design and Development: Introduction, Problem analysis, Engineering Methods, Problem Presentation, Standards of Problem Presentation, Product Development Process, Product Design, Steps in Product Design, Factors to consider in Product Design, Techniques and tools for Design Improvement.

Representation of Technical Information: Introduction, Collecting and Recording Data, General Graphing Procedures, Empirical Functions, Curve Fitting, Method of Selected Points and Least Squares, Empirical Equations: Linear, Power Curves, Exponential Curves.

Unit-III

Artificial Intelligence and Machine Learning: Introduction, AI problems, foundation of AI and history of AI intelligent agents: Agents and Environments, the concept of rationality, the nature of environments, structure of agents, problem solving agents, problem formulation, Role of AI in different Engineering Disciplines, Role of Machine learning in different domains.

Statics: Introduction, Frequency Distribution, Measures of Central Tendency, Measure of variation, Linear Regression, Coefficient of Correlation.

Unit-IV

Introduction to Engineering Economics: Introduction, Simple and Compound Interest, Cash-Flow Diagram, Present Worth and Future Worth, Annual Worth and Gradients, Economic Decision Making, Depreciation and Taxes.

Suggested Readings:

- Engineering Fundamentals and Problem Solving, Eighth Edition by Arvid Eide, Roland Jenison, Larry Northup, Steven Mickelson, McGraw-Hill Education.
- Introduction to Engineering: An Assessment and Problem Solving Approach by Q. H. Mazumder, CRC Publishers
- Engineering Fundamentals: An Introduction to Engineering by Saeed Moaveni, Cengage Learning
- Process Engineering Problem Solving Avoiding "The Problem Went Away, But it Came Back" Syndrome by J. M. Bonem, Wiley
- Fundamentals of Engineering Economics, 3rd Ed. by Chan S. Park, Pearson Education
- Probability and Statistics (for Scientists and Engineers) by Rao V. Dukkipati, New Age International Publishers.
- Applied Statistics and Probability for Engineers, by Douglas C. Montgomery and George C. Runger, Wiley
- Artificial Intelligence – A Modern Approach by S. Russel and P. Norvig, Second Edition, Pearson Education

Useful Video Links:

Unit No.	Topics	Links
Unit-I	Introduction to system Design	https://www.youtube.com/watch?v=FPp25m2KVcY
Unit-II	Product Design and Development	https://www.youtube.com/watch?v=ULt4aEst4mM&list=PLyqSpQzTE6M_RfjEQMK7_L-UvxAMhplUT&index=2
	Product Life Cycle	https://www.youtube.com/watch?v=qgVs8vskWl0&list=PLSGws_74K018yZOnbSaqWJZ837QyBB37vu&index=2
	Product Design Steps	https://www.youtube.com/watch?v=dcup4kRxSEs
Unit-III	Measures of central tendency and measures of variation	https://www.youtube.com/watch?v=kVopC1a2-ok
Unit-IV	Cash Flow Statement	https://www.youtube.com/watch?v=rR-vWCn6RP0

Course Code	**MAU-103A**				
Category	Mandatory Non-Credit Courses – Audit Course				
Course Title	**Design Thinking**				
Scheme and Credits	L	T	P	**Credits**	Semester-**II**
	0	0	2	-	
Course Objectives	The objectives of this course are to • Understand engineering design principles, prototyping techniques, and the use of tools for product development. • Apply design thinking, fabrication methods, and embedded systems to create functional prototypes and solutions. • Analyze and synthesize innovative engineering solutions, integrating design, prototyping, and testing for real-world applications.				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Recall fundamental concepts of engineering design, product development, prototyping, fabrication tools, and intellectual property rights.	Level 1: Remember
CO2	Understand the design thinking process, basic hand tools, power tools, and methods of machining and joining materials.	Level 2: Understand
CO3	Apply design thinking, engineering tools, and prototyping techniques to create functional prototypes, integrating Arduino/Raspberry Pi programming.	Level 3: Apply
CO4	Analyze product designs and prototypes, evaluate customer needs, and assess design effectiveness, functionality, and feasibility through testing.	Level 4: Analyze

List of Experiments:

Sr. No.	Contents
1	Conduct survey and identify the problem either individual or group and frame the problem statement.
2	Identify demographic or focus group for problem statement and create persona and explicitly define the characteristics of the persona.
3	Design thinking and stages of design thinking process –Define, Research, Ideate, Prototype, Select, Implement, Learn.
4	Process of product design and alignment of customer expectations with product design.
5	Introduction to basic hand tools - Tape measure, combination square, Vernier caliper, hammers, fasteners, wrenches, pliers, saws, tube cutter, chisels, vice and clamps, tapping and threading, Adhesives.
6	Basics of IPR and patents accessing and utilizing patent information in IDEA Lab.
7	Prototyping using subtractive cutting processes.

8	Machining of 3D geometry on soft material such as soft wood or modelling wax.
9	Basic welding, brazing and other joining techniques for assembly.
10	Introduction to Power tools: Power saws, band saw, jigsaw, angle grinder, belt sander, bench grinder, rotary tools, various types of drill bits.
11	Introduction to fire extinguishing media and small gears for rescue operations.
12	Schematic and PCB layout design of a suitable circuit, fabrication and testing of the circuit.
13	Arduino and Raspberry Pi programming and use.
14	Design and implementation of a capstone project involving embedded hardware, software and machined or 3D printed enclosure.
15	Solving Practical Engineering Problem through Innovative Product Design & Creative Solution.

The evaluation of students will be conducted by the concerned instructor(s) or an examiner appointed by the Director/Controller of Examination/Head of Department at the end of the semester. Based on their performance, students will be awarded grades as follows: A (Excellent), B (Good), C (Satisfactory), and F (Not Satisfactory). A student who receives an 'F' grade is required to repeat the course.

HOD AS

Course Code	**MAU-104A**				
Category	Mandatory Non-Credit Courses – Audit Course				
Course Title	**Fire Ground Operation-II**				
Scheme and Credits	L	T	P	**Credits**	Semester-**II**
	0	0	2	-	
Course Objectives	The objectives of this course are to • Develop comprehensive physical fitness and mental resilience • Understand firefighting techniques and equipment handling • Learn teamwork, communication and rescue operations • Ensure safety and protection through personal protective equipment (PPE) and breathing apparatus				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

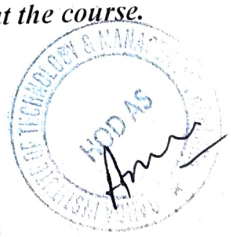
COs	Skills Demonstrated	RBT Level
CO1	Recall key terms, classifications, and features related to physical fitness, yoga, firefighting equipment and personal protective equipments.	Level 1: Remember
CO2	Explain the principles and purpose of fitness monitoring, squad drills, extinguishers, hose drills, hydrants, knots, and foam types.	Level 2: Understand
CO3	Solve basic and advanced tasks such as operating and refilling portable extinguishers, executing hose drills and practicing knots and lacing techniques.	Level 3: Apply
CO4	Analyze the suitability of different hoses and ladders for specific scenarios, and assess fitness data to provide feedback.	Level 4: Analyze

List of Experiments:

Sr. No.	Contents
1	**Physical Exercise:** Monitoring Levels of Fitness, Pulse, Blood Pressure, Body fat
2	**Yoga & Mediation**
3	**Squad Drill:** Clarification, Correction of faults, Inspection, Handling a squad, Questions, Communication drill and mutual drill
4	**Extinguishers:** Operation of portable extinguishers, Refilling of portable extinguishers, Inspection requirement of portable extinguishers
5	**Hose & Hose Fitting:** Types, (Delivery Hose, Suction Hose, Hose Reel-Hose), Hose binding/patching g/washing, Hose drill: Lifting, Lowering, Carrying, Laying, Connect, Disconnect, Removal of kinks, Under - running, Roll
6	**Hydrant:** Types of Hydrants, Hydrant Installation (underground and pillar post)
7	**Ladder:** Types of ladders: Hook ladder, Roof ladder, 35 ft Aluminum extension ladder, 45 ft Aluminum extension ladder, Truss - type and non-truss –type

8	**Knots:** Introduction, Types of ropes, Rope construction, Types of knots, Types of lacing, (Round lasing, diagonal lasing, Figure of eight lasing, Square lasing), Types of lacing, knot practice (Over hand, figure of eight, Reef, Chair knot
9	**Pump:** Types of pumps
10	**Foam:** Introduction, Part identification and specification: FB -2, FB -10, FB - 5X, FB -10X, MFG - 5A, MFG -10A
11	**B. A set:** Construction features, uses
12	**P.P.E:** Introduction

The evaluation of students will be conducted by the concerned instructor(s) or an examiner appointed by the Director/Controller of Examination/Head of Department at the end of the semester. Based on their performance, students will be awarded grades as follows: A (Excellent), B (Good), C (Satisfactory), and F (Not Satisfactory). A student who receives an 'F' grade is required to repeat the course.



Annexure 2.5

Ganga Institute of Technology and Management, Kablana

(An Autonomous Institute under Maharshi Dayanand University, Rohtak)

Department of Mechanical Engineering

Minutes of Board of Studies

30.12.2024

The first Meeting of Board of Studies of Mechanical Engineering Department was held on 30.12.2024 at 11:00 A.M in the Conference Hall of the Institute

The following members were present for the BOS meeting:

S.No.	Name of the Member	Affiliation/Organization	Designation within Board of Studies
1	Mr. Vivek	HOD, GITAM, Kablana	Chairman
2	Dr. Vineet Singla	Professor, UIET, MDU Rohtak	Member
3	Dr. Vasdev Malhotra	Professor, J.C Bose UST, YMCA Faridabad	Member
4	Dr. V.N. Mathur	Professor, ME, MAIT Rohini	Member
5	Dr. Aman Aggarwal	Professor, GITAM Kablana	Member
6	Dr. Jitender Kumar	Professor, GITAM Kablana	Member
7	Dr. Hari Parshad	Professor, GITAM Kablana	Member
8	Dr. Sunil Kadiyan	Professor, GITAM Kablana	Member
9	Dr. Vishant Kumar	Professor, GITAM Kablana	Member
10	Dr. Devender Singh Punia	Assistant Professor, GITAM Kablana	Member
11	Mr. Parvesh	Assistant Professor, GITAM Kablana	Member
12	Mr. Bhoop Singh	Assistant Professor, GITAM Kablana	Member
13	Mr. Pardeep Kumar	Assistant Professor, GITAM Kablana	Member
14	Mr. Balraj Hooda	Assistant Professor, GITAM Kablana	Member
15	Mr. Manmohan	Assistant Professor, GITAM Kablana	Member
16	Mr. Chirag Verma	Assistant Professor, GITAM Kablana	Member
17	Mr. Mohit Taneja	Assistant Professor, GITAM Kablana	Member
18	Mr. Vikas Goel	Assistant Professor, GITAM Kablana	Member
19	Mr. Nikhil Sikka	Assistant Professor, GITAM Kablana	Member
20	Mr. Vishnu	Assistant Professor, GITAM Kablana	Member
21	Mr. Manoj Kumar	Assistant Professor, GITAM Kablana	Member

GANGA INSTITUTE OF TECHNOLOGY & MANAGEMENT, KABLANA
HOD ME

Agenda of the Meeting:

1. Introduction of the members of the board of studies
2. Approval of the syllabus prescribed for M. Tech 1st year under autonomous status.
3. Approval of the syllabus prescribed for courses for B. Tech 1st year offered by the Mechanical Engineering Department under Autonomous status.
4. Panel of examiners.
5. Any other item with the permission of the chair

Proceedings:

Item: 1	The Chairperson welcomed all the BOS members and introduced external members to the internal members. The members shared their affiliations and roles within the BOS.
Item: 2	Approved the scheme and syllabus of M. Tech (MD, M&A) 1st year with suggestion to eliminate the name of softwares in the curriculum and syllabus.
Item: 3	Approved the syllabus of Manufacturing Process, Engineering Graphics and Design, Workshop Practice and Engineering fundamentals with minor changes.
Item: 4	Thepanel of theory examiners for practical as well as theory paper setting was approved.
Item: 5	Suggested to establish additional collaborations with industries and reputed academic institutions to strengthen the curriculum and improve employability prospects for students.

The meeting concluded with the vote of thanks proposed by Chairperson BOS ME to all members for their presence and insights.



Annexure 2.6

GANGA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, KABLANA (JHAJJAR)

An Autonomous Institute

'A' GRADE ACCREDITED BY NAAC

Evaluation Scheme & Syllabus For

Master of Technology (Machine Design) 1st Year

(Effective from the Session: 2024-25)

APPROVED BY AICTE, NEW DELHI AND AFFILIATED TO MDU, ROHTAK

1. DEFINITION OF CREDIT

1	1 Lecture (L) per week	1 Credit
2	2 Practical (Lab) per week	1 Credit
3	2 Seminar per Week	2 Credit
4	4 Project per Week	2 Credit

2. RANGE OF CREDIT

A credits of 86* for a student to be eligible to get Post Graduate degree in Engineering.

3. STRUCTURE OF POSTGRADUATE ENGINEERING PROGRAM (M. TECH)

Sr. No.	**Category**	**Breakup of Credits**
1	Professional Core Courses	32*
2	Professional Elective Courses (Relevant to chosen specialization/branch)	8*
3	Multidisciplinary Open Elective Courses	6*
4	Foundation Elective Courses	3*
5	Mandatory Learning Course	3*
6	Seminar	6*
7	Lab Courses	4*
8	Project	2*
9	Dissertation	22*
	Total Credits	86*

**Minor variation is allowed as per need of the respective disciplines.*

4. COURSE CODE AND DEFINITIONS

Sr. No.	Category	Course Code
1	Professional Core Courses	PCC
2	Professional Elective Courses (Relevant to chosen specialization/branch)	PEC
3	Multidisciplinary Open Elective Courses	OEC
4	Foundation Elective Courses	FLC
5	Mandatory Learning Course	MLC
6	Seminar	SM
7	Lab Courses	LC
8	Project	PROJ
9	Dissertation	DISS

GANGA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, KABLANA, JHAJJAR (HR.)

Scheme of Studies and Examination

M.Tech (MACHINE DESIGN) – 1st Semester

w.e.f. 2024-25

Sr. No.	Category	Course Code	Course Title	Hours per week			Total Load Per Week	Credits	Examination Scheme (Marks)				Exam Duration in H
				Lecture (L)	Tutorial (T)	Practical (P)			Assessment	End Semester Examination		Total	
										Theory	Practical		
1	Professional Core Courses	PCC-MTMD-101A	Numerical Analysis and Optimization	4	0	0	4	4	40	60		100	3
2	Professional Core Courses	PCC-MTMD-103A	Instrumentation and Measurement	4	0	0	4	4	40	60		100	3
3	Professional Core Courses	PCC-MTMD-105A	Experimental Stress Analysis	4	0	0	4	4	40	60		100	3
4	Professional Core Courses	PCC-MTME-107A	Metal Forming Analysis	4	0	0	4	4	40	60		100	3
5	Professional Core Courses	PCC-MTME-109A	Mechatronics and Product Design	4	0	0	4	4	40	60		100	3
6	Lab Course	LC-MTMD-111A	Experimental Stress Analysis Lab	0	0	2	2	1	25		25	50	3
7	Lab Course	LC-MTMD-113A	Mechanical Measurement Lab	0	0	2	2	1	25		25	50	3
8	Seminar	SM-MT-115A	Seminar-I	0	0	2	2	2	50			50	
Total Credits								**24**				**650**	

GANGA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, KABLANA, JHAJJAR (HR.)

Scheme of Studies and Examination

M.Tech (MACHINE DESIGN) – 2nd Semester

w.e.f. 2024-25

Sr. No.	Category	Course Code	Course Title	Hours per week			Total Load Per Week	Credits	Examination Scheme (Marks)				Exam Duration in H
				Lecture (L)	Tutorial (T)	Practical (P)			Assessment	End Semester Examination		Total	
										Theory	Practical		
1	Professional Core Courses	PCC-MTMD-102A	Theory of Elasticity	4	0	0	4	4	40	60		100	3
2	Professional Core Courses	PCC-MTMD-104A	Design of Mechanisms	4	0	0	4	4	40	60		100	3
4	Professional Elective Courses	Refer Table -I	……	4	0	0	4	4	40	60		100	3
5	Multidisciplinary Open Elective Courses	Refer Table -II	……	3	0	0	4	3	40	60		100	3
6	Foundation Elective Courses	Refer Table -III	……	3	0	0	4	3	40	60		100	3
7	Lab Course	LC-MTMD-106A	Material Testing Lab	0	0	2	2	1	25		25	50	3
8	Lab Course	LC-MTMD-108A	Design Practice Lab – I	0	0	2	2	1	25		25	50	3
9	Seminar	SM-MT-110A	Seminar-II	0	0	2	2	2	50			50	
Total Credits								**22**				**650**	

Table I (Program Elective Courses)

Courses	Remarks
PEC-MTMD-112A	Computer Aided Design
PEC-MTMD-114A	Materials Management
PEC-MTMD-116A	Design of Pressure Vessels
PEC-MTMD-118A	Finite Element Methods

Table II (Multidisciplinary Open Elective-I Courses)

Students of all M. Tech programmes are required to study one Multidisciplinary open elective course in each of the 2nd and 3rd Semesters and one foundation elective course in 2nd Semester for 2-Years Programmes. They may choose any one of the following courses (excluding the courses offered by the departments of their own subjects, if not stated otherwise).

SN	Courses Code	Course Name	Offered by Department
1	OEC-130A	Basic of Economics	Management Department
2	OEC-132A	Fundamental of Management	Management Department
3	OEC-134A	Disaster Management	Civil Engineering
4	OEC-136A	Industrial Safety	Fire Technology and Safety
5	OEC-138A	Indian Literature in Translation-I	Applied Sc. & Humanities (English)
6	OEC-140A	Environmental Issues	Applied Sc. & Humanities (Chemistry)
7	OEC-142A	Quantitative Techniques	Applied Sc. & Humanities (Mathematics)
8	OEC-144A	Sources of Energy-I	Electrical Engineering
9	OEC-146A	Operation Research	Mechanical Engineering
10	OEC-148A	Multimedia Communication	Electronics and Communication Engineering
11	OEC-150A	Introduction to Information Technology	Computer Sc. & Applications
12	OEC-152A	Cyber Forensics and Security	Computer Sc. & Engineering
13	OEC-154A	Computer Science and Principles	Computer Sc. & Engineering
14	OEC-156A	Software Engineering Practice	Computer Sc. & Engineering

Table III (Foundation Elective Courses)

SN	Courses	Remarks	Offered by Department
1	FEC-158A	Basics of Accounting	Management Department
2	FEC-160A	Basics of E-commerce	Management Department
3	FEC-162A	Element of Banking	Management Department
4	FEC-164A	Computer Fundamentals	Computer Science and Engineering
5	FEC-166A	Communication and Soft Skills	Applied Science and Humanities (English)
6	FEC-168A	Entrepreneurship Development	Management Department
7	FEC-170A	Electronics Engineering	Electronics and Communication Engineering

<table>
<tr><td>Course Code</td><td colspan="5">PCC-MTMD-101A</td></tr>
<tr><td>Category</td><td colspan="5">Professional Core Courses</td></tr>
<tr><td>Course Title</td><td colspan="5">NUMERICAL ANALYSIS AND OPTIMIZATION</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td rowspan="2">Semester-I</td></tr>
<tr><td>4</td><td>0</td><td>0</td><td>4</td></tr>
<tr><td>Course Objectives</td><td colspan="5">The objectives of this course are
Provide knowledge to approximate solutions for complex equations, where exact solutions are either impossible or impractical to find.
Study and minimize errors in numerical calculations, ensuring that algorithms are reliable, accurate, and stable across various computational environments.
Learn algorithms that optimize computational resources, making them suitable for large-scale problems and real-time applications.
Find maximum or minimum values in complex systems, which are essential for areas like engineering, machine learning, economics, and physics.
Develop skills to apply numerical and optimization techniques to solve practical problems in engineering, data science, finance, and various scientific disciplines where traditional analytical solutions are insufficient.</td></tr>
<tr><td>Assessment</td><td colspan="5">40 Marks</td></tr>
<tr><td>End Semester Examination</td><td colspan="5">60 Marks</td></tr>
<tr><td>Total Marks</td><td colspan="5">100</td></tr>
<tr><td>Duration of Exam</td><td colspan="5">03 Hours</td></tr>
</table>

Course Outcomes: After studying this course, the students will be able to

COs	Skills Demonstrated
CO1	Define basics and terminologies of numerical analysis and optimization.
CO2	Explain the concepts of numerical methods, approximation, optimization and programming etc.
CO3	Solve the problems by using various numerical methods or techniques.
CO4	Analyze the problem related to optimization, approximation, programming etc.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit No.	Contents
Unit-I	**System of linear algebraic equations and Eigen value problems**: elimination method, Gauss method, Gauss-Jordan method; Eigen values and Eigen vectors, bounds on Eigen values, Jacobi methods for symmetric matrices, householder's method for symmetric matrices. **Interpolation and approximation**: interpolation problem, linear interpolation, Lagrange interpolation, Newton interpolation, interpolation with equidistant points, spline interpolation, least square approximation.
Unit-II	**Numerical differentiation and integration**: differentiation of continuous functions, forward difference quotient, central difference quotient, error analysis; derivatives from differences table, higher-order derivatives, Richardson extrapolation techniques, Newton-Cotes method, trapezoidal rule, Simpson's rule, higher order rules, Romberg integration. **Numerical solution of ordinary differential equations**: Taylor's series method, Euler and modified Euler method, Runge-Kutta methods, Milne's method, Adam-Bashforth-Moulton method.
Unit-III	**Optimization**: basic concept of optimization, classification of optimization, optimization techniques, engineering applications of optimization. Classical optimization techniques: unconstrained optimization single-variable optimization, multivariable optimization, multivariable optimization, multivariable optimization with equality constraints: solution by direct search method, solution by Lagrange-multipliers method, multivariable optimization with inequality constraints, Kuhn-Tucker conditions. **Non-linear optimization**: general non-linear programming problem, classification of non-linear programming problem, unconstrained optimization techniques: direct search method, gradient method. Constrained optimization techniques: separable programming, quadratic programming.
Unit-IV	**Dynamic programming**: Multistage decision process: representation of a multistage decision process, conversion of nonserial system to a serial system, types of multistage decision problems, principle of optimality, computational procedure in dynamic programming, linear programming as a case of dynamic programming, application of dynamic programming.

Suggested Readings

1. Engineering Optimization, by SS Rao; New Age International Ltd.
2. Numerical Method, by E. Balagurusamy; Tata McGraw Hill.
3. Numerical methods for Scientific & Engineering Computation, by MK Jain, SRK Iyengar and RK Jain; New Age International Ltd.

Useful Video links

	Topic	Link
UNIT-I	System of linear algebraic equations and Eigen value problems	https://www.youtube.com/watch?v=IfmOZoqoW3I
		https://www.youtube.com/watch?v=6Zacf25sXhk
	Interpolation and approximation	https://www.youtube.com/watch?v=Lp2MdAvk2MY
		https://www.youtube.com/watch?v=nhfCY43iAP0
UNIT-II	Numerical differentiation and integration	https://nptel.ac.in/courses/111106101
	Numerical solution of ordinary differential equations	https://nptel.ac.in/courses/111105038
UNIT-III	Optimization	https://nptel.ac.in/courses/111105039
	Non-linear optimization	https://nptel.ac.in/courses/111105039
UNIT-IV	Dynamic programming	https://nptel.ac.in/courses/111107104

<table>
<tr><td>Course Code</td><td colspan="5">PCC-MTMD-103A</td></tr>
<tr><td>Category</td><td colspan="5">Professional Core Courses</td></tr>
<tr><td>Course Title</td><td colspan="5">Instrumentation and Measurement</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td rowspan="2">Semester-I</td></tr>
<tr><td>4</td><td>0</td><td>0</td><td>4</td></tr>
<tr><td>Course Objectives</td><td colspan="5">The objectives of this course are
Comprehensive understanding of the basic principles of instrumentation and measurement.
Learn various measurement techniques to select appropriate instruments for specific measurement tasks.
Develop skills in using appropriate instruments to measure displacement, force, torque, power, temperature, pressure, and flow.
Provide knowledge of statistical methods to analyze data accuracy, calculate mean, variance, and understand error sources.
Facilitate instrumentation concepts to real-world applications such as power plant systems, air conditioning controls, and industrial robotics.</td></tr>
<tr><td>Assessment</td><td colspan="5">40 Marks</td></tr>
<tr><td>End Semester Examination</td><td colspan="5">60 Marks</td></tr>
<tr><td>Total Marks</td><td colspan="5">100</td></tr>
<tr><td>Duration of Exam</td><td colspan="5">03 Hours</td></tr>
</table>

Course Outcomes: After studying this course, the students will be able to

COs	**Skills Demonstrated**
CO1	Define the terms and concepts of instrumental and measurement.
CO2	Explain the working of various measurements & instrumentation devices.
CO3	Use suitable instruments for the measurement of errors and different parameters.
CO4	Analyze the various parameters such as force, power, temperature, pressure and flow.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit No.	**Contents**
Unit-I	**Introduction to Instrumentation:** Major elements of a measurement system. Order, type of signals, response of instruments. Importance of sensors in measuring system. Errors and response characteristics of sensors. Measurement error. **Measurement Techniques Signal conditioning:** Amplification and noise filtering, impedance matching, Wheatstone Bridge technique. Digital signal processing: Sampling rate, aliasing, discretization, A/D and D/A converters, frequency content of a signal, concept of FFT. Common measuring instrument: Multimeter, oscilloscope, spectrum analyzer, display and recorder, plotter. Statistical analysis of data: Concept of normal distribution, mean and variance (standard deviation).

Unit-II	**Displacement and Motion Measurement:** Potentiometer, linear variable differential transformer, strain gauge, proximity probe. Angular velocity measurement: Mechanical and electric tachometer. Seismic instrument: Accelerometer. **Force, Torque & Power Measurement:** Force measurement: elastic force transducer, piezoelectric force transducer, hydraulic and pneumatic method. Torque measurement: Using shaft deflection, using induced strain, torque reaction method. Power measurement: Absorption dynamometer, mechanical & hydraulic method, transmission dynamometer, torque mete
Unit-III	**Temperature Measurement:** Thermal expansion method: Liquid-in-glass thermometer, pressure thermometer, bimetal type thermometer. Resistance Thermometer: RTD, thermistor. Thermocouple, quartz thermometer, radiation thermometer. **Pressure Measurement:** Measuring static pressure: Piezometer, manometer. Measuring dynamic & static pressure: Pressure transducer, bellow-type, diaphragm-type, piezoelectric. Bourdon tube pressure gauge.
Unit-IV	**Flow Measurement:** Obstruction meter: Venturi meter, nozzle, orifice meter, pitot tube. Positive displacement flowmeter: Rotary-vane meter, rotameter. Special methods: Turbine flow meter, ultrasonic flowmeter, magnetic flowmeter, hot wire anemometer, open channel flowmeter, laser Doppler flowmeter. Examples of Instrumentation Boiler power plant instrumentation, air conditioning plant control, industrial robotics system, etc.

Suggested Readings

1. Instrumentation and Measurement, by Nakra & Choudhry.
2. Instrumentation for Engineering Measurements, by JW Dally; John Wiley & Sons.
3. Experimental Methods for Engineers, by JP Holman; McGraw Hill.
4. Mechanical Measurements, by Thomas Beckwith and Lewis Buck; Narosa Publishing House.

Useful Video links

Unit No.	Topic	Link
UNIT-I	Mechanical Measurement System	https://onlinecourses.nptel.ac.in/noc22_me08/preview
	Analog-to-Digital Converter	https://www.youtube.com/watch?app=desktop&v=TirvWsbqBUc
UNIT-II	Linear Variable Differential Transformer or Transducer Working	https://www.youtube.com/watch?v=E-kDsP0wq6w
	Sensors & Transducers	https://youtu.be/zxYeJW9v6OU?si=YSfjQEDyD9q2OUPL
UNIT-III	Thermal Expansion	https://www.youtube.com/watch?v=Lzrjqy4PImE
	Pressure Measurement using Piezometer	https://www.youtube.com/watch?v=uEMghhfXuoA
	Pressure Measurement	https://www.youtube.com/watch?v=sHmjE21Fp9w
UNIT-IV	Flow rate measurement	https://www.youtube.com/watch?v=bsR3o-cFyMU

<table>
<tr><td>Course Code</td><td colspan="5">PCC-MTMD-105A</td></tr>
<tr><td>Category</td><td colspan="5">Professional Core Courses</td></tr>
<tr><td>Course Title</td><td colspan="5">Experimental Stress Analysis</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td rowspan="2">Semester-I</td></tr>
<tr><td>4</td><td>0</td><td>0</td><td>4</td></tr>
<tr><td>Course Objectives</td><td colspan="5">The objectives of this course are
Provide foundational knowledge of stress, strain, and material behavior under various loads.
Learn and apply key experimental methods, such as strain gauges and photo elasticity, for stress analysis.
Gain skills to accurately interpret experimental data and assess measurement uncertainties.
Acquire hands-on experience in setting up experiments to analyze stress distributions in materials.
Develop the ability to validate theoretical models through experimental findings.</td></tr>
<tr><td>Assessment</td><td colspan="5">40 Marks</td></tr>
<tr><td>End Semester Examination</td><td colspan="5">60 Marks</td></tr>
<tr><td>Total Marks</td><td colspan="5">100</td></tr>
<tr><td>Duration of Exam</td><td colspan="5">03 Hours</td></tr>
</table>

Course Outcomes: After studying this course, the students will be able to

COs	**Skills Demonstrated**
CO1	Define the terminologies related to experimental stress analysis.
CO2	Explain the fundamental principles of stress and strain analysis and their application to experimental techniques.
CO3	Use appropriate experimental method and circuit to measure stress and strain in components.
CO4	Analyze the stress-strain behavior of materials under various loading conditions using experimental techniques.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit No.	**Contents**
Unit-I	**Strain Measurement:** An ideal strain gauge, mechanical, optical, acoustical, pneumatic, dielectric and electrical strain gauges. Differential transformer and piezoelectric transducers. **Electrical Wire Resistance Strain Gauges:** bonded type gauges, bonding agents, foil gauges, gauge materials. Weldable gauges. Strain gauge adhesive. Fixing of gauges. Temperature effects in bonded gauges. Gauge factor and gauge sensitivity. Measurement of stress and stress gauge.

Unit-II	**Measuring Circuits and Strain Gauge Rosette:** Potentiometer circuit, Wheatstone bridge, circuit sensitivity and output, temperature compensation and signal addition. Rectangular, delta and tee-delta rosette. Application of strain gauge in practical problems.
Unit-III	**Whole Field Methods:** Photo elasticity, stress loci, isoclinic, isostatics and isochromatic, stress optic law and strain optic law, photo elastic materials, polarization of light, plane polarized and elliptically polarized light. Brittle coating, crack pattern and crack detection in coating. Moire Fringe, geometry.
Unit-IV	**Analysis** of Photo Elasticity Data, polariscope, fringes due to principal stress direction and difference, model making, interpretation of isoclinic and isochromatic and fractional fringe order. Calibration through tension, beam and disc models. Reflection polariscopic. Application to stress concentration and stress intensity factor. Separation of stresses.

Suggested Readings

1. Experimental Stress Analysis, by Abdul Mubeen; Dhanpat Rai and Sons.
2. Experimental Stress Analysis, by JW Dally and WF Riley; McGraw-Hill.
3 The Strain Gage Primer, by CC Perry and HR Lissner; McGraw-Hill.
4. Moire Fringes in Strain Analysis, by PS Theocharis; Pergamon Press.

Useful Video links

Unit No.	Topic	Link
UNIT-I	Overview on strain gauges	http://acl.digimat.in/nptel/courses/video/112106198/L12.html
	Differential transformer and piezoelectric transducers	https://www.youtube.com/watch?v=DifpQoX-1-k
	Weldable Strain Gage Installation	https://www.youtube.com/watch?v=QWz3aBRkHIY
UNIT-II	Sensitivity of Wheatstone bridge Circuit in Strain Gauge.	https://www.youtube.com/watch?v=bIzArJ0SJrE
	Strain Rosette	https://www.youtube.com/watch?v=E517Zp6QysE
	Application of strain gauge in practical problems	https://www.youtube.com/watch?v=PCSweA7Idz0
UNIT-III	Stress analysis using photo elasticity	https://www.youtube.com/watch?v=mhtp6PhT4aU
	Fringe Ordering in Photo elasticity	https://www.youtube.com/watch?v=4tmYHvpPQrg
	Moire Fringe	https://www.youtube.com/watch?v=MuYsFPuiadc
UNIT-IV	Fracture Mechanics (Crack Resistance, Stress Intensity Factor)	https://www.youtube.com/watch?v=rKi6_ibjVPA
	Different Polariscope	https://www.youtube.com/watch?v=ZFG0bNi1J-Y
	Stress concentration and stress intensity factor	https://www.youtube.com/watch?v=Th7oieAjpNg

<table>
<tr><td>Course Code</td><td colspan="5">PCC-MTME-107A</td></tr>
<tr><td>Category</td><td colspan="5">Professional Core Courses</td></tr>
<tr><td>Course Title</td><td colspan="5">Metal Forming Analysis</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td rowspan="2">Semester-I</td></tr>
<tr><td>4</td><td>0</td><td>0</td><td>4</td></tr>
<tr><td>Course Objectives</td><td colspan="5">The objectives of this course are
Comprehensive understanding of principles of elastic and plastic deformation in materials and their application to metal forming processes.
Learn the yield criteria and plasticity theory, including their application in analyzing metal forming processes like forging, rolling, extrusion, and sheet metal forming.
Enable to understand the role of lubrication and friction in metal forming processes, including the selection of lubricants for different applications.
Facilitate the application of finite element methods (FEM) for simulating and optimizing metal forming processes.</td></tr>
<tr><td>Assessment</td><td colspan="5">40 Marks</td></tr>
<tr><td>End Semester Examination</td><td colspan="5">60 Marks</td></tr>
<tr><td>Total Marks</td><td colspan="5">100</td></tr>
<tr><td>Duration of Exam</td><td colspan="5">03 Hours</td></tr>
</table>

Course Outcomes: After studying this course, the students will be able to

COs	Skills Demonstrated
CO1	Define the technical terms used in metal forming analysis.
CO2	Explain the fundamental principles of metal forming processes, including deformation mechanics, material flow, lubrication and stress-strain relationships.
CO3	Apply the knowledge of metal forming analysis to solve the complex engineering problem.
CO4	Analyse the different processes, mechanism used in metal forming analysis.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit No.	Contents
Unit-I	**Stress-Strain relations in Elastic and plastic Deformations**: True stress and true strain, true stress-strain curves, selection of stress-strain curves for cold and hot working, yield of isotropic plastic material, yield criteria. Tresca maximum sheer-strain- energy criterion, plastic incompressibility, Poisson's ratio for plastic deformation flow rule, application of theory of plasticity for solving metal forming Problems using Slab method, Upper and lower Bound methods, Slip line field theory.
Unit-II	**Technology and analysis of important metal forming processes:** Forging, Rolling, Extrusion. Wiredrawing, Sheet Metal forming processes like Deep drawing, Stretch forming, bending, defects in various metal forming processes like rolling, forging, extrusion, wiredrawing and deep drawing and their causes and remedial measures, Effects of temperature and strain rate in metal working, friction and lubrication in Hot and Cold working.
Unit-III	**Lubrication in metal forming processes**: principles and mechanism of lubrications, hydrodynamic and their film lubrication, boundary and extreme pressure lubricants, solid lubricants, lubricants used for rolling and cold drawing, forging.
Unit-IV	**Application of Finite Element Methods to Metal Forming Processes:** special Discretization, Shape function, Stiffness matrices and their assembly, Implicit and explicit formulations, Elasto-plastic approximations, Lagrangian Vs Eularian schemes, Material integration schemes, and auxiliary equations for contact, friction and incompressibility, Thermo-mechanical problem formulation.

Suggested Readings

1. Metal Forming Analysis- R.H. Wagoner, Cambridge University Press.
2. Theory of Elasticity-Dally and Riley
3. Mechanical Metallurgy- Dieter, McGraw Hill Inc.
4. An Introduction to the Principles of Metal working by Rowe, Arnold.

Useful Video links

Unit No.	Topic	Link
UNIT-I	Elastic properties and stress strain relations	https://www.youtube.com/watch?v=qZRFTIXADp4
	True Stress & Strain	https://www.youtube.com/watch?v=AkX6JqlWRqc
	Theories of failure	https://www.youtube.com/watch?v=xkbQnBAOFEg
	Slip Line field theory	https://www.youtube.com/watch?v=XCS3LqLssLw
UNIT-II	Metal forming technology	https://archive.nptel.ac.in/courses/112/107/112107250/
	Plasticity working of metals	https://archive.nptel.ac.in/courses/112/103/112103279/
	Analysis of Forging Process	https://www.youtube.com/watch?v=yc8UPMZ1FNA
	Analysis of wiredrawing process	https://www.youtube.com/watch?v=3jEROaVF_yQ
UNIT-III	Lubrication in metal forming processes	https://www.youtube.com/watch?v=7fGVT-U3CbQ
	Effects of temperature and strain rate in metal working	https://www.youtube.com/watch?v=xxva7b5O6m0
UNIT-IV	Introduction to Finite Element Methods	https://www.youtube.com/watch?v=C6X9Ry02mPU
	FEM approach for Rolling Process	https://www.youtube.com/watch?v=CZTQHZ6tBQw

Course Code	**PCC-MTME-109A**				
Category	Professional Core Courses				
Course Title	**Mechatronics and Product Design**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I**
	4	0	0	**4**	
Course Objectives	The objectives of this course are • Learn the fundamentals and components of mechatronics systems, including sensors, actuators, and controllers. • Learn the concepts of Logic gates, flip-flops, and sequential logic. • Familiarize with mathematical modeling and system dynamics, including transfer functions for mechatronics systems. • Enable to design and simulate mechatronics products using tools.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total Marks	100				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

COs	**Skills Demonstrated**
CO1	Define the technical terminologies related to mechatronics and product design.
CO2	Explain the fundamental principles of mechatronics, including the integration of mechanical, electrical, and electronic systems.
CO3	Apply mechatronics principles to develop control systems for mechatronics devices.
CO4	Analyze the performance of mechatronic systems, considering factors like precision, efficiency, and reliability.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit No.	**Contents**
Unit-I	**Introduction** to Mechatronics systems and components, Principles of basic electronics- Digital logic, number system logic gates, Sequence logic flip flop system, JK flip flop, D- flip flop. Micro process and their applications- Microcomputer computer structure/micro controllers, Integrated circuits-signal conditioning processes, various types of amplifiers, low pass and high pass filters.
Unit-II	**Sensors-sensors and transducers:** Displacement, position proximity sensors, velocity, forces sensors. Fluid pressure temperature, liquid level and light sensors. Selection of sensors. Actuators, Pneumatic and hydraulic systems, Mechanical actuation system. Electrical calculation system. Other Electrical/ Electronic hardware in Mechatronic system.

Unit-III	**Principles of Electronic system communication**, Interfacing, A. D. and D.A. Converters. Software and hardware principles and tools to build mechatronic systems. Basic system models mathematical models, mechanical and other system Building blocks. System models-Engg. Systems, rotational, translation, elected mechanical, Hydraulic mechanical system. System Transfer functions. First-second order system in series
Unit-IV	**Design and selection of mechatronics systems** namely sensors line encoders and revolvers, steppe rand servomotors Ball screws, solenoids, line actuators and controllers with application to CNC system, robots, consumer electronics products etc., Design of a Mechatronic Product using available softwares.

Suggested Readings

1. Mechatronics by W. Bolton, published by Addison Worley Longman Pvt. Ltd., India Brander, Delhi.
2. Automation Production System and CIMS by Mikell P Groover, Prentice Hall of India Pvt. Ltd, New Delhi.
3. Production Systems and CIM, Groover, PHI.
4. Flexible Manufacturing systems, by Maleki, Prentice Hall.

Useful Video links

Unit No.	Topic	Link
UNIT-I	Introduction To Digital Circuits	https://nptel.ac.in/courses/117106086
	S-R, J-K and D Flip Flops	https://www.youtube.com/watch?v=2ecMG_OciLo
	Micro process and their applications	https://youtu.be/iXSXIJn_Xwc?si=AfT54TfGj4gQ7V0m
UNIT-II	Position proximity sensors, velocity.	https://archive.nptel.ac.in/courses/115/107/115107122/
	Pneumatic and hydraulic systems,	https://archive.nptel.ac.in/courses/112/106/112106300/
	Mechanical actuation system	https://www.youtube.com/watch?v=BUxClwVA7f8
UNIT-III	Principles of communication system	https://archive.nptel.ac.in/courses/108/104/108104091/
	Hydraulic mechanical system.	https://archive.nptel.ac.in/courses/112/103/112103249/
	System Transfer functions	https://www.youtube.com/watch?v=fyLlgjy3Xi8
UNIT-IV	Sensors and actuators	https://archive.nptel.ac.in/courses/108/108/108108147/
	Stepper Motors	https://www.youtube.com/watch?v=oZGLLDjwwrw
	Design and selection of Mechatronics systems	https://youtu.be/LX2oxCz8cU4?si=HvOTdJpK9p7LnVaI

Course code	**LC-MTMD-111A**				
Category	Lab Courses				
Course title	**Experimental Stress Analysis Lab**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I**
	0	0	2	1	
Course Objectives	The objectives of this course are ● Understand the principles and applications of strain gauges in measuring mechanical strain on different surfaces. ● Learn the correct procedures for installing and fixing strain gauges on various surfaces to ensure accurate measurements. ● Explore the fundamentals of photo elasticity through hands-on experiments using a photo elastic bench. ● Gain proficiency in setting up and calibrating a polariscope for analyzing stress patterns in models				
Assessment	25 Marks				
End Semester Practical Examination	25 Marks				
Total Marks	50				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

COs	**Skills Demonstrated**
CO1	Determine strain on surfaces using strain gauges and understand related temperature effects.
CO2	Demonstrate skill in fixing strain gauges securely and correctly on various surfaces.
CO3	Demonstrate photo elastic bench to study stress patterns in experimental models.
CO4	Use a polariscope to evaluate stress distribution in photo elastic models and interpret the results for various loading conditions.

List of Experiments

Sr. No.	**Contents**	**Relevant COs**
1	Experiments using strain gauges.	**CO1**
2	Measurement of strain, temperature effects	**CO1**
3	Fixing of gauges on surfaces.	**CO2**
4	Experiments using photo elastic bench.	**CO3**
5	Setting of polariscope and calibration of disc, beam and tension model.	**CO4**

Virtual Lab Links

Experiment Name	**Virtual Lab Link**	**Relevant COs**
Experiments using strain gauges.	https://sl-coep.vlabs.ac.in/exp/strain-gauge-sensor/index.html	**CO1**

Measurement of strain, temperature effects	https://sl-coep.vlabs.ac.in/exp/characterize-temperature-sensor/index.html https://sl-coep.vlabs.ac.in/exp/temperature-sensor/ https://www.youtube.com/watch?v=Kh8DMrZWSiY	**CO1**
Fixing of gauges on surfaces.	https://www.youtube.com/watch?v=N-FdzDciAZI	**CO2**
Experiments using photo elastic bench.	https://www.youtube.com/watch?v=n6nADZCjWWU https://www.youtube.com/watch?v=Ta1q9BITrvQ	**CO3**
Setting of polariscope and calibration of disc, beam and tension model.	https://www.youtube.com/watch?v=XSHyBejnN90	**CO4**

Course code	**LC-MTMD-113A**				
Category	Lab Courses				
Course title	**MECHANICAL MEASUREMENT LAB**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I**
	0	0	2	1	
Course Objectives	The objectives of this course are ● Comprehensive understanding of principles of measuring linear displacement, temperature, pressure, and fluid flow using industry-standard sensors and transducers. ● Develop proficiency in using temperature measurement devices. ● Gain hands-on experience with load and strain measurement techniques using load cells and strain gauge-based cantilevers. ● Learn how to record and document measurement data effectively using plotters and recorders for analysis and interpretation				
Assessment	25 Marks				
End Semester Practical Examination	25 Marks				
Total Marks	50				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

COs	**Skills Demonstrated**
CO1	Demonstrate the ability to apply LVDT, RTD, thermistor, and thermocouple to measure linear displacement and temperature accurately.
CO2	Use the setup with load cells, inductive pickup and strain gauges on a cantilever beam for measuring load and strain.
CO3	Analyze pressure and fluid flow measurements, interpreting the data to understand system performance.
CO4	Evaluate the accuracy of recorded data and generate correct graphical plots using plotters and data recorders.

List of Experiments

Sr. No.	**Contents**	**Relevant COs**
1	Measurement of linear displacement and motion using LVDT	**CO1**
2	Temperature measurement using RTD, thermistor, and thermocouple	**CO1**
3	Pressure and fluid flow measurement.	**CO3**
4	Data logging and plotting with plotters and recorders.	**CO4**
5	Inductive pickup and strain gauge setup on a cantilever beam.	**CO2**
6	Load measurement by load cell and strain gauge based cantilever.	**CO2**

Virtual Lab Links

Experiment Name	**Virtual Lab Link**	**Relevant COs**
Measurement of linear displacement and motion using LVDT	https://sl-coep.vlabs.ac.in/exp/lvdt/simulation.html	**CO1**
Temperature measurement using RTD, thermistor, and thermocouple	https://sl-coep.vlabs.ac.in/exp/characterize-temperature-sensor/index.html https://sl-coep.vlabs.ac.in/exp/temperature-sensor/ https://www.youtube.com/watch?v=Kh8DMrZWSiY	**CO1**
Pressure and fluid flow measurement.	https://uorepc-nitk.vlabs.ac.in/exp/flow-through-venturi-meter/videos.html	**CO3**
Inductive pickup and strain gauge setup on a cantilever beam.	https://sl-coep.vlabs.ac.in/exp/strain-gauge-sensor/index.html	**CO2**
Load measurement by load cell and strain gauge based cantilever.	https://sl-coep.vlabs.ac.in/exp/strain-gauge-sensor/index.html https://www.youtube.com/watch?v=An7UHSsMKWs	**CO2**

Course Code	**SM-MT-115A**				
Category	Seminar				
Course Title	**Seminar-I**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I**
	0	0	2	**2**	
Course Objectives	The objectives of this course are • To develop students' ability to effectively present research topics and findings by effective communication. • To improve problem-solving and critical thinking skills of the students. • To expose students to the latest trends and advancements by reviewing and discussing contemporary research.				
Assessment	50 Marks				
End Semester Examination	-				
Total Marks	50				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

COs	**Skills Demonstrated**
CO1	Identify the trends and advancements in the related field.
CO2	Analyze and synthesize research literature with in-depth reviews of key studies and methodologies**.**
CO3	Undertake problem identification, formulation, proposing solution and analyze the impact on society, economy and environment.
CO4	Prepare a well-organized report employing elements of effective communication and critical thinking.
CO5	Demonstrate a sound technical knowledge of their research field.

Overview:

This is a course designed to help M. Tech students develop research presentation skills. The focus is on selecting a topic or research paper relevant to their specialization, conducting an in-depth review, and effectively presenting the research findings.

General Guidelines:

Topic Selection	Each student is required to choose the research topic based on published review paper(s) or literature related to their relevant field. The same topic cannot be selected by multiple students.
Approval Process	The selected paper or topic must be approved by the faculty members/committee appointed by the Head of Department.
Presentation Guidelines	Each student will have 30-40 minutes for their presentation, followed by 5 minutes for Q&A.
Evaluation	The presentation will be evaluated by a committee constituted by the Head of Department. The evaluation will be based on:

Parameters for the Evaluation of Seminar

Sr. No.	Parameters	Marks Allotted	Relevant COs
1	Clarity of the topic	10	CO1
2	Literature Survey	10	CO2
3	Content Relevancy	10	CO3
4	Presentation Skills	10	CO4
5	Q&A Response	10	CO5

Course Code	**PCC-MTMD-102A**				
Category	Professional Core Courses				
Course Title	**THEORY OF ELASTICITY**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	4	0	0	**4**	
Course Objectives	The objectives of this course are • Gain a foundational knowledge of stress, strain, principal values, and Hooke's Law, • Learn compatibility equations, stress functions, boundary conditions, and Fourier series to solve two-dimensional elasticity problems. • Study torsion in bars of different cross-sections and solve advanced elasticity problems in curvilinear coordinates. • Build analytical skills essential for solving real-world elasticity challenges in engineering fields.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total Marks	100				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

COs	**Skills Demonstrated**
CO1	Define the fundamental concepts of stress, strain, and elastic properties of materials.
CO2	Explain stress strain relationship, mathematical formulations of equilibrium, compatibility, and constitutive equations for elastic bodies.
CO3	Apply stress-strain relationships to solve problems in two- and three-dimensional elasticity.
CO4	Analyze the behavior of elastic materials under complex loading conditions.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts (2 from each unit/section) of 1.5 marks each and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit No.	**Contents**
Unit-I	State of stress at a point, stress notations, state of strain at a point and notations, states of plane stress and plane strain. Hooke's law and generalized statement of Hooke's law, stress-strain relationships. Concept of principal stress and strain, Mohr's circle.
Unit-II	Compatibility equations, stress function, use of stress function in solution of two dimensional problems in Cartesian coordinates, boundary conditions. Problems of cantilever, supported beam under distributed load of uniform and uniformly variable intensity. Use of Fourier series.

Unit-III	Two dimensional elasticity problems in polar coordinates, equation of equilibrium. Axi-symmetric problems, thick cylinder, curved bars. Hole in a plate problem. Idea of an edge dislocation. Torsion of straight bars, elliptic and circular section. Membrane analogy, torsion of thin rectangular section. Application of energy method to torsion problem. Torsion of thin tubes.
Unit-IV	Complex variables for curvilinear coordinates, Laplace's equation. Complex stress function and corresponding displacements. Curvilinear coordinates and stress components - elliptic hole in a uniformly stressed plate.

Suggested Readings

1. Theory of Elasticity by SP Timoshenko; McGraw-Hill (International student edition).
2. Applied Elasticity by Zhilun Xu; Wiley Eastern Ltd.
3. Applied Elasticity by Chi-Teh Wang; McGraw-Hill.

Useful Video links

Unit No.	Topic	Link
UNIT-I	Generalized Hooke's law	https://www.youtube.com/watch?v=XPURbEDSnQc
	Mohr's circle	https://youtu.be/NJB4nk89qkU?feature=shared
UNIT-II	Fourier series	https://youtu.be/lkAvgVUvYvY?feature=shared
	Two dimensional problems in Cartesian coordinate	https://youtu.be/v0KV1E_9fBs?feature=shared
UNIT-III	Curved bars	https://youtu.be/bK8NdVYX4HQ?feature=shared
	Thick cylinder	https://youtu.be/erW4HZ5I928?feature=shared
UNIT-IV	Laplace's equation	https://youtu.be/iiTOw0JqQFc?feature=shared
	Curvilinear coordinates and stress components	https://youtu.be/DOYVOWCPtJE?feature=shared

Course Code	**PCC-MTMD-104A**				
Category	Professional Core Courses				
Course Title	**DESIGN OF MECHANISMS**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	4	0	0	**4**	
Course Objectives	The objectives of this course are • Learn the fundamental concepts of mobility analysis, including degree of freedom (DOF), mixed mobility, total, partial, and fractional DOF. • Develop the ability to generate alternative design solutions for mechanisms, focusing on coding, evaluation, and selection of the optimum mechanism. • Acquire knowledge of various methods for designing and analyzing mechanisms, including graphical, algebraic, and optimization techniques, as well as matrix methods. • Explore manipulator dynamics from both the Lagrangian and Newtonian perspectives.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total Marks	100				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

COs	**Skills Demonstrated**
CO1	Define the terminology and classifications of mechanisms.
CO2	Explain the working principles and alternative design solutions of various mechanisms.
CO3	Apply graphical, analytical and optimization techniques to synthesize mechanisms for specific motion and force requirements.
CO4	Analyze the performance of mechanisms, including displacement, velocity, and acceleration profiles.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts (2 from each unit/section) of 1.5 marks each and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit No.	**Contents**
Unit-I	**MOBILITY ANALYSIS** – Degree of freedom (DOF) mixed mobility, total, partial and fractional DOF, closed and open chain systems, structural analysis and synthesis of mechanisms.
Unit-II	Alternative design solutions, coding, evaluation and selection of optimum mechanism, type synthesis, number synthesis and design of mechanisms.
Unit-III	Indexes of merit, graphical, algebraic and optimization techniques, matrix methods of design and analysis, design of function, path and motion generators, structural and mechanical error, design and analysis using software.

Unit-IV	Manipulators – Classification, actuation and transmission systems, coordinate transformation – DH notations, inverse and forward kinematics, manipulator dynamics from Lagrange and Newtonian point of view.

Suggested Readings

1. Mechanism Design Vol – 1,2 by George N Sandor and Arthur G Erdman; Prentice Hall.
2. Theory of Mechanism and Machines by Amitabha Ghosh and AK Mallik; EWLP, Delhi.
3. Theory of Mechanisms by JE Shigley and JJ Vicker; McGraw Hill.

Useful Video links

Unit No.	Topic	Link
UNIT-I	Degree of freedom	https://youtu.be/o0NLi-wJS1I?feature=shared
	Structural analysis and synthesis of mechanisms	https://youtu.be/tviGzaYmKkg?feature=shared
	Closed and open chain systems	https://youtu.be/hQklXllpyy0?feature=shared
UNIT-II	Design of mechanisms	https://youtu.be/tviGzaYmKkg?feature=shared
	Introduction to robotics	https://youtu.be/xKmL_kMxqZw?feature=shared
UNIT-III	Design and analysis using software like ADAMS	https://youtu.be/hGWs39kgnQE?feature=shared
	Matrix methods of design and analysis	https://youtu.be/T2drnetYhIA?feature=shared
UNIT-IV	DH notations	https://youtu.be/K_yvWED--UQ?feature=shared
	Forward kinematics	https://youtu.be/J87P0OjqAsU?feature=shared
	Inverse kinematics	https://youtu.be/unwUt3kkgvE?feature=shared

Course Code	**PEC-MTMD-112A**				
Category	Professional Elective Courses				
Course Title	**COMPUTER AIDED DESIGN**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	4	0	0	**4**	
Course Objectives	The objectives of this course are • Learn the various 2D and 3D transformations. • Gain knowledge in representing and fitting curves and surfaces using various methods. • Gain proficiency in working with data exchange formats like IGES, STEP, ACIS, and DXF. • Learn assembly modeling techniques, including part modeling, representation, and assembly sequence generation.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total Marks	100				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

COs	**Skills Demonstrated**
CO1	Define the fundamental concepts of computer-aided design, including modeling techniques and CAD tools.
CO2	Explain the principles of transformation, surface modeling, solid modeling, key data exchange formats and algorithms in CAD software.
CO3	Apply transformation matrices, curve fitting methods, solid modeling and mechanical assembly techniques to develop 2D and 3D CAD models for engineering applications.
CO4	Analyze the geometric properties of solid models, examining their feasibility, manufacturability, and structural integrity.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts (2 from each unit/section) of 1.5 marks each and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit No.	**Contents**
Unit-I	**Transformation and Manipulation of Objects**: Introduction, Transformation Matrix, 2D transformation, Arbitrary Rotation about the origin, Rotation by different angles, Concatenation, 2D transformation, Projection on to a 2D plane, Overall scaling, Rotation about an Arbitrary Point, 2D Reflection, 3D Transformation, 3D scaling, 3D Rotation of Objects, 3D Rotation about an arbitrary Axis, 3D Visualization-reconstruction of Three Dimensional Images.
Unit-II	**Description of Curves and Surfaces:** Line Fitting, Non Linear Curve Fitting with a Power Function, Curve Fitting with a High Order Polynomial, Chebyshev polynomial Fit. Fourier Series of Discrete Systems, Cubic Spines, Parabolic Cubic Splines, Non Parametric Cubic Spline, Boundary Conditions, Bezier Curves, Differentiation of Bezier Curve Equations, B-Spline Curve, Non Uniform Rational B-Spline(NURBS), Surface creation, Coons patch, tensor product surfaces,

	Bezier surface, relational parametric surface, parametric spline surface, Lofted surfaces, spline blended surfaces, Tangent and Twisted vectors, Blended surfaces, Application Software.
Unit-III	**Solid Modeling**: Introduction, solid models and entities, solid representation, regularized Boolean operation, Half-spaces, B-Rep and CSG modeling techniques, analytic solid modeling, solid manipulations. **Data exchange Formats**: Shape based formats; product data based formats, ISO standards, IGES- data representation, file structure and formats, processors, PDES- data representation, STEP- architecture and implementation, ACIS and DXF, creating IGES, STEP, ACIS and DXF Files.
Unit-IV	**Mechanical Assembly analysis**: Assembly modeling- parts modeling and representation, Hierarchical relationships, mating conditions, Representation schemes- Graph structure, location Graph, virtual link, generation of assembly sequences: precedence diagram, liaison sequencing analysis, precedence Graph, assembly analysis. **Hidden line and Hidden surface removal algorithms**: Visibility techniques-mini-max test, containment test, surface test, edge interactions, homogeneity test, sorting, coherence, Warnock algorithm, The priority or z- Buffer algorithm, Watkinson Scan line algorithm, Ray tracing algorithm.

Suggested Readings

1. CAD/CAM Theory and Practice by Ibrahim-Zeid; Tata McGraw Hill.
2. CAD/CAM/CIM by P Radhakrishnan; New Age International.
3. Mathematical Elements of Computer graphics by Rogers and Adams; McGraw Hill.
4. Computer Aided Design by Besant and Lui; Prentice Hall.

Useful Video links

Unit No.	Topic	Link
UNIT-I	2D transformation	https://youtu.be/iWxS2zpaRjk?feature=shared
	3D transformation	https://youtu.be/I8o4kK9QRL4?feature=shared
UNIT-II	Introduction to Curve fitting	https://youtu.be/i6ZmA9EEzrI?feature=shared
	Bezier Curve	https://youtu.be/-J2m_ugWNtc?feature=shared
	B-Spline Curve	https://youtu.be/OkncKzflw8I?feature=shared
UNIT-III	Solid Modelling	https://youtu.be/Nh6TxTUKzhA?feature=shared
	B-Rep and CSG modeling techniques	https://youtu.be/6c3-Qqh95r4?feature=shared
UNIT-IV	State Space Representation	https://youtu.be/CrXOMBlYFp0?feature=shared
	Hidden line and Hidden surface removal algorithms	https://youtu.be/OE-Es3bXj90?feature=shared

Course Code	**PEC-MTMD-114A**				
Category	Professional Elective Courses				
Course Title	**MATERIALS MANAGEMENT**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	4	0	0	**4**	
Course Objectives	The objectives of this course are • Learn the concepts of material management, its functions, and organizational structures. • Study the material planning and control techniques. • Learn about purchasing and supplier management for cost reduction through effective negotiations and purchasing research. • Learn various methods like variety reduction and material flow cost control to optimize material management.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total Marks	100				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

COs	**Skills Demonstrated**
CO1	Define the fundamental concepts and principles of materials management, including inventory control, procurement, and materials handling etc.
CO2	Explain the principles and processes of material planning, procurement, and inventory management, and their role in efficient operations.
CO3	Apply techniques of materials management to ensure efficient and cost-effective management of materials in a manufacturing environment.
CO4	Analyze the impact of material management strategies and inventory management methods on production efficiency and organizational profitability.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts (2 from each unit/section) of 1.5 marks each and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit No.	**Contents**
Unit-I	**Introduction:** Introduction to material management and productivity, functions of material management, organization structures in material management, role of material management techniques in improved material productivity. **Material planning**: Objectives, material requirement planning, manufacturing resource planning, JIT production planning, strategic material planning, material control: acceptance, sampling, inspection, make or buy decision, simple cost analysis, economic analysis, break even analysis, break-even point theory, whether to add or drop a product line store management and warehousing, product explosion.

Unit-II	**Purchasing:** Importance of good purchasing system, organization of purchasing functions, purchase policy and procedures, responsibility and limitations, purchasing decisions, purchasing role in new product development, role of purchasing role cost reduction, negotiations and purchase, purchasing research: identification of right sources of supply, vendor rating, standardization, vendor certification plans, vendor and supply reliability, developing new source of supply.
Unit-III	**Cost Reduction:** Cost control vs cost reduction, price analysis, material cost reduction techniques, variety reduction, cost reduction and value improvement, techniques of cost control, standard costing, cost effectiveness, cost analysis for material management, material flow cost control**.**
Unit-IV	**Inventory management**: Inventory vs stores, types of inventory, inventory control, inventory build-up, EOQ, various inventory models, inventory models with quantity discount, exchange curve concept, coverage analysis, optimal stocking and issuing policies, inventory management of perishable commodities, ABC - VED analysis, design of inventory distribution systems, surplus management, information system for inventory management, case studies.

Suggested Readings

1. Material management by WR Stelzer Jr; Prentice Hall.
2. Material management by DS Ammer & Richard Erwin.
3. Material management by AK Dutta; Prentice Hall.
4. Material management: An integrated approach by P Gopalakrishnan & M Sundersen; Prentice Hall.

Useful Video links

Unit No.	Topic	Link
UNIT-I	Basic elements of JIT	https://youtu.be/Zjx7zCjLjyw?feature=shared
	Break even analysis	https://youtu.be/KGF1YelPYqA?feature=shared
UNIT-II	Basics of Purchasing Management	https://youtu.be/DdSfqfXOLXk?feature=shared
	Purchasing Cycle & Procurement Development Process	https://youtu.be/H9n5KL4G6_I?feature=shared
UNIT-III	Accounting for Costs	https://youtu.be/yf0WLsrLsXg?feature=shared
	Materials Management	https://youtu.be/4Vs3xcEEU84?feature=shared
UNIT-IV	EOQ model	https://youtu.be/9tJv5COGkD0?feature=shared
	Inventory Control and Management	https://youtu.be/k-9mb4KtaGc?feature=shared

Course Code	**PEC-MTMD-116A**				
Category	Professional Elective Courses				
Course Title	**DESIGN OF PRESSURE VESSELS**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	4	0	0	**4**	
Course Objectives	The objectives of this course are • Understanding of the fundamental criteria and codes governing piping design. • Learn how to account for external loads and fatigue in piping systems. • Gain insights into the design of pipe supports, including the selection and assumptions for different types of supports, load combinations. • Acquire knowledge required to design pressure vessels, focusing on internal and external pressures, penetration design, flanges, and cone-cylinder junctions.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total Marks	100				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

COs	**Skills Demonstrated**
CO1	Define the fundamental principles of pressure vessel design.
CO2	Explain the types of stresses and their significance in pressure vessel design.
CO3	Apply the principles and relevant design codes and standards to solve the problems of pressure vessels.
CO4	Analyze the effect of external loads on piping systems and pressure vessels.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts (2 from each unit/section) of 1.5 marks each and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit No.	**Contents**
Unit-I	**Introduction:** Introduction to basic piping design criteria and codes. **Pressure Design:** Wall thickness determination under external pressure, internal pressure and vacuum pressure.
Unit-II	**External Loads and Fatigue Design:** Flexibility, fatigue, stress intensity factors, combined load (sustained wind, earth quake), Cold spring.
Unit-III	**Pipe Support Design:** Support types assumptions, load combinations, variable supports, lugs and attachments, pressure relief, Materials, Fabrication, Inspection and Testing.

Unit-IV	**Design of Pressure Vessels:** Design of Pressure vessels subjects to internal pressure, external pressure, design of penetration, design of flanges, cone cylinder junctions. Prediction of thermal and hydraulic loads, Materials, Fabrication, Inspection and Testing.

Suggested Readings

1. Pressure Vessels: Design and Practice by Somnath Chattopadhyay; CRC Press.
2. Pressure Vessel Design by Donatello Annaratone.

Useful Video links

Unit No.	Topic	Link
UNIT-I	Fundamentals of Pipe Stress Analysis in Piping Design	https://youtu.be/G3rTQJOWMMA?feature=shared
	Vessel under external pressure	https://youtu.be/WiHsX_Lzj_0?feature=shared
UNIT-II	Design of Springs	https://youtu.be/QfhIea6KzZA?feature=shared
	Stress Intensity Factors for Different Geometries	https://youtu.be/UpNVKJkWKhQ?feature=shared
UNIT-III	Pipe Support & its types	https://youtu.be/84Z6pDFMxmc?feature=shared
	Basics of Pipe Supports	https://youtu.be/_5BjlSgr9do?feature=shared
UNIT-IV	Design of Cylinders & Pressure Vessels	https://youtu.be/erW4HZ5I928?feature=shared
	Design of Flanges	https://youtu.be/itEbimufEvM?feature=shared

<table>
<tr><td>Course Code</td><td colspan="5">PEC-MTMD-118A</td></tr>
<tr><td>Category</td><td colspan="5">Professional Elective Courses</td></tr>
<tr><td>Course Title</td><td colspan="5">FINITE ELEMENT METHOD</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td rowspan="2">Semester-II</td></tr>
<tr><td>4</td><td>0</td><td>0</td><td>4</td></tr>
<tr><td>Course Objectives</td><td colspan="5">The objectives of this course are
Understand the principles and concepts of the finite element method, including discretization, element types, and the formulation of finite element equations.
Enable to apply FEM and solve engineering problems.
Develop finite element models for a variety of structural and mechanical systems, including linear and nonlinear problems.
Understand the concept of numerical integration for element stiffness.</td></tr>
<tr><td>Assessment</td><td colspan="5">40 Marks</td></tr>
<tr><td>End Semester Examination</td><td colspan="5">60 Marks</td></tr>
<tr><td>Total Marks</td><td colspan="5">100</td></tr>
<tr><td>Duration of Exam</td><td colspan="5">03 Hours</td></tr>
</table>

Course Outcomes: After studying this course, the students will be able to

COs	**Skills Demonstrated**
CO1	Define the basic concepts of finite element methods.
CO2	Explain the basic principles of the finite element method, including the discretization of structures, element types, and formulation of governing equations.
CO3	Use FEM techniques to solve complex structural problems, including the analysis of stress, strain, and deformation in various engineering structures.
CO4	Analyze finite element models and behavior of different element types and mesh configurations to ensure the reliability of simulations in engineering applications.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts (2 from each unit/section) of 1.5 marks each and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit No.	**Contents**
Unit-I	**Fundamentals:** Description of method, matrix techniques, large system of algebraic equations, basics of solid mechanics, stress and strain relationships in elastic behavior - linear and nonlinear. Variational methods in solid mechanics, minimum potential energy and minimum complementary energy, application to FE methods.
Unit-II	**Theory of FE Method:** Element shapes, one-, two-, three- dimensional and axisymmetric elements, displacement models in generalized coordinates, convergence, nodal degrees of freedom, interpolation displacement models. Element stresses and strains. Element stiffness and loads, lumped loads. Variational formulation of element stiffness and lumped load, numerical integration, condensation of internal degrees of freedom.

Unit-III	**Assemblage of Elements:** Discretization of a body or structure, effect of element aspect ratio, infinite bodies, higher order elements and refinement of mesh, nodal compatibility and interface displacement compatibility, assembly stiffness matrix. Boundary conditions, solution for element stress or strain.
Unit-IV	**Application of FEM:** Application of FEM to problems in mechanics, fluid flow and heat transfer. Making Computer Codes for FEM solutions.

Suggested Readings

1. Introduction to the Finite Element Method by CS Desai and JF Abel; Van Nostrand Reinhold Co.
2. Finite Element by OC Zienkiewicz.
3. Finite Element Procedure by Klaus-Jurgen Bathe; Prentice Hall.
4. Concept and Applications of Finite Element Analysis by R Cook, D Malkus, M Plesha and R Witt; Wiley

Useful Video links

Unit No.	Topic	Link
UNIT-I	Elastic stress- strain relations	https://youtu.be/o0jav8mpHGM?feature=shared
	Variational Methods	https://youtu.be/hahSt_5mc3A?feature=shared
UNIT-II	Introduction to Finite Element Method	https://youtu.be/KR74TQesUoQ?feature=shared
	Generalized and Principle Coordinates	https://youtu.be/AN8Ip39LXJg?feature=shared
UNIT-III	Assembly of element equations	https://youtu.be/hJmM6CzFRW8?feature=shared
	Finite Element Method	https://youtu.be/KWUcHgXOijs?feature=shared
	Total Stiffness Matrix	https://youtu.be/9bnFVE88PaM?feature=shared
UNIT-IV	Analysis of Trusses Using Finite Element Methods	https://youtu.be/m5Ng0C5ZFJ8?feature=shared
	Computer Coding	https://youtu.be/6nIDdwr9N_E?feature=shared

Course code	**LC-MTMD-106A**				
Category	Lab Courses				
Course title	**Material Testing Lab**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	0	0	2	1	
Course Objectives	The objectives of this course are ● Familiarize students with the UTM and its applications in material testing. ● Provide hands-on experience in conducting fatigue tests to evaluate fatigue strength and creep tests to analyze the deformation of materials under sustained stress at elevated temperatures. ● Develop the ability to analyze test data, including stress-strain curves, S-N curves, and creep deformation curve.				
Assessment	25 Marks				
End Semester Practical Examination	25 Marks				
Total Marks	50				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

COs	**Skills Demonstrated**
CO1	Demonstrate UTM and calculate true stress and true strain values for various materials, understanding material behavior under real-world loading conditions.
CO2	Analyze the strength coefficient (K) and strain hardening exponent.
CO3	Analyze S-N curves to determine fatigue strength.
CO4	Demonstrate creep tests and evaluating a material's suitability for applications involving sustained high temperature and stress.

List of Experiments

Sr. No.	**Contents**	**Relevant COs**
1	Study of UTM and its applications in material testing.	**CO1**
2	Determination of True Stress and True Strain Using UTM.	**CO1**
3	Determination of Strength Coefficient and Strain Hardening Exponent.	**CO2**
4	Fatigue Test to Determine Fatigue Strength	**CO3**
5	Creep Test to Determine Creep Characteristics	**CO4**

Virtual Lab Links

Experiment Name	**Virtual Lab Link**	**Relevant COs**
Study of UTM and its applications in material testing.	https://sm-nitk.vlabs.ac.in/exp/tensile-test-mild-steel/procedure.html	**CO1**

Determination of True Stress and True Strain Using UTM.	https://www.youtube.com/watch?v=AkX6JqlWRqc	**CO1**
Determination of Strength Coefficient and Strain Hardening Exponent.	https://www.youtube.com/watch?v=effCCaIjeh8	**CO2**
Fatigue Test to Determine Fatigue Strength	https://eerc01-iiith.vlabs.ac.in/exp/fatigue-test-experiment/	**CO3**
Creep Test to Determine Creep Characteristics	https://eerc01-iiith.vlabs.ac.in/exp/creep-test-experiment/	**CO4**

Course code	**LCMTMD-108A**				
Category	Lab Courses				
Course title	**DESIGN PRACTICE LAB – I**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	0	0	2	1	
Course Objectives	The objectives of this course are ● Equip students with the ability to create 2D models. ● Create detailed 3D models of complex IC engine components. ● Familiarize students with the working principles, features, and components of CNC machines. ● Enable to Implement G and M codes for programming CNC machines, covering various machining operations.				
Assessment	25 Marks				
End Semester Practical Examination	25 Marks				
Total Marks	50				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

CO	Skill Demonstrated
CO1	Create 2D models using CAD software
CO2	Create detailed 3D models of IC engine parts, applying CAD software features
CO3	Understand CNC machine features in order to prepare for industrial applications.
CO4	Develop CNC programs using G&M codes for machining operations.

List of Experiments

Sr. No.	Contents	Relevant COs
1	Modeling in 2D and image scanning using CAD software	**CO1**
2	Modeling in 3D of IC Engine parts.	**CO2**
3	To study the general features of CNC machines.	**CO3**
4	Develop program for various machining operations by using G&M codes.	**CO4**

Virtual Lab Links

Experiment Name	Virtual Lab Link	Relevant COs
Modeling in 2D and image scanning using CAD software	https://fab-coep.vlabs.ac.in/exp/3d-scanning/theory.html	**CO1**
Modeling in 3D of IC Engine parts.	https://www.youtube.com/watch?v=DM6tFJHsAnc	**CO2**
To study the general features of CNC machines.	http://vlabs.iitkgp.ac.in/psac/newlabs2020/vlabiitkgpAM/exp2/index.html	**CO3**
Develop program for various machining operations by using G&M codes.	https://www.youtube.com/watch?v=5XihF05K4yM	**CO4**

Course Code	**SM-MT-110A**				
Category	Seminar				
Course Title	**Seminar-II**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	0	0	2	**2**	
Course Objectives	The objectives of this course are • To develop students' ability to effectively present research topics and findings by effective communication. • To improve problem-solving and critical thinking skills of the students. • To expose students to the latest trends and advancements by reviewing and discussing contemporary research.				
Assessment	50 Marks				
End Semester Examination	-				
Total Marks	50				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

COs	**Skills Demonstrated**
CO1	Identify the trends and advancements in the related field.
CO2	Analyze and synthesize research literature with in-depth reviews of key studies and methodologies.
CO3	Undertake problem identification, formulation, proposing solution and analyze the impact on society, economy and environment.
CO4	Prepare a well-organized report employing elements of effective communication and critical thinking.
CO5	Demonstrate a sound technical knowledge of their research field.

Overview:

This is a course designed to help M. Tech students develop research presentation skills. The focus is on selecting a topic or research paper relevant to their specialization, conducting an in-depth review, and effectively presenting the research findings.

General Guidelines:

Topic Selection	Each student is required to choose the research topic based on published review paper(s) or literature related to their relevant field. The same topic cannot be selected by multiple students.
Approval Process	The selected paper or topic must be approved by the faculty members/committee appointed by the Head of Department.
Presentation Guidelines	Each student will have 30-40 minutes for their presentation, followed by 5 minutes for Q&A.
Evaluation	The presentation will be evaluated by a committee constituted by the Head of Department. The evaluation will be based on:

Parameters for the Evaluation of Seminar

Sr. No.	Parameters	Marks Allotted	Relevant COs
1	Clarity of the topic	10	CO1
2	Literature Survey	10	CO2
3	Content Relevancy	10	CO3
4	Presentation Skills	10	CO4
5	Q&A Response	10	CO5

GANGA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, KABLANA (JHAJJAR)

An Autonomous Institute

'A' GRADE ACCREDITED BY NAAC

Evaluation Scheme & Syllabus For

Master of Technology (Manufacturing & Automation) 1st Year

(Effective from the Session: 2024-25)

APPROVED BY AICTE, NEW DELHI AND AFFILIATED TO MDU, ROHTAK

1. DEFINITION OF CREDIT

1	1 Lecture (L) per week	1 Credit
2	2 Practical (Lab) per week	1 Credit
3	2 Seminar per Week	2 Credit
4	4 Project per Week	2 Credit

2. RANGE OF CREDIT

A credits of 86* for a student to be eligible to get Post Graduate degree in Engineering.

3. STRUCTURE OF POSTGRADUATE ENGINEERING PROGRAM (M. TECH)

Sr. No.	Category	Breakup of Credits
1	Professional Core Courses	32*
2	Professional Elective Courses	8*
3	Multidisciplinary Open Elective Courses	6*
4	Foundation Elective Courses	3*
5	Mandatory Learning Course	3*
6	Seminar	6*
7	Lab Courses	4*
8	Project	2*
9	Dissertation	22*
	Total Credits	86*

**Minor variation is allowed as per need of the respective disciplines.*

4. COURSE CODE AND DEFINITIONS

Sr. No.	Category	Course Code
1	Professional Core Courses	PCC
2	Professional Elective Courses	PEC
3	Multidisciplinary Open Elective Courses	OEC
4	Foundation Elective Courses	FLC
5	Mandatory Learning Course	MLC
6	Seminar	SM
7	Lab Courses	LC
8	Project	PROJ
9	Dissertation	DISS

GANGA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, KABLANA, JHAJJAR (HR.)

Scheme of Studies and Examination

M.Tech (M&A) – 1st Semester

w.e.f. 2024-25

Sr. No.	Category	Course Code	Course Title	Hours per week			Total Load Per Week	Credits	Examination Scheme (Marks)				Exam Duration in H
				Lecture (L)	Tutorial (T)	Practical (P)			Assessment	End Semester Examination		Total	
										Theory	Practical		
1	Professional Core Courses	PCC-MTMA-101A	Welding & Allied Processes	4	0	0	4	4	40	60		100	3
2	Professional Core Courses	PCC-MTMA-103A	Foundry Technology	4	0	0	4	4	40	60		100	3
3	Professional Core Courses	PCC-MTMA-105A	Total Quality Management	4	0	0	4	4	40	60		100	3
4	Professional Core Courses	PCC-MTME-107A	Metal Forming Analysis	4	0	0	4	4	40	60		100	3
5	Professional Core Courses	PCC-MTME-109A	Mechatronics & Product Design	4	0	0	4	4	40	60		100	3
6	Lab Course	LC-MTMA-111A	Mechatronics Lab	0	0	2	2	1	25		25	50	3
7	Lab Course	LC-MTMA-113A	Welding Lab	0	0	2	2	1	25		25	50	3
8	Seminar	SM-MT-115A	Seminar-I	0	0	2	2	2	50			50	
Total Credits								**24**				**650**	

GANGA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, KABLANA, JHAJJAR (HR.)

Scheme of Studies and Examination

M.Tech (M&A) – 2nd Semester

w.e.f. 2024-25

Sr. No.	Category	Course Code	Course Title	Hours per week			Total Load Per Week	Credits	Examination Scheme (Marks)				Exam Duration in H
				Lecture (L)	Tutorial (T)	Practical (P)			Assessment	End Semester Examination		Total	
										Theory	Practical		
1	Professional Core Courses	PCC-MTMA-102A	Mechanical Design-I	4	0	0	4	4	40	60		100	3
2	Professional Core Courses	PCC-MTMA-104A	Diagnostic Maintenance & Monitoring	4	0	0	4	4	40	60		100	3
4	Professional Elective Courses	Refer Table -I	.....	4	0	0	4	4	40	60		100	3
5	Multidisciplinary Open Elective Courses	Refer Table -II	.....	3	0	0	3	3	40	60		100	3
6	Foundation Elective Courses	Refer Table -III	.....	3	0	0	3	3	40	60		100	3
7	Lab Course	LC-MTMA-106A	CIM Lab	0	0	2	2	1	25		25	50	3
8	Lab Course	LC-MTMA-108A	Diagnostic Maintenance & Monitoring Lab	0	0	2	2	1	25		25	50	3
9	Seminar	SM-MT-110A	Seminar-II	0	0	2	2	2	50			50	
Total Credits								**22**				**650**	

Table I (Program Elective Courses)

Courses	Remarks
PEC-MTMA-112A	Quality control techniques
PEC-MTMA-114A	Finite Element Method
PEC-MTMA-116A	Artificial Intelligence in Manufacturing

Table II (Multidisciplinary Open Elective-I Courses)

Students of all M. Tech programmes are required to study one Multidisciplinary open elective course in each of the 2nd and 3rd Semesters and one foundation elective course in 2nd Semester for 2-Years Programmes. They may choose any one of the following courses (excluding the courses offered by the departments of their own subjects, if not stated otherwise).

SN	Courses Code	Course Name	Offered by Department
1	OEC-130A	Basic of Economics	Management Department
2	OEC-132A	Fundamental of Management	Management Department
3	OEC-134A	Disaster Management	Civil Engineering
4	OEC-136A	Industrial Safety	Fire Technology and Safety
5	OEC-138A	Indian Literature in Translation-I	Applied Sc. & Humanities (English)
6	OEC-140A	Environmental Issues	Applied Sc. & Humanities (Chemistry)
7	OEC-142A	Quantitative Techniques	Applied Sc. & Humanities (Mathematics)
8	OEC-144A	Sources of Energy-I	Electrical Engineering
9	OEC-146A	Operation Research	Mechanical Engineering
10	OEC-148A	Multimedia Communication	Electronics and Communication Engineering
11	OEC-150A	Introduction to Information Technology	Computer Sc. & Applications
12	OEC-152A	Cyber Forensics and Security	Computer Sc. & Engineering
13	OEC-154A	Computer Science and Principles	Computer Sc. & Engineering
14	OEC-156A	Software Engineering Practice	Computer Sc. & Engineering

Table III (Foundation Elective Courses)

SN	Courses	Remarks	Offered by Department
1	FEC-158A	Basics of Accounting	Management Department
2	FEC-160A	Basics of E-commerce	Management Department
3	FEC-162A	Element of Banking	Management Department
4	FEC-164A	Computer Fundamentals	Computer Science and Engineering
5	FEC-166A	Communication and Soft Skills	Applied Science and Humanities (English)
6	FEC-168A	Entrepreneurship Development	Management Department
7	FEC-170A	Electronics Engineering	Electronics and Communication Engineering

<table>
<tr><td>Course Code</td><td colspan="5">PCC-MTMA-101A</td></tr>
<tr><td>Category</td><td colspan="5">Professional Core Courses</td></tr>
<tr><td>Course Title</td><td colspan="5">Welding & Allied Processes</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td rowspan="2">Semester-I</td></tr>
<tr><td>4</td><td>0</td><td>0</td><td>4</td></tr>
<tr><td>Course Objectives</td><td colspan="5">The objectives of this course are
Comprehensive understanding of welding processes and their impact on the microstructure and properties of weld metal, with a focus on fusion welding
Study the behavior of welding arcs, including arc efficiency, temperature distribution, arc stability, and the role of electrode polarity in arc initiation
Provide knowledge of metal transfer mechanisms in welding, including short-circuit, globular, and spray transfer, and their effects on weld bead geometry and dilution.
Learn solid-state welding techniques such as ultrasonic, friction, explosive welding, and friction stir processing, and their applications.</td></tr>
<tr><td>Assessment</td><td colspan="5">40 Marks</td></tr>
<tr><td>End Semester Examination</td><td colspan="5">60 Marks</td></tr>
<tr><td>Total Marks</td><td colspan="5">100</td></tr>
<tr><td>Duration of Exam</td><td colspan="5">03 Hours</td></tr>
</table>

Course Outcomes: After studying this course, the students will be able to

COs	Skills Demonstrated
CO1	Define the basic terminology related to welding processes.
CO2	Explain the principles, processes, and equipment used in various welding techniques.
CO3	Apply various welding processes, including fusion and solid-state techniques, to optimize weld quality.
CO4	Select appropriate weld joints and materials based on the type of welding process and application requirements.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts (2 from each unit/section) of 1.5 marks each and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit No.	Contents
Unit-I	**Introduction:** Basic classification of welding processes, weld ability, weld thermal cycle, metallurgy of fusion welds, solidification mechanism and micro structural products in weld metal, epitaxial, cellular and dendrite solidification, metallurgical changes in weld metal, phase transformation during cooling of weld metal in carbon and low alloy steel, prediction of micro structures and properties of weld metal. Heat affected zone, re-crystallization and grain growth of HAZ, gas metal reaction, effects of alloying elements on welding of ferrous metals.

Unit-II	**Welding Arc:** Arc efficiency, temperature distribution in the arc; arc forces, arc blow, electrical characteristics of an arc, mechanism of arc initiate on and maintenance, role of electrode polarity on arc behavior and arc stability, analysis of the arc. Types of electrodes, AW Sand Indian system of classification and coding of covered electrode for mild steel, Shielding gases and associated mixtures.
Unit-III	**Metal transfer:** Short circuit/dip transfer. Free flight. Globular type. Spray type, Forces affecting metal transfer. Weld bead geometry and shape factors, Weld dilution. Electric arc welding principle, MIG: - welding equipment and processes, shielding gas, types of metal transfer. Tungsten inert gas arc welding (GTAW): -welding equipment, electrodes, inert gases and torches. Submerged arc welding (SAW): -principle of processes, applications, fluxes and welding electrodes used. CO2welding: -difference from MIG welding, Principle of operation, equipment, welding parameters and applications.
Unit-IV	**Solid state welding:** Introduction, main feature sand applications of Ultrasonic welding, Friction welding and Explosive welding friction stir processing and welding. Welding of Plastics: Difficulties in welding of Plastics, Processes for welding of Plastics.

Suggested Readings

1. Welding processes & technology by Dr. R S Parmar Khanna Publishers
2. Welding Engineering & Technology by Dr. R S Parmar Khanna Publishers
3. The Physics of welding by Lancaster Pergaman Press.
4. Welding Technology by Koenigs berger and Adaer; Macmillan.

Useful Video links

Unit No.	Topic	Link
UNIT-I	Classification of welding processes	https://archive.nptel.ac.in/courses/112/107/112107089/
	Weld thermal cycle, Metallurgy of fusion welds	https://archive.nptel.ac.in/courses/112/107/112107089/
	Solidification	https://archive.nptel.ac.in/courses/112/107/112107089/
UNIT-II	Welding arc	https://archive.nptel.ac.in/courses/112/107/112107089/
	Arc maintenance and characteristics	https://archive.nptel.ac.in/courses/112/107/112107089/
	analysis of the arc	https://archive.nptel.ac.in/courses/112/107/112107089/
	Arc efficiency	https://archive.nptel.ac.in/courses/112/107/112107089/
UNIT-III	MIG: - welding equipment and processes	https://archive.nptel.ac.in/courses/112/107/112107089/
	Tungsten inert gas arc welding (GTAW)	https://archive.nptel.ac.in/courses/112/107/112107089/
	Submerged arc welding (SAW)	https://archive.nptel.ac.in/courses/112/107/112107089/
UNIT-IV	Solid State welding	https://archive.nptel.ac.in/courses/112/103/112103273/
	Solid State welding 2	https://archive.nptel.ac.in/courses/112/103/112103273/
	Welding of Plastics	https://www.youtube.com/watch?v=Zj_S3AX7_nM

<table>
<tr><td>Course Code</td><td colspan="5">PCC-MTMA-103A</td></tr>
<tr><td>Category</td><td colspan="5">Professional Core Courses</td></tr>
<tr><td>Course Title</td><td colspan="5">Foundry Technology</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td rowspan="2">Semester-I</td></tr>
<tr><td>4</td><td>0</td><td>0</td><td>4</td></tr>
<tr><td>Course Objectives</td><td colspan="5">The objectives of this course are
Familiarize with the applications of foundry technology in manufacturing and advantages and limitations of casting processes.
Study the properties of ferrous and non-ferrous metals and alloys used in casting.
Provide the knowledge of the elements of gating systems, including the design of pouring basins, gates, and risers
Learn special casting methods such as gravity die casting, die casting, investment casting, centrifugal casting, and continuous casting,
Study the methods of repairing, salvaging defective castings and quality control techniques in foundries</td></tr>
<tr><td>Assessment</td><td colspan="5">40 Marks</td></tr>
<tr><td>End Semester Examination</td><td colspan="5">60 Marks</td></tr>
<tr><td>Total Marks</td><td colspan="5">100</td></tr>
<tr><td>Duration of Exam</td><td colspan="5">03 Hours</td></tr>
</table>

Course Outcomes: After studying this course, the students will be able to

COs	**Skills Demonstrated**
CO1	Define the fundamental terms of foundry technology.
CO2	Explain the principles, materials, and techniques involved in casting processes.
CO3	Apply advanced casting methods, repair techniques and quality control practices while adhering to environmental and safety standards.
CO4	Analyze the properties and parameters to optimize production, minimize defects, and ensure compliance with quality and environmental standards.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts (2 from each unit/section) of 1.5 marks each and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit No.	**Contents**
Unit-I	**Introduction:** Items (Domestic and Engg.) made by foundry technology. Advantage and limitations of foundry technology and other manufacturing process. Castability and factors favoring castability. Ferrous and Nonferrous casting metals and alloys and items made of them. Melting furnaces for cast iron, cast steels, aluminum alloys, brass and bronzes. Solidification of castings.
Unit-II	**Mold design considerations:** Conceptual, functional and production phase. Pattern and core design considerations, traffic rules applications. Examples, case studies. Gating system elements: objectives, practical rules, optimal time filling, types of pouring basin, types of gates, and types of risers.

Unit-III	**Special casting methods:** Gravity die casting, cold chamber die casting, hot chamber die casting, investment casting, centrifugal casting, shell mold casting. Continuous casting.
Unit-IV	**Repair and salvage of castings,** Rough cleaning (Fettling) and surface cleaning of castings. Casting inspection. Heat treatment of castings. Quality control of castings. Pollution control in foundry. Modernization of foundry

Suggested Readings

Text Book(s):

1. Principal of metal casting by Richard W. Heine, Carl R Hoper. Philip C. Rosenthal T, Tata McGraw Hill.
2. Principal of foundry technology by P. L. Jain, Tata Me Graw Hill
3. Foundry practice by W.H. Salmon

Useful Video links

Unit No.	Topic	Link
UNIT-I	Introduction to casting	https://archive.nptel.ac.in/courses/112/107/112107215/
	Melting furnaces	https://archive.nptel.ac.in/courses/112/107/112107083/
	Solidification of castings	https://archive.nptel.ac.in/courses/112/107/112107215/
UNIT-I	Pattern and core design	https://archive.nptel.ac.in/courses/112/104/112104301/
	Gating system elements	https://archive.nptel.ac.in/courses/112/107/112107215/
	Types of gates	https://archive.nptel.ac.in/courses/112/107/112107215/
UNIT-III	Die casting	https://archive.nptel.ac.in/courses/112/107/112107083/
	Investment casting	https://archive.nptel.ac.in/courses/112/107/112107083/
	Centrifugal casting	https://archive.nptel.ac.in/courses/112/107/112107083/
	Continuous casting	https://archive.nptel.ac.in/courses/112/107/112107083/
UNIT-IV	Heat treatment of castings	https://archive.nptel.ac.in/courses/112/107/112107215/
	Quality control of castings	https://archive.nptel.ac.in/courses/112/107/112107083/
	Pollution control in foundry	https://archive.nptel.ac.in/courses/112/107/112107083/

Course Code	**PCC-MTMA-105A**				
Category	Professional Core Courses				
Course Title	**Total Quality Management**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I**
	4	0	0	**4**	
Course Objectives	The objectives of this course are • Study the key concepts, principles, and practices of Total Quality Management (TQM). • Learn the tools and techniques used in TQM, including PDSA, Kaizen, Benchmarking, and the Seven Quality Tools, for continuous improvement and problem-solving. • Learn statistical process control (SPC) methods, including Taguchi's design and FMEA, to improve product and process quality • Familiarize about international quality standards such as ISO 9000 and EMS 14001, and conduct quality audits and vendor rating systems for performance measurement.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total Marks	100				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

COs	**Skills Demonstrated**
CO1	Define the basic terminologies of Total Quality Management.
CO2	Explain the principles, philosophies, and frameworks of Total Quality Management and their application in organizations.
CO3	Apply advanced techniques and tools to monitor and improve processes.
CO4	Analyse the performance measures to enhance the organizational outcomes.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts (2 from each unit/section) of 1.5 marks each and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit No.	**Contents**
Unit-I	**TQM Perspective and TQM Implementation**: Quality, Chain Reaction, Dimensions of Quality, Evolution Of Quality, Quality Control, Quality Assurance, Quality Planning, Quality Improvement, Quality Management, Total Quality Management, Cost Of Quality, Classification of Failure Cost, Reducing Costs, Juran's Model of Optimum Quality Costs, Analysis of COQ For Improvement, Analysis of External and Internal Failure Costs, TQM, Elements of TQM, Leadership For TQM, Deeming 14 Points For Top Management, TQM Tools And Techniques, PDSA, Barriers For TQM Implementation.

Unit-II	**TQM principles and Strategies:** Customer Satisfaction & Employee Involvement. Service Quality, Features of Services, The Kano Model, Employee Motivation, Motivation Theory of Individual Employees, Effective Communications, Training and Mentoring, Recognition and Reward. Continuous Process Improvement and Process Approach. Juran's Tribology, Kaizan, PDCA, Seven Quality Tools, BPR, Seven Deadly Wastes, ETX Model, Lean Manufacturing, Kanban System, Cellular Manufacturing, Single Piece Flow, Zero Defects.
Unit-III	**Statistical Process Control & TQM Tools:** The Seven Quality Control Tools, Standard Normal Distribution, AQL, Seven Management Tools, Benchmarking, QFD, Taguchi's Design, TPM, FMEA.
Unit-IV	**Quality Systems:** ISO9000 standard, EMS14001, Quality Awards Supplier Partnership and Performance Measures-Importance of Suppliers, Selection And Standards, Quality Audit, Product Audit, Vendor Rating System, PDCA For Measurements, Performance Measure Design, BSC.

Suggested Readings

1. Total Quality Management by Oakland (Butterworth- Heinemann Ltd.)
2. Managing for total quality from Deming to Taguchi and SPC by Logothetis N.(PHI)
3. Total Quality Control by Feigenbaum A.V. (MGH)
4. Total Quality Management by Besterfield Dale H (Pearson Education)

Useful Video links

Unit No.	Topic	Link
UNIT-I	Quality and its dimensions	https://youtu.be/5pMWmU_8lfI?si=hI0dsNsI2yUMLrz1
	Quality Control	https://youtu.be/xQQ2AWs0hT4?si=EKjvfZUQxU53kai2
	Total quality management	https://www.youtube.com/watch?v=yWlAOFs04go
	Deeming 14 Points	https://archive.nptel.ac.in/courses/110/105/110105088/
UNIT-II	Seven Quality Tools	https://www.youtube.com/watch?v=HQiiRh5GoIc
	Lean manufacturing	https://archive.nptel.ac.in/courses/110/107/110107130/
	Kanban	https://archive.nptel.ac.in/courses/110/107/110107130/
UNIT-III	The Seven Quality Control Tools	https://www.youtube.com/watch?v=6-JVHv5djIc
	TPM	https://www.youtube.com/watch?v=UOuTBCrW2kY
	FMEA	https://www.youtube.com/watch?v=UOuTBCrW2kY
UNIT-IV	ISO 9000	https://archive.nptel.ac.in/courses/110/104/110104080/
	PDCA	https://www.youtube.com/watch?v=4XYS7_NSvLA

Course Code	**PCC-MTME-107A**				
Category	Professional Core Courses				
Course Title	**Metal Forming Analysis**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I**
	4	0	0	**4**	
Course Objectives	The objectives of this course are The objectives of this course are • Comprehensive understanding of principles of elastic and plastic deformation in materials and their application to metal forming processes. • Learn the yield criteria and plasticity theory, including their application in analyzing metal forming processes like forging, rolling, extrusion, and sheet metal forming. • Enable to understand the role of lubrication and friction in metal forming processes, including the selection of lubricants for different applications. • Facilitate the application of finite element methods (FEM) for simulating and optimizing metal forming processes.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total Marks	100				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

COs	**Skills Demonstrated**
CO1	Define the technical terms used in metal forming analysis.
CO2	Explain the fundamental principles of metal forming processes, including deformation mechanics, material flow, lubrication and stress-strain relationships.
CO3	Apply the knowledge of metal forming analysis to solve the complex engineering problem.
CO4	Analyse the different processes, mechanism used in metal forming analysis.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts (2 from each unit/section) of 1.5 marks each and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit No.	**Contents**
Unit-I	**Stress-Strain relations in Elastic and plastic Deformations**: True stress and true strain, true stress-strain curves, selection of stress-strain curves for cold and hot working, yield of isotropic plastic material, yield criteria. Tresca maximum sheer-strain- energy criterion, plastic incompressibility, Poisson's ratio for plastic deformation flow rule, application of theory of plasticity for solving metal forming Problems using Slab method, Upper and lower Bound methods, Slip line field theory.

Unit-II	**Technology and analysis of important metal forming processes:** Forging, Rolling, Extrusion. Wiredrawing, Sheet Metal forming processes like Deep drawing, Stretch forming, bending, defects in various metal forming processes like rolling, forging, extrusion, wiredrawing and deep drawing and their causes and remedial measures, Effects of temperature and strain rate in metal working, friction and lubrication in Hot and Cold working.
Unit-III	**Lubrication in metal forming processes**: principles and mechanism of lubrications, hydrodynamic and their film lubrication, boundary and extreme pressure lubricants, solid lubricants, lubricants used for rolling and cold drawing, forging.
Unit-IV	**Application of Finite Element Methods to Metal Forming Processes:** special Discretization, Shape function, Stiffness matrices and their assembly, Implicit and explicit formulations, Elasto-plastic approximations, Lagrangian Vs Eularian schemes, Material integration schemes, and auxiliary equations for contact, friction and incompressibility, Thermo-mechanical problem formulation

Suggested Readings

1. Metal Forming Analysis- R.H. Wagoner, Cambridge University Press.
2. Theory of Elasticity-Dally and Riley
3. Mechanical Metallurgy- Dieter, McGraw Hill Inc.
4. An Introduction to the Principles of Metal working by Rowe, Arnold.

Useful Video links

Unit No.	Topic	Link
UNIT-I	Elastic properties and stress strain relations	https://www.youtube.com/watch?v=qZRFTIXADp4
	True Stress & Strain	https://www.youtube.com/watch?v=AkX6JqlWRqc
	Theories of failure	https://www.youtube.com/watch?v=xkbQnBAOFEg
	Slip Line field theory	https://www.youtube.com/watch?v=XCS3LqLssLw
UNIT-II	Metal forming technology	https://archive.nptel.ac.in/courses/112/107/112107250/
	Plasticity working of metals	https://archive.nptel.ac.in/courses/112/103/112103279/
	Analysis of Forging Process	https://www.youtube.com/watch?v=yc8UPMZ1FNA
	Analysis of wiredrawing process	https://www.youtube.com/watch?v=3jEROaVF_yQ
UNIT-III	Lubrication in metal forming processes	https://www.youtube.com/watch?v=7fGVT-U3CbQ
	Effects of temperature and strain rate in metal working	https://www.youtube.com/watch?v=xxva7b5O6m0
UNIT-IV	Introduction to Finite Element Methods	https://www.youtube.com/watch?v=C6X9Ry02mPU
	FEM approach for Rolling Process	https://www.youtube.com/watch?v=CZTQHZ6tBQw

<table>
<tr><td>Course Code</td><td colspan="5">PCC-MTME-109A</td></tr>
<tr><td>Category</td><td colspan="5">Professional Core Courses</td></tr>
<tr><td>Course Title</td><td colspan="5">Mechatronics & Product Design</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td rowspan="2">Semester-I</td></tr>
<tr><td>4</td><td>0</td><td>0</td><td>4</td></tr>
<tr><td>Course Objectives</td><td colspan="5">The objectives of this course are
Learn the fundamentals and components of mechatronics systems, including sensors, actuators, and controllers.
Learn the concepts of Logic gates, flip-flops, and sequential logic.
Familiarize with mathematical modeling and system dynamics, including transfer functions for mechatronics systems.
Enable to design and simulate mechatronics products using tools.</td></tr>
<tr><td>Assessment</td><td colspan="5">40 Marks</td></tr>
<tr><td>End Semester Examination</td><td colspan="5">60 Marks</td></tr>
<tr><td>Total Marks</td><td colspan="5">100</td></tr>
<tr><td>Duration of Exam</td><td colspan="5">03 Hours</td></tr>
</table>

Course Outcomes: After studying this course, the students will be able to

COs	Skills Demonstrated
CO1	Define the technical terminologies related to mechatronics and product design.
CO2	Explain the fundamental principles of mechatronics, including the integration of mechanical, electrical, and electronic systems.
CO3	Apply mechatronics principles to develop control systems for mechatronics devices.
CO4	Analyze the performance of mechatronic systems, considering factors like precision, efficiency, and reliability.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts (2 from each unit/section) of 1.5 marks each and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit No.	Contents
Unit-I	**Introduction** to Mechatronics systems and components, Principles of basic electronics- Digital logic, number system logic gates, Sequence logic flip flop system, JK flip flop, D- flip flop. Micro process and their applications- Microcomputer computer structure/micro controllers, Integrated circuits-signal conditioning processes, various types of amplifiers, low pass and high pass filters.
Unit-II	**Sensors-sensors and transducers:** Displacement, position proximity sensors, velocity, forces sensors. Fluid pressure temperature, liquid level and light sensors. Selection of sensors. Actuators, Pneumatic and hydraulic systems, Mechanical actuation system. Electrical calculation system .Other Electrical/ Electronic hardware in Mechatronic system.
Unit-III	**Principles of Electronic system communication**, Interfacing, A. D. and D.A. Converters. Software and hardware principles and tools to build mechatronic systems. Basic system models mathematical models, mechanical and other system Building blocks. System models-Engg. Systems, rotational, translation, elected mechanical, Hydraulic mechanical system. System Transfer functions. First-second order system in series.

Unit-IV	**Design and selection of Mechatronics systems** namely sensors line encoders and revolvers, steppe rand servomotors Ball screws, solenoids, line actuators and controllers with application to CNC system, robots, consumer electronics products etc., Design of a Mechatronic Product using available softwares.

Suggested Readings

1. Mechatronics by W. Bolton, published by Addison Worley Longman Pvt. Ltd., India Brander, Delhi.
2. Automation Production System and CIMS by Mikel P Groover, Prentice Hall of India Pvt. Ltd, New Delhi.
3. Production Systems and CIM, Groover, PHI.
4. Flexible manufacturing systems, by Maleki, Prentice Hall.

Useful Video links

Unit No.	Topic	Link
UNIT-I	Introduction To Digital Circuits	https://nptel.ac.in/courses/117106086
	S-R, J-K and D Flip Flops	https://www.youtube.com/watch?v=2ecMG_OciLo
	Micro process and their applications	https://youtu.be/iXSXIJn_Xwc?si=AfT54TfGj4gQ7V0m
UNIT-II	Position proximity sensors, velocity	https://archive.nptel.ac.in/courses/115/107/115107122/
	Pneumatic and hydraulic systems,	https://archive.nptel.ac.in/courses/112/106/112106300/
	Mechanical actuation system	https://www.youtube.com/watch?v=BUxClwVA7f8
UNIT-III	Principles of communication system	https://archive.nptel.ac.in/courses/108/104/108104091/
	Hydraulic mechanical system.	https://archive.nptel.ac.in/courses/112/103/112103249/
	System Transfer functions	https://www.youtube.com/watch?v=fyLlgjy3Xi8
UNIT-IV	Sensors and actuators	https://archive.nptel.ac.in/courses/108/108/108108147/
	Stepper Motors	https://www.youtube.com/watch?v=oZGLLDjwwrw
	Design and selection of Mechatronics systems	https://youtu.be/LX2oxCz8cU4?si=HvOTdJpK9p7LnVaI

Course code	**LC-MTMA-111A**				
Category	Lab Courses				
Course title	**MECHATRONICS LAB**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I**
	0	0	2	1	
Course Objectives	The objectives of this course are ● Learn to verify and implement basic logic gates and design logic equations using digital circuits. ● Study the integration of mechanical, electrical, and control components to create functional mechatronic systems. ● Explore the use of software tools to automate mechanical movements and utilize DAC systems for precise motion control in mechatronic applications. ● Learn to select appropriate sensors for specific applications				
Assessment	25 Marks				
End Semester Practical Examination	25 Marks				
Total Marks	50				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

COs	**Skills Demonstrated**
CO1	Verify digital logic circuits using basic gates.
CO2	Select appropriate sensors and incorporating mechatronics principles to enhance the product's functionality and value.
CO3	Use software to control and automate motion in mechatronic systems and operate systems with PLC and DAC to control movements in a mechatronic setup.
CO4	Analyze and predict system behavior and performance, with focus on mechatronics and interfacing in CNC machines.

List of Experiments

Sr. No.	**Contents**	**Relevant COs**
1	To verify truth table of various gates such as AND, OR, NOR NOT, etc.	**CO1**
2	To realize a logic equation Y=AB+CD	**CO1**
3	Selection of sensor for a particular application from Catalogue/Internet.	**CO2**
4	Design a mechatronics product/system and incorporate application of mechatronics for enhancing product values.	**CO2**
5	To study the hardware's and softwares of mechatronics kit.	**CO2**
6	To move a table in X-direction within the range of proximity sensors using Control-X software.	**CO3**
7	To rotate a table using DAC system.	**CO3**
8	To move a table in Y-direction within the range of proximity sensors using Control-X software.	**CO3**

9	To ornament to with PLC.	**CO3**
10	To run a conveyor with computer.	**CO3**
11	To study the movement of actuating cylinders and sensors.	**CO3**
12	To study mechatronic and the reinter facing in a CNC machine.	**CO4**
13	Life prediction from computer programme based on mathematical model.	**CO4**

Note: At least 10 experiments are to be performed by the students.

Virtual Lab Links

Experiment Name	**Virtual Lab Link**	**Relevant COs**
To verify truth table of various gates such as AND, OR, NOR NOT, etc.	https://de-iitr.vlabs.ac.in/exp/truth-table-gates/theory.html	**CO1**
To ornament to with PLC.	https://plc-coep.vlabs.ac.in/exp/hardware-software-plc/	**CO3**
To run a conveyor with computer.	https://www.youtube.com/watch?v=GhgFdLDdUIY	**CO3**
To study the movement of actuating cylinders and sensors.	https://sl-coep.vlabs.ac.in/exp/characterize-temperature-sensor/ https://sl-coep.vlabs.ac.in/exp/strain-gauge-sensor/	**CO3**
To study mechatronic and the reinter facing in a CNC machine.	http://vlabs.iitkgp.ac.in/cim/exp3/index.html	**CO4**

Course code	**LC-MTMA-113A**				
Category	Lab Courses				
Course title	**Welding Lab**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I**
	0	0	2	1	
Course Objectives	The objectives of this course are ● Study the tensile properties, bead geometry, hardness, and microstructure of welding beads produced by various welding processes. ● Enable to investigate mechanical properties such as tensile strength, hardness, impact strength, corrosion resistance, wear, and fatigue behavior in materials. ● Explore how different welding techniques influence the grain structure and overall material performance.				
Assessment	25 Marks				
End Semester Practical Examination	25 Marks				
Total Marks	50				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

COs	**Skills Demonstrated**
CO1	Explain heat flow during gas welding and its effects on material properties and weld quality.
CO2	Assess tensile strength, bead geometry, hardness, and microstructure for different welding techniques like MIG, TIG, SAW, and Arc welding.
CO3	Evaluate mechanical behaviors such as impact strength, corrosion resistance, and fatigue for materials processed by friction stir welding and friction stir processing.

List of Experiments

Sr. No.	**Contents**	**Relevant COs**
1	To study Heat flow in Welding (Equipment for use –Gas Welding equipment)	**CO1**
2	To study tensile property, Bead Geometry, Hardness of Bead, Micro structure of welding Bead in case of: i) MIG Welding ii) TIG Welding iii) SAW Welding iv) Arc welding	**CO2**
3	To study mechanical behavior (tensile strength, Hardness of Bead, Micro structure of welding Bead, impact strength, corrosion and wear, fatigue Behaviour) in case of 1. Friction stir welding 2. Friction stir processing	**CO3**

Virtual Lab Links

Experiment Name	**Virtual Lab Link**	**Relevant COs**
To study Heat flow in Welding (Equipment for use –Gas Welding equipment)	https://www.youtube.com/watch?v=k7Hjl_1fCkE	**CO1**
To study tensile property, Bead Geometry, Hardness of Bead, Micro structure of welding Bead in case of: i) MIG Welding ii) TIG Welding iii) SAW Welding iv)Arc welding	https://www.youtube.com/watch?v=QVhYIGTVgDA&t=1s	**CO2**
To study mechanical behavior (tensile strength, Hardness of Bead, Micro structure of welding Bead, impact strength, corrosion and wear, fatigue Behaviour) in case of 1. Friction stir welding 2. Friction stir processing	https://www.youtube.com/watch?v=0Sqc9DjpwxI	**CO3**

Course Code	**SM-MT-115A**				
Category	Seminar				
Course Title	**Seminar-I**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I**
	0	0	2	**2**	
Course Objectives	The objectives of this course are • To develop students' ability to effectively present research topics and findings by effective communication. • To improve problem-solving and critical thinking skills of the students. • To expose students to the latest trends and advancements by reviewing and discussing contemporary research.				
Assessment	50 Marks				
End Semester Examination	-				
Total Marks	50				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

CO	**Skill Demonstrated**
CO1	Identify the trends and advancements in the related field.
CO2	Analyze and synthesize research literature with in-depth reviews of key studies and methodologies.
CO3	Undertake problem identification, formulation, proposing solution and analyze the impact on society, economy and environment.
CO4	Prepare a well-organized report employing elements of effective communication and critical thinking.
CO5	Demonstrate a sound technical knowledge of their research field.

Overview:

This is a course designed to help M. Tech students develop research presentation skills. The focus is on selecting a topic or research paper relevant to their specialization, conducting an in-depth review, and effectively presenting the research findings.

General Guidelines:

Topic Selection	Each student is required to choose the research topic based on published review paper(s) or literature related to their relevant field. The same topic cannot be selected by multiple students.
Approval Process	The selected paper or topic must be approved by the faculty members/committee appointed by the Head of Department.
Presentation Guidelines	Each student will have 30-40 minutes for their presentation, followed by 5 minutes for Q&A.
Evaluation	The presentation will be evaluated by a committee constituted by the Head of Department. The evaluation will be based on:

Parameters for the Evaluation of Seminar

Sr. No.	Parameters	Marks Allotted	Relevant COs
1	Clarity of the topic	10	CO1
2	Literature Survey	10	CO2
3	Content Relevancy	10	CO3
4	Presentation Skills	10	CO4
5	Q&A Response	10	CO5

<table>
<tr><td>Course Code</td><td colspan="5">PCC-MTMA-102A</td></tr>
<tr><td>Category</td><td colspan="5">Professional Core Courses</td></tr>
<tr><td>Course Title</td><td colspan="5">MECHANICAL DESIGN-I</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td rowspan="2">Semester-II</td></tr>
<tr><td>4</td><td>0</td><td>0</td><td>4</td></tr>
<tr><td>Course Objectives</td><td colspan="5">The objectives of this course are
Equip students with methods and skills to generate, develop, and evaluate innovative product ideas.
Teach students how to connect customer needs with design characteristics through QFD and material selection.
Help students learn techniques to simplify assembly processes and improve product reliability.
Introduce students to principles of designing products that are easier and more cost-effective to manufacture.
Provide foundational knowledge of various production technologies used in manufacturing.
Familiarize students with techniques used for joining materials in product assembly.</td></tr>
<tr><td>Assessment</td><td colspan="5">40 Marks</td></tr>
<tr><td>End Semester Examination</td><td colspan="5">60 Marks</td></tr>
<tr><td>Total Marks</td><td colspan="5">100</td></tr>
<tr><td>Duration of Exam</td><td colspan="5">03 Hours</td></tr>
</table>

Course Outcomes: After studying this course, the students will be able to

COs	Skills Demonstrated
CO1	Define the basics of mechanical design.
CO2	Describe the principles of design for assembly (DFA), design for manufacturing (DFM), and the functions of various production processes.
CO3	Use knowledge of material properties and conceptual design methods to create functional and manufacturable product designs.
CO4	Analyze the compatibility of materials, designs, and production methods to identify potential challenges and opportunities for optimization.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts (2 from each unit/section) of 1.5 marks each and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit No.	Contents
Unit-I	**Concept Design :** Brain storming methods and sketching.
Unit-II	**Quality Function Development**: Material Characteristics Mechanical, thermal and electrical properties.
Unit-III	**Design**: Design for assembly. Design for manufacturing.
Unit-IV	**Production technologies**: Metal forming, casting, machining, surface treatment, welding, bonding, fastening, clinching.

Suggested Readings

1. Quality Function development, L. Cohen.
2. Manufacturing Engg.: Principles for Organization, D.T. Koenig.
3. Materials Science and Engineering: An Introduction, W.D. Callister Jr.
4. Handbook of Aluminum: Alloy Production and Materials Manufacturing Vol.2, G.E. Totten.
5. CAD Software Catia, Dassault system.

Useful Video links

Unit No.	Topic	Link
UNIT-I	Concept Design : Brain storming method sand sketching	https://www.youtube.com/watch?v=sLi7oHicHCU
		https://youtu.be/MAxqEV8u0aQ?si=68Bfm9e3Xy0mq_6s
		https://youtu.be/DTbijbgUC30?si=tu5QTzwUlOKySkLV
UNIT-II	Quality Function Development Material Characteristics Mechanical, thermal and electrical properties	https://www.youtube.com/watch?v=jS_nXHJG3ZU
UNIT-III	Design for assembly. Design for manufacturing.	https://youtu.be/udM9CrT38AM?si=cR6I9no2wAi29V4Y
UNIT-IV	Metal forming, casting, machining, surface treatment, welding, bonding, fastening, clinching.	https://youtu.be/jdFrBtHeJbs?si=4xh9KrEkRBLm1zaK

Course Code	**PCC-MTMA-104A**				
Category	Professional Core Courses				
Course Title	**Diagnostic Maintenance & Monitoring**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	4	0	0	**4**	
Course Objectives	The objectives of this course are • Learn the foundational concepts of maintenance management, its relevance, and the role of automation in maintenance strategies. • Explore different types of failure analyses, including FTA, FMEA, and FMECA. • Familiarize students with condition monitoring techniques, including non-destructive testing (NDT). • Understand the principles of Total Productive Maintenance (TPM), its implementation process, and its impact on productivity improvement and reliability.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total Marks	100				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

COs	**Skills Demonstrated**
CO1	Define the basis of diagnostic maintenance & monitoring.
CO2	Explain equipment failures techniques and maintenance management strategies based on the nature and frequency of failures.
CO3	Apply condition monitoring techniques, such as vibration and temperature analysis, and analyzing data from these methods to make informed decisions about predictive maintenance needs.
CO4	Analyse TPM systems by following the basic principles and procedures to improve productivity and enhance the overall reliability of manufacturing systems.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts (2 from each unit/section) of 1.5 marks each and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit No.	**Contents**
Unit-I	**Maintenance Management :** Relevance of maintenance, maintenance: an overview, maintenance services, problems of the plant manager, automation and maintenance, maintenance objectives and costs, quality and quality circle in maintenance, Engineering reliability, maintainability.
Unit-II	**Failure analysis :** Defect generation types of failures, FTA, FMEA, FMECA Maintenance Types/systems Planned and unplanned maintenance, breakdown, corrective, opportunistic, routine, preventive, predictive, CBM, Design out maintenance.

Unit-III	**Condition monitoring :** NDT concepts ,visual and temperature monitoring, leakage monitoring, vibration monitoring, lubricant monitoring methods, equipments, ferrography, spectroscopy, cracks monitoring, thickness monitoring, corrosion monitoring, noise monitoring, sound monitoring, smell monitoring
Unit-IV	**Total productive maintenance**: Development and scope of concept, terotechnology, basic systems of TPM procedure and steps of TPM, productivity circle

Suggested Readings

1. Maintenance planning and Control-Kelly, A. Buttersworth&Co.1984
2. Maintenance and spare parts Management–Krishanan G, Prentice Hall–1991

Useful Video links

Unit No.	Topic	Link
UNIT-I	TQM	https://youtu.be/5pMWmU_8lfI?feature=shared
	Reliability	https://youtu.be/Yukes35HeCM?feature=shared
UNIT-II	FMECA	https://archive.nptel.ac.in/courses/112/105/112105232/
	FMEA	https://youtu.be/ffKaRuNx84M?feature=shared
UNIT-III	Condition Monitoring	https://youtu.be/j_Xpzzo0iko?feature=shared
	NDT concepts	https://youtu.be/DK1dItnI8mM?feature=shared
UNIT-IV	Total Productive Maintenance	https://youtu.be/UOuTBCrW2kY?feature=shared
	Productivity	https://youtu.be/Au6GGv93R5E?feature=shared

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<tr><td>Course Code</td><td colspan="5">PEC-MTMA-112A</td></tr>
<tr><td>Category</td><td colspan="5">Professional Elective Courses</td></tr>
<tr><td>Course Title</td><td colspan="5">QUALITY CONTROL TECHNIQUES</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td rowspan="2">Semester-II</td></tr>
<tr><td>4</td><td>0</td><td>0</td><td>4</td></tr>
<tr><td>Course Objectives</td><td colspan="5">The objectives of this course are
Understand statistical concepts in quality control to evaluate variation in process and product quality.
Analyze control charts to distinguish between chance and assignable causes of variation.
Interpret control chart parameters to determine process settings and assess capability.
Apply probability theory and operating characteristic curves to design effective sampling plans.
Assess quality protection in sampling plans using Average Outgoing Quality (AOQ) and Average Outgoing Quality Limit (AOQL).</td></tr>
<tr><td>Assessment</td><td colspan="5">40 Marks</td></tr>
<tr><td>End Semester Examination</td><td colspan="5">60 Marks</td></tr>
<tr><td>Total Marks</td><td colspan="5">100</td></tr>
<tr><td>Duration of Exam</td><td colspan="5">03 Hours</td></tr>
</table>

Course Outcomes: After studying this course, the students will be able to

COs	**Skills Demonstrated**
CO1	Define the basics of quality control techniques.
CO2	Explain the fundamental principles of quality control, process control, and the role of quality assurance in manufacturing and service industries.
CO3	Apply control charts, tools and theorems to monitor and control product quality during production.
CO4	Analyze the impact on quality assurance and process performance.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts (2 from each unit/section) of 1.5 marks each and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit No.	**Contents**
Unit-I	Statistical concepts in Quality Control, variables and attributes, Graphical Representation, Continuous and Discrete Probability Distributions, control limit Theorem. Introduction to Quality Control, process Control and Product Control ,Chance and Assignable causes of Quality variation, Advantages of Shewhart control charts, Process Control charts for variables, X, R and P charts, fixation of control limits, Type I and Type II Errors
Unit-II	Theory of runs, Interpretation of Out of Control points, Probability limits, Initiation of control charts, Trial control limits, Determination of aimed at value of Process Setting, Rational method of sub grouping, control chart parameters, control limits and specification limits, Natural tolerance limits, Relationship of a process in Control to upper and lower specification limits, process capability studies

Unit-III	Special control charts for variables, group control chart, control charts with large sub groups, control chart with reject limits, use of control limits for moving averages Variables inspection and Attributes inspection, Relative merits and demerits, Control charts for Attributes, p chart and n p chart, varying control limits, high defectives and low defectives, CUSU M or Cumulative sum control chart, Average run length (ARL) Relative efficiency or sensitivity of control chart.
Unit-IV	Probability theory binomial and Poisson distribution, Acceptance Inspection, 100% Inspection, No Inspection and sampling Inspection, (O.C.curve). Effect of sample size and Acceptance number operating characteristic curve, type A and type B. O.C. curves, Single, Double and Multiple sampling Plans, SS Plan. Acceptance/Rejection and Acceptance/Rectification Plans, Producers Risk and Consumer's Risk, Indifference Quality level, Average Outgoing quality (AOQ) curve, AOQL ,quality protection offered by a sampling Plan

Suggested Readings

1. Statistical Quality control by E.L. Grant
2. Quality control and Industrial Statistics, by A.J. Duncan
3. Quality control by Dale H. Besterfield
4. Total Quality Control by A. V. Feigenbaum
5. Elementary S.O.L. by I. W. Burr, M. Dekker

Useful Video links

Unit No.	Topic	Link
UNIT-I	Statistical Concepts in Quality Control	https://www.youtube.com/watch?v=yRG1zfqxID4
	Probability Distributions	https://www.youtube.com/watch?v=b9a27XN_6tg
	Control Charts	https://www.youtube.com/watch?v=Aj7lJLR-7b4
UNIT-II	Trial Control Limits	https://www.youtube.com/watch?v=cTsVqOIYyDM
	Rational Method of Sub Grouping	https://www.youtube.com/watch?v=ocfNbNU3xxM
	Process in Control	https://youtu.be/1IhsnvXWkmo?si=sFF_-d0s0rKtIQp7
UNIT-III	Special Control Charts for Variables	https://www.youtube.com/watch?v=yUnDWQ5GmaE
	Variables Inspection and Attributes Inspection	https://www.youtube.com/watch?v=qmNzDzLeoT4
	P and N Chart	https://www.youtube.com/watch?v=p-gvwkHePaU
UNIT-IV	Binomial and Poisson Distribution	https://www.youtube.com/watch?v=c06FZ2Yq9rk
	Operating Characteristic Curve	https://www.youtube.com/watch?v=JE2gfjMj144
	Average Outgoing Quality Limit	https://www.youtube.com/watch?v=-fenqKOEW7E

<table>
<tr><td>Course Code</td><td colspan="5">PEC-MTMA-114A</td></tr>
<tr><td>Category</td><td colspan="5">Professional Elective Courses</td></tr>
<tr><td>Course Title</td><td colspan="5">Finite Element Methods</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td rowspan="2">Semester-II</td></tr>
<tr><td>4</td><td>0</td><td>0</td><td>4</td></tr>
<tr><td>Course Objectives</td><td colspan="5">The objectives of this course are
Understand the principles and concepts of the finite element method, including discretization, element types, and the formulation of finite element equations.
Enable to apply FEM and solve engineering problems.
Develop finite element models for a variety of structural and mechanical systems, including linear and nonlinear problems.
Understand the concept of numerical integration for element stiffness.</td></tr>
<tr><td>Assessment</td><td colspan="5">40 Marks</td></tr>
<tr><td>End Semester Examination</td><td colspan="5">60 Marks</td></tr>
<tr><td>Total Marks</td><td colspan="5">100</td></tr>
<tr><td>Duration of Exam</td><td colspan="5">03 Hours</td></tr>
</table>

Course Outcomes: After studying this course, the students will be able to

COs	**Skills Demonstrated**
CO1	Define the basic concepts of finite element methods.
CO2	Explain the basic principles of the finite element method, including the discretization of structures, element types, and formulation of governing equations.
CO3	Use FEM techniques to solve complex structural problems, including the analysis of stress, strain, and deformation in various engineering structures.
CO4	Analyze finite element models and behavior of different element types and mesh configurations to ensure the reliability of simulations in engineering applications.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts (2 from each unit/section) of 1.5 marks each and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit No.	**Contents**
Unit-I	**Fundamentals:** Description of method, matrix techniques, large system of algebraic equations, basics of solid mechanics, stress and strain relationships in elastic behavior - linear and nonlinear. Variational methods in solid mechanics, minimum potential energy and minimum complementary energy, application to FE methods.
Unit-II	**Theory of FE Method:** Element shapes, one-, two-, three- dimensional and axisymmetric elements, displacement models in generalized coordinates, convergence, nodal degrees of freedom, interpolation displacement models. Element stresses and strains. Element stiffness and loads, lumped loads. Variational formulation of element stiffness and lumped load, numerical integration, condensation of internal degrees of freedom.

Unit-III	**Assemblage of Elements:** Discretization of a body or structure, effect of element aspect ratio, infinite bodies, higher order elements and refinement of mesh, nodal compatibility and interface displacement compatibility, assembly stiffness matrix. Boundary conditions, solution for element stress or strain.
Unit-IV	**Application of FEM:** Application of FEM to problems in mechanics, fluid flow and heat transfer. Making Computer Codes for FEM solutions.

Suggested Readings

1. Introduction to the Finite Element Method by CS Desai and JF Abel; Van Nostrand Reinhold Co.
2. Finite Element by OC Zienkiewicz.
3. Finite Element Procedures by Klaus-Jurgen Bathe; Prentice Hall.
4. Concept and Applications of Finite Element Analysis by R Cook, D Malkus, M Plesha and R Witt; Wiley
5. Practical finite element analysis by Nitin S Gokhale, Desh Pande, Bedekar & Thite, Finite to infinite, Pune

Useful Video links

Unit No.	Topic	Link
UNIT-I	Elastic stress- strain relations	https://youtu.be/o0jav8mpHGM?feature=shared
	Variational Methods	https://youtu.be/hahSt_5mc3A?feature=shared
UNIT-II	Introduction to Finite Element Method	https://youtu.be/KR74TQesUoQ?feature=shared
	Generalized and Principle Coordinates	https://youtu.be/AN8Ip39LXJg?feature=shared
UNIT-III	Assembly of element equations	https://youtu.be/hJmM6CzFRW8?feature=shared
	Finite Element Method	https://youtu.be/KWUcHgXOijs?feature=shared
	Total Stiffness Matrix	https://youtu.be/9bnFVE88PaM?feature=shared
UNIT-IV	Analysis of Trusses Using Finite Element Methods	https://youtu.be/m5Ng0C5ZFJ8?feature=shared
	Computer Coding	https://youtu.be/6nIDdwr9N_E?feature=shared

Course Code	**PEC-MTMA-116A**				
Category	Professional Elective Courses				
Course Title	**Artificial Intelligence In Manufacturing**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	4	0	0	**4**	
Course Objectives	The objectives of this course are • Learn the fundamental concepts, scope, and applications of artificial intelligence in the manufacturing industry. • Understanding of expert systems' architecture, development processes, and applications in manufacturing. • Explore knowledge representation methods, heuristic search techniques, and reasoning strategies for problem-solving in AI. • Familiarize students with practical AI applications in manufacturing domains, including CAD, CAPP, scheduling, and maintenance, through case studies and examples.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total Marks	100				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

COs	**Skills Demonstrated**
CO1	Define artificial intelligence and its role in manufacturing.
CO2	Explain the fundamental concepts of artificial intelligence and its applications in manufacturing, including machine learning, neural networks, and robotics.
CO3	Apply artificial intelligence in manufacturing to optimize manufacturing processes, improve quality control, and enhance production efficiency.
CO4	Analyze expert systems for various manufacturing domains, comparing their architectures with procedural programming, and implement them for applications.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts (2 from each unit/section) of 1.5 marks each and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit No.	**Contents**
Unit-I	Definition, basic concepts of artificial Intelligence, scope, role and potential of artificial intelligence in manufacturing, Expert systems, Popular AI application.
Unit-II	Overview of Expert systems, architecture, comparison with procedural programming, developing Expert system of typical manufacturing domains, implementation and maintenance, state- of-art Expert system application, case study.
Unit-III	All theory problems, problem spaces and search, Heuristic search technique, Knowledge acquisition and knowledge representation, predicate logic, procedurals, Declarative knowledge, forward V/s backward reasoning AI architecture, overview of advanced features and planning, learning, natural language processing, neural nets, fuzzy logic, object oriented programs.

Unit-IV	Case studies, examples of AI, theoretical concepts to manufacturing problems, CAD, CAPP, scheduling GT, CIM system. Domains welding, casting, forming, metal cutting, maintenance

Suggested Readings

1. Artificial Intelligence: A Modern Approach, Second Edition, Russell, S. and Norvig, P., Pearson Education.
2. Machine Learning, First Edition, Dutt, S., Chandramouli, S. and Das, A.K. Pearson Education
3. Artificial Intelligence in Manufacturing: Applications and Case Studies by Masoud Soroush, Richard D Braatz.

Useful Video links

Unit No.	Topic	Link
UNIT-I	Introduction to AI	https://youtu.be/pKeVMlkFpRc?feature=shared
	Basic concepts of artificial Intelligence	https://youtu.be/NCq26BvEYIg?feature=shared
UNIT-II	Expert Systems	https://www.youtube.com/watch?v=nE5c5w4aizU
	Functional, Procedural & Object-oriented Programming	https://www.youtube.com/watch?v=aoE-92Ac4zE
UNIT-III	Fuzzy Sets, Logic and Systems	https://youtu.be/K7S3TgfqnX0?feature=shared
	Neural Networks	https://youtu.be/xbYgKoG4x2g?feature=shared
UNIT-IV	Computer aided manufacturing and process planning	https://youtu.be/20_K7c65Swg?feature=shared
	Group Technology	https://youtu.be/1EiGhdMfjok?feature=shared

Course code	**LC-MTMA-106A**				
Category	Lab Courses				
Course title	**CIM LAB**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	0	0	2	1	
Course Objectives	The objectives of this course are ● To study the general features and capabilities of CNC machining and turning centers ● Use and control of robotic systems in applications. ● Understand the functionality and applications of Automated Guided Vehicles. ● Explore the configuration and role of CMMs and machine vision in quality control and their applications in a CIM environment..				
Assessment	25 Marks				
End Semester Practical Examination	25 Marks				
Total Marks	50				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

COs	**Skills Demonstrated**
CO1	Understand and create CNC part programs for various components.
CO2	Understand the applications of robotic systems in ASRS and FMS, and their role in improving automation and efficiency in manufacturing.
CO3	Analyze the working principles and applications of Coordinate Measuring Machines (CMM) and Automated Guided Vehicles (AGVs) in a Computer Integrated Manufacturing (CIM) environment.
CO4	Apply machine vision technologies for quality control and understand the integration of conveyor systems within CIM environments..

List of Experiments

Sr. No.	**Contents**	**Relevant COs**
1	To study general features of Machining Center.	**CO1**
2	To prepare the CNC part program for machining a prismatic component on CNC Machining centre.	**CO1**
3	To study the general features of a CNC Turning center.	**CO1**
4	To prepare the CNC part program for machining of a Cylindrical Component.	**CO1**
5	Study and Applications of Robotic system in Automated storage and Retrieval system.	**CO2**
6	Application and Control of robotic system in Flexible manufacturing System.	**CO2**
7	To study the general features of Automated Guided Vehicle.	**CO3**
8	To study the general configuration of CMM and its Application in CIM environment.	**CO3**
9	Machine Vision and Quality Control in CIM environment.	**CO4**
10	Study and Applications of Conveyer System in CIM system.	**CO4**
11	Study and application of CIM software.	**CO4**

Note: At least 10 experiments are to be performed by the students.

Virtual Lab Links

Experiment Name	**Virtual Lab Link**	**Relevant COs**
To study general features of Machining Center.	https://www.youtube.com/watch?v=8EfEWZLgM-w	**CO1**
To prepare the CNC part program for machining a prismatic component on CNC Machining centre.	https://www.youtube.com/watch?v=5XihF05K4yM	**CO1**
To study the general features of a CNC Turning center.	https://www.youtube.com/watch?v=jym9H6p9-3U&t=444s	**CO1**
To prepare the CNC part program for machining of a Cylindrical Component.	https://www.youtube.com/watch?v=VvDCB8Y2SjQ	**CO1**
Study and Applications of Robotic system in Automated storage and Retrieval system.	https://www.youtube.com/watch?v=POb_zniNqPM	**CO2**
Application and Control of robotic system in Flexible manufacturing System.	https://www.youtube.com/watch?v=uhl4jEQT_aQ	**CO2**
To study the general features of Automated Guided Vehicle.	https://www.youtube.com/watch?v=dNYKcbgbY1A	**CO3**
To study the general configuration of CMM and its Application in CIM environment.	https://www.youtube.com/watch?v=BPQI1xMXC04 https://www.youtube.com/watch?v=oyhnglr_HiY	**CO3**
Machine Vision and Quality Control in CIM environment.	https://www.youtube.com/watch?v=w8oEJgnO0S0	**CO4**

Course code	**LC-MTMA-108A**				
Category	Lab Courses				
Course title	**Diagnostic Maintenance & Monitoring Lab**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	0	0	2	1	
Course Objectives	The objectives of this course are ● Introduce various maintenance techniques and their importance in industrial applications. ● To study and perform NDT techniques. ● Understand and use diagnostic tools for wear analysis and equipment inspection. ● Study the role and applications of diagnostic maintenance techniques. ● Learn strategies for maintenance planning and control, focusing on efficient work planning and management in large industrial setups.				
Assessment	25 Marks				
End Semester Practical Examination	25 Marks				
Total Marks	50				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

COs	**Skills Demonstrated**
CO1	Explain the fundamentals of maintenance techniques and apply them to improve machine reliability.
CO2	Explain Non-Destructive Testing (NDT) techniques such as liquid dye penetration, leak testing, and perform visual inspection using Boroscope and Flexiscope.
CO3	Apply techniques such as Eddy current testing, ultrasonic testing, thermography, and ferrography for wear analysis and fault detection.
CO4	Apply maintenance planning, work control, and diagnostic maintenance practices in large industrial plants such as sugar mills or power plants.

List of Experiments

Sr. No.	**Contents**	**Relevant COs**
1	To study the introduction to maintenance techniques. Preventive and predictive Maintenance	**CO1**
2	To study and perform Non-Destructive Testing techniques, liquid dye penetrates and leak testing.	**CO2**
3	To study and perform, Boroscope, Flexiscope.	**CO2**
4	To study and perform Eddy current testing &Ultrasonic testing	**CO3**
5	To study and perform Magnetic particle detection and Particle counter.	**CO3**
6	To study wear Analysis through thermography and Ferrography.	**CO3**
7	To study the applications of Diagnostic Maintenance to Industrial Machines and plants such as Sugar Industry or Textile Mills or Thermal Power plants and Railways.	**CO4**
8	To study the Maintenance planning and control of a large factory, work planning and work control.	**CO4**

Virtual Lab Links

Experiment Name	**Virtual Lab Link**	**Relevant COs**
To study the introduction to maintenance techniques. Preventive and predictive Maintenance	https://www.youtube.com/watch?v=4wneZDEB3VA	**CO1**
To study and perform Non-Destructive Testing techniques, liquid dye penetrates and leak testing.	https://www.youtube.com/watch?v=iwasC3G141w	**CO2**
To study and perform Eddy current testing & Ultrasonic testing	https://www.youtube.com/watch?v=tZBA1L2GkHg	**CO3**
To study and perform Magnetic particle detection and Particle counter.	https://www.youtube.com/watch?v=lD95ri6F2YY	**CO3**
To study wear Analysis through thermography and Ferrography.	https://www.youtube.com/watch?v=piJh0UFdNNw https://www.youtube.com/watch?v=PlZZOWREtvY	**CO3**

Course Code	**SM-MT-110A**				
Category	Seminar				
Course Title	**Seminar-II**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	0	0	2	**2**	
Course Objectives	The objectives of this course are • To develop students' ability to effectively present research topics and findings by effective communication. • To improve problem-solving and critical thinking skills of the students. • To expose students to the latest trends and advancements by reviewing and discussing contemporary research.				
Assessment	50 Marks				
End Semester Examination	-				
Total Marks	50				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

CO	**Skill Demonstrated**
CO1	Identify the trends and advancements in the related field.
CO2	Analyze and synthesize research literature with in-depth reviews of key studies and methodologies.
CO3	Undertake problem identification, formulation, proposing solution and analyze the impact on society, economy and environment.
CO4	Prepare a well-organized report employing elements of effective communication and critical thinking.
CO5	Demonstrate a sound technical knowledge of their research field.

Overview:

This is a course designed to help M. Tech students develop research presentation skills. The focus is on selecting a topic or research paper relevant to their specialization, conducting an in-depth review, and effectively presenting the research findings.

General Guidelines:

Topic Selection	Each student is required to choose the research topic based on published review paper(s) or literature related to their relevant field. The same topic cannot be selected by multiple students.
Approval Process	The selected paper or topic must be approved by the faculty members/committee appointed by the Head of Department.
Presentation Guidelines	Each student will have 30-40 minutes for their presentation, followed by 5 minutes for Q&A.
Evaluation	The presentation will be evaluated by a committee constituted by the Head of Department. The evaluation will be based on:

Parameters for the Evaluation of Seminar

Sr. No.	Parameters	Marks Allotted	Relevant COs
1	Clarity of the topic	10	CO1
2	Literature Survey	10	CO2
3	Content Relevancy	10	CO3
4	Presentation Skills	10	CO4
5	Q&A Response	10	CO5

Annexure 2.7

Ganga Institute of Technology and Management, Kablana

(An Autonomous Institute under Maharshi Dayanand University, Rohtak)

Department of Computer Science and Engineering

Minutes of 1st Meeting of Board of Studies

Date: 04.01.2025

The first Meeting of Board of Studies of Computer Science and Engineering Department was held on 04.01.2025 at 11:00 A.M in the Conference Hall of the Institute.

The following members were present for the BOS meeting:

Name of the Member	Affiliation/Organization	Designation within Board of Studies
Dr. Nitin Kumar	HOD-CSE, Ganga Institute of Technology and Management, Kablana	Chairperson
Prof. Yudhvir Singh	Director, UIET, MDU, Rohtak, University Nominee	Member
Prof. Yogesh Chaba	Subject Expert (Professor, CSE, GJU Science & Technology, Hisar), Outside Parent University	Member
Prof. Namita Gupta	Subject Expert (Professor, CSE, MAIT, New Delhi), Outside Parent University	Member
Mr. Sumit Nijhawan	Industry/ Corporate Sector	Member
Dr. Pramod Kumar	Associate Professor, CSE, GITAM Kablana	Member
Dr. Poonam	Assistant Professor, CSE, GITAM Kablana	Member
Dr. Priyanka Rani	Assistant Professor, CSE, GITAM Kablana	Member
Ms. Upasna	Assistant Professor, CSE, GITAM Kablana	Member
Mr. Rahul	Assistant Professor, CSE, GITAM Kablana	Member
Mr. Jitender Kumar	Assistant Professor, CSE, GITAM Kablana	Member
Ms. Nisha Rani	Assistant Professor, CSE, GITAM Kablana	Member
Ms. Ritu Kadyan	Assistant Professor, CSE, GITAM Kablana	Member
Ms. Sonia	Assistant Professor, CSE, GITAM Kablana	Member
Ms. Manjali	Assistant Professor, CSE, GITAM Kablana	Member
Ms. Aakansha	Assistant Professor, CSE, GITAM Kablana	Member
Ms. Smriti	Assistant Professor, CSE, GITAM Kablana	Member
Mr. Tarun Kumar	Assistant Professor, CSE, GITAM Kablana	Member
MS. Sonika	Assistant Professor, CSE, GITAM Kablana	Member
Ms. Ritu Lohchab	Assistant Professor, CSE, GITAM Kablana	Member
Mr. Rakesh	Assistant Professor, CSE, GITAM Kablana	Member
Mr. Vikas	Assistant Professor, CSE, GITAM Kablana	Member
Mr. Arihant Jain	Alumni	Member

Agenda of the Meeting:

Item No.: 1.1	Introduction of the members of the board of studies.
Item No.: 1.2	Approval of the Scheme of Examinations and Syllabus prescribed for M.Tech CSE 1st year and M.Tech CFIS 1st year for academic session 2024-25.
Item No.: 1.3	Approval of Scheme of Examinations and Syllabus of Programming for Problem Solving (PPS) for B.Tech 1st year (Common for all branches) offered by the Computer Science and Engineering Department for academic session 2024-25.
Item No.: 1.4	Panel of examiners for theory and practical's of B.Tech and M.Tech Programs for academic session 2024-25.
Item No.: 1.5	Any other item with the permission of the chair

Proceedings:

Item No.: 1.1	The Chairperson welcomed all the BOS members and introduced external members to the internal members. The members shared their affiliations and roles within the BOS.
Item No.: 1.2	Approved the Scheme of Examinations and Syllabus prescribed for M.Tech CSE 1st year and M.Tech CFIS 1st year for academic session 2024-25. The approved Scheme of Examinations and Syllabi for the M.Tech CSE are attached as Annexure–I (Pages 1–46), and for the M.Tech CFIS are attached as Annexure–II (Pages 47–86).
Item No.: 1.3	Approved the Scheme of Examinations and Syllabus of Programming for Problem Solving (PPS) for B.Tech 1st year (Common for all branches) offered by the Computer Science and Engineering Department for academic session 2024-25 and are attached as Annexure-III (Pages 87–90).
Item No.: 1.4	Panel of examiners for theory and practical's of B.Tech and M.Tech Programs for academic session 2024-25 is attached as Annexure-IV (Pages 91-94).
Item No.: 1.5	Suggested to establish additional collaborations with industries and reputed academic institutions to strengthen the curriculum and improve employability prospects for students.

The meeting concluded with the vote of thanks proposed by Chairperson BOS CSE to all members for their presence and insights.

Dr. Nitin Kumar
Chairperson
Board of Studies
Computer Science and Engineering Deptt

Endst No. GITAM/BOSCSE/001

The copy of the same is forwarded to

- Hon'ble Director Sir for kind information and approval
- Hon'ble Registrar for further necessary action
- IQAC
- In-charge website of the Institute to upload the same
- All the Members of Board of Studies
- All HODs

Dr. Nitin Kumar
Chairperson
Board of Studies
Computer Science and Engineering Deptt

Annexure I

Annexure 2.8

GANGA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, KABLANA (JHAJJAR)

An Autonomous Institute

'A' GRADE ACCREDITED BY NAAC

Evaluation Scheme and Syllabus For

Master of Technology (Computer Science and Engineering)

Effective from the Session: 2024-25

APPROVED BY AICTE, NEW DELHI AND AFFILIATED TO MDU, ROHTAK

1. DEFINITION OF CREDIT

1	1 Lecture (L) per week	1 Credit
2	2 Practical (P) per week	1 Credit
3	2 Seminar per Week	2 Credit
4	4 Project Per Week	2 Credit

2. RANGE OF CREDIT

A credit of 86 is required for a student to be eligible for a postgraduate degree in Computer Science and Engineering.

3. STRUCTURE OF POSTGRADUATE ENGINEERING PROGRAM (M.TECH)

Sr. No.	Category	Breakup of Credits
1	Professional Core Courses	32*
2	Professional Elective Courses (Relevant to chosen specialization/branch)	8*
3	Mandatory Learning Course	3*
4	Multidisciplinary Open Elective Courses	6*
5	Foundation Elective Courses	3*
6	Seminar	6*
7	Lab Courses	4*
8	Project	2*
9	Dissertation	22*
	Total Credits	**86***

**Minor variation is allowed as per need of the respective disciplines.*

4. COURSE CODE AND DEFINITIONS

Sr. No.	Category	Course Code
1	Professional Core Courses	PCC
2	Professional Elective Courses (Relevant to chosen specialization/branch)	PEC
3	Mandatory Learning Course	MLC
4	Multidisciplinary Open Elective Courses	OEC
5	Foundation Elective Courses	FEC
6	Seminar	SM
7	Lab Courses	LC
8	Project	PROJ
9	Dissertation	DISS

GANGA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, KABLANA, JHAJJAR (HR.)

Scheme of Studies and Examination

M. Tech (Computer Science & Engineering) –1st Semester

w.e.f. 2024-25

Sr. No.	Category	Course Code	Course Title	Lectures per week			Total Load Per Week	Credits	Examination Scheme (Marks)				Exam Duration in Hours
				Lecture (L)	Tutorial (T)	Practical (P)			Assessment	End Semester Examination		Total	
										Theory	Practical		
1	Professional Core Courses	PCC-MTCSE-101A	Data Communication and Computer Networks	4	0	0	4	4	40	60		100	3
2	Professional Core Courses	PCC-MTCSE-103A	Advanced Operating Systems	4	0	0	4	4	40	60		100	3
3	Professional Core Courses	PCC-MTCSE-105A	Advanced Database Management System	4	0	0	4	4	40	60		100	3
4	Professional Core Courses	PCC-MTCSE-107A	Data Warehouse and Mining	4	0	0	4	4	40	60		100	3
5	Professional Core Courses	PCC-MTCSE-109A	Mathematical Foundation of Computer Science	4	0	0	4	4	40	60		100	3
6	Lab Course	LC-MTCSE-111A	Advanced Operating Systems Lab	0	0	2	2	1	25		25	50	3
7	Lab Course	LC-MTCSE-113A	Advanced Database Management System Lab	0	0	2	2	1	25		25	50	3
8	Seminar	SM-MT-115A	Seminar-I	0	0	2	2	2	50			50	
							Total Credits	**24**				**650**	

GANGA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, KABLANA, JHAJJAR (HR.)

Scheme of Studies and Examination

M. Tech (Computer Science & Engineering) –2nd Semester

w.e.f. 2024-25

Sr. No.	Category	Course Code	Course Title	Hours per week			Total Load Per Week	Credits	Examination Scheme (Marks)				Exam Duration in H
				Lecture (L)	Tutorial (T)	Practical (P)			Assessment	End Semester Examination		Total	
										Theory	Practical		
1	Professional Core Courses	PCC-MTCSE-102A	Soft Computing	4	0	0	4	4	40	60		100	3
2	Professional Core Courses	PCC- MTCSE-104A	Algorithm Design	4	0	0	4	4	40	60		100	3
3	Professional Elective Courses	Refer Table-I	.....	4	0	0	4	4	40	60		100	3
4	Multidisciplinary Open Elective Courses	Refer Table-II	.....	3	0	0	3	3	40	60		100	3
5	Foundation Elective Courses	Refer Table-III	.....	3	0	0	3	3	40	60		100	3
6	Lab Course	LC-MTCSE-106A	Soft Computing Lab	0	0	2	2	1	25		25	50	3
7	Lab Course	LC-MTCSE-108A	Algorithm Design Lab	0	0	2	2	1	25		25	50	3
8	Seminar	SM-MT-110A	Seminar-II	0	0	2	2	2	50			50	
Total Credits								**22**				**650**	

Table I: Professional Elective Courses

Sr. No.	Course Code	Course Name
1	PEC- MTCSE-112A	Mobile and Wireless Communication
2	PEC- MTCSE-114A	Optimization Techniques
3	PEC- MTCSE-116A	Discrete Mathematics
4	PEC- MTCSE-118A	Internet and Web Development

Table II: Multidisciplinary Open Elective-I Courses

Students of all M.Tech programmes are required to study one Multidisciplinary open elective course in each of the 2nd and 3rd Semesters and one foundation elective course in 2nd Semester for 2-Years Programmes. They may choose any one of the following courses (excluding the courses offered by the departments of their own subjects, if not stated otherwise).

Sr. No	Course Code	Course Name	
1	OEC-130A	Basic of Economics	
2	OEC-132A	Fundamentals of Management	
3	OEC-134A	Disaster Management	
4	OEC-136A	Industrial Safety	
5	OEC-138A	Indian Literature in Translation-I	
6	OEC-140A	Environmental Issues	
7	OEC-142A	Quantitative Techniques	
8	OEC-144A	Sources of Energy-I	
9	OEC-146A	Operation Research	
10	OEC-148A	Multimedia Communication	
11	OEC-150A	Introduction to Information Technology	
12	OEC-152A	Cyber Forensics and Security	
13	OEC-154A	Computer Science and Principles	
14	OEC-156A	Software Engineering Practice	

Table III: Foundation Elective Courses

Sr. No	Course Code	Course Name	
1	FEC-158A	Basics of Accounting	
2	FEC-160A	Basics of E-commerce	
3	FEC-162A	Element of Banking	
4	FEC-164A	Computer Fundamentals	
5	FEC-166A	Communication and Soft Skills	
6	FEC-168A	Entrepreneurship Development	
7	FEC-170A	Electronics Engineering	

<table>
<tr><td>Course Code</td><td colspan="5">PCC-MTCSE-101A</td></tr>
<tr><td>Category</td><td colspan="5">Professional Core Courses</td></tr>
<tr><td>Course Title</td><td colspan="5">Data Communication and Computer Networks</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td rowspan="2">Semester-I</td></tr>
<tr><td>4</td><td>0</td><td>0</td><td>4</td></tr>
<tr><td>Course Objectives</td><td colspan="5">The objectives of this course are
• To explain data communication principles, transmission modes, and network switching techniques.
• To introduce network layer protocols, IP addressing, and routing algorithms for efficient network design.
• To familiarize students with transport layer protocols and performance optimization through connection and congestion control.
• To educate students in network security, applying encryption, firewalls, and VPNs for secure communications.</td></tr>
<tr><td>Assessment</td><td colspan="5">40 Marks</td></tr>
<tr><td>End Semester Examination</td><td colspan="5">60 Marks</td></tr>
<tr><td>Total</td><td colspan="5">100 Marks</td></tr>
<tr><td>Duration of Exam</td><td colspan="5">03 Hours</td></tr>
</table>

Course Outcomes: After studying this course, the students will be able to

CO	Skill Demonstrated	RBT Level
CO1	Define the fundamentals of data communication and computer networks.	Level 1: Remember
CO2	Understand the basic concepts of data communication and computer networks.	Level 2: Understand
CO3	Apply the concepts of data communication, network management & security and networking protocols to solve real world problems.	Level 3: Apply
CO4	Analyze routing algorithms, networking protocols, network management & security measures to improve network performance and ensure data security.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts (2 from each unit/section) of 1.5 marks each and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Data communication: Digital and analog communication, Transmission modes, serial and parallel communication, packet switching, circuit switching and message switching.

Network models: OSI and TCP/IP model, OSI vs TCP/IP

MAC: ALOHA, CSMA, CSMA/CD

Unit-II

Network Layer: ARP, RARP, ICMP, IGMP, IPv4, IPv6, IPv4 addressing, classful addressing, CIDR–Introduction, CIDR addressing, CIDR address blocks and Bit masks, subnets and super netting, IPv6 addressing, address space allocation, global unicast addresses.

Routing Algorithms: Distance vector Routing, Link State Routing, Path Vector Routing, Hierarchical Routing, RIP, OSPF, and BGP.

Unit-III

Transport Layer: Transport Layer Services, UDP, TCP Protocol, TCP services, TCP features, connection management, congestion control SCTP Protocol, SCTP services, SCTP features, and SCTP association.
Application layer:-SMTP, POP, IMAP, and MIME, DHCP, DHCP operation, Configuration FTP, SSH.

Unit-IV

Network Management and Security: Congestion control, Quality of services, SNMP, Ciphers- traditional, modern, asymmetric, public and private key, key management, digital signature, Network Layer Security, Transport Layer Security, Application Layer security, Firewall, VPN.

Suggested Readings:

1. Computer Networks by Tanenbaum Andrew S, International edition.
2. TCP/IP protocol suite by Behrouz A. Forouzan, TMH publication.
3. Data Communications and Networking by Behrouz A. Forouzan, TMH.
4. Computer Networking: A Top-Down Approach by Kurose and Ross, Pearson.
5. Computer Networks – A System Approach by Larry L. Peterson & Bruce S. Davie, Morgan Kaufmann Publishers Inc.

Useful Video links:

Unit No.	Topics	Links
Unit-I	Introduction to digital communication	https://youtu.be/4NYt34yNWqU?si=IcnxmQMrKc3QRxtz
	Analog Communication	https://youtu.be/s_vmLqT_6NQ?si=RLE67tZx0L6wk584
	Transmission Modes	https://youtu.be/4jT7TG0NNhc?si=z_x4LZt0NnteRv6X
	Switching Techniques	https://youtu.be/yZV3y-usK_g?si=zNdV2piMDqo4zrSe
	Network Models (OSI and TCP/IP models)	https://youtu.be/8BK70Udgyrc?si=-ZbQsVOEhZzGUY6L
Unit-II	ARP/RARP	https://youtu.be/JkqgkN_j6Lo?si=iPes4Vps2xmW1M9h
	ICMP/IGMP	https://youtu.be/2w8upObjYtk?si=469mTv7AylZlnyhx
	IP Addressing (Ipv4,Ipv6)	https://youtu.be/5vbPS-KnhvI?si=edOqaxGhwXFsBC7M https://youtu.be/FkaFr3cpg6U?si=_1Fqj_a5xvvn-eHG
	Routing algorithms	https://youtu.be/yQBuCHG5co0?si=m0yQA0JvkZj_3VbP
Unit-III	Transport layer services UDP, TCP	https://youtu.be/8-3CSAkscYU?si=A1LkOiW6DNvJ9Sd3
	Connection management	https://youtu.be/fBPDLGwfSUM?si=sfdCQd0ucwr-hTh3
	Congestion control	https://youtu.be/b-nCA0tZU-0?si=uyaZb0XBAkd5_Td8
	Application layer	https://youtu.be/JsUzPkOxZfA?si=r1Hg2VfWvdwRpHSc
Unit-IV	Congestion control	https://youtu.be/b-nCA0tZU-0?si=uyaZb0XBAkd5_Td8
	SNMP	https://youtu.be/YkE2ps9IcUQ?si=37mWvODsAxTYgEUm
	Public/private keys	https://youtu.be/6qKCaxodZkI?si=oxohpdz5MCRGDiWR
	Digital signatures	https://youtu.be/JMq2RaFYWXI?si=XZ97mobwwaLnG-J1
	Application layer security	https://youtu.be/kM5IX1FhABc?feature=shared
	VPN	https://youtu.be/hlndD4Tmnwo?si=YsbnPnaqvZuvM6wB

Course Code	**PCC-MTCSE-103A**				
Category	Professional Core Courses				
Course Title	**Advanced Operating Systems**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I**
	4	0	0	**4**	
Course Objectives	The objectives of this course are • To explain advanced operating system concepts including process management, synchronization, memory management, deadlock, and distributed systems. • To introduce students with synchronization techniques like semaphores, mutex, and monitors to resolve critical section problems in concurrent programming. • To get students introduced to process scheduling algorithms such as Round Robin, SJF, FCFS, and Priority Scheduling in various operating system scenarios. • To understand and analyze deadlock detection, prevention, and avoidance techniques and memory management policies.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

CO	Skill Demonstrated	RBT Level
CO1	Define key concepts, principles and terminology in operating systems, distributed operating systems, multiprocessor and database operating systems.	Level 1: Remember
CO2	Explain the concepts, techniques and algorithms in operating distributed operating systems, multiprocessor and database operating system environments.	Level 2: Understand
CO3	Apply analytical and algorithmic techniques to solve problems related to process scheduling, and concurrency control in advanced operating systems.	Level 3: Apply
CO4	Analyze synchronization mechanisms, deadlock concepts, distributed system protocols, recovery strategies, fault tolerance, and concurrency control in distributed databases and operating systems.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts (2 from each unit/section) of 1.5 marks each and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Introduction: Operating System Concept, Functions of an Operating System, Design Approaches, Types of Advanced Operating System – Synchronization Mechanisms, Concept of a Process, Concurrent Processes, The Critical Section Problem, Other Synchronization Problems, Language Mechanisms for Synchronization, Axiomatic Verification of Parallel Programs – Process Deadlocks – Preliminaries, Models of Deadlocks,

Resources, System State, Necessary and Sufficient conditions for a Deadlock, Systems with Single-Unit Requests, Consumable Resources, Re-usable Resources.

Unit-II

Distributed Operating Systems: Introduction, Issues, Communication Primitives, Inherent Limitations– Lamport's Logical Clock, Vector Clock, Causal Ordering, Global State, Cuts, Termination Detection, Distributed Mutual Exclusion, Non-Token Based Algorithms, Lamport's Algorithm – Token-Based Algorithms, Suzuki-Kasami's Broadcast Algorithm, Distributed Deadlock Detection, Issues, Centralized Deadlock-Detection Algorithms –Distributed Deadlock-Detection Algorithms, Agreement Protocols, Classification – Solutions, Applications.

Distributed Resource Management: Distributed File systems, Architecture, Mechanisms, Design Issues, Distributed Shared Memory, Architecture, Algorithm, Protocols – Design Issues. Distributed Scheduling, Issues, Components, Algorithms.

Unit-III

Failure Recovery and Fault Tolerance: Basic Concepts-Classification of Failures, Basic Approaches to Recovery; Recovery in Concurrent System; Synchronous and Asynchronous Check-pointing and Recovery; Check pointing in Distributed Database Systems; Fault Tolerance; Issues – Two-phase and Non-blocking Commit Protocols; Voting Protocols; Dynamic Voting Protocols.

Unit-IV

Multiprocessor and Database Operating Systems: Structures, Design Issues, Threads, Process Synchronization, Processor Scheduling, Memory Management, Reliability / Fault Tolerance; Database Operating Systems, Introduction, Concurrency Control, Distributed Database Systems, Concurrency Control Algorithms.

Suggested Readings:

1. Advanced Concepts in Operating Systems by Mukesh Singhal and N. G. Shivaratri, McGraw Hill, 2000
2. Operating System Concepts by Abraham Silberschatz, Peter B. Galvin, G. Gagne, Sixth Addison n Wesley Publishing Co., 2003.
3. Modern Operating Systems by Andrew S. Tanenbaum, Second Edition, Addison Wesley, 2001.

Useful Video links:

Unit No.	Topics	Links
Unit-I	Operating System Fundamentals	https://www.youtube.com/playlist?list=PLrpK1inhO61UQRHHuB8xSYulwJrAuVGPw
	Introduction to Processes	https://youtu.be/g_kLI2pkNC4?si=tsSKxqa5cYG4iTkd
	Synchronization	https://youtu.be/qKPCfuZAAEc?si=9rQj9xRt4DARt652
	Deadlocks	https://youtu.be/8ZS7xzWPo5A?si=9i6tbqKdxyk91uR1
Unit-II	Distributed Operating Systems	https://youtu.be/AWryELkUwow?si=x65Zl-2TzFgG8eFj
	Distributed Resource Management	https://youtu.be/dlBVWMdGhqw?si=B-zyFFQMq3Slgo2e
Unit-III	Recovery in Concurrent System	https://www.youtube.com/watch?v=BqujBzSlEZc
Unit-IV	Foundation for Concurrency Control	https://youtu.be/EeVDvQLKU0E?si=1Vk1lA63uDaEsUPD
	Memory Management	https://youtu.be/_pKbqFyG03s?list=PLEAYkSg4uSQ2Pach478muxnoeTNz_QeUJ

Course Code	**PCC-MTCSE-105A**				
Category	Professional Core Courses				
Course Title	**Advanced Database Management System**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I**
	4	-	-	**4**	
Course Objectives	The objectives of this course are • To educate students in database architecture, relational models, SQL, and normalization for efficient database design. • To introduce students to query evaluation, optimization strategies, and techniques for improving query execution. • To provide the knowledge of transaction management, recovery techniques, and concurrency control for data integrity and system reliability. • To explain object-oriented database concepts and distributed DBMS for scalable data management.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

CO	Skill Demonstrated	RBT Level
CO1	Define the fundamental concepts of DBMS & data warehousing.	Level 1: Remember
CO2	Explain the basic concepts DBMS & data warehousing.	Level 2: Understand
CO3	Apply the concepts of DBMS, data warehousing and object relational databases to solve real world problems.	Level 3: Apply
CO4	Analyze architectures, models, and advanced features of DBMS and data warehousing to design efficient and scalable database solutions.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts (2 from each unit/section) of 1.5 marks each and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Introduction: Architecture, Advantages, Disadvantages, Data models, relational algebra, SQL, Normal forms. Query Processing: General strategies for query processing, transformations, expected size, statistics in estimation, query improvement. Query evaluation, view processing, query processor.

Unit-II

Recovery: Reliability, Transactions, recovery in centralized DBMS, reflecting updates, Buffer management logging schemes, disaster recovery. Concurrency: Introduction, Serializability, Concurrency control, Locking schemes, Timestamp based ordering, Optimistic, Scheduling, Multisession techniques, Deadlocks.

Unit-III

Object Oriented Database Development: Introduction, object definition language, creating object instances, Object query language.
Distributed Database: Basis concepts, options for distributing a database, distributed DBMS.

Unit-IV

Data Warehousing: Introduction, basic concepts, data warehouse architecture, data characteristics, reconciled data layer, data transformation, derived data layer, user interface. Object Relational Databases: Basic Concepts, Enhanced SQL, and Advantages of object relational approach.

Suggested Readings:

1. An introduction to database systems by Bipin C. Desai, Galgotia Publications.
2. Modern Database Management by Feffery A Liofer, Mary B. Prescotl, Fred R Mcfadden, 6th edition, Pearson Education.
3. Principles of distributed database systems, by M. Tamer & Valduriez, 2nd editon, LPE Pearson education.
4. Database system concepts by Avi Silberschatz, Henry F. Korth, S. Sudarshan, 7th edition, McGraw-Hill.

Useful Video links:

Unit No.	Topics	Links
Unit-I	Introduction to Database system	https://youtu.be/EUzsy3W4I0g?si=H8b7eQ9s0mJWPvuJ
	Normal Forms	https://www.youtube.com/watch?v=NfHGvgMi6rw
	Query Processing & Optimization	https://youtu.be/GYQZpYEaNvk?si=dspK0Tc2mpUJUREd
Unit-II	Transaction	https://www.youtube.com/watch?v=ldIbItnHX9o
	Recovery system	https://youtu.be/ltHM8ayAVcw?si=pP_cKlMp1Pm2kJJ1
	Concurrency control	https://youtu.be/abLIS6BX964?si=FJpQYN7jwNWkjp2u
Unit-III	Object Oriented Database	https://youtu.be/meWQLWq7QSE?si=cReJI6hLmChXjhAq
	Object Query Language	https://youtu.be/wBSzXEa70Wc?si=CTivuvw4xsAzPuFd
	Distributed database	https://youtu.be/aUyqZxn12sY?si=Vkdlq0ZimDdJ2w3F
Unit-IV	Introduction to Data Warehousing	https://www.youtube.com/watch?v=m-aKj5ovDfg
	Object relational database	https://youtu.be/aUyqZxn12sY?si=Vkdlq0ZimDdJ2w3F

<table>
<tr><td>Course Code</td><td colspan="5">PCC-MTCSE-107A</td></tr>
<tr><td>Category</td><td colspan="5">Professional Core Courses</td></tr>
<tr><td>Course Title</td><td colspan="5">Data Warehouse and Mining</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td rowspan="2">Semester-I</td></tr>
<tr><td>4</td><td>0</td><td>0</td><td>4</td></tr>
<tr><td>Course Objectives</td><td colspan="5">The objectives of this course are
To introduce students to the terminology, concepts and applications of data warehousing.
To teach students the basics of various approaches & techniques such as association rule mining and classification used in the data mining.
To explain OLAP techniques for multidimensional data analysis to facilitate interactive decision support.
To provide knowledge of clustering algorithms and web data mining methods to extract patterns from large datasets and web content.</td></tr>
<tr><td>Assessment</td><td colspan="5">40 Marks</td></tr>
<tr><td>End Semester Examination</td><td colspan="5">60 Marks</td></tr>
<tr><td>Total</td><td colspan="5">100 Marks</td></tr>
<tr><td>Duration of Exam</td><td colspan="5">03 Hours</td></tr>
</table>

Course Outcomes: After studying this course, the students will be able to

CO	Skill Demonstrated	RBT Level
CO1	Define the fundamental concepts, and terminologies related to data warehousing, data mining, classification, and clustering methods.	Level 1: Remember
CO2	Explain the principles and methodologies of data warehousing, data mining.	Level 2: Understand
CO3	Implement data warehousing and data mining algorithms in real-world scenarios.	Level 3: Apply
CO4	Analyze complex data mining problems, compare different algorithms and methods for data warehousing and data mining.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts (2 from each unit/section) of 1.5 marks each and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Data warehousing: Introduction, Operational data stores, ETL, Data warehouses – design guidelines for data warehouse implementation, Data warehouse metadata; OLAP – introduction, Characteristics, Multidimensional view and data cube, Data cube operations.

Unit-II

Data mining: Introduction, association rules mining, Naive algorithm, Apriori algorithm, direct hashing and pruning (DHP), Dynamic Item set counting (DIC), Mining frequent pattern without candidate generation (FP, growth), performance evaluation of algorithms.

Unit-III

Classification: Introduction, decision tree, tree induction algorithm – split algorithm based on information theory, split algorithm based on Gini index, naïve Bayes method, estimating predictive accuracy of classification method, classification software, software for association rule mining; case study, KDD Insurance Risk Assessment.

Unit-IV

Cluster analysis: Introduction, partitional methods, hierarchical methods, and density-based methods, dealing with large databases, cluster software.

Web Data Mining: Web Terminology and Characteristics, Locality and Hierarchy in the web, Web Content Mining, Web Usage Mining, Web Structure Mining, Web mining Software.

Suggested Readings:

1. Data mining concepts and techniques by Han J., Kamber M. and Pei J., Morgan Kaufmann Publishers (2011) 3rd ed.
2. Data Mining by Pudi V., Krishana P.R., Oxford University press (2009), 1st ed.
3. Data mining by Adriaans P., Zantinge D., Pearson education press (1996), 1st ed.
4. Data Warehousing Fundamentals by Pooniah P., Wiley-Interscience Publication, (2001), 1st ed.

Useful Video links:

Unit No.	Topics	Links
Unit-I	Data warehousing: Introduction, ETL	https://youtu.be/m-aKj5ovDfg?feature=shared
	OLAP	https://youtu.be/G4NYQox4n2g
Unit-II	Introduction to Data mining	https://youtu.be/ykZ-_UGcYWg?feature=shared
	Association rules mining	https://youtu.be/N_whCVtfL9M?feature=shared
Unit-III	Classification: Introduction	https://youtu.be/VsYKqOokgaE?feature=shared
	Decision Tree	https://youtu.be/4l4_BREP6ZI?feature=shared
	Naïve Bayes Method	https://youtu.be/jMS9OKsz9DE?si=LUj-V0wKWyd-KYGg
Unit-IV	Cluster analysis	https://youtu.be/9OjRP0ZLKkk?feature=shared
	Hierarchical Clustering analysis	https://youtu.be/Ot44DnL7V60?si=4N_CBibs_1czBPY2
	Density-based methods	https://youtu.be/AxARUMZh0sk?si=UFAcoGjCkmurkO-l

Course Code	**PCC-MTCSE-109A**				
Category	Professional Core Courses				
Course Title	**Mathematical Foundation of Computer Science**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I**
	4	0	0	**4**	
Course Objectives	The objectives of this course are • To explain the fundamentals of DFA, NFA, and their equivalence, along with Mealy and Moore machines for language recognition. • To introduce the students to context-free grammars, CFLs, and the role of pushdown automata in language parsing. • To understand Turing machines, decidability, and the limits of computation, including the Halting Problem. • To explore undecidable problems, primitive recursive functions, and the Church-Turing Thesis in computation.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

CO	Skill Demonstrated	RBT Level
CO1	Define the fundamentals of automata, formal languages, turing machines, reducibility and computability used in formal language theory.	Level 1: Remember
CO2	Explain the basic concepts and properties of finite automata, formal languages, and Turing machines.	Level 2: Understand
CO3	Apply the concepts of automata machines and models to solve language recognition problems.	Level 3: Apply
CO4	Analyze formal languages, computational models, and the decidability of computational problems, with an understanding of their theoretical and practical implications in computer science.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts (2 from each unit/section) of 1.5 marks each and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Regular Languages: Finite automata, DFA, NFA, Equivalence of DFA & NFA, an application Mealy and Moore Models, Regular expressions and languages.
Context free languages (CFL): CFGs, Applications, Ambiguity removal, CNF, GNF.

Unit-II

Push Down Automata: Basics of push down automata (PDA), Acceptance by PDA, PDA and CFL, Parsing and PDA: Top Down Parsing and Bottom up Parsing.

Unit-III

Turing Machine: Turing machines, variants of TMs, Restricted TMs, TMs and Computers.
Decidability: Decidable languages, decidable problems concerning Context free languages, the halting problem, halting problem is undecidable.

Unit-IV

Reducibility and Computability: Undecidable problems from language theory–Regular expressions, Turing machines, Reduction. A simple undecidable problem (PCP), Primitive recursive functions, tractable decision problems, theory of Optimization, Church- Turing Thesis.

Suggested Readings:

1. Introduction to Theory of Computation by Michael Sipser (Thomson Nrools/Cole).
2. Introduction to Automata Theory, Languages and Computations by J.E. Hopcroft, Rajeev Motwani & J.D. Ullman (Pearson Education Asia), 2nd Edition.
3. Theory of Computation by Peter Linz, Prentice Hall of India.
4. Introduction to languages and theory of computation by John C. Martin, McGraw-Hill Higher Education.

Useful Video links:

Unit No.	Topics	Links
Unit-I	Basics of Automata	https://www.youtube.com/watch?v=dVDUcuWPixU
	Equivalence of NFA and DFA	https://www.youtube.com/watch?v=CEqRyV32yBo
	Equivalence of Regular Expression and DFA Througha GNFA	https://www.youtube.com/watch?v=QTdVvyDUtdk
Unit-II	Context Free Grammars and Push Down Automata	https://www.youtube.com/watch?v=aXkvu1d3Xfk
	Pumping Lemma for Context Free Languages	https://www.youtube.com/watch?v=AbCMVqbd8fo
Unit-III	Turing Recognizable &Decidable Languages and TM Examples	https://www.youtube.com/watch?v=t9eGtSOVjPk
	Church-Turing Thesis	https://www.youtube.com/watch?v=yIim-rT7jKY
Unit-IV	Decidable Problems Concerning Regular Languages	https://www.youtube.com/watch?v=WiAVpj9uumU
	Proving Undecidability Using Reductions	https://www.youtube.com/watch?v=0niOxXMi4ME
	Co-Turing Recognizability	https://www.youtube.com/watch?v=KvImCxmvvAM

<table>
<tr><td>Course code</td><td colspan="5">LC-MTCSE-111A</td></tr>
<tr><td>Category</td><td colspan="5">Lab Course</td></tr>
<tr><td>Course title</td><td colspan="5">Advanced Operating Systems Lab</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td rowspan="2">Semester-I</td></tr>
<tr><td>0</td><td>0</td><td>2</td><td>1</td></tr>
<tr><td>Course Objectives</td><td colspan="5">The objectives of this course are
● To introduce process management techniques such as process creation, scheduling, and inter-process communication using system calls and synchronization mechanisms to the students.
● To describe synchronization methods like semaphores to resolve concurrency issues and ensure safe resource access.
● To provide knowledge about process scheduling algorithms (Round Robin, SJF, FCFS, Priority) for efficient CPU time management.
● To enable students to simulate deadlock handling techniques (Banker's Algorithm) and implement memory and file allocation policies for efficient system resource management.</td></tr>
<tr><td>Course Pre-requisite</td><td colspan="5">Knowledge of C language needed</td></tr>
<tr><td>Assessment</td><td colspan="5">25 Marks</td></tr>
<tr><td>End Semester Practical Examination</td><td colspan="5">25 Marks</td></tr>
<tr><td>Total</td><td colspan="5">50 Marks</td></tr>
<tr><td>Duration of Exam</td><td colspan="5">03 Hours</td></tr>
</table>

Course Outcomes: After studying this course, the students will be able to

CO	Skill Demonstrated	RBT Level
CO1	Understand the advanced concepts of operating systems.	Level 2: Understand
CO2	Apply Scheduling algorithms, file allocation techniques, memory management techniques such as paging and demonstrate process creation.	Level 3: Apply
CO3	Solve classic synchronization problems like Producer-Consumer using semaphores to manage concurrency.	Level 3: Apply
CO4	Analyze banker's algorithm for deadlock avoidance and prevention.	Level 4: Analyze

List of Experiments:

Sr. No.	Content
1	Study advanced concepts of operating systems.
2	Write a C program to implement the Round Robin scheduling algorithm.
3	Write a C program to implement the Shortest Job First (SJF) scheduling algorithm.
4	Write a C program to implement the First Come First Served (FCFS) scheduling algorithm.
5	Write a C program to implement the Priority-based scheduling algorithm.

6	Write a C program to implement the sequential file allocation technique.
7	Write a C program to implement the indexed file allocation technique.
8	Write a C program to implement the linked file allocation technique.
9	Write a C program to implement memory management using paging.
10	Write a C program to demonstrate process creation using the fork() system call.
11	Write a C program to solve the producer-consumer problem using semaphores.
12	Write a program to simulate the Banker's algorithm for deadlock avoidance.

Note: At least 10 experiments are to be performed by the students. Faculty member can add 2-3 extra experiment under topic beyond syllabus.

<table>
<tr><td>Course code</td><td colspan="5">LC-MTCSE-113A</td></tr>
<tr><td>Category</td><td colspan="5">Lab Course</td></tr>
<tr><td>Course title</td><td colspan="5">Advanced Database Management System Lab</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td rowspan="2">Semester-I</td></tr>
<tr><td>0</td><td>0</td><td>2</td><td>1</td></tr>
<tr><td>Course Objectives</td><td colspan="5">The objectives of this course are
• To enable students to create, modify, and describe tables, and understand SQL syntax for effective database schema design and management.
• To develop skills in inserting, updating, and retrieving data using advanced SQL queries, including logical and comparison operators.
• To understand the use of SQL set operations, indexes, views, sequences, synonyms, save points, and PL/SQL triggers to enhance database functionality and performance.
• To impart knowledge in implementing parallel databases in SQL to optimize performance in large-scale database environments.</td></tr>
<tr><td>Course Pre-requisite</td><td colspan="5">Database Management System Lab</td></tr>
<tr><td>Assessment</td><td colspan="5">25 Marks</td></tr>
<tr><td>End Semester Practical Examination</td><td colspan="5">25 Marks</td></tr>
<tr><td>Total</td><td colspan="5">50 Marks</td></tr>
<tr><td>Duration of Exam</td><td colspan="5">03 Hours</td></tr>
</table>

Course Outcomes: After studying this course, the students will be able to

CO	Skill Demonstrated	RBT Level
CO1	Explain fundamental SQL commands to create, describe, and manage database tables.	Level 2: Understand
CO2	Apply SQL queries to create and manipulate tables and implement its advanced features.	Level 3: Apply
CO3	Demonstrate transaction control commands and apply DELETE and DROP operations to manage data and maintain database integrity.	Level 3: Apply
CO4	Analyze triggers in PL/SQL to automate database operations and enforce business rules, ensuring data consistency and process efficiency.	Level 4: Analyze

List of Experiments:

Sr. No.	Content
1	To Study SQL and their Commands.
2	Write a program to Create a table using SQL and Describe Table.
3	Write a program to Insert values in a table using SQL and retrieve their values.
4	Write a program to Create a Table in SQL and Apply Logical Operators Using Where Clause.
5	Write a program to Create an SQL query that uses a comparison operator.
6	Write a program to Create an SQL query that performs a SET operation.
7	Write a program to modify the structure of a table.

8	Write a program to Create an SQL query to update specific values in a table.
9	Write a program to Create an SQL query for managing indexes, views, sequences and synonyms.
10	Write a program to Create an SQL query that applies the DELETE and DROP commands.
11	Write a program in SQL to implement transaction control commands.
12	Analyse the use of Triggers in PL/SQL.

Note: At least 10 experiments are to be performed by the students. Faculty member can add 2-3 extra experiment under topic beyond syllabus.

<table>
<tr><td>Course Code</td><td colspan="5">SM-MT-115A</td></tr>
<tr><td>Category</td><td colspan="5">Seminar</td></tr>
<tr><td>Course Title</td><td colspan="5">Seminar-I</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td rowspan="2">Semester-I</td></tr>
<tr><td>0</td><td>0</td><td>2</td><td>2</td></tr>
<tr><td>Course Objectives</td><td colspan="5">The objectives of this course are
To develop students' ability to effectively present research topics and findings by effective communication.
To improve problem-solving and critical thinking skills of the students.
To expose students to the latest trends and advancements by reviewing and discussing contemporary research.</td></tr>
<tr><td>Assessment</td><td colspan="5">50 Marks</td></tr>
<tr><td>End Semester Examination</td><td colspan="5">-</td></tr>
<tr><td>Total</td><td colspan="5">50 Marks</td></tr>
<tr><td>Duration of Exam</td><td colspan="5">03 Hours</td></tr>
</table>

Course Outcomes: After studying this course, the students will be able to

CO	Skill Demonstrated
CO1	Identify the trends and advancements in the related field.
CO2	Analyze and synthesize research literature with in-depth reviews of key studies and methodologies.
CO3	Undertake problem identification, formulation, proposing solution and analyze the impact on society, economy and environment.
CO4	Prepare a well-organized report employing elements of effective communication and critical thinking.
CO5	Demonstrate a sound technical knowledge of their research field.

Overview:

This is a course designed to help M.Tech students develop research presentation skills. The focus is on selecting a topic or research paper relevant to their specialization, conducting an in-depth review, and effectively presenting the research findings.

General Guidelines:

Topic Selection	Each student is required to choose the research topic based on published review paper(s) or literature related to their relevant field. The same topic cannot be selected by multiple students.
Approval Process	The selected paper or topic must be approved by the faculty members/committee appointed by the Head of Department.
Presentation Guidelines	Each student will have 30-40 minutes for their presentation, followed by 5 minutes for Q&A.
Evaluation	The presentation will be evaluated by a committee constituted by the Head of Department. The evaluation will be based on:

Parameters for the Evaluation of Seminar

Sr. No.	Parameters	Marks Allotted	Relevant COs
1	Clarity of the topic	10	CO1
2	Literature Survey	10	CO2
3	Content Relevancy	10	CO3
4	Presentation Skills	10	CO4
5	Q&A Response	10	CO5

GANGA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, KABLANA, JHAJJAR (HR.)

Scheme of Studies and Examination

M.Tech (Computer Science & Engineering) – 2nd Semester

w.e.f. 2024-25

Sr. No.	Category	Course Code	Course Title	Hours per week			Total Load Per Week	Credits	Examination Scheme (Marks)				Exam Duration in H
				Lecture (L)	Tutorial (T)	Practical (P)			Assessment	End Semester Examination		Total	
										Theory	Practical		
1	Professional Core Courses	PCC-MTCSE-102A	Soft Computing	4	0	0	4	4	40	60		100	3
2	Professional Core Courses	PCC- MTCSE-104A	Algorithm Design	4	0	0	4	4	40	60		100	3
3	Professional Elective Courses	Refer Table-I	.....	4	0	0	4	4	40	60		100	3
4	Multidisciplinary Open Elective Courses	Refer Table-II	.....	3	0	0	3	3	40	60		100	3
5	Foundation Elective Courses	Refer Table-III	.....	3	0	0	3	3	40	60		100	3
6	Lab Course	LC-MTCSE-106A	Soft Computing Lab	0	0	2	2	1	25		25	50	3
7	Lab Course	LC-MTCSE-108A	Algorithm Design Lab	0	0	2	2	1	25		25	50	3
8	Seminar	SM-MT-110A	Seminar-II	0	0	2	2	2	50			50	
Total Credits								**22**				**650**	

<table>
<tr><td>Course Code</td><td colspan="5">PCC-MTCSE-102A</td></tr>
<tr><td>Category</td><td colspan="5">Professional Core Courses</td></tr>
<tr><td>Course Title</td><td colspan="5">Soft Computing</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td rowspan="2">Semester-II</td></tr>
<tr><td>4</td><td>0</td><td>0</td><td>4</td></tr>
<tr><td>Course Objectives</td><td colspan="5">The objectives of this course are
• To explain the fundamentals of neural networks, their biological foundations, and mathematical models to the students.
• To develop students' skills to design and implement neural network models, including supervised, unsupervised, and reinforcement learning.
• To provide insights about fuzzy logic, including fuzzy sets, membership functions, and rule generation for uncertain data to the students.
• To enhance students' ability to use fuzzy arithmetic operations to solve real-world problems involving uncertainty and imprecision.
• To enable students to apply fuzzy logic to manage uncertainty and process imprecise data for decision-making and problem-solving.</td></tr>
<tr><td>Assessment</td><td colspan="5">40 Marks</td></tr>
<tr><td>End Semester Examination</td><td colspan="5">60 Marks</td></tr>
<tr><td>Total</td><td colspan="5">100 Marks</td></tr>
<tr><td>Duration of Exam</td><td colspan="5">03 Hours</td></tr>
</table>

Course Outcomes: After studying this course, the students will be able to

CO	Skill Demonstrated	RBT Level
CO1	Define the fundamental concepts of Artificial Neural Networks and Fuzzy Logic.	Level 1: Remember
CO2	Understand the basic concepts of Artificial Neural Networks and Fuzzy Logic.	Level 2: Understand
CO3	Apply Artificial Neural Networks algorithms, fuzzy logic concepts and techniques in control systems and decision making.	Level 3: Apply
CO4	Analyze complex systems using ANN and fuzzy logic to handle uncertainty and improve decision-making in dynamic environments.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts (2 from each unit/section) of 1.5 marks each and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Neural Networks: History, Overview of Biological Neuro-System, Mathematical Models of Neurons, ANN architecture, Learning rules, Gradient Descent Algorithm, Learning Paradigms-Supervised, Unsupervised and Reinforcement Learning, ANN Training Algorithms-Perceptron's, Training Rules, Delta, Back Propagation Algorithm, Multilayer Perceptron Model, Hopfield Networks, Associative Memories, Applications of Artificial Neural Networks.

Unit-II

Fuzzy Logic: Introduction to fuzzy Logic, Classical and Fuzzy Sets, Overview of Classical Sets, Mem**be**rship Function, Fuzzy Rule generation. Operations on Fuzzy Sets: Compliment, Intersection, Union, Combination of Operations, Aggregation Operation.

Unit-III

Fuzzy Arithmetic: Fuzzy Numbers, Linguistic Variables, Arithmetic Operations on Intervals & Numbers, Lattice of Fuzzy Numbers, Fuzzy Equations, Classical Logic, Multi-Valued Logics, Fuzzy Propositions, Fuzzy Qualifiers, Linguistic Hedges.

Unit-IV

Uncertainty Based Information: Information & Uncertainty, Non specificity of Fuzzy & Crisp Sets, Fuzziness of Fuzzy Sets.

Suggested Readings:

1. Principles of Soft Computing by Dr. S. N. Sivanandam and Dr. S. N. Deepa, Wiley.
2. Fuzzy Logic & Fuzzy Sets by Klir & Yuan, Pearson.
3. Neural Networks by Simon Haykin, Pearson College Div.
4. Neural Networks: A Classroom Approach by Satish Kumar, McGraw Hill.

Useful Video links:

Unit No.	Topics	Links
Unit-I	Introduction to Artificial Neural Networks	https://youtu.be/xbYgKoG4x2g?si=EhUFZFGB9eTJ0iYV
	Associative memory	https://youtu.be/Ccrw9L1DK4g?si=Y4IJMVdAVJDPqHwy
	Interval, fuzzy numbers	https://youtu.be/6daiRieEQlU?si=3_UhZC0YUuZcQHaw
Unit-II	Fuzzy Sets, Logic and Systems & Applications	https://youtu.be/JrRWdPvG7yk?si=eZRj_P4YjfO-MWka
	Membership Functions	https://youtu.be/EnQcgob2NUM?si=nC7XkleChQdEBHHW
	Set Theoretic Operation On Fuzzy	https://youtu.be/1m4KSMsjdaM?si=5pi7tKXgvBodPYRG
Unit-III	Arithmetic Operations on Fuzzy Numbers	https://youtu.be/PIvxnE2S_tE?si=fN_W9-6858Dg_oH5
	Complement of Fuzzy Sets	https://youtu.be/wUPJon6oXEo?si=PN0-D37aqqsHtXO7
	Fuzzy Relation	https://youtu.be/8Y_QreQ7VC4?si=uo7FZBM1lhZiSXTg
Unit-IV	Operations on Crisp and Fuzzy Relations	https://youtu.be/dKSVecDUUI8?si=hQzRV5pIhHX4nCYs
	Reasoning under Uncertainty	https://www.youtube.com/watch?v=1lKsSiEsJ18

<table>
<tr><td>Course Code</td><td colspan="5">PCC-MTCSE-104A</td></tr>
<tr><td>Category</td><td colspan="5">Professional Core Courses</td></tr>
<tr><td>Course Title</td><td colspan="5">Algorithm Design</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td rowspan="2">Semester-II</td></tr>
<tr><td>4</td><td>0</td><td>0</td><td>4</td></tr>
<tr><td>Course Objectives</td><td colspan="5">The objectives of this course are
• To familiarize students to the database architecture, relational models, SQL, and normalization for efficient database design.
• To introduce query evaluation, optimization strategies, and techniques for improving query execution to the students.
• To provide knowledge about transaction management, recovery techniques, and concurrency control for data integrity and system reliability to the students.
• To explain object-oriented database concepts and distributed DBMS for scalable data management.</td></tr>
<tr><td>Assessment</td><td colspan="5">40 Marks</td></tr>
<tr><td>End Semester Examination</td><td colspan="5">60 Marks</td></tr>
<tr><td>Total</td><td colspan="5">100 Marks</td></tr>
<tr><td>Duration of Exam</td><td colspan="5">03 Hours</td></tr>
</table>

Course Outcomes: After studying this course, the students will be able to

CO	Skill Demonstrated	RBT Level
CO1	Define the key concepts of data structures, algorithm design, NP-Hard problems, parallel algorithms and approximation techniques.	Level 1: Remember
CO2	Understand the principles and applications of data structures, algorithm design techniques, optimization methods, NP-Hard problems and parallel algorithms.	Level 2: Understand
CO3	Apply data structures, algorithmic strategies, and optimization techniques to solve real-world problems.	Level 3: Apply
CO4	Analyze and evaluate the performance of algorithms and data structures, and make informed decisions on their suitability for solving complex problems.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts (2 from each unit/section) of 1.5 marks each and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Foundation & Data Structure: Foundation & Elementary Data Structure: Algorithms, Performance analysis: Space & time complexity, Growth of functions, Divide & Conquer, Recurrence Equations, Basic elements of data structure like Stacks & Queues, Trees, Graphs, Linked List, Sorting & Order statistics. Data Structure: Dynamic sets & searching: Introduction, Array doubling, Amortized time analysis, R-B trees, Hashing, Dynamic equivalence relations & Union-Find programs, Priority queues with a decrease key operation. Graph & graph traversals: DFS, strongly connected components, Bi-connected components.

Unit-II

Advanced Design & Analysis Techniques: Greedy & Dynamic Method: General methods, Knapsack problem, Job sequencing with deadlines, Minimum cost spanning trees, Optimal merge patters, Single-source shortest path, 0/1 Knapsack, Multistage graphs, All-pair shortest path, Optimal binary search trees, Travelling salesperson problem, Flow shop scheduling. Backtracking & Branch and Bound: General methods, 8 Queens problem, Sum of subsets, Graph coloring, Hamiltonian cycles, Knapsack problem, Travelling salesperson problem, Efficiency consideration.

Unit-III

NP-Hard & NP-Complete Problems: Basic concepts, Cook's Theorem, NP-hard graph problem, NP-Hard scheduling problems. String Matching: Introduction, A straight forward solution, The Knuth-Morris-Pratt algorithm, The Boyer-Moore algorithm, approximate string matching.

Unit-IV

Parallel Algorithms: Introduction, Parallelism, The PRAM, and other models, some simple PRAM algorithms, Handling write conflicts, Merge and Sorting, Finding connected components. Approximation algorithms: Introduction, Absolute approximations, ϵ- approximations, Polynomial time approximation schemes, Fully Polynomial time approximations schemes.

Suggested Readings:

1. Computer Algorithms: Introduction to design and analysis (3rdedition) by Sara Baase and Allen Van Gelder, Pearson, 2000.
2. Fundamentals of Algorithms by Gilles Brassard and Paul Bratley, Prentice Hall (1996).
3. Design and Analysis of Algorithms (Computer science Series) by Jeffrey D. Smith Publications.
4. Fundamentals of Computer algorithms, Ellis Horowitz and SratajSahnim 1978, Galgotia Publications.
5. Algorithms Design (PIE) by Eva Tardos and Jon Klienberg, person, Pearson Publications.
6. Introduction to Algorithms, Thomas h Cormen, Harles E leiserson and Ronald Lrivest: 1990, TMH.

Useful Video links:

Unit No.	Topics	Links
Unit-I	Performance analysis: Space complexity	https://youtu.be/FSfsl7xiQBg?si=CuapTVdXhUCO29Xe
	R-B trees	https://www.youtube.com/watch?v=8Y5kheRDAhw
	DFS	https://www.youtube.com/watch?v=CIm6RzdoPCI
Unit-II	Sum of Subset, Knapsack Problem	https://www.youtube.com/watch?v=yDjadhjQ3eE
	Travelling salesperson problem	https://www.youtube.com/watch?v=-cLsEHP0qt0&t=16s
	8 Queens problem	https://youtu.be/FQWTa3XjyWg?si=giNKRtJp0rU8Z3Jj
Unit-III	NP Complete Problem	https://youtu.be/qpCvPS-WwGA?feature=shared
	The Knuth-Morris-Pratt algorithm	https://www.youtube.com/watch?v=NeVqZ5YFmgs&t=6s
Unit-IV	PRAM Algorithm	https://youtu.be/gaJjpBKeYgo?feature=shared
	Approximation algorithms	https://www.youtube.com/watch?v=Dd0XNsAkkqE

<table>
<tr><td>Course code</td><td colspan="5">LC-MTCSE-106A</td></tr>
<tr><td>Category</td><td colspan="5">Lab Course</td></tr>
<tr><td>Course title</td><td colspan="5">Soft Computing Lab</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td rowspan="2">Semester-II</td></tr>
<tr><td>0</td><td>0</td><td>2</td><td>1</td></tr>
<tr><td>Course Objectives</td><td colspan="5">The objectives of this course are
To enable students to master fuzzy set operations (union, intersection, complement) and apply De Morgan’s laws to solve real-world problems.
To expose students to FIS using MATLAB’s FIS Editor for applications like predicting tip values based on quality and service.
To introduce students to McCulloch-Pitts neurons to solve logical functions (AND, ANDNOT, XOR) and explore multi-layer networks for non-linear problems.
To introduce and test Hopfield networks for storing and retrieving patterns, handling noisy or incomplete input data.</td></tr>
<tr><td>Course Pre-requisite</td><td colspan="5">MATLAB</td></tr>
<tr><td>Assessment</td><td colspan="5">25 Marks</td></tr>
<tr><td>End Semester Practical Examination</td><td colspan="5">25 Marks</td></tr>
<tr><td>Total</td><td colspan="5">50 Marks</td></tr>
<tr><td>Duration of Exam</td><td colspan="5">03 Hours</td></tr>
</table>

Course Outcomes: After studying this course, the students will be able to

CO	Skill Demonstrated	RBT Level
CO1	Understand the fundamental concepts of fuzzy logic, neural networks, and their applications.	Level 2: Understand
CO2	Apply fuzzy logic principles to implement real-world problem-solving systems.	Level 3: Apply
CO3	Apply neural network models for problem solving.	Level 3: Apply
CO4	Analyze hetero-associative neural net and auto-associative net for problem solving.	Level 4: Analyze

List of Experiments:

Sr. No.	Content
1	Study fuzzy logic, neural networks, and their applications.
2	Write a program to perform Union, Intersection and Complement operations.
3	Write a program to implement De- Morgan’s Law.
4	Write a program to plot various membership functions.
5	Write a program to implement FIS Editor. Use Fuzzy toolbox to model tip value that is given after a dinner based on quality and service.
6	Write a program to generate AND, NOT function using McCulloch-Pitts neural net.

7	Write a program to generate XOR function using McCulloch-Pitts neural net.
8	Write a program to apply Hebb network to classify two dimensional input patterns in bipolar with given targets.
9	Write a program to implement Perceptron network for an AND function with bipolar inputs and targets.
10	Write a program to store the vector, find the weight matrix with no self-connection. Test this using a discrete Hopfield net.
11	Write a program to calculate the weights for given patterns using hetero-associative neural net.

Note: At least 10 experiments are to be performed by the students. Faculty member can add 2-3 extra experiment under topic beyond syllabus.

<table>
<tr><td>Category</td><td colspan="5">LC-MTCSE-108A</td></tr>
<tr><td>Course title</td><td colspan="5">Algorithm Design Lab</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td rowspan="2">Semester-II</td></tr>
<tr><td>0</td><td>0</td><td>2</td><td>1</td></tr>
<tr><td>Course Objectives</td><td colspan="5">The objectives of this course are
To implement sorting algorithms using Divide & Conquer techniques, such as Quick Sort and Merge Sort, in C++.
To solve shortest path problems by implementing algorithms like Floyd-Warshall and Dijkstra’s Algorithm in C++.
To explore optimization and problem-solving strategies by applying algorithms such as the Greedy approach for the Knapsack Problem, Prim’s Algorithm for Minimum Spanning Tree, and Dynamic Programming for the Travelling Sales Problem in C++.
To practice problem-solving with recursive and backtracking techniques by implementing solutions for the Tower of Hanoi, N Queen Problem, Sum of Subsets, and connected graph checks, as well as tree operations in B-Trees in C++.</td></tr>
<tr><td>Course Pre-requisite</td><td colspan="5">C++ Lab</td></tr>
<tr><td>Assessment</td><td colspan="5">25 Marks</td></tr>
<tr><td>End Semester Practical Examination</td><td colspan="5">25 Marks</td></tr>
<tr><td>Total</td><td colspan="5">50 Marks</td></tr>
<tr><td>Duration of Exam</td><td colspan="5">03 Hours</td></tr>
</table>

Course Outcomes: After studying this course, the students will be able to

CO	Skill Demonstrated	RBT Level
CO1	Understand the fundamental concepts of sorting algorithms and optimization techniques using the Divide and Conquer paradigm.	Level 1: Remember
CO2	Apply advanced algorithmic techniques, such as Dynamic Programming, Greedy Algorithms, and Backtracking to effectively solve complex computational problems.	Level 2: Understand
CO3	Implement advanced data structures concepts and algorithms for solving problems using.	Level 3: Apply
CO4	Analyze algorithms for graph connectivity for solving complex computational problems.	Level 4: Analyze

List of Experiments:

Sr. No.	Content
1	Write a C++ Program to perform Quick Sort using Divide & Conquer Technique.
2	Write a C++ Program to perform Merge Sort using Divide & Conquer Technique
3	Write a C++ Program to solve the Knapsack Problem using Greedy Approach
4	Write a C++ Program to solve Travelling Sales Problem using the Dynamic Programming Approach.

5	Write a C++ Program for Sum of Subsets Problem using Back Tracking.
6	Write a C++ Program to find solution of N Queen Problem using Backtracking
7	Write a C++ Program to find all the Shortest Path using Floyd-Warshall Algorithm
8	Write a C++ Program to find the Minimum Spanning Tree using Prim's Algorithm.
9	Write a Program to implement insertion and deletion operations in B-Tree.
10	Write a Program to implement the tower of Hanoi problem using recursion.
11	Write a C++ Program for Shortest Path using Dijkstra's Algorithm.
12	Write a Program to Check whether a given graph is connected or not using the DFS method.

Note: At least 10 experiments are to be performed by the students. Faculty member can add 2-3 extra experiment under topic beyond syllabus.

<table>
<tr><td>Course Code</td><td colspan="5">SM-MT-110A</td></tr>
<tr><td>Category</td><td colspan="5">Seminar</td></tr>
<tr><td>Course Title</td><td colspan="5">Seminar-II</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td rowspan="2">Semester-II</td></tr>
<tr><td>0</td><td>0</td><td>2</td><td>2</td></tr>
<tr><td>Course Objectives</td><td colspan="5">The objectives of this course are
To develop students' ability to effectively present research topics and findings by effective communication.
To improve problem-solving and critical thinking skills of the students.
To expose students to the latest trends and advancements by reviewing and discussing contemporary research.</td></tr>
<tr><td>Assessment</td><td colspan="5">50 Marks</td></tr>
<tr><td>End Semester Examination</td><td colspan="5">-</td></tr>
<tr><td>Total</td><td colspan="5">50 Marks</td></tr>
<tr><td>Duration of Exam</td><td colspan="5">03 Hours</td></tr>
</table>

Course Outcomes: After studying this course, the students will be able to

CO	Skill Demonstrated
CO1	Identify the trends and advancements in the related field.
CO2	Analyze and synthesize research literature with in-depth reviews of key studies and methodologies.
CO3	Undertake problem identification, formulation, proposing solution and analyze the impact on society, economy and environment.
CO4	Prepare a well-organized report employing elements of effective communication and critical thinking.
CO5	Demonstrate a sound technical knowledge of their research field.

Overview:

This is a course designed to help M. Tech students develop research presentation skills. The focus is on selecting a topic or research paper relevant to their specialization, conducting an in-depth review, and effectively presenting the research findings.

General Guidelines:

Topic Selection	Each student is required to choose the research topic based on published review paper(s) or literature related to their relevant field. The same topic cannot be selected by multiple students.
Approval Process	The selected paper or topic must be approved by the faculty members/committee appointed by the Head of Department.
Presentation Guidelines	Each student will have 30-40 minutes for their presentation, followed by 5 minutes for Q&A.
Evaluation	The presentation will be evaluated by a committee constituted by the Head of Department. The evaluation will be based on:

Parameters for the Evaluation of Seminar:

Sr. No.	Parameters	Marks Allotted	Relevant COs
1	Clarity of the topic	10	CO1
2	Literature Survey	10	CO2
3	Content Relevancy	10	CO3
4	Presentation Skills	10	CO4
5	Q&A Response	10	CO5

<table>
<tr><td>Course Code</td><td colspan="5">PEC-MTCSE-112A</td></tr>
<tr><td>Category</td><td colspan="5">Professional Elective Courses</td></tr>
<tr><td>Course Title</td><td colspan="5">Mobile and Wireless Communication</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td rowspan="2">Semester-II</td></tr>
<tr><td>4</td><td>0</td><td>0</td><td>4</td></tr>
<tr><td>Course Objectives</td><td colspan="5">The objectives of this course are
To introduce the key principles of wireless transmission, modulation techniques, and multiple access methods used in modern telecommunication systems.
To enable students to examine the architecture and protocols of satellite systems, WLANs, and Bluetooth to design efficient, secure, and scalable wireless networks.
To explain explore mobile networking concepts such as Mobile IP, ad-hoc routing, and mobility management to address the challenges of connectivity in dynamic environments.
To impart knowledge to the students about transport layer protocols (TCP variants) and application protocols for mobile systems, ensuring reliable, low-latency communication in wireless networks.</td></tr>
<tr><td>Assessment</td><td colspan="5">40 Marks</td></tr>
<tr><td>End Semester Examination</td><td colspan="5">60 Marks</td></tr>
<tr><td>Total</td><td colspan="5">100 Marks</td></tr>
<tr><td>Duration of Exam</td><td colspan="5">03 Hours</td></tr>
</table>

Course Outcomes: After studying this course, the students will be able to

CO	Skill Demonstrated	RBT Level
CO1	Define the fundamentals of mobile and wireless communication.	Level 1: Remember
CO2	Understand the basic concepts of mobile and wireless communication.	Level 2: Understand
CO3	Apply the concepts of wireless communication systems and mobile communication to solve data communication problems.	Level 3: Apply
CO4	Analyze wireless transmission systems, mobile communication, their architectures, and protocols for better data communication.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts (2 from each unit/section) of 1.5 marks each and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Application, history, market, reference model and overview, Wireless Transmission- Frequencies, signals, antennae, signal propagation, multiplexing, modulation, spread spectrum, cellular system.
MAC and Telecommunication System: Specialized MAC, SDMA, FDMA, TDMA – Fixed TDM, classical ALOHA, Slotted, ALOHA, CSMA, DAMA, PKMA, reservation TDMA. Collision avoidance, polling inhibit sense multiple access. CDMA, comparison, GSM-mobile services, architecture radio, interface, protocol, localization, calling handover, security, new data services, Introduction to WLL.

Unit-II

Satellite and Broadcast Systems: History, Applications, GEO, LEO, MEO, routing, localization, handover in satellite system, Digital audio and video broadcasting,
WIRELESS LAN: IEEE 802 11- System and protocol architecture, physical layer, MAC layered management, Bluetooth- User scenarios, physical layer, MAC Layer, networking, security and link management.

Unit-III

Mobile Network Layer: Mobile IP-goals, assumptions, requirement, entities, terminology, IP packet delivery, Agent advertisement and discovery, registration, tunnelling, encapsulation, optimization, reserve tunnelling, IPv6, DHCP, Adhoc Networks, Routing, destination sequence distance vector, dynamic source routing, hierarchical algorithm, algorithm, algorithm metric.

Unit-IV

Mobile Transport Layer: Traditional TCP, Indirect TCP, Snooping; TCP, Mobile TCP fast retransmission, Transaction oriented TCP. Support for Mobility: File, system, WWW-HIT, HTML, system architecture, WAP-architecture, Wireless datagram, protocol, wireless transport layer security, wireless transaction protocol, application environment, and telephony application.

Suggested Readings:

1. Mobile Communication by Jochen Schiller, Pearson Education, 2002
2. Mobile Cellular Telecommunications by LEE, McGRAW-Hill, 2nd Edition.
3. Wireless Communications by Theodore S Rappaport, Pearsons.
4. Wireless and Mobile Communication by Upena Dalal & Manoj K. Shukla, Oxford University Press.

Useful Video links:

Unit No.	Topics	Links
Unit-I	Slotted ALOHA	https://youtu.be/6zv3vcqDj4s
	GSM and CDMA	https://youtu.be/bur9hq_abog
Unit-II	GEO, LEO, MEO	https://youtu.be/P0AXEXi5Xxs
	IEEE 802.11	https://youtu.be/QhKIaK4ReUA
Unit-III	IPV6	https://youtu.be/FkaFr3cpg6U
	Ad-hoc Networks	https://archive.nptel.ac.in/courses/106/105/106105160/
Unit-IV	Fast Retransmission	https://youtu.be/EU_5aVvmGTU?si=iu16Q27wA3nzzs0D

Course Code	**PEC-MTCSE-114A**				
Category	Professional Elective Courses				
Course Title	**Optimization Techniques**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	4	0	0	**4**	
Course Objectives	The objectives of this course are • To explain the core concepts of Operating Systems, including process management, synchronization, scheduling, and deadlock handling for efficient execution. • To explore memory management techniques like swapping, virtual memory, and page replacement to optimize system resources. • To introduce students to the principles of file system and I/O management, including file structures, device drivers, and disk scheduling. • To familiarize students with Windows OS internals and tools like the registry, process/thread management, and WMI to manage system resources and automate tasks.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

CO	Skill Demonstrated	RBT Level
CO1	Define the concepts of linear/non-linear programming, transportation, assignment, reliability, and queuing models.	Level 1: Remember
CO2	Explain problem-solving methodologies for optimization, reliability, and queuing systems.	Level 2: Understand
CO3	Apply optimization techniques, to solve real-world decision-making and resource allocation problems.	Level 3: Apply
CO4	Analyze and evaluate optimization, reliability, and queuing models for efficient decision-making.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts (2 from each unit/section) of 1.5 marks each and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Linear Programming: Simplex Method, Big M-Method, Duality in Linear Programming, Sensitivity Analysis, Revised Simplex Method, Two-Phase Simplex Method, Dual Simplex Method. Integer Linear Programming: Branch and Bound Algorithms, Gomory Cutting Plane Method.

Unit-II

Transportation Problems: Types of Transportation Problems, Mathematical Models, Transportation Algorithms. Assignments: Definition, Differences between Transportation and Assignment Models, Representation

Assignment Problem as Transportation Problem and as Linear Programming, Assignment Algorithm -Hungarian Method.

Unit-III

Non-Linear Programming: Classical optimization Techniques, NLP with constraints: Graphical Solution, Multivariable Optimization with Equality constraints (Lagrange Multipliers Method), with inequality constraints-Kuhn-Tucker conditions, Quadratic Programming and Separable Programming: Standard form, Wolf's Method, Beale's Method, Search Method for Unconstrained Non-Linear Programming Problems.

Unit-IV

Reliability: Basic concepts, conditional failure rate function, Failure time distributions, certain life Models, Reliability of a system in terms of the reliability of its components, series system, parallel system. Queuing Theory: Introduction, elements or Parameters of Queuing system, Steady state Balance Equation, Kendall's Notation for Representing Queuing /N/FCFS) Finite ∞ Models, Model!: Single server Model(M/M/1/∞/∞/FCFS), Model 2:M/M/1/ Capacity Queue System, Model3:Multi-server Model, Model4: Machine Servicing Model.

Suggested Readings:

1. Optimization Techniques by C. Mohan and Kusum Deep, New Age International.
2. Operations Research by K. Rajagopal, PHI, India.
3. Reliability Engineering by K K Aggarwal, Springer.
4. Operations Research: An Introduction by Taha H.A, Pearson.
5. Linear Programming and Network Flows by Mokhtar S. Bazaraa, John J. Jarvis, and Hanif D. Sherali, Wiley.
6. Reliability Engineering by Elsayed A. Elsayed. Wiley.
7. Fundamentals of Queuing Theory by Donald Gross, John F. Shortle, James M. Thompson, and Carl M. Harris, Wiley.

Useful Video links:

Unit No.	Topics	Links
Unit-I	Operation Research	https://onlinecourses.nptel.ac.in/noc24_ma55/preview
	Linear Programming	https://www.nptelvideos.com/lecture.php?id=14985
Unit-II	Dual of the transportation problem and the optimality of the MODI method	https://www.youtube.com/watch?v=-tIfLz3Vsuk
	Hungarian Algorithm	https://www.youtube.com/watch?v=BUGIhEecipE
Unit-III	Non linear Programming	https://archive.nptel.ac.in/courses/111/107/111107104/
	Dynamic Programming	https://www.youtube.com/watch?v=qa9fnsdY0A8&t=1s
Unit-IV	Introduction to Queueing Theory	https://www.youtube.com/watch?v=4H9dMn919cs
	Birth-Death Queues: General Theory, M/M/1 Queues and their Steady State Solution	https://www.youtube.com/watch?v=AOcCMi7SPqM

<table>
<tr><td>Course Code</td><td colspan="5">PEC-MTCSE-116A</td></tr>
<tr><td>Category</td><td colspan="5">Professional Elective Courses</td></tr>
<tr><td>Course Title</td><td colspan="5">Discrete Mathematics</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td rowspan="2">Semester-II</td></tr>
<tr><td>4</td><td>0</td><td>0</td><td>4</td></tr>
<tr><td>Course Objectives</td><td colspan="5">The objectives of this course are
To enable students to evaluate and simplify propositions and predicates, and use inference rules for valid reasoning.
To introduce students to expressions, design circuits, and solve logical problems.
To provide knowledge to the students about graph theory problems including traversal, shortest paths, and spanning trees using relevant algorithms.
To explain formal languages and automata to model and solve computational problems using finite state machines and Turing machines.</td></tr>
<tr><td>Assessment</td><td colspan="5">40 Marks</td></tr>
<tr><td>End Semester Examination</td><td colspan="5">60 Marks</td></tr>
<tr><td>Total</td><td colspan="5">100 Marks</td></tr>
<tr><td>Duration of Exam</td><td colspan="5">03 Hours</td></tr>
</table>

Course Outcomes: After studying this course, the students will be able to

CO	Skill Demonstrated	RBT Level
CO1	Define the concepts in logic, Boolean algebra, graph theory, and formal languages.	Level 1: Remember
CO2	Explain the relationships between logical connectives, Boolean functions, graph algorithms, and formal languages.	Level 2: Understand
CO3	Apply logic, Boolean algebra, graph algorithms, and finite state machines to solve problems.	Level 3: Apply
CO4	Analyze and compare different algorithms, logical connectives, and Boolean functions for efficiency and applicability in various computational and real-world scenarios.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts (2 from each unit/section) of 1.5 marks each and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Propositions, Logical Connectives, Conditionals and Biconditionals, Tautologies, Logical Equivalences, Predicates, Quantifiers, Inference theory, Validity Probability, Information and Mutual Information.

Unit-II

Poset, Lattices, Principle of Duality, Basic Properties of Lattices, Some Special Lattices, Boolean Algebras, Identities of Boolean Algebra, Uniqueness of Finite Boolean Algebras, Boolean Functions and Boolean Expressions, Normal Forms, The Karnaugh Map method, Application of Boolean Algebra to Switching Circuits.

Unit-III

Introduction to Graphs, Types of Graphs, Representation of graphs, Paths and Circuits, Graph Traversals, Shortest Path in Weighted Graphs, Dijkstra Algorithm, Euler Graphs, Fleury's Algorithm, Hamiltonian Graphs, Travelling Salesman Problem, Planar Graphs, Kuratowski's Two Graph, Euler's Theorem, Colouring of Graphs, Transport Networks Trees, Rooted Trees, Representation of Algebraic Expressions by Binary Trees, Binary Search Trees, Spanning Trees and Cut-Sets, Minimum Spanning Tree, Kruskal's Algorithm, Prim's Algorithm.

Unit-IV

Languages, Phrase Structure Grammars, Types of Grammars and Languages, Finite State Machines, Equivalent Machines, Finite State Machines as Language Recognizers, Finite State Languages and Type-3 Languages, Turing Machine.

Suggested Readings:

1. Elements of Discrete Mathematics: A Computer Oriented Approach,by C. L. Liu and D. P.Mohapatra, McGraw Hill Education.
2. Discrete Mathematical Structures with Applications to Computer Science by J. P Tremblay and R. Manohar, Tata McGraw Hill Edition.
3. Mathematical Structures for Computer Science by J. L. Gersting, Computer Science Press, New York.
4. Discrete Mathematical Structures by B. Kolman, R. C. Busby and S Ross, PHI.
5. Discrete Mathematics by Babu Ram, Vinayak Publishers and Distributors, Delhi.
6. Discrete Mathematics by Semyour Lipschutz and Marc Lipson, Schaum's outline.
7. Discrete Mathematics by R.K. Bisht and H. S. Dhami, Oxford University Press.

Useful Video links:

Unit No.	Topics	Links
Unit-I	Propositional Logic	https://youtu.be/0uTE24o3q-o
	Conditionals and Biconditionals	https://youtu.be/bD-CUgfe-dA?feature=shared
Unit-II	Lattice Theory	https://youtu.be/QLIQpF9ENqk
	The Karnaugh Map method	https://youtu.be/EznCqZ1eh5Q
Unit-III	Graphs	https://youtu.be/Tm-VB6FsRvY?feature=shared
	Colouring of Graphs	https://youtu.be/kubJIJMOS8I
Unit-IV	Types of Grammars	https://youtu.be/-aIRqNnUvEg
	Turing Machine	https://youtu.be/IhyEGNn-7Uo

Course Code	**PEC-MTCSE-118A**				
Category	Professional Elective Courses				
Course Title	**Internet and Web Development**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	4	0	0	**4**	
Course Objectives	The objectives of this course are • To introduce students to Internet Protocols and Routing • To enhance students' expertise in Router Technology and Security • To expose students to Web Servers, Browsers, and HTTP/HTTPS • To enable students to develop Dynamic Websites Using Modern Web Technologies				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

CO	Skill Demonstrated	RBT Level
CO1	Define the fundamental concepts of internet protocols, web architecture, and web development.	Level 1: Remember
CO2	Understand the concepts of Internet, web design and the role of client-side and server-side technologies in web development.	Level 2: Understand
CO3	Apply the concepts of web design, internet, routing techniques, and web technologies to configure network environments and develop secure web-based systems.	Level 3: Apply
CO4	Analyze the architecture and functionality of routing protocols, web technologies, and website development tools to evaluate their effectiveness in implementing secure and dynamic web-based solutions.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts (2 from each unit/section) of 1.5 marks each and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Introduction: Internet protocols models, Internet addresses, IP Routing concepts, Table Driven and next hop routing, other routing related protocols, Internet Access through PPP, SLIP, and WWW.

Unit-II

Router technology: Hubs, Bridges, Routers, Routing Protocols, Routing security, Switch based routing, Routing in unicast environment, multicasting, mobile routing.

Unit-III

Web server and Browser: Web Servers (IIS/PWS & Apache), HTTP request types, system architecture, client-side scripting, accessing web servers, HTTP, secure HTTP, Secure Sockets Layer, WWW Proxies, Web Browser, Bookmarks, Cookies, Progress Indicators, Customization of Browsers, Browsing Tricks, Next Generation Web Browsing, Search Engines, Architecture of Search Engines, Search Tools, Web Crawlers.

Unit-IV

Website Development: DHTML, XHTML, AJAX, XM: Structuring data, XML namespaces, DTD and schemas, XML variables, DOM methods, simple API for XML, web services, and application of XML. Active Server Pages (ASP): How ASP works, ASP objects, file system, objects, ASP.NET

Suggested Readings:

1. Fundamentals of the Internet and the World Wide Web, Raymond Green Law and Ellen Hepp-2011, TMH.
2. Internet and World Wide Web Programming, Deitel, Deitel and Neito, 2000, Pearson Education.
3. Beginning XHTML by Frank Boumphrey, Ted Wugofski, Cassandra Greer, Dave Raggett, Jenny Raggett, Sebastian Schnitzenbaumer, Ted Wugoiski 2000, WROX Press (Indian Shroff Publication SPD)1st Edition.
4. Complete Reference Guide to Java Script, Aron Weiss, QUIE, 1977.
5. Intranet and Internet Engg., By Minoli.

Useful Video links:

Unit No.	Topics	Links
Unit-I	Internet protocol model	https://youtu.be/8BK70UDgyrc?si=ODJJXAaJF3t7fTbD
	Internet addresses	https://youtu.be/5vbPS-KnhvI?si=JGG1P8iQFJjM5QzQ
Unit-II	Routing Protocols	https://youtu.be/yQBuCHG5co0?si=SAmALWddxuOvDWJm
	Routers	https://youtu.be/9HgkQN7u7-8?si=4iSRIS7Y_7y2LMf2
Unit-III	Web Servers	https://www.youtube.com/watch?v=Adx2gP0RNDU
	Architecture of Search Engines	https://www.youtube.com/watch?v=JjywDlY1OJk&t=212s
	Web Crawlers	https://youtu.be/JjywDlY1OJk?si=D38xn2Q_GRzVueKP
Unit-IV	AJAX	https://www.youtube.com/watch?v=2QrLvmi0yhc
	XML	https://www.youtube.com/watch?v=8RK8FDTdLSc
	Active Server Pages	https://www.youtube.com/watch?v=CPPE6rpzJJc

<table>
<tr><td>Course Code</td><td colspan="5">OEC-152A</td></tr>
<tr><td>Category</td><td colspan="5">Multidisciplinary Open Elective Courses</td></tr>
<tr><td>Course Title</td><td colspan="5">Cyber Forensic and Security</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td rowspan="2">Semester-II</td></tr>
<tr><td>3</td><td>0</td><td>0</td><td>3</td></tr>
<tr><td>Course Objectives</td><td colspan="5">The objectives of this course are
• To understand the types of information systems and evaluate security threats to organizational assets.
• Apply forensic techniques to protect data and identify vulnerabilities like spyware and adware.
• To learn ethical hacking practices, including network, web, and password hacking techniques.
• To gain proficiency in digital evidence handling and understand legal protocols and cyber laws, including the Information Technology Act 2000.</td></tr>
<tr><td>Assessment</td><td colspan="5">40 Marks</td></tr>
<tr><td>End Semester Examination</td><td colspan="5">60 Marks</td></tr>
<tr><td>Total</td><td colspan="5">100 Marks</td></tr>
<tr><td>Duration of Exam</td><td colspan="5">03 Hours</td></tr>
</table>

Course Outcomes: After studying this course, the students will be able to

CO	Skill Demonstrated	RBT Level
CO1	Define the fundamental concepts of information systems, cyber security and ethical hacking.	Level 1: Remember
CO2	Explain the principles and technologies of cyber security, ethical hacking and their role in protecting information systems.	Level 2: Understand
CO3	Apply the concepts and techniques of ethical hacking and cyber security to identify and mitigate vulnerabilities in computer systems and networks.	Level 3: Apply
CO4	Analyze cybercrimes, security standards and legal frameworks in the context of information technology and forensics.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts (2 from each unit/section) of 1.5 marks each and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Introduction to Information Systems: Types of information Systems, Introduction to information security, Need for Information security, Threats to Information Systems, Information Security Investigations. Security threats - Sources of security threats- Motives - Target Assets and vulnerabilities – Consequences of threats- E-mail threats - Web-threats - Intruders and Hackers, Insider threats, Security Threats to E-Commerce, Cyber-crimes.

Unit-II

Cyber Forensics: Cyber Security, Cyber Security roles, Cyber Security Principles, Difference between information Security and Cyber Security, Types of Computer Forensics Technology, Types of Military Computer Forensic Technology, Types of Law Enforcement: Computer Forensic Technology, Types of Business Computer

Forensic Technology, Specialized Forensics Techniques, Hidden Data and How to Find It, Spyware and Adware, Encryption Methods and Vulnerabilities, Protecting Data from Being Compromised Internet Tracing Methods, Security and Wireless Technologies, Avoiding Pitfalls with Firewalls Biometric Security Systems.

Unit-III

Ethical Hacking: Essential Terminology, Hacking windows – Network hacking – Web hacking – Password hacking, Malware, Scanning, Cracking. Digital Evidence in Criminal Investigations: The Analog and Digital World, Training and Education in digital evidence, Evidence Collection and Data Seizure: Why Collect Evidence, Collection Options Obstacles, Types of Evidence, The Rules of Evidence, Volatile Evidence, General Procedure, Collection and Archiving, Methods of Collection, Artifacts, Collection Steps, Controlling Contamination: The Chain of Custody, Reconstructing the Attack, The digital crime scene, Investigating Cybercrime, Duties Support Functions and Competencies.

Unit-IV

Cyber Crimes and Cyber Security Standards: Crime incident Handling Basics: Cyber activism, Tracking hackers, clues to cyber-crime, privacy act, search warrants, common terms, organizational roles, procedure for responding to incidents, reporting procedures, legal considerations, Information Technology Act 2000: Scope, jurisdiction, offense and contraventions, powers of police, adjudication, Intellectual property issues in cyberspace, ISO, Copyright Act, Patent Law, Cyber Laws in India..

Suggested Readings:

1. Cryptography and Information Security by V.K. Pachghare, PHI Learning Private Limited, India.
2. Computer Security: Principles and Practice by William Stallings and Lawrie Brown, Prentice Hall.
3. Ethical Decision making and IT: An Introduction with Cases by Earnest A. Kallman, J.P Grillo, McGraw Hill Publication.
4. Cyber Security and Global Information Assurance: Threat Analysis and Response Solutions by Kenneth J. Knapp, IGI Global.
5. Principles of Information Security by Michael E. Whitman, Herbert J. Mattord, Cengage Learning Pub.
6. Computer Network Security by Joseph M Kizza, Springer Verlag.

Useful Video links:

Unit No.	Topics	Links
Unit-I	IT Revolution	https://www.youtube.com/watch?v=bwq74PuiH9o
	Internet Security Threats	https://www.youtube.com/watch?v=2tiZ89N4izc
	Authentication Based Attacks	https://www.youtube.com/watch?v=ch-7pCZZzUg
Unit-II	Cyber Security and Privacy	https://www.youtube.com/watch?v=ozsxJCM4BGs
	Cyber Security policy	https://youtu.be/snROvNy3wf8?si=tAdRHgxQ6guDOMPn
Unit-III	Introduction to Ethical Hacking	https://youtu.be/qswOrF2WPaw?si=XTqfXGwXglP3fEQz
	Man in The middle Attack	https://youtu.be/8_nP254d9aY?si=mgdMeAF9eoEMYcEx
Unit-IV	Security management Governance, risk and compliance	https://www.youtube.com/watch?v=1okOQCY6Bsk
	Cyber security technologies	https://www.youtube.com/watch?v=3rkIe2ZkkfY

<table>
<tr><td>Course Code</td><td colspan="5">OEC-154A</td></tr>
<tr><td>Category</td><td colspan="5">Multidisciplinary Open Elective Courses</td></tr>
<tr><td>Course Title</td><td colspan="5">Computer Science and Principles</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td rowspan="2">Semester-II</td></tr>
<tr><td>3</td><td>0</td><td>0</td><td>3</td></tr>
<tr><td>Course Objectives</td><td colspan="5">The objectives of this course are
To master fundamental computing concepts including problem-solving, data representation, and abstraction.
To learn web development using HTML, CSS, and JavaScript to create interactive web pages.
To understand data mining techniques for extracting patterns and insights from large datasets.
To grasp networking and OS principles, including protocols, resource management, and system operations.</td></tr>
<tr><td>Assessment</td><td colspan="5">40 Marks</td></tr>
<tr><td>End Semester Examination</td><td colspan="5">60 Marks</td></tr>
<tr><td>Total</td><td colspan="5">100 Marks</td></tr>
<tr><td>Duration of Exam</td><td colspan="5">03 Hours</td></tr>
</table>

Course Outcomes: After studying this course, the students will be able to

CO	Skill Demonstrated	RBT Level
CO1	Define the fundamental concepts of computer science and engineering.	Level 1: Remember
CO2	Explain the principles and concepts of computer science.	Level 2: Understand
CO3	Apply the methods and techniques of computer science to solve engineering problems.	Level 3: Apply
CO4	Analyze network structures, web designing, operating systems and data mining techniques to identify problems and propose optimal solutions.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts (2 from each unit/section) of 1.5 marks each and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Fundamental of computer science and computational thinking: Logical reasoning, problem solving, data representation, processing of data, abstraction, managing complexity, operation of computers and networks, effective Web searching, ethical, legal and social aspects of information technology.

Unit-II

HTML and XTML basics: LIST – unordered list – nested and ordered list – Basic HTML Tables – Intermediate HTML table and Formatting – basic HTML Forms and Formatting – More Complex HTML Forms – Frameset Element – Nested Frameset. Style Sheets and Graphics: Introduction to Style sheets – Formatting Text by Using Style Sheets – Formatting Paragraphs by Using Style Sheets, Java Script Basics.

Unit-III

Data Mining: Introduction, Motivation, Importance, Knowledge Discovery Process, KDD and Data Mining, Data Mining vs. Query Tools, Kind of Data mining, kind of data, Functionalities, interesting patterns, Classification of data mining systems, Major issues, from Data warehousing to data Mining.

Unit-IV

Computer Networks: Network fundamentals, Local Area Networks (LAN), Metropolitan Area Networks (MAN), Wide Area Networks (WAN), Wireless Networks, Inter Networks. Reference Models: The OSI model, TCP/IP model. Operating Systems: Main functions of operating systems. Multi Programming, multiprocessing, and multitasking. Deadlock and CPU scheduling algorithms.

Suggested Readings:

1. Blown To Bits: Your Life, Liberty and Happiness After the Digital Explosion by Hal Abelson, Ken Leeden and Harry Lewis, 2010.
2. HTML & CSS: The Complete Reference by Thomas A. Powell, Osborne Media; 5th Edition, 2010.
3. Data mining: a knowledge, discovery approach by Krzysztof J. Cios, Witold Pedrycz, Roman W. Swiniarski, Springer, 2007.

Useful Video links:

Unit No.	Topics	Links
Unit-I	Effective Web searching	https://www.youtube.com/watch?v=vUvmCyM2C40
	Technology and Ethics	https://youtu.be/cVA80jjesSc
Unit-II	HTML	https://youtu.be/QEtWL4lWlL4
	Stylesheets	https://youtu.be/h_RftxdJTzs
Unit-III	Knowledge Discovery Process	https://youtu.be/ykZ-_UGcYWg
	Data Mining and Knowledge Discovery	https://youtu.be/m5c27rQtD2E
Unit-IV	LAN, WAN, MAN	https://youtu.be/u2UboyYSc4Q
	TCP/IP	https://youtu.be/zzXs0EnCin0
	Network Models	https://youtu.be/3DZLItfbqtQ

<table>
<tr><td>Course Code</td><td colspan="5">FEC-164A</td></tr>
<tr><td>Category</td><td colspan="5">Foundation Elective Courses</td></tr>
<tr><td>Course Title</td><td colspan="5">Computer Fundamentals</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td rowspan="2">Semester-II</td></tr>
<tr><td>3</td><td>0</td><td>0</td><td>3</td></tr>
<tr><td>Course Objectives</td><td colspan="5">The objectives of this course are to
Understand the development of computing systems, their characteristics, and classifications, learn number systems and codes.
Gain knowledge about memory types, storage devices, memory and their impact on performance and data management.
Learn the functions of operating systems, system utilities, application software, and user interfaces.
Gain skills in word processing, spreadsheets, and presentations, including formatting, data manipulation, formula creation, and document presentation.
Understand network types, topologies and applications, and their role in modern communication and data sharing.</td></tr>
<tr><td>Assessment</td><td colspan="5">40 Marks</td></tr>
<tr><td>End Semester Examination</td><td colspan="5">60 Marks</td></tr>
<tr><td>Total</td><td colspan="5">100 Marks</td></tr>
<tr><td>Duration of Exam</td><td colspan="5">03 Hours</td></tr>
</table>

Course Outcomes: After studying this course, the students will be able to

CO	Skill Demonstrated	RBT Level
CO1	Recall the fundamental concepts of computer systems and office tools.	Level 1: Remember
CO2	Explain the basic concepts of computers, office productivity suite, Internet and its impact on society.	Level 2: Understand
CO3	Apply principles, tools and techniques of computer engineering to solve real world problems.	Level 3: Apply
CO4	Analyze the applications of computer technology, its societal impact and the importance of network security.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts (2 from each unit/section) of 1.5 marks each and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Historical Evolution of Computing Systems: Overview of Data Processing, History of Computing, Computer Generations; Characteristics of Computer, Anatomy of Computer, Classification of Computers.
Number Systems and Codes: Introduction, Number Systems and its types, and inter-conversion of Number Systems; ASCII and EBCDIC codes. **Input and Output Devices:** Concept of Input/Output, Types of Input Devices; Output Devices – Printers, Plotters and Monitors.

Unit-II

Memory and Storage Devices: Characteristics of memory systems, memory hierarchy, Types of Memory – RAM, ROM, etc.; Magnetic Disks, Magnetic Tapes, Optical Disks; Concept of Cache Memory and Virtual Memory.

Software and Operating System Concepts: Introduction, Software Types, Language translators, System Utility Software, Application Software; Operating System – Characteristics, its functions, and its classification; User Interfaces – CUI and GUIs. DOS and Windows operating.

Unit-III

Working with Office Tools: Using Word Processing Tool: Opening and Closing of documents, Text creation and Manipulation, Moving Around in a Document, Formatting of text, Table handling, Spell check, language setting and thesaurus, Handling Multiple Documents, Printing of word document.
Using Spreadsheet tool: Basics of Spreadsheet; Manipulation of cells, Formulas and Functions, Editing of Spread Sheet, Page setups, header and footer, printing of Spread Sheet.
Using Slide Presentation Tool: Basics of power point, Preparation and Presentation of Slides, Slide Show, Formatting and Clip Arts, Taking printouts of presentation / handouts.

Unit-IV

Communication and Networks: Data Communication, Transmission Modes, Basics of Computer networks, types of computer network - LAN, MAN, WAN; Network Topologies and Applications of Computer Networks.
Internet Basics: Concept of Internet, Application of Internet, WWW, Web-sites and URLs, Search Engine, Using Electronic mails, Instant Messaging, Web Browsing software, Surfing the Internet.
Social Concern: Positive and Negative Impacts of Computer Technology, Computer Crimes, Computer Virus: Definition, Types of viruses, Characteristics of viruses, anti- virus software.
Computer Applications: Data Analysis, Sports, Research, Education, Business, Medicines & Health Care, Weather Forecasting, Military.

Suggested Readings:

1. Handbook of Computer Fundamentals by Nasib Singh Gill, Khanna Books Publishing Co.(P) Ltd., New Delhi, 2016.
2. Computer Fundamentals by P.K Sinha, BPB Publications.
3. Computing Fundamentals and Programming in C by Nasib Singh Gill, Khanna Book Publishing Co.(P) Ltd., New Delhi.
4. Fundamentals of Computers by V. Rajaraman, PHI.
5. Introduction to Computers by Leon, Alexis & Leon, Mathews, Leon Tech World.
6. Data Processing and Information Technology by C.S. French, BPB Publications.

Useful Video links:

Unit No.	Topics	Links
Unit-I	Evolution of Computers	https://youtu.be/TS2odp6rQHU
	Number Systems and Codes	https://youtu.be/juJR_JDJRa0
Unit-II	Memory	https://youtu.be/cjNORC_00_A
	Cache Memory	https://youtu.be/OvWZ1uQ767U
Unit-III	Word Processing Tool	https://youtu.be/y-AiPdAYixI
	Spreadsheet Tool	https://youtu.be/8tHzppXayik
	Slide Presentation Tool	https://youtu.be/KqgyvGxISxk
Unit-IV	Internet	https://youtu.be/YOXwcbwSEUo
	WWW	https://youtu.be/q9THx--fAFw

Annexure-II

GANGA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, KABLANA (JHAJJAR)
An Autonomous Institute

'A' GRADE ACCREDITED BY NAAC

Evaluation Scheme & Syllabus For

Master of Technology (Cyber Forensics and Information Security)

(Effective from the Session: 2024-25)

APPROVED BY AICTE, NEW DELHI AND AFFILIATED TO MDU, ROHTAK

1. DEFINITION OF CREDIT

1	1 Lecture (L) per week	1 Credit
2	2 Practical (P) per week	1 Credit
3	2 Seminar per Week	2 Credit
4	4 Project Per Week	2 Credit

2. RANGE OF CREDIT

A credit of 86 is required for a student to be eligible for a postgraduate degree in Cyber Forensics and Information Security

3. STRUCTURE OF POSTGRADUATE ENGINEERING PROGRAM (M.TECH)

Sr. No.	Category	Breakup of Credits
1	Professional Core Courses	32*
2	Professional Elective Courses (Relevant to chosen specialization/branch)	8*
3	Mandatory Learning Course	3*
4	Multidisciplinary Open Elective Courses	6*
5	Foundation Elective Courses	3*
6	Seminar	6*
7	Lab Courses	4*
8	Project	2*
9	Dissertation	22*
	Total Credits	**86***

**Minor variation is allowed as per need of the respective disciplines.*

4. COURSE CODE AND DEFINITIONS

Sr. No.	Category	Course Code
1	Professional Core Courses	PCC
2	Professional Elective Courses (Relevant to chosen specialization/branch)	PEC
3	Mandatory Learning Course	MLC
4	Multidisciplinary Open Elective Courses	OEC
5	Foundation Elective Courses	FEC
6	Seminar	SM
7	Lab Courses	LC
8	Project	PROJ
9	Dissertation	DISS

GANGA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, KABLANA, JHAJJAR (HR.)

Scheme of Studies and Examination

M. Tech (Cyber Forensics and Information Security) –1st Semester

w.e.f. 2024-25

Sr. No.	Category	Course Code	Course Title	Lectures per week			Total Load Per Week	Credits	Examination Scheme (Marks)				Exam Duration in Hours
				Lecture (L)	Tutorial (T)	Practical (P)			Assessment	End Semester Examination		Total	
										Theory	Practical		
1	Professional Core Courses	PCC-MTCFIS-101A	Mathematical Foundations of Information Security	4	0	0	4	4	40	60		100	3
2	Professional Core Courses	PCC-MTCFIS-103A	Networks and Information Security	4	0	0	4	4	40	60		100	3
3	Professional Core Courses	PCC-MTCFIS-105A	Operating Systems and Security	4	0	0	4	4	40	60		100	3
4	Professional Core Courses	PCC-MTCFIS-107A	Cyber Forensics	4	0	0	4	4	40	60		100	3
5	Professional Core Courses	PCC-MTCFIS-109A	Database Security	4	0	0	4	4	40	60		100	3
6	Lab Course	LC-MTCFIS-111A	Information Security Lab	0	0	2	2	1	25		25	50	3
7	Lab Course	LC-MTCFIS-113A	OS Security Lab	0	0	2	2	1	25		25	50	3
8	Seminar	SM-MT-115A	Seminar-I	0	0	2	2	2	50			50	
							Total Credits	**24**				**650**	

GANGA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, KABLANA, JHAJJAR (HR.)

Scheme of Studies and Examination

M. Tech (Cyber Forensics and Information Security) –2nd Semester

w.e.f. 2024-25

Sr. No.	Category	Course Code	Course Title	Hours per week			Total Load Per Week	Credits	Examination Scheme (Marks)				Exam Duration in H
				Lecture (L)	Tutorial (T)	Practical (P)			Assessment	End Semester Examination		Total	
										Theory	Practical		
1	Professional Core Courses	PCC-MTCFIS-102A	Ethical Hacking and Digital Forensics	4	0	0	4	4	40	60		100	3
2	Professional Core Courses	PCC- MTCFIS-104A	Steganography and Digital Watermarking	4	0	0	4	4	40	60		100	3
3	Professional Elective Courses	Refer Table-I	.....	4	0	0	4	4	40	60		100	3
4	Multidisciplinary Open Elective Courses	Refer Table-II	.....	3	0	0	3	3	40	60		100	3
5	Foundation Elective Courses	Refer Table-III	.....	3	0	0	3	3	40	60		100	3
6	Lab Course	LC-MTCFIS-106A	Ethical Hacking Lab	0	0	2	2	1	25		25	50	3
7	Lab Course	LCMTCFIS-108A	Steganography Lab	0	0	2	2	1	25		25	50	3
8	Seminar	SM-MT-110A	Seminar-II	0	0	2	2	2	50			50	
Total Credits								**22**				**650**	

Table I: Professional Elective Courses

Sr. No.	Course Code	Course Name
1	PEC- MTCFIS-112A	Advanced Computer Networks
2	PEC- MTCFIS-114A	Security Threats
3	PEC- MTCFIS-116A	Multimedia Security
4	PEC- MTCFIS-118A	Mobile & Wireless Security

Table II: Multidisciplinary Open Elective-I Courses

Students of all M. Tech programmes are required to study one Multidisciplinary open elective course in each of the 2nd and 3rd Semesters and one foundation elective course in 2nd Semester for 2-Years Programmes. They may choose any one of the following courses (excluding the courses offered by the departments of their own subjects, if not stated otherwise).

Sr. No	Course Code	Course Name	
1	OEC-130A	Basic of Economics	
2	OEC-132A	Fundamentals of Management	
3	OEC-134A	Disaster Management	
4	OEC-136A	Industrial Safety	
5	OEC-138A	Indian Literature in Translation-I	
6	OEC-140A	Environmental Issues	
7	OEC-142A	Quantitative Techniques	
8	OEC-144A	Sources of Energy-I	
9	OEC-146A	Operation Research	
10	OEC-148A	Multimedia Communication	
11	OEC-150A	Introduction to Information Technology	
12	OEC-152A	Cyber Forensics and Security	
13	OEC-154A	Computer Science and Principles	
14	OEC-156A	Software Engineering Practice	

Table III: Foundation Elective Courses

Sr. No	Course Code	Course Name	
1	FEC-158A	Basics of Accounting	
2	FEC-160A	Basics of E-commerce	
3	FEC-162A	Element of Banking	
4	FEC-164A	Computer Fundamentals	
5	FEC-166A	Communication and Soft Skills	
6	FEC-168A	Entrepreneurship Development	
7	FEC-170A	Electronics Engineering	

<table>
<tr><td>Course Code</td><td colspan="5">PCC-MTCFIS-101A</td></tr>
<tr><td>Category</td><td colspan="5">Professional Core Courses</td></tr>
<tr><td>Course Title</td><td colspan="5">Mathematical Foundations of Information Security</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td rowspan="2">Semester-I</td></tr>
<tr><td>4</td><td>0</td><td>0</td><td>4</td></tr>
<tr><td>Course Objectives</td><td colspan="5">The objectives of this course are
• To understand the principles of number theory and their applications in cryptography.
• To explore classical and modern encryption techniques for secure communication.
• To study public key cryptography and advanced cryptographic protocols.
• To analyze primality testing and factorization methods for cryptographic applications.</td></tr>
<tr><td>Assessment</td><td colspan="5">40 Marks</td></tr>
<tr><td>End Semester Examination</td><td colspan="5">60 Marks</td></tr>
<tr><td>Total</td><td colspan="5">100 Marks</td></tr>
<tr><td>Duration of Exam</td><td colspan="5">03 Hours</td></tr>
</table>

Course Outcomes: After studying this course, the students will be able to

CO	Skill Demonstrated	RBT Level
CO1	Define the fundamental concepts of number theory and cryptosystems.	Level 1: Remember
CO2	Understand the basic concepts of number theory, algebra and cryptography.	Level 2: Understand
CO3	Apply the concepts of encryption schemes and number theory to solve computational problems.	Level 3: Apply
CO4	Analyze the principles, theorems and algorithms in number theory and cryptography to enhance efficiency and security in information Systems.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts (2 from each unit/section) of 1.5 marks each and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Topics in elementary number theory: O and notations, time estimates for doing arithmetic, divisibility and the Euclidean algorithm, Congruences: Definitions and properties, linear congruences, residue classes, Euler's phi function, Fermat's Little Theorem, Chinese Remainder Theorem, Applications to factoring, finite fields, quadratic residues and reciprocity: Quadratic residues, Legendre symbol, Jacobi symbol.

Unit-II

Simple Cryptosystems: Enciphering Matrices, Encryption Schemes, Symmetric and Asymmetric Cryptosystems, Cryptanalysis, Block ciphers–Use of Block Ciphers, Multiple Encryption, Stream Ciphers–Affine cipher, Vigenere, Hill, and Permutation Cipher, Secure Cryptosystem.

Unit-III

Public Key Cryptosystems: The idea of public key cryptography, The Diffie–Hellman Key Agreement Protocol - RSA Cryptosystem, Bit security of RSA, ElGamal Encryption - Discrete Logarithm ,Knapsack problem, Zero-Knowledge Protocols, From Cryptography to Communication Security-Oblivious Transfer.

Unit-IV

Primality and Factoring: Pseudo primes, the rho (γ) method, Format factorization and factor bases, the continued fraction method, the quadratic seieve method. Number Theory and Algebraic Geometry: Elliptic curves, basic facts, elliptic curve cryptosystems, elliptic curve primality test, and elliptic curve factorization.

Suggested Readings:

1. A Computational Introduction to Number Theory and Algebra by Victor Shoup, Cambridge University Press, 2005.
2. Hand Book of Applied Cryptography by A. Manezes, P. Van Oorschot and S. Vanstone, CRC Press, 1996.
3. Classical Introduction to Cryptography, Applications for Communication Security by Serge Vaudenay, Springer, 2006.
4. A Course in Number Theory and Cryptography by Neal Koblitz, 2nd Edition, Springer, 2002.
5. Introduction to Cryptography by Johannes A. Buchman, 2nd Edition, Springer, 2004.
6. The Mathematics of Ciphers, Number Theory and RSA Cryptography by S.C. Coutinho, A.K. Peters, Natick, Massachusetts, 1998.

Useful Video links:

Unit No.	Topics	Links
Unit-I	Fundamental theorem of arithmetic	https://youtu.be/FpEI8yh7Ls8?si=U7vVHU9a7egq6on1
	Chinese remainder theorem	https://youtu.be/qs1nop_YEmc?si=IomQX0vcLBwrw3fZ
	Fermat's theorem	https://youtu.be/FT_NqVQI-Hs?si=ulA7aQQnmFF3HtP0
Unit-II	Symmetric key Encryption	https://youtu.be/eIJzIUhks6E?si=TXlqkrnTuPfY5eSc
	Modes of operation of block cipher	https://youtu.be/3ujQWgW41-M?si=VBO7Jb3xedvHlAvw
	Symmetric key encryption	https://youtu.be/eIJzIUhks6E?si=ynr5SKbP4ItXS4i4
Unit-III	Public key encryption	https://youtu.be/tBRP0aSeHyE?si=WMOKnis6eieK4Asq
	RSA public key cryptosystem	https://youtu.be/gVPyTRbBc70?si=W5MTXCEqNpYnGIkg
	Diffie-Hellman Problem and Security of ElGamal Systems	https://youtu.be/2kfAga111ls?si=zJJFJmZv2Y7lLLDR
Unit-IV	Pseudo random functions	https://youtu.be/_iPVd87B_zc?si=Auv4Ojp0LyunhI08
	Primality testing	https://youtu.be/_7F8tVeOgZE?si=h3SSQkUQ98QyuVkA

Course Code	**PCC-MTCFIS-103A**				
Category	Professional Core Courses				
Course Title	**Networks and Information Security**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I**
	4	0	0	**4**	
Course Objectives	The objectives of this course are • To understand the fundamental concepts of network security. • To explore various access control mechanisms and models • To gain a comprehensive understanding of cryptographic techniques and encryption methods • To analyze the role of security protocols and services				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

CO	**Skill Demonstrated**	**RBT Level**
CO1	Define the concepts of network security, protocols, and cryptographic techniques used to protect data and ensure secure communications.	Level 1: Remember
CO2	Explain various security services, such as confidentiality, integrity, authentication, and non-repudiation, and their role in network security.	Level 2: Understand
CO3	Apply appropriate access control mechanisms, encryption methods, and security protocols to secure communication and prevent cyber threats.	Level 3: Apply
CO4	Analyze different security models, access control mechanisms, and cryptographic systems to assess their effectiveness in mitigating network risks.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts (2 from each unit/section) of 1.5 marks each and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Introduction: Characteristics of Networks, Security Concepts, Kinds of security breaches, Threats and Risks, Points of vulnerability, Attacks, Passive and Active, Security Services, Confidentiality, Authentication, Non-Repudiation, Integrity, Access Control, Availability, Methods of defence, Control measures, Effectiveness of controls, Model for Internetwork Security, Internet Standards and RFCs Access Control Mechanisms, Access Matrix, HRU, TAM, ACL and capabilities.

Unit-II

Access Control Models: Chinese wall, Clark-Wilson, Bell-LaPadula, Non Interference and Role Base Model. Cryptography, Encryption techniques, Characteristics of good encryption systems, Secret Key and Public Key Cryptosystems, Symmetric Ciphers, Block Ciphers and Stream Ciphers, DES, IDEA and Key Escrow, RSA and ElGamal, Secure Hash and Key management, Non-repudiation, cryptanalysis.

Unit-III

Secure sockets, IPsec overview, IP security architecture–IPsec-Internet Key Exchanging (IKE)–IKE phases, encoding, Internet security, Threats to privacy, Packet sniffing, Spoofing - Web security requirements, Real Time communication security, Security standards–Kerberos.X.509 Authentication Service. Security protocols, Transport layer protocols, SSL, Electronic mail security, PEM and S/MIME security protocol, Pretty Good Privacy, Web Security-Firewalls design principles, trusted systems, Electronic payment protocols. Intrusion detection, password management, Viruses and related Threats, Virus Counter measures, Virtual Private Networks.

Unit-IV

Network Security Applications, Authentication Mechanisms: Passwords, Cryptographic authentication protocol, Smart Card, Biometrics, Digital Signatures and seals, Kerberos, X.509 LDAP Directory. Web Security: SSL Encryption, TLS, SET, Email Security, Pretty Good Privacy (PGPs)/MIME, IP Security, Access and System Security, Intruders, Intrusion Detection and Prevention, Firewall, Hardware Firewall, Software Firewall, Application Firewall, Packet Filtering, Packet Analysis, Proxy Servers, Firewall setting in Proxy, ACL in Proxy.

Suggested Readings:

1. Network Security Essentials by William Stallings, 3rd Edition, Pearson Education, 2006.
2. Fundamentals of Computer Security Technology by Edward Amoroso, Prentice-Hall, 1999.
3. Security in Computing by Charles P. Pleeger, Pearson Education, 5th Edition, 2001.
4. Cryptography and Network Security: Principles and Standards by William Stallings, Prentice Hall India, 3rd Edition, 2003.

Useful Video links:

Unit No.	Topics	Links
Unit-I	Security Concepts, Kinds of security breaches, Threats and Risks, Points of vulnerability	https://youtu.be/eCqYztA7iXc?list=PLFe9iOZ1HkC5V4gwbV8H8buJZhgo4cb_z
	Attacks, Passive and Active	https://youtu.be/i9j2tw_RhQU?si=vbxYax1xc90rvbS8
	Identification and Authentication	https://youtu.be/tDQvHzfS4X0?si=4aBisRd6YSbLnmjm
Unit-II	Cryptography, Cryptology, Cryptoanalysis	https://youtu.be/Svb9rNB3feU?si=BHALT3juTXQqAJdp
	Encryption techniques, Secret Key and Public Key Cryptosystems,	https://youtu.be/uzGzSHGip_o?t=446
	Symmetric Ciphers, Block Ciphers and Stream Ciphers	https://youtu.be/j53iXhTSi_s?list=PLBlnK6fEyqRgJU3EsOYDTW7m6SUmW6kII&t=391
Unit-III	IPsec overview, Internet Key Exchanging (IKE)	https://youtu.be/XsgVqrcP32U
	Packet sniffing, Spoofing	https://youtu.be/Y6jLOqD9WzI?t=192
	Security protocols, Transport layer protocols	https://youtu.be/lnU-Zw3NEEQ?si=ElnLBRNE4t_833As
	Virus Counter measures	https://youtu.be/AXk_3avEAlM?t=464
	Firewalls design principles	https://youtu.be/BK6nxKDKijc?t=1
Unit-IV	Authentication Mechanisms: Passwords, Cryptographic authentication protocol	https://youtu.be/n17OOlXsUaU?t=240
	Web Security: SSL Encryption, TLS, SET	https://youtu.be/FmflaVEZRPo?t=645
	Email Security, PGPs / MIME	https://youtu.be/Ta8r_I7-wrw?t=489

Course Code	**PCC-MTCFIS-105A**				
Category	Professional Core Courses				
Course Title	**Operating System and Security**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I**
	4	0	0	**4**	
Course Objectives	The objectives of this course are • To understand the core concepts of Operating Systems, including process management, synchronization, scheduling, and deadlock handling for efficient execution. • To evaluate memory management techniques like swapping, virtual memory, and page replacement to optimize system resources. • Learn the principles of file system and I/O management, including file structures, device drivers, and disk scheduling. • To explore Windows OS internals and tools like the registry, process/thread management, and WMI to manage system resources and automate tasks.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

CO	Skill Demonstrated	RBT Level
CO1	Define the basic concepts of operating system and security.	Level 1: Remember
CO2	Understand the fundamentals of operating systems, process & memory management, threads, access control and file system security.	Level 2: Understand
CO3	Apply different scheduling, page replacement algorithms and principles of system security to solve the real world problems.	Level 3: Apply
CO4	Analyze process, memory & windows management techniques and security mechanisms for securing operating systems.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts (2 from each unit/section) of 1.5 marks each and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Introduction: Operating Systems Concepts, System Calls, OS Organization, Factors in OS Design, Basic Implementation Considerations, Time Sharing and Multi Programming, Real Time Systems.
Process Management: Process Concepts, Model, Process Synchronization, Process Scheduling, Threads.
Deadlock: Detection & Recovery, Avoidance, Prevention- Two Phase Locking Issues.

Unit-II

Memory Management: Basic Memory Management, Swapping, Virtual Memory, Page Replacement Algorithms, Segmentation, File System and I/O Management: Files, Low Level File Implementations, Memory Mapped Files, Directories, Implementation, Principles of I/O Hardware & Software, Device Drivers, Disks Hardware, Formatting & Arm Scheduling Algorithms.

Unit-III

Windows Management Mechanisms: The registry, Registry usage, Registry data types, Local structure, Troubleshooting Registry problems, Registry Internals, Services, Applications, Accounts, Service control Manager, Windows Management Instrumentation, Processes, Threads, and Jobs: Process Internals, Flow of create process, Thread Internals, Examining Thread creation, Thread Scheduling, Job Objects.

Unit-IV

Secure Operating Systems: Access control and file system security, Remote file system security, NFS, SMB, SFS, User authentication, Passwords, Biometrics, Smartcards, Intrusion Detection and Virus Protection: Trusted Computing, TCPA and NGSCB, Digital Rights Management.

Suggested Readings:

1. Modern Operating Systems by Andrew S. Tanenbaum, 2nd edition, Addison Wesley, 2001.
2. Operating Systems A Modern Perspective by Gary Nutt, 2nd edition, Pearson Education, 2001.
3. The Design of the Unix Operating System by Maurice J. Bach, Prentice Hall of India, 1991.
4. Microsoft® Windows® Internals by Mark E. Russinovich and David A. Solomon, 4th Edition, Microsoft Press, 2004.
5. Operating Systems: Internals and Design Principles by William Stallings, 5th Edition, Prentice Hall, 2005.

Useful Video links:

Unit No.	Topics	Links
Unit-I	Introduction to Operating System	https://archive.nptel.ac.in/noc/courses/noc21/SEM2/noc21-cs72/
	Introduction to Computer	https://archive.nptel.ac.in/courses/106/105/106105214/
	Deadlock	https://onlinecourses.swayam2.ac.in/cec22_cs23/preview
Unit-II	Introduction to Memory management	https://youtu.be/_pKbqFyG03s?si=3xUICKHljgRMR-_I
	Virtual Memory	https://youtu.be/kQKpJ4bD8TA?si=qtLN6B735HAFe9KE
	Arm Scheduling Algorithm	https://www.youtube.com/watch?v=9uoa_p8q47Y
Unit-III	Windows Registry & its Types	https://www.youtube.com/watch?v=jXaGtWy_5is
	Multi-Threading	https://www.youtube.com/watch?v=6rYOyIGfy3w
Unit-IV	Secure Operating System	https://www.youtube.com/playlist?list=PL0ABbZ9l6XI5y8yym50mVVP_m1WrDghff
	Intrusion Detection and Prevention Systems	https://www.youtube.com/watch?v=G_oJ2OtD9ys

Course Code	**PCC-MTCFIS-107A**				
Category	Professional Core Courses				
Course Title	**Cyber Forensics**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I**
	4	0	0	**4**	
Course Objectives	The objectives of this course are • To develop a Comprehensive Understanding of Cyber Forensics. • To explore Forensic Technologies across Different Sectors. • To gain Proficiency in Evidence Collection and Analysis. • To master Network Forensics and Digital Crime Scene Investigation.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

CO	Skill Demonstrated	RBT Level
CO1	Define the fundamental concepts, terminology, methods, and tools in cyber forensics and ethical hacking.	Level 1: Remember
CO2	Explain the concepts, technologies, and methods of cyber forensics and ethical hacking.	Level 2: Understand
CO3	Apply techniques, tools, and methodologies of cyber forensics and ethical hacking to resolve network intrusions, investigate cybercrimes cases and ensure data security to mitigate cyber threats across various domains.	Level 3: Apply
CO4	Analyze case studies, previous attacks and cyber forensic methodologies to detect, collect, investigate security breaches and identify vulnerabilities across digital systems.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts (2 from each unit/section) of 1.5 marks each and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Introduction to Cyber forensics: Information Security Investigations, Corporate Cyber Forensics, Scientific method in forensic analysis, investigating large scale Data breach cases, Analyzing Malicious software, Types of Computer Forensics Technology, Types of Military Computer Forensic Technology, Types of Law Enforcement: Computer Forensic Technology, Types of Business Computer Forensic Technology, Specialized Forensics Techniques, Hidden Data and How to Find It, Spyware and Adware, Encryption Methods and Vulnerabilities, Protecting Data from Being Compromised Internet Tracing Methods, Security and Wireless Technologies, Avoiding Pitfalls with Firewalls Biometric Security Systems.

Unit-II

Types of Computer Forensics Systems: Internet Security Systems, Intrusion Detection Systems, Firewall Security Systems, Storage Area Network Security Systems, Network Disaster Recovery Systems, Public Key Infrastructure

Systems, Wireless Network Security Systems, Satellite Encryption Security Systems, Instant Messaging (IM) Security Systems, Net Privacy Systems, Identity Management Security Systems, Identity Theft, Biometric Security Systems

Unit-III

Ethical Hacking: Essential Terminology, Windows Hacking, Malware, Scanning, Cracking. Digital Evidence in Criminal Investigations: The Analog and Digital World, Training and Education in digital evidence, Evidence Collection and Data Seizure: Why Collect Evidence, Collection Options Obstacles, Types of Evidence, The Rules of Evidence, Volatile Evidence, General Procedure, Collection and Archiving, Methods of Collection, Artifacts, Collection Steps, Controlling Contamination: The Chain of Custody, Reconstructing the Attack, The digital crime scene, Investigating Cybercrime, Duties Support Functions and Competencies.

Unit-IV

Identification of Data: Timekeeping, Forensic Identification and Analysis of Technical Surveillance Devices, Reconstructing Past Events: How to Become a Digital Detective, Useable File Formats, Unusable File Formats, Converting Files, Investigating Network Intrusions and Cyber Crime, Network Forensics and Investigating logs, Investigating network Traffic, Investigating Web attacks, Router Forensics, Cyber forensic tools and case studies.

Suggested Readings:

1. Computer Forensics: Computer Crime Scene Investigation by John R. Vacca, 2nd Edition, Charles River Media, 2005.
2. Understanding Cryptography: A Text book for Students and Practitioners by Christof Paar, Jan Pelzl, 2nd Edition, Springer's, 2010.
3. Ali Jahangiri, Live Hacking: The Ultimate Guide to Hacking Techniques & Countermeasures for Ethical Hackers & IT Security Experts, Ali Jahangiri, 2009.
4. Computer Forensics: Investigating Network Intrusions and Cyber Crime (Ec-Council Press Series: Computer Forensics), 2010.

Useful Video links:

Unit No.	Topics	Links
Unit-I	Introduction to Cyber forensics	https://www.youtube.com/watch?v=crmA2rzwHE
	Types of Computer Forensics Technology	https://www.youtube.com/watch?v=pKqyz0ckdK0
	Biometric Security Systems	https://youtu.be/GMDggxifxqk?si=PMvooWp607rFXDcJ
	Encryption Methods and Vulnerabilities	https://www.youtube.com/watch?v=HvZ-05RssYw
Unit-II	Intrusion Detection Systems	https://nptel.ac.in/courses/106106178
	Firewall Security Systems	https://www.youtube.com/watch?v=2YGUvopGkQc
	Satellite Encryption Security Systems	https://youtu.be/dt4Ce8gQPns?si=8om6_9gudSD_rdVe
Unit-III	Types of Evidence	https://www.youtube.com/watch?v=4mQ7fvJOkck
	Reconstructing the Attack	https://youtu.be/usOYloLB2SU?t=1
Unit-IV	Forensic Identification and Analysis of Technical Surveillance Devices	https://youtu.be/giv0DQDSsjQ?list=PLJu2iQtpGvv-2LtysuTTka7dHt9GKUbxD&t=1
	Network Forensics and Investigating logs	https://www.youtube.com/watch?v=bCFJcY8ifJw
	Cyber forensic tools and case studies.	https://youtu.be/JfvHzsexnmc?list=PLa2xctTiNSCiTGuejkc05zsr-G5t9AuH8&t=1

Course Code	**PCC-MTCFIS-109A**				
Category	Professional Core Courses				
Course Title	**Database Security**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I**
	4	0	0	**4**	
Course Objectives	The objectives of this course are • To understand the fundamental problems and challenges in database security • To gain knowledge of security mechanisms used in databases • To explore the principles of statistical database protection and intrusion detection systems • To study models for the protection of new generation database systems				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

CO	Skill Demonstrated	RBT Level
CO1	Define the basic concepts of database security and security measures.	Level 1: Remember
CO2	Explain the principles of database security models, security mechanisms, and protection techniques in distributed, object-oriented, and new-generation database systems.	Level 2: Understand
CO3	Apply database security mechanisms, such as access control, encryption, and intrusion detection, to ensure secure database management systems.	Level 3: Apply
CO4	Analyze the strengths and weaknesses of various database security models and assess their applicability to real-world database security problems.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts (2 from each unit/section) of 1.5 marks each and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Introduction to Database Security Problems in Databases Security Controls, Security Models–1: Introduction Access Matrix Model Take-Grant Model, Aclcn Model, PN Model, Hartsor and Hsiao's Model, Fernandez's Model, Bussolati and Martella's Model for Distributed databases, Security Models 2: Bell and LaPadula's Model, Biba's Model, Dion's Model, Sea View Model, Jajodia and Sandhu's Model, the Lattice Model for the Flow Control conclusion.

Unit-II

Security Mechanisms: Introduction User Identification/Authentication Memory Protection Resource Protection Control Flow Mechanisms Isolation Security Functionalities in Some Operating Systems Trusted Computer System Evaluation Criteria - Security Software Design: Introduction, A Methodological Approach to Security Software Design Secure Operating System Design Secure DBMS Design Security Packages Database Security Design.

Unit-III

Statistical Database Protection & Intrusion Detection Systems: Introduction Statistics Concepts and Definitions Types of Attacks Inference Controls Evaluation Criteria for Control Comparison, Introduction IDES System, RETISS System, ASES System Discovery.

Unit-IV

Models For the Protection Of New Generation Database Systems -1: Introduction, A Model for the Protection of Frame Based Systems, Model for the Protection of Object: Oriented Systems SORION Model for the Protection of Object-Oriented Databases Models For The Protection Of New Generation Database Systems -2: A Model for the Protection of New Generation Database Systems: the Orion Model Jajodia anc Kenan's Model A Model for the Protection of Active Databases Conclusions.

Suggested Readings:

1. Database Security by Castano, Silvana; Fugini, Maria Grazia, Martella, Giancarlo, Pearson Edition, 1994.
2. Database Security and Auditing: Protecting Data Integrity and Accessibility by 1st Edition, Hassan Afyouni Thomos Edison, 2006.

Useful Video links:

Unit No.	Topics	Links
Unit-I	Database Security Problems in Databases Security Controls	https://www.youtube.com/watch?v=_2JLaovsRnk&list=PLyp-1WQY32mPzFy0oPS8VOsg9Z47glxbB
	LaPadula's Model Biba's Model	https://www.youtube.com/watch?v=9Co0OwXopyM
	Security Models in data base security	https://youtu.be/_2JLaovsRnk?si=8u1pqzS1nS5T9ivk
Unit-II	Security Mechanisms	https://www.youtube.com/watch?v=KOv4csT0W1s
	Operating system security	https://www.youtube.com/watch?v=3kKkOBClw1Q
	DBMS security design	https://www.youtube.com/watch?v=Nl-Sb1RZpew
Unit-III	Intrusion Detection Systems	https://www.youtube.com/watch?v=3xfLPBjs5BU&t=303s
	Inference Controls	https://www.youtube.com/watch?v=Z9ZjtvcgOcs
	Data base security	https://youtu.be/_2JLaovsRnk?si=DFXWAkT79kFg0f0x
	Database security and attacks	https://www.youtube.com/watch?v=xCL_amRLw7o
Unit-IV	New Generation Database System	https://www.youtube.com/watch?v=pyGj9AvHiJg
	Concept of object-oriented system	https://youtu.be/JUL1yhFrXkg?si=P4LMzwCld1xhdzSF

<table>
<tr><td>Course code</td><td colspan="5">LC-MTCFIS-111A</td></tr>
<tr><td>Category</td><td colspan="5">Lab Course</td></tr>
<tr><td>Course title</td><td colspan="5">Information Security Lab</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td rowspan="2">Semester-I</td></tr>
<tr><td>0</td><td>0</td><td>2</td><td>1</td></tr>
<tr><td>Course Objectives</td><td colspan="5">The objectives of this course are
To understand and apply network monitoring and analysis tools.
To implement and evaluate cryptographic algorithms and protocols.
To develop secure communication systems.
To identify and mitigate common security vulnerabilities.</td></tr>
<tr><td>Assessment</td><td colspan="5">25 Marks</td></tr>
<tr><td>End Semester Practical Examination</td><td colspan="5">25 Marks</td></tr>
<tr><td>Total</td><td colspan="5">50 Marks</td></tr>
<tr><td>Duration of Exam</td><td colspan="5">03 Hours</td></tr>
</table>

Course Outcomes: After studying this course, the students will be able to

CO	Skill Demonstrated	RBT Level
CO1	Understand basic network security concepts and threats.	Level 2: Understand
CO2	Implement access control mechanisms and models in real-world scenarios.	Level 3: Apply
CO3	Apply encryption techniques for secure communication.	Level 3: Apply
CO4	Analyze network protocols for security vulnerabilities, evaluate network security applications such as firewalls and intrusion detection systems, and propose effective mitigation techniques.	Level 4: Analyze

List of Experiments:

Sr. No.	Content
1	Study basic network security concepts and threats.
2	Implement a basic Access Control List (ACL) for a simulated network.
3	Implement the Bell-LaPadula security model for ensuring data confidentiality.
4	Demonstrate confidentiality and integrity using hashing algorithms (e.g., MD5 or SHA).
5	Encrypt and decrypt a message using symmetric key encryption (e.g., DES, AES).
6	Encrypt and decrypt a message using RSA (asymmetric key encryption).
7	Perform cryptanalysis on a simple substitution cipher.
8	Configure and demonstrate a secure communication using Secure Sockets Layer (SSL).

9	Simulate a basic Kerberos authentication process.
10	Implement and analyze the Internet Key Exchange (IKE) protocol for IPsec.
11	Simulate a simple intrusion detection system (IDS) to detect abnormal activities.
12	Design and configure a firewall using software tools (e.g., IP tables or pfSense).

Note: At least 10 experiments are to be performed by the students. Faculty member can add 2-3 extra experiment under topic beyond syllabus.

Course Code	**LC-MTCFIS-113A**				
Category	**Lab Course**				
Course title	**OS Security Lab**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I**
	0	0	2	1	
Course Objectives	The objectives of this course are ● To teach the fundamentals of core operating system concepts like process management, memory allocation, and file systems through practical experiments. ● To give exposure and training to handle OS security mechanisms including access control, user authentication, and secure file systems.				
Assessment	25 Marks				
End Semester Practical Examination	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

CO	Skill Demonstrated	RBT Level
CO1	Understand basic concepts of operating system security.	Level 2: Understand
CO2	Implement the fundamental concepts of operating systems and secure operating system mechanisms.	Level 3: Apply
CO3	Implement algorithms and system calls to manage processes, memory, and files effectively in an operating system.	Level 3: Apply
CO4	Analyze and simulate deadlock scenarios, page replacement algorithms, and disk scheduling strategies.	Level 4: Analyze

List of Experiments:

Sr. No.	Content
1	Study basic concepts of operating system security.
2	Write a program to demonstrate the use of system calls for file operations.
3	Write a script to read, write, and modify Windows registry keys using a high-level programming language.
4	Implement file access control lists (ACLs) to simulate secure file access.
5	Write a program to simulate user authentication using password-based security.
6	Implement a producer-consumer problem using semaphores or mutexes.
7	Develop a program to examine thread creation and scheduling using Windows APIs.
8	Simulate virtual memory management using paging and segmentation
9	Write a program to detect a deadlock using a resource allocation graph.

10	Implement disk arm scheduling algorithms like FCFS, SSTF, or C-SCAN.
11	Implement page replacement algorithms.

Note: At least 10 experiments are to be performed by the students. Faculty member can add 2-3 extra experiment under topic beyond syllabus.

<table>
<tr><td>Course Code</td><td colspan="5">SM-MT-115A</td></tr>
<tr><td>Category</td><td colspan="5">Seminar</td></tr>
<tr><td>Course Title</td><td colspan="5">Seminar-I</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td rowspan="2">Semester-I</td></tr>
<tr><td>0</td><td>0</td><td>2</td><td>2</td></tr>
<tr><td>Course Objectives</td><td colspan="5">The objectives of this course are
To develop students' ability to effectively present research topics and findings by effective communication.
To improve problem-solving and critical thinking skills of the students.
To expose students to the latest trends and advancements by reviewing and discussing contemporary research.</td></tr>
<tr><td>Assessment</td><td colspan="5">50 Marks</td></tr>
<tr><td>End Semester Examination</td><td colspan="5">-</td></tr>
<tr><td>Total</td><td colspan="5">50 Marks</td></tr>
<tr><td>Duration of Exam</td><td colspan="5">03 Hours</td></tr>
</table>

Course Outcomes: After studying this course, the students will be able to

CO	Skill Demonstrated
CO1	Identify the trends and advancements in the related field.
CO2	Analyze and synthesize research literature with in-depth reviews of key studies and methodologies.
CO3	Undertake problem identification, formulation, proposing solution and analyze the impact on society, economy and environment.
CO4	Prepare a well-organized report employing elements of effective communication and critical thinking.
CO5	Demonstrate a sound technical knowledge of their research field.

Overview:

This is a course designed to help M. Tech students develop research presentation skills. The focus is on selecting a topic or research paper relevant to their specialization, conducting an in-depth review, and effectively presenting the research findings.

General Guidelines:

Topic Selection	Each student is required to choose the research topic based on published review paper(s) or literature related to their relevant field. The same topic cannot be selected by multiple students.
Approval Process	The selected paper or topic must be approved by the faculty members/committee appointed by the Head of Department.
Presentation Guidelines	Each student will have 30-40 minutes for their presentation, followed by 5 minutes for Q &A.
Evaluation	The presentation will be evaluated by a committee constituted by the Head of Department. The evaluation will be based on:

Parameters for the Evaluation of Seminar:

Sr. No.	Parameters	Marks Allotted	Relevant COs
1	Clarity of the topic	10	CO1
2	Literature Survey	10	CO2
3	Content Relevancy	10	CO3
4	Presentation Skills	10	CO4
5	Q &A Response	10	CO5

GANGA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, KABLANA, JHAJJAR (HR.)

Scheme of Studies and Examination

M. Tech (Cyber Forensics and Information Security)–2nd Semester

w.e.f. 2024-25

Sr. No.	Category	Course Code	Course Title	Hours per week			Total Load Per Week	Credits	Examination Scheme (Marks)				Exam Duration in H
				Lecture (L)	Tutorial (T)	Practical (P)			Assessment	End Semester Examination		Total	
										Theory	Practical		
1	Professional Core Courses	PCC-MTCFIS-102A	Ethical Hacking and Digital Forensics	4	0	0	4	4	40	60		100	3
2	Professional Core Courses	PCC- MTCFIS-104A	Steganography and Digital Watermarking	4	0	0	4	4	40	60		100	3
3	Professional Elective Courses	Refer Table-I	.....	4	0	0	4	4	40	60		100	3
4	Multidisciplinary Open Elective Courses	Refer Table-II	.....	3	0	0	3	3	40	60		100	3
5	Foundation Elective Courses	Refer Table-III	.....	3	0	0	3	3	40	60		100	3
6	Lab Course	LC-MTCFIS-106A	Ethical Hacking Lab	0	0	2	2	1	25		25	50	3
7	Lab Course	LCMTCFIS-108A	Steganography Lab	0	0	2	2	1	25		25	50	3
8	Seminar	SM-MT-110A	Seminar-II	0	0	2	2	2	50			50	
Total Credits								**22**				**650**	

Course Code	**PCC-MTCFIS-102A**				
Category	Professional Core Courses				
Course Title	**Ethical Hacking and Digital Forensics**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	4	0	0	**4**	
Course Objectives	The objectives of this course are • To understand and analyze various hacking techniques • To explore networking security protocols and vulnerabilities • To examine strategies for fraud detection and prevention • To develop expertise in fraud analysis and forensic techniques.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

CO	Skill Demonstrated	RBT Level
CO1	Define the basic concepts of ethical hacking and cyber forensics.	Level 1: Remember
CO2	Understand the fundamental concepts and techniques in cyber security, threat identification, attack prevention, fraud detection, and system protection.	Level 2: Understand
CO3	Apply cyber security concepts and techniques to identify threats, prevent attacks, detect fraud, and secure digital systems.	Level 3: Apply
CO4	Analyze cyber security threats, attack methods, network vulnerabilities, fraud detection techniques to enhance the security and integrity of digital systems.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts (2 from each unit/section) of 1.5 marks each and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Hacking windows, Network hacking, Web hacking, Password hacking. A study on various attacks, Input validation attacks, SQL injection attacks, Buffer overflow attacks, Privacy attacks.

Unit-II

TCP / IP, Checksums, IP Spoofing port scanning, DNS Spoofing, DOS attacks, SYN attacks, Smurf attacks, UDP flooding, DDOS, Models. Firewalls, Packet filter firewalls, Packet Inspection firewalls, Application Proxy Firewalls, Batch file programming.

Unit-III

Fundamentals of Computer Fraud, Threat concepts, Framework for predicting inside attacks, managing the threat, Strategic Planning Process, Architecture strategies for computer fraud prevention, Protection of Websites, Intrusion detection system, NIDS, HIDS, Penetration Testing process, Web Services, Reducing transaction risks.

Unit-IV

Key Fraud Indicator selection process customized taxonomies, Key fraud signature selection process, Accounting Forensics, Computer Forensics, Journaling and its requirements, Standardized Logging criteria, Journal Risk And control matrix, Neural Networks, Misuse Detection and Novelty detection.

Suggested Readings:

1. Insider Computer Fraud by Kenneth C. Brancik, Auerbach Publications Taylor & Francis Group, 2008.
2. Ethical Hacking by Ankit Fadia, 2nd Edition, Macmillan India Ltd, 2006.

Useful Video links:

Unit No.	Topics	Links
Unit-I	Introduction to Ethical Hacking	https://youtu.be/qswOrF2WPaw?si=aChTJPlb1byA7AJi
	SQL injection attacks	https://www.youtube.com/watch?v=lwqACxcFOO0
	Buffer overflow attacks	https://www.youtube.com/watch?v=7nFUdrAZib4&t=75s
Unit-II	TCP / IP, Checksums	https://www.youtube.com/watch?v=EO4B_ykP8f8
	Firewalls	https://www.youtube.com/watch?v=2YGUvopGkQc
	DDOS, Models	https://www.youtube.com/watch?v=Wan1S9RJacU
Unit-III	Fundamentals of Computer Fraud	https://www.youtube.com/watch?v=weWbKxN5qIE
	Penetration Testing process	https://www.youtube.com/watch?v=C44oY7safys
	Advanced Fraud Prevention Technologies	https://www.youtube.com/watch?v=uCDe72jtarA
Unit-IV	Key fraud signature selection process	https://www.youtube.com/watch?v=3J23S9VJQBs
	Novelty Detection through Model-Based Characterization of Neural Networks	https://www.youtube.com/watch?v=CkPC-vGR7Dk

Course Code	**PCC- MTCFIS-104A**				
Category	Professional Core Courses				
Course Title	**Steganography And Digital Watermarking**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	4	0	0	**4**	
Course Objectives	The objectives of this course are • To understand the principles and historical context of information hiding in steganography and watermarking. • To evaluate various steganographic techniques. • To investigate the techniques used for detecting, extracting, and disabling hidden information. • To assess the principles, algorithmic design issues, and current techniques in watermarking.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

CO	**Skill Demonstrated**	**RBT Level**
CO1	Define the basic concepts of information hiding, steganography, and watermarking in digital media and communication systems.	Level 1: Remember
CO2	Explain the principles and applications of steganography and watermarking.	Level 2: Understand
CO3	Apply steganographic techniques to hide information in digital media, ensuring robustness against common attacks and distortions.	Level 3: Apply
CO4	Analyze various information hiding methods based on detection, security, and robustness against attacks.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts (2 from each unit/section) of 1.5 marks each and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Introduction to Information hiding, Brief history and applications of information hiding, Principles of Steganography, Frameworks for secret communication, Security of Steganography systems, Information hiding in noisy data, Adaptive versus non adaptive algorithms, Laplace filtering, Using cover models, Active and malicious attackers, Information hiding in written text, Examples of invisible communications.

Unit-II

Survey of steganographic techniques, Substitution system and bitplane tools, Transform domain techniques, Spread spectrum and information hiding, Statistical Steganography, Distortion and code generation techniques, Automated generation of English text.

Unit-III

Steganalysis, Detecting hidden information, Extracting hidden information, Disabling hidden information, Watermarking techniques, History, Basic Principles, applications, Requirements of algorithmic design issues, Evaluation and benchmarking of watermarking system.

Unit-IV

Survey of current watermarking techniques, Cryptographic and psycho visual aspects, Choice of a workspace, Formatting the watermark bets, Merging the watermark and the cover, Optimization of the watermark receiver, Extension from still images to video, Robustness of copyright making systems, Fingerprints, Examples, Classification, Research history, Schemes, Digital copyright and watermarking, Conflict of copyright laws on the internet.

Suggested Readings:

1. Information hiding techniques for Steganography and Digital Watermarking by Stefan Katzenbelsser and Fabien A. P. Petitcolas, ARTECH House Publishers, 2004.
2. Steganography in Digital Media: Principles, Algorithms, and Applications by Jessica Fridrich, Cambridge university press, 2010.
3. Digital Image Steganography by Abbas Cheddad, VDM Verlag Dr. Müller Aktiengesellschaft & Co. KG, Dec 2009.
4. Digital Watermarking And Steganography by Ingemar Cox, Matthew Miller, Jeffrey Bloom, Jessica Fridrich and Ton Kalker, Morgan Kaufmann Publishers, Nov 2007.

Useful Video links:

Unit No.	Topics	Links
Unit-I	Introduction to Information hiding	https://youtu.be/t4GPGkLh4Vg?feature=shared
	Security of Steganography systems	https://www.youtube.com/watch?v=CWQfbYrommk
	Cyber Security: Steganography, Introduction	https://youtu.be/wLRb9zhhqIk?feature=shared
Unit-II	Steganographic techniques	https://www.youtube.com/live/u_luy52v7z4?feature=shared
	Transform domain techniques	https://youtu.be/ODf76oPiPWQ?feature=shared
Unit-III	Ste analysis	https://www.youtube.com/watch?v=xtZPe4RWe4s
	Introduction of digital watermarking	https://youtu.be/WvRBKn8-JJA?feature=shared
Unit-IV	Cryptographic and psycho visual aspects	https://youtu.be/iTVyKbDCJrA?feature=shared
	Fingerprints	https://youtu.be/45uJAOs22jE?feature=shared

Course code	**LC-MTCFIS-106A**				
Category	Lab Course				
Course title	**Ethical Hacking Lab**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	0	0	2	1	
Course Objectives	The objectives of this course are • To implement firewall rules to control network traffic and enhance security. • To deploy and configure firewall IDS to detect and alert on suspicious network activities • To set up honeypots to attract and analyze cyber attackers. • To configure and apply ethical hacking tools to enhance system security				
Assessment	25 Marks				
End Semester Practical Examination	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

CO	Skill Demonstrated	RBT Level
CO1	Understand the fundamental concepts of network security, ethical hacking techniques, and the identification of vulnerabilities in network systems.	Level 2: Understand
CO2	Apply security tools and techniques to monitor network traffic, detect unauthorized access, and implement protective measures to defend systems from attacks.	Level 3: Apply
CO3	Implement security protocols, configure firewalls, and deploy intrusion detection systems to enhance the defense mechanisms of network infrastructure.	Level 3: Apply
CO4	Analyze security measures to prevent attacks, and determine areas for improvement in strengthening an organization's network security.	Level 4: Analyze

List of Experiments:

Sr. No.	Content
1	Study Trojan, backdoor tool for monitoring network communication on a test network.
2	Write a program to apply Data Packet Sniffers tools to monitor network communication and assess security risks.
3	Write a program to apply any Keylogger to steal data and suggest countermeasures against keyloggers.
4	Write a program to apply Password guessing to identify vulnerabilities and implement.
5	Write a program to apply Penetration Testing using proper tools.
6	Write a program to implement countermeasures to defend against Denial of Service in the controlled lab environment.

7	Write a program to implement security tools to identify and mitigate vulnerabilities in wireless networks.
8	Write a program to appl**y** Firewalls and Intrusion Detection systems to protect the network against unauthorized access and enhance network security.
9	Write a program to implement Password Cracking script ethically in a controlled lab environment.
10	Write a program to implement honeypots to enhance system integrity and mitigate the risk of malicious activities.

Note: At least 10 experiments are to be performed by the students. Faculty member can add 2-3 extra experiment under topic beyond syllabus.

<table>
<tr><td>Course code</td><td colspan="5">LC-MTCFIS-108A</td></tr>
<tr><td>Category</td><td colspan="5">Engineering Science Courses</td></tr>
<tr><td>Course title</td><td colspan="5">Steganography Lab</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td rowspan="2">Semester-II</td></tr>
<tr><td>0</td><td>0</td><td>2</td><td>1</td></tr>
<tr><td>Course Objectives</td><td colspan="5">The objectives of this course are
To develop Expertise in Steganography and Information Hiding Techniques.
To gain practical knowledge of digital watermarking systems.
To understand and apply cryptographic methods for data security.
To analyze the advanced security techniques and protocols in Information Hiding.</td></tr>
<tr><td>Assessment</td><td colspan="5">25 Marks</td></tr>
<tr><td>End Semester Practical Examination</td><td colspan="5">25 Marks</td></tr>
<tr><td>Total</td><td colspan="5">50 Marks</td></tr>
<tr><td>Duration of Exam</td><td colspan="5">03 Hours</td></tr>
</table>

Course Outcomes: After studying this course, the students will be able to

CO	Skill Demonstrated	RBT Level
CO1	Understand the basic concepts of steganography and watermarking.	Level 2: Understand
CO2	Implement digital certificates for authorization.	Level 3: Apply
CO3	Apply the concepts of information hiding and encryption for privacy and security.	Level 3: Apply
CO4	Analyze steganography and watermarking techniques to enhance performance and security.	Level 4: Analyze

List of Experiments:

Sr. No.	Content
1	Study common steganography methods used.
2	Study basic principles of digital watermarking.
3	Write a program to implement a digital certificate for authorization.
4	Write a program to implement encryption and decryption techniques.
5	Write a program to implement Information hiding in binary files.
6	Write a program to implement Information hiding in text.
7	Write a program to implement Information hiding in images.
8	Write a program to implement Information hiding in audio/video.

9	Write a program to implement Information hiding using DNA techniques.
10	Write a program to analyze different steganography methods.
11	Write a program to analyze performance of LSB and DCT Watermarking.

Note: At least 10 experiments are to be performed by the students. Faculty member can add 2-3 extra experiment under topic beyond syllabus.

Course Code	**SM-MT-110A**				
Category	Seminar				
Course Title	**Seminar-II**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	0	0	2	**2**	
Course Objectives	The objectives of this course are • To develop students' ability to effectively present research topics and findings by effective communication. • To improve problem-solving and critical thinking skills of the students. • To expose students to the latest trends and advancements by reviewing and discussing contemporary research.				
Assessment	50 Marks				
End Semester Examination	-				
Total	50 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

CO	Skill Demonstrated
CO1	Identify the trends and advancements in the related field.
CO2	Analyze and synthesize research literature with in-depth reviews of key studies and methodologies.
CO3	Undertake problem identification, formulation, proposing solution and analyze the impact on society, economy and environment.
CO4	Prepare a well-organized report employing elements of effective communication and critical thinking.
CO5	Demonstrate a sound technical knowledge of their research field.

Overview:

This is a course designed to help M. Tech students develop research presentation skills. The focus is on selecting a topic or research paper relevant to their specialization, conducting an in-depth review, and effectively presenting the research findings.

General Guidelines:

Topic Selection	Each student is required to choose the research topic based on published review paper(s) or literature related to their relevant field. The same topic cannot be selected by multiple students.
Approval Process	The selected paper or topic must be approved by the faculty members/committee appointed by the Head of Department.
Presentation Guidelines	Each student will have 30-40 minutes for their presentation, followed by 5 minutes for Q&A.
Evaluation	The presentation will be evaluated by a committee constituted by the Head of Department. The evaluation will be based on:

Parameters for the Evaluation of Seminar:

Sr. No.	Parameters	Marks Allotted	Relevant COs
1	Clarity of the topic	10	CO1
2	Literature Survey	10	CO2
3	Content Relevancy	10	CO3
4	Presentation Skills	10	CO4
5	Q&A Response	10	CO5

Course Code	**PEC- MTCFIS-112A**				
Category	Professional Elective Courses				
Course Title	**Advanced Computer Networks**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	4	0	0	**4**	
Course Objectives	The objectives of this course are • To learn the structure and functions of the TCP/IP and OSI models. • To master IP addressing and routing: Understand IPv4/IPv6 addressing and network-layer routing protocols. • To explore transport and application protocols: Gain proficiency in TCP, UDP, and common application-layer protocols. • To learn about Wi-Fi, Mobile IP, and multimedia networking technologies.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

CO	Skill Demonstrated	RBT Level
CO1	Define the fundamental concepts of computer networks.	Level 1: Remember
CO2	Understand the advanced concepts of computer networks.	Level 2: Understand
CO3	Apply the concepts of networking to solve computational challenges in computer networks.	Level 3: Apply
CO4	Analyze advanced networking concepts, protocols and addressing to improve network performance and enhance security.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts (2 from each unit/section) of 1.5 marks each and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Foundation of Networking Protocols: 5-layer TCP/IP Model, 7-layer OSI Model, Internet Protocols and Addressing, Equal-Sized Packets Model: ATM -Networking Devices: Multiplexers, Modems and Internet Access Devices, Switching and Routing Devices, Router Structure.
The Link Layer and Local Area Networks: Link Layer: Introduction and Services, Error-Detection and Error-Correction techniques,- Multiple Access Protocols, Link Layer Addressing, Ethernet, Interconnections: Hubs and Switches, PPP: The Point-lo-Point Protocol, Link Visualization - Routing and Internetworking: Network-Layer Routing, Least-Cost-Path algorithms, Non-Least-Cost-Path algorithms, Intradomain Routing Protocols, Interdomain Routing Protocols, Congestion Control at Network Layer.

Unit-II

Logical Addressing: IPv4 Addresses, IPv6 Addresses - Internet Protocol: Internetworking, IPv4, IPv6, Transition from IPv4 to IPv6 - Multicasting Techniques and Protocols: Basic Definitions and Techniques, Intradomain Multicast Protocols, Interdomain Multicast Protocols, Node-Level Multicast algorithms - Transport and End-to-End

Protocols: Transport Layer, Transmission Control Protocol (TCP), User Datagram Protocol (UDP), Mobile Transport Protocols, TCP Congestion Control - Application Layer: Principles of Network Applications, The Web and HTTP, File Transfer: FTP, Electronic Mail in the Internet, Domain Name System (DNS), P2P File Sharing, Socket Programming with TCP and UDP, Building a Simple Web Server.

Unit-III

Wireless Networks and Mobile IP: Infrastructure of Wireless Networks, Wireless LAN Technologies. IEEE: 802.11 Wireless Standard, Cellular Networks, Mobile IP, Wireless Mesh Networks (WMNs) - Optical Networks and WDM Systems: Overview of Optical Networks, Basic Optical Networking Devices, Large-Scale Optical Switches, Optical Routers, Wavelength Allocation in Networks, Case Study: An All-Optical Switch.

Unit-IV

VPNs, Tunneling and Overlay Networks: Virtual Private Networks (VPNs), Multiprotocol Label Switching (MPLS), Overlay Networks-VoIP and Multimedia Networking: Overview of IP Telephony, VoIP Signaling Protocols, Real-Time Media Transport Protocols, Distributed Multimedia Networking, Stream Control Transmission Protocol.
Mobile A-Hoc Networks: Overview of Wireless Ad-Hoc Networks, Routing in Ad-Hoc Networks, Routing Protocols for Ad-Hoc Networks - Wireless Sensor Networks: Sensor Networks and Protocol Structures, Communication Energy Model, Clustering Protocols, Routing Protocols

Suggested Readings:

1. Computer Networking: A Top-Down Approach Featuring the Internet by James E Kurose, Keith W. Ross, Third Edition, Pearson Education, 2007.
2. Computer and Communication Networks by Nader F. Mir, Pearson Education. 2007.
3. Data Communications and Networking by Behrouz A. Forouzan, Fourth Edition, TMH, 2007.
4. An Engineering Approach to Computer Networking by S. Keshav. Pearson Education, 4th Edition, 1997.
5. Computer Networks by Andrew S. Tanenbaum, Fourth Edition, Prentice Hall, 4th Edition, 2002.

Useful Video links:

Unit No.	Topics	Links
Unit-I	Network model	https://youtu.be/b6f9vh3cd6w
	Link layer	https://youtu.be/rGWPOm3ectk
Unit-II	IP V4	https://youtu.be/5vbPS-KnhvI
	IP V6	https://youtu.be/FkaFr3cpg6U
Unit-III	IEEE 802.11	https://youtu.be/6SWBxiPeSqk
	Mobile IP	https://youtu.be/0QLRULNfbFg
Unit-IV	Multiprotocol Label Switching (MPLS)	https://youtu.be/t2WpMsk18yU?feature=shared
	Mobile Ad-Hoc Networks	https://youtu.be/ycaz99NogS4

Course Code	**PEC- MTCFIS-114A**				
Category	Professional Elective Courses				
Course Title	**Security Threats**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	4	0	0	**4**	
Course Objectives	The objectives of this course are • To understand and Identify Security Threats • To implement Effective Risk and Threat Management • To master Security Elements and Protocols • To apply Access Control and Trusted Computing Practices.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

CO	Skill Demonstrated	RBT Level
CO1	Define the basic concepts of security threats, vulnerabilities, and common attack techniques in network and information security.	Level 1: Remember
CO2	Explain the concepts of security threats, risk management, and threat identification methods to enhance understanding of cybersecurity practices.	Level 2: Understand
CO3	Apply appropriate security measures and techniques to safeguard systems and networks.	Level 3: Apply
CO4	Analyze potential security risks and vulnerabilities using threat modeling, forensic analysis, and vulnerability assessment tools.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts (2 from each unit/section) of 1.5 marks each and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Introduction: Security threats, Sources of security threats, Motives, Target Assets and vulnerabilities, Consequences of threats, E-mail threats, Web-threats - Intruders and Hackers, Insider threats, Cybercrimes. Network Threats: Active/ Passive, Interference, Interception, Impersonation, Worms, Virus, Spam's, Adware, Spyware, Trojans and covert channels, Backdoors, Bots, IP, Spoofing: ARP spoofing, Session Hijacking, Sabotage, Internal treats, Environmental threats, Threats to Server security.

Unit-II

Security Threat Management: Risk Assessment, Forensic Analysis, Security threat correlation, Threat awareness, Vulnerability sources and assessment, Vulnerability assessment tools, Threat identification, Threat Analysis, Threat Modeling, Model for Information Security Planning.

Unit-III

Security Elements: Authorization and Authentication - types, policies and techniques - Security certification - Security monitoring and Auditing - Security Requirements Specifications - Security Policies and Procedures, Firewalls, IDS, Log Files, Honey Pots.

Unit-IV

Access control, Trusted Computing and multilevel security - Security models, Trusted Systems, Software security issues, Physical and infrastructure security, Human factors ,Security awareness, training, Email and Internet use policies.

Suggested Readings:

1. Threat Modeling by Swiderski, Frank and Syndex, Microsoft Press, 2004.
2. Computer Security: Principles and Practice by William Stallings and Lawrie Brown, Prentice Hall, 2008.
3. Computer Network Security by Joseph M Kizza, Springer Verlag, 2005.
4. Information Security Intelligence: Cryptographic Principles & Application by Thomas Calabres and Tom Calabrese, Thomson Delmar Learning, 2004.

Course Code	**PEC- MTCFIS-116A**				
Category	Professional Elective Courses				
Course Title	**Multimedia Security**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	4	0	0	**4**	
Course Objectives	The objectives of this course are • To understand the Fundamentals of Digital Watermarking. • To explore Media-Specific Watermarking Techniques. • To analyze and Develop Secure Watermarking Protocols. • To integrate Cryptography with Multimedia Security.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

CO	Skill Demonstrated	RBT Level
CO1	Define the fundamental concepts of digital watermarking, protocols and basic cryptographic principles used in multimedia encryption.	Level 1: Remember
CO2	Understanding the concepts of digital watermarking, models, media-specific applications and the application of cryptographic protocols for secure watermarking and multimedia encryption.	Level 2: Understand
CO3	Apply digital watermarking techniques to various media formats and implement cryptographic methods and secure watermarking protocols to protect and encrypt multimedia data.	Level 3: Apply
CO4	Analyze the effectiveness of digital watermarking techniques and cryptographic protocols in securing multimedia content and preventing forgeries across various media formats.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts (2 from each unit/section) of 1.5 marks each and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Digital Watermarking Basics: Models of Watermarking, Basic Message Coding, Error Correction Coding. Digital Watermarking and Digital Communications: Mutual Information and Channel Capacity, How to Design a Good Digital Watermark, Spread Spectrum Watermarking, Block DC domain Watermarking, Watermarking with Side-Information (Dirty-paper Coding), Improved Spread Spectrum Watermarking, Affine-Resistant Watermarking.

Unit-II

Media Specific Digital Watermarking: Image Watermarking, Video Watermarking, Audio Watermarking, Watermarking for CG-models, Watermarking for Binary Images, Watermarking for 3D Contents, Data Hiding through watermarking techniques.

Unit-III

Digital Watermarking Protocols: A Buyer-Seller Watermarking Protocol, An Efficient and Anonymous Buyer-Seller, Watermarking Protocol, Extensions of Watermarking Protocols, Protocols for Secure Computation.

Unit-IV

Cryptography and Multimedia Encryption: Introduction to Cryptography, Multimedia Processing in the Encryption Domain, Privacy preserving Information Processing, Information Theory and Digital Forensics, Forgeries Detection, New ways for making Forgeries.

Suggested Readings:

1. Digital Watermarking and Steganography, 2nd Edition, by Cox, Miller, Bloom, Fredric, and Kalker, 2008.
2. Multimedia Security Handbook by Borko Furth, Darko Kirov ski, CRC Press, 2004.
3. Multimedia Security Technologies for Digital Rights Management by Wenjun Zeng, Heather Yu, Ching-Yung Lin, Elsevier, 2006.

Useful Video links:

Unit No.	Topics	Links
Unit-I	Digital Watermarking	https://youtu.be/gd2W0vaKTxA?t=395
	Models of Watermarking	https://youtu.be/2Kx9jbSMZqA?t=1
Unit-II	Image Watermarking, Video Watermarking	https://youtu.be/2AoD5pDMjXQ?t=99
	Audio Watermarking	https://youtu.be/Xv7hay6w_Uc?t=489
	Data Hiding through watermarking techniques.	https://youtu.be/FuqVbw1jJ_s?t=17
Unit-III	A Buyer-Seller Watermarking Protocol	https://youtu.be/tf9zVbL9Kvg?t=697
	Protocols for Secure Computation	https://youtu.be/mhEz8DoueXg?t=4
Unit-IV	Cryptography and Multimedia Encryption	https://youtu.be/xHlSWqJT8lc?t=2434
	Digital Forensics	https://youtu.be/giv0DQDSsjQ?list=PLJu2iQtpGvv-2LtysuTTka7dHt9GKUbxD&t=1233
	Information Theory	https://youtu.be/TlzTNjD_t8I?si=nwM-LF4daopUMZeU

Course Code	**PEC- MTCFIS-118A**				
Category	Professional Elective Courses				
Course Title	**Mobile & Wireless Security**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	4	0	0	**4**	
Course Objectives	The objectives of this course are • To understand and analyze the key components of wireless network hardware, protocols, and security mechanisms • To explore the implementation of standards and policy solutions for wireless network security • To examine the core principles of security in wireless networks • To investigate the role of global mobile satellite systems and enterprise wireless networks				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

CO	Skill Demonstrated	RBT Level
CO1	Define the fundamental concepts of mobile and wireless networks.	Level 1: Remember
CO2	Understand the basic concepts of mobile and wireless networks.	Level 2: Understand
CO3	Apply security solutions and configure wireless networks to ensure protection against common security threats.	Level 3: Apply
CO4	Analyze wireless network protocols, security mechanisms, vulnerabilities and global mobile satellite systems for enhanced security of wireless communication systems.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts (2 from each unit/section) of 1.5 marks each and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Wireless Fundamentals: Wireless Hardware, Wireless Network Protocols, Wireless Programming, WEP Security. Wireless Cellular Technologies: concepts, Wireless reality, Security essentials, Information classification standards, Wireless Threats: Cracking WEP, Hacking Techniques, Wireless Attacks, Airborne Viruses**.**

Unit-II

Standards and Policy Solutions: Network Solutions, Software Solutions. Physical Hardware Security, Wireless Security: Securing WLAN, Virtual Private Networks, Intrusion Detection System, Wireless Public Key infrastructure. Tools: Auditing tools, Pocket PC hacking, wireless hack walkthrough.

Unit-III

Security Principles: Authentication, Access control and Authorization, Non-repudiation, privacy and Confidentiality, Integrity and Auditing, Security analysis process, Privacy in Wireless World, Legislation and Policy, Identify targets and roles analysis, Attacks and vulnerabilities, Analyze mitigations and protection.
WLAN Configuration: IEEE 802.11, Physical layer, media access frame format, systematic exploitation of 802.11b WLAN, WEP, WEP Decryption script, overview of WEP attack, Implementation, Analysis of WEP attacks.

Unit-IV

Global Mobile Satellite Systems, case studies of the IRIDIUM and GLOBALSTAR systems, Wireless Enterprise Networks: Introduction to Virtual Networks, Bluetooth technology, Bluetooth Protocols. Server-side programming in Java, Pervasive web application architecture, Device independent example application.

Suggested Readings:

1. Wireless Security Essentials: Defending Mobile from Data Piracy by Russel Dean Vines, John Wiley & Sons, 1st Edition, 2002.
2. Maximum Wireless Security by Cyrus, Peikari and Seth Fogie, SAMS Publishing, 2002.
3. Neural Networks by Simon Haykin, Pearson Education.
4. Mobile and Personal Communication systems and services by Raj Pandya, Prentice Hall of India, 2001.

Useful Video links:

Unit No.	Topics	Links
Unit-I	Types of Wireless communication	https://youtu.be/QHDxbbc1GWs?si=e1NbtFic9v7q0Nyd
	The cellular concept - System Design issues	https://youtu.be/whYljse4Abc?si=Zgd0q8lvjyuHfs2Y
	5G and other Wireless Technologies	https://www.youtube.com/watch?v=MONjGfn0Sjk
Unit-II	Intruders - Types, Intrusion Detection Systems	https://www.youtube.com/watch?v=Q0eLuRLKiCE
	Internet Key Exchange - Phases, Modes, Methods	https://www.youtube.com/watch?v=BNr9JP76ZSQ
Unit-III	Intruders - Types, Intrusion Detection Systems	https://www.youtube.com/watch?v=Q0eLuRLKiCE
	Internet Key Exchange - Phases, Modes, Methods	https://www.youtube.com/watch?v=BNr9JP76ZSQ
Unit-IV	Bluetooth Architecture, Protocol Stack	https://www.youtube.com/watch?v=XDwz1XNOkhY
	Global Navigation Satellite System	https://www.youtube.com/watch?v=kHOsM9dGTEA

Annexure 2.9

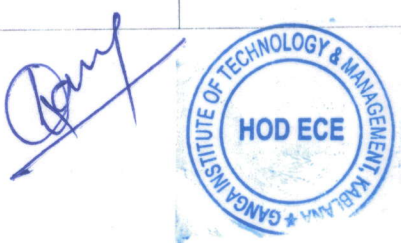
Ganga Institute of Technology and Management, Kablana
(An Autonomous Institute under Maharshi Dayanand University, Rohtak)

Minutes of 1st Meeting of Board of Studies of Electronics & Communication Engg. Department held on 04.01.2025

The Board of Studies meeting was held on 04.01.2025 at 11:00 A.M in the Conference Hall of the Institute.

Members Present:

S. No.	Name of the Member	Affiliation/Organization	Designation within Board of Studies
1	Prof. Rakesh Kumar Joon	Head of the Department	Chairman
2	Prof. Pradeep Sangwan	Professor, MSIT, New Delhi	Member
3	Prof. Manoj Taleja	Professor, NIT, New Delhi	Member
4	Prof. Sunil Mathur	Professor, MAIT, New Delhi	Member
5	Dr. Vivek Kumar	Professor, GITAM, Kablana	Member
6	Dr. Rishu Bhatia	Professor, GITAM, Kablana	Member
7	Dr. Shankar Kumar Vijay	Associate Professor, GITAM, Kablana	Member
8	Dr. Hitanshu	Associate Professor, GITAM, Kablana	Member
9	Dr. Nitin Kumar	Associate Professor, GITAM, Kablana	Member
10	Mr. Amit Dalal	Asst. Professor, GITAM, Kablana	Member
11	Mr. Satish	Asst. Professor, GITAM, Kablana	Member
12	Ms. Lalina	Asst. Professor, GITAM, Kablana	Member



13	Ms. Gaganpreet	Asst. Professor, GITAM, Kablana	Member
14	Ms. Ritu Juneja	Asst. Professor, GITAM, Kablana	Member
15	Mr. Vishal	Asst. Professor, GITAM, Kablana	Member
16	Mr. Parveen	Asst. Professor, GITAM, Kablana	Member
17	Ms. Neetu Sharma	Asst. Professor, GITAM, Kablana	Member
18	Mr. Bhushan	Asst. Professor, GITAM, Kablana	Member
19	Ms. Deepanshi	Asst. Professor, GITAM, Kablana	Member
20	Ms. Kavita Chaudhary	Asst. Professor, GITAM, Kablana	Member
21	Ms. Ritu Rana	Asst. Professor, GITAM, Kablana	Member
22	Ms. Rashmi Kiran	Asst. Professor, GITAM, Kablana	Member
23	Mr. Devender Nath Maurya	Industry Representative	Member
24	Mr. Nishant Dev Rathi	Alumni	Member

Agenda of the Meeting:-

1. Introduction of the Members of the Board of Studies.
2. Review and approval of the Syllabus Prescribed for 1st Year under Autonomous Status of M.Tech Program.
3. Panel of Examiners for Theory and Practical's of M.Tech Program.
4. Any Other Item with the Permission of the Chair.

Agenda Items Discussed:

1. Introduction of the Members of the Board of Studies

GANGA INSTITUTE OF TECHNOLOGY & MANAGEMENT
HOD ECE

- The meeting began with a warm welcome by Prof. Rakesh Kumar Joon, Chairperson, who welcomed the Experts in the Board of Studies and introduced all members of the Board of Studies with them. The members shared their affiliations and roles within the BOS.

2. Review and approval of the Syllabus Prescribed for 1st Year under Autonomous Status of M.Tech Program

3. Panel of Examiners for Theory and Practical's of M.Tech Program

4. Any Other Item with the Permission of the Chair

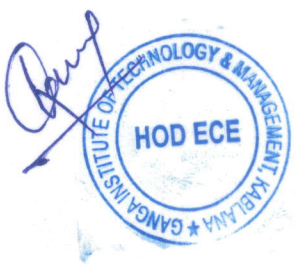
- The BOS discussed upcoming initiatives under the autonomous framework to further enhance the academic and administrative processes of the department.
- Suggestions were made to establish additional collaborations with industries and reputed academic institutions to strengthen the curriculum time to time and improve employability prospects for students.
- Prof. (Dr.) Sunil Mathur, MAIT Delhi has suggested to change the name of subject VLSI Design to Advanced VLSI Design and Semiconductor Technologies to meet the latest trends of industry and advancement in the field of VLSI design..
- Prof. (Dr.) Pardeep Sangwan, MSIT Delhi has suggested to change the name of subject Wireless and Mobile Communication to Modern Wireless Networks & Technologies to meet the challenges of modern communication industry.

Resolutions Passed:

1. The Board of studies approved the syllabus and scheme of the Electronics & Communications with minor changes.

Vote of Thanks: Dr. Rishu Bhatia proposed the vote of thanks, expressing gratitude to all members for their valuable contributions and active participation.

The meeting concluded with the Chairperson thanking all members for their presence and insights.



Annexure 2.10

GANGA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, KABLANA (JHAJJAR)
(An Autonomous Institute)

'A' GRADE ACCREDITED BY NAAC

Evaluation Scheme & Syllabus For
Master of Technology (Electronics and Communication Engineering)
(Effective from the Session: 2024-25)

APPROVED BY AICTE, NEW DELHI AND AFFILIATED TO MDU, ROHTAK

1. DEFINITION OF CREDIT

1	1 Lecture (L) per week	1 Credit
2	2 Practical (Lab) per week	1 Credit
3	2 Seminar per Week	2 Credit
4	4 Project per Week	2 Credit

2. RANGE OF CREDIT

A credits of 86* for a student to be eligible to get Post Graduate degree in Engineering.

3. STRUCTURE OF POSTGRADUATE ENGINEERING PROGRAM (M. TECH)

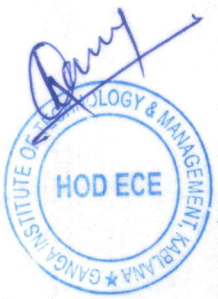
Sr. No.	Category	Breakup of Credits
1	Professional Core Courses	32*
2	Professional Elective Courses (Relevant to chosen specialization/branch)	8*
3	Multidisciplinary Open Elective Courses	6*
4	Foundation Elective Courses	3*
5	Mandatory Learning Course	3*
6	Seminar	6*
7	Lab Courses	4*
8	Project	2*
9	Dissertation	22*
	Total Credits	86*

**Minor variation is allowed as per need of the respective disciplines.*

GANGA INSTITUTE OF TECHNOLOGY & MANAGEMENT JHAJJAR
HOD ECE

4. COURSE CODE AND DEFINITIONS

Sr. No.	Category	Course Code
1	Professional Core Courses	PCC
2	Professional Elective Courses (Relevant to chosen specialization/branch)	PEC
3	Multidisciplinary Open Elective Courses	OEC
4	Foundation Elective Courses	FLC
5	Mandatory Learning Course	MLC
6	Seminar	SM
7	Lab Courses	LC
8	Project	PROJ
9	Dissertation	DISS



GANGA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, KABLANA, JHAJJAR (HR.), DELHI-NCR

Scheme of Studies and Examination

M.Tech (Electronics & Communication Engineering) – 1st Semester

W.e.f. 2024-25

Sr. No.	Category	Course Code	Course Title	Lectures per week			Total Load Per Week	Credits	Examination Scheme (Marks)				Exam Duration in
				Lecture (L)	Tutorial (T)	Practical (P)			Assessment	End Semester Examination		Total	
										Theory	Practical		
1	Professional Core Courses	PCC-MTECE-101A	Satellite Communication and Space Technology	4	0	0	4	4	40	60		100	3
2	Professional Core Courses	PCC-MTECE-103A	Information Theory and Coding Techniques	4	0	0	4	4	40	60		100	3
3	Professional Core Courses	PCC-MTECE-105A	Advanced Digital Signal Processing and Systems	4	0	0	4	4	40	60		100	3
4	Professional Core Courses	PCC-MTECE-107A	Data Networks and Communication Protocols	4	0	0	4	4	40	60		100	3
5	Professional Core Courses	PCC-MTECE-109A	Microprocessor and Embedded Systems	4	0	0	4	4	40	60		100	3
6	Lab Course	LC-MTECE-111A	Satellite Communication Lab	0	0	2	2	1	25		25	50	3
7	Lab Course	LC-MTECE-113A	Microprocessor & Micro Controller Lab	0	0	2	2	1	25		25	50	3
8	Seminar	SM-MT-115A	Seminar-I	0	0	2	2	2	50			50	
							Total Credits	24	300	300	50	650	

GANGA INSTITUTE OF TECHNOLOGY & MANAGEMENT, KABLANA ★ HOD ECE

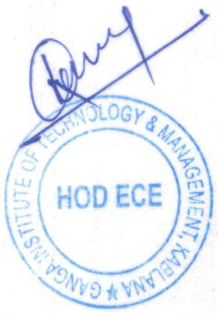
GANGA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, KABLANA, JHAJJAR (HR.), DELHI-NCR

Scheme of Studies and Examination

M.Tech (Electronics & Communication Engineering) – 2nd Semester

W.e.f. 2024-25

Sr. No.	Category	Course Code	Course Title	Lectures per week			Total Load Per Week	Credits	Examination Scheme (Marks)				Exam Duration in Hours
				Lecture (L)	Tutorial (T)	Practical (P)			Assessment	End Semester Examination		Total	
										Theory	Practical		
1	Professional CoreCourses	PCC-MTECE-102A	Optical Communication	4	0	0	4	4	40	60		100	3
2	Professional CoreCourses	PCC-MTECE-104A	Advanced VLSI Design and Semiconductor Technologies	4	0	0	4	4	40	60		100	3
4	Professional Elective Courses	Refer Table -I	--------	4	0	0	4	4	40	60		100	3
5	Multidisciplinary Open Elective Courses	Refer Table -II	--------	3	0	0	3	3	40	60		100	3
6	Foundation Elective Courses	Refer Table -III	---------	3	0	0	3	3	40	60		100	3
7	Lab Course	LC-MTECE-106A	VLSI Lab	0	0	2	2	1	25		25	50	3
8	Lab Course	LC-MTECE-108A	Optical Communication Lab	0	0	2	2	1	25		25	50	3
9	Seminar	SM-MT-110A	Seminar-II	0	0	2	2	2	50			50	
Total								**22**	300	300	50	**650**	



Professional Elective Courses: Table-1

S. No	Course Code	Course Name
1	PEC-MTECE-112A	Electronic System Design
2	PEC-MTECE-114A	Image Processing
3	PEC-MTECE-116A	Advanced Mathematics for Engineers
4	PEC-MTECE-118A	Modern Wireless Networks & Technologies

Table-II

Students of all M.Tech programmes are required to study one Multidisciplinary open elective course in each of the 2nd and 3rd Semesters and one foundation elective course in 2nd Semester for 2-Years Programmes. They may choose any one of the following courses (excluding the courses offered by the departments of their own subjects, if not stated otherwise).

Multidisciplinary Open Elective –I Courses

SN	Course Code	Course Name	Offered by Department
1	OEC-130A	Basic of Economics	Management Department
2	OEC-132A	Fundamentals of Management	Management Department
3	OEC-134A	Disaster Management	Civil Engineering
4	OEC-136A	Industrial Safety	Fire Technology and Safety
5	OEC-138A	Indian Literature in Translation-I	Applied Sc. & Humanities (English)
6	OEC-140A	Environmental Issues	Applied Sc. & Humanities (Chemistry)
7	OEC-142A	Quantitative Techniques	Applied Sc. & Humanities (Mathematics)
8	OEC-144A	Sources of Energy-I	Electrical Engineering
9	OEC-146A	Operation Research	Mechanical Engineering
10	OEC-148A	Multimedia Communication	Electronics and Communication Engineering
11	OEC-150A	Introduction to Information Technology	Computer Sc. & Applications
12	OEC-152A	Cyber Forensics and Security	Computer Sc. & Engineering
13	OEC-154A	Computer Science and Principles	Computer Sc. & Engineering
14	OEC-156A	Software Engineering Practice	Computer Sc. & Engineering

Table-III

Foundation Elective

SN	Course Code	Course Name	Offered by Department
1	FEC-158A	Basics of Accounting	Management Department
2	FEC-160A	Basics of E-commerce	Management Department
3	FEC-162A	Elements of Banking	Management Department
4	FEC-164A	Computer Fundamentals	Computer Science and Engineering
5	FEC-166A	Communication and Soft Skills	Applied Science and Humanities (English)
6	FEC-168A	Entrepreneurship Development	Management Department
7	FEC-170A	Electronics Engineering	Electronics and Communication Engineering

HOD ECE

Course Code	**PCC-MTECE-101A**				
Category	Professional Core Course				
Course Title	**Satellite Communication and Space Technology**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I**
	4	0	0	4	
Course Objectives	The objectives of this course are to • Learn about the history, advantages and applications of satellite communication systems. • Study the effects of environmental factors on satellite signal propagation. • Explore orbital mechanics and satellite launching processes. • Gain insights into the design of satellite communication links. • Understand modulation, detection techniques of satellite systems.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated
CO1	Define fundamental concepts and operational terminologies of satellite communication systems.
CO2	Explain launch mechanisms, Earth station parameters, subsystems, link design equations and environmental effects influencing signal propagation and satellite performance.
CO3	Apply Kepler's laws, orbital determination techniques, modulation methods, detection techniques and error rate performance to optimize satellite communication systems.
CO4	Analyze synchronization techniques, multiple access methods, security protocols and their effects on satellite communication performance.

Note: Examiner will set nine questions in total. Question no. one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit No.	Contents
Unit-I	**Introduction:** Brief History of the evolution & growth of communication satellites, Satellite frequency allocation & Band spectrum, Subsystems, Geostationary and Geosynchronous satellites, Active & Passive satellites, Advantages and applications of satellite communication, Satellite Frequency Reuse Techniques, Space Debris and Collision Avoidance.
Unit-II	**Orbital Mechanism and Launching of satellite:** Kepler`s Laws, LEO, MEO, GEO and HEO satellites and their characteristics, Look angle, Azimuth angle, Elevation angle, orbital determination, Mechanism of launching a Satellite, Overview to launch vehicles. **Satellite Link Design:** General link design equation, Complete link design, Earth Station parameters, Delay Transponders, Eclipse effects.

HOD ECE

Unit-III	**Propagation effects:** Introduction, Free space path loss, Atmospheric absorption, Rainfall Attenuation, Ionospheric scintillation, Telemetry, Tracking and commands of satellites. **Modulation and Detection Techniques:** QPSK, OQPSK and MSK. Coherent and non coherent detection, Error rate performance of QPSK and MSK.
Unit-IV	**Synchronization:** Principle and techniques, Multiple Access Techniques (FDMA, TDMA system: concept and configuration, system timing frames format), VSAT, Random access, TELSAT and INSAT system, GPS systems, Satellite Security and Encryption.

Suggested Readings:

- Satellite Communications by Dennis Roddy, TMH
- Satellite Communication by D.C. Aggarwal, Khanna Publishers
- Satellite Communication by T. Pratt and C.W. Boston, John Willey and sons
- Satellite Communication by Monojit Mitra, PHI
- Fundamentals of satellite Communication by K.N.Raja Rao, PHI
- Satellite Communications by Sapna Katiyar , Katson Books

Useful Video Links:

Unit No.	Topics	Links
Unit-I	Space Debris and Collision Avoidance	https://www.youtube.com/watch?v=OlZfC_6b-dY
	Active & Passive satellite. Applications of satellite communication	https://www.youtube.com/watch?v=Xf7AqkTiZf4
Unit-II	Overview of launch vehicle technologies	https://www.youtube.com/watch?v=SMX4-rIlIak
	Satellite and Orbits, Types of Orbits	https://www.youtube.com/watch?v=GGncz-DKkeU
	Propagation Effects in Satellite Communication	https://www.youtube.com/watch?v=-ltobgKDdWU
Unit-III	Rain Attenuation	https://youtu.be/ulCRyxC5H3o
Unit-IV	Satellite Cyber security and Encryption	https://www.youtube.com/watch?v=AltCfizF_4w
	Multiple Access Techniques (FDMA, TDMA, CDMA)	https://www.youtube.com/watch?v=HFNbkmub6MQ

HOD ECE

Course Code	PCC-MTECE-103A				
Category	Professional Core Course				
Course Title	**Information Theory and Coding Techniques**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I**
	4	0	0	4	
Course Objectives	The objectives of this course are to • Understand key concepts in information theory, like information and redundancy. • Explore methods to detect and correct errors in data. • Study linear block codes and their use for error correction. • Compare the effectiveness of different coding methods for error correction.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated
CO1	Define the fundamental concept of information, entropy, mutual and joint information for efficient encoding schemes used in communication system.
CO2	Describe the principle of channel encoding/decoding schemes used in communication system.
CO3	Apply various error detection and correction techniques used in communication system like linear block code, cyclic code & hamming code etc.
CO4	Analyze the parameters and coding schemes to maximize the efficiency rate of communication system.

Note: Examiner will set nine questions in total. Question no. one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit No.	Contents
Unit-I	**Information Theory:** Concept of Information and Entropy, Shannon's theorems, Channel Capacity Self information, Discrete and Continuousentropy, Mutual and joint information, Redundancy.
Unit-II	**Coding Theory:** Source encoding & channel encoding, Error detection & Correction, Various codes for channel coding, Rate Distortion functions.
Unit-III	**Information Theory Codes:** Linear block codes, systematic linear codes & optimum coding for Binary symmetric channel, The Generator & parity check matrices, Syndrome decoding & Symmetric channels, Hamming codes, Weight enumerator, Perfect codes, BCH codes, Idempotent & Mattson Solomon polynomials, Reed Solomon codes, Justeen codes, MDS codes & generalized BCH codes, Convolution codes & Viterbi decoding algorithm.
Unit-IV	**Performance of codes:** Performance of linear block codes & convolution code, code incurable error probability Upper & lower bounds.

Suggested Readings:

HOD ECE

- Digital Modulation and Coding by Wilson, Pearson
- Communication System by B.P. Lathi, Oxford
- Information Theory, Coding & Cryptography by Ranjan Bose, TMH
- Principles of Digitals Communication by J. Dass. , S.K. Malik & P.K. Chatterjee
- Information Theory and Coding by Nitin Mittal, Bharat
- Information Theory and Coding by Murlidhar Kulkarni, K.S. Shivaprakasha, Wiley

Useful Video Links:

Unit No.	Topics	Links
Unit-I	Huffman Coding	https://www.youtube.com/watch?v=uDS8AkTAcIU
Unit-II	Introduction to Rate Distortion Theory	https://youtu.be/qmCTnAoMSc8
Unit-III	Convolution Codes	https://youtu.be/9JTXHsZVutM
Unit-IV	Block Code & Amp; its Properties	https://youtu.be/5d9O530dUKQ

HOD ECE

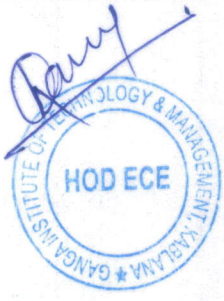
Course Code	PCC-MTECE-105A				
Category	Professional Core Course				
Course Title	**Advanced Digital Signal Processing and Systems**				
Scheme and Credits	L	T	P	Credits	Semester-I
	4	0	0	4	
Course Objectives	The objectives of this course are to • Learn discrete Fourier transforms, properties of DFT and its applications to linear filtering. • Understand the characteristics of digital filters, design digital FIR filters and apply these filters to filter undesirable signals in various frequency bands. • Design digital IIR filters and apply these filters to filter undesirable signals in various frequency bands. • Understand the effects of finite precision representation on digital filters.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated
CO1	Define the fundamental concepts, properties and principles of discrete time signals and systems.
CO2	Explain the classifications, characteristics and applications of Fourier, Z-transforms and digital filters to design digital systems for signal processing.
CO3	Apply discrete signal processing techniques for digital filter design and system implementations.
CO4	Analyze the realization, effects and methods for designing digital filters in digital signal processing systems.

Note: Examiner will set nine questions in total. Question no. one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit No.	Contents
Unit-I	**Introduction of DSP:** Introduction to Signal Processing, Discrete Linear Systems, superposition Principle, Unit-Sample response, stability & causality Criterion. **Fourier Transform & inverse Fourier transform:** Frequency domain design of digital filters, Fourier transform, use of Fourier transform in Signal processing. The inverse Fourier transform, Sampling continuous function to generate a sequence, Reconstruction of continuous -time signals from Discrete-time sequences.



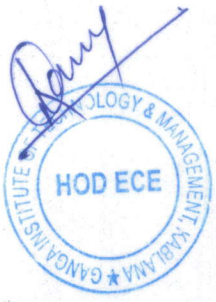
Unit-II	**DFT & FFT & Z transform with Applications:** Discrete Fourier transform, properties of DFT, Circular Convolution, Fast Fourier Transform, and Realizations of DFT. The Z-transform, the system function of a digital filter, Digital Filter implementation from the system function, the inverse Z- transform, properties & applications, Special computation of finite sequences, sequence of infinite length & continuous time signals, computation of fourier series & time sequences from spectra.
Unit-III	**Digital Filter Structure & Implementation:** Linearity, time- invariance & causality, the discrete convolution, the transfer function, stability tests, steady state response, Amplitude & Phase characteristics, stabilization procedure, Ideal LP Filter, Physical reliability & specifications. FIR Filters, Truncation windowing & Delays, design example, IIR Filters: Review of design of analogfilters & analog frequency transformation. Digital frequency transformation. Design of LP filters using impulse invariance method, Bilinear transformation, Phase equalizer, digital all pass filters.
Unit-IV	**Implementation of Filters:** Realization block diagrams, Cascade & parallel realization, effect of infinite-word length, transfer function of degree 1&2, Sensitivity comparisons, effects of finite precision arithmetic on Digital filters.

Suggested Readings:

- Digital Signal Processing by Alam V. Oppenheim & Ronald W. Schafer, PHI
- Digital Signal Processing by JG Proakis, (PHI) 3rd Edition
- Communication System by B.P. Lathi, Oxford
- Theory & application of digital Signal Processing by Rabiner & Gold, PHI
- Introduction to Digital Signal Processing by Roman kuc, McGraw hill Edition

Useful Video Links:

Unit No.	Topics	Links
Unit-I	Basics of DSP	https://youtu.be/4hVWXQEVYSA?si=B-MsPfL1cjndXsO_
Unit-II	Fourier Transform	https://youtu.be/l2I2hys8uGQ?si=noWoflLMPtI4Fl3q
	Fast Fourier Trans form	https://youtube.com/playlist?list=PL4K9r9dYCOoqmykdiyCq2jyAb0zwO0p-b&si=4ZF8MysP1h5rBUKs
Unit-III	Z-Transform	https://youtu.be/RIJi-83X9BE?si=61F8TehDlP0s0xSu
Unit-IV	FIR and IIR Filter	https://youtu.be/lvgCyZefR1Y?si=mVqWV4RwexTS2or8



Course Code	PCC-MTECE-107A				
Category	Professional Core Course				
Course Title	**Data Networks and Communication Protocols**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I**
	4	0	0	4	
Course Objectives	The objectives of this course are to • Introduce the fundamentals of data communication networks. • Understand the functions of various topologies and switching techniques. • Understand the functions of various protocols of the Data link layer. • Examine various layer Protocols of OSI & TCP/IP models.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated
CO1	Define the fundamental concepts of analog and digital transmission of data communication network.
CO2	Explain the switching techniques and topologies of data communication networks.
CO3	Apply various detection and correction techniques used in data communication networks.
CO4	Analyze various communication architectures and their protocols in data communication networks.

Note: Examiner will set nine questions in total. Question no. one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit No.	Contents
Unit-I	**Introduction to Data Transmission:** Overview of Data Communication and networking, Analog And Digital Data Transmission, Transmission Impairments, Various Transmission Media, Data Encoding. **Digital Data Communication Techniques** : Asynchronous And Synchronous Transmission, Error Detection and correction techniques, Physical interfaces
Unit-II	**Data Link Control:** Link Configurations, Protocol principles (Error control, Flow control), Bit Oriented and character oriented protocol, Data link layer services, Link Control. **Multiplexing:** F.D.M. Synchronous TDM, Statistical TDM
Unit-III	**Communication Networking Techniques:** Communication Networks, Circuit Switching, Message Switching, Packet Switching, Local Networking Technology, The bus / tree topology, the ring topology, Medium Access control protocols (CSMA/CD, Token ring, FDDI, DQDB).

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Unit-IV	**Computer Communication Architecture:** OSI and TCP/IP Model, Protocol And Architecture, Networking Access protocols, Inter Networking, Transport layer Protocols, Session Service And Protocols, and Presentation/ Application protocols **ISDN Networks**: Concepts & Architecture, Protocols

Suggested Readings:

- Data and Computer Communication by William Stallings, PHI
- Data communications and networking by Forouzan, TMH
- Computer Networking by Andrew Tanenbaum, PHI
- Data communications and network by Godbole, TMH
- Data Communication and networks by Dr. Sanjay Sharma, Katson
- Introduction to data communications and networking by Wayne Tomasi, Pearson

Useful Video Links:

Unit No.	Topics	Links
Unit-I	Communication Networks–An Introduction and Overview	https://www.youtube.com/watch?v=VwN91x5i25g&list=PLBlnK6fEyqRgneraVKkEXrwyLVx2vJUvt
Unit-II	Multiplexing	https://www.youtube.com/watch?v=L5jJIN8Z4lo
Unit-III	Switching Techniques Circuit Switching	https://www.youtube.com/watch?v=yZV3y-usK_g
Unit-IV	ISDN Networks	https://www.youtube.com/watch?v=CGXkmyRLSLk

HOD ECE

Course Code	PCC-MTECE-109A				
Category	Professional Core Course				
Course Title	**Microprocessor and Embedded Systems**				
Scheme and Credits	L	T	P	Credits	Semester-I
	4	0	0	4	
Course Objectives	The objectives of this course are to • Understand microprocessor architecture, registers, ALU, and memory addressing techniques. • Explore microprocessor instruction sets, addressing modes, and I/O communication protocols. • Learn 8051 microcontroller architecture, programming, and interrupt handling. • Study Intel x86 and Motorola 68XXX families, including instruction sets and hardware features. • Develop microprocessor-based systems, focusing on design, testing, and regulatory compliance.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated
CO1	Define the basic concepts and terminologies of microprocessors, microcontrollers and peripheral chips.
CO2	Describe the features, commands and architecture design of different microprocessors and microcontrollers.
CO3	Applying interfacing between microprocessors/microcontrollers and peripheral chips.
CO4	Differentiate architecture, pin configuration and working operations of different microprocessors and microcontrollers.

Note: Examiner will set nine questions in total. Question no. one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit No.	Contents
Unit-I	**Design of basic microprocessor architectural Concepts:** Microprocessorarchitecture of 8086, Pentium series, word Lengths, addressable memory,Microprocessor's speed architectural characteristics, registers, instructions **Microprocessor Instructions & Communication:** Instruction Set, Mnemonics, Basic Instruction Types, Addressing modes, Microprocessor I/O devices, Polling and Interrupts.
Unit-II	**Microcontroller:** Introduction to 8051 architecture and programming model,Internal RAM and registers, I/O ports, Interrupt system & Instruction sets, ARM controller, Sleep mode of low power 8051 microcontroller.

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Unit-III	**Advanced microprocessors:** Intel X86 family of advanced Microprocessor, programming model for XX86 family. Motorola 68 XXX family of microprocessor, 68 XXX addressing modes, instruction set, multi-core processor.
Unit-IV	**Microprocessor I/O:** Data Communication, parallel I/O serial communication, Serial interface and UART modems, I/O devices, D/A, A/D interface, special I/O devices, viz timers and sensors **Developing Microprocessor Based Products:** Introduction to the Design Process, Preparing the specifications, Developing a design, Implementing and Testing and design, Regulatory Compliance Testing, design tool for Microprocessor Development.

Suggested Readings:

- Microprocessors Principals and Application by C.M. Gilmore, MGH
- Embedded System, Architecture & Programming by Rajkamal, TMH
- Inter Series of microprocessors by Berry B. Berry, PHI
- Microprocessor & Interfacing by D. V. Hall, TMH
- Microprocessor Based System Design by Peatman, Pearson
- Fundamentals of Microprocessor and Microcontroller by B. Ram, Dhanpat Rai Publications

Useful Video Links:

Unit No.	Topics	Links
Unit-I	Microprocessor and Microcontroller in Computer system	https://www.youtube.com/watch?v=SBh6dJMM6AI&list=PLxCzCOWd7aiHL7mF_dRsj4Q9x1NNaZqkh
Unit-II	8086 Basics of Buses & Memory	https://youtu.be/RFDZbZWPMvg
Unit-III	Addressing Modes	https://www.youtube.com/watch?v=Bu8CZSI-1zc
Unit-IV	D/A, A/D Interface	https://www.youtube.com/watch?v=bkQVpZoRw9g

HOD ECE

Course Code	LC-MTECE-111A				
Category	Lab Course				
Course Title	**Satellite Communication Lab**				
Scheme and Credits	L	T	P	Credits	**Semester-I**
	0	0	2	1	
Course Objectives	The objectives of this course are to • Understand transmission and reception processes in satellite communication systems. • Identify various components, their working, applications and setups of satellite communication links. • Understand various parameters and assess the effect on link quality in satellite communication. • Study propagation delay, GPS data analysis and radiation patterns for effective satellite communication design.				
Assessment	25 Marks				
End Semester Examination	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated
CO1	Show the process of transmitting/receiving the signals in a satellite communication link.
CO2	Explain the working of satellite transmitter, receiver and transponder for setting up the satellite communication link.
CO3	Demonstrate carrier to noise ratio, signal to noise ratio and radiation pattern of parabolic reflector.
CO4	Analyze and measure the propagation delay of signals in satellite communication link.

List of Experiments

Sr. No.	Contents
1	To Study the process of Transmitting Signals.
2	To Study the base band Signal in a Satellite Link.
3	To estimate the S/N Ratio.
4	To set up a digital satellite Communication Link.
5	To plot the radiation pattern of a parabolic reflector.
6	To Study Satellite Communication Receivers.
7	To set up a PC to PC Satellite Communication.
8	To measure the propagation delay of a signal in a Sat.Com. Link.
9	To transmit & receive the function generator waveform through a Sat.Com. Link.
10	To set up an active satellite communication link & study their differences.
11	To study different GPS data like longitude, latitude & different types of dilute of precision using a GPS receiver.
12	Study of Data and PN Sequence Generation.

Note: At least 10 experiments are to be performed by the students. Faculty member can add 2-3 extra experiment under topic beyond syllabus.

HOD ECE

Useful Video Links:

Exp No.	Topics	Links
1	To study uplink transmitter, downlink receiver and transponder	https://www.youtube.com/watch?v=sWYJcoV4mlY
2	To Estimate S/N Ratio	https://www.youtube.com/watch?v=_DBFZxLV9fM
3	To Study GPS Data like Latitude, Longitude & Types of Dilution of Precision using GPS Receiver	https://www.youtube.com/watch?v=xaU-43WHLPU

HOD ECE

Course Code	LC-MTECE-113A				
Category	Lab Course				
Course Title	**Microprocessor & Micro Controller Lab**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I**
	0	0	2	1	
Course Objectives	The objectives of this course are to • Learn assembly programming for number conversion, input/output operations using 8086 microprocessor. • Develop microcontroller programming skills to generate frequencies and interface displays using ALP. • Write assembly programs for basic arithmetic, string manipulation, and number checks in ALP. • Interface microcontrollers with displays and implement frequency generation and communication protocols.				
Assessment	25 Marks				
End Semester Examination	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated
CO1	Define the programming concepts of 8086 and 8051.
CO2	Interpret the 8086 and 8051 instruction set for developing the programs.
CO3	Apply various interfacing peripheral chips used with microprocessors.
CO4	Analyze and compare the programme output carried out by different microprocessors and microcontrollers for performance optimization.

List of Experiments

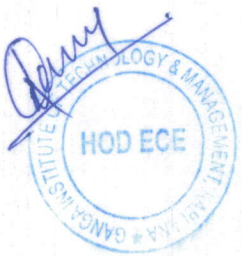
Sr. No.	Contents
1	To study the architecture of 8086 Kit.
2	Write an ALP to convert a hexadecimal No. to decimal No. in single step execution (DEBUG).
3	Write an ALP to enter a word from keyboard and to display.
4	Write an ALP for addition of two one digit Numbers.
5	Write an ALP to display a string on screen.
6	Write an ALP reverse a string.
7	To study the Microcontroller Kit.
8	Write an ALP to generate 10 KHz frequency square wave.
9	Write an ALP to generate 10 KHz & 100KHz frequency using interrupt.
10	Write an ALP to interface intelligent LCD display.
11	Write an ALP to interface one microcontroller with other using serial / parallelcommunication.
12	Write an ALP to interface intelligent LED display.
13	Write an ALP to check whether the No. is Palindrome.

Note: At least 10 experiments are to be performed by the students. Faculty member can add 2-3 extra experiment under topic beyond syllabus.

HOD ECE

Useful Video Links:

Exp. No.	Topics	Links
1	To study the architecture of 8086 Kit.	https://www.youtube.com/watch?v=GZibA34SU0c
2	Write an ALP to convert a hexadecimal No. todecimal No. in single step execution DEBUG).	https://www.youtube.com/watch?v=Y0Si2IYHuiE
3	To study the Microcontroller Kit.	https://www.youtube.com/watch?v=4zIabWC5lpQ
4	Write an ALP to generate 10 KHz & 100KHz frequency using interrupt.	https://www.youtube.com/watch?v=7uXxEQ_Noys
5	Write an ALP to interface intelligent LCD display.	https://www.youtube.com/watch?v=vB-43ITmRsA
6	Write an ALP to check whether the No. is Palindrome.	https://www.youtube.com/watch?v=LJfQxc56_pI



Course Code	**SM-MT-115A**				
Category	Lab Course				
Course Title	**Seminar-I**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I**
	0	0	2	2	
Course Objectives	The objectives of this course are to • Develop students' ability to effectively present research topics and findings by effective communication. • Improve problem-solving and critical thinking skills of the students. • Expose students to the latest trends and advancements by reviewing and discussing contemporary research.				
Assessment	50 Marks				
End Semester Examination	-				
Total	50 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated
CO1	Identify the trends and advancements in the related field.
CO2	Analyze and synthesize research literature with in-depth reviews of key studies and methodologies.
CO3	Undertake problem identification, formulation, proposing solution and analyze the impact on society, economy and environment.
CO4	Prepare a well-organized report employing elements of effective communication and critical thinking.
CO5	Demonstrate a sound technical knowledge of their research field.

Overview:

This is a course designed to help M.Tech students develop research presentation skills. The focus is on selecting a topic or research paper relevant to their specialization, conducting an in-depth review, and effectively presenting the research findings.

General Guidelines:

Topic Selection	Each student is required to choose the research topic based on published review paper(s) or literature related to their relevant field. The same topic cannot be selected by multiple students.
Approval Process	The selected paper or topic must be approved by the faculty members/committee appointed by the Head of Department.
Presentation Guidelines	Each student will have 30-40 minutes for their presentation, followed by 5 minutes for Q&A.
Evaluation	The presentation will be evaluated by a committee constituted by the Head of Department. The evaluation will be based on:

HOD ECE

Parameters for the Evaluation of Seminar

Sr. No.	Parameters	Marks Allotted	Relevant COs
1	Clarity of the topic	10	CO1
2	Literature Survey	10	CO2
3	Content Relevancy	10	CO3
4	Presentation Skills	10	CO4
5	Q&A Response	10	CO5

HOD ECE

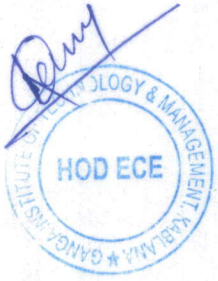
Course Code	**PCC-MTECE-102A**				
Category	Professional Core Course				
Course Title	**Optical Communication**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	4	0	0	4	
Course Objectives	The objectives of this course are to • Understand core principles of optical fiber communication. • Learn about optical sources and detectors. • Analyze optical communication system design. • Explore advanced coherent systems and detection methods				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated
CO1	Define the fundamental concepts and terminologies of optical communication systems.
CO2	Describe various modes and characteristics of optical communication systems.
CO3	Demonstrate different light sources and photodiodes used in mobile communication.
CO4	Analyze various parameters of optical fibres such as attenuation, absorption, noise and bandwidth etc.

Note: Examiner will set nine questions in total. Question no. one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit No.	Contents
Unit-I	**Introduction**: Elements, Advantages and Applications of optical fiber communication, elements of the fiber communication link, ray theory and electromagnetic mode theories for optical propagation, step-index and graded-index fibers and numerical aperture. **Optical fibers, Losses & Dispersion:** Attenuation, absorption, linear and nonlinear scattering losses, overall fiber dispersion losses, polarization, fiber bending losses, multimode step-index and graded-index fibers, single-mode fibers, plastic-clad and all-plastic fibers, optical fiber cables, dispersion- shifted and dispersion-flattened fibers.



Unit-II	**Optical Sources**: Introduction, LED for optical communication, Burrus-type double-heterostructure, surface-emitting LEDs, shaped-geometry, edge- emitting LEDs, LED-to-fiber launch systems, Semiconductor lasers: theory, modulation and characteristics, Fabry-Perot lasers, quantum-well lasers, and distributed-feedback lasers. **Photo Detectors**: PIN photodiodes: Theory and characteristics of PIN photodiodes, Avalanche photodiode detectors: Theory, bandwidth, and noise.
Unit-III	**Optical fiber communication System**: Optical transmitter circuit: LED and laser drive circuits, optical receiver circuit, structure, pre-amplifier, AGC, equalization, optical power budgeting, line loading, Analog systems: Analog modulation, direct modulation, subcarrier modulation, distribution system, optical TDM subcarrier multiplexing, WDM.
Unit-IV	**Coherent Systems**: Coherent receiver and their noises, homodyne and heterodyne detection techniques, polarization control, Homodyne receiver: Reusability and laser linewidth, Heterodyne receiver: Synchronous, asynchronous, and self-synchronous demodulation, phase diversity receivers.

Suggested Readings:

- Optical Fiber Communication by Gerd Keiser, TMH.
- Optical Communication by JH Franz & Jain VK, Narosa Publications.
- Optical Communication by John M. Senior, PHI.
- Optical Communications by Martin Sibley, Springer
- Optical Communication System by Satinder Bal Gupta, Ashish Goel, University Science Press
- Optical Communication System by Sapna Katiyar, S.K. Kataria and Sons

Useful Video Links:

Unit No	Topics	Links
Unit-I	Semiconductor Photo-Diodes Fiber Optic Communication Technology	https://www.youtube.com/watch?v=ougKUUM3hJA&list=PLHj96QRJ0kOhH8xoXXrOgkMf9ZOvjhqYl
Unit-II	P-N & PIN Photo detectors	https://www.youtube.com/watch?v=H5VSrybJ6XU
Unit-III	Semiconductor Photo-Diodes	https://www.youtube.com/watch?v=S9jMMALKKKs
Unit-IV	Effect of Modulation Techniques on Power Budgeting in Optical Fiber System	https://www.youtube.com/watch?v=G5i62xsSiB0

SANGAM INSTITUTE OF TECHNOLOGY & MANAGEMENT
HOD ECE

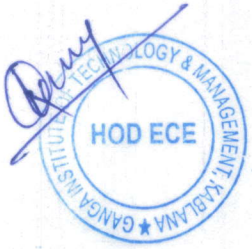
Course Code	PCC-MTECE-104A				
Category	Professional Core Course				
Course Title	**Advanced VLSI Design and Semiconductor Technologies**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	4	0	0	4	
Course Objectives	The objectives of this course are to • Provide a strong foundation in MOS and CMOS transistor technology and fabrication processes. • Teach layout design rules and the design of key CMOS circuits, including inverters and pass transistors. • Explore VLSI architectural concepts, including scaling, combinational and sequential logic, and PLAs. • Develop practical skills in designing and analyzing digital circuits like ALUs and sequential systems, addressing real-world VLSI challenges				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated
CO1	Define basic steps and terminologies of fabrication of MOS circuits.
CO2	Describe the structure, operation, properties and characteristics of the MOS transistor.
CO3	Demonstrate stick diagram of different logic functions and switching characteristics of CMOS inverter.
CO4	Analyze the subsystem design, scaling effects on the MOS circuits and its limitations.

Note: Examiner will set nine questions in total. Question no. one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit No.	Contents
Unit-I	**MOS Technology**: Basic MOS transistors, enhancement and depletion mode transistors, NMOS and CMOS processes, thermal aspects of processing, production ofmasks.
Unit-II	**Electrical Properties of MOS Circuit**: Parameters of MOS transistors, pass transistors, NMOS inverter, pull-up to pull-down ratio for an NMOS inverter, CMOSinverters, MOS transistor circuit model, latch-up in CMOS circuits.
Unit-III	**Design Processes**: MOS layers, stick diagrams, design rules, CMOS process, double-metal single-poly silicon. **Basic Circuit Concepts:** Sheet resistance, area capacitance, delay units, inverter delay, super buffers, propagation delays.



Unit-IV	**Subsystem Design & Layout**: Architectural issues in VLSI, switch logic, gate logic, Examples of Combinational logic, Clocked sequential circuits, other system consideration. Scaling of MOS circuits: Scaling factor, limitations, scaling of wires and interconnection, PLA and Finite state Machines. **Design Examples**: Design of an ALU subsystem, carry-lookahead adder, parallelism.

Suggested Readings:

- Basic VLSI Design System & Circuits by Pucknell D. A. and Eshrachain K, PHI, 1988.
- VLSI Design Techniques for Analog and Digital Circuit by Geiger, Rr, Allen P. E. Strader N. R.,MGH1990`
- Modern VLSI Design by Wolf, Pearson SZE, "VLSI Technology", TMH
- Digital VLSI Design With Verilog by John Williams, Springer
- VLSI Design by A Shanthi, A Kavitha, New Age
- Principles of CMOS VLSI Design by Neil H. E. Weste, Kamran Eshraghian, Pearson

Useful Video Links:

Unit No.	Topics	Video links
Unit-I	Review of MOS technology	https://www.youtube.com/watch?v=D7dHSXRQVag
Unit-II	Electrical properties of MOS circuit	https://www.youtube.com/watch?v=G9wXgTLU4A4
Unit-III	Design processes	https://www.youtube.com/watch?v=_3fs0vA46Rc
Unit-IV	Subsystem Design & Layout	https://www.youtube.com/watch?v=vUnKDl8M_QM

HOD ECE

Course Code	PEC-MTECE-112A				
Category	Professional Elective Course				
Course Title	**Electronic System Design**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	4	0	0	4	
Course Objectives	The objectives of this course are to • Implement MSI/LSI circuits including arithmetic units, multiplexers and bus-oriented systems. • Design sequential circuits using flip-flops, counters, registers,and analyze clocking aspects. • Develop system controllers using ROM, PLA, PAL and understand CPLD/FPGA implementations. • Analyze asynchronous finite state machines considering races, hazards and MEV design approaches				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated
CO1	Define components of MSI and LSI circuits, including arithmetic circuits, comparators, multiplexers, and bus-oriented structures.
CO2	Explain the working operations of sequential machines, including flip-flops, counters, shift registers, and state diagrams in synchronous circuits.
CO3	Apply the concepts and principles of system controller design to develop MSI decoders, ROM, PLA, PAL, CPLD, and FPGA-based systems.
CO4	Analyze asynchronous finite state machines, focusing on identifying and mitigating hazards, cycles and races using excitation maps and MEV methods.

Note: Examiner will set nine questions in total. Question no. one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit No.	Contents
Unit-I	**MSI and LSI Circuits And Their Applications:** Arithmetic Circuits, Comparators, Multiplexers, Code Converters, XOR And AND-OR INVERTER Gates, Wired Logic, Bus Oriented Structures, Tri-State Bus System, Propagation Delay.
Unit-II	**Sequential Machines:** The Concept Of Memory, The Binary Cell, The Cell And The Bouncing Switch, Set / Reset, D, Clocked T, Clocked JK Flip Flop,Design Of Clock F/F, Conversion, Clocking Aspects, Clock Skew, State Diagram Synchronous Analysis Process, Design Steps For Traditional Synchronous Sequential Circuits, State Reduction, Design Steps For Next State Decoders, Design Of Out Put Decoders, Counters, Shift Registers and Memory.

HOD ECE

Unit-III	**Multi Input System Controller Design:** System Controllers, Design PhasesAnd System Documentation, Defining The System, Timing And Frequency Considerations, Functional, Position And Detailed Flow Diagram Development, MDS Diagram, Generation, Synchronizing Two System And Choosing Controller, Architecture, State Assignment, Next State Decoders And Its Maps, Output Decoders, Clock And Power Supply Requirements, MSI Decoders, Multiplexers In System Controllers, Indirect Addressed Multiplexers Configurations, Programmable System Controllers, ROM, PLA And PAL Based Design. Introduction to the CPLD & FPGA.
Unit-IV	**Asynchronous Finite State Machines:** Scope, Asynchronous Analysis, Design Of Asynchronous Machines, Cycle And Races, Plotting And Reading The Excitation Map, Hazards, Essential Hazards Map Entered Variable, MEVApproaches To Asynchronous Design, Hazards In Circuit Developed By MEV Method.

Suggested Readings:

- An Engineering Approach to Digital Design by Fletcher, PHI.
- Switching and Finite Automata Theory by Z. Kohavi, TMH.
- Digital Design by Mano, PHI.
- Verilog Digital System Design by Z Navabi, TMH
- Digital System Design with VHDL by Mark Z Wolinski, Pearson
- Digital System Design and Microprocessors by John P Hayes, TMH

Useful Video Links:

Unit No	Topics	Links
Unit-I	MSI and LSI Circuits And Their Applications	https://www.youtube.com/watch?v=XBcHnz08ZW8&list=PL803563859BF7ED8C&index=28
Unit-II	Sequential Machines	https://www.youtube.com/watch?v=MiuMYEn3dpg&list=PL803563859BF7ED8C&index=24
Unit-III	Multi Input System Controller Design	https://www.youtube.com/watch?v=XMGE_v323oA
Unit-IV	Asynchronous Finite State Machines	https://www.youtube.com/watch?v=FZAHhQ1v7B0&list=PL803563859BF7ED8C&index=23

HOD ECE

Course Code	PEC-MTECE-114A				
Category	Professional Elective Course				
Course Title	**Image Processing**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	4	0	0	4	
Course Objectives	The objectives of this course are to • Study the fundamentals of digital image processing. • Explore image enhancement, restoration, and compression techniques using various methods. • Use Fourier and wavelet transforms in processing and analysis tasks. • Learn image segmentation, representation and Contents methods for pattern recognition and interpretation				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated
CO1	Define fundamental concepts of digital image processing systems, including acquisition, storage, processing, and display.
CO2	Explain visual perception, image models, sampling, quantization, transforms, and enhancement techniques for image improvement.
CO3	Apply filtering, restoration, and compression techniques to enhance and process degraded or redundant images.
CO4	Analyze segmentation methods like edge detection, threshold and motion-based techniques of image processing.

Note: Examiner will set nine questions in total. Question no. one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit No.	Contents
Unit-I	**Introduction:** Elements of Digital Image Processing Systems, Image Acquisition, Storage, Processing Communication Display. **Digital Image Fundamentals**: Visual Perception, simple image models, concept of uniform and nonuniform sampling & quantization, Relationships between pixels-neighbors of pixel, connectivity labeling of connected components. Relations, equivalence and Transitive closure, Distance measures, Arithmetic/ Logic operation, Imaging Geometry Basic and perspective transformation stereo imaging
Unit-II	**Image Transforms:** Discrete Fourier transform, 2-D Fourier Transforms and its properties. Fast Fourier transform and its uses. Walsh, Hadamard Discrete cosine, Heir and slant transforms hostelling their algorithms and computer implementations. **Image Enhancement**: Spatial and frequency domain methods point processing, intensity transformation, Histogram processing image substation and Averaging spatial filtering, LP, HP and homo- morphic felling, generation of spatial marks, Color image processing.

HOD ECE

Unit-III	**Image Restoration**: Degradation model, digitalization of circulate and block circulate metrics, Algebraic approved invoice filtering, wiener filter, constrained least square restoration, Interactive restoration in spatial domain geometric transformation. **Image Compression**: Redundancy models, error free compression, Lossy compression, Image compression standards.
Unit-IV	**Image Segmentation**: Detection of Discontinuity, Edge detection, Boundary detection, Thresholding, Regional oriented segmentation use of motion in segmentation. **Representation and Contents**: Image analysis, Pattern and their classes, Decision theoretical methods, Structural methods, Interpretation.

Suggested Readings:

- Fundamentals of Digital Image Processing by Anil K Jain, PHI.
- Digital Image Processing by Rafael C. Gonzalez and Richard E. Woods, Pearson.
- Digital Image Processing & Analysis by Chanda & Majumder, PHI.
- Digital Image Processing by Wilhelm Burger, Mark James Burger, Springer
- Digital Image Processing by William K Pratt, Wiley
- Digital Image Processing by Madhuri A Joshi, PHI

Useful Video Links:

Unit No	Topics	Links
Unit-I	Digital Image Processing Systems	https://www.youtube.com/watch?v=DSGHkvQBMbs&list=PLuv3GM6-gsE08DuaC6pFUvFaDZ7EnWGX8
Unit-II	Digital image processing	https://www.youtube.com/watch?v=q0AnFKYl7sg&list=PLLDC70psjvq7765_splMFlBmM37NWnOj3
Unit-III	Image Restoration	https://www.youtube.com/watch?v=5qxrzD6ODHc
Unit-IV	Image Segmentation	https://www.youtube.com/watch?v=bYWa7AuzIUQ

HOD ECE

Course Code	PEC-MTECE-116A				
Category	Professional Elective Course				
Course Title	**Advanced Mathematics for Engineers**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	4	0	0	4	
Course Objectives	The objectives of this course are to • Understand Fourier transforms, their properties and applications in signal analysis and differential equations. • Learn Z-transform techniques, inverse evaluation, and properties for analyzing discrete-time systems and stability. • Solve linear systems using various methods. • Apply conformal mapping, variational calculus and optimization techniques engineering and mathematical modeling				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated
CO1	Define the fundamental concepts of Fourier and Z-Transforms, including their properties, theorems, and relationships with other transforms.
CO2	Describe the methods for solving linear systems of equations, including Gaussian elimination, Crout's triangularization, and iterative approaches like Jacobi's and Gauss-Seidel methods.
CO3	Apply conformal mapping techniques and transformations, such as linear, bi-linear, and Schwarz-Christoffel transformations, to solve problems in complex analysis.
CO4	Analyze problems in calculus of variations by deriving and solving Euler-Lagrange equations, and use advanced methods such as the Rayleigh-Ritz and Galerkin methods for practical applications.

Note: Examiner will set nine questions in total. Question no. one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit No.	Contents
Unit-I	**Fourier Transforms**: Introduction, Fourier Integral Theorem, Fourier Sine and Cosine Integral, Complex form of Fourier Integrals, Fourier Transforms, Inverse Fourier Transform, Properties, Modulation Theorem, Convolution Theorem for Fourier Transforms, Parseval's Identity, Fourier Transforms of derivative of functions, Relation between Fourier and Laplace transform.
Unit-II	**Z –Transform:** Introduction, Properties of Z- Transform, Evaluation of inverse Z – Transform.
Unit-III	**Matrices and Linear System of Equations:** Solution of linear simultaneous equations by Gaussian elimination and its modification, Crout's triangularization method, Iterative methods- Jacobins method, Gauss-Seidal method, Determination of Eigen values by iteration.

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Unit-IV	**Conformal Mapping:** Conformal mapping, linear transformations, Bi- linear transformations, Schwarz's-Christoffel transformations. **Calculus Of Variations:** Euler-Lagrange's differential equation,The Brachistochrone problems and other applications. Isoperi-metric problem, Hamilton's Principle and Lagrange's Equation. Rayleigh-Ritz method, Galerkin method.

Suggested Readings:

- Higher Engineering Mathematics by Dr. B.S. Grewal, Khanna Publishers.
- Fourier Series and Boundary Values Problems by Churchill, McGraw Hill.
- Calculus of Variations by Galfand & Fomin, PHI.
- Complex Variables & Applications by Churchill, McGraw Hill.
- Calculus of Variations by Elsgole, Addison Wesley.

Useful Video Links:

Unit No	Topics	Links
Unit-I	Fourier Transform	https://www.youtube.com/watch?v=lkAvgVUvYvY
Unit-II	Properties of Z- Transform	https://www.youtube.com/watch?v=rGFrWzW0cjE
Unit-III	Solution of linear simultaneous equations by Gaussian elimination and its modification	https://www.youtube.com/watch?v=T4c1YCU3xr8
Unit-IV	Euler-Lagrange's differential equation	https://www.youtube.com/watch?v=aI4VvpiU5Fg

HOD ECE

Course Code	PEC-MTECE-118A				
Category	Professional Elective Course				
Course Title	**Modern Wireless Networks & Technologies**				
Scheme and Credits	L	T	P	Credits	**Semester-II**
	4	0	0	4	
Course Objectives	The objectives of this course are to • Explain mobile radio systems, cellular concepts, and capacity strategies in wireless networks. • Describe mobile radio propagation models, signal fading, and diversity techniques. • Analyze spread spectrum and multiple access methods for mobile communication. • Evaluate wireless standards, protocols, and mobile data networking methods.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated
CO1	Define fundamental concepts and terminologies of various wireless mobile communication systems.
CO2	Describe different models, standards and protocols used in wireless and mobile communication system.
CO3	Apply multiple access and handoff techniques to maintain seamless network connectivity by efficient resource utilization for optimization of wireless systems.
CO4	Analyze various parameters like interference, coverage, trunking & grade of services in wireless and mobile communication system.

Note: Examiner will set nine questions in total. Question no. one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit No.	Contents
Unit-I	**Introduction to mobile radio systems:** Paging systems, cordless telephone system, Cellular telephone systems- Cellular concept, frequency reuse, channel assignment strategies, Interference and system capacity, trunking and grade of service, cell splitting, sectoring, microcell zone concept, HO strategies. 5G Network Basics and Architecture: Overview
Unit-II	**Mobile radio propagation:** Mechanism, free space path loss, log-distance path loss models, Okumara model, Hata model, PCS model, Wideband PCS microcell model, indoor propagation models, Jake's channel model, Multi path characteristics of radio waves, signal fading, Time dispersion, Doppler spread, coherence time LCR, fading statistics, diversity techniques

HOD ECE

Unit-III	**Introduction to spread spectrum communication, multiple access techniques used in mobile wireless communication:** FDMA/TDMA/CDMA, OFDMA, Cellular CDMA, packet radio protocols, CSMA, reservation protocols, capacity of cellular CDMA, soft HO
Unit-IV	**Wireless systems and standards**: GSM standards, signaling and call control, mobility management, location tracing, wireless data networking, packet errormodeling on fading channels, Performance analysis of link and transport layer protocols over wireless channels, mobile data networking (mobile IP), wireless data services, IS-95, GPRS

Suggested Readings:

- Wireless Communications by Principles and practices by T. S. Rappaport, Edition - PHI 1996.
- Mobile Cellular Telecommunications, Analog and Digital Systems by William C. Y. Lee 2nd Edition, MGH-1995.
- Wireless Digital communications, Modulation and Spread Spectrum Applications by Kamilo Feher, PHI 2001.
- Mobile Communications by Jochen Schillar, Pearson Education 2009.
- Wireless Communications and Networking by William Stallings, Pearson
- Wireless Communications and Networking by Jon W. Mark, Weihua Zhuang, Pearson

Useful Video Links:

Unit No	Topics	Links
Unit-I	5G: Next Gen network	https://www.youtube.com/watch?v=mo1lNRKnayA
Unit-II	Diversity techniques	https://www.youtube.com/watch?v=zQBGYc3VzV4
Unit-III	FDMA/TDMA/CDMA, SDMA Techniques	https://www.youtube.com/watch?v=sArkTtUMDgg&t=15s
Unit-IV	GSM standards, mobility management, and location tracing	https://www.youtube.com/watch?v=MZTtY1Sz-O4

HOD ECE

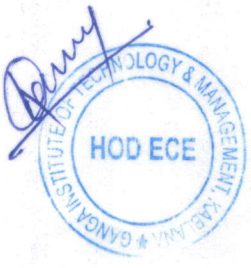
Course Code	LC-MTECE-106A				
Category	Lab Course				
Course Title	VLSI Lab				
Scheme and Credits	L	T	P	Credits	Semester-II
	0	0	2	1	
Course Objectives	The objectives of this course are to • Design CMOS Logic Circuits: Develop skills to design and simulate CMOS circuits like inverters, NAND, and NOR gates using SPICE. • Implement Complex Digital Circuits: Learn to create and simulate advanced circuits such as D-latches, half adders, and full adders using CMOS technology. • Master Layout Design: Gain hands-on experience in designing layouts for PMOS, NMOS, and CMOS gates in layout editors. • Optimize Circuit Performance: Analyze and enhance circuit performance for parameters like speed, power, and signal integrity through simulation.				
Assessment	25 Marks				
End Semester Practical Examination	25 Marks				
Total Marks	50				
Duration of Exam	3 hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated
CO1	Describe the layout of various combinational and sequential circuits.
CO2	Demonstrate the half adder using NAND gate and full adder using half adder.
CO3	Apply the SPICE program for CMOS inverter, NAND and NOR gate.
CO4	Analyze the designing steps of the CMOS inverter with equal rise and fall time.

List of Experiments

Sr. No.	Contents
1	Write a spice programme for CMOS inverter with following details. pmos L = .8ym W=12.0um, nmos = 8um W=2.4um, nmos (kp=60u Vto=0.6v) pmos(kp=20u Vto=-0.8v)
2	Write a spice programme for CMOS nand gate with following details : Vdd=5 volt, pmos L=.8 um W=20um, nmos L = 8um W=um, nmos (kp=45u V to = 1.0v) pmos (kp=25u Vto=-1.2v)
3	Write a spice programme for CMOS nor gates with following details : Vdd=5volt, pmos L=8um W=20um, nmos L=Burn W=8um, nmos (kp=45u Vto-1.0v)Pmos (kp=25u Vto=-1.2v)
4	Design a d-latch with clk time period=6ns using nand gates with following specification : L=2U W=100U for n&p-mos, For n-mos Kn'=60U Vto = 0.6V) for p-mos kp=20UVto=0.8V)

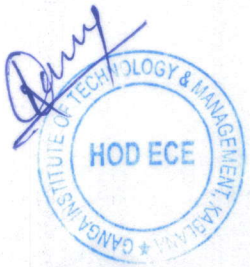


5	Design a half adder using nand gates with following specifications : for n-mos : L=20 W=100U, for p-mos L=2U W=650U, for n- mos Kn'=600Vto=0.6V) for P-mos Kp=20U Vto=0.8v)
6	Design a full adder using half adder designed above
7	Design the layout for PMOS in layout editor.
8	Design the Layout for NMOS in layout editor.
9	Design the layout for CMOS inverter with equal rise and fall time in layout editor.
10	Design the layout for 2-Input NAND gate.
11	Design the layout for 2-Input NOR gate.
12	Design the layout for clocked S-R flip-flop.

Note: At least 10 experiments are to be performed by the students. Faculty member can add 2-3 extra experiment under topic beyond syllabus.

Useful Video Links

Exp No.	Topics	Links
1	Write a spice programme for CMOSinverter with following details. pmos L = .8ym W=12.0um, nmos = 8umW=2.4um, nmos (kp=60u Vto=0.6v) pmos(kp=20u Vto=-0.8v)	https://www.youtube.com/watch?v=aeGXhmxSWRY
2	Design a d-latch with clk time period=6nsusing nand gates with following specification : L=2U W=100U for n&p- mos, For n-mos Kn'=60U Vto = 0.6V) for p-mos kp=20UVto=0.8V)	https://www.youtube.com/watch?v=LPP7HScUvgk
3	Design a half adder using nand gates withfollowing specifications : for n-mos : L=20 W=100U, for p-mos L=2U W=650U, for n- mos Kn'=600 Vto=0.6V) for P-mos Kp=20U Vto=0.8v)	https://www.youtube.com/watch?v=ABId0PQZBhc
4	Design the layout for PMOS in layouteditor.	https://www.youtube.com/watch?v=oOblwp65WFA



Course Code	LC-MTECE-108A				
Category	Lab Course				
Course Title	**Optical Communication Lab**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	0	0	2	1	
Course Objectives	The objectives of this course are to • Understand the principles and working mechanisms of optical devices in fiber optic communication • Develop practical skills in setting up fiber optic communicationlinks. • Analyze the performance characteristics of fiber optic components. • Explore modulation techniques in fiber optic systems.				
Assessment	25 Marks				
End Semester Practical Examination	25 Marks				
Total Marks	50				
Duration of Exam	3 hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated
CO1	Show the various components used in optical communication system.
CO2	Describe the characteristics and interconnections of light sources and photodiodes for efficient optical signal generation and detection.
CO3	Demonstrate modulation and demodulation techniques for efficient signal transmission and reception in optical fiber communication systems.
CO4	Analyze different parameters of optical fiber such as attenuation, bending and numerical aperture etc.

List of Experiments

Sr. No.	Contents
1	Study the working of optical devices.
2	Study of fiber-optic transmitter and detector.
3	Determination of numerical aperture of optical fiber.
4	Study of characteristics of LED.
5	Study of characteristics of LASER diode.
6	Setting a fiber-optic analog link.
7	Setting a fiber-optic digital link.
8	Study of modulation and demodulation of light source by direct amplitude modulation techniques.

HOD ECE

9	Forming a PC-to-PC communication link using optical fiber and RS-232.
10	Setting up a fiber-optic voice link.
11	Study of modulation and demodulation of light source by PPM technique.
12	Study of modulation and demodulation of light source by PWM technique.
13	Study of propagation loss and sending loss in optical fiber.

Note: At least 10 experiments are to be performed by the students. Faculty members can add 2-3 extra experiment under topic beyond syllabus

Useful Video Links

Exp No.	Topics	Links
1	Study of optical devices.	https://www.youtube.com/watch?v=oOyMmARcVDM
2	Determination of numerical aperture of optical fiber	https://www.youtube.com/watch?v=D9op3IBtQLI
3	Study of characteristics of LED.	https://www.youtube.com/watch?v=1YewZMlQ6zo
4	Setting a fiber optic analog link.	https://www.youtube.com/watch?v=dhcOFSB7ex8

HOD ECE

Course Code	SM-MT-110A				
Category	Seminar				
Course Title	Seminar-II				
Scheme and Credits	L	T	P	Credits	Semester-II
	0	0	2	2	
Course Objectives	The objectives of this course are to • Develop students' ability to effectively present research topics and findings by effective communication. • Improve problem-solving and critical thinking skills of the students. • Expose students to the latest trends and advancements byreviewing and discussing contemporary research.				
Assessment	50 Marks				
End Semester Examination	-				
Total	50 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

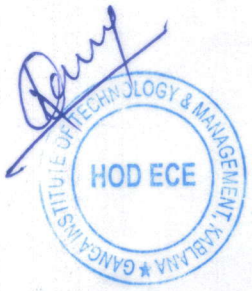
COs	Skills Demonstrated
CO1	Identify the trends and advancements in the related field.
CO2	Analyze and synthesize research literature with in-depth reviews of key studies and methodologies.
CO3	Undertake problem identification, formulation, proposing solution and analyze the impact on society, economy and environment.
CO4	Prepare a well-organized report employing elements of effective communication and critical thinking.
CO5	Demonstrate a sound technical knowledge of their research field.

Overview:

This is a course designed to help M. Tech students develop research presentation skills. The focus is on selecting a topic or research paper relevant to their specialization, conducting an in-depth review, and effectively presenting the research findings.

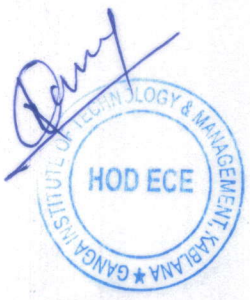
General Guidelines:

Topic Selection	Each student is required to choose the research topic based on published review paper(s) or literature related to their relevant field. The same topic cannot be selected by multiple students.
Approval Process	The selected paper or topic must be approved by the faculty members/committee appointed by the Head of Department.
Presentation Guidelines	Each student will have 30-40 minutes for their presentation, followed by 5 minutes for Q&A.
Evaluation	The presentation will be evaluated by a committee constituted by the Head of Department. The evaluation will be based on:



Parameters for the Evaluation of Seminar

Sr. No.	Parameters	Marks Allotted	Relevant COs
1	Clarity of the topic	10	CO1
2	Literature Survey	10	CO2
3	Content Relevancy	10	CO3
4	Presentation Skills	10	CO4
5	Q&A Response	10	CO5



Annexure 2.11

Ganga Institute of Technology and Management, Kablana
(An Autonomous Institute under Maharshi Dayanand University, Rohtak)

Minutes of 1st Meeting of Board of Studies of Department of Electrical Engineering held on 02.01.2025

The Board of Studies meeting was held on 02.01.2025 at 2:00 P.M in the Conference Hall of the Institute

Members Present:

S.No.	Name of the Member	Affiliation/Organization	Designation within Board of Studies
1	Mr. Joginder Singh	HOD, GITAM, Kablana	Chairperson
2	Dr. Alok Prakash Mittal	Subject Expert (Adjunct Professor, NSUT Delhi), Outside Parent University	Member
3	Dr. Naresh Kumar Yadav	Subject Expert (Professor, DCRUST Murthal), Outside Parent University	Member
4	Dr. Vipin Kumar	Subject Expert (Assistant Professor, UIET, MDU Rohtak), University Nominee	Member
5	Mr. Abhishake Jain	Assistant Professor, GITAM Kablana	Member
6	Mr. Ajay Kumar Chhillar	Assistant Professor, GITAM Kablana	Member
7	Mr. Deshveer	Assistant Professor, GITAM Kablana	Member
8	Mr. Ankush Tyagi	Assistant Professor, GITAM Kablana	Member
9	Mr. Brijesh Jha	Assistant Professor, GITAM Kablana	Member
10	Ms. Deepika	Assistant Professor, GITAM Kablana	Member

Agenda of the Meeting:

1. Introduction of the Members of the Board of Studies
2. Review and approval of the Syllabus Prescribed for 1st Year under Autonomous Status of B.Tech and M.Tech Program.
3. Panel of Examiners for Theory and Practical of B.Tech and M.Tech Program
4. Any Other Item with the Permission of the Chair.

Agenda Items Discussed:

1. **Introduction of the Members of the Academic Council**
   - The meeting began with a warm welcome by Mr. Joginder Singh, Chairperson, who welcomed the Experts in the Board of Studies and introduced all members of the Board of Studies with them. The members shared their affiliations and roles within the BOS.
2. **Review and approval of the Syllabus Prescribed for 1st Year under Autonomous Status of B.Tech and M.Tech Program.**
   - Suggestions were made to offer an advanced course related to smart grid in the M.Tech 2nd sem syllabus. The same has been included in the syllabus.
   - The BOS suggested to include one experiment related to house wiring and installation in the laboratory course of Basics of Electrical Engineering.
3. **Panel of Examiners for Theory and Practical of B.Tech and M.Tech Program**
   - The panel of theory paper setter and practical examiner for B.Tech and M.Tech has been presented in BOS meeting, experts suggested names of experts to be included in the panel and the same has been included.
4. **Any Other Item with the Permission of the Chair**
   - The BOS discussed upcoming initiatives under the autonomous framework to further enhance the academic and administrative processes of the department.
   - Suggestions were made to establish additional collaborations with industries and reputed academic institutions to strengthen the curriculum and improve employability prospects for students.

Resolutions Passed:

1. The Board of studies approved the syllabus and scheme of the M.Tech (Electrical Power Systems) as attached in Annexure-I.
2. The Board of studies approved the syllabus of Basics of Electrical Engineering (Theory) to be offered for 1st year (common for all branches) as attached in Annexure-II.
3. The Board of studies approved the syllabus of Basics of Electrical Engineering (Lab) for 1st year (common for all branches) to be offered for 1st year (common for all branches) as attached in Annexure-III.
4. The panel of theory paper setter and practical examiner has been approved by the BOS attached as Annexure-IV.

Vote of Thanks: Mr. Abhishake Jain proposed the vote of thanks, expressing gratitude to all members for their valuable contributions and active participation.

The meeting concluded with the Chairperson thanking all members for their presence and insights.

Annexure 2.12

GANGA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, KABLANA (JHAJJAR)
An Autonomous Institute

'A' GRADE ACCREDITED BY NAAC

Evaluation Scheme & Syllabus For

Master of Technology

(Electrical Power Systems)

(Effective from the Session: 2024-25)

APPROVED BY AICTE, NEW DELHI AND AFFILIATED TO MDU, ROHTAK

1. DEFINITION OF CREDIT

1	1 Lecture (L) per week	1 Credit
2	4 Project per week	2 Credit
3	2 Practical (Lab) per week	1 Credit
4	2 Seminar per week	2 Credit

2. RANGE OF CREDIT

A credits of 81 for a student to be eligible to get Post Graduate degree in Engineering.

3. STRUCTURE OF POSTGRADUATE ENGINEERING PROGRAM (M.TECH)

Sr. No.	Category	Breakup of Credits
1	Professional Core Courses	28
2	Professional Elective Courses (Relevant to chosen specialization/branch)	8
3	Multidisciplinary Open Elective Courses	6
4	Foundation Elective Courses	3
5	Mandatory Learning Courses	3
6	Seminar	6
7	Lab Courses	3
8	Project	2
9	Dissertation	22
	Total Credits	**81**

**Minor variation is allowed as per need of the respective disciplines.*

4. COURSE CODE AND DEFINITIONS

Sr. No.	Category	Course Code
1	Professional Core Courses	PCC
2	Professional Elective Courses (Relevant to chosen specialization/branch)	PEC
3	Mandatory Learning Courses	MLC
4	Multidisciplinary Open Elective Courses	OEC
5	Foundation Elective Courses	FEC
6	Seminar	SM
7	Lab Courses	LC
8	Project	PROJ
9	Dissertation	DISS

GANGA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, KABLANA, JHAJJAR (HR.)

Scheme of Studies and Examination

M.Tech (Electrical Power Systems) – 1st Semester

w.e.f. 2024-25

Sr. No.	Category	Course Code	Course Title	Hours per week			Total Load Per Week	Credits	Examination Scheme (Marks)				Exam Duration in H
				Lecture (L)	Tutorial (T)	Practical (P)			Assessment	End Semester Examination		Total	
										Theory	Practical		
1	Professional Core Courses	PCC-MTEPS-101A	Microprocessor & Microcontroller	4	0	0	4	4	40	60		100	3
2	Professional Core Courses	PCC-MTEPS-103A	HVDC Transmission	4	0	0	4	4	40	60		100	3
3	Professional Core Courses	PCC-MTEPS-105A	Power System Operation and Control	4	0	0	4	4	40	60		100	3
4	Professional Core Courses	PCC-MTEPS-107A	Reactive Power Compensation & Management	4	0	0	4	4	40	60		100	3
5	Professional Core Courses	PCC-MTEPS-109A	Electrical Distribution System	4	0	0	4	4	40	60		100	3
6	Lab Course	LC-MTEPS-111A	Power System Lab	0	0	2	2	1	25		25	50	3
7	Lab Course	LCMTEPS-113A	Simulation Lab	0	0	2	2	1	25		25	50	3
8	Seminar	SM-MTEPS-115A	Seminar-I	0	0	2	2	2	50			50	
Total Credits								**24**				**650**	

GANGA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, KABLANA, JHAJJAR (HR.)

Scheme of Studies and Examination

M.Tech (Electrical Power Systems) – 2nd Semester

w.e.f. 2024-25

Sr. No.	Category	Course Code	Course Title	Hours per week			Total Load Per Week	Credits	Examination Scheme (Marks)				Exam Duration in H
				Lecture (L)	Tutorial (T)	Practical (P)			Assessment	End Semester Examination		Total	
										Theory	Practical		
1	Professional Core Courses	PCC-MTEPS-102A	Power System Dynamics and Stability	4	0	0	4	4	40	60		100	3
2	Professional Core Courses	PCC-MTEPS-104A	FACTS Controller	4	0	0	4	4	40	60		100	3
4	Professional Elective Courses	Refer Table -I	……	4	0	0	4	4	40	60		100	3
5	Multidisciplinary Open Elective Courses	Refer Table -II	……	3	0	0	3	3	40	60		100	3
6	Foundation Elective Courses	Refer Table -III	……	3	0	0	3	3	40	60		100	3
7	Lab Course	LC-MTEPS-116A	Soft Computing Lab	0	0	2	2	1	25		25	50	3
8	Seminar	SM-MTEPS-118A	Seminar-II	0	0	2	2	2	50			50	
Total Credits								**21**				**600**	

GANGA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, KABLANA, JHAJJAR (HR.)

Scheme of Studies and Examination

M.Tech (Electrical Power Systems) – 3rd Semester

w.e.f. 2024-25

Sr. No.	Category	Course Code	Course Title	Hours per week			Total Load Per Week	Credits	Examination Scheme (Marks)				Exam Duration in H
				Lecture (L)	Tutorial (T)	Practical (P)			Assessment	End Semester Examination		Total	
										Theory	Practical		
1	Mandatory learning courses	MLC-MTEPS-201A	Research Methodology	3	0	0	3	3	40	60		100	3
2	Professional Elective Courses	Refer Table -IV	……	4	0	0	4	4	40	60		100	3
3	Multidisciplinary Open Elective Courses	Refer Table -V	……	3	0	0	3	3	40	60		100	3
4	Project Courses	PROJ-MTEPS-211A	Project	0	0	4	4	2	50		50	100	3
5	Seminar	SM-MTEPS-213A	Seminar-III	0	0	2	2	2	50			50	
6	Dissertation	DISS-MT-EPS-215A	Literature Survey (Dissertation stage 1)	0	0	4	4	2	100			100	
Total Credits								**16**				**550**	

GANGA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, KABLANA, JHAJJAR (HR.)

Scheme of Studies and Examination

M.Tech (Electrical Power Systems) – 4th Semester

w.e.f. 2024-25

Sr. No.	Category	Course Code	Course Title	Hours per week			Total Load Per Week	Credits	Examination Scheme (Marks)				Exam Duration in H
				Lecture (L)	Tutorial (T)	Practical (P)			Assessment	End Semester Examination		Total	
										Theory	Practical		
1	Dissertation	DISS-MTEPS-202A	Dissertation and viva (Dissertation Stage 2)	-	-	-	-	20	250		500	750	
Total Credits								**20**				**750**	

Notes:

- The student has to publish at least one research paper related to his/her research work in peer-reviewed/Refereed/UGC/ SCOPUS/SCI Journal/Proceeding of National/ International conference before the final viva of Dissertation Stage-2.

Table I (Professional Elective Courses)

S.No.	Course Code	Course
1	PEC-MTEPS-106A	Real-time control of Power System
2	PEC-MTEPS-108A	EHVAC Transmission
3	PEC-MTEPS-110A	AI Techniques
4	PEC-MTEPS-112A	Insulation technology
5	PEC-MTEPS-114A	Smart Grid Technology

Table II (Multidisciplinary Open Elective-I Courses)

Students of all M.Tech programmes are required to study one Multidisciplinary open elective course in each of the 2nd and 3rd semesters and one foundation elective course in 2nd semester for 2-year programmes. They may choose any one of the following courses (excluding the course offered by the department of their own subjects, if not stated otherwise).

S.No.	Course Code	Course Name	Offered by Department
1	OEC-130A	Basics of Economics	Management Department
2	OEC-132A	Fundamental of Management	Management Department
3	OEC-134A	Disaster Management	Civil department
4	OEC-136A	Industrial Safety	Fire Technology and Safety
5	OEC-138A	Indian Literature in Translation-I	Applied Sc. & Humanities (English)
6	OEC-140A	Environmental Issues	Applied Sc. & Humanities (Chemistry)
7	OEC-142A	Quantitative Research	Applied Sc. & Humanities (Mathematics)
8	OEC-144A	Sources of Energy-I	Electrical Engineering

9	OEC-146A	Operation Research	Mechanical Engineering
10	OEC-148A	Multimedia Communication	Electronics and Communication Engineering
11	OEC-150A	Introduction to Information technology	Computer science & Applications
12	OEC-152A	Cyber forensics and Security	Computer Sc. & Engineering
13	OEC-154A	Computer science and Principles	Computer Sc. & Engineering
14	OEC-156A	Software Engineering Practice	Computer Sc. & Engineering

Table III (Foundation Elective Courses)

S.No.	Course Code	Course Name	Offered by Department
1	FEC-158A	Basics of Accounting	Management Department
2	FEC-160A	Basics of E-Commerce	Management Department
3	FEC-162A	Elements of Banking	Management Department
4	FEC-164A	Computer Fundamentals	Computer Sc. & Engineering
5	FEC-166A	Communication and Soft Skills	Applied Sc. & Humanities (English)
6	FEC-168A	Entrepreneurship Development	Management Department

7	FEC-170A	Electronics Engineering	Electronics and Communication Engineering

Table IV (Professional Elective Courses)

S.No.	Course Code	Course
1	PEC-MTEPS-203A	Advanced power system protection
2	PEC-MTEPS-205A	Power Quality
3	PEC-MTEPS-207A	Digital Control System
4	PEC-MTEPS-209A	Demand side Energy Management

GANGA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, KABLANA, JHAJJAR (HR.)

Scheme of Studies and Examination

M.Tech (Electrical Power Systems) – 1st Semester

w.e.f. 2024-25

Sr. No.	Category	Course Code	Course Title	Hours per week			Total Load Per Week	Credits	Examination Scheme (Marks)				Exam Duration in H
				Lecture (L)	Tutorial (T)	Practical (P)			Assessment	End Semester Examination		Total	
										Theory	Practical		
1	Professional Core Courses	PCC-MTEPS-101A	Microprocessor & Microcontroller	4	0	0	4	4	40	60		100	3
2	Professional Core Courses	PCC-MTEPS-103A	HVDC Transmission	4	0	0	4	4	40	60		100	3
3	Professional Core Courses	PCC-MTEPS-105A	Power System Operation and Control	4	0	0	4	4	40	60		100	3
4	Professional Core Courses	PCC-MTEPS-107A	Reactive Power Compensation & Management	4	0	0	4	4	40	60		100	3
5	Professional Core Courses	PCC-MTEPS-109A	Electrical Distribution System	4	0	0	4	4	40	60		100	3
6	Lab Course	LC-MTEPS-111A	Power System Lab	0	0	2	2	1	25		25	50	3
7	Lab Course	LCMTEPS-113A	Simulation Lab	0	0	2	2	1	25		25	50	3
8	Seminar	SM-MTEPS-115A	Seminar-I	0	0	2	2	2	50			50	
							Total Credits	**24**				**650**	

Course code	**PCC-MTEPS-101A**				
Category	Professional Core Courses				
Course title	**Microprocessors & Micro Controllers**				
Scheme and Credits	L	T	P	Credits	Semester-I
	4	0	0	4	
Course Objectives:	The objectives of this course are to • Gain a foundational understanding of the architecture and organization of the 8086 and 8051 microcontrollers. • Develop proficiency in using the instruction sets of the 8086 and 8051, focusing on writing and debugging assembly language programs. • Learn fundamental I/O concepts and interfacing methods for connecting peripherals to microcontroller systems. • Analyze simple embedded systems using the 8086 and 8051 microcontrollers through hands-on projects.				
Class work	40 Marks				
Exam	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Describe the basic concept of microprocessor, microcontroller and peripheral chips.	Level 1: Remember
CO2	Compare the design and working of microprocessor and microcontroller.	Level 2: Understand
CO3	Applying interfacing between microprocessor or microcontroller and peripheral chips.	Level 3: Apply
CO4	Differentiate architecture, pin diagram and working of microprocessor and microcontroller.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit No.	Contents
Unit-I	Introduction to 8086 Microprocessor: Register Organization of 8086, Architecture, Signal description of 8086, Physical memory Organization, and addressing modes of 8086, 8086/8088 Instruction set and assembler directives, machine language instruction formats. Introduction to advanced microprocessor: 80386 & 80486

Unit-II	Bus Operation and I/O Operations: General Bus Operation, Minimum and Maximum Mode of 8086 system, Fundamental I/O consideration, Programmed I/O, Interrupt I/O, Block transfers and DMA.
Unit-III	Introduction to Stack, Interrupts and Interfacing: Introduction to stack, stack structure of 8086/8088, interrupts and Interrupts service routine, interrupt cycle of 8086/8088, Interfacing ROM, RAM and I/O ports to Micro computer system, PPI (Programmable Peripheral Interface), 8255 modes of Operation, Interfacing A/D and D/A converters, Interfacing principles and stepper motor interfacing.
Unit-IV	Microcontroller: Introduction to 8051/31 Micro-Controller, PIN Diagram, architecture, Different modes of operation of timer/counter, addressing modes of 8051 and instruction set, Programmable interval timer 8254, Programmable Interrupt Controller 8259A, key board or display controller 8279, Programmable Communication Interface 8251 USART.

Suggested Readings:

- Microprocessors and Interfacing: Programming and Hardware by Douglas V. Hall, 2nd edition, TMH, New Delhi, 1999.
- Micro Computer Systems : The 8086/8088 family by YU-CHENG LIU, GLENN A. GIBSON, 2nd edition, PHI India, 2000.
- The 8051Microcontrollers : Architecture, Programming & Applications by Kenneth J Ayala, Second Edition, Penram International Publishing (India).
- Advanced Microprocessors and Peripherals, Architecture Programming and Interfacing by A.K. Ray & K.M. Bhurchandi, Forth reprint 2004, TMH.
- The 8051 Microcontroller and Embedded Systems – Mohammad Ali Mazdi, Janice GillispieMazidi, Pearson Education (Singapore) Pvt. Ltd., 2003.

Useful Video links:

Unit No.	Topics	Links
Unit-I	Introduction to 8086 Microprocessor	https://archive.nptel.ac.in/courses/108/103/108103157/
Unit-II	8086 Microprocessor	https://youtu.be/LnDMIaTJF6s
	I/O Operations	https://archive.nptel.ac.in/courses/108/103/108103157/
Unit-III	Stack, Interrupts and Interfacing	https://archive.nptel.ac.in/courses/108/103/108103157/
	Microprocessors and Interfacing	https://youtu.be/0t4LROuEVnw?list=PLwdnzlV3ogoXgNjr_oe5cWQIbf72ZY4Zf
	stack structure of 8086	https://archive.nptel.ac.in/courses/108/105/108105102/
Unit-IV	8051 Microcontroller	https://archive.nptel.ac.in/courses/108/105/108105102/
	Programmable Interrupt Controller 8259A	https://archive.nptel.ac.in/courses/108/107/108107029/

<table>
<tr><td>Course code</td><td colspan="5">PCC-MTEPS-103A</td></tr>
<tr><td>Category</td><td colspan="5">Professional Core Courses</td></tr>
<tr><td>Course title</td><td colspan="5">H.V.D.C. Transmission</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td rowspan="2">Semester-I</td></tr>
<tr><td>4</td><td>0</td><td>0</td><td>4</td></tr>
<tr><td>Course Objectives:</td><td colspan="5">The objectives of this course are to
Understand the principles and configurations of HVDC systems and static converters.
Analyze harmonics in HVDC systems and explore control strategies for optimal performance.
Evaluate the interactions between HV AC and DC systems, focusing on stability and modulation techniques.
Implement protection methods for HVDC systems against overvoltage’s and faults to ensure reliability.</td></tr>
<tr><td>Class work</td><td colspan="5">40 Marks</td></tr>
<tr><td>Exam</td><td colspan="5">60 Marks</td></tr>
<tr><td>Total</td><td colspan="5">100 Marks</td></tr>
<tr><td>Duration of Exam</td><td colspan="5">03 Hours</td></tr>
</table>

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Recall substation, general power electronics components, harmonics, transients, components of substation and transmission line components in HVDC and HVAC system.	Level 1: Remember
CO2	Understand working principle, converters, rectifier, filters, firing angle, DC links, voltage disturbances, protection system in HVDC System.	Level 2: Understand
CO3	Apply converters, rectifier, harmonics and transients filters, firing angle, DC links, voltage disturbances, protection system in HVDC System.	Level 3: Apply
CO4	Compare HVDC and HVAC system with its components, Converters. Control Schemes, power handling capabilities and other factors	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit No.	Contents
Unit-I	**Introduction to HVDC System and Converters:** General considerations, Power Handling Capabilities of HVDC Lines, Basic Conversion principles, static converter configuration. Static Power Converters: 3-pulse, 6-pulse and 12-pulse converters, converter station and Terminal equipment, commutation process, Rectifier and inverter operation, equivalent circuit for converter – special features of converter transformers.
Unit-II	**Harmonics and Control of HVDC System:** Harmonics in HVDC Systems, Harmonic elimination, AC and DC filters, Control of HVDC Converters and systems: constant current, constant extinction angle and constant Ignition angle control. Individual phase control and equidistant firing angle control, DC power flow control.
Unit-III	**MTDC System:** Interaction between HV AC and DC systems – Voltage interaction, Harmonic instability problems and DC power modulation, Multi-terminal DC links and systems: series, parallel and series parallel systems, their operation and control.
Unit-IV	**Faults and Protection in HVDC system:** Transient over voltages in HV DC systems: Over voltages due to disturbances on DC side, over voltages due to DC and AC side line faults, Converter faults and protection in HVDC Systems: Converter faults, over current protection - valve group, and DC line protection, circuit breakers. Over voltage protection of converters, surge arresters.

Suggested Readings

1. K.R.Padiyar : High Voltage Direct current Transmission, Wiley Eastern Ltd., New Delhi – 1992.
2. E.W. Kimbark : Direct current Transmission, Wiley Inter Science – New York.
3. J.Arillaga : H.V.D.C.Transmission Peter Peregrinus ltd., London UK 1983
4. E.Uhlman : Power Transmission by Direct Current, Springer Verlag, Berlin Helberg –1985.

Useful Video links:

Unit No.	Topics	Links
Unit-I	HVDC System	https://nptel.ac.in/courses/108104013
	Converters	https://archive.nptel.ac.in/courses/108/102/108102157/
Unit-II	Harmonics and Control of HVDC System	https://archive.nptel.ac.in/courses/108/104/108104013/
	Harmonics in HVDC Systems	https://archive.nptel.ac.in/courses/108/106/108106160/
Unit-III	HVAC AND HVDC system	https://archive.nptel.ac.in/courses/108/108/108108099/
	DC power modulation	https://archive.nptel.ac.in/courses/108/108/108108035/
Unit-IV	Faults and Protection in HVDC system	https://youtu.be/6WmOuK7oVHI

Course code	**PCC-MTEPS-105A**				
Category	Professional Core Courses				
Course title	**Power System Operation and Control**				
Scheme and Credits	L	T	P	**Credits**	Semester-I
	4	0	0	4	
Course Objectives:	The objectives of this course are to • Enable students to solve Unit Commitment Problems using various methods while considering thermal and hydro constraints. • Equip students to apply Load Frequency Control techniques, including Proportional-Integral control. • Train students to analyze and optimize load frequency control in two-area systems. • Develop skills to assess economic interchange impacts, including unit commitment and transmission losses in power systems.				
Class work	40 Marks				
Exam	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	**Skills Demonstrated**	**RBT Level**
CO1	Understand Unit commitment, load frequency control and generation with limited energy supply	Level 1: Remember
CO2	Solve unit commitment problem by different method and fuel scheduling by linear programming	Level 2: Understand
CO3	Analyze steady state and dynamic response of 1-area, 2-area and multi area system and estimate generation cost.	Level 3: Apply
CO4	Compare interchange evaluation methods	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit No.	Contents
Unit-I	**Unit Commitment:** Unit commitment problem: Introductions to UCP, thermal & Hydro constraints in Unit commitment: Priority list scheme method, unit commitment problem solution by priority list scheme method, Unit commitment problem solutions by Dynamic Programming Approach. Introduction, advantages of DP method over priority list scheme, Backward & forward DP approach algorithm and their flow charts.
Unit-II	**Load Frequency control-I**: Necessity of keeping frequency constant. Definition of control area, single area control, Block diagram representation of an isolated Power System, Steady State analysis, Dynamic response-uncontrolled case, Proportional plus Integral control of single area and its block diagram representation, steady state response, load frequency control and Economic dispatch control.
Unit-III	**Load Frequency control-II**: Load frequency control of 2-area system: uncontrolled case and controlled case, tie-time bias control, Optimal LF control-steady state representation, performance Index and optimal parameter adjustment.
Unit-IV	**Interchange of Power and Energy:** Interchange Evaluation and Power Pools Economy Interchange, Economy interchange Evaluation, Interchange Evaluation with unit commitment, Multiple Interchange contracts. After-the-fact production costing, Transmission Losses in transaction Evaluation, other types of Interchange, power pools, Take-or-pay fuel supply contract, composite generation production cost function.

Suggested Readings

1. Electrical Energy Systems Theory - by O.I.Elgerd, Tata McGraw-Hill Publishing Company Ltd, 2nd edition.
2. Power System Analysis by HadiSaadat – Tata McGraw Hill Publications
3. Power Generation, Operation and Control - by A.J.Wood and B.F.Wollenberg, Johnwiley & sons Inc. 1984.
4. Modern Power System Analysis - by I.J.Nagrath & D.P.Kothari, Tata McGraw-Hill Publishing Company ltd, 2nd edition.

Useful Video links:

Unit No.	Topics	Links
Unit-I	Unit Commitment	https://archive.nptel.ac.in/courses/108/102/108102047/
	Dynamic programming	https://archive.nptel.ac.in/courses/108/105/108105104/
Unit-II	Load Frequency control-I	https://archive.nptel.ac.in/courses/108/105/108105104/
	LFC single area case	https://archive.nptel.ac.in/courses/108/102/108102047/
Unit-III	LFC for two area case	https://archive.nptel.ac.in/courses/108/105/108105104/
Unit-IV	Interchange of Power and Energy	https://archive.nptel.ac.in/courses/108/101/108101005/

<table>
<tr><td>Course code</td><td colspan="5">PCC-MTEPS-107A</td></tr>
<tr><td>Category</td><td colspan="5">Professional Core Courses</td></tr>
<tr><td>Course title</td><td colspan="5">Reactive Power Compensation and Management</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td rowspan="2">Semester-I</td></tr>
<tr><td>4</td><td>0</td><td>0</td><td>4</td></tr>
<tr><td>Course Objectives:</td><td colspan="5">The objectives of this course are to
Grasp the key principles of reactive power and its impact on voltage regulation and load compensation.
Explore and evaluate various methods of compensation to enhance system performance in different operating conditions.
Assess power quality issues and develop effective strategies for reactive power planning and loss reduction.
Implement load-shaping techniques and analyze power tariffs to improve efficiency in electrical systems, especially for industrial applications.</td></tr>
<tr><td>Class work</td><td colspan="5">40 Marks</td></tr>
<tr><td>Exam</td><td colspan="5">60 Marks</td></tr>
<tr><td>Total</td><td colspan="5">100 Marks</td></tr>
<tr><td>Duration of Exam</td><td colspan="5">03 Hours</td></tr>
</table>

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Recall Reactive Power Characteristics, Types of Compensation and Reactive Power Management	Level 1: Remember
CO2	Explain load compensation and its importance to society and industry	Level 2: Understand
CO3	Identify disturbances-steady –state variations – effects of under voltages – frequency Harmonics,	Level 3: Apply
CO4	Examine Load patterns – basic methods load shaping – power tariffs- KVAR based tariffs penalties for voltage flickers and Harmonic voltage levels.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit No.	Contents
Unit-I	**Load Compensation and Reactive Power Coordination:** Objectives and specifications – reactive power characteristics – inductive and capacitive approximate biasing – Load compensator as a voltage regulator – phase balancing and power factor correction of unsymmetrical loads- examples, Objective – Operation planning – transmission benefits – Basic concepts of quality of power supply – disturbances- steady –state variations – effects of under voltages – frequency – Harmonics, radio frequency and electromagnetic interferences**.**
Unit-II	**Reactive Power Compensation in Transmission System:** Transient state: Characteristic time periods – passive shunt compensation – static compensations- series capacitor compensation – compensation using synchronous condensers – examples, Steady-state: Uncompensated line – types of compensation – Passive shunt and series and dynamic shunt compensation – examples**.**
Unit-III	**Reactive Power Management:** Distribution side: System losses –loss reduction methods – examples – Reactive power planning – objectives – Economics Planning capacitor placement – retrofitting of capacitor, User Side: KVAR requirements for domestic appliances – Purpose of using capacitors – selection of capacitors – deciding factors – types of available capacitor, characteristics and Limitations**.**
Unit-IV	**Demand side Management:** Load patterns – basic methods load shaping – power tariffs- KVAR based tariffs penalties for voltage flickers and Harmonic voltage levels, Typical layout of traction systems – reactive power control requirements – distribution transformers- Electric arc furnaces – basic operations- furnaces transformer –filter requirements – remedial measures –power factor of an arc furnace.

Suggested Readings

1. Reactive power control in Electric power systems by T.J.E. Miller, John Wiley and sons, 1982
2. Reactive power Management by D.M. Tagare, Tata McGraw Hill, 2004.
3. Power System Analysis by HadiSaadat – Tata McGraw Hill Publications
4. Power Generation, Operation and Control - by A.J.Wood and B.F.Wollenberg, Johnwiley & sons Inc. 1984.
5. Modern Power System Analysis - by I.J.Nagrath & D.P.Kothari, Tata McGraw-Hill Publishing Company ltd, 2nd edition.

Useful Video links:

Unit No.	Topics	Links
Unit-I	Reactive power and voltage control	http://kcl.digimat.in/nptel/courses/video/108105133/L50.html
Unit-II	Reactive Power Compensation in Transmission System	https://www.youtube.com/watch?app=desktop&v=OR5Fdfh9Hbw
Unit-III	Reactive Power Management	https://archive.nptel.ac.in/courses/108/105/108105133/
Unit-IV	Demand side management	https://youtu.be/ExIYoi8_WPM

Course code	**PCC-MTEPS-109A**				
Category	Professional Core Courses				
Course title	**Electrical Distribution System**				
Scheme and Credits	L	T	P	**Credits**	Semester-I
	4	0	0	4	
Course Objectives:	The objectives of this course are to • Develop a foundational knowledge of key concepts in distribution systems, including load modeling and load factor relationships. • Acquire skills to design and evaluate distribution feeders and substations for optimal performance and service delivery. • Learn to identify common faults and coordinate protective devices to enhance system reliability and safety. • Explore strategies for power factor correction and voltage control, focusing on the effective use of capacitors in distribution systems.				
Class work	40 Marks				
Exam	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	**Skills Demonstrated**	**RBT Level**
CO1	Recall economic factors, substation, feeders, basic components of substation and feeders etc.	Level 1: Remember
CO2	Understand the construction, design, modeling, protection systems of distribution system.	Level 2: Understand
CO3	Apply construction, design, modeling, protection systems, loss calculation techniques of distribution system..	Level 3: Apply
CO4	Analyze different factors, parameters, location, and coordination of different devices of the distribution system.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit No.	Contents
Unit-I	**Introduction to Distribution System:** Introduction to Distribution systems, an overview of the role of computers in distribution system planning-Load modeling and characteristics: definition of basic terms like demand factor, utilization factor, load factor, plant factor, diversity factor, coincidence factor, contribution factor and loss factor-Relationship between the load factor and loss factor - Classification of loads (Residential, Commercial, Agricultural and Industrial) and their characteristics.
Unit-II	**Feeders and Substations:** Distribution Feeders and Substations: Design consideration of Distribution feeders: Radial and loop types of primary feeders, voltage levels, feeder-loading, Design practice of the secondary distribution system, Location of Substations: Rating of a Distribution Substation, service area with primary feeders. Benefits derived through optimal location of substations.
Unit-III	**Protective Devices and coordination**: Objectives of distribution system protection, types of common faults and procedure for fault calculation, Principle of operation of fuses, circuit reclosers, line sectionalizer and circuit breakers. Coordination of protective devices: General coordination procedure.
Unit-IV	**Capacitive compensation for power factor control:** Different types of power capacitors, shunt and series capacitors, effect of shunt capacitors (Fixed and switched) power factor correction, capacitor location. Economic justification. Procedure to determine The best capacitor location, Voltage control: Equipment for voltage control, effect of series capacitors, effect of AVB/AVR, line drop compensation.

Suggested Readings

1. Electric Power Distribution System Engineering by Turan Gonen, Mc.Graw-Hill Book Company, 1986.
2. Electric Power Distribution-by A.S. Pabla, Tata McGraw-Hill Publishing Company, 4th edition, 1997.
3. M.K. Khedkar, G.M. Dhole, “A Text Book of Electrical power Distribution Automation”, University Science Press, New Delhi.
4. Anthony J Panseni, “Electrical Distribution Engineering”, CRC Press.
5. James Momoh, “Electric Power Distribution, automation, protection & control”, CRC Press.

Useful Video links:

Unit No.	Topics	Links
Unit-I	Introduction to Distribution System	https://archive.nptel.ac.in/courses/108/107/108107112/
	Operation and planning of Distribution system	https://archive.nptel.ac.in/courses/117/103/117103149/
Unit-II	Substation	https://youtu.be/5Y_XAQMXsC8
	Distribution System Components, Systems and Operations	https://youtu.be/su2wlj877Kc
Unit-III	Protective Devices	https://archive.nptel.ac.in/courses/108/107/108107167/
Unit-IV	Capacitive compensation for power factor control	https://youtu.be/2td7tXl7Nhc

Course code	**LC-MTEPS-111A**				
Category	Laboratory Core Courses				
Course title	**Power System Laboratory**				
Scheme and Credits	L	T	P	**Credits**	Semester-I
	0	0	2	1	
Course Objectives:	The objectives of this course are to ● Analyze the performance of synchronous machines by determining sub-transient reactance and sequence impedances under various operating conditions. ● Understand power system protection through the study of IDMT overcurrent relays, static negative sequence relays, and differential relays, focusing on their characteristics and applications. ● Analyze transmission lines, examining the Ferranti effect, surge impedance loading, and voltage control techniques. ● Perform transformer oil testing to assess transformers' health, and evaluate dielectric strength, moisture content, and other key parameters.				
Assessment	25 Marks				
Practical Examination	25 Marks				
Total Marks	50				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Define the methods for determining sub-transient reactance and sequence impedances for synchronous machines.	Level 1: Remember
CO2	Explain the fault analysis techniques for different fault types in synchronous machines, including LG, LL, LLG, and LLLG faults.	Level 2: Understand
CO3	Apply fault analysis and relay characteristics for fault protection in power systems, including IDMT and Over Voltage Relays.	Level 3: Apply
CO4	Analyze the simulation of transmission lines and transformer testing techniques, including Ferranti effect and surge impedance.	Level 4: Analyze

LIST OF EXPERIMENTS:

S. No.	Contents
1	Determination of Sub-Transient Reactance of a Salient Pole Machine.
2	Determination of Sequence Impedances of a Cylindrical Rotor Synchronous Machine.
3	Fault Analysis of i) LG Fault ii) LL Fault iii) LLG Fault iv) LLLG Fault
4	Power Angle Characteristics of a Salient Pole Synchronous Machine.
5	Equivalent Circuit of a Three Winding Transformer.
6	Characteristics of IDMT Over Current Relay (Electro Magnetic Type).

7	Characteristics of Static Negative Sequence Relay.
8	Characteristics of Over Voltage Relay. i) Electromagnetic Type ii) Microprocessor Type
9	Characteristics of Percentage Biased Differential Relay. i) Electromagnetic Type ii) Static Type
10	Simulation of 220KV Transmission line model. i) Ferranti Effect ii) Transmission line parameter iii) Surge Impedance loadings iv) Voltage control methods
11	Transformer Oil Testing.

Virtual Lab Links:

Experiment Name	Virtual Lab Links
Determination of Sub-Transient Reactance of a Salient Pole Machine.	https://vp-dei.vlabs.ac.in/Dreamweaver/exp8.html
Determination of Sequence Impedances of a Cylindrical Rotor Synchronous Machine.	https://vp-dei.vlabs.ac.in/Dreamweaver/exp3.html
Characteristics of IDMT Over Current Relay (Electro Magnetic Type).	https://vp-dei.vlabs.ac.in/Dreamweaver/exp7.html
Characteristics of Percentage Biased Differential Relay. i) Electromagnetic Type ii) Static Type	https://vp-dei.vlabs.ac.in/Dreamweaver/exp10.html
Transformer Oil Testing.	https://vp-dei.vlabs.ac.in/Dreamweaver/exp4.html

Note: At least 10 experiments are to be performed by the students. Faculty members can add 2-3 extra experiment if they feel useful to add.

Course code	**LC-MTEPS-113A**				
Category	Laboratory Core Courses				
Course title	**Simulation Laboratory**				
Scheme and Credits	L	T	P	**Credits**	Semester-I
	0	0	2	1	
Course Objectives:	The objectives of this course are to ● Apply methods for load flow, fault analysis, and stability assessment in power systems. ● Solve economic load dispatch and unit commitment problems, with and without transmission losses. ● Perform transient stability analysis and evaluate system responses using simulation tools like SIMULINK. ● Implement control techniques, such as integral control, for multi-area power system stability and efficiency.				
Course Pre-requisite	B.Tech				
Class work	25 Marks				
Exam	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	**Skills Demonstrated**	**RBT Level**
CO1	Determine sub transient reactance of salient pole machine and Produce characteristics of different relays.	**L1**
CO2	Analyze Different types of fault and testing of transformer oil	**L2**
CO3	Analyze fault timing in different types of relays.	**L3**
CO4	Evaluate Ferranti effect and Transmission line parameters.	**L4**

LIST OF EXPERIMENTS:

S. No.	**Contents**
1	Y - Bus Formation
2	Gauss-Seidel Load Flow Analysis.
3	Fast Decoupled Load Flow Analysis.
4	Decoupled Load Flow Analysis.
5	Load Flow Analysis for Distribution Systems.
6	Formation of Z-Bus.
7	Symmetrical and Unsymmetrical fault analysis using Z-Bus.
8	Economic load dispatch without and with transmission loss.
9	Unit Commitment Problem.
10	Hydro-thermal scheduling problem.
11	Transient stability analysis using point-by-point method.
12	Step Response of Two Area System with Integral Control and Estimation of Tie Line Power Deviation using SIMULINK

Virtual Lab Links

Experiment Name	Virtual Lab Link
Y - Bus Formation	https://srmeeevlab.github.io/PSA/3_Formation_of_Bus_admittance_Matrix_(without_mutual_coupling)/index.html
Gauss-Seidel Load Flow Analysis.	https://srmeeevlab.github.io/PSA/4_Power_Flow_Analysis_by_Gauss_Seidel_method/index.html
Fast Decoupled Load Flow Analysis.	https://srmeeevlab.github.io/PSA/6_Power_Flow_Analysis_by_Fast_Decoupled_Power_Flow_method/index.html

Note: At least 10 experiments are to be performed by the students. Faculty members can add 2-3 extra experiment if they feel useful to add.

Course Code	**SM-MT-115A**				
Category	Seminar				
Course Title	**Seminar-I**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I**
	0	0	2	**2**	
Course Objectives	The objectives of this course are • To develop students' ability to effectively present research topics and findings by effective communication. • To improve problem-solving and critical thinking skills of the students. • To expose students to the latest trends and advancements by reviewing and discussing contemporary research.				
Assessment	50 Marks				
End Semester Examination	-				
Total Marks	50				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	**Skills Demonstrated**
CO1	Identify the trends and advancements in the related field.
CO2	Analyze and synthesize research literature with in-depth reviews of key studies and methodologies.
CO3	Undertake problem identification, formulation, proposing solution and analyze the impact on society, economy and environment.
CO4	Prepare a well-organized report employing elements of effective communication and critical thinking.
CO5	Demonstrate a sound technical knowledge of their research field.

Overview:
This is a course designed to help M. Tech students develop research presentation skills. The focus is on selecting a topic or research paper relevant to their specialization, conducting an in-depth review, and effectively presenting the research findings.

General Guidelines:

Topic Selection	Each student is required to choose the research topic based on published review paper(s) or literature related to their relevant field. The same topic cannot be selected by multiple students.
Approval Process	The selected paper or topic must be approved by the faculty members/committee appointed by the Head of Department.
Presentation Guidelines	Each student will have 30-40 minutes for their presentation, followed by 5 minutes for Q&A.
Evaluation	The presentation will be evaluated by a committee constituted by the Head of Department. The evaluation will be based on:

Parameters for the Evaluation of Seminar

Sr. No.	**Parameters**	**Marks Allotted**	**Relevant COs**
1	Clarity of the topic	10	CO1
2	Literature Survey	10	CO2
3	Content Relevancy	10	CO3
4	Presentation Skills	10	CO4
5	Q&A Response	10	CO5

Course code	**PCC-MTEPS-102A**				
Category	Professional Core Courses				
Course title	**Power System Dynamics and Stability**				
Scheme and Credits	L	T	P	**Credits**	Semester-II
	4	0	0	4	
Course Objectives:	The objectives of this course are to • Understand and apply synchronous machine models in state-space form. • Analyze steady-state and dynamic stability limits of power systems. • Gain practical experience in digital simulation for transient stability assessment. • Explore the impact of excitation systems and governors on power system stability.				
Class work	40 Marks				
Exam	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Define the fundamental concepts, modeling techniques, and stability analysis of synchronous machines and power systems.	Level 1: Remember
CO2	Explain the state-space representation, machine equations, and dynamic stability analysis of power systems.	Level 2: Understand
CO3	Apply eigenvalue methods and digital simulation techniques for analyzing transient stability in multi-machine systems.	Level 3: Apply
CO4	Analyze the effects of excitation systems, governors, and voltage regulators on power system stability.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit No.	Contents	Relevant COs
Unit-I	System Dynamics: Synchronous machine model in state space form, computer representation for excitation and governor systems –modelling of loads and induction machines, Stability – steady state stability limit – Dynamic Stability limit – Dynamic stability analysis.	**CO-1 CO-2**
Unit-II	State space representation of synchronous machine connected to infinite bus, Time response – Stability by Eigen value approach, Digital Simulation of Transient Stability: Swing equation, Machine equations.	**CO-3 CO-4**
Unit-III	Concept of Multi-machine Stability, Multi-machine Transient Stability Under Different Faulted Conditions, Effect of governor action and exciter on power system stability. Effect of saturation, saliency & automatic voltage regulators on stability.	**CO-5**
Unit-IV	Excitation Systems : Rotating Self-excited Exciter with direct acting Rheostatic type, voltage regulator – Rotating main and Pilot Exciters with Indirect Acting Rheostatic Type Voltage Regulator, Rotating Main Exciter, Rotating Amplifier and Static Voltage Regulator – Static excitation scheme – Brushless excitation system.	**CO-6**

Suggested Readings

1. Power System Stability by Kimbark Vol. I&II, III – 1968, Dover Publication Inc, New York 1968.
2. Power System control and stability by Anderson and Fund, Vol – I,
3. P.M. Arolerson & A.A. fouad, Galgotia Publications, New Delhi, 1981, 1 st edition.
4. Power System Dynamics Stability and Control by K.R. Padiyar, Second edition B.S. Publications 2002.
5. Computer Applications to Power Systems–Glenn.W. Stagg &Ahmed. H.El. Abiad
6. Power Systems Analysis & Stability – S.S. VadheraKhanna Publishers.
7. Power System Analysis by "HadiSaadat" – Tata McGraw Hill Publication.
8. Power System Analysis by John J.Graniger William D.Stevenson. JR. – Tata McGraw Hill Publications.

Useful Video links:

Unit No.	Topics	Links
Unit-I	Power system stability	https://archive.nptel.ac.in/courses/108/105/108105067/
	Load modelling and stability	https://archive.nptel.ac.in/courses/108/101/108101004/
Unit-II	Swing equation	https://archive.nptel.ac.in/content/storage2/courses/108104051/chapter_9/9_3.html
	Transient stability analysis	https://archive.nptel.ac.in/courses/108/105/108105133/
Unit-III	Automatic voltage regulators	https://archive.nptel.ac.in/courses/108/101/108101004/
	Effect of governor action and exciter on power system stability	https://archive.nptel.ac.in/courses/108/102/108102080/
Unit-IV	Excitation Systems	https://archive.nptel.ac.in/courses/108/101/108101004/

<table>
<tr><td>Course code</td><td colspan="5">PCC-MTEPS-104A</td></tr>
<tr><td>Category</td><td colspan="5">Professional Core Courses</td></tr>
<tr><td>Course title</td><td colspan="5">FACTS Controller</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td rowspan="2">Semester-II</td></tr>
<tr><td>4</td><td>0</td><td>0</td><td>4</td></tr>
<tr><td>Course Objectives:</td><td colspan="5">The objectives of this course are to
• Understand AC transmission interconnections, power flow, and dynamic stability in power systems.
• Explore the types, principles, and benefits of Flexible AC Transmission Systems (FACTS) controllers.
• Analyze voltage and current source converters, focusing on their configurations and harmonic characteristics.
• Implement shunt and series compensation methods to improve voltage regulation and transient stability in power systems.</td></tr>
<tr><td>Class work</td><td colspan="5">40 Marks</td></tr>
<tr><td>Exam</td><td colspan="5">60 Marks</td></tr>
<tr><td>Total</td><td colspan="5">100 Marks</td></tr>
<tr><td>Duration of Exam</td><td colspan="5">03 Hours</td></tr>
</table>

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Define the concepts, components, and operation of power systems and FACTS controllers.	Level 1: Remember
CO2	Explain the principles, characteristics, and advantages of various FACTS controllers and high power devices.	Level 2: Understand
CO3	Apply voltage source and current source converter principles for the design and operation of FACTS controllers.	Level 3: Apply
CO4	Analyze the performance, stability enhancement, and power oscillation damping in power systems using FACTS controllers.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit No.	Contents	Relevant COs
Unit-I	Transmission interconnections, power flow in an AC System, loading capability limits, Power flow and Dynamic stability considerations, importance of controllable parameter, Opportunities for FACTS, basic types of FACTS controllers, benefits from FACTS controllers, Requirements and Characteristics of High Power devices – Voltage and Current rating, losses and speed of switching, parameter trade-off of devices.	**CO-1**
Unit-II	Basic concept of Voltage source converter, Single phase full wave bridge converter, Single phase-leg (pole) operation, Square-wave voltage harmonics for a single phase Bridge, 3 Phase full wave bridge converter, Transformer connections for 12 pulse, 24 and 48 pulse operation. Three level voltage source converter, pulse width modulation converter, basic concept of current source converters, and comparison of current source converters with voltage source converters.	**CO-2**
Unit-III	Objectives of shunt compensation, mid-point voltage regulation for line Segmentation, End of line voltage support to prevent voltage instability, improvement of transient stability, Power oscillation damping. Methods of controllable var generation: variable impedance type static var generators – TCR and TSR, TSC, FC-TCR, TSC-TCR, switching converter type var generators, hybrid var generators.	**CO-3 CO-4**
Unit-IV	SVC and STATCOM : The regulation and slope transfer function and dynamic Performance, transient stability enhancement and power oscillation damping, operating point control and summary of compensation control, Static series compensators: Concept of series capacitive compensation, improvement of transient stability, power oscillation damping, functional requirements. GTO thyristor controlled series capacitor (GSC), thyristor switched series capacitor (TSSC), and thyristor controlled series capacitor (TCSC), control schemes for GSC, TSSC and TCSC.	**CO-5 CO-6**

Suggested Readings

1. Understanding FACTS, N.G.Hingorani and L.Guygi, IEEE Press, Standard Publications, 2001.
2. Flexible ac transmission system (FACTS), Edited by YONG HUE SONG and ALLAN T JOHNS, Institution of Electrical Engineers, London.
3. FACTS Controllers in Power Transmission and Distribution by K.R. Padiyar, 2016, New age International Publishers.
4. Introduction to FACTS Controllers by Kalyan K Sen, Mey Ling Sen, Wiley 2009

Useful Video links:

Unit No.	Topics	Links
Unit-I	Introduction to FACTS	https://archive.nptel.ac.in/courses/108/107/108107114/
	PWM	https://youtu.be/IKrr6olW4pY
Unit-II	Multi-Level Inverter	https://youtu.be/X-_dUk-VEIY
Unit-III	Shunt compensator TCR and TSC	https://youtu.be/eGRtNTt61TI
Unit-IV	STATCOM	https://archive.nptel.ac.in/courses/108/107/108107114/
	Series compensator	https://archive.nptel.ac.in/courses/108/107/108107114/

Course code	**PEC-MTEPS-106A**				
Category	Professional Elective Courses				
Course title	**Real Time Control of Power System**				
Scheme and Credits	L	T	P	**Credits**	Semester-II
	4	0	0	4	
Course Objectives:	The objectives of this course are to • Apply various state estimation techniques, including Weighted Least Squares, to improve system accuracy. • Identify and eliminate bad data in power system measurements for enhanced reliability. • Perform security analysis and contingency evaluations to assess the impact of outages on power systems. • Implement SCADA systems for real-time control and monitoring of power systems.				
Class work	40 Marks				
Exam	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Define the concepts, techniques, and methods for state estimation and bad data detection in power systems.	Level 1: Remember
CO2	Explain security analysis, contingency evaluation, and the role of SCADA in power system monitoring and control.	Level 2: Understand
CO3	Apply voltage stability analysis, including P-V and Q-V curves, to assess and improve power system stability.	Level 3: Apply
CO4	Analyze the role of AI and ANN techniques for power system applications like load forecasting and fault diagnosis.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit No.	Contents
Unit-I	**State Estimation:** Different types of State Estimations, Theory of WLS state estimation, sequential and non-sequential methods to process measurements, Bad data Observability, Bad data detection, identification and elimination.
Unit-II	**Security and Contingency Evaluation:** Security concept, Security Analysis and monitoring, Contingency Analysis for Generator and line outages by iterative linear power flow method, Fast Decoupled model, and network sensitivity methods, Computer Control of Power Systems: Need for real time and computer control of power systems, operating states of a power system.
Unit-III	**SCADA** - Supervisory control and Data Acquisition systems implementation considerations, energy control centres, software requirements for implementing the above functions, Voltage Stability: What is voltage stability, voltage collapse, and voltage security, relation of voltage stability to rotor angle stability
Unit-IV	**Voltage stability analysis**: Introduction to voltage stability analysis `P-V' curves and 'Q-V' curves, voltage stability in mature power systems, long-term voltage stability, power flow analysis for voltage stability, voltage stability static indices and Research Areas Application of AI and ANN in Power System : Basic concepts and definitions, algorithms for load flow, short term load forecasting, fault diagnosis and state estimation.

Suggested Readings

1. John J.Grainger and William D.Stevenson, Jr.: Power System Analysis, McGraw-Hill, 1994, International Edition.
2. Allen J.Wood and Bruce F.Wollenberg : Power Generation operation and control, John Wiley & Sons, 1984.
3. R.N.Dhar : Computer Aided Power Systems Operation and Analysis, Tata McGraw Hill, 1982
4. L.P.Singh : Advanced Power System Analysis and Dynamics, Wiley Eastern Ltd. 1986.
5. PrabhaKundur : Power System Stability and Control -, McGraw Hill, 1994.
6. P.D.Wasserman : `Neural Computing : Theory and Practice' Van Nostrand-Feinhold, New York.

Useful Video links:

Unit No.	Topics	Links
Unit-I	State Estimation	https://youtu.be/x0g_Oua0SkA
Unit-II	Newton-Raphson Technique	https://archive.nptel.ac.in/courses/108/107/108107028/
Unit-III	SCADA	https://archive.nptel.ac.in/courses/108/106/108106022/
Unit-IV	Criterion for assessing voltage stability	https://archive.nptel.ac.in/courses/108/107/108107028/

Course code	**PEC-MTEPS-108A**				
Category	Professional Elective Courses				
Course title	**EHVAC Transmission**				
Scheme and Credits	L	T	P	**Credits**	Semester-II
	4	0	0	4	
Course Objectives:	The objectives of this course are • Understand the principles and standards of EHV A.C. transmission, including voltage levels, power handling, and line losses. • Analyze the electrical parameters of transmission lines, including the effects of bundled conductors. • Study the electrostatic effects on system performance and biological organisms. • Explore methods for voltage control, compensation, and harmonic mitigation in power systems, focusing on SVC schemes and filter design.				
Class work	40 Marks				
Exam	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Define the principles, properties, and calculations for transmission lines and associated electrical parameters.	Level 1: Remember
CO2	Explain the effects of electrostatic fields, corona, and surface voltage gradients on EHV transmission systems.	Level 2: Understand
CO3	Apply power frequency voltage control techniques and compensation methods for improving EHV transmission line stability.	Level 3: Apply
CO4	Analyze static reactive compensating systems and the effects of harmonics in EHV transmission networks.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit No.	Contents
Unit-I	E.H.V. A.C. Transmission, line trends and preliminary aspects, standard transmission voltages – power handling capacities and line losses – mechanical aspects, Calculation of line resistance and inductance: resistance of conductors, temperature rise of conductor and current carrying capacity. Properties of bundled conductors and geometric mean radius of bundle, inductance of two conductor lines and multi conductor lines, Maxwell's coefficient matrix.
Unit-II	Line capacitance calculation: capacitance of two conductor line, and capacitance of multi conductor lines, potential coefficients for bundled conductor lines, sequence inductances and capacitances and diagonalization, Calculation of electro static field of AC lines - Effect of high electrostatic field on biological organisms and human beings.
Unit-III	Surface voltage Gradient on conductors, surface gradient on two conductor bundle and cosine law, maximum surface voltage gradient of bundle with more than 3 sub-conductors, Mangolt formula, Corona : Corona in EHV lines – corona loss formulae – attenuation of traveling waves due to corona – Audio noise due to corona, its generation, characteristics and limits, measurement of audio noise.
Unit-IV	Power Frequency voltage control : Problems at power frequency, generalized constants, No load voltage conditions and charging currents, voltage control using synchronous condenser, cascade connection of components : Shunt and series compensation, sub synchronous resonance in series – capacitor compensated lines Static reactive compensating systems : Introduction, SVC schemes, Harmonics injected into network by TCR, design of filters for suppressing harmonics injected into the system.

Suggested Readings

1. Extra High Voltage AC Transmission Engineering – Rakosh Das Begamudre, Wiley Eastem ltd., New Delhi – 1987.
2. EHV Transmission line reference book – Edision Electric Institute (GEC) 1986.
3. EHV AC, HVDC Transmission and Distribution Engineering by Sunil S. Rao, 2023 Khanna Publications.
4. EHV AC, HVDC Transmission and Distribution Engineering by Sanjay Kumar Sharma, 2013 KATSON books.

Useful Video links:

Unit No.	Topics	Links
Unit-I	Introduction	https://youtu.be/1AeJ0zC90e0
Unit-II	Effect of high electrostatic field	https://archive.nptel.ac.in/courses/108/108/108108099/
Unit-III	Corona interference on transmission lines	https://youtu.be/gPxNeOYozvk
Unit-IV	Voltage control	https://www.youtube.com/watch?v=opocYkK_oSA

<table>
<tr><td>Course code</td><td colspan="5">PEC-MTEPS-110A</td></tr>
<tr><td>Category</td><td colspan="5">Professional Elective Courses</td></tr>
<tr><td>Course title</td><td colspan="5">AI Techniques</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td rowspan="2">Semester-II</td></tr>
<tr><td>4</td><td>0</td><td>0</td><td>4</td></tr>
<tr><td>Course Objectives:</td><td colspan="5">The objectives of this course are
Understand neural network fundamentals and their biological inspiration, learning processes, and applications.
Master Perceptron models and training algorithms, including their limitations and real-world uses.
Explore advanced AI techniques like backpropagation, RBF networks, and genetic algorithms for optimization and classification tasks.
Apply AI methods to solve real-world problems in power systems, including load forecasting, economic dispatch, and motor control.</td></tr>
<tr><td>Class work</td><td colspan="5">40 Marks</td></tr>
<tr><td>Exam</td><td colspan="5">60 Marks</td></tr>
<tr><td>Total</td><td colspan="5">100 Marks</td></tr>
<tr><td>Duration of Exam</td><td colspan="5">03 Hours</td></tr>
</table>

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Define fundamental concepts and models of neural networks and fuzzy sets in AI.	Level 1: Remember
CO2	Explain the structure, training algorithms, and limitations of neural network models and their applications in AI systems.	Level 2: Understand
CO3	Apply genetic algorithms, fuzzy logic systems, and backpropagation methods to AI-based solutions.	Level 3: Apply
CO4	Analyze the use of AI techniques in load forecasting, economic dispatch, and motor control applications.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit No.	Contents	Relevant COs
Unit-I	**Neural Networks:** Introduction, Humans and Computers, Organization of the Brain, Biological Neuron, Biological and Artificial Neuron Models, introduction-neural network models-architectures knowledge representation-learning process-learning tasks, Feed Forward Neural Networks: Introduction, Perceptron Models: Discrete, Continuous and Multi-Category, Training Algorithms: Discrete and Continuous Perceptron Networks, Perceptron Convergence theorem, Limitations of the Perceptron Model, Applications, ANN paradigm-back propagation-RBF algorithms-Hope field network.	**CO-1 CO-2 CO-3**
Unit-II	**Genetic algorithms** - introduction- encoding - fitness function- reproduction operators, Genetic modelling- genetic operators- cross over and mutation -generational cycle-convergence of genetic algorithm.	**CO-4**
Unit-III	**Classical AND Fuzzy Sets:** Introduction to classical sets - properties, Operations and relations; Fuzzy sets, Membership, Uncertainty, Operations, properties, fuzzy relations, cardinalities, membership functions, Fuzzy Logic System Components: Fuzzification, Membership value assignment, development of rule base and decision making system, Defuzzification to crisp sets, Defuzzification methods.	**CO-5**
Unit-IV	**Applications of Ai Techniques**-load forecasting-load flow studies-economic load dispatch-load frequency control-reactive power control-speed control of dc and ac motors	**CO-6**

Suggested Readings

1. Neural Networks, Fuzzy logic, Genetic algorithms: synthesis and applications by Rajase kharan and Rai – PHI Publication.
2. Introduction to Artificial Neural Systems - Jacek M. Zuarda, Jaico Publishing House, 1997.
3. Working with AI by Steven M. Miller, Thomas H. Davenport, 2022
4. Generative Ai: Techniques, Models & Applications,18 March 2025 by Rajan Gupta, Sanju Tiwari , Poonam Chaudhary, Springer

Useful Video links:

Unit No.	Topics	Links
Unit-I	Optimal design of Neural Networks	https://youtu.be/p-77tEMG_Vg
Unit-II	Introduction to Genetic Algorithm	https://youtu.be/UzfSy2WHORM
Unit-III	Fuzzy sets	https://archive.nptel.ac.in/courses/127/105/127105006/
Unit-IV	Application of ANN	https://youtu.be/Faqe8ioMIyk

<table>
<tr><td>Course code</td><td colspan="5">PEC-MTEPS-112A</td></tr>
<tr><td>Category</td><td colspan="5">Professional Elective Courses</td></tr>
<tr><td>Course title</td><td colspan="5">Insulation Technology</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td rowspan="2">Semester-II</td></tr>
<tr><td>4</td><td>0</td><td>0</td><td>4</td></tr>
<tr><td>Course Objectives:</td><td colspan="5">The objectives of this course are to
To understand the properties of dielectric materials and how external factors) affect their performance.
To analyze dielectric breakdown to predict and mitigate failure in electrical systems.
To examine the behavior of gaseous and liquid dielectrics under electric fields, including ionization and discharge phenomena.
To evaluate various insulating materials for their suitability in electrical applications, focusing on both natural and synthetic options.</td></tr>
<tr><td>Class work</td><td colspan="5">40 Marks</td></tr>
<tr><td>Exam</td><td colspan="5">60 Marks</td></tr>
<tr><td>Total</td><td colspan="5">100 Marks</td></tr>
<tr><td>Duration of Exam</td><td colspan="5">03 Hours</td></tr>
</table>

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Define the basic properties and behavior of insulating materials under different conditions.	Level 1: Remember
CO2	Explain the breakdown mechanisms in gaseous, solid, and liquid dielectrics, and their impact on insulation systems.	Level 2: Understand
CO3	Apply theories of breakdown mechanisms and the electrical properties of dielectrics to insulation system design.	Level 3: Apply
CO4	Analyze the factors affecting dielectric strength, breakdown mechanisms, and material behavior in various environments.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit No.	Contents	Relevant COs
Unit-I	**General Properties of Insulating Materials:** Requirements for insulating materials - electrical properties - molecular properties of dielectrics - dependence of permittivity on temperature, pressure, humidity and voltage - permittivity of mixtures - practical importance of permittivity-behavior of dielectrics under alternating fields - complex dielectric constants-bipolar relaxation and dielectric loss - dielectric strength	**CO-1**
Unit-II	**Breakdown Mechanisms in Gaseous Dielectrics:** Behavior of gaseous dielectrics in electric fields-gaseous discharges-different ionization processes-effect of electrodes on gaseous discharge - Townsend's theory - streamer theory - electronegative gases and their influence on gaseous discharge - Townsend's criterion for spark break down-gaseous discharges in non-uniform fields - breakdown in vacuum insulation.	**CO-2 CO-3**
Unit-III	**Breakdown Mechanisms in Solid Dielectrics:** Intrinsic breakdown of solid dielectrics - electromechanical breakdown – streamer breakdown and thermal breakdown of solid dielectrics - erosion-electrochemical breakdown - tracking in dielectrics and treeing.	**CO-4**
Unit-IV	**Breakdown Mechanisms in Liquid Dielectrics:** Electronic breakdown of - cavitation breakdown of liquid dielectrics - suspended particle theory of breakdown of liquid dielectrics, Insulation Materials: Natural inorganic insulating materials - synthetic inorganic insulating materials – natural organic insulating materials - synthetic organic insulating materials.	**CO-5 CO-6**

Suggested Readings

1. Adrianus, J.Dekker, "Electrical Engineering materials", Prentice Hall of India Pvt. Ltd., New Delhi, 1979
2. Van Vlack, "Elements of materials science", Addison Wesley, 1964
3. Kuffel, E., Zaengl, W.S. and Kuffel J., "High Voltage Engineering Fundamentals", Newness, Second Edition, Butterworth-Heinemann Publishers, New Delhi, 2000
4. Dissado. L.A., Fothergill. J.C, "Electrical Degradation and Breakdown in Polymers", Peter Peregrinus, 1992

Useful Video links:

Unit No.	Topics	Links
Unit-I	Cables	https://youtu.be/wh6egdeiFdk
	Insulation cordination	https://youtu.be/l4yQkZd6H2U
Unit-II	Breakdown in gaseous dielectrics	https://digimat.in/nptel/courses/video/113104090/L26.html
Unit-III	Breakdown in solid dielectrics	https://digimat.in/nptel/courses/video/113104090/L26.html
Unit-IV	Breakdown in liquid dielectrics	https://digimat.in/nptel/courses/video/113104090/L26.html

<table>
<tr><td>Course code</td><td colspan="5">PEC-MTEPS-114A</td></tr>
<tr><td>Category</td><td colspan="5">Professional Elective Courses</td></tr>
<tr><td>Course title</td><td colspan="5">Smart Grid Technology</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td rowspan="2">Semester-I</td></tr>
<tr><td>4</td><td>0</td><td>0</td><td>4</td></tr>
<tr><td>Course Objectives:</td><td colspan="5">The objectives of this course are to
Develop a foundational knowledge of key concepts in distribution systems, including load modeling and load factor relationships.
Acquire skills to design and evaluate distribution feeders and substations for optimal performance and service delivery.
Learn to identify common faults and coordinate protective devices to enhance system reliability and safety.
Explore strategies for power factor correction and voltage control, focusing on the effective use of capacitors in distribution systems.</td></tr>
<tr><td>Class work</td><td colspan="5">40 Marks</td></tr>
<tr><td>Exam</td><td colspan="5">60 Marks</td></tr>
<tr><td>Total</td><td colspan="5">100 Marks</td></tr>
<tr><td>Duration of Exam</td><td colspan="5">03 Hours</td></tr>
</table>

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Define the basic concepts, components, and principles of smart grid systems and their planning.	Level 1: Remember
CO2	Explain the operation, control, and regulatory aspects of smart grids, including voltage and frequency control.	Level 2: Understand
CO3	Apply smart grid planning techniques, including demand-side management and optimal power flow analysis.	Level 3: Apply
CO4	Analyze the economic dispatch, contingency, and voltage stability in smart grid operations and control.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit No.	Contents
Unit-I	**Analysis of Smart Grid System**: Smart grid concepts, smart grid components and control elements, Distributed generation resources and Energy Storage, Plug-in-Hybrid Electric Vehicles (PHEV), Microgrids, Load Flow study for AC/DC power system, smart grid Monitoring, smart grid standards and policies.
Unit-II	**Smart Grid Planning**: Planning Aspects of smart grid, Optimal power flow, Demand side management of smart grid, Demand response analysis of smart grid, Planning and Design of smart grid systems.
Unit-III	**Voltage and frequency control of Smart Grid:** (Angle/Voltage instability Phenomena, stability constraints), frequency & voltage regulations, Automatic generation Control, Tie-line power sharing, Voltage Stability assessment, Voltage and reactive power control, Shunt compensation, SVC, Voltage stability Indexing, and Volt-VAR support.
Unit-IV	**Operation and Control of Smart Grids:** Operational aspects of smart grid system, Economic Dispatch, Load Dispatch Centre Functions: Contingency Analysis, preventive, Emergency and Restorative, control objectives of smart distribution system, architecture and different schemes of smart grid control, bottleneck in smart grid control, Ancillary Services.

Suggested Readings

1. Electric Power Distribution System Engineering by Turan Gonen, Mc.Graw-Hill Book Company, 1986.
2. Electric Power Distribution-by A.S. Pabla, Tata McGraw-Hill Publishing Company, 4th edition, 1997.
3. M.K. Khedkar, G.M. Dhole, "A Text Book of Electrical power Distribution Automation", University Science Press, New Delhi.
4. Anthony J Panseni, "Electrical Distribution Engineering", CRC Press.
5. James Momoh, "Electric Power Distribution, automation, protection & control", CRC Press.

Useful Video links:

Unit No.	Topics	Links
Unit-I	Introduction to Distribution System	https://archive.nptel.ac.in/courses/108/107/108107112/
	Operation and planning of Distribution system	https://archive.nptel.ac.in/courses/117/103/117103149/
Unit-II	Substation	https://youtu.be/5Y_XAQMXsC8
	Distribution System Components, Systems and Operations	https://youtu.be/su2wlj877Kc
Unit-III	Protective Devices	https://archive.nptel.ac.in/courses/108/107/108107167/
Unit-IV	Capacitive compensation for power factor control	https://youtu.be/2td7tXl7Nhc

<table>
<tr><td>Course code</td><td colspan="5">LC-MTEPS-116A</td></tr>
<tr><td>Category</td><td colspan="5">Lab Course</td></tr>
<tr><td>Course title</td><td colspan="5">Soft Computing Lab</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td rowspan="2">Semester-II</td></tr>
<tr><td>0</td><td>0</td><td>2</td><td>1</td></tr>
<tr><td>Course Objectives</td><td colspan="5">The objectives of this course are to
Master fuzzy set operations (union, intersection, complement) and apply De Morgan’s laws to solve real-world problems.
Design and implement FIS using MATLAB’s FIS Editor for applications like predicting tip values based on quality and service.
Use McCulloch-Pitts neurons to solve logical functions (AND, ANDNOT, XOR) and explore multi-layer networks for non-linear problems.
Implement and test Hopfield networks for storing and retrieving patterns, handling noisy or incomplete input data.</td></tr>
<tr><td>Assessment</td><td colspan="5">25 Marks</td></tr>
<tr><td>Practical Examination</td><td colspan="5">25 Marks</td></tr>
<tr><td>Total Marks</td><td colspan="5">50</td></tr>
<tr><td>Duration of Exam</td><td colspan="5">03 Hours</td></tr>
</table>

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Define and perform fundamental set operations such as Union, Intersection, and Complement with fuzzy sets.	Level 1: Remember
CO2	Explain De Morgan's Law and demonstrate its application with fuzzy set operations, including membership function plotting.	Level 2: Understand
CO3	Apply neural network models (McCulloch-Pitts, Hebb, and Perceptron) for logical functions, classification, and weight calculation.	Level 3: Apply
CO4	Analyze associative and Hopfield neural networks for storing and testing input patterns, weight matrices, and self-connections.	Level 4: Analyze

List of Experiments

Sr. No.	Contents
1	To perform Union, Intersection and Complement operations.
2	To implement De- Morgan’s Law.
3	To plot various membership functions.
4	To implement FIS Editor. Use Fuzzy toolbox to model tip value that is given after a dinner based on quality and service.
5	To implement FIS Editor.
6	Generate AND, NOT function using McCulloch-Pitts neural net.
7	Generate XOR function using McCulloch-Pitts neural net.

8	Hebb Netto classify two dimensional input pattern sin ipolar with given targets.
9	Perceptron net for an AND function with bipolar inputs and targets.
10	To calculate the weights for given patterns using hetero-associative neural net.
11	To store vector in a nauto-associative net. Find weight matrix & amp;test the net with input.
12	To store the vector, find the weight matrix with no self-connection. Test this using a discrete Hopfield net.

Virtual Lab Links

Experiment Name	**Virtual Lab Link**
To implement FIS Editor. Use Fuzzy toolbox to model tip value that is given after a dinner based on quality and service	https://scte-iitkgp.vlabs.ac.in/exp/fuzzy-inference-system/procedure.html
Perceptron net for an AND function with bipolar inputs and targets.	https://cse22-iiith.vlabs.ac.in/exp/perceptron-learning/
To store the vector, find the weight matrix with no self-connection. Test this using a discrete Hopfield net	https://cse22-iiith.vlabs.ac.in/exp/mean-field-annealing/procedure.html
To perform Union, Intersection and Complement operations.	https://scte-iitkgp.vlabs.ac.in/exp/fundamental-fuzzy-logic/procedure.html

Course Code	**SM-MTEPS-118A**				
Category	Seminar				
Course Title	**Seminar-II**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	0	0	2	**2**	
Course Objectives	The objectives of this course are • To develop students' ability to effectively present research topics and findings by effective communication. • To improve problem-solving and critical thinking skills of the students. • To expose students to the latest trends and advancements by reviewing and discussing contemporary research.				
Assessment	50 Marks				
End Semester Examination	-				
Total Marks	50				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	**Skills Demonstrated**
CO1	Identify the trends and advancements in the related field.
CO2	Analyze and synthesize research literature with in-depth reviews of key studies and methodologies.
CO3	Undertake problem identification, formulation, proposing solution and analyze the impact on society, economy and environment.
CO4	Prepare a well-organized report employing elements of effective communication and critical thinking.
CO5	Demonstrate a sound technical knowledge of their research field.

Overview:
This is a course designed to help M. Tech students develop research presentation skills. The focus is on selecting a topic or research paper relevant to their specialization, conducting an in-depth review, and effectively presenting the research findings.

General Guidelines:

Topic Selection	Each student is required to choose the research topic based on published review paper(s) or literature related to their relevant field. The same topic cannot be selected by multiple students.
Approval Process	The selected paper or topic must be approved by the faculty members/committee appointed by the Head of Department.
Presentation Guidelines	Each student will have 30-40 minutes for their presentation, followed by 5 minutes for Q&A.
Evaluation	The presentation will be evaluated by a committee constituted by the Head of Department. The evaluation will be based on:

Parameters for the Evaluation of Seminar

Sr. No.	**Parameters**	**Marks Allotted**	**Relevant COs**
1	Clarity of the topic	10	CO1
2	Literature Survey	10	CO2
3	Content Relevancy	10	CO3
4	Presentation Skills	10	CO4
5	Q&A Response	10	CO5

Annexure 2.13

Ganga Institute of Technology and Management, Kablana
(An Autonomous Institute under Maharshi Dayanand University, Rohtak)

Minutes of 1st Meeting of Board of Studies of Civil Engineering Department held on 03.01.2025

The Board of Studies meeting was held on 03.01.2025 at 11:00 A.M in the Conference Hall of the Institute.

Members Present:

S.No.	Name of the Member	Affiliation/Organization	Designation within Board of Studies
1	Mr. Virender Singh	Chairperson	HOD & Assistant Professor, CE, GITAM, Kablana
2	Dr. Isha Verma	Member	Subject Expert (Assistant Professor, civil, UIET, MDU Rohtak), University Nominee
3	Dr. Vikas Garg	Member	Subject Expert (Professor, civil,Central University Mahendergarh), Outside Parent University
4	Dr. Mahesh Pal	Member	Subject Expert (Professor, civil,NIT KURUKSHETRA) Outside Parent University
5	Mr. Bhupender Malik	Member	Assisstant Professor, civil, GITAM Kablana
6	Mr.Md. Anzar Rabbani	Member	Assisstant Professor, civil, GITAM Kablana
7	Mr. Mukesh	Member	Assisstant Professor, civil, GITAM Kablana
8	Ms. Sheela Malik	Member	Assisstant Professor, civil, GITAM Kablana
9	Ms. Anju	Member	Assisstant Professor, civil, GITAM Kablana
10	Mr. Sachin Dalal	Member	Assisstant Professor, civil, GITAM Kablana
11	Mr.Himalaya	Member	Assisstant Professor, civil, GITAM Kablana
12	Ms. Jyoti	Member	Assisstant Professor, civil, GITAM Kablana
13	Mr.Rahul	Member	Assisstant Professor, civil, GITAM Kablana
14	Ms. Pinki	Member	Assisstant Professor, civil, GITAM Kablana
15	Mr. Chetan	Member	Assisstant Professor, civil, GITAM Kablana
16	Dr. Tinku Biswas	Member	Industry/ Corporate Sector

HOD CIVIL

Agenda of the Meeting:-

1. Introduction of the Members of the Board of Studies.
2. Review and approval of the Syllabus Prescribed for 1st Year under Autonomous Status of M.Tech (SD) Program.
3. Panel of Examiners for Theory and Practical's of B.Tech and M.Tech Program.
4. Any Other Item with the Permission of the Chair.

Agenda Items Discussed:

1. Introduction of the Members of the Board of Studies

- The meeting began with a warm welcome by Mr. Virender Singh, Chairperson, who welcomed the Experts in the Board of Studies and introduced all members of the Board of Studies with them. The members shared their affiliations and roles within the BOS.

2. Review and approval of the Syllabus Prescribed for 1st Year under Autonomous Status of M.Tech Program

3. Panel of Examiners for Theory and Practical's of B.Tech and M.Tech Program

4. Any Other Item with the Permission of the Chair

- The BOS discussed upcoming initiatives under the autonomous framework to further enhance the academic and administrative processes of the department.
- Suggestions were made to establish additional collaborations with industries and reputed academic institutions to strengthen the curriculum time to time and improve employability prospects for students.
- Prof. (Dr.) Vikas Garg from CUH Mahendergarh proposed splitting the existing course, Design of Structures, into two separate courses: Design of RCC Structures and Design of Steel Structures. He also suggested adding a new course, Design of Formwork, as an elective.
- Prof. (Dr.) Mahesh Pal proposed that the courses Material Science and Material Technology be shifted from professional core courses to elective courses.
- Dr. Isha Verma suggested adding Finite Element Method as a professional core course.

Resolutions Passed:

1. The Board of studies approved the syllabus and scheme of the M.Tech. Structural Design with minor changes.

Vote of Thanks: Ms. Sheela Malik proposed the vote of thanks, expressing gratitude to all members for their valuable contributions and active participation.

The meeting concluded with the Chairperson thanking all members for their presence and insights.

Annexure 2.14

GANGA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, KABLANA
(JHAJJAR)
An Autonomous Institute

'A' GRADE ACCREDITED BY NAAC

Evaluation Scheme & Syllabus For

Master of Technology
(Structural Design)
(Effective from the Session: 2024-25)

APPROVED BY AICTE, NEW DELHI AND AFFILIATED TO MDU, ROHTAK

1. DEFINITION OF CREDIT

1	1 Lecture (L) per week	1 Credit
2	2 Practical (Lab) per week	1 Credit
3	2 Seminar per week	2 Credit
4	4 Project per week	2 Credit

2. RANGE OF CREDIT

A credits of 86 for a student to be eligible to get Post Graduate degree in Engineering.

3. STRUCTURE OF POSTGRADUATE ENGINEERING PROGRAM (M.TECH)

Sr. No.	Category	Breakup of Credits
1	Professional Core Courses	32*
2	Professional Elective Courses (Relevant to chosen specialization/branch)	8*
3	Multidisciplinary Open Elective Courses	6*
4	Foundation Elective Courses	3*
5	Mandatory Learning course	3*
6	Seminar	6*
7	Lab Courses	4*
8	Project	2*
9	Dissertation	22*
	Total Credits	**86***

**Minor variation is allowed as per need of the respective disciplines.*

4. COURSE CODE AND DEFINITIONS

Sr. No.	Category	Course Code
1	Professional Core Courses	PCC
2	Professional Elective Courses (Relevant to chosen specialization/branch)	PEC
3	Multidisciplinary Open Elective Courses	OEC
4	Foundation Elective Courses	FEC
5	Mandatory Learning Course	MLC
6	Seminar	SM
7	Lab Courses	LC
8	Project	PROJ
9	Dissertation	DISS

GANGA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, KABLANA, JHAJJAR (HR.), DELHI-NCR

Scheme of Studies and Examination

M.Tech (Structural Design) – 1st Semester

***w.e.f.* 2024-25**

Sr No.	Category	Course Code	Course Title	Lectures per week			Total Load Per Week	Credits	Examination Scheme (Marks)				Exam Duration in Hours
				Lecture (L)	Tutorial (T)	Practical (P)			Assessment	End Semester Examination		Total	
										Theory	Practical		
1	Professional Core Courses	PCC-MTSD-101A	Material Technology	4	0	0	4	4*	40	60		100	3
2	Professional Core Courses	PCC-MTSD-103A	Advanced Structural Analysis	4	0	0	4	4*	40	60		100	3
3	Professional Core Courses	PCC-MTSD-105A	Pre-Stressed Concrete Design	4	0	0	4	4*	40	60		100	3
4	Professional Core Courses	PCC-MTSD-107A	Design of Structures-I	4	0	0	4	4*	40	60		100	3
5	Professional Core Courses	PCC-MTSD-109A	Material Science	4	0	0	4	4*	40	60		100	3
6	Lab Courses	LC-MTSD-111A	Structural Engineering Laboratory	0	0	2	2	1*	25		25	50	3
7	Lab Courses	LC-MTSD-113A	Computational Laboratory-I	0	0	2	2	1*	25		25	50	3
8	Seminar	SM-MTSD-115A	Seminar-I	0	0	2	2	2*	50			50	
							Total Credits		24*				650	

GANGA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, KABLANA, JHAJJAR (HR.), DELHI-NCR

Scheme of Studies and Examination

M.Tech (Structural Design) –2nd Semester

***w.e.f.* 2024-25**

Sr. No	Category	Course Code	Course Title	Hours per week			Total Load Per Week	Credits	Examination Scheme (Marks)				Exam Duration in Hours
				Lecture (L)	Tutorial (T)	Practical (P)			Assessment	End Semester Examination		Total	
										Theory	Practical		
1	Professional Core Courses	PCC-MTSD-102A	Stability of Structures	4	0	0	4	4*	40	60		100	3
2	Professional Core Courses	PCC-MTSD-104A	Design of Structures-II	4	0	0	4	4*	40	60		100	3
3	Professional Elective Courses	Refer Table -I	----------	4	0	0	4	4*	40	60		100	3
4	Multidisciplinary Open Elective Courses	Refer Table -II	----------	3	0	0	3	3*	40	60		100	3
5	Foundation Elective Courses	Refer Table -III	----------	3	0	0	3	3*	40	60		100	3
6	Lab Courses	LC-MTSD-106A	Structural Engineering Design Practice Lab	0	0	2	2	1*	25		25	50	3
7	Lab Courses	LC-MTSD-108A	Computational Laboratory-II	0	0	2	2	1*	25		25	50	3
8	Seminar	SM-MTSD-110A	Seminar-II	0	0	2	2	2*	50			50	
							Total Credits	22*				650	

GANGA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, KABLANA, JHAJJAR (HR.), DELHI-NCR

Scheme of Studies and Examination

M.Tech (Structural Design) –3rd Semester

***w.e.f.* 2024-25**

Sr. No.	Category	Course Code	Course Title	Hours per week			Total Load Per Week	Credits	Examination Scheme (Marks)				Exam Duration in Hours
				Lecture (L)	Tutorial (T)	Practical (P)			Assessment	End Semester Examination		Total	
										Theory	Practical		
1	Professional Core Courses	PCC-MTSD-201A	Design of Structures- III	4	0	0	4	4*	40	60		100	3
2	Mandatory Learning course	MLC-MTSD-	----------	3	0	0	3	3*	40	60		100	3
3	Professional Elective Courses	PEC-MTSD-203A	----------	4	0	0	4	4*	40	60		100	3
4	Multidisciplinary Open Elective Courses	Refer Table -V	----------	3	0	0	3	3*	40	60		100	3
5	Project Courses	PROJ-MTSD-205A	Project	0	0	4	4	2*	50		50	100	3
6	Seminar	SM-MTSD-207A	Seminar -III	0	0	2	2	2*	50			50	
7	Dissertation (Literature Survey)	DISS-MTSD-209A	Dissertation Phase-I	0	0	4	4	2*	100			100	
							Total Credits	20*				650	

GANGA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, KABLANA, JHAJJAR (HR.), DELHI-NCR

Scheme of Studies and Examination

M.Tech (Structural Design) –4th Semester

***w.e.f.* 2024-25**

Sr. No.	Category	Course Code	Course Title	Hours per week			Total Load Per Week	Credits	Examination Scheme (Marks)				Exam Duration in Hours
				Lecture (L)	Tutorial (T)	Practical (P)			Assessment	End Semester Examination		Total	
										Theory	Practical		
1	Dissertation	DISS-MTSD-202A	Dissertation and viva (Dissertation Stage 2)	-	-	-	-	20*	250		500	750	
Total Credits								20*				750	

Notes:

- The student has to publish at least one research paper related to his/her research work in peer-reviewed/Referenced/UGC/SCOPUS/SCI Journal/Proceeding of National/International conference before the final viva of Dissertation stage-2.

(Professional Elective Courses): Table I

S. No	Course Code	Course Name
1	PEC-MTSD 112A	Repairs and Rehabilitation of Structures
2	PEC-MTSD 114A	Advance Steel Design
3	PEC-MTSD 116A	Construction Failure

Table-II

Multidisciplinary open elective-I courses

Students of all M.Tech programmes are required to study one Multidisciplinary open elective course in each of the 2nd and 3rd Semesters and one foundation elective course in 2nd Semester for 2-Years Programmes. They may choose any one of the following courses (excluding the courses offered by the departments of their own subjects, if not stated otherwise).

SN	Course Code	Course Name	Offered by Department
1	OEC-130A	Basic of Economics	Management Department
2	OEC-132A	Fundamental of Management	Management Department
3	OEC-134A	Disaster Management	Civil Engineering
4	OEC-136A	Industrial Safety	Fire Technology and Safety
5	OEC-138A	Indian Literature in Translation-I	Applied Sc. & Humanities (English)
6	OEC-140A	Environmental Issues	Applied Sc. & Humanities (Chemistry)
7	OEC-142A	Quantitative Techniques	Applied Sc. & Humanities (Mathematics)
8	OEC-144A	Sources of Energy-I	Electrical Engineering
9	OEC-146A	Operation Research	Mechanical Engineering
10	OEC-148A	Multimedia Communication	Electronics and Communication Engineering
11	OEC-150A	Introduction to Information Technology	Computer Sc. & Applications
12	OEC-152A	Cyber Forensics and Security	Computer Sc. & Engineering
13	OEC-154A	Computer Science and Principles	Computer Sc. & Engineering
14	OEC-156A	Software Engineering Practice	Computer Sc. & Engineering

Table-III Foundation Elective

SN	Course Code	Course Name	Offered by Department
1	FEC-158A	Basics of Accounting	Management Department
2	FEC-160A	Basics of E-commerce	Management Department
3	FEC-162A	Elements of Banking	Management Department
4	FEC-164A	Computer Fundamentals	Computer Science and Engineering
5	FEC-168A	Communication and Soft Skills	Applied Science and Humanities (English)
6	FEC-170A	Entrepreneurship Development	Management Department
7	FEC-172A	Electronics Engineering	Electronics and Communication Engineering

Table-V
Multidisciplinary Open Elective –II Courses

Sr. No.	Course Code	Course Name	Offered by Department
1	OEC-131A	Fundamental of Income Tax	Management Department
2	OEC-133A	Stress Management	Management Department
3	OEC-135A	Fundamental of Marketing	Management Department
4	OEC-137A	Business Analytics	Management Department
5	OEC-139A	Statistical Tools using SPSS	Applied Sc. & Humanities (Mathematics)
6	OEC-141A	Mathematical Techniques and Applications	Applied Sc. & Humanities (Mathematics)
7	OEC-143A	MATLAB	Electrical Engineering
8	OEC-145A	Sources of Energy -II	Electrical Engineering
9	OEC-147A	Natural and Manmade Disaster	Civil Engineering
10	OEC-149A	Optimization Techniques	Computer Sc. & Engineering
11	OEC-151A	Composite Materials	Mechanical Engineering
12	OEC-153A	Cost Management of Engineering Projects	Mechanical Engineering
13	OEC-155A	Voice and Data Network	Electronics and Communication Engineering
14	OEC-157A	IT for Professionals	Computer Sc. & Applications

Course code	PCC-MTSD-101A				
Category	Professional Core courses				
Course title	Material Technology				
Scheme and Credits	L	T	P	**Credits**	**Semester-I**
	4	0	0	4	
Course Objectives:	The objectives of this course are to • To provide foundational knowledge of the composition, properties, and behavior of cement, concrete, and construction metals. • To equip students with the skills to apply mix design, mechanical testing, and quality control techniques to improve material performance in construction. • To enable students to analyze the impact of environmental factors and material imperfections on the durability and strength of construction materials.				
Class work	40 Marks				
Exam	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Identify the factors influencing the strength, durability, and deformation of construction materials, including concrete.	Level 1: Remember
CO2	Explain mechanical testing methods and mix design principles for quality control in concrete, incorporating stress-strain behavior and failure theories.	Level 2: Understand
CO3	Determine fatigue and creep mechanisms, considering material properties and temperature effects under various loading conditions.	Level 3: Apply
CO4	Analyze the impact of material imperfections on construction performance and recommend suitable measures for improvement.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts (2 from each unit/section) of 1.5 marks each and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Cement and Concrete: Portland cement: chemical composition, hydration of cement, structure of hydrated cement, mechanical strength of cement gel, water held in hydrated cement paste, heat of hydration, cements of different types, factors affecting the strength of concrete, elasticity, shrinkage, and creep of concrete, durability of concrete: permeability of concrete, chemical attack of concrete, air-entrained concrete, thermal properties of concrete

Unit-II

Mechanical Properties and Strength of Concrete and Metals: Mechanical tests of hardened concrete, lightweight and high-density concrete, mix design, statistical quality control, biaxial strength of concrete, fiber-reinforced concrete, metals: behavior of common constructional metals in tension and compression, true stress-strain curve for mild steel in simple tension, theories of failure, yield surfaces.

Unit-III

Fatigue properties: nature of fatigue failure, fatigue strength for completely reversed stresses, fatigue strength with superimposed static stress, factors influencing fatigue strength, temperature and creep properties: low temperature properties, high temperature properties, creep-stress-time-temperature relations for simple tension, mechanics of creep in tension.

Unit-IV

Material Structure and Deformation: Structure of materials and their imperfections, deformation of crystals, theory of dislocations .

Suggested Readings

- A.M. Neville, J.J. Brooks, Concrete Technology, Low Priced Edition, Pearson
- A J Martin, Mechanical behavior of engineering materials.
- J. Martin: Communication Satellite System, PH Englewood.
- S P Timoshenko, Strength of materials- Part II
- M. S. Shetty, Concrete technology- Theory & Practice, S.Chand & Company New Delhi, 2005
- M.L. Gambhir, Concrete Technology: Theory And Practice

Useful Video links:

Unit No.	Topics	Links
1	**Cement and Concrete**	https://archive.nptel.ac.in/courses/105/102/105102012/
2	**Mechanical Properties and Strength of Concrete**	https://www.youtube.com/watch?v=m8UeEOYGBNE
3	**Fatigue properties**	https://www.youtube.com/watch?v=Yx-bIKo-_wg
4	**Material Structure and Deformation**	https://www.youtube.com/watch?v=ZKtp6SLu7Mk

Course code	PCC-MTSD-103A					
Category	Professional Core courses					
Course title	Advanced Structural Analysis					
Scheme and Credits	L	T	P	**Credits**	**Semester-I**	
	4	0	0	4		
Course Objectives:	The objectives of this course are to • To equip students with foundational knowledge of flexibility and stiffness matrix methods in structural analysis. • To develop an understanding of the principles and behaviors of beams, frames, and trusses under various loading conditions. • To enable students to apply analytical methods for effective design and evaluation of structural systems.					
Class work	40 Marks					
Exam	60 Marks					
Total	100 Marks					
Duration of Exam	03 Hours					

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Define the degree of indeterminacy in beams and frames by the flexibility method.	Level 1: Remember
CO2	Describe truss types on base of load distribution in truss members.	Level 2: Understand
CO3	Calculate internal forces in truss structures by using the method of joints and sections.	Level 3: Apply
CO4	Analyze stiffness matrices for beams and frames, considering boundary conditions.	Level 4: Analyze

Note: : Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts (2 from each unit/section) of 1.5 marks each and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Flexibility Matrix Method for Analysis of Beams and Frames: Introduction to Flexibility Matrix Method, Flexibility Method, Structural Indeterminacy, Compatibility Conditions, Superposition Principle, Analysis of Beams, Flexibility Coefficient, Bending Moment, Moment-Curvature Relationship, Boundary Conditions and Their Effects on Analysis, Analysis of Frames, Frame Structure, Flexibility Matrix, Joint Reactions.

Unit-II

Flexibility Matrix Method for Analysis of Trusses: Introduction to Truss Structures, Truss, Pin-Jointed, Load Distribution in Trusses, Types of Trusses (e.g., Pratt, Warren), Analysis of Trusses, Method of Joints, Method of Sections, Internal Forces in Truss Members, Effect of External Loads on Truss Stability

Unit-III

Stiffness Matrix Method for Analysis of Beams and Frames: Introduction to Stiffness Matrix Method, Stiffness Method, Structural Stiffness, Relationship Between Forces and Displacements, Formation of the Global Stiffness

Matrix, Analysis of Beams, Stiffness Matrix for Beams, Deflection, Importance of Boundary Conditions, Variations in Cross-Section and Material Properties, Analysis of Frames, Nodal Displacement, Load Application, Assembly of Global Stiffness Matrix, Effects of Load Types on Frame Behavior

Unit-IV

Stiffness Matrix Method for Analysis of Trusses: Analysis of Trusses, Axial Deformations, Global and Local Stiffness Matrices, Stiffness of Truss Members, Stability Analysis of Truss Systems, Stability and Integrity, Buckling, Safety Factors, Failure Modes in Truss Members, Design Considerations for Stability under Load

Suggested Readings

- Matrix Analysis of Framed Structure by Gere & Weaver.
- Structural Analysis by Ghali & Neville.
- Computer Analysis of Structural System by Fleming J.F.
- Computer Methods of Structural Analysis by Beaufait, Rowan, Hadley, Heckett.
- Intermediate Structural Analysis by C.K.Wang.

Useful Video links:

Unit No.	Topics	Links
1	**Flexibility Matrix Method for Analysis of Beams and Frames**	https://www.youtube.com/watch?v=N6jD-m48gr8&list=PLbRMhDVUMngeZatm4MIOKG4sHxXuB_yri&index=22 & https://www.youtube.com/watch?v=amKFttgBUnc&list=PLbRMhDVUMngeZatm4MIOKG4sHxXuB_yri&index=27
2	**Flexibility Matrix Method for Analysis of Trusses:**	https://www.youtube.com/watch?v=T2drnetYhlA&list=PLbRMhDVUMngeZatm4MIOKG4sHxXuB_yri&index=17
3	**Stiffness Matrix Method for Analysis of Beams and Frames**	https://www.youtube.com/watch?v=N6jD-m48gr8&list=PLbRMhDVUMngeZatm4MIOKG4sHxXuB_yri&index=22 & https://www.youtube.com/watch?v=amKFttgBUnc&list=PLbRMhDVUMngeZatm4MIOKG4sHxXuB_yri&index=27
4	**Stiffness Matrix Method for Analysis of Trusses**	https://www.youtube.com/watch?v=T2drnetYhlA&list=PLbRMhDVUMngeZatm4MIOKG4sHxXuB_yri&index=17 Mk

Course code	PCC-MTSD-105A				
Category	Professional Core courses				
Course title	Pre-stressed Concrete Design				
Scheme and Credits	L	T	P	Credits	**Semester-I**
	4	0	0	4	
Course Objectives:	The objectives of this course are to • To provide a comprehensive understanding of the principles and applications of prestressed concrete in structural design. • To equip students with knowledge of materials and techniques used in prestressing, including the properties of high-strength concrete and prestressing steel. • To develop skills for designing prestressed concrete structures, focusing on the determination of flexural stresses, design considerations, and limit state methodology.				
Class work	40 Marks				
Exam	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Define the concepts and materials used in prestressed and reinforced concrete structures.	Level 1: Remember
CO2	Explain various methods and the behavior of prestressing steel in prestressed concrete.	Level 2: Understand
CO3	Examine prestress losses and their effects on deflections in prestressed structures.	Level 3: Apply
CO4	Analyze the Limit State Method for designing prestressed concrete elements.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts (2 from each unit/section) of 1.5 marks each and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Introduction to Prestressed Concrete: Introduction of Prestressed Concrete, Definition, Comparison with Reinforced Concrete, Advantages and Disadvantages .

Unit-II

Basic Principles and Materials: Review (Analysis) Basic Principles, Determination of Concrete Flexural Stresses, Basic Concept Method, C Line Method, Load Balancing Method, Classification of Members, Materials for Prestressed Concrete, High Strength Concrete, Short-term & Long-term Properties.

Unit-III

Prestressing Steel and Effects: Prestressing Steel, Steel Relaxation and Other Effects, Auxiliary Materials, Prestress Losses, Stresses in Steel Due to Loads, Kern Points, Cracking Moment, Deflection Under Service Conditions of Loading and Prestressing, Determination of Strength in Bending, Shear, and Bond.

Unit-IV

Design Considerations: Preliminary Design Considering No Tension in Concrete, Elastic Design Allowing and Considering Tension, Shapes of Concrete Sections, Dimensioning and Proportioning of Section Profile, Shear Design, Bond, Bearing and End Block Design, Introduction of Limit State Method.

Suggested Readings

- T. Y. Lin and H. Burns Ned, Design of Prestressed concrete structures, John Willey & Sons, New York-1982.
- Y. Guyen, Prestressed concrete Vol-I & Vol.-II, John Willey & Sons, New York-1960.
- E. W. Bennet, Prestressed concrete theory & design, Chapman & Hall, London-1962.
- Design of Prestressed Concrete by Gilbert & Mickleborough
- N. Krishnaraju, Prestressed concrete,Tata McGraw-Hill, New Delhi-2004
- S. K. Mallik and A. P. Gupta, Prestressed concrete, Oxford & IBH, New Delhi-1982.

Useful Video links:

Unit No.	Topics	Links
1	**Prestressed Concrete**	https://youtu.be/4KYPltsNAWs?si=Vnoy1AdghHXlUG6M
2	**Classification of Members**	https://youtu.be/Vdx2dNGsuEM?si=hCeeN48mCELxP5Je
3	**Prestressing Steel**	https://youtu.be/vhXJ6ZcKb5c?si=jHZ2-2e595JXXwSC
4	**Introduction of Limit State Method**	https://youtu.be/utgnv9NIFQc?si=v67OlkZ98zVa_mYO

Course code	PCC-MTSD-107A				
Category	Professional Core courses				
Course title	Design of Structures-I				
Scheme and Credits	L	T	P	**Credits**	**Semester-I**
	4	0	0	4	
Course Objectives:	The objectives of this course are to • To provide a comprehensive understanding of the principles and applications of structural steel and reinforced concrete design in engineering. • To equip students with the skills to estimate loads and design various structural members, adhering to relevant codes and standards. • To develop proficiency in analyzing and designing connections in steel structures and detailing reinforced concrete elements for effective performance.				
Class work	40 Marks				
Exam	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Recall the basic properties, advantages, disadvantages, and applications of structural steel and reinforced concrete elements.	Level 1: Remember
CO2	Describe steel members such as tension, compression, and flexural members, as well as welded and bolted connections, following IS:800 standards.	Level 2: Understand
CO3	Apply design principles to reinforced concrete elements like beams, slabs, columns, and footings, focusing on stress-strain relationships and ensuring compliance with load-bearing requirements.	Level 3: Apply
CO4	Analyze and design industrial structures, including gantry girders, steel trusses, portal frames, roofing, cladding, and purlins, under various loads such as dead, live, wind, and earthquake.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts (2 from each unit/section) of 1.5 marks each and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Basics of Structural Steel: Role of Design Engineer, Properties of Structural Steel, Merits and Demerits of Structural Steel over Reinforced Concrete Structures, Components & Terminology.

Load Estimation and Design Members: Load Estimation, Choice of Sections, Design of Tension Members, Compression Members, Flexure Members, and Beam-Column Junctions, Codal Provisions of IS:800.

Unit-II

Industrial Steel Structures: Steel Structure Design, Analysis and Design for Gantry Girders, Industrial Structures with Steel Trusses and Portal Frames. Typical Configuration with Various Elements, Load Assessment (Dead Load, Live Load, Wind Load, and Earthquake Load), Different Roofing and Cladding Alternatives and Their Design, Types of Purlins and Their Design.

Unit-III

Welded Connections: Advantages of Welding, Fundamentals and Methods of Welding, Types of Joints, Welding Symbols, Inspection of Welding, Codal Provisions, Design of Typical Welded Connections. **Bolted Connections:** Types of Bolts, Codal Provisions, Design of Typical Bolted Connections.

Unit-IV

Reinforced Concrete Design: Design Approach, Stress-Strain Relationships for Concrete and Steel, Theory for Flexural Strength, Strength of Members with Flexure. Strength of Members with Flexure and Axial Load, Strength of Members with Shear, Bond and Anchorage, Service Load Behavior, Design of Various Structural Elements (Beams, Slabs, Stairs, Columns, Walls, Footings, etc.), Reinforcement Detailing for Various Structural Elements Along with Beam-Column Joints.

Suggested Readings

- Design of Steel Structures - by Bresler & Lin.
- Theory of Modern Steel Structures - by Linton Grinter.
- Design of Steel Structures - by P. Dayaratnam.
- Reinforced Concrete Structural Elements (behaviour, analysis & design) by P.Purushothoman.
- Practical Design of Reinforced Concrete by Russell S. Fling.
- Design of Reinforced Concrete Structures by Ashok Kumar Gupta.

Useful Video links:

Unit No.	Topics	Links
1	**Introduction of Structural Steel design**	https://youtu.be/CNE4hk_SGTo?si=ImEvuX-npfKnZ1-r
2	**Types of Purlins and Their Design**	https://youtu.be/ewUdYOgvEfQ?si=2FSMtBK-kUaajV3Z
3	**Types of Joints**	https://youtu.be/xQc8EdLwqRc?si=5tkdUC1euxFnCPxr
4	**Theory for Flexural Strength**	https://youtu.be/GkFgysZC4Vc?si=RVmmgdnSlF3PKRIo

Course code	PCC-MTSD-109A				
Category	Professional Core courses				
Course title	Material Science				
Scheme and Credits	L	T	P	**Credits**	**Semester-I**
	4	0	0	4	
Course Objectives:	The objectives of this course are to • To provide a comprehensive understanding of material classifications, properties, and atomic bonding in crystalline and non-crystalline solids. • To equip students with the knowledge of multiphase solids and heat treatment processes, including phase diagrams and the effects of alloying elements. • To develop proficiency in analyzing the structure and performance of ceramics, polymers, and composites, focusing on their applications in civil engineering.				
Class work	40 Marks				
Exam	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Define materials based on their structure, bonding, crystal imperfections, and diffusion processes in solids.	Level 1: Remember
CO2	Understand material properties, selection criteria, and heat treatment processes for steels and alloys.	Level 2: Understand
CO3	Apply knowledge of materials, including composite types like fiber-reinforced and laminar-reinforced, in industries such as construction and manufacturing.	Level 3: Apply
CO4	Analyze the behavior and applications of advanced materials, including composites, for industrial purposes.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts (2 from each unit/section) of 1.5 marks each and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Material Classifications and Properties: Material classifications and important properties: Requirements and selection factors. Crystalline, no crystalline, atomic bonding and generalized properties, crystal structure, crystal planes & directions, crystal imperfections, diffusion mechanism of solid and its application.

Unit-II

Multiphase Solids and Heat Treatment: Structure, properties and control of multiphase solids: Solid solutions, home rathery's rules for alloys, system, phases and structural constituents, phase diagrams and transformation; iron-carbon system end T.T.T. diagram, heat treatment of steel and other alloys, effect of alloying elements on steel, case hardening and surface treatment

Unit-III

Ceramic and Organic Materials : General structure and properties of ceramics, silicate glass, refractory, abrasives etc. Polymer and polymerization, structure and properties of plastics, rubber etc.

Composite material: Component and types (dispersion reinforced, laminar reinforced fiber reinforced) and applications like Ferro cement, reinforced glass and polymer concrete.

Unit-IV

Composite Materials and Performance in Service: Cement and concrete: Hydration mechanism, microstructure and related properties, constituents and admixture, high strength concretes. Structure property relationship in concrete.

Performance of material in service: Corrosion and oxidation, fracture and fatigue, performance

Under high temperature, radiation damages.

Suggested Readings

- Elementary Material Science-By Lawrence
- Material Science and Metallurgy-By Khanna
- Material Science-By R Gupta
- Material Science-By J Patel
- Concrete-By P.K.Mehta Testing, design tool for Microprocessor Development

Useful Video links:

Unit No.	Topics	Links
1	Material classifications	https://youtu.be/5EiZjZjG-IY?si=qWcX-3qZRduOet3R
2	Polymer and polymerization	https://youtu.be/rkT_6slskPc?si=sNIYfma8aUgjo7PQ
3	Composite Materials	https://youtu.be/0kB0G6WKhKE?si=POY4ph1xyMqJvbdi
4	Corrosion	https://youtu.be/Vd8Kvz39msQ?si=RRgZ7PAmCF6qTwEQ

Course code	LC-MTSD-111A				
Category	Lab Courses				
Course title	Structural Engineering Laboratory				
Scheme and Credits	L	T	P	**Credits**	**Semester-I**
	0	0	2	1	
Course Objectives:	The objectives of this course are to • To introduce the fundamental components and materials used in concrete mix design and their role in construction. • To develop students' ability to evaluate the tensile and flexural properties of concrete and steel, including testing methods for structural integrity. • To equip students with the skills to analyze and assess the performance of structural elements under various conditions using both destructive and non-destructive testing methods.				
Class work	25 Marks				
Exam	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Define the components and materials used in concrete mix design and types of steel rebars for construction.	Level 1: Remember
CO2	Explain and design concrete mixes for various grades, incorporating admixtures and ensuring compliance with standards.	Level 2: Understand
CO3	Apply principles to analyze the tensile and flexural strength of concrete and evaluate the performance of RCC beams and columns.	Level 3: Apply
CO4	Analyze experimental findings and create comprehensive reports, applying design principles to optimize construction performance.	Level 4: Analyze

List of Experiments

1. Identify the various components and materials used in concrete mix design.
2. Recognize the different types of steel rebars and rolled steel sections, including their applications in construction.
3. Design the mix of concrete for different grades and using various admixtures.
4. Evaluate the tensile and flexural strength of concrete for different grades.
5. Determine the tensile strength of different types of steel rebars and rolled steel sections.
6. Conduct tests on simply supported RCC beams to analyze flexural failure.
7. Perform tests on simply supported RCC beams to assess shear failure.
8. Test the structural integrity of RCC columns to examine their performance under load.
9. Utilize non-destructive testing methods, including the rebound hammer and ultrasonic pulse method, to measure concrete quality
10. Investigate the permeability of concrete to understand its water resistance properties.
11. Analyze the vibration characteristics of beams and plates to identify potential resonance issues.
12. Calculate the buckling load of struts to evaluate their stability under axial loads.

Useful Video links:

Exp. No.	Topics	Links
1	Identify the various components and materials used in concrete mix design	https://youtu.be/3Do2cZMUGYc?si=6tCbf08Wnqf-4hkR
2	Design the mix of concrete for different grades and using various admixtures.	https://youtu.be/qgODTPmv7pQ?si=slXzpvWBaEapcCfi
3	Evaluate the tensile and flexural strength of concrete for different grades	https://youtu.be/l6tnBsdTf34?si=GhOAYGPsm1EBisr6
4	Perform tests on simply supported RCC beams to assess shear failure.	https://youtu.be/KO3HczU-ICw?si=nAxpL57UO9mFZwef

Course code	LC-MTSD-113A				
Category	Lab Courses				
Course title	Computational Laboratory				
Scheme and Credits	L	T	P	**Credits**	**Semester-I**
	0	0	2	1	
Course Objectives:	The objectives of this course are to • To provide a solid understanding of matrix operations and their applications in solving civil engineering problems through programming in C++. • To equip students with skills in structural analysis techniques, including matrix and finite element methods for evaluating trusses and beams. • To develop proficiency in using AutoCAD for 2D and 3D design, including customization and quantity extraction for construction projects.				
Class work	25 Marks				
Exam	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Define matrix operations and their civil engineering applications.	Level 1: Remember
CO2	Explain structural analysis principles using matrix and finite element methods.	Level 2: Understand
CO3	Apply programming to trusses and beams for internal forces and deflections.	Level 3: Apply
CO4	Analyze results from structural analysis to assess element behavior.	Level 4: Analyze

List of Experiments

1. Identify the basic matrix operations (addition, subtraction, and multiplication) and implement them in C++
2. Recognize the principles of structural analysis and write a C++ program to implement the matrix method for analyzing a simple frame structure
3. Design a C++ program to solve a one-dimensional finite element problem, including stiffness matrix formulation and boundary conditions
4. Analyze the internal forces in truss members using a C++ program for truss analysis (method of joints or method of sections)
5. Create a 2D floor plan of a simple building using AutoCAD, including walls, doors, windows, and apply dimensioning techniques.
6. Explain the process of 3D modeling in AutoCAD and develop a 3D model of a structural component, such as a column or beam.
7. Customize the AutoCAD environment by creating a personalized toolbar and modifying templates for civil engineering drawings.
8. Analyze and extract quantities from a 2D AutoCAD drawing, generating a material take-off report for construction purposes.

Useful Video links:

Exp. No.	Topics	Links
1	Identify the basic matrix operations (addition, subtraction, and multiplication) and implement them in C++	https://youtu.be/pzxRLRtONRQ?si=HjDm0vNIGujG6Rhw
2	Analyze and extract quantities from a 2D AutoCAD drawing, generating a material take-off report for construction purposes.	https://youtu.be/m6u4JOK6RyY?si=OlsKxKL816jaTS5g
3	Create a 2D floor plan of a simple building using AutoCAD, including walls, doors, windows, and apply dimensioning techniques.	https://youtu.be/247hzssVgS0?si=riiAciRWXzghOxef
4	Analyze and extract quantities from a 2D AutoCAD drawing, generating a material take-off report for construction purposes	https://youtu.be/7NSn8wCYbq0?si=37W1KWXTCk4iZjqf

Course Code	SM-MT-115A				
Category	Seminar				
Course Title	Seminar-I				
Scheme and Credits	L	T	P	Credits	Semester-I
	0	0	2	2	
Course Objectives	The objectives of this course are to • To develop students' ability to effectively present research topics and findings by effective communication. • To improve problem-solving and critical thinking skills of the students. • To expose students to the latest trends and advancements by reviewing and discussing contemporary research.				
Assessment	50 Marks				
End Semester Examination	-				
Total Marks	50				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

COs	Skills Demonstrated
CO1	Identify trends and advancements in the related field, highlighting key developments.
CO2	Analyze and synthesize research literature, conducting in-depth reviews of key studies and methodologies.
CO3	Undertake problem identification and formulation, propose solutions, and analyze the societal, economic, and environmental impact.
CO4	Prepare a well-organized report, demonstrating effective communication, critical thinking, and technical knowledge.

Overview:
This is a course designed to help M. Tech students develop research presentation skills. The focus is on selecting a topic or research paper relevant to their specialization, conducting an in-depth review, and effectively presenting the research findings.

General Guidelines:

Topic Selection	Each student is required to choose the research topic based on published review paper(s) or literature related to their relevant field. The same topic cannot be selected by multiple students.
Approval Process	The selected paper or topic must be approved by the faculty members/committee appointed by the Head of Department.
Presentation Guidelines	Each student will have 30-40 minutes for their presentation, followed by 5 minutes for Q&A.
Evaluation	The presentation will be evaluated by a committee constituted by the Head of Department. The evaluation will be based on:

Parameters for the Evaluation of Seminar

Sr. No.	Parameters	Marks Allotted	Relevant COs
1	Clarity of the topic	10	CO1
2	Literature Survey	10	CO2
3	Content Relevancy	10	CO3
4	Presentation Skills	10	CO4
5	Q&A Response	10	CO4

Course code	PCC-MTSD-102A				
Category	Professional Core Courses				
Course title	Stability of Structures				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	4	0	0	4	
Course Objectives:	The objectives of this course are to • Understand torsional behavior in thin-walled sections, including warping effects, strain energy, and torsional buckling with Wagner's effect. • Study lateral and torsional buckling in beams, and use methods like Rayleigh-Ritz for analyzing beam-columns under different load conditions. • Use energy-based approaches to approximate critical loads in bars under various load conditions and structural variations. • Analyze inelastic buckling in columns, built-up columns, and plates, applying stability functions and concepts like Shanley's tangent and reduced modulus.				
Class work	40 Marks				
Exam	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Define fundamental concepts of torsion, buckling, and bending in thin-walled open sections.	Level 1: Remember
CO2	Explain principles of lateral buckling, beam-columns, and critical load calculations in structural systems.	Level 2: Understand
CO3	Apply energy methods and advanced techniques for stability and load analysis of structural elements.	Level 3: Apply
CO4	Analyze effects of warping, shearing, and inelastic buckling in beams, columns, and plates under various loads.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Torsion of thin walled open sections, warping displacements under pure torsion,-Warping constants for rolled steel section. Strain energy in bending and torsion of members of thin walled open section including the effects of warping. Torsional buckling including the effects of Wagner's effect, flexural torsional buckling (with centroid and shear centres coincident)

Lateral buckling of beams under pure bending central point load through centre of gravity of the section. Cantilever beams with point load at the free end, Application of Rayleigh-Ritz method

Unit-II

Beam-columns on rigid supports-concentrated and continuous lateral loads with simply supported and built in-ends. Continuous beam with as axial loads. Application of trigonometric series. Inplane buckling of bars.

Unit-III

Approximate calculation of critical loads for bar structures by energy method- a bar on elastic foundation, a bar with intermediate compressive forces, bar under distributed axial loads, a bar with changes in cross section.

Unit-IV

Effects of shearing force on the critical load. Buckling of built-up columns. In-elastic in-plane buckling of columns. Tangent and reduced modulus concept, Shanley's contribution, elastic critical loads for rigid frames and triangulated structures, stability functions. Bending of thin plate. Buckling of thin rectangular plates in compression, shear and bending.

Suggested Readings:

- S.P. Timoshenko and J. M. Gere, Theory of Elastic Stability , MC Graw Hill,
- A. Kumar, Stability of Structures, Allied Publishers Ltd., New Delhi, 1998
- M.R.Horns and W.Merchang, The stability of frames, Porgamon press, 1965.
- M.Gregory , Elastic Instability Civil Engineering series,1967.
- F.Bleich, Buckling strength of Metal structures,Mc Graw Hill Book co.,1952
- T.V Galambos, Structural members and frames, Prentice-Hall INC, 1968Suggested Readings

Useful Video links:

Unit No.	Topics	Links
1	Cantilever beams with point load at the free end	https://youtu.be/sp8KE7YPr9c?si=W8lwXjeAjG0AYxWL
2	Continuous beam with as axial loads	https://youtu.be/fSRAljTN1Dk?si=_Vv_-05avGyHmZ7W
3	A bar with intermediate compressive forces	https://youtu.be/2P4WNU27gJM?si=ca1bjQTm5LCeJnK_
4	Buckling of built-up columns	https://youtu.be/ZSQ_5IRj5gI?si=dIFIhEoE2yU94nhj

Course code	PCC-MTSD-104A				
Category	Professional Core courses				
Course title	Design of Structures-II				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	4	0	0	4	
Course Objectives:	The objectives of this course are to • Calculate deflections and crack widths in reinforced concrete beams and slabs, and understand moment redistribution. • Design reinforced concrete elements like deep beams, flat slabs, and walls under torsional and complex loads. • Develop foundation designs for elements like staircases, corbels, pile caps, and raft foundations. • Create durable designs for underground and overhead water tanks, focusing on load resistance and water-tightness.				
Class work	40 Marks				
Exam	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to:

COs	Skills Demonstrated	RBT Level
CO1	Define fundamental concepts of deflection, crack estimation, and moment redistribution in reinforced concrete structures.	Level 1: Remember
CO2	Explain principles of designing reinforced concrete beams, slabs, walls, and foundations for various conditions.	Level 2: Understand
CO3	Apply design techniques to reinforced concrete structures, including staircases, corbels, and water tanks.	Level 3: Apply
CO4	Analyze the structural behavior and design considerations for advanced reinforced concrete systems under different loads.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Deflection of reinforced concrete beams and slabs. Estimation of crack width in reinforced concrete members. Redistribution of moments in reinforced concrete beams.

Unit-II

Design for torsion. Design of deep beams, ribbed (voided or waffle) slabs, flat slabs, flat plates, spandrel (edge) beams, reinforced concrete walls.

Unit-III

Design of staircases, corbels, brackets and nibs. Design of pile caps, beam and slab footings, raft foundations.

Unit-IV

Design of underground and overhead water tanks.

Suggested Readings:

- Limit State Design of Reinforced Concrete by Dr.P.C.Varghese.
- Advanced Reinforced Concrete Design by Dr.P.C.Varghese.
- Design and Construction of Foundations by G.P.Manning.
- Reinforced Concrete Structures by R.Park and T.Paulay.
- Reinforced Concrete Structural Elements Behaviour, Analysis and Design by P. Purushothaman.
- Reinforced Concrete Design Theory and Examples by T.J.MacGinley and B.S.Choo.

Useful Video links:

Unit No.	Topics	Links
1	Deflection of reinforced concrete beams and slabs	https://youtu.be/G7jMIC9afp8?si=oH2VhltOIWO0gGgv
2	Design for torsion	https://youtu.be/nV1cmja84Qs?si=TU7PAXId4C-IphKC
3	Design of staircases	https://youtu.be/vJCQEShrgis?si=3mWq8CLV3PQ3cthe
4	Design of underground and overhead water tanks.	https://youtu.be/eyIfDRCDjoc?si=HLGRz5W5IyiOPFKG

Course code	PEC-MTSD-112A				
Category	Professional Elective courses				
Course title	Repairs and Rehabilitation of Structures				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	4	0	0	4	
Course Objectives:	The objectives of this course are to • Conduct investigations, surveys, and material testing to assess structural distress. • Select materials and methods for surface repair, bonding, and reinforcement protection. • Use techniques to enhance strength in beams, columns, and other structural components. • Implement methods to stabilize cracks and reinforce connections for long-term durability.				
Class work	40 Marks				
Exam	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to:

COs	Skills Demonstrated	RBT Level
CO1	Define fundamental concepts of structural investigation, material testing, and repair methods for distressed structures.	Level 1: Remember
CO2	Explain materials, technologies, and techniques used for repairing, strengthening, and stabilizing structural components.	Level 2: Understand
CO3	Apply repair, strengthening, and stabilization methods to address shear, flexural, and crack-related structural issues.	Level 3: Apply
CO4	Analyze evaluation reports and develop repair, strengthening, and protection strategies for structural systems.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Investigation and Evaluation of Distressed Structures. Preliminary investigation, detailed investigation, documentation, field observation and condition survey, sampling and material testing, evaluation, final report

Unit-II

Materials & Technologies for Repair. Surface repair, material requirements, material selection, surface preparation, reinforcing steel, cleaning, repair and protection, bonding repair materials to existing concrete, placement methods.

Unit-III

Strengthening and Stabilisation. Techniques/Design considerations, beam shear capacity strengthening

Unit-IV

Shear transfer strengthening between members, stress reduction techniques, column strengthening, flexural strengthening, connections stabilisation and strengthening, crack stabilisation.

Suggested Readings:

- Concrete Repairs & Maintenance by Peter H. Emmons & Gajanan M. Subnis.
- Repair and Rehabilitation of Concrete Structures, ACI Compilation 10.
- Bridge Repairs & Rehabilitation, ACI Compilation 29.
- Guide to Investigation of Structural Failures by Jack R. Jonney & ASCE Research Council on Performance of Structures.
- Strength Evaluation of Existing Concrete Buildings by ACI 437R-91.

Useful Video links:

Unit No.	Topics	Links
1	Detailed investigation	https://youtu.be/oeCW3D4e9Sc?si=m-8nuqvmTPA7ewxu
2	Materials & Technologies for Repair	https://youtu.be/B0x_rojIKPA?si=KMjHpNU9bTtP58RI
3	Strengthening and Stabilization	https://youtu.be/cuyzlvCbZ_M?si=E2bCqr-h4KVx42A8
4	Beam shear capacity strengthening	https://youtu.be/cuyzlvCbZ_M?si=E2bCqr-h4KVx42A8

Course code	LC-MTSD-106A				
Category	Lab Course				
Course title	Structural Engineering Design Practice Laboratory				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	0	0	2	1	
Course Objectives:	The objectives of this course are to • Use STAAD. Pro and SAP for analyzing and designing multi-storey frames. • Apply software to design water tanks, bridge decks, and steel trusses. • Evaluate wind and earthquake loads and analyze dynamic response with PULSE. • Learn from real-world cases and apply software for accurate structural analysis.				
Class work	25 Marks				
Exam	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to:

COs	Skills Demonstrated	RBT Level
CO1	Define the fundamental concepts and principles of multi-storey building frames, elevated water tanks, and steel trusses.	Level 1: Remember
CO2	Explain the process of designing multi-storey building frames, elevated water tanks, and bridge decks using STAAD Pro and SAP.	Level 2: Understand
CO3	Apply design principles to analyze stability, strength, and load effects on structures using STAAD Pro, SAP, and relevant codal provisions.	Level 3: Apply
CO4	Analyze dynamic behavior, assess wind and earthquake loads, and evaluate real-world reinforced concrete case studies using PULSE software.	Level 4: Analyze

List of Experiments

1. Analysis and design of Multi-storey building frames using STAAD. Pro. SAP
2. Analysis and design of Elevated Water Tank using STAAD-Pro., SAP
3. Analysis and design of bridge decks and other structures using STAAD-Pro., SAP
4. Analysis and design of steel trusses using STAAD-Pro., SAP
5. Assessment of loads including that due to wind and earthquake on various structural elements and Systems adopting codal provisions.
6. Dynamic response of structures using PULSE software.
7. Analysis of the structure adopting software.
8. Case studies of actual buildings executed using reinforced concrete.

Useful Video links:

Exp. No.	Topics	Links
1	Analysis and design of Multi-storey building frames using STAAD. Pro	https://youtu.be/bN03Y-9R9Oo?si=9kFzg7AtjpjmejNh
2	Analysis and design of Elevated Water Tank using STAAD-Pro	https://youtu.be/7LKn4Piii5k?si=vHL4F8ojVMzieh DQ
4	Analysis and design of steel trusses using STAAD-Pro.	https://youtu.be/Mtgn17dO-BE?si=XpehufrVDq7rUCGd
6	Dynamic response of structures using PULSE software	https://youtu.be/7rgN1G9pZMw?si=YuyuSzXGyV2 GmwDX

Course code	LC-MTSD-108A				
Category	Lab Course				
Course title	Computational Laboratory-II				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	0	0	2	1	
Course Objectives:	The objectives of this course are to • Apply object-oriented programming (OOP) concepts to structural engineering problems. • Develop C++ programs for structural analysis of beams, trusses, and frames. • Create finite element programs for structural analysis, including plates and shells. • Integrate OOP with finite element methods for solving complex engineering problems.				
Class work	25 Marks				
Exam	25 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to:

COs	Skills Demonstrated	RBT Level
CO1	Define OOP concepts like classes, inheritance, and polymorphism for structural engineering problems.	Level 1: Remember
CO2	Explain the application of OOP principles in developing C++ programs for structural engineering.	Level 2: Understand
CO3	Apply templates and exception handling in C++ to enhance program flexibility and reliability.	Level 3: Apply
CO4	Design finite element programs for beam, truss, and frame analysis using C++ and OOP techniques.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

List of Experiments

1. Object oriented programming (OOP) - classes & objects, inheritance, overloading, polymorphism templates & exception handling.
2. C++ programming for structural engineering problems. Application of above for some structural engineering problems.
3. Construction of C++ programmes using OOP for some structural engineering problems.
4. Development of Finite Element Programming for analysis of beams, trusses, frames. ; Analysis of plates and shells using commercial software.

Useful Video links:

Exp. No	Topics	Links
1	Object oriented programming (OOP) - classes & objects	https://youtu.be/jw1Xf_33YM0?si=uK2bMibPnj2rqJf3
2	C++ programming for structural engineering problems	https://youtu.be/FbW2gCsT4cI?si=CiFXxxE6yQoEjJT4
3	Construction of C++ programmes using OOP for some structural engineering problems.	https://youtu.be/HcgLqP-5vMo?si=aSUDTGOU_g-hn5A_
4	Development of Finite Element Programming for analysis of beams	https://youtu.be/vvLx-Ge6jag?si=vRrRqvUiKprMsWFR

Course Code	SM-MTSD-115A				
Category	Seminar				
Course Title	Seminar-II				
Scheme and Credits	L	T	P	Credits	Semester-II
	0	0	2	2	
Course Objectives	The objectives of this course are to • To develop students' ability to effectively present research topics and findings by effective communication. • To improve problem-solving and critical thinking skills of the students. • To expose students to the latest trends and advancements by reviewing and discussing contemporary research.				
Assessment	50 Marks				
End Semester Examination	-				
Total Marks	50				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Identify the trends and advancements in the related field.	Level 1: Remember
CO2	Analyze and synthesize research literature with in-depth reviews of key studies and methodologies.	Level 2: Understand
CO3	Undertake problem identification, formulation, proposing solution and analyze the impact on society, economy and environment.	Level 3: Apply
CO4	Prepare a well-organized report employing elements of effective communication and critical thinking.	Level 4: Analyze

Overview:

This is a course designed to help M. Tech students develop research presentation skills. The focus is on selecting a topic or research paper relevant to their specialization, conducting an in-depth review, and effectively presenting the research findings.

General Guidelines:

Topic Selection	Each student is required to choose the research topic based on published review paper(s) or literature related to their relevant field. The same topic cannot be selected by multiple students.
Approval Process	The selected paper or topic must be approved by the faculty members/committee appointed by the Head of Department.
Presentation Guidelines	Each student will have 30-40 minutes for their presentation, followed by 5 minutes for Q&A.
Evaluation	The presentation will be evaluated by a committee constituted by the Head of Department. The evaluation will be based on:

Parameters for the Evaluation of Seminar

Sr. No.	Parameters	Marks Allotted	Relevant COs
1	Clarity of the topic	10	CO1
2	Literature Survey	10	CO2
3	Content Relevancy	10	CO3
4	Presentation Skills	10	CO4
5	Q&A Response	10	CO4

Course code	PEC-MTSD-114A				
Category	Professional Elective courses				
Course title	Advanced Steel Design				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	4	0	0	4	
Course Objectives:	The objectives of this course are to • Understand the fundamental principles of designing tension and compression members, including appropriate connections, plate girders, crane girders, and trusses for various structural applications. • To gain knowledge in the design of multi-storied buildings, silos, bins, hoppers, and steel tanks with proper staging, considering material handling and structural stability. • To develop skills in designing bridges and trusses with lateral and sway bracing, accounting for stress reversals and load distribution in structural elements. • Able to apply plastic theory in the design of continuous beams and frames, optimizing structural performance and material efficiency.				
Class work	40 Marks				
Exam	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to:

COs	Skills Demonstrated	RBT Level
CO1	Define the fundamental concepts of tension, compression members, connections, and steel structures.	Level 1: Remember
CO2	Explain the principles of designing girders, trusses, bridges, and bracings for structural applications.	Level 2: Understand
CO3	Apply design techniques for plate girders, crane girders, steel tanks, and plastic analysis of frames.	Level 3: Apply
CO4	Analyze structural systems, including continuous beams and frames, under varying loads and stress conditions.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Design for tension and compression members, connections, design of plate girders, crane girders and trusses.

Unit-II

Multi-storyed buildings. Silos, bins and hoppers. Design of steel tanks and staging.

Unit-III

Design of bridges, trusses, lateral bracings, sway brackens and stress reversals.

Unit-IV

Design of continuous beams and frames by plastic theory.

Suggested Readings:

- K.Mukhanov, *Design of Metal structures.*
- B Bresler, T Y Lin and J B Scalzi, *Design of Steel structures.*
- P Dayaratnam, *Design of Steel Structures*

Useful Video links:

Unit No.	Topics	Links
Unit-I	Design for tension and compression members	https://youtu.be/v_G6JMj_yq8?si=WAy7FU0Sf0CGXIh0 https://www.youtube.com/live/sRTn3Y4xZ04?si=Ed4UalykxIdJulwX
Unit-II	Design of Multi-storyed buildings	https://youtu.be/9Dta3ImeJqQ?si=elB502NX7lQQSWlQ https://youtu.be/M6RbWiBj2LE?si=TENxEcBk48ofCeIr https://youtu.be/QxA7JcoK-_Q?si=_pMH77oOFCRmINyr https://youtu.be/-CjYSbpsqiQ?si=D6oRE1AvNGsXVPZy https://youtu.be/uCGlUKO_npQ?si=wM8653LSFhhMmXN3
Unit-III	Design of bridges	https://youtu.be/RX-WImcb73Y?si=uEobNN1TeDS6hdUU https://youtu.be/Llg1rYoZMfU?si=Qb47_yiIJukENK6c https://youtu.be/3UBrBrpW-uY?si=EC5NRa-35hxBmGG3 https://youtu.be/7HXF3oGWRIA?si=CQzzzAqpyzuQ6M1D https://youtu.be/1t_tUmLUWcE?si=BlcwDlcuTr7BnsLg
Unit-IV	Design of continuous beams and frames by plastic theory	https://youtu.be/yI3W25ofR8g?si=8pLUJznFJD6Bm9aS

Course code	PEC-MTSD-116A				
Category	Professional Elective courses				
Course title	Construction Failures				
Scheme and Credits	L	T	P	Credits	Semester-II
	4	0	0	4	
Course Objectives:	The objectives of this course are to • Understand causes of construction failures, including design, materials, workmanship, and external factors. • Examine factors affecting concrete durability, with emphasis on corrosion and code-based solutions. • Identify causes of cracking in concrete and masonry and strategies for prevention. • Learn professional and legal responsibilities to minimize construction failures.				
Class work	40 Marks				
Exam	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to:

COs	Skills Demonstrated	RBT Level
CO1	Define the causes, factors, and concepts related to construction failures and durability in structures.	Level 1: Remember
CO2	Explain the mechanisms of concrete durability, reinforcement corrosion, and measures for mitigating construction failures.	Level 2: Understand
CO3	Apply strategies to identify, prevent, and mitigate cracks in concrete and masonry structures.	Level 3: Apply
CO4	Analyze professional and legal responsibilities to reduce the frequency and severity of construction failures.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Meaning of construction failure, historical references, main broad causes of failures such as design deficiency, use of improper materials and poor workmanship, removal of formwork at early stage, inadequate supervision and inspection, subsidence of foundations, fire, flood, earthquake, etc.

Unit-II

Factors affecting durability of concrete structures with emphasis on corrosion of reinforcement and codal provisions for design of durable concrete structures.

Unit-III

Cracks in concrete and masonry structures their reasons and measures to reduce or/and to avoid such cracks..

Unit-IV

Professional & legal responsibility. Measures to reduce frequency and severity of constructions failures.

Suggested Readings:

- Construction Failures by Jacob Feld.
- Learning from Failures : Deficiency Design, Construction & Service by R.N.Raiker.
- Concrete Reinforced Concrete Deterioration & Protection Edited by V.Moskvin.
- Building Failures. Diagnosis and Avoidance by W.H.Ransom.
- Building Disasters & Failures by Geoff Scott.
- Common Defects in Buildings Published by HMSO, London.
- Design & Construction Failures, Lesson from Forensic Investigation by Dov Kaminetzky -
- 1991.
- The Testing of Concrete in Structure, Second Edition by J.H.Bungey.

Useful Video links:

Unit No.	Topics	Links
Unit-I	Construction failure	https://youtu.be/2Pbz7lMSPbE?si=4V5oCdrRVosuEK8a
Unit-II	Factors affecting durability of concrete structures	https://youtu.be/--JS3CsQ4Gg?si=2k-LRprR7VkMA9hN
Unit-III	Cracks in concrete and masonry structures their reasons	https://youtu.be/ez-O6c4BqRQ?si=nRFUPZzdRlZC8p4S
Unit-IV	Measures to reduce frequency and severity of constructions failures.	https://youtu.be/P4_LGl5qXZ8?si=v7Jk1exYDPaC1MDz

Course code	PEC-MTSD-11A				
Category	Professional Elective courses				
Course title	Disaster Management				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	4	0	0	4	
Course Objectives:	The objectives of this course are to • Understand the causes, phases, and types of disasters, including rapid and slow onset events, and analyze how natural and human factors affect geo-hazards, coastal changes, and seismic activities. • Understand the causes and hazards of floods, cyclones, and tsunamis, and explore forecasting, management, and risk reduction strategies to mitigate their impact. • Identify the causes, characteristics, and risks of earthquakes, volcanic eruptions, and landslides, and explore early warning systems and risk mitigation strategies. • Learn about international efforts and policies for disaster reduction, including the UN's humanitarian coordination and challenges in financing and insurance for disaster response.				
Class work	40 Marks				
Exam	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to:

COs	Skills Demonstrated	RBT Level
CO1	Define the causes, phases, and characteristics of disasters and associated geo-hazards.	Level 1: Remember
CO2	Explain the processes, impacts, and mitigation strategies for floods, cyclones, earthquakes, and other natural disasters.	Level 2: Understand
CO3	Apply disaster risk mitigation techniques, forecasting methods, and management strategies to minimize disaster impacts.	Level 3: Apply
CO4	Analyze policies, international efforts, and challenges related to disaster reduction, financing, and coordination.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Disaster- Causes and phases of disaster, Rapid onset and slow onset disasters. Nature and responses to geo-hazards, trends in climatology, meteorology and hydrology. Seismic activities. Changes in Coastal zone, coastal erosion, beach protection. Coastal erosion due to natural and manmade structures.

Unit-II

Floods and Cyclones: causes of flooding, Hazards associated with flooding. Flood forecasting. Flood management, Integrated Flood Management and Information System (IFMIS), Flood control. Water related

hazards- Structure and nature of tropical cyclone, Tsunamis – causes and physical characteristics, mitigation of risks.

Unit-III

Earthquakes: Causes and characteristics of ground-motion, earthquake scales, magnitude and intensity, earthquake hazards and risks, Volcanic land forms, eruptions, early warning from satellites, risk mitigation and training. Landslides.

Unit-IV

Mitigation efforts: UN draft resolution on Strengthening of Coordination of Humanitarian Emergency Assistance, International Decade for Natural Disaster Reduction (IDNDR), Policy for disaster reduction, problems of financing and insurance.

Suggested Readings:

- Bolt, B.A. Earthquakes , W. H. Freeman and Company, New York. 1988
- Carter, N.W. Disaster Management: A Disaster Manager's Hand Book, Asian Development Bank, Manila. 1992
- Gautam Ashutosh. Earthquake: A Natural Disaster, Ashok Publishing House, New Delhi. 1994
- Sahni, P.and Malagola M. (Eds.).Disaster Risk Reduction in South Asia, Prentice-Hall of India, New Delhi. 2003.
- Sharma, V.K. (Ed.). Disaster Management, IIPA, New Delhi. 1995.
- Singh T. Disaster management Approaches and Strategies, Akansha Publishing House, New Delhi. 2006
- Sinha, D. K. Towards Basics of Natural Disaster Reduction, Research Book Centre, New Delhi. 2006
- Smith, K. Environmental Health, Assessing Risk and Reduction Disaster, 3rd Edition, Routledge, London. 2001 21

Useful Video links:

Unit No.	Topics	Links
Unit-I	Causes and phases of disaster	https://youtu.be/ueHvGqY8I78?si=IJDVCFpW9Yez1xLZ
Unit-II	Floods and Cyclones	https://youtu.be/DFMa_IgYUa8?si=DppHS9vzT6M3_qX8
Unit-III	risk mitigation and training	https://youtu.be/JHowIkB1btY?si=bJt0B1X2FCjlUxfX
Unit-IV	Policy for disaster reduction	https://youtu.be/BRfBFa0-Ss1?si=EV562mxJSe6f-7tY

Course code	PEC-MTSD-11A				
Category	Professional Elective courses				
Course title	Natural and Manmade Disaster				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	4	0	0	4	
Course Objectives:	The objectives of this course are to • Disaster Types and Geological Disasters: Learn about natural disasters like earthquakes, tsunamis, and volcanic eruptions, and their mitigation. • Cyclones, Storms, Forest Fires, and Floods: Study the formation, impact, and management of cyclones, storms, forest fires, and floods. • Human-Induced Disasters and Pollution: Understand nuclear and chemical accidents, and pollution prevention techniques. • Global Environmental Disasters and Public Health: Explore climate change impacts, international cooperation, and disease outbreak management.				
Class work	40 Marks				
Exam	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to:

COs	Skills Demonstrated	RBT Level
CO1	Define various types of natural and human-induced disasters, including their causes and effects.	Level 1: Remember
CO2	Explain the processes of disaster formation, impacts, early warnings, and preparedness strategies for mitigation.	Level 2: Understand
CO3	Apply disaster management techniques for mitigating environmental degradation, pollution, and managing hazard impacts.	Level 3: Apply
CO4	Analyze global disaster responses, including climate change, epidemics, and international cooperation for disaster reduction.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 6 parts of 2 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Disaster Classification: Types and categories of disasters, Environmental degradation.

Natural Geological Disasters: Earthquakes: causes, effects, and mitigation, Tsunamis: formation and warning systems, Volcanic eruptions: types and hazard management, Landslides and avalanches: risk

Unit-II

Cyclones and Storms: Formation, tracking, and impact, Early warning and preparedness

Forest Fires: Causes, prevention, and control, Impact on ecosystems

Droughts and Desertification: Types, impacts, and management, Long-term mitigation strategies

Floods: Types, prediction, and control measures, Flood plain management.

Unit-III

Human-induced disasters:

Nuclear Disasters: Types of accidents and safety protocols, Radiation protection and emergency response.

Chemical Disasters: Industrial safety and regulations, Emergency procedures.

Environmental Pollution: Soil and water contamination, Prevention and remediation.

Unit-IV

Global Environmental Disasters: Climate change impacts, International cooperation.

Epidemics: Disease outbreak management, Public health measures.

Suggested Readings:

- Ahmed, Shaik Iftikhar (2008). Disaste Flood, Twenty First Century Publicatio
- Bryant Edwards (2005). Natural Hazar U.K.
- Carter, W. Nick (1991). Disaster M Bank, Manila.
- Central Water Commission (1987). F Delhi.
- Central Water Commission (1989). M Delhi.
- Government of India (1997). Vulnerab Kapur, A. (2010). Vulnerable Indi Disasters, Sage Publications, New Del
- Kapur, A. (2005). Disasters in India: Publications, Jaipur.
- Sahni, Pardeep et al. (eds.) (2002). and Reflections, Prentice Hall of India
- Bilham, R. (2009). The seismic future Engineering, 7, pp. 839- 887.
- Bureau of Indian Standards (2002). Earthquake Resistant Design of Structu
- Government of India (1997). Vulnerab Building Materials and Technology Housing & Urban Poverty Alleviation)

Useful Video links:

Unit No.	Topics	Links
Unit-I	Natural Geological Disasters	https://youtu.be/Xsg8aydKyto?si=p-cMslJNrvU4cHdZf https://youtu.be/FYEQSBownPY?si=xxx8mf8U8P84yzMw
Unit-II	Cyclones and Storms	https://youtu.be/0GGuIM0Q0xc?si=BWexBRr5d0bY1QMg https://youtu.be/-JyB8q9e-XU?si=gRBipYWod0sol26O
Unit-III	Nuclear Disasters	https://youtu.be/QaOMddzwGGk?si=dlgm3AFKwBsl9PMk
Unit-IV	Epidemics	https://youtu.be/bkEAWJwGFBQ?si=bOfYpdce4upkOYOU https://youtu.be/fVmJk19d3YE?si=5cgrVMegcqeChRvP

Annexure 2.15

Department of Computer Science and Applications

Minutes of the 1st Meeting of the Board of Studies (BOS) Department of Computer Science and Applications

The meeting of the Board of Studies of Department of Computer Science and Applications was held on 10.01.2025 at 11:00 A.M in the Conference Hall of the Institute

Members Present:

S. No.	Name of the Member	Affiliation/Organization	Designation within Board of Studies
1	Mr. Jitender Singh	Chairperson	Assistant Prof. & Head, CSA, GITAM, Kablana
2	Prof. Rahul Rishi (Deptt. of CSE, UIET, MDU, Rohtak)	Member	Subject Expert, (University Nominee)
3	Prof. Shailender Verma (Deptt of CSE, DTU, Delhi)	Member	Subject Expert, Outside the Parent University
4	Dr.Praveen Dahiya	Member	Assistant Professor, CSA, GITAM Kablana
5	Dr.Prince	Member	Assistant Professor, CSA, GITAM Kablana
6	Dr. Kavita	Member	Assistant Professor, CSA, GITAM Kablana
7	Mrs. Meenu Sharma	Member	Assistant Professor, CSA, GITAM Kablana
8	Mr. Lakshay Khanagwal	Member	Assistant Professor, CSA, GITAM Kablana
9	Mrs. Sonika	Member	Assistant Professor, CSA, GITAM Kablana
10	Mrs. Komal Rani	Member	Assistant Professor, CSA, GITAM Kablana
11	Mrs. Mahima	Member	Assistant Professor, CSA, GITAM Kablana
12	Ms. Renu Deswal	Member	Assistant Professor, CSA, GITAM Kablana
13	Ms. Priya	Member	Assistant Professor, CSA, GITAM Kablana
14	Ms. Pooja	Member	Assistant Professor, CSA, GITAM Kablana
15	Ms. Rani	Member	Assistant Professor, CSA, GITAM Kablana
16	Ms. Nitika	Member	Industry/ Corporate Sector (Associate Analyst, Content Engineering)

17	Mr. Yumesh	Member	Alumni (Embedded Designs Services India Private Limited)
18	Ms Inderjeet Kaur	Member	Assistant Professor, CSA, GITAM Kablana
19	Dr. Vivek Kumar	Special Invitee	Registrar & COE, GITAM Kablana
20	Dr. Nitin Kumar	Special Invitee	HOD, CSE, GITAM Kablana

Agenda of the Meeting:

At the outset the chairperson welcome all the members present in the meeting. The agenda was taken up with the permission of chair.

Item 1:

Introduction of the members of the Board of Studies of the Department of Computer Science and Applications.

The chairperson introduce the members of the Board of Studies of the Department of Computer Science and Applications. (**Annexure 1, Pages 1-2**)

Item 2:

Approval of the Scheme of Studies & Examination and Syllabi of the first year of the MCA program.

Resolved that the Scheme of Studies & Examination and Syllabus of first year of MCA program be approved. **(Annexure 2, Pages 3-75)**

Further resolved that the same be recommended to the academic councill for approval.

Item 3:

Approval of the Scheme of Studies & Examination and Syllabi of the first year BCA program.

Resolved that the Scheme of Studies & Examination and Syllabus of first year of BCA program be approved. **(Annexure 3, Pages 76-152)**

Further resolved that the same be recommended to the academic council for approval.

Item 4:

Approval of panel of examiners for theory and practical examination of BCA and MCA program.

Resolved that the panel of examiners for theory and practical examination of the BCA and MCA program be approved. **(Annexure 4, Pages 153-155)**

Further resolved that same is to be sent to the controller of examinations for further action.

Item 5:

Any Other Item with the Permission of the Chair.

There being no other item for discussion, the meeting concluded with a vote of thanks to the chair.



GANGA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, KABLANA (JHAJJAR)

An Autonomous Institute (UGC)
Approved by AICTE, New Delhi and Affiliated to MDU, Rohtak
NAAC 'A' GRADE

Scheme of Studies and Examination
Master of Computer Science and Applications

1. DEFINITION OF CREDIT

1	1 Lecture (L) per week	1 Credit
2	1 Tutorial (T) per week	1 Credit
3	1 Practical (P) per week	0.5 Credit
4	2 Practical (Lab) per week	1 Credit

2. RANGE OF CREDIT

A range of credits from 110-120 for a student will be eligible to get Post Graduate degree.

3. STRUCTURE OF MASTER OF COMPUTER APPLICATIONS PROGRAM (MCA)

Sr. No.	Category	Breakup of Credits MCA
1	Discipline-Specific Courses (DSC) /Experiential Learning	72*
2	Discipline-Specific Elective Courses	32*
3	Multidisciplinary Open Elective Courses	03*
4	Foundation Elective Courses	03*
4	Research Project/Dissertation	06*
	Total Credits	**116***

Minor variation is allowed as per need of the respective disciplines.

4. COURSE CODE AND DEFINITIONS

Sr. No.	Category	Course Code
1	Discipline Specific Courses	DSC
2	Discipline Specific Elective Courses	DSEC
3	Experiential Learning	EL
4	Research Report	RR
5	Multidisciplinary Open Elective Courses	MDC
6	Bridge Course	BC

5. ELIGIBILITY FOR ADMISSION TO MCA 2-YEARPROGRAMME

a) Passed BCA/B.Sc. (Hons.) Computer Science/ B.E. or B.Tech. (CSE/IT)/ B.Voc. (Software Development/IT) or an equivalent degree with having at least 50% marks (45% for SC/ST candidates of Haryana only) in aggregate.

Or

b) Passed B.Sc. / B. Com/ B.A with Mathematics at 10+2 level or at Graduation level with having at least 50% marks (45% for SC/ST candidates of Haryana only)in aggregate, along with the students admitted with this eligibility will have to simultaneously undertake additional

c) Bridge Course* as prescribed by the institute during the first semester.

Note: It is compulsory for each student to pass out Bridge Course (three additional theory papers and one practical as prescribed in scheme of examination of Bridge Course) as per institute norms during the 1st year of MCA-2 year course and the degree will be awarded after the completion of Bridge Course. However, these papers under Bridge Course will be taught only in the 1st semester of the course.

Note:

1. The duration of all the end-term theory examinations shall be 3 hours.
2. The Criteria for Assessment of Theory Courses throughout the Program shall be as under:

i. End Semester Examination (Theory Examination):

Questions papers for the end semester examination shall be set by paper setters appointed by Controller of Examinations in consultation with Chairperson of the Examination Committee i.e. Director of the Institute from a panel of examiners submitted by the Chairman of the Board of Studies. In case a question paper is not received in time from a paper setter COE shall get the paper set from an alternate examiner who is otherwise competent to do so from the panel approved by BOS. The evaluation of answer scripts shall be done as per procedure laid down by the Examination Committee.

ii. Practical Examination:

Examination in Practical and viva-voce shall be conducted jointly by the two examiners. One examiner shall be appointed by the Controller of Examinations from a panel of examiners submitted by Chairman of B.O.S. of respective departments and one examiner by Head of the department.

iii. Sessional (Internal Assessment):

Sessional works shall be evaluated by the teachers of the various subjects/courses based on the work done during semester on the basis of the following weightage:

I. For Theory subjects:

I. Sessional Test –I 60% of the weightage of the Internal Marks
Sessional Test-II considering best two of three sessional tests
Sessional Test-III

II. Assignments / Classwork 20% of the weightage of the Internal Marks

III. Attendance 20% of the weightage of the Internal Marks

The marks for attendance will be awarded as per below mentioned criteria

S. No	Range	%age (Weightage)	Out of 8	Out of 5	Out of 3
1	Above 90%	100	8	5	3
2	85-89.99%	80	6	4	3
3	80-84.99%	60	5	3	2
4	75-79.99%	40	4	2	2
5	65-75%	20	2	1	1
6	Less than 65	0	0	0	0

II. For Practical/Project/Seminar/Drawing:

i. Viva-Voce/ Test 20% of the weightage of the practical

ii. Laboratory Record/ 48% of the weightage of the practical
   a. Project Report/Seminar
   b. Report/Drawing Sheet

iii. Attendance 32% of the weightage of the practical

Every student has to appear in minimum two Sessional Tests. If a student does not take a Sessional test, he/she shall be awarded zero marks in that test. The marks obtained in sessional/practical/theory/drawing are to be submitted to the Examination Branch duly signed by the Head of the department before the close of semester examination or marks can be uploaded on the examination portal before a date fixed by the COE. The examination branch shall convert the marks in to equivalent grades as per the grading procedure.

The proportion of external and internal assessment in any course shall be preferably 60%:40%. However, this proportion may vary depending upon the nature of course.

Scheme of Studies and Examination
MCA – 1st Semester
w.e.f. 2024-25

SN	Category	Course Code	Course Title	Hours per week			Total Load Per Week	Credits	Examination Schedule (Marks)				Exam Duration in Hours
				L	T	P			Assessment	End Semester Exam		Total	
										Theory	Practical		
1	Discipline-Specific Courses	DSC-MCA-101A	Object Oriented Programming Using JAVA	4	0	0	4	4	40	60		100	3
2	Discipline-Specific Courses	DSC-MCA-103A	Compiler Design	4	0	0	4	4	40	60		100	3
3	Discipline-Specific Courses	DSC-MCA-105A	Computer Graphics andMultimedia	4	0	0	4	4	40	60		100	3
4	Discipline Specific Elective Courses	Refer Table-I(a)	Elective-I	4	0	0	4	4	40	60		100	3
5	Discipline Specific Elective Courses	Refer Table-I(b)	Elective-II	4	0	0	4	4	40	60		100	3
6	Experiential Learning	EL-MCA-101A	Software Lab-1	0	0	6	6	3	50		50	100	3
7	Experiential Learning	EL-MCA-117A	Software Lab-2	0	0	6	6	3	50		50	100	3
Total								**26**	300	300	100	**700**	

GANGA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, JHAJJAR (HR.), DELHI-NCR

Scheme of Studies and Examination

Bridge Course

w.e.f. 2024-25

SN	Category	Course Code	Course Title	Hours per week			Total Load Per Week	Credits	Examination Schedule (Marks)				Exam Duration in Hours
				L	T	P			Assessment	End Semester Exam		Total	
										Theory	Practical		
1	Bridge Course	BC-MCA-111A	Computer Fundamentals and Programming in C	4	0	0	4	4	40	60		100	3
2	Bridge Course	BC-MCA-121A	C++ and Data Structures	4	0	0	4	4	40	60		100	3
3	Bridge Course	BC-MCA-123A	Visual Basic and Database Systems	4	0	0	4	4	40	60		100	3
4	Bridge Course- LAB	BC-MCA-125A	Software Lab-Bridge Course	0	0	8	8	4	50		50	100	3
							Total	**16**	170	180	50	**400**	

Note: It is compulsory for each student to pass Bridge Courses (three additional theory papers and one practical as prescribed in scheme of examination of Bridge Course) as per Institute norms during the 1st year of MCA-2year course and the degree will be awarded after the completion of Bridge Courses. However, these papers under Bridge Courses will be taught only in the 1st semester of the course.

Scheme of Studies and Examination

MCA – 2nd Semester

w.e.f. 2024-25

SN	Category	Course Code	Course Title	Hours per week			Total Load Per Week	Credits	Examination Schedule (Marks)				Exam Duration in Hours
				L	T	P			Assessment	End Semester Exam		Total	
										Theory	Practical		
1	Discipline-Specific Courses	DSC-MCA-102A	Advance Object Technology	4	0	0	4	4	40	60		100	3
2	Discipline-Specific Courses	DSC-MCA-104A	Advance Database Systems and Data Warehouse	4	0	0	4	4	40	60		100	3
3	Discipline-Specific Courses	DSC-MCA-106A	Operating Systems and Shell Programming	4	0	0	4	4	40	60		100	3
4	Discipline Specific Elective Courses	Refer Table-I (c)	Elective-III	4	0	0	4	4	40	60		100	3
5	Discipline Specific Elective Courses	Refer Table-I (d)	Elective-IV	4	0	0	4	4	40	60		100	3
6	Experiential Learning	EL-MCA-108A	Software Lab-3	0	0	6	6	3	50		50	100	3
7	Experiential Learning	EL-MCA-110A	Software Lab-4	0	0	6	6	3	50		50	100	3
8	Research Report	RR-MCA-112A	Industry Internship Report/ Project Report/Dissertation–I	0	0	0	6	3	50		50	100	3
9	Foundation Elective Courses	Refer Table-III	Refer Pool of Foundation Elective courses defined by the Institute	3	0	0	3	3	40	60		100	3
							Total	**32**	390	360	150	**900**	

Table No. I (a) (Discipline Specific Elective Courses)

Elective- I

Sr. No.	Course Code	Course Title
1	DSEC-MCA-111A	Computer Organization and Architecture
2	DSEC-MCA-113A	Cloud Computing

Table No. I (b) (Discipline Specific Elective Courses)
Elective- II

Sr. No.	Course Code	Course Title
1	DSEC-MCA-115A	Theory of Computation
2	DSEC-MCA-117A	Advance Data Structures Using C++/Java

Table No. I (c) (Discipline Specific Elective Courses)
Elective- III

Sr. No.	Course Code	Course Title
1	DSEC-MCA-112A	Software Engineering
2	DSEC-MCA-114A	Web Technologies

Table No. I (d) (Discipline Specific Elective Courses)
Elective- IV

Sr. No.	Course Code	Course Title
1	DSEC-MCA-116A	Computer Network
2	DSEC-MCA-118A	Advance Computer Architecture

Table –III (Pool of Foundation Elective Course defined by the Institute)

Foundation Elective Courses

SN	Course Code	Course Name	Offered by Department
1	FEC-158A	Basics of Accounting	Management Department
2	FEC-160A	Basics of E-commerce	Management Department
3	FEC-162A	Elements of Banking	Management Department
4	FEC-164A	Computer Fundamentals	Computer Science and Engineering
5	FEC-168A	Communication and Soft Skills	Applied Science and Humanities (English)
6	FEC-170A	Entrepreneurship Development	Management Department
7	FEC-172A	Electronics Engineering	Electronics and Communication Engineering

Scheme of Studies and Examination

MCA – 3rd Semester

w.e.f. 2025-26

SN	Category	Course Code	Course Title	Hours per week			Total Load Per Week	Credits	Examination Schedule (Marks)				Exam Duration in Hours
				L	T	P			Assessment	End Semester Exam		Total	
										Theory	Practical		
1	Discipline-Specific Courses	DSC-MCA-201A	Data Mining & Big Data Analytics	4	0	0	4	4	40	60		100	3
2	Discipline-Specific Courses	DSC-MCA-203A	Machine Learning & Python Programming	4	0	0	4	4	40	60		100	3
3	Discipline-Specific Courses	DSC-MCA-205A	Network Programming	4	0	0	4	4	40	60		100	3
4	Discipline Specific Elective Courses	Refer Table-II (a)	Elective-V	4	0	0	4	4	40	60		100	3
5	Discipline Specific Elective Courses	Refer Table-II (b)	Elective-VI	4	0	0	4	4	40	60		100	3
6	Experiential Learning	EL-MCA-207A	Software Lab-5	0	0	6	6	3	50		50	100	3
7	Experiential Learning	EL-MCA-209A	Software Lab-6	0	0	6	6	3	50		50	100	3
8	Open Elective (O)	Refer Table-IV	To be Chosen from the pool of Open Electives provided by the Institute					3					
Total								**29**	300	300	100	**700**	

Scheme of Studies and Examination
MCA – 4th Semester
w.e.f. 2025-26

SN	Category	Course Code	Course Title	Hours per week			Total Load Per Week	Credits	Examination Schedule (Marks)				Exam Duration in Hours
				L	T	P			Assessment	End SemesterExam		Total	
										Theory	Practical		
1	Discipline-Specific Courses	DSC-MCA-202A	Advance Software Engineering	4	0	0	4	4	40	60		100	3
2	Discipline-Specific Courses	DSC-MCA-204A	IoT & Sensor Networks	4	0	0	4	4	40	60		100	3
3	Discipline-Specific Courses	DSC-MCA-206A	Web Development Using.NET Framework	4	0	0	4	4	40	60		100	3
4	Discipline Specific Elective Courses	Refer Table-II (c)	Elective-VII	4	0	0	4	4	40	60		100	3
5	Discipline Specific Elective Courses	Refer Table-II (d)	Elective-VIII	4	0	0	4	4	40	60		100	3
6	Experiential Learning	EL-MCA-208A	Software Lab-7	0	0	6	6	3	50		50	100	3
7	Experiential Learning	EL-MCA-210A	Software Lab-8	0	0	6	6	3	50		50	100	3
8	Research Report	RR-MCA-212A	Industry Internship Report/ Project Report/Dissertation–II	0	0	0	6	3	50		50	100	3
							Total	**29**	340	300	160	**800**	

Table No. II (a) (Discipline Specific Elective Courses)

Elective- V

Sr. No.	Course Code	Course Title
1	DSEC-MCA-211A	Cyber Security & Blockchain Technology
2	DSEC-MCA-213A	Software Testing & Quality Assurance

Table No. II (b) (Discipline Specific Elective Courses)
Elective- VI

Sr. No.	Course Code	Course Title
1	DSEC-MCA-215A	Android Mobile Application Development
2	DSEC-MCA-217A	Full Stack Development

Table No. II (c) (Discipline Specific Elective Courses)
Elective- VII

Sr. No.	Course Code	Course Title
1	DSEC-MCA-214A	Artificial Intelligence
2	DSEC-MCA-216A	Mixed Reality & Wearable Computing

Table No. II (d) (Discipline Specific Elective Courses)
Elective-VIII

Sr. No.	Course Code	Course Title
1	DSEC-MCA-218A	High Speed Networks
2	DSEC-MCA-220A	Neural Networks & Deep Learning

Table-IV (Pool of Foundation Elective Course defined by the Institute)
Foundation Elective Courses

SN	Course Code	Course Name	Offered by Department
1	OEC-131A	Fundamental of Income Tax	Management Department
2	OEC-133A	Stress Management	Management Department
3	OEC-135A	Fundamental of Marketing	Management Department
4	OEC-137A	Business Analytics	Management Department
5	OEC-139-A	Statistical Tools using SPSS	Applied Sc. & Humanities (Mathematics)
6	OEC-141-A	Mathematical Techniques and Applications	Applied Sc. & Humanities (Mathematics)
7	OEC-143A	MATLAB	Electrical Engineering
8	OEC-145A	Sources of Energy-II	Electrical Engineering
9	OEC-147A	Natural and Manmade Disaster	Civil Engineering
10	OEC-149A	Software Engineering Practices	Computer Sc. & Engineering
11	OEC-151A	Composite Materials	Mechanical Engineering
12	OEC-153A	Cost Management of Engineering Projects	Mechanical Engineering
13	OEC-155A	Voice and Data Network	Electronics and Communication Engineering
14	OEC-157A	IT for Professionals	Computer Sc. & Applications

Course Code	**DSC-MCA-101A**				
Category	Discipline- Specific Courses				
Course Title	**Object Oriented Programming Using JAVA**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I**
	4	0	0	**4**	
Course Objectives	The objectives of this course are to • Understand and apply Java basics, including syntax, data types, operators, control structures, and object-oriented principles to write simple Java programs. • Implement Java's object-oriented features, such as classes, inheritance, interfaces, and packages, to develop modular and reusable code. • Apply advanced Java concepts like exception handling, multithreading, and file I/O to build robust and concurrent applications. • Design and develop interactive GUI applications using Java applets, AWT, and graphics components.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total Marks	100Marks				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

Cos	**Skills Demonstrated**	**RBT Level**
CO1	Describe Java language fundamentals, program structure, inheritance, exception handling, and the applet lifecycle.	Level 1: Remember
CO2	Explain Java's class-based structure, string manipulation, exception handling, multithreading, and applet functionality.	Level 2: Understand
CO3	Develop Java programs using object-oriented principles, packages, interfaces, and multithreaded techniques for real-world problems.	Level 3: Apply
CO4	Analyze class hierarchies, exception-handling mechanisms, and thread synchronization to optimize Java applications.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Introduction: Genesis and Evolution of Java Language, Internet & Java, Byte-code, its Features, Java Program Structure and Java's Class Library, Data Types, Variables, and Operators, Operator Precedence; Selection Statements, Scope of Variable, Iterative Statement; Defining Classes & Methods, Creating Objects of a Class, Defining and Using a Class, Automatic Garbage Collection.

Arrays and Strings: Arrays, Arrays of Characters, String Handling Using String Class, Operations on String Handling Using String Buffer Class.

Unit-II

Classes and Inheritance: Using Existing Classes, Class Inheritance, Choosing Base Class, Multiple Levels of Inheritance, Abstraction through Abstract Classes, Using Final Modifier. Packages: Understanding Packages, defining a Package, packaging up Your Classes, Adding Classes from a Package to Your Program, Understanding CLASSPATH, Standard Packages, Access Protection in Packages.

Interface Fundamentals: Creating an Interface, implementing an Interface, Using Interface References, Implementing Multiple Interfaces, Constants in Interfaces, Interfaces can be extended, Nested Interfaces, Final Thoughts on Interfaces.

Unit-III

Exception Handling: The concept of Exceptions, Types of Exceptions, dealing with Exceptions, Exception Objects, Defining Your Own Exceptions.

Multithreading Programming: The Java Thread Model, Understanding Threads, The Main Thread, creating a Thread, Creating Multiple Threads, Thread Priorities, Synchronization.

Input/output in Java: I/O Basic, Byte and Character Structures, I/O Classes, Reading Console Input Writing Console Output, Reading and Writing on Files, Random Access Files, Storing and Retrieving Objects from File, Stream Benefits

Unit-IV

Applets in Java: Applet Basics, Applet Architecture, Applet Life Cycle, Simple Applet Display Methods, The HTML APPLET Tag Passing Parameters to Applets.

Working with Windows: AWT Classes, Window Fundamentals, working with Frame, creating a Frame Window in an Applet; Displaying Information within a Window.

Working with Graphics and Text: Working with Graphics, working with Color, Setting the Paint Mode, working with Fonts, Managing Text Output; Using Font Metrics, Exploring Text and Graphics, Working with AWT Controls, Layout Managers and Menus.

Suggested Readings:

- The Complete Reference JAVA, TMH Publication, July 2017.
- Beginning JAVA, Ivor Horton, WROX Public, 7 October 2011.
- JAVA 2 UNLEASHED, Tech Media Publications,23 July2022.
- JAVA 2(1.3) API Documentations.
- Any other book(s) covering the contents of the paper in more depth.

Useful Video links:

Unit No.	Topics	Links
Unit-I	Genesis and Evolution of Java Language, Internet & Java, Byte-code, its Features	https://archive.nptel.ac.in/courses/106/105/106105191/#
	Java Program Structure and Java's Class Library, Data Types, Variables	https://www.youtube.com/watch?v=1B5ppTif5ZY&list=PLbRMhDVUMngcx5xHChJ-f7ofxZI4JzuQR&index=4
Unit-II	Class Inheritance, Choosing Base Class, Multiple Levels of Inheritance	https://archive.nptel.ac.in/courses/106/105/106105151/
	Using Final Modifier. Packages	https://www.youtube.com/watch?v=V9t_Ar1nHV4
Unit-III	Exception Handling	https://www.youtube.com/watch?v=iTGH6qSCy2I
	The Java Thread Model	https://www.youtube.com/watch?v=MNoPTVrsXZs
Unit-IV	Applets in Java	https://nptel.ac.in/courses/106105191
	AWT Classes	https://www.youtube.com/watch?v=4La3ChRGCtY

Course Code	**DSC-MCA-103A**				
Category	Discipline- Specific Courses				
Course Title	**Compiler Design**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I**
	4	0	0	**4**	
Course Objectives	The objectives of this course are to • Understand system programming fundamentals, including assemblers, loaders, linkers, macros, and software tools. • Study compiler phases with a focus on lexical analysis, syntax analysis, and parsing techniques. • Learn intermediate code generation, syntax-directed definitions, and symbol table management. • Apply code optimization techniques and understand code generation principles like register allocation and global data flow analysis. • Develop system programs in C for lexical analysis, symbol table generation, and memory storage evaluation.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total Marks	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

Cos	**Skills Demonstrated**	**RBT Level**
CO1	Describe fundamental concepts of system programming, compiler phases, and code optimization techniques.	Level 1: Remember
CO2	Explain the workings of loaders, lexical analyzers, parsers, symbol tables, and intermediate code generation processes.	Level 2: Understand
CO3	Implement system programs and compiler components such as tokenizes, parsers, and memory evaluators using programming languages like C.	Level 3: Apply
CO4	Analyze compiler design processes, optimization techniques, and the structure of syntax trees and symbol tables.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Evolution of Systems Programming: Introduction to System programs, Overview of Assemblers, Loaders, Linkers, Macros, and Compilers. System Software Tools: Variety of software tools, Text editors, Interpreters and program generators, Debug Monitor, System Programming environment. Loader Schemes: Compile and Go Loader, general loader schemes, Absolute Loader, Subroutine linkage, Reallocating Loader, Direct Linkage Loader, Binders, Linking loader, overlays.

Unit-II

Compiler: Phases of Compiler, Compiler writing tools, Lexical Analysis, Finite Automata, Regular Expression, From a Regular expression to an NFA, NFA to DFA, Design of Lexical Analyzer. Syntax Analyzer, CFG, Role of the Parser, CFG, Top-Down Parsing, Recursive Descent parsing, predictive Parsers, bottom-up Parsing, Shift reduce, Operator Precedence parsers, LR Parsers.

Unit-III

Intermediate Code: Syntax directed definitions, Evaluation Orders of Syntax directed definitions; Intermediate Languages: Intermediate code generation, Syntax trees, Construction of Syntax trees, Three Address Code, Types and Declarations, Translation of Expressions, Type Checking, Postfix form. Symbol table: Contents of Symbol table, Data Structures for Symbol table; Runtime Storage Administration.

Code Optimization and Code Generation: Principal sources of optimization, loop optimization, DAG - Optimization of Basic Blocks, Global Data Flow Analysis – Efficient Data Flow Algorithm. Code Generation: Issues in code generation, Design of a simple Code Generator, Register allocation and Assignment, Peephole optimization.

Unit-IV

System & Compiler programming: Developing system programs using C for basic OS commands apart from developing programs for lexical analysis, token counts, symbol table generator, memory storage requirement evaluator for identifiers for one or multiple declarative statements.

Suggested Readings:

- Donovan: Systems Programming, Tata McGraw Hill,2009.
- Dhamdhere: System Software, Tata McGraw Hill,July 2011.
- Alfred V. Aho, Ravi Sethi, Jeffrey D. Ullman: Compilers Principles, Techniques and Tools, Addison Wesley,2017.
- Alfred V.Aho and Jeffrey D.Ullman: Principles of Compiler Design, Addison Wesley,January 2002.
- William M. Waite, Gerhard Goos: Compiler Construction,May 2013.
- TorbenÆgidiusMogensen: Basics of Compiler Design, ISBN 978-87-993154-0-6.
- Bergmann, Seth D: Compiler Design: Theory, Tools and Examples,2017.
- Any other book(s) covering the contents of the paper in more depth.

Useful Video links:

Unit No.	Topics	Links
Unit-I	Overview of Assemblers, Loaders, Linkers, Macros, Compilers	https://www.nptelvideos.com/lecture.php?id=5232

Unit-II	Compiler Phases	https://www.nptelvideos.com/lecture.php?id=5234
	Lexical Analysis	https://www.nptelvideos.com/lecture.php?id=5235
	Shift reduce	https://www.nptelvideos.com/lecture.php?id=5240
Unit-III	Intermediate code generation	https://www.nptelvideos.com/lecture.php?id=5234
	Postfix form. Symbol table	https://www.nptelvideos.com/lecture.php?id=5246
Unit-IV	Global Data Flow Analysis	https://www.nptelvideos.com/lecture.php?id=5254
	Register allocation and Assignment	https://nptelvideos.com/lecture.php?id=5258

Course Code	**DSC-MCA-105A**				
Category	Discipline- Specific Courses				
Course Title	**Computer Graphics and Multimedia**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I**
	4	0	0	**4**	
Course Objectives	The objectives of this course are to • Understand computer graphics fundamentals, including display devices, graphics primitives, and scan conversion algorithms. • Apply 2D and 3D transformation techniques like translation, scaling, rotation, and clipping. • Analyze and implement 3D object representation methods, hidden surface detection, and shading techniques. • Understand multimedia systems, including architecture, compression, authoring, and data standards for integrated content creation.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total Marks	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

Cos	Skills Demonstrated	RBT Level
CO1	Describe fundamental concepts of computer graphics, multimedia systems, color models, and 2D/3D transformations.	Level 1: Remember
CO2	Explain scan conversion algorithms, 3D objects representations, multimedia components, and compression-decompression techniques.	Level 2: Understand
CO3	Apply basic graphical primitives, transformations, and multimedia projects using tools like FLASH or BLENDER.	Level 3: Apply
CO4	Analyze viewing pipelines, clipping algorithms, surface detection techniques, and multimedia system architectures.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Basics of Computer Graphics: Computer Graphics, Classification, Applications of computer graphics, Display devices, Random and Raster scan systems, Graphics input devices, Graphics software and standards.

Graphics Primitives: Points, lines, circles and ellipses as primitives, scan conversion algorithms for primitives, Fill area primitives including scan-line polygon filling, inside- outside test, boundary and flood-fill, character generation, line attributes, area-fill attributes, character attributers.

Unit-II

2D Transformation and Viewing: Transformations (translation, rotation, scaling), matrix representation, homogeneous coordinates, composite transformations, reflection and shearing, viewing pipeline and coordinates system, window-to-viewport transformation, clipping including point clipping, line clipping (cohen-sutherland, liang- bersky, NLN), polygon clipping.

3D Concepts and Object Representation: 3D display methods, polygon surfaces, tables, equations, meshes, curved lies and surfaces, quadric surfaces, spline representation, cubic spline interpolation methods, Bazier curves and surfaces, B-spline curves and surfaces.

Unit-III

3D Transformation and Viewing: 3D scaling, rotation and translation, composite transformation, viewing pipeline and coordinates, parallel and perspective transformation, view volume and general (parallel and perspective) projection transformations. Modelling: Wireframe and Solid.

Hidden Surfaces: Visible surface detection concepts, Back-face detection, Depth Buffer method, Illumination, Light sources, Illumination methods (ambient, diffuse reflection, specular reflection). Color models: properties of light, XYZ, RGB, YIQ and CMY color models. Shading: Flat, Gouraud and Phong.

Unit-IV

Multimedia Basics: Concepts of Multimedia, Multimedia applications, Multimedia system architecture, Evolving technologies for multimedia, Defining objects for multimedia systems, Multimedia data interface standards, Multimedia databases. Compression and decompression: Data and file format standards, Multimedia I/O technologies, Digital voice and audio, Video image and animation, Full motion video, Storage and retrieval technologies.

Multimedia Authoring: Concept of Multimedia Authoring, Hypermedia messaging, Mobile messaging, Hypermedia message component, Creating hypermedia message, Integrated multimedia message standards, Integrated document management, Distributed multimedia systems.

Case Study (FLASH/ BLENDER): Drawing Basic Shapes, Modeling, Shading & Textures, Creating a multimedia project.

Suggested Readings:

- Donald Hearn and M.Pauline Baker: Computer Graphics, PHI Publications, 1986
- Plastock: Theory & Problem of Computer Graphics, Schaum Series,1986.
- Foley & Van Dam: Fundamentals of Interactive Computer Graphics, Addison-Wesley,1982.
- Newman: Principles of Interactive Computer Graphics, McGraw Hill,1979.

- Tosijasu, L.K.: Computer Graphics, Springer-Verlag,1991.
- S Gokul: Multimedia Magic, BPB Publication,2000.
- Bufford: Multimedia Systems, Addison Wesley,1996.
- Jeffcoate: Multimedia in Practice, Prentice-Hall,1995.

Useful Video links:

Unit No.	Topics	Links
Unit-I	Computer Graphics	https://www.nptelvideos.com/lecture.php?id=6261
	Classification of Computer Graphics	https://www.nptelvideos.com/lecture.php?id=6262
	Display Devices	https://www.nptelvideos.com/lecture.php?id=6263
Unit-II	clipping including point clipping, line clipping (cohen-sutherland, liang- bersky, NLN)	https://www.nptelvideos.com/lecture.php?id=6264
	Transformations (translation, rotation, scaling)	https://www.nptelvideos.com/lecture.php?id=6266
	polygon surfaces	https://www.nptelvideos.com/lecture.php?id=6276
Unit-III	Parallel and Perspective Transformation	https://www.nptelvideos.com/lecture.php?id=6268
	Viewing Pipeline for 3D	https://www.nptelvideos.com/lecture.php?id=6288
Unit-IV	Video image and animation	https://www.nptelvideos.com/lecture.php?id=6293
	Hypermedia message component	https://nptel.ac.in/courses/106106090

Course Code	**DSEC-MCA-111A**				
Category	Discipline Specific Elective Courses				
Course Title	**Computer Organization and Architecture**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I**
	4	0	0	**4**	
Course Objectives	The objectives of this course are to • Understand number systems, binary arithmetic, and Boolean algebra for logic simplification. • Design and analyze combinational and sequential circuits, including adders, multiplexers, flip-flops, and counters. • Apply computer architecture concepts like instruction sets, CPU design, and assembly language programming. • Understand I/O organization, memory management, and advanced architectures (parallel processing, pipelining, SIMD) for real-world applications.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total Marks	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

Cos	**Skills Demonstrated**	**RBT Level**
CO1	Describe number systems, binary arithmetic, Boolean algebra, and basic instruction sets in computer architecture.	Level 1: Remember
CO2	Explain combinational and sequential circuits, CPU micro-operations, addressing modes, and pipelining principles in computer systems.	Level 2: Understand
CO3	Implement basic digital circuits, registers, counters, and assembly language programs for 8086/8088 processors.	Level 3: Apply
CO4	Analyze control unit designs, instruction cycles, and the functioning of parallel processing architectures for improved efficiency.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Number System: Binary, Octal, Hexadecimal and Decimal, 1's and 2's Complements, Inter conversion of numbers. Codes: Weighted and non-weighted codes, BCD Codes, Gray codes, Self-complementing codes, Error-Detecting/Correcting codes, Alphanumeric Codes, Hamming Codes, Floating Point Numbers.
Binary Arithmetic: Binary Addition and Subtraction, 2's Complement Arithmetic, Booth Coding, Binary Multiplication.

Logic Design: Logic Gates, Truth Tables, Boolean Algebra, Boolean Expressions-Variables and Literals, Boolean Expressions–Equivalent and Complement, Theorems of Boolean Algebra, Simplification Techniques, SOPs & POSs Boolean Expressions.

Unit-II

Combinational Circuits: Combinational Logic, Arithmetic Circuits– Adder and Subtractor, BCD Adder, Code Converters, Magnitude Comparator, Parity Generators/Checkers, Multiplexers, Demultiplexers, Decoders, Encoders.

Sequential Circuits: Latches, R S Flip Flop, Level Triggered and Edge Triggered Flip Flops, JK Flip-Flop, Master-Slave Flip Flops, T Flip-Flop, D Flip-Flops.

Registers and Counters: Controlled Buffer Registers, Shift Registers, Applications of Shiftregisters; Ripple Counter, Synchronous Counter, Modulus Counter, Binary Ripple Counters, Up/Down Counters, Decade and BCD Counters.

Unit-III

Basic Computer Design: Computer Instructions and types, Instruction Set, Instruction Cycle, Instruction Formats, Addressing Modes, Computer Registers, Bus System, Register Transfer Language terminology.

Programming in 8086/8088 Assembly Language: A/L program structure, segments, registers, instructions, macros, A/L directives.

CPU Design: CPU Registers, Micro-operations and its types, Design of ALU. Control Unit Design-Microprograms, Control Unit of a basic computer–Timing and Control; Hardwired and Micro-programmed controlled unit. Architectures -RISC, CISC, Scalar, Superscalar and pipelined architectures.

Unit-IV

Input/output Organization: Peripheral Devices, Input-output Interface, Asynchronous Data Transfer, Mode of Transfer, Priority Interrupt, Direct Memory Access, Input-output Processor, Serial Communication.

Advance Architecture: Introduction to parallel processing– Pipelining, Parallel Computer structures, Architectural classification. Pipelining & Vector processing; Instruction and Arithmetic pipelines, Principles of designing pipelined processors, Structures for array processors: SIMD Array processor, SIMD Interconnection networks. Parallel Processing Applications a multimedia project.

Suggested Readings:

- Mano, M.M.: Digital Logic and Computer Design, Prentice-Hall of India, 1979 (First Edition).
- Gill Nasib Singh and Dixit J.B: Digital Design and Computer Organisation, University Science Press (Laxmi Publications),New Delhi, 2009 (First Edition).

- Stallings, William: Computer Organisation& Architecture, 2020 (10th Edition).
- Mano, M.M.: Digital Design, Prentice-Hall of India, 2001 (4th Edition).
- Anand Kumar: Fundamentals of Digital Circuits, PHI, 2008 (2nd Edition).
- Kai Hwang: Advanced Computer Architecture, McGraw Hill International, 1993 (First Edition)
- Mano,M.M.: Computer System Architecture, Prentice-Hall of India, 2007 (3rd Edition).
- Tokheim: Digital Electronics, TMH, 1999 (5th Edition).
- Any other book(s) covering the contents of the paper in more depth.

Useful Video links:

Unit No.	Topics	Links
Unit-I	Binary, Octal, Hexadecimal, Decimal Conversions	https://www.nptelvideos.com/lecture.php?id=5269
Unit-II	Multiplexers and Decoders	https://www.nptelvideos.com/lecture.php?id=5836
	Error-Detecting/Correcting codes	https://www.nptelvideos.com/lecture.php?id=5841
Unit-III	Computer Instructions and types	https://archive.nptel.ac.in/courses/106/105/106105163/
	pipelined architectures	https://archive.nptel.ac.in/courses/117/105/117105078/
Unit-IV	Input-output Interface	https://www.youtube.com/watch?v=09jCRiVWsJw&t=2s
	Introduction to parallel processing	https://www.youtube.com/watch?v=NypfUUd6M8k

Course Code	**DSEC-MCA-117A**				
Category	Discipline Specific Elective Courses				
Course Title	**Advance Data Structures Using C++/JAVA**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I**
	4	0	0	**4**	
Course Objectives	The objectives of this course are to • Understand algorithm analysis, including time and space complexity, asymptotic notations, and strategies for efficient algorithm design. • Implement essential data structures, such as trees and heaps, and applying traversal methods for effective data organization and management. • Introduce graph algorithms, such as shortest path, minimum spanning tree, and network flow algorithms, to solve complex computational problems. • Introduce concepts of computational complexity, such as NP-completeness, for classifying and approaching hard problems.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total Marks	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

Cos	**Skills Demonstrated**	**RBT Level**
CO1	Describe key algorithms, graph representations, tree traversal methods, dynamic programming techniques, and complexity classes in algorithm design.	Level 1: Remember
CO2	Explain the principles of algorithm analysis, tree and graph algorithms, dynamic programming, and NP-completeness in computational theory.	Level 2: Understand
CO3	Implement and execute various algorithms, such as divide-and-conquer, backtracking, graph algorithms, and string-matching, using C++/Java.	Level 3: Apply
CO4	Analyze the time and space complexity of algorithms using asymptotic notations and evaluate the efficiency of data structures in problem-solving.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

The Role of Algorithms in computing: Analyzing Algorithms, Time and Space Analysis of Algorithms, Big-Oh and Theta Notations, Average, Best and Worst case analysis. Designing Algorithms, Growth of functions. Asymptotic Notations, Divide and Conquer, Recurrences, Maximum sub-array problem, Stressan's Method, Substitution method, Recurrence tree method, The Master method, Floors and Ceilings.

Unit-II

Trees: Binary tree traversal methods: Pre-order, In-order, post-ordered traversal. Recursive Algorithms. Traversal methods. Representation of trees and its applications: Binary tree representation of a general tree. Conversion of forest into tree. Threaded binary trees. Binary search tree: Height balanced (AVL) tree, B-trees, Splay tree. Heap: Heap operations, Binomial heaps, Fibonacci heaps, Skew heaps, heap set.

Unit-III

Graphs & Algorithms: Representation, Type of Graphs, Paths and Circuits: Euler Graphs, Hamiltonian Paths & Circuits; Cut-sets, Connectivity and Separability, Planar Graphs, Isomorphism, Graph Coloring, Covering and Partitioning, , Depth-and breadth-first traversals, Minimum Spanning Tree: Prim's and Kruskal's algorithms, Shortest-path Algorithms: Dijkstra's and Floyd's algorithm, Topological sort, Maxflow: Ford-Fulkerson algorithm, max flow –min cut.

Unit-IV

Dynamic Programming: Backtracking Algorithms, Design Methodologies, Travelling salesperson problem, 0/1 Knapsack problem, multistage graphs, All Pair Shortest Path, 8-Queens problem Advanced String-Matching Algorithms: Naïve string-matching algorithm, Robin-Karp algorithm, string matching with finite automata, Knuth-Morris-Pratt algorithm.

P, NP and Approximation Algorithms: Basic Concepts, Non-Deterministic algorithms, NP Complete and NP-hard classes, NP complete Problems.

Implementation of above mentioned data structures & algorithms through C++/Java programming.

Suggested Readings:

- Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest: Introduction to Algorithms, PHI Learning Pvt. Ltd,2009.
- Gilles Brassard, Paul Bratley: Fundamentals of Algorithms, PHI Learning Pvt. Ltd, 2011.
- Hubbard JR: Schaum's Outline of Data Structures with C++, Tata McGraw Hills, New Delhi,2000.
- R. Sedgewick: Algorithms in C++, Pearson Education Asia,2001.
- Y. Langsam, M.J.Augenstein and A.M.Tanenbaum: Data Structures Using C and C++, Prentice Hall of India,1996.
- R.Kruse, C.L.Tonodo and B.Leung: Data Structures and Program Design in C, Pearson Education. New Delhi,1997.
- G.L. Heileman: Data Structutes: Algorithms and Object-Oriented Programming, Tata McGraw Hill, New Delhi,2009.
- E. Horowitz, Sahni and D. Mehta: Fundamentals of Data Structures in C++, Galgotia Publication, New Delhi,2008.

Useful Video links:

Unit No.	Topics	Links
Unit-I	Analyzing Algorithms	https://www.nptelvideos.com/lecture.php?id=5947
	Designing Algorithms	https://www.nptelvideos.com/lecture.php?id=5950
Unit-II	Binary tree traversal methods	https://www.youtube.com/watch?v=hV4AFZS81wU
	Height balanced (AVL) tree	https://www.youtube.com/watch?v=YOtXKE1Kjdk
Unit-III	Dijkstra's and Floyd's algorithm	https://archive.nptel.ac.in/courses/106/106/106106127/
	Prim's and Kruskal's algorithms	https://nptel.ac.in/courses/106102064
Unit-IV	NP Complete and NP-hard classes	https://www.nptelvideos.com/lecture.php?id=5971

Course Code	**EL-MCA-101A**				
Category	Experiential Learning				
Course Title	**Software Lab-1**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I**
	0	0	6	**3**	
Course Objectives	The objectives of this course are to • Apply Java syntax, data structures, control flow, and OOP principles (classes, objects, inheritance, and polymorphism). • Design and implement Java apps using OOP features, exception handling, and multithreading for efficient software. • Design user-friendly GUIs using AWT components (buttons, labels, text fields) for smooth user interactions. • Manage errors with exception propagation, exception objects, and effective exception handling strategies.				
Internal Assessment	50Marks				
External Practical	50 Marks				
Total	100Marks				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

Cos	**Skills Demonstrated**	**RBT Level**
CO1	Implement object-oriented concepts such as inheritance, abstraction, interfaces, event handling, and graphics algorithms in Java and C/C++.	Level 3: Apply
CO2	Analyze and debug Java programs, algorithms for geometric transformations, and multi-threading applications for optimization and error resolution.	Level 4: Analyze
CO3	Evaluate the efficiency and functionality of matrix multiplication, event handling techniques, graphical algorithms, and multi-threading in Java and C/C++.	Level 5: Evaluate
CO4	Design and develop Java applications and C/C++ programs for graphical transformations, event-driven programming, and multi-threading with real-time functionality.	Level 6: Create

List of Experiments:

Sr. No.	Contents
1	Write a java program to multiply two given matrices
2	Write a java program for Method overloading and Constructor overloading
3	Write a java program to display the employee details using Scanner class
4	Write a java program to represent Abstract class with example.
5	Write a java program to implement Interface using extends keyword
6	Write a Java program that implements a multi-thread application that has three threads
7	Write an applet program that displays a simple message
8	Write a java program for handling Mouse events and Key events
9	Write a java program for handling Key events
10	Write a java program to find the Fibonacci series using recursive and non-recursive functions
11	Write a java program that checks whether a given string is palindrome or not
12	Write a java program to create inner classes.

Suggested Readings:

- The Complete Reference JAVA, TMH Publication,1972.
- JAVA 2 UNLEASHED, Tech Media Publications,2002.

Useful Video Links:

Experiment No.	Experiment Name	Links
1	Introduction of java and types	https://archive.nptel.ac.in/courses/106/105/106105191/
2	Arrays and Strings types in java	https://www.youtube.com/watch?v=VksxhzfD8kQ
3	Packages in java	https://www.youtube.com/watch?v=TwU3cv1FFis
4	Interface Fundamentals in java	https://www.youtube.com/watch?v=nFH-Hm8iTR0

Course Code	**EL-MCA-117A**				
Category	Experiential Learning				
Course Title	**Software Lab-2**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I**
	0	0	6	**3**	
Course Objectives	The objectives of this course are to • Understand and Apply Core Concepts of Algorithm Analysis. • Design and Implement Tree Data Structures and Traversal Algorithms. • Implement Graph Algorithms for Problem Solving. • Solve Optimization Problems Using Dynamic Programming and Backtracking. • Implement Advanced String-Matching Algorithms for Text Searching.				
Internal Assessment	50 Marks				
External Practical	50 Marks				
Total	100Marks				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

Cos	Skills Demonstrated	RBT Level
CO1	Apply sorting algorithms, tree traversals, graph search techniques, and string-matching algorithms to solve computational problems in programming.	Level 3: Apply
CO2	Analyze the time and space complexities of sorting algorithms, tree operations, and optimization problems, evaluating their efficiency.	Level 4: Analyze
CO3	Critically assess the performance and correctness of algorithms such as KMP, Prim's, Kruskal's, and dynamic programming solutions for optimization problems.	Level 5: Evaluate
CO4	Design and develop efficient solutions for graph and tree-based problems, including tree balancing, minimum spanning tree, and optimization problems.	Level 6: Create

List of Experiments

Sr. No.	Contents
1	Implementing and Analyzing Sorting Algorithms: Bubble Sort and Selection Sort
2	Analyzing the Time and Space Complexity of Binary Search
3	Solving Recurrences Using the Master Theorem
4	Binary Tree Traversal: Pre-order, In-order, and post-order
5	Implementing Binary Search Tree (BST) Operations: Insert, Delete, Search
6	Implementing AVL Tree for Balancing a Binary Search Tree
7	Implementing Depth-First Search (DFS) and Breadth-First Search (BFS)
8	Finding Minimum Spanning Tree Using Prim's Algorithm
9	Finding Minimum Spanning Tree Using Kruskal's Algorithm
10	Solving the 0/1 Knapsack Problem Using Dynamic Programming
11	Solving the Travelling Salesman Problem Using Backtracking
12	Solving the N-Queens Problem Using Backtracking
13	Naïve String-Matching Algorithm
14	Implementing Knuth-Morris-Pratt (KMP) String Matching Algorithm

Suggested Readings:

1. Gilles Brassard, Paul Bratley: Fundamentals of Algorithms, PHI Learning Pvt. Ltd, 2011
2. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest: Introduction to Algorithms, PHI Learning Pvt. Ltd,2009
3. Hubbard JR: Schaum's Outline of Data Structures with C++, Tata McGraw Hills, New Delhi,2000.
4. Y.Langsam, M.J.Augenstein andA.M.Tanenbaum: Data Structures Using C and C++, Prentice Hall of India,2015.

Useful Video Links:

Experiment No.	Experiment Name	Links
1	Sorting Algorithms: Bubble Sort and Selection Sort	https://archive.nptel.ac.in/courses/106/102/106102064/
2	Time and Space Complexity of Binary Search	https://www.youtube.com/watch?v=zWg7U0OEAoE
3	Prim's Algorithm	https://www.nptelvideos.com/lecture.php?id=5899
4	Depth-First Search (DFS)	https://www.nptelvideos.com/lecture.php?id=5893

Course Code	**BC-MCA-111A**				
Category	Bridge Course				
Course Title	**Computer Fundamental and Programming in C**				
Scheme and Credits	L	T	P	**Credits**	**SEMESTER – I**
	4	0	0	**4**	
Course Objectives	The objectives of this course are to • Understand computer basics and role of operating system. • Learn about concept of computer network, Internet and social impacts of IT. • Design an algorithm and draw flowchart for simple problems. • Develop C programs implementing all features of C.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total Marks	100Marks				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

Cos	Skills Demonstrated	RBT Level
CO1	Describe fundamental computer concepts, programming basics, and network terminologies, including data, operating systems, and file handling.	Level 1: Remember
CO2	Explain the working of computers, application software, and network protocols, emphasizing problem-solving techniques and IT impacts.	Level 2: Understand
CO3	Use programming constructs, office tools, and file management techniques to create and manage efficient solutions for real-world tasks.	Level 3: Apply
CO4	Break down complex problems using algorithms, flowcharts, and pseudo code, analyzing programming logic and network topologies for optimization.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Computer Fundamentals: Concept of data and information, Historical evolution of computers, Block Diagram of Computer and working, Characteristics, Classification of Computers, Advantages and Limitations of Computer, Applications of Computer, I/O Devices, Memory and Storage Devices;

Computer Software: System and Application Software.

Operating System: Characteristics, bootstrapping, types of Operating System, Operating System as resource manager.

Programming Languages: Machine, Assembly, High Level Language, 4GL. Language Translator, System Utilities- Editor, Linker, Loader, File Manager.

Computer Network Concepts: Definition, Types of Networks, Topology, Protocols, Intranet, Extranet, Internet, WWW, Search Engine, Web Browsers, Services of Internet. IT and Social Impacts of IT: Positive and Negative Impacts, Computer Crimes, Viruses and their remedial solutions.

Unit-II

Word Processor: Introduction, Windows Interface, Customizing the Word Application, Document Views, Basic Formatting in MS Word, Advanced Formatting, navigating through a Word Document, Performing a Mail Merge, A Quick Look at Macros, Printing Documents, Print Preview

Spreadsheet Application: Introduction, Workbook, Worksheet, formatting in excel, Advanced formatting in Excel, Working with formulas, Printing worksheets

Presentation Software: Introduction, creating a Presentation, Basic Formatting in PowerPoint, Advanced Formatting, Using Templates, inserting charts, Inserting tables, Printing presentations.

Unit-III

Problem Solving: Problem Identification, Analysis, Algorithms, Flowcharts, Pseudo codes, Decision Tables, Program Coding, Program Testing and Execution.

C Programming Fundamentals: Basic Concepts, Structure of a C program, Operators & Expressions; Library Functions, Decision making using if…else, Else If Ladder; Switch, break, Continue and Goto statements, Control Statements: Looping using while, do…while, for statements, Nested loops.

Arrays & Functions: Declaration and Initialization, Multidimensional Arrays, String: Operations of Strings, Functions: Defining & Accessing User defined functions, Function Prototype, Passing Arguments, Passing array as argument, Recursion, Use of Library Functions, Macro vs. Functions.

Unit-IV

Pointers: Declarations, Operations on Pointers, passing to a function, Pointers & Arrays, Array of Pointers, Array accessing through pointers, Pointer to functions, Function returning pointers, Dynamic Memory Allocations.

Structures and Union: Defining and Initializing Structure, Array within Structure, Array of Structure, Nesting of Structure, Pointer to Structure, Passing structure and its pointer to Functions, Unions: Introduction to Unions and its Utilities.

File Handling: Opening and closing file in C, Create, Read and Write data to a file, Modes of Files, Operations on file using C Library Functions, Working with Command Line Arguments, Program Debugging and types of errors.

Suggested Readings:

- Gill Nasib Singh: Computing Fundamentals and Programming in C, Khanna Books Publishing Co., New Delhi, 30 December 2015.
- Kenneth. A.: C problem solving and programming, Prentice Hall, 1990.
- Gottfried, B.: Theory and problems of Programming in C, Schaum Series, 1996.
- Gill, Nasib Singh: Handbook of Computers, Khanna Books Publishing Co., New Delhi, 2016.
- Sanders, D.: Computers Today, Tata McGraw-Hill, 1988.
- Cooper, Mullish: The spirit of C, An Introduction to Modern Programming, Jaico Publ. House, New Delhi, 2016.
- Kernighan & Ritchie: The C Programming Language, PHI, 1988.

Useful Video links:

Unit No.	Topics	Links
Unit-I	Operating System	https://archive.nptel.ac.in/courses/106/105/106105214/
	Topology	https://archive.nptel.ac.in/courses/106/105/106105081/
Unit-II	Advanced formatting in Excel	https://www.youtube.com/watch?v=uisSkBOGlUM
Unit-III	Basic Concepts and Structure of a C program	https://archive.nptel.ac.in/courses/106/104/106104128/
	Decision making using if…else, Else If Ladder	https://archive.nptel.ac.in/courses/106/105/106105171/
Unit-IV	Operations on Pointers	https://www.youtube.com/watch?v=Z_0xXmOgYtY
	File Handling	https://archive.nptel.ac.in/courses/106/104/106104128/

Course Code	**BC-MCA-121A**				
Category	Bridge Course				
Course Title	**C++ and Data Structures**				
Scheme and Credits	L	T	P	**Credits**	**SEMESTER-I**
	4	0	0	**4**	
Course Objectives	The objectives of this course are to • Understand concept of object-oriented programming and its features • Understand the importance of class design in C++ • Understand importance of polymorphism and inheritance • Implement key data structures like arrays, stacks, queues, and linked lists, and teach students how to represent and manipulate these structures in C++ for solving real-world computational problems.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total Marks	100Marks				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

Cos	Skills Demonstrated	RBT Level
CO1	Describe core object-oriented programming principles, algorithm concepts, data structures, and memory management techniques.	Level 1: Remember
CO2	Explain OOP characteristics, inheritance, polymorphism, data structures, and their real-world applications.	Level 2: Understand
CO3	Implement OOP concepts, algorithms, sorting techniques, and data structures to solve computational problems effectively.	Level 3: Apply
CO4	Examine algorithms, data structures, and OOP design principles to optimize time and space complexity in programs.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Introduction to OOP: Concept of OOP, Procedural vs. Object oriented programming, Characteristics of OOP: Objects, classes, Encapsulation, Data Abstraction, Inheritance, Polymorphism, Dynamic Binding, and Message Passing.

C++ Programming: Data-types, Variables, Static Variables, Operators in C++, Arrays, Strings, Structure, Functions, Recursion, Control Statements.

Access Specifies: Private, Public and Protected, Member functions of the class, Constructor and Destructor, Parameterized Constructor, Copy Constructors.

Unit-II

Inheritance: Reusability, Types of Inheritance: Single inheritance, Multiple, Multilevel, Hybrid Inheritance, Public, Private, and Protected Derivations.

Polymorphism: Function Overloading, Static Class Members, Static Member Functions, Friend Functions. Operator

Overloading: Unary and Binary Operator Overloading, Abstract class, Virtual function, pure virtual function, Overloading vs. Overriding. Memory management: new, delete, object Creation at Run Time. Exception handling: Throwing, Catching, and Re-throwing an exception.

Unit-III

Design and Analysis of Algorithm: Algorithm definition, comparison of algorithms. Top down and bottom-up approaches to Algorithm design.

Introduction to Data Structures: Concept of Data Structure, Types of Data Structure: Primitive and non–primitive.

Arrays: Single and Multidimensional arrays. Address calculation using column and row major ordering. Various Operations on arrays. Applications of arrays.

Sorting: Selection sort, Insertion sort, Bubble sort, Quick sort, merge sort, Radix sort. Searching: Sequential and binary search, Indexed search, Hashing Schemes. Comparison of time complexity

Unit-IV

Stacks and Queues: Representation of stacks and queues using arrays and linked-list.

Applications of stacks: Conversion from infix to postfix and prefix expressions, Evaluation of postfix expression using stacks.

Linked list: Singly linked list; operations on list, Linked stacks and queues. Polynomial representation and manipulation using linked lists. Circular linked lists, doubly linked lists.

Applications of Stack, Queue and Linked List data structures.

Suggested Readings:

- Herbert Schildt: C++ - The Complete Reference, Tata McGraw Hill Publications, 2017.
- E. Balaguruswamy: C++, Tata McGraw Hill Publications, 2020.
- E. Balaguruswamy: Object Oriented Programming and C++, TMH, 2008.
- Shah &Thakker: Programming in C++, ISTE/EXCEL, 2002.
- Johnston: C++ Programming Today, PHI, 2007.

Useful Video links:

Unit No.	Topics	Links
Unit-I	C++ Programming	https://archive.nptel.ac.in/courses/106/105/106105234/#
	Classes, Functions and constructors	https://www.youtube.com/watch?v=6niBuqibHZk
Unit-II	Inheritance	https://archive.nptel.ac.in/courses/106/105/106105151/
	Polymorphism	https://www.youtube.com/watch?v=N0iYriJWq94&t=566s
Unit-III	Algorithm	https://www.youtube.com/watch?v=zWg7U0OEAoE&t=1s
	Array	https://www.youtube.com/watch?v=mjxdMDItUjo
Unit-IV	Stacks and Queues	https://www.youtube.com/watch?v=g1USSZVWDsY&t=1s
	Linked list	https://nptel.ac.in/courses/106102064

Course Code	**BC-MCA-123A**				
Category	Bridge Course				
Course Title	**Visual Basic and Database Systems**				
Scheme and Credits	L	T	P	**Credits**	**SEMESTER -I**
	4	0	0	**4**	
Course Objectives	The objectives of this course are to • Design user interfaces and develop basic applications using fundamental controls, variables, and control structures. • Implement menus and enhance application functionality in Visual Basic. • Introduce foundational concepts of Database Management Systems, including data models, ER modeling, relational models, and query languages. • Teach database normalization techniques, ACID properties, and concurrency control to optimize performance and ensure data integrity.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total Marks	100Marks				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

Cos	**Skills Demonstrated**	**RBT Level**
CO1	Describe fundamental concepts of Visual Basic, database management systems, ER modeling, and normalization techniques.	Level 1: Remember
CO2	Explain the principles of event-driven programming, database design, and concurrency control in database systems.	Level 2: Understand
CO3	Develop Visual Basic applications using forms, dialog boxes, menus, and data controls to interact with databases.	Level 3: Apply
CO4	Analyze database schemas for redundancy, apply normalization techniques, and evaluate transaction schedules for concurrency issues.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Introduction to Visual Basic: VB IDE, an overview of VB project types, VB as event driven & object-based language, Default Controls in Tool Box: Label Box, Text Box, Command Button, List Box, Combo Box, Picture & Image Box, Shape box, Timer, Option button, Check Box & Frames. Exploring Project Properties.

Programming with VB: Variables, Constants, Data types, Variable Scope, Arithmetic operations, String Operations, Built-in functions, I/O in VB, Branching & Looping statements, Procedures, Arrays, Collection.

Unit-II

Working with Forms: Working with multiple forms; Loading, Showing and Hiding forms; Creating Forms at Run Time, Drag and Drop operation, MDI form, Arranging MDI Child Windows, Coordinating Data between MDI Child Forms.

Dialog Boxes and Menu: Using Common Dialog Box; Adding Menu, Modifying and Deleting Menu Items, Creating Submenus.

VB & Databases: The Data Controls and Data-Bound Controls; Using DAO, RDO, ADO

Unit-III

Database Management System: Introduction, Database System Applications, History of Database Systems, Database System Vs. File Processing System, View of Data, Data Abstraction, Instances and Schemas. DBMS Environment, Database languages, Database Models.

Database design and ER Model: Physical, Conceptual and Logical Database design, ER Modelling, Conceptual design with ER Model

Unit-IV

Normalization: Schema Refinement, Problems caused by redundancy, Decomposition & its properties; Normalization: FIRST, SECOND, THIRD Normal forms, BCNF, Multivalued Dependencies, Join Dependencies. Transaction Management.

Concurrency Control: ACID properties, Transactions and Schedules, Concurrent execution of transaction, Serializability and Recoverability, Lock based Concurrency control, Lock Management, Lock Conversion, Dealing with deadlocks, Concurrency without Locking

Suggested Readings:

- Steven Holzner: Visual Basic 6 Programming: Black Book, Dreamtech PRESS,1998.
- EvangelosPetroutsos: Mastering Visual Baisc 6, BPB, 1998.
- Julia Case Bradley & Anita C.: Mills paugh Programming in Visual Basic 6.0,Tata McGraw-Hill,1999.
- Michael Halvorson: Step by Step Microsoft Visual Basic 6.0 Professional, PHI, 2022.
- Scott Warner: Teach Yourself Visual basic 6, Tata McGraw-Hill Edition, 1998.
- Elmasri&Navathe: Fundamentals of Database Systems,5th edition, Pearson Education,2018.
- Thomas Connolly, Carolyn Begg: Database Systems, Pearson Education,2019.
- C. J. Date: An Introduction to Database Systems, 8th edition, Addison Wesley N. Delhi, 2006.

Useful Video links:

Unit No.	Topics	Links
Unit-I	Introduction to Visual Basic: VB IDE	https://www.nptelvideos.com/video.php?id=1771&c=21
	An overview of VB project types VB as event driven & object-based language	https://www.youtube.com/watch?v=hkcO_M9gcNw&t=20s
Unit-II	Working with Forms	https://www.youtube.com/watch?v=9EJXzWasTq4
	Dialog Boxes and Menu	https://www.youtube.com/watch?v=ww3nzKtuHqY
Unit-III	Database design and ER Model	https://www.nptelvideos.com/lecture.php?id=6473
	Integrity Constraint Over relations	https://www.nptelvideos.com/lecture.php?id=6474
Unit-IV	Lock based Concurrency	https://www.nptelvideos.com/lecture.php?id=6509
	Normalization: FIRST, SECOND, THIRD Normal forms, BCNF.	https://www.nptelvideos.com/lecture.php?id=6484

Course Code	**BC-MCA-125A**				
Category	Bridge Course LAB				
Course Title	**Software Lab-Bridge Course**				
Scheme and Credits	L	T	P	**Credits**	**SEMESTER-I**
	0	0	8	**4**	
Course Objectives	The objectives of this course are to • Understand the Basics of Computer Systems, Operating Systems, and Computer Networks. • Develop Proficiency in Using Office Automation Tools and Enhancing Productivity. • Learn C Programming Fundamentals and Master Problem-Solving Techniques • Understand and Apply Object-Oriented Programming Concepts in C++ • Develop Advanced C++ Programming Skills with Inheritance, Polymorphism, and Exception Handling • Design and Implement Efficient Algorithms and Data Structures				
Internal Assessment	50 Marks				
External Practical	50 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

Cos	**Skills Demonstrated**	**RBT Level**
CO1	Demonstrate the ability to apply programming logic and data handling techniques to solve real-world problems using C/C++.	Level 3: Apply
CO2	Break down complex problems into smaller parts and determine the most efficient approach to program design and data processing.	Level 4: Analyze
CO3	Critique and compare different methods of problem-solving, algorithm efficiency, and program functionality across various applications.	Level 5: Evaluate
CO4	Design and develop comprehensive software solutions, integrating various programming concepts and tools to meet user requirements.	Level 6: Create

List of Experiments

Sr. No.	Contents
1	Creating and Formatting Documents in MS Word
2	Data Analysis and Visualization in MS Excel
3	Creating and Delivering Presentations in MS PowerPoint
4	C Program to Find the Sum and Average of Three Numbers
5	C Program to Find the Sum of Individual Digits of a Given Integer
6	C Program to Generate Prime Numbers Between 1 to n
7	C Program to Check Whether a Given Number is Armstrong Number
8	C Program to Find Factorial of a Given Integer Using Non-Recursive Function
9	C Program to Find GCD of Two Integers Using Recursive Function
10	C Program to Find Both Largest and Smallest Number in a List
11	C++ Program to Print Multiplication Table
12	C++ Program to Find Factorial Using Recursive Function
13	C++ Program to Implement Inheritance, Polymorphism, Overloading
14	C++ Program for Sorting and Searching (e.g., Bubble Sort, Binary Search)
15	C++ Program to Implement Stacks Using Arrays

Suggested Readings:

- Gill Nasib Singh: Computing Fundamentals and Programming in C, Khanna Books Publishing Co., New Delhi,2015.
- Kenneth. A.: C problem solving and programming, Prentice Hall,1990.
- E. Balaguruswamy: Programming in C, Tata McGraw Hill,2019.
- E. Balaguruswamy: C++, Tata McGraw Hill Publications,2020.
- Herbert Schildt: C++ - The Complete Reference, Tata McGraw Hill Publications,2017

Virtual Lab Links:

Experiment No.	Experiment Name	Virtual Lab Links
1	Recursive Function	https://www.nptelvideos.com/lecture.php?id=6643
2	Inheritance	https://archive.nptel.ac.in/courses/106/105/106105151/
3	Polymorphism	https://www.youtube.com/watch?v=N0iYriJWq94&t=566s
4	Sorting and Searching	https://www.nptelvideos.com/lecture.php?id=6976

2nd Semester

Course Code	**DSC-MCA-102A**				
Category	Discipline-Specific Courses				
Course Title	**Advance Object Technology**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	4	0	0	**4**	
Course Objectives	The objectives of this course are to • Learn Java Script, XML, and applet basics for interactive web development. • Understand GUI development with Swing, AWT, and Java Beans. • Master Servlets and JSP for dynamic web content and MVC design. • Develop advanced JSP applications with error handling, data sharing, and frameworks.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total Marks	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

Cos	Skills Demonstrated	RBT Level
CO1	Describe fundamental concepts of JavaScript, XML, applets, Swing, Servlets, JSP, and web development tools and frameworks.	Level 1: Remember
CO2	Explain the differences between AWT and Swing controls, JSP and Servlets, and understand the lifecycle of servlets and JSP pages.	Level 2: Understand
CO3	Implement interactive web pages and dynamic content using JavaScript, Servlets, JSP, and Swing, along with handling HTTP requests and responses.	Level 3: Apply
CO4	Analyze and debug the architecture of a web application using the MVC pattern, JSP, and Struts framework, ensuring optimal data sharing and memory management.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Introduction to Java Scripts, Objects in Java Script, Dynamic HTML with Java Script. XML: Document type definition, XML Schemas, Document Object model, Presenting XML, Review of Applets, Class, Event Handling, AWT Programming.

Unit-II

Introduction to Swing, Differences between AWT Controls & Swing Controls, JApplet, Swing Button: JButton, JToggleButton, CheckBoxes, Radio Button, JComboBox, Text Boxes etc., Icons, Labels, JTabbed Pains, JScrollPains, JList, JTrees, JTables Java Beans: Introduction to Java Beans, Advantages of Java Beans, BDK Introspection, developing a Home page using Applet & Swing.

Unit-III

Introduction to Servlets: Lifecycle of a Servlet, The Servlet API, The javax. Servlet Package, Reading Servlet parameters, Reading Initialization parameters; The javax.servlet HTTP package, Handling Http Request & Responses, Security Issues Introduction to JSP, Problem with Servlet. The Anatomy of a JSP Page, JSP Processing. JSP Application Design with MVC Setting Up and JSP Environment: Installing the Java Software Development Kit, Tomcat Server & Testing Tomcat.

Unit-IV

JSP Application Development: Generating Dynamic Content, Using Scripting Elements Implicit JSP Objects, Conditional Processing – Displaying Values Using an Expression to Set an Attribute, Declaring Variables and Methods Error Handling and Debugging Sharing Data Between JSP pages, Requests, and Users Passing Control and Date between Pages – Sharing Session and Application Data – Memory Usage Considerations Introduction to struts framework, RMI, CGI programming.

Suggested Readings:

- Dietel and Nieto: Internet and World Wide Web – How to program? PHI/Pearson Education Asia.
- Patrick Naughton and Herbert Schildt: The Complete Reference Java, Tata McGraw-Hill.
- Hans Bergstan: Java Server Pages.
- Bill Siggelkow, S P D O'Reilly: Jakarta Struts, Cookbook.
- Murach: Murach's beginning JAVA JDK 5, SPD.
- Wang-Thomson: An Introduction to Web Design and Programming.

Useful Video links: -

Unit No.	Topics	Links
Unit-I	Introduction to JavaScript:	https://archive.nptel.ac.in/courses/106/105/106105191/
	Java Applets and Event Handling.	https://youtu.be/0pzR2FGTEhk?si=1inrwjwWueDS-cyE
Unit-II	Introduction to Swing in Java	https://youtu.be/mQj34vUhpts?si=LeeznBdsLuXyJ7xJ
	AWT in Java	https://youtu.be/Vtc-eipVgL0?si=Q8-nxuOKIJVrAgop
Unit-III	HTTP package	https://youtu.be/-foyVzTOf8o?si=gYW1aNe7WdTuXSKc
Unit-IV	JSP Application Development	https://archive.nptel.ac.in/courses/106/106/106106156/

Course Code	**DSC-MCA-104A**				
Category	Discipline-Specific Courses				
Course Title	**Advance Database Systems and Data Warehouse**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	4	0	0	**4**	
Course Objectives	The objectives of this course are to • Understand advanced database models and their applications. • Learn parallel and distributed database technologies for optimized data processing. • Explore emerging database systems like mobile, multimedia, and GIS databases. • Master data warehousing and OLAP for effective data analysis and reporting.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total Marks	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

Cos	Skills Demonstrated	RBT Level
CO1	Describe key concepts and terminology related to advanced database systems, including EER models, object-oriented databases, parallel databases, and data warehouses.	Level 1: Remember
CO2	Explain the principles of object-relational databases, distributed databases, active databases, and emerging database technologies like mobile, multimedia, and GIS databases.	Level 2: Understand
CO3	Implement advanced database models for object-oriented and distributed databases, including the design of EER models, object-relational database schemas, and client-server architectures.	Level 3: Apply
CO4	Analyze database architectures, query processing, transaction control, and concurrency management for distributed, parallel, and object-relational database systems.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Introduction to Advance Database Systems: Overview of advance database systems, their importance and Applications;

EER Model -The ER model revisited, EER model: Super classes, Subclasses, Inheritance, Specialization and Generalization, Constraints and characteristics of specialization and Generalization, Category.

Object Model: Overview of Object-Oriented concepts, Object identity, Object structure, Type constructors, Encapsulation of operations, Methods, and Persistence, Type hierarchies and Inheritance, Complex objects, Schema design for OODBMS, OQL, Persistent Programming language, OODBMS architectures and storage issues, Transaction and concurrency control.

Object Relational Database and Information Retrieval: Database design for an ORDBMS – Nested relations and collections; Storage and access methods, Query processing and Optimization, Advance Querying: User defines data types, manipulating objects table, object views; Information Retrieval & ways to retrieve information.

Unit-II

Parallel Database: Architectures for parallel databases, Inter and Intra Query parallelism, Inter and Intra Query operations, Parallelizing individual operations, Sorting, Joins, and Pipelining.

Distributed Database: Architectures for Distributed Database, Data Fragmentation, Replication, and Allocation Techniques for Distributed Database Design, Query processing in Distributed Databases; Concurrency Control and Recovery in Distributed Databases.

Overview of Client Server Architectures: Centralized and Client-Server architectures, Server architectures.

Unit-III

Enhanced Data Models for Advanced Applications: Active database- syntax and semantics (DB2, Oracle), applications, design principles for active rules, Temporal database concepts, Spatial databases, Deductive databases.

Emerging Database Technologies: Mobile databases, Multimedia Databases, Geographic Information systems (GIS); XML and Internet Databases: Structured, Semi-structured and Unstructured Data, Introduction to web databases and XML, Structure of XML data.

Unit-IV

Data Warehouse and OLAP Technology: Need for data warehouse, Definition, Goals of data Warehouse, Challenges faced during Warehouse Construction, Advantages, Types of Warehouse: Data Mart, Virtual Warehouse and Enterprise Warehouse; Components of Warehouse: Fact data, Dimension data, Fact table and Dimension table, Designing fact tables; Pre-requisite Phases: Extract, Transform and load process; Warehouse Schema: star, snowflake and galaxy schemas; OLTP vs OLAP, Strengths of OLAP, Applications of OLAP.

Multidimensional data models: Data Cubes & Data Cuboids, Lattice; OLAP operations: Advantages, Types: Roll up, Drill down, Pivot, Slice & Dice operations, Applications; OLAP Server: Need, Types: ROLAP, MOLAP and HOLAP, Features; Data Warehouse Implementation, Introduction to Efficient computation of data cubes.

Suggested Readings:

- Elmasri and Navathe: Fundamentals of Database Systems, Pearson Education.
- Korth, Silberchatz, Sudarshan: Database System Concepts, McGraw-Hill.
- Raghu Ramakrishnan, Johannes Gehrke: Database Management Systems, McGraw-Hill
- Peter Rob and Coronel: Database Systems, Design, Implementation and Management, Thomson

Learning.
- C.J.Date, Longman: Introduction to Database Systems, Pearson Education.

Useful Video links:

Unit No.	Topics	Links
Unit-I	Introduction to Advanced Database Systems:	https://www.nptelvideos.com/lecture.php?id=5903
	ER Model to Relational Mapping	https://www.nptelvideos.com/lecture.php?id=5910
	Object Oriented Databases	https://www.nptelvideos.com/lecture.php?id=5939
Unit-II	Query Processing and Optimization	https://www.nptelvideos.com/lecture.php?id=5917
	Concurrency Control for Distributed Transaction	https://www.nptelvideos.com/lecture.php?id=5929
	Introduction to Transaction Recovery	https://www.nptelvideos.com/lecture.php?id=5930
	XML - Introductory Concepts	https://www.nptelvideos.com/lecture.php?id=5941
	XML Databases	https://www.nptelvideos.com/lecture.php?id=5943
Unit-IV	Introduction to Data Warehousing and OLAP	https://www.nptelvideos.com/lecture.php?id=5933
	OLAP Operations: Roll Up, Drill Down, Pivot.	https://www.nptelvideos.com/lecture.php?id=5934

Course Code	**DSC-MCA-106A**				
Category	Discipline-Specific Courses				
Course Title	**Operating Systems and Shell Programming**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	4	0	0	**4**	
Course Objectives	The objectives of this course are to • Understand OS fundamentals: Process management, scheduling, and virtual machines. • Learn IPC and deadlock handling for efficient synchronization. • Master memory and I/O management for system optimization. • Develop Linux skills: Linux architecture, shell scripting, and utilities.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total Marks	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

Cos	Skills Demonstrated	RBT Level
CO1	Describe fundamental concepts and terminology in operating systems, such as process management, memory management, interprocess communication, and file systems.	Level 1: Remember
CO2	Describe the functions, services, and structures of an operating system, as well as the principles of process scheduling, deadlock handling, and memory management.	Level 2: Understand
CO3	Apply scheduling algorithms, process management techniques, memory allocation strategies, and file management concepts to solve real-world operating system problems.	Level 3: Apply
CO4	Analyze various operating system problems, including deadlocks, interprocess communication issues, memory fragmentation, and I/O management challenges.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Operating System Basics: Evolution, Objectives & Functions, Characteristics; Classification of Operating Systems, OS Services, System Calls, OS Structures, Concept of Virtual Machine.

Process Concepts: Definition, Process Relationship, Process states, Process State transitions, Process Control Block, Context switching – Threads – Concept of multithreads, Benefits of threads – Types of threads.

Process Scheduling: Definition, Scheduling objectives, Types of Schedulers, Scheduling criteria. Scheduling Algorithms: Preemptive and Non-preemptive, FCFS–SJF–RR, Multiprocessor scheduling: Types, Performance evaluation of the scheduling.

Unit-II

Inter process Communication: Race Conditions, Critical Section, Mutual Exclusion, Hardware Solution, Strict Alternation, Peterson's Solution, Producer Consumer Problem, Semaphores, Event Counters, Monitors, Message Passing, Classical IPC Problems: Reader's & Writer Problem, Dinning Philosopher Problem.

Deadlocks: System Model, Deadlock Principles, Deadlock Characterization, Methods for Handling Deadlocks Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, and Recovery from Deadlock.

Unit-III

Memory Management: Basic Memory Management, Logical and Physical address map, Memory allocation, Fragmentation and Compaction, Paging and its disadvantages, Virtual Memory, Locality of reference, Page Fault, Working Set, Demand paging concept, Page Replacement policies.

Input / Output Management: I/O devices, Device controllers, Direct memory access Principles of I/O Software: Goals of Interrupt handlers, Device drivers, Device independent I/O software, Secondary-Storage Structure: Disk structure, Disk scheduling algorithms.

File Management: File concept, Access methods, File types, File operation, Directory structure, File System structure, Allocation methods.

Unit-IV

Linux Basics: Genesis of Linux, Architecture of Linux, Features of Linux, Introduction to vi editor, Linux commands. Linux Shells: Role, Types- Bourne Shell (sh), C Shell (csh), Korn Shell (ksh), Bourne Again Shell (bash).

Linux Utilities: File handling utilities, Security by file permissions, Process utilities, Disk utilities, Networking commands, Filters, Text Processing utilities and backup utilities.

Shell programming (With bash): Introduction, shell responsibilities, pipes and Redirection, running a shell script, the shell as a programming language, Shell meta characters, File name substitution, Shell variables, Command substitution, Shell commands, the environment, Quoting, Test command, control structures, arithmetic in shell, shell script examples, interrupt processing, functions, debugging shell scripts.

Suggested Readings:

- Dhamdhere: Operating Systems, Tata McGraw Hill.
- Robert Love: Linux System Programming, O'Reilly, SPD.
- Jason Cannon: Linux For Beginners,
- William Shotts: The Linux Command Line: A Complete Introduction.
- Daniel J. Barrett: Linux Pocket Guide: Essential Commands
- Any other book(s) covering the contents of the paper in more depth.
- Silberschatz& Galvin: Operating System Concept, Wiley.
- Milan Milenkovic: Operating Systems, Tata McGraw – Hill.

Useful Video links: -

Unit No.	Topics	Links
Unit-I	Operating System Overview	https://www.youtube.com/watch?v=a2B69vCtjOU
	Process states	https://www.youtube.com/watch?v=jENkpxUOoXM&list=PLyqSpQzTE6M9SYI5RqwFYtFYab94gJpWk&index=4
Unit-II	Deadlock Prevention and Avoidance	https://www.youtube.com/watch?v=UczJ7misUEk&list=PLyqSpQzTE6M9SYI5RqwFYtFYab94gJpWk&index=32
Unit-III	Memory Management Techniques	https://www.youtube.com/watch?v=_pKbqFyG03s&list=PLyqSpQzTE6M9SYI5RqwFYtFYab94gJpWk&index=6
Unit-IV	Introduction to Linux and Shells	https://archive.nptel.ac.in/courses/117/106/117106113/
	Networking commands	https://www.youtube.com/watch?v=Z0RVnURLRZM&t=334s

Course Code	**DSEC-MCA-112A**				
Category	Discipline Specific Elective Courses				
Course Title	**Software Engineering**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	4	0	0	**4**	
Course Objectives	The objectives of this course are to • Understand software development models and apply them to various projects. • Design, implement, and test software solutions using appropriate strategies and techniques. • Manage software projects effectively, focusing on risk management, estimation, and maintenance.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total Marks	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

Cos	Skills Demonstrated	RBT Level
CO1	Describe fundamental concepts of software engineering, including software life cycle models, requirements gathering, software design principles, and types of software maintenance.	Level 1: Remember
CO2	Explain the various software life cycle models, software requirements, design strategies, and the differences between verification and validation in software testing.	Level 2: Understand
CO3	Apply software engineering practices like requirement analysis, system design, testing, and project management strategies.	Level 3: Apply
CO4	Analyze design, testing, and project plans to identify improvements using metrics like LOC and complexity.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Introduction: Software and its Characteristics, Evolving Role of Software, Software Product, Software Processes, Software Crisis, 'Software Engineering' Evolution, Principles of Software Engineering, Programming-in-the-small vs. Programming-in-the-large, Software Components, Software Engineering Processes.

Software Life Cycle (SLC) Models: Water Fall Model, Prototype Model, Spiral Model, Evolutionary Development Models, Iterative Enhancement Models, Object Oriented Models and other latest Models.

Software Requirements: Functional and Non-Functional, User requirements, System requirements. Software Requirements Document – Requirement

Engineering Process: Feasibility Studies, Requirements elicitation and analysis, requirements validation, requirements management.

Unit-II

Software Design: Basic Concept of Software Design, Architectural Design,

Low Level Design: Modularization, Design Structure Charts, Flow Charts, Coupling and Cohesion Measures; Design Strategies: Function Oriented Design, Object Oriented Design, Top-Down and Bottom-Up Design, User Interface Design, Programming practices and Coding standards.

Software Testing: Introduction, Verification vs. Validation, Software Reliability, Levels of Testing, Structural Testing (White Box Testing), Functional Testing (Black Box Testing).

Unit-III

Software Quality: Attributes, Software Quality Assurance – plans & activities; Software Documentation.

Software Project Management: Project Management activities, Project Estimation, Project planning, Project scheduling.

Software Risk Management: Reactive versus Proactive Risk Strategies, Risk management activities; Software Risks (Risk Identification, Risk Projection, Risk Refinement, Risk Mitigation), Risks Monitoring and Management.

Software Measurement and Metrics: Process Metrics, Project metrics, Estimation – LOC, Halstead's Software Science, Function Point (FP), Cyclomatic Complexity Measures; Software Project Estimation Models- Empirical, Putnam, COCOMO I & II.

Unit-IV

Software Maintenance: Need for Maintenance, Categories of Maintenance: Preventive, Corrective and Perfective Maintenance, Cost of Maintenance; Software Re- Engineering, Reverse Engineering, Software Documentation.

Software Configuration Management: SCM Activities, Change Control Process, Software Version Control; Software Reuse, Software Evolution.

CASE Computer Aided Software Engineering (CASE), CASE Tools.

Suggested Readings:

- Rogers Pressman: Software Engineering, TMH.
- Gill, Nasib Singh: Software Engineering, Khanna Book Publishing Co.(P) Ltd, New Delhi
- Jalote, Pankaj: An Integrated Approach to Software Engineering, Narosa Publications.
- ChhillarRajender Singh: Software Engineering: Testing, Faults, Metrics, Excel Books, New Delhi.

- Ghezzi, Carlo: Fundaments of Software Engineering, PHI.

Useful Video links

Unit No.	Topics	Links
Unit-I	Introduction to Software Engineering	https://www.nptelvideos.com/lecture.php?id=7029
	Software Engineering-Challenges	https://www.nptelvideos.com/lecture.php?id=7028
	Requirements Engineering / Specification	https://www.nptelvideos.com/lecture.php?id=7032
Unit-II	Software Design Techniques	https://www.nptelvideos.com/lecture.php?id=7041
	Software Testing Overview	https://www.nptelvideos.com/lecture.php?id=7045
	White Box and Black Box Testing	https://www.nptelvideos.com/lecture.php?id=7046
Unit-III	Software Quality Management Systems	https://www.nptelvideos.com/lecture.php?id=7063
	Software Maintenance and Reengineering	https://www.youtube.com/watch?v=DW78Vr6Y2fg
Unit-IV	Software Management	https://www.nptelvideos.com/lecture.php?id=7065

Course Code	**DSEC-MCA-116A**				
Category	Discipline Specific Elective Courses				
Course Title	**Computer Network**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	4	0	0	**4**	
Course Objectives	The objectives of this course are to • Understand the fundamentals of data communication, including network models and protocols. • Comprehend the principles of distributed systems, focusing on synchronization, fault tolerance, and security. • Analyze network and transport layer protocols, data link functions, and implement practical communication mechanisms.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total Marks	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

Cos	Skills Demonstrated	RBT Level
CO1	Describe the fundamental concepts of data communication, network classification, communication models, and protocols used in distributed systems.	Level 1: Remember
CO2	Explain data encoding, modulation techniques, multiplexing, and the layered architecture of network reference models system, communication models, and fault tolerance mechanisms.	Level 2: Understand
CO3	Implement various data link layer protocols, such as HDLC and sliding window protocol, and apply network protocols and replication management.	Level 3: Apply
CO4	Analyze data link protocols, error correction, medium access, synchronization, and fault tolerance in distributed systems.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Data Communication: Introduction to data communication; analog and digital signals; asynchronous and synchronous transmission; data encoding and modulation techniques, broadband and base band transmission, multiplexing, transmission medium.

Network Classification: Wired Network, Wireless Network, Internetworking Devices.

Network Reference Models: Layered architectures, protocol hierarchies, interface and services: ISO- OSI reference model, TCP/IP reference model; internet protocol stacks.

Unit-II

Data Link Layer Functions and Protocols: Framing, error-control, flow-control; sliding window protocol; HDLC, Error detection and correction, Data link layer of internet.

Medium Access Sub-layer: CSMA/CD protocol, IEEE standards for LAN and MAN, X.25, frame relay, Narrowband and Broadband ISDN, Asynchronous Transfer Modes.

Network Functions & Protocols: Switching mechanism and its various types, routing and congestion control, Internetworking-TCP/IP, IP Packet, IP address, IPv6

Transport Layer: Design issues, Connection management (UDP, TCP and their Frame Format); Application Layer: File Transfer, Access and Management, E-Mail, Virtual Terminal, Public Network

Unit-III

Introduction to Distributed Systems: Introduction, Design Goals, Types of Distributed systems, System Architecture and Fundamental models, Middleware, Threads, Virtualization, Client-server model, multiple servers, proxy servers and caches, peer processes, code migration.

Communication Fundamentals: Basic concepts, Remote Procedure Call, Message Oriented Communication, Stream Oriented Communication, Multicast Communication.

Synchronization: Clock synchronization, Logical clocks, Mutual exclusion algorithms: centralized, decentralized, distributed and token ring algorithms, election algorithms.

Unit-IV

Replication Management: Need for replication, Consistency models, Consistency protocols, Replica management.

Fault Tolerance: Basic concepts and failure models, Process resilience, Reliable client-server and group communication, Distributed commit recovery mechanisms.

Security in Distributed Systems: Secure channels, Access control, Security management, Cryptographic algorithms; Digital signatures; certificates, firewalls.

Naming: Flat naming, Structured naming, Name space and Resolution, Attribute- based naming, Directory services, LDAP, Decentralized implementations.

Suggested Readings:

- W. Tomasi: Introduction to Data Communications and Networking, Pearson Education.
- P.C. Gupta: Data Communications and Computer Networks, Prentice-Hall of India.
- Behrouz Forouzan and S.C. Fegan: Data Communications and Networking, McGraw Hill.
- L. L. Peterson and B. S. Davie: Computer Networks: A Systems Approach, Morgan
- Kaufmann.
- William Stallings: Data and Computer Communications, Pearson Education.
- George Coulouris, Jean Dollimore, Tim Kindberg: Distributed Systems-Concepts and Design, Pearson Education

Useful Video links:

Unit No.	Topics	Links
Unit-I	Introduction to Data Communication	https://www.nptelvideos.com/lecture.php?id=5826
	Transmission Impairments and Channel Capacity	https://www.nptelvideos.com/lecture.php?id=5829
	Introduction to Data Transmission & Networking	https://www.nptelvideos.com/lecture.php?id=5860
Unit-II	IEEE 802 LANs	https://www.nptelvideos.com/lecture.php?id=5854
	TCP/IP - II	https://www.nptelvideos.com/lecture.php?id=5861
	X.25 and Frame Relay	https://www.nptelvideos.com/lecture.php?id=5849
Unit-III	Introduction to Distributed Systems	https://archive.nptel.ac.in/courses/106/106/106106168/
	Remote Procedure Call and Communication	https://www.youtube.com/watch?v=wqzKqYp
Unit-IV	Firewalls and Intrusion Detection Systems	https://www.nptelvideos.com/lecture.php?id=5824

Course Code	**EL-MCA-108A**				
Category	Experiential Learning				
Course Title	**Software Lab-3**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	0	0	6	**3**	
Course Objectives	The objectives of this course are to • Explore emerging database systems like mobile, multimedia, and GIS databases. • Master data warehousing and OLAP for effective data analysis and reporting.				
Assessment	50 Marks				
End Semester Practical Examination	50 Marks				
Total Marks	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

Cos	Skills Demonstrated	RBT Level
CO1	Apply SQL commands to insert, update, delete records, and perform calculations on columns using arithmetic operations and SQL functions.	Level 3: Apply
CO2	Analyze the data using logical operators, BETWEEN, and aggregate functions such as COUNT and GROUP BY to group and filter records.	Level 4: Analyze
CO3	Evaluate the structure of SQL queries for data integrity and correctness, including proper use of joins, grouping, and ordering of records.	Level 5: Evaluate
CO4	Design and create views, implement constraints, and demonstrate effective transaction control to ensure database consistency and integrity.	Level 6: Create

List of Experiments

Sr. No.	Contents
1	Write SQL command to create a table with columns of your choice. Write an SQL command to add a new column to the table. Write an SQL command to delete the table from the database.
2	Write SQL command to insert a new record into the table. Write an SQL command to update a column value in the table. Write an SQL command to delete a record from the table.
3	Write SQL commands showcase the use `ROUND`, `COUNT` , `UPPER` , `SYSDATE` , and `TO_CHAR` functions
4	Write SQL command to perform an arithmetic calculation on numeric columns.
5	Write SQL command to find records that satisfy either of two conditions using logical operators.
6	Write SQL command using the `BETWEEN` operator to find records within a specific range.
7	Write SQL command to perform a natural join between two tables.
8	Write SQL command to group records by a column and count the number of records in each group, displaying only groups that meet a specific condition.

9	Write SQL command to order records by a specific column in ascending or descending order.
10	Write SQL command to create a view that displays specific columns from a table.
11	Write SQL commands to implement `PRIMARY KEY`, `FOREIGN KEY`, `UNIQUE`, `CHECK`, and `NOT NULL` constraints on a table.
12	Write SQL commands to demonstrate transaction control using `ROLLBACK`, `COMMIT`, and `SAVEPOINT`.

Useful Video Link:

Experiment No	Experiment Name	Links
1	Write SQL command to create a table with columns of your choice. Write an SQL command to add a new column to the table. Write an SQL command to delete the table from the database.	https://archive.nptel.ac.in/courses/106/106/106106220/
2	Write SQL command to insert a new record into the table. Write an SQL command to update a column value in the table. Write an SQL command to delete a record from the table.	https://archive.nptel.ac.in/courses/106/106/106106220/
3	Write SQL commands showcase the use `ROUND`, `COUNT`, `UPPER`, `SYSDATE`, and `TO_CHAR` functions	https://archive.nptel.ac.in/courses/106/106/106106220/
4	Write SQL command to perform an arithmetic calculation on numeric columns.	https://archive.nptel.ac.in/courses/106/106/106106220/
5	Write SQL command to find records that satisfy either of two conditions using logical operators.	https://archive.nptel.ac.in/courses/106/106/106106220/
6	Write SQL command to create a table with columns of your choice. Write an SQL command to add a new column to the table. Write an SQL command to delete the table from the database.	https://archive.nptel.ac.in/courses/106/106/106106220/

Course Code	**EL-MCA-110A**				
Category	Experiential Learning				
Course Title	**Software Lab-4**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	0	0	6	**3**	
Course Objectives	The objectives of this course are to • Develop JavaScript programs for client-side form validation and dynamic content manipulation. • Implement XML documents and validate them using internal DTD for structured data representation. • Design interactive web applications using JSP and Servlets for session management and data processing. • Integrate Java Swing with web components to create GUI-based interactive applications.				
Assessment	50 Marks				
End Semester Practical Examination	50 Marks				
Total Marks	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

Cos	Skills Demonstrated	RBT Level
CO1	Implement object-oriented concepts such as inheritance, abstraction, interfaces, event handling, and graphics algorithms in Java and C/C++.	Level 3: Apply
CO2	Analyze and debug Java programs, algorithms for geometric transformations, and multi-threading applications for optimization and error resolution.	Level 4: Analyze
CO3	Evaluate the efficiency and functionality of matrix multiplication, event handling techniques, graphical algorithms, and multi-threading in Java and C/C++.	Level 5: Evaluate
CO4	Design and develop Java applications and C/C++ programs for graphical transformations, event-driven programming, and multi-threading with real-time functionality.	Level 6: Create

List of Experiments:

Sr. No.	Contents
1	Write a JavaScript program to validate USER LOGIN page.
2	Write a JavaScript program for validating REGISTRATION FORM.
3	Write a program for implementing XML document for CUSTOMER DETAILS.
4	Write an internal Document Type Definition to validate XML for CUSTOMER DETAILS?

5	Write a JavaScript to design a simple calculator to perform the following operations: sum, product, difference and quotient.
6	Write a JavaScript that calculates the squares and cubes of the numbers from 0 to 10and outputs HTML text that displays the resulting values in an HTML table format.
7	Write a JavaScript code that displays text "TEXT-GROWING" with increasing font size in the interval of 100ms in RED COLOR, when the font size reaches 50pt it displays "TEXT-SHRINKING" in BLUE color. Then the font size decreases to 5pt.
8	Write a simple servlet that displays a message.
9	Write a servlet that reads parameters from employee login page.
10	How to create a HTML Button in a Java Swing application.
11	Write a JSP for session tracking.
12	Write a JSP that reads parameters from user login page.

Useful Video Links:

Unit No.	**Topics**	**Links**
Unit-I	Introduction to JavaScript:	https://archive.nptel.ac.in/courses/106/105/106105191/
	Java Applets and Event Handling.	https://youtu.be/0pzR2FGTEhk?si=1inrwjwWueDS-cyE
Unit-II	Introduction to Swing in Java	https://youtu.be/mQj34vUhpts?si=LeeznBdsLuXyJ7xJ
	AWT in Java	https://youtu.be/Vtc-eipVgL0?si=Q8-nxuOKIJVrAgop
Unit-III	HTTP package	https://youtu.be/-foyVzTOf8o?si=gYW1aNe7WdTuXSKc
Unit-IV	JSP Application Development	https://archive.nptel.ac.in/courses/106/106/106106156/

Course Code	**DSEC-MCA-113A**				
Category	Discipline Specific Elective Courses				
Course Title	**Cloud Computing**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I**
	4	0	0	**4**	
Course Objectives	The objectives of this course are to • Understand Cloud Fundamentals: Grasp the basic concepts, models, architecture, and benefits of cloud computing. • Explore Virtualization and Platforms: Study the role of virtualization and popular cloud platforms like AWS, Google Cloud, and Azure. • Learn Cloud Management: Gain insights into cloud service management, data scalability, and service-oriented architectures.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total Marks	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

Cos	Skills Demonstrated	RBT Level
CO1	Describe cloud computing concepts, deployment models, service models, and platforms (IaaS, PaaS, SaaS) with features.	Level 1: Remember
CO2	Explain cloud computing concepts, architecture, benefits, virtualization, load balancing, and platforms like AWS, Google Cloud, Azure.	Level 2: Understand
CO3	Apply cloud services (IaaS, PaaS, SaaS) and platforms like AWS, Google App Engine, Azure for deployment.	Level 3: Apply
CO4	Analyze cloud architecture, compare service models, and evaluate benefits/limitations of virtualization, SDN, and NFV.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Cloud Computing Fundamentals: Definition of Cloud Computing: Defining a cloud, Evolution of Cloud Computing cloud types-NIST model, cloud cube model, Deployment models, Service models, Cloud Reference model, Characteristics of Cloud, Cloud Computing Benefits and Limitations, Cloud Architecture: Introduction on Infrastructure, platforms, virtual appliances, communication protocols; Cloud computing vs. Cluster computing vs. Grid computing; Applications: Technologies and Process required when deploying Web services; Deploying a web service from inside and Outside of a Cloud. Services and Applications by Types: IaaS, PaaS, SaaS, IDaaS, and CaaS.

Unit-II

Virtualization: Objectives, Benefits of Virtualization, Emulation, Virtualization for Enterprise, VMware, Server Virtualization, Data Storage Virtualization, Load balancing and Virtualization, Improving Performance through Load Balancing, Hypervisors, Machine Imaging, Porting of applications in the cloud. Concept of Software-Defined Networking (**SDN**), Network-Function Virtualization (**NFV**) and Virtual Network Functions (**VNF**).

Use of Platforms in Cloud Computing: Concepts of Platform as a Service, Use of PaaS application frameworks; Use of Google, Amazon and Microsoft Web Services. Cloud vendors and Service Management: Amazon cloud, AWS Overview, Installation of AWS, Google app engine, azure cloud, salesforce.

Unit-III

Cloud Management: Features of Network management system, Monitoring of an entire cloud computing deployment stack, lifecycle management of cloud services(six stages of lifecycle)

Service Management in Cloud Computing: Service Oriented Architecture: concepts of message-based transactions, Protocol stack for an SOA architecture, Event driven SOA, Enterprise Service bus, Service Catalogs, Service Level Agreements (SLAs), Managing Data: Looking at Data, Scalability & Cloud Services, Database & Data Stores in Cloud, Large Scale Data Processing.

Unit-IV

Cloud Security Concepts: Cloud security challenges, Cloud security approaches: encryption, tokenization/ obfuscation, cloud security alliance standards, cloud security models and related patterns, Cloud security in mainstream vendor solutions, Mainstream Cloud security offerings: security assessment, secure Cloud architecture design, Authentication in cloud computing, Client access in cloud, Cloud contracting Model, Security Mapping, Identity Management.

Case Study on Open Source & Commercial Clouds: Eucalyptus, Microsoft Azure, Amazon EC2.

Suggested Readings:

- Cloud Computing: A Practical Approach by Anthony T. Velte Toby J. Velte, Robert Elsenpeter, The McGraw-Hill.
- Cloud Computing: SaaS, PaaS, IaaS, Virtualization and more. by Dr. Kris Jamsa.
- Tim Mather, SubraKumaraswamy, ShahedLatif: Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance, O'ReillyMedia Inc.
- Cloud Computing Bible, Barrie Sosinsky, Wiley-India.
- Jason Venner,Pro: Hadoop,Apress.
- Cloud Computing: Principles and Paradigms, Editors: RajkumarBuyya, James Broberg, Andrzej M. Goscinski, Wiley.

Useful Video links:

Unit No.	Topics	Links
Unit-I	Cloud Computing Fundamentals	https://youtu.be/NzZXz3fJf6o?si=Jl6S2DP0_NmiJn2P
	Cloud Computing Architecture	https://youtu.be/fZ3D6HQrWzs?si=bugPgty_2y9UC-J2
Unit-II	Introduction to Virtualization and Cloud Computing	https://archive.nptel.ac.in/courses/106/105/106105167/
	Virtualization Explained	https://youtu.be/GtJGB1WxRW8?si=JIiaURE5tKb23X_g
	Cloud Platforms Overview (AWS, Azure, Google Cloud	https://youtu.be/XTW3ujxnndo?si=zTX1WCHmbsH1P9I1
Unit-III	Cloud Management Essentials	https://archive.nptel.ac.in/courses/106/104/106104182/
	Database Management and Cloud Scalability	https://youtu.be/CYY0lRKQwb8?si=h0P_Ac-3R8-Ci7UL
Unit-IV	Cloud Security Basics	https://archive.nptel.ac.in/courses/106/105/106105223/
	Quantum Computing and Security in the Cloud	https://archive.nptel.ac.in/courses/106/104/106104242/

Course Code	**DSEC-MCA-115A**				
Category	Discipline Specific Elective Courses				
Course Title	**Theory of Computation**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	4	0	0	**4**	
Course Objectives	The objectives of this course are to • Grasp mathematical foundations for formalizing computation. • Design automata and grammars for language recognition. • Analyze computational models to understand decidability. • Classify problems by computational complexity (P, NP).				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total Marks	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

Cos	Skills Demonstrated	RBT Level
CO1	Describe key concepts in formal languages, automata theory, Turing machines, and computational complexity properties.	Level 1: Remember
CO2	Explain the relationship between formal languages, grammars, automata, Chomsky hierarchy, undecidability, and Turing machines.	Level 2: Understand
CO3	Apply automata theory to design finite automata, pushdown automata, Turing machines, and solve with pumping lemma.	Level 3: Apply
CO4	Analyze languages to simplify grammars, convert to normal forms, and evaluate equivalence and decidability.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Review of Mathematical Terms and Theory: Basic Mathematical Notations and Set Theory, Logic Functions And Relations, Language Definitions, Mathematical Inductions and Recursive Definitions.

Finite Automata: Introduction, Alphabets, Strings and Languages, Kleen-closure; Deterministic Finite Automata (DFA) and Nondeterministic Finite Automata (NFA) -Formal definition, simpler notations (state transition diagram, transition table), Regular and Non-Regular Languages, Equivalence of NDFA & DFA, NDFA to DFA conversion, DFA minimization using Myhill-Nerode Theorem, Applications of Finite Automata, Finite automata with output (Moore and Mealy machines) and inter-conversion.

Unit-II

Context Free Grammar: Introduction to CFG, CFG and Known Languages, Unions Concatenations and *'S Notations and CFL, Derivations of Trees and Ambiguity, Unambiguous CFG and Algebraic Expressions, Normal Forms and Simplified Forms.

Formal Grammar: Definition, Chomsky hierarchy of grammars, Construction of Context free, derivation, parse tree, ambiguity in grammars, Removal of null and unit production, Normal forms- CNF & GNF.

Pushdown Automata: Introduction to PDA, Types of PDA, Designing of PDA, CFG Corresponding to PDA, Introduction to CFL, Intersections and Complements of CFL, Decisions Problems and CFL, Equivalence of Pushdown Automata and CFL, Pumping Lemma for CFL, Applications.

Unit-III

Turing Machines: Model of Computation and Church Turning Thesis, Definition of Turing Machine, Tm and Language Acceptors, Variations of Tm, Non- Deterministic Tm, Universal Tm, Tm & computers.

Recursive Language: Introduction, Enumerable and Language, Recursive and Non Recursive Enumerable, their properties.

PCP: Introduction to undecidability, undecidable problems about TMs, Post correspondence problem (PCP), Modified PCP.

Unit-IV

Computation Functions, Measuring, Classifications and Complexity: Primitive Recursive Functions, Halting Problem, Recursive Predicates and Some Bounded Operations, Unbounded Minimizations and μ-Recursive Functions, Godel Numbering, Computable Functions and μ-Recursive, Numerical Functions.

Tractable and Intractable Problems: Growth Rate and Functions, Time and Speed Complexity, Complexity Classes, Tractable and Possibly Intractable Problems, P And NP Completeness, Reduction Of Time, Cook's Theorem, NP-Complete Problems.

Suggested Readings:

- John C. Martin: Introduction to Language and theory of Computation, Mcgraw Hill.
- John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman: Introduction to Automata Theory Languages and Computation, Pearson Education
- K. L. P Mishra, N. Chandrashekaran: Theory of Computer Science-Automata Languages and Computation, Prentice Hall of India, India.
- K.Krithivasan and R.Rama: Introduction to Formal Languages, Automata Theory and Computation; Pearson Education.
- Harry R. Lewis and Christos H. Papadimitriou: Elements of the Theory of Computation, Second Edition, Prentice-Hall of India Pvt. Ltd
- Any other book(s) covering the contents of the paper in more depth. 6. Wang-Thomson: An Introduction to Web Design and Programming.

Useful Video links

Unit No.	Topics	Links
Unit-I	Introduction to Set Theory	https://www.nptelvideos.com/lecture.php?id=7192
	Finite Automata and Regular Languages	https://www.nptelvideos.com/lecture.php?id=7193
Unit-II	Context-Free Grammars (CFGs)	https://www.nptelvideos.com/lecture.php?id=7211
	Pushdown Automata	https://www.nptelvideos.com/lecture.php?id=7222
Unit-III	Turing Machines	https://www.nptelvideos.com/lecture.php?id=7229
	Non- Deterministic Tm	https://youtu.be/RG5bohlmaTk?si=9q7rmnS6yBbm4c0O
	Post correspondence problem (PCP)	https://youtu.be/TzI3DXEXBwE?si=rsONlMBx6-MqME4W
Unit-IV	Time and Speed Complexity	https://youtu.be/Jsh5iwNfmIQ?si=u93h6mq8oOhxSOEj
	Cook's Theorem	https://youtu.be/96JURPTS8dA?si=pVtHYjJc2L3dv_d3
	NP-Complete Problems	https://youtu.be/Wp_nB-MF_Mk?si=3EtRW5j_BxV7RKDa

Course Code	**DSEC-MCA-114A**				
Category	Discipline Specific Elective Courses				
Course Title	**Web Technologies**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I**
	4	0	0	**4**	
Course Objectives	The objectives of this course are to • Understand Web Architecture: Learn web protocols, HTML, XHTML, and CSS for web page design. • JavaScript Programming: Gain skills in client-side JavaScript for interactivity and DOM manipulation. • · Server-Side Programming: Develop dynamic web content using Java Servlets and manage sessions.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total Marks	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

Cos	Skills Demonstrated	RBT Level
CO1	Describe web development concepts: HTML, CSS, JavaScript, Servlets, JSP, XML, AJAX, DOM, HTTP, W3C.	Level 1: Remember
CO2	Explain web clients, servers, protocols, and the role of HTML, CSS, JavaScript, Servlets, JSP.	Level 2: Understand
CO3	Apply static/dynamic web pages with HTML, CSS, JavaScript, and create applications using Servlets, JSP, AJAX.	Level 3: Apply
CO4	Analyze client-side vs server-side technologies and evaluate integrating HTML, CSS, JavaScript, XML, AJAX, Web Services.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Web Essentials: Clients, Servers, and Communication. Basic Internet Protocols, W3C, HTTP, Web Clients & Web Servers.

Markup languages-XHTML: Introduction to HTML, basics of XTHML, HTML elements, HTML tags, lists, tables, frames, forms, defining XHTML's abstract syntax, defining HTML documents.

CSS style sheets: Introduction, CSS core syntax, text properties, CSS box model, normal flow box layout, other properties like list, tables, DHTML, XML, XML documents & vocabulary, XML versions & declarations, Introduction to WML.

Unit-II

Client-Side Programming: The JavaScript Language-History and Versions Introduction JavaScript in Perspective-Syntax-Variables and Data Types-Statements-Operators-Literals-Functions-Objects-Arrays-Built-in Objects-JavaScript Debuggers.

Host Objects: Browsers and the Document Object Model (DOM), Levels-Intrinsic Event Handling-Modifying Element Style-The Document Tree-DOM Event Handling-Accommodating Noncompliant Browsers Properties of window.

Server-Side Programming: Concept of server-side programming, Java Servlets revistited- Architecture - Overview-A Servlet-Generating Dynamic Content-Life Cycle- Parameter Data-Sessions-Cookies-URL Rewriting-Other Capabilities-Data Storage Servlets and Concurrency- Databases and Java Servlets.

Unit-III

Separating Programming and Presentation: JSP Technology revisited - JavaBeans Classes and JSP-Tag Libraries and Files-Support for the Model-View-Controller Paradigm- Databases and JSP. Representing Web Data: XML-Documents and Vocabularies-Versions and Declaration-Namespaces- DOM based XML processing Event-oriented Parsing: SAX-Transforming XML Documents-Selecting XML Data: XPATH-Template based Transformations: XSLT-Displaying XML Documents in Browsers.

Unit-IV

AJAX: Ajax Client Server Architecture-XML Http Request Object-Call Back Methods.

Web Services: JAX-RPC-Concepts-Writing a Java Web Service-Writing a Java Web Service Client-Describing Web Services: WSDL- Representing Data Types: XML Schema-Communicating Object Data: SOAP Related Technologies-Software Installation-Storing Java Objects as Files.

Suggested Readings:

- Jackson: Web Technologies: A Computer Science Perspective, Pearson Education India.
- Roger S Pressman, David Lowe: Web Engineering: A Practitioner's Approach, TMH.
- AchyutGodbole, AtulKahate: Web Technologies, McGraw-Hill Education.
- Uttam K Roy: Web Technologies, Oxford University Press.
- Chris Bates: Web Programming, Wiley.
- Gertel Keppel, Birgit Proll, Siegfried Reich, Werner R.: Web Engineering, John Wiley& Sons Inc.

Useful Video links:

Unit No.	Topics	Links
Unit-I	Basic Internet Protocols	https://youtu.be/nhGRUmtnGB4?si=Yaic70rQ5Lu-KSvk
	Introduction to HTML	https://youtu.be/QEtWL4lWlL4?si=Ohu2kd6ucbnyg4xc
Unit-II	JavaScript Language-History and Versions	https://youtu.be/uUhOEj4z8Fo?si=cFFEWSGScuBHvFB9
	Java Servlets revisited- Architecture - Overview	https://youtu.be/XlryaovT_3k?si=rxJliGNfb67hhiv2

Course Code	**DSEC-MCA-118A**				
Category	Discipline Specific Elective Courses				
Course Title	**Advance Computer Architecture**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	4	0	0	**4**	
Course Objectives	The objectives of this course are to • Understand evolution and classification of computer architectures and their performance characteristics. • Analyze program and network properties influencing hardware and software parallelism. • Explore interconnection network architectures and memory hierarchy for efficient data access. • Examine multiprocessor and multicomputer systems, coherence protocols, and message-passing mechanisms.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total Marks	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

Cos	Skills Demonstrated	RBT Level
CO1	Recall key concepts of computer architecture, interconnect systems, memory hierarchies, and multiprocessor structures to understand fundamental design Principles.	Level 1: Remember
CO2	Explain parallelism conditions, flow mechanisms, memory organization, and network topologies used in modern high-performance computer systems.	Level 2: Understand
CO3	Apply knowledge of interconnection networks and cache mapping techniques to solve performance and architectural configuration problems.	Level 3: Apply
CO4	Analyze program flow models, routing algorithms, and cache coherence protocols to identify system bottlenecks and architectural trade-offs.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Evolution of Computer Architecture: Introduction of computer architecture, Elements of Modern Computers, Evolution of Computer Architectures, Classification of parallel computers, System attributes to performance.

Program and Network Properties: Conditions of Parallelism - data and resource dependences, Bernstein's conditions, hardware and software parallelism. Program Flow Mechanisms - control flow versus data flow, data flow architecture, demand driven mechanisms, comparison of flow mechanisms.

Unit-II

System Interconnect Architectures: Network properties and routing, Static connection Networks –Linear Array, Ring & Chordal Ring, Barrel Shifter, Fat Tree, Mesh & Torus, Systolic Arrays, Hypercubes; Dynamic connection Networks – Digital Buses, Switch modules, MINs, Omega-, Baseline-, Crossbar-Network.

Unit-III

Memory Hierarchy Design: Memory hierarchy, Inclusion, coherence & locality; memory capacity planning; Virtual Memory technology – Models, TLB, Paging and Segmentation; Cache Memory Organization - Cache basics & cache performance, cache addressing models & mapping, multilevel cache hierarchies, interleaved memory.

Unit-IV

Multiprocessor and Multicomputer Architectures: Multiprocessor System Interconnects – Hierarchical bus systems, Crossbar Switch and Multiport memory, Multistage and Combining networks; Symmetric shared memory architectures, distributed shared memory architectures, Cache coherence problem, Snoopy cache coherence protocol, directory-based protocols; Multicomputer Generations, Message passing mechanisms – message routing schemes, deadlock and virtual channels, flow control strategies, multicast routing algorithms.

Suggested Readings:

- Kai Hwang &NareshJotwani: Advanced Computer Architecture; McGraw-Hill.
- Kai Hwang: Advanced computer architecture; TMH.
- D.Sima, T.Fountain, P.Kasuk: Advanced Computer Architecture-A Design space Approach, Addison Wesley.
- M.J Flynn: Computer Architecture, Pipelined and Parallel Processor Design; Narosa Publishing.
- D. A. Patterson and J. L. Hennessey: Computer organization and design, Morgan Kaufmann.

Useful Video links:

Unit No.	Topics	Links
Unit-I	Introduction to Computer Architecture	https://www.nptelvideos.com/lecture.php?id=5631
	Basics of Computer Architecture	https://youtu.be/4TzMyXmzL8M?si=cmIOLt9Fnsyi4OUb
Unit-II	Memory Hierarchy in Computer Organization	https://www.nptelvideos.com/lecture.php?id=5658
	Cache Memory in Computer Architecture	https://www.nptelvideos.com/lecture.php?id=5286
Unit-III	Parallel Processing and Multiprocessing	https://youtu.be/TE4cJqrIHvI?si=UnmelScrq9kRDy_L
	Symmetric and Distributed Memory Architecture	https://youtu.be/WdqdebPmPuQ?si=WQwvPZ9gnUvRcbhS
	Message Passing and Routing in Multiprocessors	https://www.youtube.com/watch?v=T_A4LgEJaIo
Unit-IV	Quantum Computing Overview	https://youtu.be/2SPjEA-4lKk?si=KWUiY4G0mne8CDV8
	Quantum Computing	https://youtu.be/xnmpWfQKPSE?si=gZH7hGpIIdja0wdM

Course Code	**RR-MCA-112A**				
Category	Research Report				
Course Title	**Industry Internship Report/ Project Report/Dissertation–I**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	0	0	6	**3**	
Course Objectives	The objectives of this course are to • Develop effective project planning and management skills. • Enhance technical skills in software development, database design, and system integration. • Apply problem-solving techniques to address technical challenges. • Improve written and oral communication skills. • Understand and apply ethical principles in software development.				
Assessment	50 Marks				
End Semester Examination	50 Marks				
Total Marks	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

Cos	Skills Demonstrated	RBT Level
CO1	Identify various technologies and fields for practical training.	Level 1: Remember
CO2	Understand the process to make reports and presentation.	Level 2: Understand
CO3	Applying engineering knowledge to solve industrial problems.	Level 3: Apply
CO4	Analyze ethical practices and tools used in different technologies	Level 4: Analyze
CO5	Evaluate the performance on parameters such as communication skills, technical knowledge.	Level 5: Evaluate
CO6	Design and develop the skills to make software/hardware, related to industrial training.	Level 6: Create

Overview:
MCA Dissertation-I is a foundational course that introduces students to the research process in computer science and information technology. This course provides students with the necessary skills and knowledge to undertake independent research projects. Students will learn to identify research problems, conduct literature reviews, design research methodologies, collect and analyze data, and present their findings effectively.

General Guidelines:

Project Selection	Choose a project that is relevant to the field of computer science and information technology. Ensure that the project is feasible and achievable within the given timeframe. Consult with the supervisor to refine the project scope and objectives.
Approval Process	The selected project must be approved by the faculty members/committee appointed by the Head of Department.
Presentation Guidelines	Each student will have 30-40 minutes for their presentation, followed by 5 minutes for Q&A.
Evaluation	The presentation will be evaluated by a committee constituted by the Head of Department. The evaluation will be based on:

Parameters for the Evaluation of Seminar:

Sr. No.	Parameters	Marks Allotted
1	Clarity of the topic	5
2	Project Planning and Management	5
3	Technical Implementation	10
4	Testing and Debugging	10
5	Documentation	10
6	Teamwork and Collaboration	10

Annexure 2.17

GANGA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, KABLANA (JHAJJAR)

An Autonomous Institute (UGC)
Approved by AICTE, New Delhi and Affiliated to MDU, Rohtak
NAAC 'A' GRADE

Scheme of Studies and Examination
Bachelor of Computer Applications

1. DEFINITION OF CREDIT

1	1 Lecture (L) per week	1 Credit
2	1Tutoria l(T) per week	1 Credit
3	1 Practical (P) per week	0.5 Credit
4	2 Practical (Lab) per week	1 Credit

2. RANGE OF CREDIT

A range of credits from136 to144 for a student to be eligible to get Under Graduate degree in Computer Application. A student will be eligible to get Under Graduate degree with Honours or Research Program, if he/she completes an additional 48 credits.

3. STRUCTURE OF UNDER GRADUATE PROGRAM (BCA)

Sr. No.	Category	Break up of Credits BCA	BCA (Honours)	BCA (With Research)
1	Discipline-Specific Courses(DSC)-Major Course	76*	116*	104*
2	Minor(MIC)/MIC Vocational(VOC)/Skill Enhancement Courses (SEC)/Internship	37*	45*	45*
3	Multidisciplinary Courses	9*	9*	9*
4	Ability Enhancement Course	8*	8*	8*
5	Value Added Course	6*	6*	6*
6	Research Project/Dissertation			12*
	Total Credits	**136***	**184***	**184***

* Minor variations all owed as per need of the respective disciplines.

* Students exiting the program after second semester and securing48 credits including 4 credits of summer internship will be awarded UG Certificate in the relevant Discipline/Subject. Students exiting the program after fourth semester and securing 96 credits including 4 credits of summer internship will be awarded UG Diploma in the relevant Discipline/Subject. Students will be awarded 3-year UG Degree in relevant major Discipline/Subject upon securing 136 credits.

* Four credits of internship earned by a student during summer internship after 2nd semester or 4th semester will be counted in 5th semester of a student who pursue 3-year UG Programs without taking exit option.

4. COURSE CODE AND DEFINITIONS

Sr. No.	Category	Course Code
1	Discipline-Specific Courses-Major Course	DSC
2	Minor Vocational	MV
3	Skill Enhancement Courses	SEC
4	Multidisciplinary Courses	MDC
5	Ability Enhancement Courses	AEC
6	Value Added Courses	VAC
7	Internship	INT
8	Research Project	PR
9	Dissertation	DISS

GANGA INSTITUTE OF TECHNOLOGY AND MANAGEMENT,

JHAJJAR (HR.), DELHI-NCR

Scheme of Studies and Examination

BCA – 1st Semester

w.e.f. 2024-25

Sr. No.	Category	Course Code	Course Title	Hours per Week			Total Load Per Week	Credits	Examination Schedule (Marks)				Exam Duration In Hours
				L	T	P			Assessment	End Semester Exam	Practical	Total	
1	Discipline-Specific Courses-Major Courses	DSC-BCA-101A	Mathematical Foundations of Computer Science	4	0	0	4	4	30	70	-	100	3
2	Discipline-Specific Courses-Major Courses	DSC-BCA-103A	Computer Fundamental and Problem-Solving using C	3	0	0	3	3	25	50	-	75	3
		LC-BCA-105A	Computer Fundamental and Problem-Solving using C Lab	0	0	2	2	1	10	-	15	25	3
3	Minor Vocational	MV-BCA-107A	PC Software	3	0	0	3	3	25	50	-	75	3
		LC-BCA-109A	PC Software Lab	0	0	2	2	1	10	-	15	25	3
4	Skill Enhancement Courses	SEC-BCA-111A	Internet& Web Design	1	0	0	1	1	-	25	-	25	3
		LC-SEC-113A	Internet & Web Design Lab	0	0	4	4	2	15		35	50	3
5	Multidisciplinary Courses	Refer Table I	----------	3	0	0	3	3	25	50	-	75	3
6	Ability Enhancement Courses	Refer Table II	----------	2	0	0	2	2	15	35	-	50	3
7	Value Added Courses	Refer Table III	----------	2	0	0	2	2	15	35	-	50	3
Total Credits								**22**	**170**	**315**	**65**	**550**	

Scheme of Studies and Examination

BCA – 2nd Semester

w.e.f. 2024-25

Sr. No.	Category	Course Code	Course Title	Hours per week			Total Load Per Week	Credits	Examination Schedule (Marks)				Exam Duration In Hours
				L	T	P			Assessment	End Semester Exam	Practical	Total	
1	Discipline-Specific Courses Major Courses	DSC-BCA-102A	Digital Logic Design	4	0	0	4	4	30	70	-	100	3
2	Discipline-Specific Courses-Major Courses	DSC-BCA-104A	Data and File Structure	3	0	0	3	3	25	50	-	75	3
		LC-BCA-106A	Data and File Structure Lab	0	0	2	2	1	10	-	15	25	3
3	Minor Vocational	MV-BCA-108A	Programming in C & Data Structure	3	0	0	3	3	25	50	-	75	3
		LC-BCA-110A	Programming in C & Data Structure Lab	0	0	2	2	1	10	-	15	25	3
4	Skill Enhancement Courses	SEC-112A	Python Programming	1	0	0	1	1	-	25	-	25	3
		LC-SEC-114A	Python Programming Lab	0	0	4	4	2	15	-	35	50	3
5	Multidisciplinary Courses	Refer Table IV	----------	3	0	0	3	3	25	50	-	75	3
6	Ability Enhancement Courses	Refer Table V	----------	2	0	0	2	2	15	35	-	50	3
7	Value Added Courses	Refer Table VI	----------	2	0	0	2	2	15	35	-	50	3
Total Credits								**22**	**170**	**315**	**65**	**550**	

GANGA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, JHAJJAR (HR.), DELHI-NCR

Scheme of Studies and Examination

BCA – 3rd Semester

w.e.f. 2025-26

Sr. No.	Category	Course Code	Course Title	Hours per Week			Total Load Per Week	Credits	Examination Schedule (Marks)				Exam Duration In Hours
				L	T	P			Assessment	End Semester Exam	Practical	Total	
1	Discipline-Specific Courses-Major Courses	DSC-BCA-201A	Operating Systems	4	0	0	4	4	30	70	-	100	3
2	Discipline-Specific Courses-Major Courses	DSC-BCA-203A	Object Oriented Programming Using C++	3	0	0	3	3	25	50	-	75	3
		LC-BCA-205A	Object Oriented Programming Using C++ Lab	0	0	2	2	1	10	-	15	25	3
3	Discipline-Specific Courses-Major Courses	DSC-BCA-207A	Database Management System & SQL	3	0	0	3	3	25	50	-	75	3
		LC-BCA-209A	Database Management System & SQL Lab	0	0	2	2	1	10	-	15	25	3
4	Minor Vocational	MV-BCA-211A	Web Development-I	2	0	0	2	2	15	35	-	50	3
		LC-BCA-213A	Web Development-I Lab	0	0	4	4	2	15	-	35	50	3
5	Skill Enhancement Courses	SEC-215A	Data Science	1	0	0	1	1	-	25	-	25	3
		LC-SEC-217A	Data Science using Excel Lab	0	0	4	4	2	15	-	35	50	3
6	Multidisciplinary Courses	Refer Table VII	----------	3	0	0	3	3	25	50	-	75	3
7	Ability Enhancement Courses	Refer Table VIII	----------	2	0	0	2	2	15	35	-	50	3
Total Credits								**24**	**185**	**315**	**100**	**600**	

Scheme of Studies and Examination

BCA – 4th Semester

w.e.f. 2025-26

Sr. No.	Category	Course Code	Course Title	Hours per Week			Total Load Per Week	Credits	Examination Schedule (Marks)				Exam Duration InHours
				L	T	P			Assessment	End Semester Exam	Practical	Total	
1	Discipline-Specific Courses Major Courses	DSC-BCA-202A	Computer System Architecture	4	0	0	4	4	30	70	-	100	3
2	Discipline-Specific Courses Major Courses	DSC-BCA-204A	Data Communication & computer Networks	4	0	0	4	4	30	70	-	100	3
3	Discipline-Specific Courses-Major Courses	DSC-BCA-206A	Java Programming	2	0	0	2	2	15	35	-	50	3
		LC-BCA-208A	Java Programming Lab	0	0	4	2	2	15	-	35	50	3
4	Discipline-Specific Courses-Major Courses	DSC-BCA-210A	Computer Graphics	3	0	0	3	3	25	50		75	3
		LC-BCA-212A	Computer Graphics Lab	0	0	2	2	1	10	-	15	25	3
5	Minor Vocational	MV-BCA-214A	Web Development-II	1	0	0	1	1	-	25		25	3
		LC-BCA-216A	Web Development-II Lab	0	0	6	3	3	25	-	50	75	3
6	Ability Enhancement Courses	Refer Table IX	----------	2	0	0	2	2	15	35	-	50	3
7	Value Added Courses	Refer Table X	----------	2	0	0	2	-	15	35	-	50	3
Total Credits								**24**	**180**	**320**	**100**	**600**	

Scheme of Studies and Examination

BCA – 5th Semester

w.e.f. 2026-27

Sr. No.	Category	Course Code	Course Title	Hours per Week			Total Load Per Week	Credits	Examination Schedule (Marks)				Exam Duration In Hours
				L	T	P			Assessment	End Semester Exam	Practical	Total	
1	Discipline-Specific Courses Major Courses	DSC-BCA-301A	Software Engineering	4	0	0	4	4	30	70	-	100	3
2	Discipline-Specific Courses Major Courses	DSC-BCA-303A	Artificial Intelligence & Expert System	4	0	0	4	4	30	70	-	100	3
3	Discipline-Specific Courses Major Courses	DSC-BCA-305A	Cloud Computing	3	0	0	3	3	25	50	-	75	3
		LC-BCA-307A	Cloud Computing Lab	0	0	2	1	1	10	-	15	25	3
4	Discipline-Specific Courses Major Courses	DSC-BCA-309A	Web Application Development	2	0	0	2	2	15	35	-	50	3
		LC-BCA-311A	Web Application Development Lab	0	0	4	2	2	15	-	35	50	3
5	Minor Vocational	MV-BCA-313A	Web Development	1	0	0	1	1	-	25	-	25	3
		LC-BCA-315A	Web Development Lab	0	0	6	3	3	25	-	50	75	3
6	Internship	INT-BCA-317	----------	0	0	0	0	4	30	-	70	100	
Total Credits								**24**	**180**	**250**	**170**	**600**	

Scheme of Studies and Examination

BCA – 6th Semester

w.e.f. 2026-27

Sr. No.	Category	Course Code	Course Title	Hours per week			Total Load Per Week	Credits	Examination Schedule (Marks)				Exam Duration InHours
				L	T	P			Assessment	End Semester Exam	Practical	Total	
1	Discipline-Specific Courses Major Courses	DSC-BCA-302A	Internet of Things(IoT)	3	0	0	3	3	25	50	-	75	3
		LC-BCA-304A	Internet of Things(IoT) Lab	0	0	2	1	1	10	-	15	25	3
2	Discipline-Specific Courses Major Courses	DSC-BCA-306A	Computer Security	3	0	0	3	3	25	50	-	75	3
		LC-BCA-308A	Computer Security Lab	0	0	2	1	1	10	-	15	25	3
3	Discipline-Specific Courses Major Courses	DSC-BCA-310A	Data Warehousing & Mining	3	0	0	3	3	25	50	-	75	3
		LC-BCA-312A	Data Warehousing & Mining Lab	0	0	2	1	1	10	-	15	25	3
4	Discipline-Specific Courses Major Courses	DSC-BCA-314A	Advance Database System	2	0	0	2	2	15	35	-	50	3
		LC-BCA-316A	Advance Database System Lab	0	0	4	2	2	15	-	35	50	3
5	Minor Vocational	MV-BCA-318A	Object Technology	1	0	0	1	1	-	25	-	25	3
		LC-BCA-320A	Object Technology Lab	0	0	6	3	3	25	-	50	75	3
Total Credits								**20**	**160**	**210**	**130**	**500**	

Scheme of Studies and Examination

BCA – 7th Semester

w.e.f. 2027-28

Sr. No.	Category	Course Code	Course Title	Hours per week			Total Load Per Week	Credits	Examination Schedule (Marks)				Exam Duration In Hours
				L	T	P			Assessment	End Semester Exam	Practical	Total	
1	Discipline-Specific Courses Major Courses	DSC-BCA-401A	Advance Software Engineering	3	0	0	3	3	25	50	-	75	3
		LC-BCA-403A	Advance Software Engineering Lab	0	0	2	1	1	10	-	15	25	3
2	Discipline-Specific Courses Major Courses	DSC-BCA-405A	Computational Intelligence	3	0	0	3	3	25	50	-	75	3
		LC-BCA-407A	Computational Intelligence Lab	0	0	2	1	1	10	-	15	25	3
3	Discipline-Specific Courses Major Courses	DSC-BCA-409A	Advance Java Programming	2	0	0	2	2	15	35	-	50	3
		LC-BCA-411A	Advance Java Programming Lab	0	0	4	2	2	15	-	35	50	3
4	Discipline-Specific Courses Major Courses	DSC-BCA-413A	Machine Learning Using Python	2	0	0	2	2	15	35	-	50	3
		LC-BCA-415A	Machine Learning Using Python Lab	0	0	4	2	2	15	-	35	50	3
5	Discipline-Specific Courses Major Courses	DSC-BCA-417A	Theory of Computation	4	0	0	4	4	30	70	-	100	3
6	Minor Vocational	MV-BCA-419A	Operating System & Shell Programming	2	0	0	2	2	15	35	-	50	3
		LC-BCA-421A	Operating System & Shell Programming Lab	0	0	4	2	2	15	-	35	50	3
Total Credits								**24**	**190**	**275**	**135**	**600**	

Scheme of Studies and Examination

BCA – 8th Semester (Only for Hons.)

w.e.f. 2027-28

Sr. No.	Category	Course Code	Course Title	Hours per week			Total Load Per Week	Credits	Examination Schedule (Marks)				Exam Duration In Hours
				L	T	P			Assessment	End Semester Exam	Practical	Total	
1	Discipline-Specific Courses Major Courses	DSC-BCA-402H	Block chain Technology and Applications	3	0	0	3	3	25	50	-	75	3
		LC-BCA-404H	Block chain Technology and Applications Lab	0	0	2	1	1	10	-	15	25	3
2	Discipline-Specific Courses Major Courses	DSC-BCA-406H	Artificial Neural Network & Deep Learning	3	0	0	3	3	25	50		75	3
		LC-BCA-408H	Artificial Neural Network & Deep Learning Lab	0	0	2	1	1	10	-	15	25	3
3	Discipline-Specific Courses Major Courses	DSC-BCA-410H	Data Analytics Using R	2	0	0	2	2	15	35	-	50	3
		LC-BCA-412H	Data Analytics Using R Lab	0	0	4	2	2	15	-	35	50	3
4	Discipline-Specific Courses Major Courses	DSC-BCA-414H	Mobile Application Development	2	0	0	2	2	15	35	-	50	3
		LC-BCA-416H	Mobile Application Development Lab	0	0	4	2	2	15	-	35	50	3
5	Discipline-Specific Courses Major Courses	DSC-BCA-418H	Augmented and Virtual Reality	3	0	0	3	3	25	50	-	75	3
		LC-BCA-420H	Augmented and Virtual Reality Lab	0	0	2	1	1	10	-	15	25	3
6	Minor Vocational	MV-BCA-422H	Computer Networks & Programming	2	0	0	2	2	15	35	-	50	3
		LC-BCA-424H	Computer Networks & Programming Lab	0	0	4	2	2	15	-	35	50	3
Total Credits								**24**	**195**	**255**	**150**	**600**	

Scheme of Studies and Examination

BCA – 8th Semester (Hons. With Research)

w.e.f. 2027-28

Sr. No.	Category	Course Code	Course Title	Hours per week			Total Load Per Week	Credits	Examination Schedule (Marks)				Exam Duration In Hours
				L	T	P			Assessment	End Semester Exam	Practical	Total	
1	Discipline-Specific Courses Major Courses	DSC-BCA-402R	Research Methodology	4	0	0	4	4	30	70	-	100	3
2	Discipline-Specific Courses Major Courses	DSC-BCA-404R	Web and Social Media Analytics	3	0	0	3	3	25	50	-	75	3
		LC-BCA-406R	Web and social media Analytics Lab	0	0	2	1	1	10	-	15	25	3
3	Minor Vocational	MV-BCA-408R	Research Ethics	4	0	0	4	4	30	70		100	3
4	Research Project/ Dissertation	PR-BCA-410R/ DISS-BCA-412R	----------	0	0	0	0	12	-	-	-	300	3
			Total Credits					**24**	**95**	**190**	**15**	**600**	

Note:

1. The duration of all the end-term theory examinations shall be 3 hours.
2. The Criteria for awarding the internal assessment throughout the programme shall be as under:
   a) Sessional Examination: 20 Marks (66.67%)
   b) Assignments /Presentations /Seminars and Class Participation: 5 Marks (16.67%)
   c) Attendance : 5 Marks (16.67%)

   Less than 65% : 0% of Attendance marks

   65% - 69.99% : 40% of Attendance marks

   70% - 74.99% : 60% of Attendance marks

   75% - 80% : 80% of Attendance marks

   Above 80% : 100% of Attendance marks

3. The Criteria for awarding the Internal assessment practical course throughout the Programs hall be asunder:
   a) Practical Assignments /Practical File :06 Marks (60% Weightage of Assessment)
   b) Attendance (Criteria as mentioned above in 2 (c)) :04 Marks (40% Weightage of Assessment)
4. The panel of examiners for end-semester theory examinations shall be prepared and approved by the Department of Computer Science and Application of the internal/external examiners based on their expertise/ specialization/ area of interest.
5. The panel of examiners based on the examiners' expertise/specialization/area of interest for practicum/viva-voce

examination shall be recommended by the Department of Computer Science and Application. In case of unavailability of external examiners due to unavoidable circumstances, the Controller of Examinations may allow the conduct of practical examinations by the internal examiners.

6. The panel of examiners for assessment of the Project Reports/Dissertation/Research Project/Summer Internship Reports shall be recommended by the Department of Computer Science and Application.
7. A student while selecting the minor discipline has to ensure that the courses of the opted minor discipline do not match with the major courses of his/her opted programme.
8. The student may choose the Multidisciplinary Courses from other than the courses offered by their own/respective department.

Semester-I

Table No I (Multidisciplinary Courses)

S.No.	Category	Course Code	Course Title	Offered By
1	Multidisciplinary Courses	MDC-BBA-101A	Foundations of Management	Department of Management (UG)
2		MDC-ASH-103A	Introductory Mathematics	Department of Applied Sciences
3		MDC-CSA-105A	Fundamentals of IT	Department of Computer Application
4		MDC-FTS-107A	Industrial Safety	Department of Fire and Safety

Table No. II (Ability Enhancement Course)

S.No.	Category	Course Code	Course Name
1	Ability Enhancement Courses	AEC-101A	General English-I
2		AEC-103A	French

Table No. III (Value Added Courses)

S.No.	Category	Course Code	Course Title
1	Value Added Courses	VAC-113A	Environment Studies
2		VAC-115A	Health and Wellness

Semester-II

Table No. IV (Multidisciplinary Courses)

S.No.	Category	Course Code	Course Title	Offered By
1	Multidisciplinary Courses	MDC-BBA-102A	Marketing Management	Department of Management (UG)
2		MDC-BBA-104A	Entrepreneurship and MSME	Department of Management (UG)
3		MDC-BCA-106A	Basics of Multimedia	Department of Computer Application
4		MDC-ASH-108A	Introduction to Statistics	Department of Applied Sciences

Table No. V (Ability Enhancement Course)

S.No.	Category	Course Code	Course Name
1	Ability Enhancement Course	AEC-102A	Hindi-I
2		AEC-104A	Sanskrit

TableNo.VI (Value Added Courses)

S.No.	Category	Course Code	Course Title
1	Value Added Course	VAC-114A	Digital and Technological Solutions
2		VAC-116A	Human Values &Ethics

Semester-III

Table No VII (Multidisciplinary Courses)

S. No.	Category	Course Code	Course Title	Offered By
1	Multidisciplinary Courses	MDC-BBA-201A	Corporate Social Responsibility	Department of Management (UG)
2		MDC-BBA-203A	Finance for Non-Finance Professional	Department of Management (UG)
3		MDC-BBA-205A	Group Dynamics and Leadership	Department of Management (UG)
4		MDC-CSA-209A	Graphic Designing	Department of Computer Application
5		MDC-CSA-211A	Office and Spreadsheet tools learning	Department of Computer Application
6		MDC-CSA-213A	Web Technology	Department of Computer Application

Table No. VIII (Ability Enhancement Course)

S. No.	Category	Course Code	Course Name
1	Ability Enhancement Courses	AEC-201A	English-II
2		AEC-203A	German

Semester-IV

Table No. IX (Ability Enhancement Course)

S. No.	Category	Course Code	Course Name
1	Ability Enhancement Course	AEC-202A	Hindi-II
2		AEC-204A	French

Table No. X (Value Added Courses)

S. No.	Category	Course Code	Course Title
1	Value Added Courses	VAC-213A	Basics of GST
2		VAC-215A	Professional Networking Skills
3		VAC-217A	Social and Emotional Learning
4		VAC-219A	Social Networks
5		VAC-221A	Cyber Security

Course Code	**DSC-BCA-101A**				
Category	Discipline-Specific Courses –Major Courses				
Course Title	**Mathematical Foundation of Computer Science**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I**
	4	0	0	**4**	
Course Objectives	The objectives of this course are to • Build a strong mathematical foundation of computer science. • Learn different concepts such as sets, functions, matrices, determinants, limits, differentiation, and statistics for effective problem-solving and analysis.				
Assessment	30 Marks				
End Semester Examination	70 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated
CO1	Recall and define fundamental concepts of sets, functions, trigonometry, limits, differentiation, matrices, and determinants.
CO2	Explain and interpret the relationships between mathematical concepts and demonstrate basic understanding of functions and their applications.
CO3	Apply mathematical principles to solve problems involving sets, functions, differentiation, trigonometry, matrices, and determinants.
CO4	Analyze mathematical problems, identify patterns, and break down complex concepts into simpler components using algebraic methods.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 7 parts of 2 marks each from all units and remaining 8 questions of 14 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Sets: Sets, Subsets, Equal Sets Universal Sets, Finite and Infinite Sets, Operation on Sets, Union, Inter-section and Complements of Sets, Cartesian Product, Cardinality of Set, Practical applications of set theory.
Relations And Functions: Relations, Equivalence Relation, Function: Domain and Range, Onto, Into and One to One Functions, Composite and Inverse Functions.

Unit-II

Trigonometry: Introduction, Measurement of angles, trigonometric functions, relation between trigonometric functions, signs of trigonometric functions, trigonometric functions of standard angles. Basic of inverse trigonometry.
Limits & Continuity : Limit at a Point, properties of limit, computation of limits of various types of functions, Continuity of a function at a point, Continuity over an interval.

Unit-III

Differentiation: Derivative of a function, Derivatives of sum, differences, product & quotient of functions, Derivatives of polynomial, trigonometric, exponential, logarithmic, inverse trigonometric and implicit functions, Logarithmic Differentiation, Chain rule and differentiation by substitution.

Unit-IV

Matrices: Definition, Types of Matrices, Addition, Subtraction, Scalar Multiplication and Multiplication of Matrices. Adjoint of matrix, Inverse of matrix, solving a system of linear equations using matrix method.

Determinants: Definition, Minors, Cofactors , Properties of Determinants, Applications of determinants in finding area of triangle.

Suggested Readings:

- Business Statistics Gupta by S.P. & M.P. Gupta,
- An Introduction to Statistical Methods by Gupta, C.B.,
- A Text Book of Business Mathematics Reddy by R. Jaya Prakash, Y. Mallikarjuna Reddy, Ashish Publishing House, New Delhi.
- Business Mathematics by Janardan Dinodia and Dr. Dalip Kumar, Jeevansons Publications New Delhi**.**

Useful Video Links:

Unit No.	**Topics**	**Links**
Unit-I	Set Theory	https://youtube.com/playlist?list=PLEHGYFbPuuMEMCD8hwgnsZS0xKd8ydie&si=wr6io6TNmtN9CNsa
Unit-II	Trigonometry	https://www.youtube.com/watch?v=F2NqTIej98Q
	Limits & Continuity	https://www.youtube.com/watch?v=tffrrtzUhmw&list=PL7oBzLzHZ1wXBSiJEgqz_iwVoLiY8qhbv
Unit-III	Differentiation	https://www.youtube.com/watch?v=N2PpRnFqnqY
Unit-IV	Matrices	https://www.youtube.com/watch?v=T7I_C_lL75I
	Determinants	https://www.youtube.com/watch?v=7SQbz96xUyg

Course Code	**DSC-BCA-103A**				
Category	Discipline-Specific Courses –Major Courses				
Course Title	**Computer Fundamental and Problem-Solving Using C**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I**
	3	0	0	**3**	
Course Objectives	The objectives of this course are to • Develop problem-solving skills by applying logical thinking to write Efficient C programs. • Study about how to work with files for input/output operations in C.				
Assessment	25 Marks				
End Semester Examination	50 Marks				
Total	75 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated
CO1	Recall key concepts related to computer fundamentals, programming techniques, data structures, and system components.
CO2	Explain the functioning of computer systems, programming concepts, decision-making structures, and basic data handling techniques in C.
CO3	Apply programming skills in C to solve computational problems, manipulate data structures, and implement algorithms effectively.
CO4	Analyze complex programming problems, identify appropriate solutions, and break down problems into sub-tasks using logical structures and functions.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 5 parts of 2 marks each from all units and remaining 8 questions of 10 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Computer Fundamentals: Generations of Computers, Block Diagram along with its components, classification of computers, Applications of computers in various fields. Input/ Output Devices, Memory: Concept of primary &secondary memory, Cache Memory, Secondary storage devices.

Overview of Networking & Operating System: Introduction to computer networking, Network types, Network topologies, Internet and its applications; Operating system and its functions.

Unit-II

Planning the Computer Program: Concept of problem solving, Problem definition, Program design, Debugging, Types of errors in programming, Techniques of Problem Solving, Documentation, Algorithms, flow chart, decision tables, pseudo code.

Overview of C: History of C, Importance of C, Elements of C: C character set, identifiers and keywords, Data types, Constants and Variables, Assignment statement, Symbolic constant, Structure of a C Program, printf(), scanf() Functions, Operators & Expression, type casting and conversion, operator hierarchy & associativity.

Unit-III

Decision making & Branching: Decision making with IF statement, IF-ELSE statement, NestedIF statement, ELSE-IF ladder, switch statement, goto statement.
Decision making& Looping: while, do-while and for loop, jumps in loops, break, continue statement, Nested loops
Functions: Standard Mathematical functions, Input/output: Unformatted & formatted I/O function in C, Input functions output functions, string manipulation functions User defined functions, Introduction/Definition, function prototype, Local and global variables, passing parameters, recursion.

Unit-IV

Arrays & Pointers: Definition, types, initialization, processing an array, passing arrays to functions, Declaration and initialization of string, Input/output of string data, Introduction to pointers.
Structure & Union: Structure definition, Declaration, structure Assignments, Arrays in structure, Structure Arrays, Pointer Structure, Nested Structure, Arrays and Arrays of Structure, Union and File Handling.

Suggested Readings:

- Programming with C by Gottfried, Byron S., Tata McGraw Hill.
- Computing Fundamentals and Programming in C by Gill Nasib Singh, Khanna Books Publishing Co. New Delhi.
- Programming in ANSIC by Balagurusamy,E.,4E,Tata McGraw-Hill.
- Problem Solving and Program Design in C by Jeri R. Hanly & Elliot P. Koffman, Addison Wesley.
- Letus C by Yashwant Kanetker, BPB.
- Computer Programming in C by Rajaraman,V., PHI.
- Working with C by Yashwant Kanetker, BPB.

Useful Video Links:

Unit No.	Topics	Links
Unit-I	Generations of Computers	https://archive.nptel.ac.in/courses/106/105/106105163/
	Introduction to computer networking	https://archive.nptel.ac.in/courses/106/105/106105183/
	Introduction to operating system	https://archive.nptel.ac.in/courses/106/105/106105214/
Unit-II	Algorithm & Flow Chart	https://www.youtube.com/watch?v=5AHRXOtn9bY
	Introduction To C Programming	https://www.youtube.com/watch?v=IoT0zP4YlMk
Unit-III	Conditional Control Statements & Loops	https://www.youtube.com/watch?v=HyDpW7Al6_E
	Functions	https://www.youtube.com/watch?v=CUBwN0rHxvg
	Call By value & Call By reference	https://www.youtube.com/watch?v=1iwmwEJhcMw
Unit-IV	Introduction to Array	https://www.youtube.com/watch?v=I9828WOCEMg
	String	https://www.youtube.com/watch?v=rcGeNl95Gv4
	Structures	https://www.youtube.com/watch?v=kDDd7AmXq1w

Course Code	**LC-BCA-105A**				
Category	Discipline-Specific Courses –Major Courses				
Course Title	**Computer Fundamental and Problem Solving Using C Lab**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I**
	0	0	2	**1**	
Course Objectives	The objectives of this course are to • Equip students with the ability to write correct and well-structured C programs. • Enhance student's logical thinking and problem-solving abilities.				
Assessment	10 Marks				
End Semester Examination	15 Marks				
Total	25 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated
CO1	Write and execute C programs to perform operations like sum, finding largest number, swapping values, and using recursion and iteration.
CO2	Analyze and debug C programs to identify logical errors, optimize code, and ensure correctness in solving problems like Fibonacci series and arrays.
CO3	Evaluate the efficiency and correctness of functions, mathematical operations, string manipulations, and memory management techniques in C.
CO4	Design and develop complex C programs using arrays, functions, pointers, structures, and file handling techniques to solve real-world problems.

Exp. No.	Contents
1.	Introduction to the programming environment (Turbo C IDE).
2.	Write a C program to calculate the sum of two numbers.
3.	Write a C program to find the largest of three numbers using if-else statements
4.	Write a program to swap the values of two given variables.
5.	Apply the concepts of recursive functions to solve problems like factorial, Fibonacci series.
6.	Apply the concepts of Iteration to solve problems e.g., sum of series.
7.	Apply the concepts of arrays for 1D&2D Array manipulation
8.	Apply various string manipulation functions.
9.	Apply the concepts of functions, call by value &call by reference.
10.	Apply various mathematical functions like abs(), pow(), sqrt(), floor(), etc.
11.	Apply the concepts of pointers, structures and dynamic memory allocation.
12.	Analyze the concept of file handling techniques and their operations

Useful Video links:

Experiment no.	Experiment name	Links
1	Calculate the sum of two numbers.	https://www.youtube.com/watch?v=s4EiG4RXwyU
2	Find the largest of three numbers using if-else statements.	https://www.youtube.com/watch?v=HyDpW7Al6_E
3	Recursive functions to solve problems like factorial, Fibonacci series.	https://www.youtube.com/watch?v=LoIe_9cTtPE
4	Arrays for 1D & 2D Array manipulation.	https://www.youtube.com/watch?v=I9828WOCEMg
5	Pointers, structures and dynamic memory allocation.	https://www.youtube.com/watch?v=Z_0xXmOgYtY

Course Code	**MV-BCA-107A**				
Category	Minor Vocational				
Course Title	**PC Software**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I**
	3	0	0	**3**	
Course Objectives	The objectives of this course are to • Develop a foundational understanding of MS-Windows operating system interface. • Enable students to proficiently use key office applications, including word processors, spreadsheets, and presentation software.				
Assessment	25 Marks				
End Semester Examination	50 Marks				
Total	75 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

Cos	Skills Demonstrated
CO1	Recall basic concepts of MS-Windows, word processing, spreadsheet, and presentation software functionalities and tools.
CO2	Explain the essential functions of MS-Windows, word processing, spreadsheet, and presentation software, including their practical applications.
CO3	Apply their skills in MS-Windows, word processing, Excel, and PowerPoint to create and manage documents, presentations, and spreadsheets.
CO4	Analyze and organize data, documents, and presentations, determining effective layouts, formatting, and data analysis methods.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 5 parts of 2 marks each from all units and remaining 8 questions of 10 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

MS-Windows: Operating System-Definition & functions, basics of Windows. Basic components of windows, icons, types of icons, taskbar, activating windows, using desktop, title bar, running applications, exploring computer, managing files and folders, copying and moving files and folders. Control panel –display properties, adding and removing software and hardware, setting date and time, screensaver and appearance. Using windows accessories.

Unit-II

Documentation Using word processing software: Introduction to word processing, Toolbars, Creating &Editing Document, Formatting Document and printing document, Finding and replacing text, Format painter,Header and footer, Spelling and Grammar Tool, Page Formatting, Bookmark, Mail Merge, Macros, Tables and File Management, Clipart, Templates, Tracking changes.

Unit-III

Slide based Presentation: Starting MS–Power Point, working with power point, Creating, Saving and Printing a presentation, working with Animation, adding a slide to presentation, navigating through a presentation, Slide-sorter, Slide-show, editing slides, Working with Graphics and Multimedia in PowerPoint (Inserting Photo, Video & Sound).

Unit-IV

Electronic Spreadsheet using Excel Workbook: Introduction to MS-Excel, Feature of MS-Excel, Creating& Editing Worksheet, Formatting and Essential Operations, Formulas and Functions, Charts, Cell referencing, Pivot table & Pivot Chart, Linking, Sorting, Filtering.

Suggested Readings:

- Learn Microsoft Office by Russell A. Stultz – BPB Publication
- Microsoft Office 2000 by Courter, G Marquis (1999), Professional Edition. BPB.
- Microsoft Office XP Fast and Easy by Koers, D (2001), PHI.
- Office XP: The Complete Reference by Nelson, S L and Kelly, J (2002), Tata McGraw-Hill.
- Microsoft Office Complete Reference – BPB Publication.

<table>
<tr><td>Course Code</td><td colspan="5">LC-BCA-109A</td></tr>
<tr><td>Category</td><td colspan="5">Minor Vocational</td></tr>
<tr><td>Course Title</td><td colspan="5">PC Software Lab</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td rowspan="2">Semester-I</td></tr>
<tr><td>0</td><td>0</td><td>2</td><td>1</td></tr>
<tr><td>Course Objectives</td><td colspan="5">The objectives of this course are to
• Equip students with hands-on experience in using various PC software applications, including word processors, spread sheets, presentation tools.
• Enable students to create, format, and edit various types of documents, applying advanced features and tools for professional presentation.</td></tr>
<tr><td>Assessment</td><td colspan="5">10 Marks</td></tr>
<tr><td>End Semester Examination</td><td colspan="5">15 Marks</td></tr>
<tr><td>Total</td><td colspan="5">25 Marks</td></tr>
<tr><td>Duration of Exam</td><td colspan="5">03 Hours</td></tr>
</table>

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated
CO1	Apply office automation tools like MS-Word, Excel, and PowerPoint to create, format, and manage documents, spreadsheets, and presentations.
CO2	Analyze data, charts, and formulas in MS-Excel, identifying patterns and drawing conclusions to support decision-making.
CO3	Evaluate the effectiveness of document formatting, Excel formulas, and presentation designs, ensuring accuracy, clarity, and professional standards.
CO4	Design and create professional documents, presentations, and reports by integrating advanced features like macros, charts, and mail merge.

Exp. No.	Contents
1.	To study about various concepts of office automation Tools.
2.	Use the concept of find and replace text in MS-Word.
3.	Use the features of Format Painter, Header and Footer, Drop Cap, Auto Text, and Auto correct in MS-Word.
4.	Analyze the marks of the students of a class using various chart (Line, XY, Bar and Pie) with the help of MS-Excel.
5.	Evaluate the accuracy of Microsoft Excel formulas (SUM, AVERAGE etc.) and conditional formatting.
6.	Create a professional resume using Microsoft Word, including headers, footers, and bullet points.
7.	Create a document in MS- Word with macros to automate repetitive tasks. Explain how to Record and execute macros.
8.	Create personalized letter with the help of mail merge features.
9.	Design a worksheet in MS-Excel with a header and footer.
10.	Create a Microsoft PowerPoint presentation with various slide layouts, images, and charts.
11.	Implement slide transitions and animations in MS-PowerPoint.
12.	Design a presentation in MS-Power Point with Excel charts and WordArt.

Course Code	**SEC-BCA-111A**				
Category	Skill Enhancement Courses				
Course Title	**Internet & Web Design**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I**
	1	0	0	**1**	
Course Objectives	The objectives of this course are to • Guide students in designing visually appealing and functional websites using HTML. • Enable students to apply CSS techniques for improving user experience and web accessibility.				
Assessment	-------				
End Semester Examination	25 Marks				
Total	25 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated
CO1	Recall key concepts related to the Internet, web browsers, HTML, CSS, web publishing, and web page elements.
CO2	Explain the principles of web development, including HTML, CSS, web page structures, and the role of different web technologies.
CO3	Apply web development techniques to create and design basic websites using HTML and CSS, integrating text, graphics, and forms.
CO4	Analyze web design problems, evaluate design options, and implement effective solutions for layout, content, and user interaction.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 5 parts of 1 mark each from all units and remaining 8 questions of 5 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Introduction to Internet and World Wide Web: A brief Introduction to the Internet, Evolution of World Wide Web; Basic features; Web Browsers; Web Servers; Hypertext Transfer Protocol, URLs; Searching and Web-Casting Techniques; Search Engines and Search Tools, Domain Name System, Home Page, Web page and website.

Unit-II

Web Publishing: Hosting your Site; Internet Service Provider, Phases of Planning and designing your WebSite, steps for developing your Site, Choosing the contents

Web Development: Introduction to HTML, Hypertext and HTML; HTML Document Features; HTML command Tags; Headers; Text styles; Text Structuring; Text colors and Background; formatting text.

Unit-III

List: Ordered and Unordered lists, Table Creation and Layouts. Images; Inserting Graphics; Frame Creation and Layouts; Creating Links; Working with Forms and Menus; Working with Radio Buttons and Check Boxes; Text Boxes; Page layouts.

Unit-IV

Cascading Style Sheets (CSS): Basic Concepts, Properties, Creation of Style Sheets. Common Tasks with CSS: Text, Fonts, Margins, Links, Tables, Colors. Marquee. Mouse Overs. Filters and Transitions. Adding Links. Adding Tables. Adding Forms. Adding Image and Sound. Use of CSS in HTML Documents, Linking and Embedding of CSS in HTML.

Suggested Readings:

- Fundamentals of the Internet and the World Wide Web by Raymond Greenlaw and Ellen Hepp – 2001, TMH.
- Internet &World Wide Programming by Deitel & Nieto, 2000, Pearson Education.
- Web Technologies by Uttam K. Roy, Oxford University Press.
- HTML Black Book by Stephen Holzner, Wiley Dreamtech.
- Web Technology by Rajkamal, Tata McGraw-Hill.

Useful Video Links:

Unit No.	Topics	Links
Unit-I	Introduction To Internet	https://www.youtube.com/watch?v=YOXwcbwSEUo
	Internet and www	https://www.youtube.com/watch?v=-2hpoIjNSb4
Unit-II	Web Development	https://www.youtube.com/watch?v=QEtWL4lWlL4
Unit-III	List and table creation	https://www.youtube.com/watch?v=omuyzDmNaf4
Unit-IV	Cascading style sheets	https://www.youtube.com/watch?v=h_RftxdJTzs

Course Code	**LC-SEC-113A**				
Category	Skill Enhancement Courses				
Course Title	**Internet & Web Design Lab**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I**
	0	0	4	**2**	
Course Objectives	The objectives of this course are to • Create structured and well-formatted web pages using HTML, incorporating various elements such as text, images, links, lists, tables, and forms. • Use CSS to make web pages look attractive by adding colors, fonts, and layouts.				
Assessment	15 Marks				
End Semester Examination	35 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

Cos	Skills Demonstrated
CO1	Write and implement HTML programs to create headings, insert images, format text, change background, and design forms.
CO2	Analyze the application of different style sheets (inline, internal, external) in web pages and evaluate their impact on design.
CO3	Evaluate the usability and effectiveness of HTML forms for user interaction and assess their integration into web pages.
CO4	Design and develop multi-page websites using HTML, incorporating tables, lists, forms, framesets, and linked pages for user navigation.

Exp. No.	Contents
1.	To study the basic Structure of HTML.
2.	Write a program to use Heading Element in HTML.
3.	Write a program to insert image in HTML.
4.	Write a program to use Formatting text in HTML.
5.	Write a program for changing Background and Style.
6.	Analyze the use of various types of style sheets in a webpage (inline, internal and external style sheets).
7.	Evaluate the usability of the form for user interaction.
8.	Write a program to Create a Table in HTML.
9.	Write a program to Create list in HTML.
10.	How to implement Frame set in HTML.
11.	Write a program to Design a student registration and Log-inform.
12.	Create a simple multi-page website with linked HTML pages.

Useful Video links:

Experiment no.	Experiment name	Links
1	Basic Structure of HTML.	https://www.youtube.com/watch?v=QEtWL4lWlL4
2	Program to use Heading Element in HTML.	https://www.youtube.com/watch?v=omuyzDmNaf4
3	Program to insert image in HTML.	https://www.youtube.com/watch?v=zGedWVlx6hQ
4	Program to Create a Form in HTML.	https://www.youtube.com/watch?v=TeV2eDHtVa0
5	Program to Create a Table in HTML.	https://www.youtube.com/watch?v=WRdTXaz4_Ls

Course Code	**MDC-BBA-101A**				
Category	Multidisciplinary Courses				
Course Title	**Foundations of Management**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I**
	3	0	0	**3**	
Course Objectives	The objectives of this course are to • Help the students develop fundamental and transfer able skills in order to become effective managers. • The students will understand how planning, organizing, and controlling have impacts on a manager's effectiveness and efficiency.				
Assessment	25 Marks				
End Semester Examination	50 Marks				
Total	75 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated
CO1	Recall key concepts of management, including managerial levels, functions, planning, organizing, controlling, and decision-making processes.
CO2	Explain the nature and purpose of management, various planning and decision-making processes, and the significance of control techniques in organizations.
CO3	Apply management principles to real-world scenarios, demonstrating effective decision-making, organizational structuring, and control techniques in different business contexts.
CO4	Analyze management problems, assess organizational structures, and evaluate strategies and control systems to improve business performance.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 5 parts of 2 marks each from all units and remaining 8 questions of 10 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Overview of Management: Concept, Nature, Process, Managerial levels (Technical, Conceptual, Interpersonal), Skills, Functions and Role of managers, Challenges of Management.

Unit-II

Planning: Nature and purpose of planning, Planning process, Types of plans, Management by Objectives (MBO), Strategies, types of strategies (Corporate Strategy, Business Strategy, Differentiation Strategy, Retrenchment Strategy, Growth Strategy), Decision making: Types of decision, Decision making process, Rational decision making.

Unit-III

Organizing: Meaning, Nature and purpose of organizing, organization structure, Departmentation, Span of control, Centralization and Decentralization, Delegation of authority and responsibility.

Unit-IV

Controlling: Meaning, Nature and scope of control, Types of control, Control process, Control techniques (Budgetary Control, Financial Control, Quality Control, Inventory Control, Statistical Control, Production Control), Cost Control, Effective control system.

Suggested Readings:

- Management Theory and Practice by C. B. Gupta, Sultan Chand and Sons
- Essentials of Management by Koontz and Wechrich, Tata McGraw-Hill
- Management: Concepts and Strategies by J. S. Chandan, Vikas Publishing House, New Delhi
- Management by Robbins and Coulter, Prentice Hall of India, New Delhi
- Developing Communication Skills by Krishna Mohan and Meera Banerji, Macmillan India Ltd., New Delhi
- Management and Organizational Behavior by Wendy Blaoisi, Curtis W. Cook, and Phillip L. Hunsaker, McGraw Hill

Useful Video Links:

Unit No.	Topics	Links
Unit-I	**Introduction to Management**	https://youtu.be/TtbImDfUt4c?feature=shared
Unit-II	Decision Making	https://youtu.be/B96-Gpn56sU?feature=shared
Unit-III	Delegation Of Authority	https://youtu.be/GlLXV7JLVnk?feature=shared
Unit-IV	Controlling: Issues, Types, Techniques and Importance	https://youtu.be/v7XmhnenEGs?feature=shared

Course Code	**MDC-ASH-103A**				
Category	Multidisciplinary Courses				
Course Title	**Introductory Mathematics**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I**
	3	0	0	**3**	
Course Objectives	The objectives of this course are to • Understand and apply set theory, matrix algebra, determinants, sequences, series, permutations, combinations, and the binomial theorem • To solve practical problems, interpret results, and evaluate their real-world applications and implications.				
Assessment	25 Marks				
End Semester Examination	50 Marks				
Total	75 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

Cos	Skills Demonstrated
CO1	Describe the fundamental concepts of set theory, indices & apply them to solve practical problems.
CO2	Classify various types of matrices and perform the different operations and solve equations using matrices.
CO3	Solve system of linear equations using the concepts of determinants including minors, co-factors & properties of determinants.
CO4	Understand the basics of sequences, series and progression to apply them for solving related numerical problems.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 5 parts of 2 marks each from all units and remaining 8 questions of 10 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Theory of Sets: Meaning and types of sets, Representation of sets, Venn diagram, Operation on sets, Union, intersection and complements of sets, Cardinality of finite set, Practical applications of set theory, Ordered pairs, Cartesian product of two sets. **Indices:** Introduction, Law of indices.

Unit-II

Algebra of Matrices: Definition, Types of matrices, Addition, Subtraction, Scalar multiplication, Multiplication of matrices and its properties.

Determinants: Introduction, Minors, Co-factors, Properties of determinants, Applications of determinants in finding solution of linear equations.

Matrices (Continued): Transpose of matrix, Symmetric and skew-symmetric matrices, Singular and non-singular matrices, Ad joint of matrix, Inverse of matrix, Solution of system of linear and homogeneous linear equations by using matrix method.

Unit-III

Sequence and Series: Sequence, Series and progression, Arithmetical progression and its representation, Sum of n terms of an A.P, Arithmetic mean, Geometrical progression and sum of G.P, Geometric mean, Application of A.P and G.P, Some special sequences.

Unit-IV

Permutation and Combination: Factorial notation, Permutation, Circular permutation, Combination, Practical problem on combinations.
Binomial Theorem: Introduction, General term, Middle term, Absolute term, Coefficient of any power of x.

Suggested Readings:

- Business Mathematics by Sancheti, D.C., A.M. Malhotra, V.K. Kapoor, Sultan Chand & Sons
- Business Mathematics by Zameerudin, Qazi, S.K. Bhambri, Vikas Publishing House Pvt. Ltd
- Text Book of Business Mathematics by R. Jaya Prakash, Ashish Publishing House
- Business Mathematics by Janardan Dinodia, Dr. Dalip Kumar, Jeevan sons Publications

Useful Video Links:

Unit No.	Topics	Links
Unit-I	Introduction to set theory	https://youtube.com/playlist?list=PLEHGYFbPuuMEMCD-8hwgnsZS0xKd8ydie&si=wr6io6TNmtN9CNsa
Unit-II	Arithmetic Progression	https://youtube.com/playlist?list=PLaAhQ2ofZZRD6WKjeCFg890_07QXWNT6i&si=udeAM9Kq_4CZwK_K
Unit-III	Permutation and Combination	https://youtu.be/iyIq1YSSA5E?si=Qukhh4uhRDgADByC
Unit-IV	Sequence and Series	https://youtube.com/playlist?list=PLVFqK_9GOGXm-Ia53f-yONR8XhwGknj9Z&si=YXFrCI3YdJnjYAez

Course Code	**MDC-CSA-105A**				
Category	Multidisciplinary Courses				
Course Title	**Fundamentals of IT**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I**
	3	0	0	**3**	
Course Objectives	The objectives of this course are • To develop fundamental skills in using IT tools and applications for everyday tasks and problem-solving. • To explore basic networking concepts and understand how data is transmitted across networks and the internet.				
Assessment	25 Marks				
End Semester Examination	50 Marks				
Total	75 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated
CO1	Recall key concepts related to the evolution of computers, types of storage, input/output devices, operating systems, and basic internet terminology.
CO2	Explain the functions of various computer components, data storage methods, operating systems, and the principles of data communication and internet usage.
CO3	Apply their knowledge of computer systems to organize and retrieve data, use input/output devices effectively, and operate web-based applications.
CO4	Analyze data transmission methods, evaluate the types of storage and communication systems, and assess how operating systems manage resources and user interfaces.

Note: Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 5 parts of 2 marks each from all units and remaining 8 questions of 10 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Introduction: Evolution of computers, Classification of computers, Block Diagram along its components and characteristics, Usefulness of computers, Human being Vs. Computer, Applications of computers in various fields, I/O devices, Role of I/O devices in a computer system, Input Units, Keyboard, Pointing devices, Scanners and its types, Voice recognition systems, Vision input system, Touch screen, Output units, Monitors and its types, Printers & its types, Plotters and types of plotters, Sound cards, Speakers.

Unit-II

Storage Fundamentals: Primary Vs Secondary storage, Data storage and retrieval methods, Primary Storage, RAM, ROM, PROM, EPROM, EEPROM, Secondary storage, Magnetic tapes, Magnetic disks, Cartridge tape, Hard disks, Floppy disks, Optical disks, Compact disks, Zip drive, Flash drives.

Business Data Processing: Introduction, Data storage hierarchy, Method of organizing data, File types, File organization, File utilities, Data representation and its conversion.

Unit-III

Operating Systems: Operating system basics, Purpose of the operating system, Types of an operating system, providing user interface, Running programs, Sharing information, Managing hardware enhancing with utility software.

Data Communication: Communication process, Data transmission speed, Communication types (modes), Data transmission medias, Modem and its working, Characteristics, Types of networks, Network topology, Computer protocols.

Unit-IV

Internet: Basic interne terms, Web Page, Website, Homepage, Browser, URL, Hypertext, ISP, Web Server, HTML, DHTML, XML, Search engine application of internet, Introduction to client side and server side scripting.

Electronic Mail: Introduction, Advantages and disadvantages, User Ids, Passwords, e-mail addresses, Message components, Message composition, Web Browsers and search engines.

Suggested Readings:

- Computers Today by Donald Sanders, McGraw-Hill Publishers.
- Introduction to Computers by Davis, McGraw-Hill Publishers.
- Fundamentals of Computers by V. Rajaraman, Prentice-Hall India Ltd., New Delhi.
- Computer Fundamentals by A. Goel, Pearson Education.
- Fundamentals of Computers by Reema Thareja, Oxford.

Useful Video Links:

Unit No.	Topics	Links
Unit-I	Introduction to Computer	https://www.youtube.com/watch?v=LJ5c3AycRIE
Unit-II	Memory	https://www.youtube.com/watch?v=tas2eUavhRE
Unit-III	Operating System	https://www.youtube.com/watch?v=jciGIvn7UfM&list=PL3-wYxbt4yCjpcfUDz-TgD_ainZ2K3MUZ
Unit-IV	Internet	https://youtu.be/YOXwcbwSEUo?si=tzxN6w6N37mdTHF3

Course Code	**MDC-FTS-107A**				
Category	Multidisciplinary Courses				
Course Title	**Industrial Safety**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I**
	3	0	0	**3**	
Course Objectives	The objectives of this course are • To familiarize with the safety methodology, education and training for an organization and environment. • To know the different types of accident and its preventive methods. • To study the rules of safety and safety management system.				
Assessment	25 Marks				
End Semester Examination	50 Marks				
Total	75 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	**Skills Demonstrated**
CO1	Recall key concepts related to safety, accident prevention, safety rules, safety organization, and safety audits in industrial settings.
CO2	Explain the importance of safety integration, the principles of accident prevention, types of safety audits, and the role of safety committees.
CO3	Apply safety protocols, accident investigation processes, and safety management systems to real-world industrial scenarios to ensure a safe working environment.
CO4	Analyze accident reports, safety audits, and training programs to identify potential hazards, areas for improvement, and effective safety practices.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 5 parts of 2 marks each from all units and remaining 8 questions of 10 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Safety: Introduction to Safety, Need for Integration of Health and Environment Safety, Safety and Productivity, Fundamental of Safety, Important Points for Consideration of Safety, General Instructions for Safety, Safety in Design and Operations, Inherent and Engineered Safety.

Unit-II

Safety Organization: Objectives, Types and Functions, Safety Committee, Need, Types, Advantages.
Accident: Introduction, Types of Accidents, Causes of Accidents, Principle of Accident Prevention, Accident Investigation, Process of Investigation, Reporting, Cost of Accident.

Unit-III

Safety Education and Training: Introduction, Importance, various Training Methods, Effectiveness of Training, Behavior Oriented Training, Communication, Purpose, Barrier to Communication, Domestic Safety and Training.

Unit-IV

Safety Rules: Safety Rules for Industries, Safety Culture, Safety Policy, Safety Management System, Safety Reporting.
Safety Audits: Introduction, Types of Audit, Audit Methodology, Non-Conformity Report, Audit Checklist and Report,

Suggested Readings:

- Fundamentals of Industrial Safety & Health by K.U.Mistry, SiddharthPrakashan.
- Safety Management by R.K. Mishra, AITBS Publishers.
- Safety Management in Industry by N.V. Krishnan, Jaico Publishing House, 1997.
- Industrial Safety by Ronald P. Blake, Prentice Hall, New Delhi, 1973.
- Occupational Safety and health by David L. Goetsch, Prentice Hall
- Modern Accident Investigation and Analysis by Ted S. Ferry, John Wiley & Sons
- Fire Safety in Buildings by V K Jain, New Age publishers, New Delhi
- Fundamentals of Fire Safety in Building Design by Dr. Than Singh Sharma, Aayush Publications, N. Delhi

Useful Video links:

Unit No.	Topics	Links
Unit-I	Safety	https://www.youtube.com/watch?v=v-eltsixu4I https://www.youtube.com/watch?v=MQ3xuV98wwM
Unit-II	Accident Investigation	https://youtu.be/VhuZ6M7a8N8
Unit-III	Safety Performance	https://www.youtube.com/watch?v=pwkjK0Zqa3w

Course Code	**AEC-101A**				
Category	Ability Enhancement Courses				
Course Title	**General English-I**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I**
	2	0	0	**2**	
Course Objectives	The objective of this course is to • Develop proficiency in English grammar, communication fundamentals, LSRW skills, and technical writing for effective and professional written and verbal interactions.				
Assessment	15 Marks				
End Semester Examination	35 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated
CO1	Recall key concepts related to English grammar, communication, LSRW skills, and technical writing.
CO2	Demonstrate an understanding of communication processes, grammar rules, and effective writing techniques for various contexts.
CO3	Apply English grammar rules, communication skills, and technical writing formats to real-world scenarios and practical exercises.
CO4	Analyze communication barriers and effective strategies, along with evaluating different types of writing formats and their effectiveness.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 7 parts of 1marks each from all units and remaining 8 questions of 7 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Basics of English Grammar: Parts of speech, Conjunction, Prepositions, Articles, Subject-verb agreement and Noun-pronoun agreement, Determiners.

Unit-II

Basics of Communication: Definition, Nature, Importance of communication, Communication process, Barriers to effective communication and overcoming strategies, Types of communication, Communication networks.

Unit-III

Enhancing LSRW Skills: Listening skills, Cognitive process of listening, Types of listening, Active listening techniques, Barriers to effective listening, Speaking skills, Public speaking, Voice modulation, Reading skills.

Unit-IV

Technical Writing: Notices, Memo, Circulars, Structure and layout of business letters, Structure, layout and types of letters.

Suggested Readings:

- Business Communication Process and Product by Mary Ellen Guffey and Dana Loewy, Cengage Learning.
- Effective Communication Skill by John Nielsen, NTC/Contemporary Publishing Company
- Public Speaking for Success by Dale Carnegie, Per Capita Publishing
- Word Power Made Easy by Norman Lewis, Goyal Publishers & Distributors Pvt Ltd.
- English Grammar in Use by Raymond Murphy, Cambridge University Press

Useful Video Links:

Unit No.	Topics	Links
Unit-I	Definitions and concepts	https://drive.google.com/file/d/13pBi2pR451YrMPrahAzTN2aXnG4W3yt/view?usp=drive_link
	Introduction	https://drive.google.com/file/d/12oHQHoXb3vXjOXyNp_Z0tj8Ues5qz2gk/view?usp=drive_link
Unit-II	Non Verbal Communication	https://drive.google.com/file/d/132F5pw8s4mz-ImMPmCCvW97gfG6gZF3q/view?usp=drive_linkhttps://drive.google.com/file/d/13fVlQJccvxZeE0WfdYa6Yu0CQskkQTK/view?usp=drive_link
	Written communication in international business	https://drive.google.com/file/d/13Z0aC56H_xNsnPH3K5NI2qRDyIwJqxlj/viewusp=drive_link
	Barriers to communication	https://drive.google.com/file/d/13b4B4mLWvd6c25uHTSLSA4ALo_npSvJM/viewusp=drive_link
Unit-III	Business letters writing	https://drive.google.com/file/d/13WXoM4FWL7O1BfKOMO8X3OMGNSU64929/view?usp=drive_link
Unit-IV	Written communication in international business	https://drive.google.com/file/d/13Z0aC56H_xNsnPH3K5NI2qRDyIwJqxlj/view?usp=drive_link

Course Code	**AEC-103A**				
Category	Ability Enhancement Course				
Course Title	**French Language**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I**
	2	0	0	**2**	
Course Objectives	The objectives of this course are • To develop foundational language skills necessary for basic communication, including introducing themselves and others, describing places, and talking about their surroundings. • To focus on enhancing students' ability to express personal likes, interests, and other simple ideas, ensuring their ability to engage in basic communicative transactions. • To achieve a partialA1 level by the end of the semester according to the Common European Framework, which will enable them to handle simple communication in everyday situations.				
Assessment	15 Marks				
End Semester Examination	35 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	**Skills Demonstrated**
CO1	Recall key vocabulary, phrases, and basic grammar structures related to their environment for simple communication tasks.
CO2	Understand simple spoken and written texts related to everyday topics, demonstrating comprehension through answering questions and following instructions.
CO3	Apply basic language skills to complete writing tasks, participate in conversations, and engage in everyday activities like shopping.
CO4	Analyze short conversations, identifying key information, and differentiate between formal and informal communication in familiar settings**.**

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 7 parts of 1marks each from all units and remaining 8 questions of 7 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Reading: Reading Simple Texts Related to One's Immediate Environment such as Notices, Posters, Catalogs, Fliers, Personal Messages or Emails and Answering Questions on them.

Unit-II

Listening: Understanding familiar Words and very Basic Phrases about Oneself, One's Family, and Immediate Concrete Surroundings, such as Very Brief Announcements in Public Spaces, Short, Simple Formal /Informal Conversation, Questions and Instructions When Speakers are Speaking at a Slower Pace.

Unit-III

Writing: Guided Writing will Include activities such as, Filling a Form, Writing Simple Phrases (Postcards, Messages, Invitations etc) on everyday Topics.

Unit-IV

Speaking:
Monologue: Describing and Presenting oneself, One's Immediate Environment and the People S/He Knows Using Simple Phrases and Sentences.
Dialogue: Taking part in a Conversation and Interaction in a Simple way provided the other Person is Prepared to Repeat or to Rephrase more Slowly and help Formulate what s/he is trying to say asking simple Questions on familiar Topics or Matters related toone's Immediate Environment. Making simple Purchases in Shops or Obtaining Services that one Requires.

Suggested Readings:

- Kizirian,V.M,Daill,E.,Berthet,A.,Hugot,C.,Waendendries, M. AlterEgo+1.Paris:Hachette.
- Berthet,A.,Daill,E.,Hugot,C.,Waendendries,M.AlterEgo+1,Cahierd'activités.Paris:Hachette.
- Hachette,Y.,Mérieux,R.Latitudes1,(Livredel'élève&Cahierd'exercices).Paris:Didier.
- Cocton,M-N.,Dupleix,D.,Heu,E.,Kasazian,E.,Ripaud,D.Saison1, (Livredel'élève&Cahier d'exercices). Paris : Didier.
- Denyer,M.,Garmendia,A.,Lions-Olivieri,M-L.VersionOriginale1,Livredel'élève.Paris:Editions Maisons des Langues.
- Magne,M.,Lions-Olivieri,M-L.VersionOriginale1,Cahier d'exercices.Paris:EditionsMaisonsdes Langues.

Useful Video Links:

Unit No	Topics	Links
Unit-I	French Absolute Beginners Guide	https://www.youtube.com/watch?v=Sk6YQynZ1h8
	Learn how to read in French	https://www.youtube.com/watch?v=sSCEoAWw0q4
Unit-II	FrenchListeningPractice-50Everyday French Sentences	https://www.youtube.com/watch?v=Aofb0XEJIks
Unit-III	Learn how to write French with me	https://www.youtube.com/watch?v=9iUiei9YMCk
Unit-IV	Slow and Easy French Conversation Practice	https://www.youtube.com/watch?v=ReVCwcHwnZI

Course Code	**VAC-113A**				
Category	Value Added Courses				
Course Title	**Environment Studies**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I**
	2	0	0	**2**	
Course Objectives	The objective of this course is to • Create a pro-environment attitude and a behavioral pattern in student community and society that attaches importance and priority to create sustainable lifestyle and awareness on various environmental issues.				
Assessment	15 Marks				
End Semester Examination	35 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated
CO1	Recall the fundamental concepts of environmental studies, ecosystems, natural resources, biodiversity, pollution, and disaster management.
CO2	Explain the scope, importance, and multidisciplinary nature of environmental studies, including sustainability, resource conservation, and environmental issues.
CO3	Apply knowledge of natural resources, ecosystems, and biodiversity conservation techniques to address real-world environmental problems and promote sustainable practices.
CO4	Analyze environmental issues such as pollution, resource depletion, and biodiversity loss, and assess their causes, effects, and solutions.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 7 parts of 1marks each from all units and remaining 8 questions of 7 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Introduction to Environmental Studies: Multidisciplinary nature of environmental studies, Scope and importance, Concept of sustainability and sustainable development, Ecosystem, Introduction, Characteristic and features, Structure and function of the following ecosystem- Forest ecosystem, Aquatic ecosystems (ponds, lakes, rivers, oceans).

Unit-II

Renewable and Non-renewable resources: Natural resources and associated problems, Forest resources – (Use and over-exploitation, deforestation, timber extraction, mining, dams and their effects on forest and tribal people), Water resources – (Use and over-utilization of surface and ground water, Floods, Drought, Conflicts over water, dams benefits and problems), Land resources – (Land as a resource, Land degradation, Role of an individual in conservation of natural resources).

Unit-III

Biodiversity and its Conservation: Introduction, Genetic, Species and ecosystem diversity, biogeographically classification of India, Value of biodiversity, Consumptive use, Productive use, Social use, Ethical use, Threats to biodiversity, Habitat loss, Poaching of wildlife, Man wildlife conflicts.
Conservation of biodiversity: Benefits and name of the methods of In-situ and Ex-situ conservation of biodiversity.

Unit-IV

Environmental Pollution: Definition, Causes, Effects and control measures of (Air pollution and Water pollution), Role of an individual in prevention of pollution, Disaster management Meaning, Reason and solutions of floods, earthquake, cyclone and landslides, Meaning of Climate change, Reasons and solution to greenhouse gases, acid rain and global warming.

Suggested Readings:

- Text Book of Environmental Studies by D. K. Asthana, S. Chand Publishing.
- Fundamentals of Environmental Studies by M. Basu, S. Xavier, Cambridge University Press.
- Environment, edited by R. N. Basu, University of Calcutta, Kolkata.
- Environmental Science by T. O. Miller Jr., Wadsworth Publishing Co.
- Environmental Management by K. D. Wagner, W.B. Saunders Co., Philadelphia

Useful Video Links:

Unit No.	Topics	Links
Unit-I	Multidisciplinary nature of environmental studies	https://nptel.ac.in/courses/122102006
	Ecosystem	https://archive.nptel.ac.in/content/storage2/courses/122103039/pdf/mod6.pdf
Unit-II	Renewable and non-renewable resources	https://archive.nptel.ac.in/courses/121/106/121106014
Unit-III	Biodiversity and its conservation	https://nptel.ac.in/courses/129105008
Unit-IV	Environmental Pollution	https://archive.nptel.ac.in/courses/123/105/123105001/

Course Code	**VAC-115A**				
Category	Value Added Courses				
Course Title	**Health and Wellness**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I**
	2	0	0	**2**	
Course Objectives	The objective of this course is: • To enhance physical fitness through regular exercise and Balanced diet. • To adopt health and wellness routines to accommodate the demand of a fast-paced, modern lifestyle.				
Assessment	15 Marks				
End Semester Examination	35 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated
CO1	Recall and define key concepts of health, wellness, malnutrition, body systems, and diseases, and identify factors influencing health.
CO2	Explain the differences between health and wellness, the importance of nutrition, and the impact of mental and physical health factors.
CO3	Apply knowledge of diet, nutrition, and exercise to promote healthy living, manage lifestyle diseases, and prevent malnutrition.
CO4	Analyze the effects of modern lifestyle, stress, and unhealthy habits on health, and identify strategies for disease prevention and management.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 7 parts of 1 mark each from all units and remaining 8 questions of 7 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Introduction: Definition and differentiate health and wellness, Importance of health and wellness education, Local, Demographic, Societal issues and factors affecting health and wellness, Diet and nutrition for health & wellness, Essential components of balanced diet for healthy living with specific reference to the role of Carbohydrates, Proteins, Fats, Vitamins and Minerals.

Unit-II

Malnutrition: Under nutrition and Over nutrition, processed foods and unhealthy eating habits, Body systems and common diseases, Sedentary lifestyle and its risk of disease, Stress, Anxiety, Depression, Factors affecting mental health, Identification of suicidal tendencies, Substance abuse (Drugs, Cigarette, Alcohol),De addiction, Counseling and Rehabilitation.

Unit-III

Management of Health and Wellness: Origin of yoga, Definition and scope of yoga, Limitation, Importance of yoga, Healthy foods for prevention and progression of Cancer, Hypertension, Cardiovascular, Metabolic diseases(Obesity, Diabetes, Polycystic Ovarian Syndrome), Types of physical fitness and its health benefits.

Unit-IV

Modern lifestyle: Modern lifestyle and hypo-kinetic diseases, Prevention and management through exercise, Postural deformities and corrective measures, Spirituality and mental health, Role of Yoga, asana and meditation in maintaining health and wellness, Role of sleep in maintenance of physical and mental health.

Suggested Readings:

- Physical Activity and Health by Claude Bouchard, Steven N. Blair, and William L. Haskell.
- Mental Health Workbook by Emily Attached and Marzia Fernandez.
- Mental Health Workbook for Women: Exercises to Transform Negative Thoughts and Improve Well-being by Nashay Lorick.
- Lifestyle Diseases Management by C. Nyambichu and Jeff Lumiri.
- Physical Activity and Mental Health by Angela Clow and Sarah Edmunds.

Useful Video Links:

Unit No.	Topics	Links
Unit-I	Introduction of health and wellness	https://www.youtube.com/watch?v=b_rB4S_D5dU
Unit-II	Malnutrition	https://www.youtube.com/watch?v=Ua-dLw2nFs4
Unit-III	Management of Health and Wellness	https://www.youtube.com/results?search_query=Modernlifestyle
Unit-IV	Modern lifestyle	https://www.youtube.com/watch?v=Y84eLN9q0x8

Course Code	**DSC-BCA-102A**				
Category	Discipline-Specific Courses-Major Course				
Course Title	**Digital Logic Design**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	4	0	0	**4**	
Course Objectives	The objectives of this course are to • Understand and apply the principles of Boolean algebra, logic gates, and simplification methods (such as Karnaugh maps) for the efficient design and optimization of combinational and sequential digital circuits. • Develop a strong foundation in number systems, binary codes, and error detection techniques while gaining expertise in designing and implementing key digital systems like adders, counters, registers, and flip-flops for real-world applications.				
Assessment	30 Marks				
End Semester Examination	70 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Recall the key concepts of digital systems, number systems, Boolean algebra, and logic gates for circuit design.	Level 1: Remember
CO2	Explain the operation and principles behind digital logic gates, Boolean functions, and the design of combinational circuits.	Level 2: Understand
CO3	Apply digital logic design techniques to construct combinational and sequential circuits, including adders, multiplexers, and flip-flops.	Level 3: Apply
CO4	Analyze complex digital circuits, evaluate the efficiency of various logic gate configurations, and identify optimization opportunities in circuit designs using K-map methods.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 7 parts of 2 marks each from all units and remaining 8 questions of 14 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Digital Systems and Binary Numbers: Digital Systems: Digital Signals, Digital Waveforms, Digital Computers and Digital Integrated Circuits.
Number Systems: Binary Number Systems, Octal and Hexadecimal Number System. Number Base Conversions. Complements, Signed Binary Numbers and Binary Codes, Error Detection and Correction codes.
Boolean Algebra and Logic Gates: Boolean Algebra: Axiomatic Definition, Theorems and Properties. Boolean Functions, Canonical Standard forms: SOP and POS forms.

Digital Logic Gates: NOT, OR, AND, NOR, NAND, XOR and XNOR. Universal Gates and their implementation

Unit-II

Gate Level Minimization: Karnaugh Map (K-map) Method: Simplification: Algebra postulates and Canonical forms. Prime Implicants: Types, Determination and Selection of Prime implicants, Don't Care Conditions, NAND and NOR implementation.

Unit-III

Combinational Circuits: Introduction, Characteristics and Designing principles of Combinational circuits. Binary Adder: Half-Adder & Full-Adder, Subtractor: Half-Subtractor & Full-Subtractor, Parallel binary Adder/Subtractor, Binary Multiplier, Comparators, Multiplexers, De-multiplexers, Encoders and Decoders.

Unit-IV

Sequential Circuits: Characteristics of Sequential Circuits, Latches, **Flip-Flops:** Introduction, S-R Flip flop, J-K Flip Flop, D Flip flop, T Flip flop and Master Slave Flip flop.
Registers: Shift Registers, Applications of Registers.
Counters: Asynchronous & Synchronous Counters. Modulo-N Counters and Up-Down Counters.

Suggested Readings:

- Digital Logic and Computer Design by Mano, M.M, Prentice- Hall of India.
- Digital Design and Computer Organisation by Gill, Nasib Singh and Dixit J.B., University Science Press (Laxmi Publications), New Delhi.
- Computer Organisation& Architecture by Stallings, William.
- Digital Design, Prentice by Mano, M.M.,Hall of India.
- Fundamentals of Digital Circuits by Anand Kumar, PHI.
- Digital Electronics by Tokheim, TMH.

Useful Video Links:

Unit No.	Topics	Links
Unit-I	Digital Systems and Binary Numbers	https://www.youtube.com/watch?v=aduM2zyf6p4&t=9s
	Number Systems	https://www.youtube.com/watch?v=pLTDDsvMnFQ
	Digital Logic Gates	https://www.youtube.com/watch?v=9kBog5wYVKM
Unit-II	Karnaugh Map (K-map) Method	https://www.youtube.com/watch?v=igwR1-1cImw
Unit-III	Multiplexer	https://www.youtube.com/watch?v=JR6_a3KPKHE
	Encoder	https://www.youtube.com/watch?v=_MZHAO2qqYw
Unit-IV	Sequential Circuits	https://www.youtube.com/watch?v=rwtxSnyPXwI
	D Flip flop	https://www.youtube.com/watch?v=oEkl2LjmPnw
	Registers	https://www.youtube.com/watch?v=sFzDOKblUnY

Course Code	**DSC-BCA-104A**				
Category	Discipline-Specific Courses –Major Courses				
Course Title	**Data and File Structure**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	3	0	0	**3**	
Course Objectives	The objectives of this course are to • Understand and implement basic data structures (arrays, stacks, queues, linked lists, trees) and their operations. • Learn and apply searching, sorting algorithms, and file organization techniques for efficient data management.				
Assessment	25 Marks				
End Semester Examination	50 Marks				
Total	75 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated
CO1	Recall key concepts related to data structures, such as arrays, stacks, queues, linked lists, trees, graphs, and file structures.
CO2	Explain the fundamental principles of data structures, their operations, and their applications, including searching, sorting, and file organization techniques.
CO3	Apply data structure concepts and algorithms to implement basic operations like insertion, deletion, searching, and sorting on arrays, stacks, queues, and linked lists.
CO4	Analyze the efficiency of different searching and sorting algorithms, compare their time complexities, and assess the suitability of different data structures for specific applications.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 5 parts of 2 marks each from all units and remaining 8 questions of 10 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Introduction: Elementary data organization, Data Structure definition, Data type vs. data structure, Categories of data structures, Data structure operations, Applications of data structures.

Arrays: Introduction, Linear arrays, Representation of linear array in memory, address calculations, Traversal, Insertions, Deletion in an array, Multidimensional arrays, Parallel arrays, Sparse arrays.

Searching: Introduction, Sequential search, Binary search, Prerequisite for binary search, Comparison in terms of efficiency.

Unit-II

Sorting: Bubble sort, Selection sort, Insertion sort, Quick sort, Merge sort, Comparison in terms of their efficiency

Stack: Introduction, Array and linked representation of stacks, Operations on stacks, Applications of stacks: Polish notation, Recursion.

Queues: Introduction, Array and linked representation of queues, Operations on queues, Deques, Priority Queues, Applications of queues.

Unit-III

Linked List: Introduction, Representation of linked lists in memory, Traversal, Insertion, Deletion, Searching in a linked list, Header linked list, Circular linked list, Two-way linked list, Threaded lists, Garbage collection, Applications of linked lists.

Tree: Introduction, Definition, Representing Binary tree in memory, Traversing binary trees, Traversal algorithms using stacks.

Graph: Introduction, Graph Theory terminology, Sequential and Linked representation of Graphs.

Unit-IV

Introduction to file structures: Concept of a file, types of files, File operations - open, read, write, close. External storage devices, Concepts of record, file, database and database system.

File Organization: Sequential file organisation – structures and processing, Record structures and access methods. Indexed sequential file organisation – structures and processing, Indexing techniques, B-trees and hashing for indexed files. Direct file organisation. Hashed File Organization - Hash function implementation.

Suggested Readings:

- Data Structure by Seymour Lipschutz, Tata-McGraw-Hill
- Fundamentals of Data Structures in C by Horowitz, Sahni & Anderson-Freed, Orient Longman.
- An Introduction to Data Structures With Applications by Trembley, J.P. And Sorenson P.G., McGraw-Hill International Student Edition, New York.
- Data Structures and Algorithm Analysis In C by Mark Allen Weiss, Addison- Wesley, (An Imprint Of Pearson Education), Mexico City. Prentice- Hall Of India Pvt. Ltd., New Delhi.
- Data Structures Using C by Yedidyan Langsam, Moshe J. Augenstein, and Aaron M. Tenenbaum, Prentice- Hall of India Pvt. Ltd., New Delhi.

Useful Video Links:

Unit No.	Topics	Links
Unit-I	Introduction of data structure	https://www.youtube.com/watch?v=zWg7U0OEAoE&list=PLBF3763AF2E1C572F
	Arrays	https://www.youtube.com/watch?v=5MtwWJEqwKo&t=3965s
	Searching	https://www.youtube.com/watch?v=r1-8p11fSPw&t=1s
Unit-II	Sorting	https://www.youtube.com/watch?v=4OxBvBXon5w
	Stack	https://www.youtube.com/watch?v=g1USSZVWDsY
	Queue	https://archive.nptel.ac.in/courses/106/102/106102064/
Unit-III	Tree	https://archive.nptel.ac.in/courses/106/102/106102064/
	Graph	https://www.youtube.com/watch?v=9zpSs845wf8
Unit-IV	Introduction to file structures	https://youtu.be/jp6vnN5K-eI?feature=shared
	File Organization	https://youtu.be/TK2Uzba7N7g?feature=shared

Course Code	**LC-BCA-106A**				
Category	Discipline-Specific Courses –Major Courses				
Course Title	**Data and File Structure Lab**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	0	0	2	**1**	
Course Objectives	The objectives of this course are to • Gain practical experience in implementing and manipulating fundamental data structures such as arrays, stacks, queues, and linked lists. • Practice implementing searching, sorting algorithms, and file organization techniques, and analyze their efficiency through practical applications.				
Assessment	10 Marks				
End Semester Examination	15 Marks				
Total	25 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

Cos	Skills Demonstrated
CO1	Apply C programming techniques to implement algorithms, manipulate arrays, and perform data structure operations to solve real-world problems.
CO2	Analyze C programs, algorithms, and data structures to identify issues, optimize solutions, and ensure correctness and efficiency.
CO3	Evaluate different programming techniques, algorithms, and data structures, selecting the most efficient methods to address complex computing challenges.
CO4	Design and implement efficient programs using advanced C concepts, algorithms, and data structures to solve complex problems effectively.

Exp. No.	Contents
1.	Write a C program to demonstrate basic data structure operations such as creating, inserting, deleting, and displaying elements in an array.
2.	Write a C program to insert and delete an element at a specified position in a linear array.
3.	Write a C program to implement and demonstrate a sequential search on an array.
4.	Write a C program to implement and demonstrate a binary search on a sorted array.
5.	Write a C program to implement and demonstrate the Bubble sort algorithm.
6.	Write a C program to implement and demonstrate the Selection sort algorithm.
7.	Write a C program to implement and demonstrate the Insertion sort algorithm.
8.	Write a C program to implement and demonstrate the Quick sort algorithm.
9.	Write a C program to implement and demonstrate the Merge sort algorithm.
10.	Write a C program to implement a stack using an array and perform basic stack operations: push, pop, and display.
11.	Write a C program to implement a queue using an array and perform basic queue operations: enqueue, dequeue, and display.
12.	Write a C program to implement a singly linked list and perform insertion, deletion, and traversal operations.

Useful Video links:

Experiment no.	Experiment name	Links
1	Program to insert and delete an element at a specified position in a linear array.	https://www.youtube.com/watch?v=TXcz8FTulzY
2	Program to implement and demonstrate a binary search on a sorted array.	https://www.youtube.com/watch?v=JQxGS5HLxg8
3	Program to implement and demonstrate the Bubble sort algorithm.	https://www.youtube.com/watch?v=C426zQV2XOg
4	program to implement and demonstrate the Selection sort algorithm.	https://www.youtube.com/watch?v=00CNTz2GvO8
5	Program to implement and demonstrate the Insertion sort algorithm.	https://www.youtube.com/watch?v=oZgbwa8lvDE
6	Program to implement and demonstrate the Quick sort algorithm.	https://www.youtube.com/watch?v=6PSBJD26En0
7	Program to implement and demonstrate the Merge sort algorithm.	https://www.youtube.com/watch?v=V7fvTmhqokM&t=200s
8	Program to implement a stack using an array	https://www.youtube.com/watch?v=baSVZqQhCVk
11	Program to implement a queue using an array	https://www.youtube.com/watch?v=THMyk2_p530
12	Program to implement a singly linked list	https://www.youtube.com/watch?v=K7VIKlUdo20

<table>
<tr><td>Course Code</td><td colspan="5">MV-BCA-108A</td></tr>
<tr><td>Category</td><td colspan="5">Minor Vocational</td></tr>
<tr><td>Course Title</td><td colspan="5">Programming in C & Data Structure</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td rowspan="2">Semester-II</td></tr>
<tr><td>3</td><td>0</td><td>0</td><td>3</td></tr>
<tr><td>Course Objectives</td><td colspan="5">The objectives of this course are to
• Develop proficiency in C programming fundamentals, including data types, operators, control structures, functions, arrays, and pointers for effective problem-solving.
• Gain expertise in implementing and using fundamental data structures, such as arrays, linked lists, stacks, queues, and trees, and understanding their practical applications.</td></tr>
<tr><td>Assessment</td><td colspan="5">25 Marks</td></tr>
<tr><td>End Semester Examination</td><td colspan="5">50 Marks</td></tr>
<tr><td>Total</td><td colspan="5">75 Marks</td></tr>
<tr><td>Duration of Exam</td><td colspan="5">03 Hours</td></tr>
</table>

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated
CO1	Recall fundamental concepts of C programming, data types, functions, arrays, pointers, and basic data structures like stacks, queues, and trees.
CO2	Explain the syntax and structure of C programs, the role of functions, arrays, pointers, and how data structures like stacks, queues, and graphs are represented and utilized.
CO3	Apply C programming skills to write and debug programs involving variables, operators, functions, arrays, and implement basic data structures like stacks, queues, and linked lists.
CO4	Analyze and evaluate C programs and data structures, identifying inefficiencies or errors, and determine the best data structure for specific problem-solving scenarios.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 5 parts of 2 marks each from all units and remaining 8 questions of 10 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

C Programming Fundamentals: Basic concepts of a C program, Declaration, Assignment & Print statements, Data Types, operators and expressions, decision making & branching, Programming examples.

Unit-II

Functions: Standard Mathematical functions, Input/output: Unformatted & formatted I/O function in C, Input functions, output functions.

User defined functions: Introduction/Definition, prototype, Local and global variables, passing parameters. Introduction to array and pointers.

Unit-III

Introduction: Elementary data organization, Data Structure, Categories of data structures, Data structure operations, Applications of data structures.
Linear Data Structure: Array, Linked List, Stack, Queue and their Implementation.

Unit-IV

Non-Linear Data Structure: Tree; Introduction, Definition, Representing Binary tree in memory, Traversing binary trees, Traversal algorithms using stacks.
Graph: Introduction, Graph theory terminology, Sequential and linked representation of graphs

Suggested Readings:

- Let us C by Yashwant Kanetker, BPB.
- Computer Programming in C by Rajaraman, V., PHI.
- Working with C by Yashwant Kanetker, BPB.
- An Introduction to Data Structures With Applications by Trembley, J.P. And Sorenson P.G., McGraw-Hill International Student Edition, New York.
- Data Structures and Algorithm Analysis In C by Mark Allen Weiss, Addison- Wesley, (An Imprint Of Pearson Education), Mexico City.Prentice- Hall Of India Pvt. Ltd., New Delhi.
- Data Structures Using C by Yedidyan Langsam, Moshe J. Augenstein and Aaron M. Tenenbaum, Prentice- Hall of India Pvt. Ltd., New Delhi.

Useful Video Links:

Unit No.	Topics	Links
Unit-I	Basics of C Programming	https://youtu.be/XTiIiI-LOY8?feature=shared
	Operators	https://youtu.be/wiY0O_tHyrI?feature=shared
Unit-II	Functions	https://youtu.be/CUBwN0rHxvg?feature=shared
	Introduction to array and pointers.	https://archive.nptel.ac.in/courses/106/105/106105151/
Unit-III	Introduction To Data Structure	https://youtu.be/zWg7U0OEAoE?feature=shared
	Stack	https://youtu.be/g1USSZVWDsY?feature=shared
	Queue and Linked list	https://youtu.be/PGWZUgzDMYI?feature=shared
Unit-IV	Tree	https://youtu.be/tORLeHHtazM?feature=shared
	Graph	https://youtu.be/9zpSs845wf8?feature=shared

<table>
<tr><td>Course Code</td><td colspan="5">LC-BCA-110A</td></tr>
<tr><td>Category</td><td colspan="5">Minor Vocational</td></tr>
<tr><td>Course Title</td><td colspan="5">Programming in C & Data Structure Lab</td></tr>
<tr><td rowspan="2">Scheme and Credits</td><td>L</td><td>T</td><td>P</td><td>Credits</td><td rowspan="2">Semester-II</td></tr>
<tr><td>0</td><td>0</td><td>2</td><td>1</td></tr>
<tr><td>Course Objectives</td><td colspan="5">The objectives of this course are to
• Learn to design and implement structured C programs using control statements, functions, arrays, and pointers for problem-solving.
• Develop knowledge of fundamental data structures like arrays, stacks, queues, and trees for efficient data management and algorithm implementation.</td></tr>
<tr><td>Assessment</td><td colspan="5">10 Marks</td></tr>
<tr><td>End Semester Examination</td><td colspan="5">15 Marks</td></tr>
<tr><td>Total</td><td colspan="5">25 Marks</td></tr>
<tr><td>Duration of Exam</td><td colspan="5">03 Hours</td></tr>
</table>

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated
CO1	Apply C programming techniques to write functional code for tasks such as mathematical calculations, array manipulations, and data structures.
CO2	Analyze and troubleshoot errors in C programs by breaking down code and identifying logical or syntax issues.
CO3	Evaluate and select appropriate C programming methods and tools to optimize program performance and solve real-world problems.
CO4	Create efficient C programs by integrating knowledge of data structures, functions, and libraries to solve complex challenges.

Exp. No.	Contents
1.	Write a C program to declare variables, assign values to them, and print the values using printf().
2.	Write a C program to demonstrate the working of various operators (arithmetic, relational, logical,and bitwise).
3.	Write a C program to find the largest of three numbers using if-elsestatements.
4.	Write a C program to demonstrate the use of switch statement.
5.	Write a C program to demonstrate the use of loops (for, while, do-while) by printing the first 10 numbers.
6.	Write a C program to use standard mathematical functions like sqrt(), pow(), and abs().
7.	Write a C program to demonstrate the use of unformatted and formatted input/output functions (getchar(), putchar(), scanf(), printf()).
8.	Write a C program to define and use a user-defined function to calculate the area of a circle.
9.	Write a C program to swap two numbers using call by value and call by reference (pointers).
10.	Write a C program to insert and delete an element at a specified position in a linear array.
11.	Write a C program to implement a stack using an array and perform basic operations: push, pop, and display.
12.	Write a C program to implement a queue using an array and perform basic operations: enqueue, dequeue, and display.

Useful Video links:

Experiment no.	Experiment name	Links
1	Program on Arithmetic, Relational, Logical, Assignment, Bit wise Operators	https://youtube.com/watch?v=jlQmeyce65Q&t=288s
2	Program to use of switch statement	https://www.youtube.com/watch?v=0g82dDC-mtc
3	Program to Print 1-10 Number using For Loop, While Loop & Do While Loop	https://www.youtube.com/watch?v=whKYtLcLODo
4	Program to insert and delete an element at a specified position in a linear array.	https://www.youtube.com/watch?v=3Xo6P_V-qns
5	Program to implement a stack using an array	https://www.youtube.com/watch?v=baSVZqQhCVk
6	program to implement a queue using an array	https://www.youtube.com/watch?v=THMyk2_p530

Course Code	**SEC-112A**				
Category	Skill Enhancement Courses				
Course Title	**Python Programming**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	1	0	0	**1**	
Course Objectives	The objectives of this course are to • Learn the basics of Python programming, including data types, flow control, and file handling. • Understand how to connect to and interact with databases using Python, including performing CRUD operations and handling transactions.				
Assessment					
End Semester Examination	25 Marks				
Total	25 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated
CO1	Recall the fundamental concepts of Python programming, including its features, data types, control structures, file operations, and database programming basics.
CO2	Explain Python syntax, flow control statements, complex data types like strings and lists, and how Python interacts with files and databases.
CO3	Apply Python programming concepts to solve problems using control structures, data types, string manipulation, file operations, and database interactions.
CO4	Analyze Python programs to identify logic errors, evaluate the use of data types, and determine the most effective way to manage file and database operations.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 5 parts of 1marks each from all units and remaining 8 questions of 5 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Introduction to Python: History and Features of Python Programming, Basics of Python: Keywords, Variables, Operators, I/O Statements, Indentation, and Comments. Python Basic Data Types, Data Types Declaration, and Implementation.

Unit-II

Flow Control Statement: if statement, if-else statement, nested-if statement, if-else, if-else ladder, While loop, range() Function, For Loop, Nested Loops, Infinite Loop, Break Statement, Continue Statement, Pass Statement.

Unit-III

Python Complex data types: String Data Type, String Manipulation Methods and implementation using Python Programming.
List and Dictionary Data Type, Declaration, and Implementation using Various built-in Functions and Libraries.

Unit-IV

Python File Operations: Reading Files, Writing Files in Python, Understanding Read Functions: read(), readline(), readlines(), Understanding Write Functions: write() and writelines() Manipulating file pointer using seek Programming, using file operations.
Database Programming: Connecting to a Database, Creating Tables, INSERT, UPDATE, DELETE and READ operations, Transaction Control, Disconnecting from a database, and Exception Handling in Databases.

Suggested Readings:

- Al Sweigart: Automate the Boring Stuff with Python.
- Think Python: How to Think Like a Computer Scientist, 2nd Edition by Allen B. Downey, Green Tea Press
- Introduction to Computer Science Using Python, 1st Edition by Charles Dierbach, Wiley India Pvt Ltd.
- Core Python Applications Programming, 3rd Edition by Wesley J Chun, Pearson Education India
- Data Structures and Algorithms in Python, 1st Edition by Roberto Tamassia, Michael H Goldwasser, Michael T Goodrich, Wiley India Pvt Ltd
- Python Programming using problem solving approach by Reema Thareja, Oxford University press.
- Python for Everybody: Exploring Data Using Python 3, 1st Edition by Charles R. Severance, Shroff Publishers.

Useful Video Links:

Unit No.	Topics	Links
Unit-I	History and Features of Python Programming	https://youtu.be/8ndsDXohLMQ?feature=shared
	Data Types of Python	https://youtu.be/8n4MBjuDBu4?feature=shared
Unit-II	Conditional Statements	https://www.youtube.com/watch?v=9xiFcK3MRYA&t=25s
	Loops in Python	https://youtu.be/jFLCMFewIUc?feature=shared
	break, continue and pass	https://youtu.be/SVAVQHfJbE0?feature=shared
Unit-III	String data type	https://youtu.be/sS89tiDuqoM?feature=shared
	String Manipulation	https://youtu.be/e45MVXwya7A?feature=shared
	List and Dictionary Data Type	https://youtu.be/X8Nj5cxaP9E?feature=shared
Unit-IV	Basics of File Operations	https://youtu.be/o5MBF0yo6lA?feature=shared
	Reading and Writing Files in python	https://youtu.be/rYLJaAdgLhI?feature=shared

Course Code	**LC-SEC-114A**
Category	Skill Enhancement Courses

Course Title	**Python Programming Lab**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	0	0	4	**2**	
Course Objectives	The objectives of this course are to • Learn the basics of Python programming, including data types, flow control, and file handling. • Understand how to connect to and interact with databases using Python, including performing CRUD operations and handling transactions.				
Assessment	15 Marks				
End Semester Examination	35 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

Cos	Skills Demonstrated
CO1	Implement programming solutions for mathematical operations, string manipulations, searching, sorting, and problem-solving tasks using appropriate algorithms.
CO2	Break down complex programming problems into smaller, manageable tasks, and identify patterns and relationships in the data.
CO3	Assess and critique the effectiveness of different algorithms and programming solutions in terms of time, space, and correctness.
CO4	Design and develop original software programs by combining various programming concepts, data structures, and algorithms for problem-solving.

Exp. No.	Contents
1.	Write a program to convert the given temperature from Fahrenheit to Celsius and vice versa depending upon user's choice.
2.	Write a program to find the factorial of the given number.
3.	Write a program, using user-defined function to find the area of a rectangle, square, circle and triangle by accepting suitable input parameters from the user.
4.	Write a program to display the first n terms of the Fibonacci series.
5.	Write a program to find whether the given number is Armstrong Number or not.
6.	Write a program to create a function that accepts a string and calculates the number of upper-case letters and lower-case letters.
7.	Write a program to perform string operations (concatenation, slicing, indexing, and length).
8.	Write a program to find the largest and smallest number in a matrix entered by the user.
9.	Write a program to count the number of even and odd numbers from N numbers.
10.	Write a program to find the largest and smallest numbers in the list entered by the user.
11.	Write a program to sort a list of elements using the bubble sort algorithm.
12.	Write a program to implement a linear search algorithm to search an element in the list entered by a user.

Useful Video links:

Experiment no.	Experiment name	Links
1	Program to find the factorial of the given number.	https://youtu.be/6lTY2GZJvQ8?feature=shared
2	Program to display the first n terms of the Fibonacci series.	https://youtu.be/OgQ4j5Xw8t0?feature=shared
3	Program to perform string operations (concatenation, slicing, indexing, and length).	https://www.youtube.com/watch?v=rcGeNl95Gv4
4	Program to sort a list of elements using the bubble sort algorithm.	https://youtu.be/4OxBvBXon5w?feature=shared
5	Program to implement a linear search algorithm to search an element in the list entered by a user.	https://youtu.be/IAy8Hgx6wwU?feature=shared

Course Code	**MDC-BBA-102A**				
Category	Multidisciplinary Courses				
Course Title	**Marketing Management**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I**
	3	0	0	**3**	
Course Objectives	The objectives of this course are • To help the students analyze marketing activities within a firm and apply marketing concepts and theories to realistic marketing situations. • To help the students for develop a better appreciation and understanding of the role of marketing in a business organization specifically, and in our society at large.				
Assessment	25 Marks				
End Semester Examination	50 Marks				
Total	75 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

Cos	Skills Demonstrated
CO1	Recall fundamental marketing concepts, including the nature and scope of marketing, consumer behavior, market segmentation, product life cycle, and promotional strategies.
CO2	Explain the core principles of marketing, consumer buying behavior, the product development process, pricing strategies, and the role of promotional and distribution channels.
CO3	Apply marketing concepts to design product strategies, determine pricing models, develop promotional plans, and select appropriate distribution channels to address market needs.
CO4	Analyze market environments, consumer behavior, and competitive dynamics to identify strategic opportunities for market segmentation, targeting, and positioning.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 5 parts of 2 marks each from all units and remaining 8 questions of 10 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit No.	526 Contents
Unit-I	**Introduction to Marketing:** Nature, Scope, Core concepts of marketing, Tasks of marketing management, corporate orientation towards marketplace, Marketing environment, Ethical issues in marketing.
Unit-II	**Understanding consumer and Business markets:** Consumer buying decision process in consumer and business markets, building customer value, Satisfaction and loyalty, Market segmentation, targeting and positioning approaches to deal with market competition, Tools of product differentiation.
Unit-III	**Product and Pricing Decisions:** Product life cycle, Product mix and product line decisions, new product development process, Branding, Packaging and labeling decisions, Determinants of price, Pricing methods and strategies.
Unit-IV	**Promotion and Distribution Decisions:** Promotion mix, Advertising and sales promotion, public relations, Personal selling, Channels of distribution, Functions of intermediaries, Channel design decisions, Selecting channel members, Channel management, Wholesaling and Retailing.

Suggested Readings:

- Marketing Management by Kotler, Philip and Keller, Pearson Education
- Marketing Management in South Asian Perspective by Kotler, Philip, Kevin Keller, A. Koshy, and M. Jha, Pearson Education
- Marketing by Kerin, Hartley, Berkowitz, and Rudelius, TMH
- Marketing: Concepts and Cases by Etzel, Michael J., TMH
- Marketing Management Text and Cases by Dhunna, Mukesh, Wisdom Publications Managing
- Marketing An Applied Approach by Capon, Noel and Singh, Siddharth, Wiley Publications

Useful Video Links:

Unit No.	Topics	Links
Unit-I	**Introduction to Marketing**	https://onlinecourses.nptel.ac.in/noc22_mg57/preview
Unit-II	Consumer Behaviour	https://youtu.be/dptzjrKRAm8?feature=shared
Unit-III	Product Pricing	https://youtu.be/obdqjcWFWyc?feature=shared
Unit-IV	Introduction to sales Management	https://youtu.be/MPZgEJMS97o?feature=shared

Course code	**MDC-BBA-104A**				
Category	Multidisciplinary Courses				
Course title	**Entrepreneurship and MSME**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	3	0	0	**3**	
Course Objectives	The objectives of this course are • To explore entrepreneurship concepts, characteristics, and its role in economic development. • To learn about feasibility studies, business plans, and market analysis for new ventures. • To understand financing options, venture capital, and legal issues like intellectual property rights. • To understand the role, challenges, and government initiatives supporting MSMEs in India.				
Assessment	25Marks				
End Semester Examination	50 Marks				
Total Marks	75 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	**Skills Demonstrated**
CO1	Recall fundamental concepts of entrepreneurship, including characteristics of entrepreneurs, the process of starting a venture, sources of finance, and the role of MSMEs in India.
CO2	Explain the key elements of entrepreneurship, such as environmental scanning, feasibility studies, and the dynamics of MSMEs, and the impact of entrepreneurship on economic development.
CO3	Apply entrepreneurial concepts to create a business plan, conduct market feasibility studies, and identify financing options, including debt and equity, for new ventures.
CO4	Analyze business opportunities and challenges by assessing competitor and industry dynamics, evaluating business plans, and conducting financial feasibility assessments for entrepreneurial ventures.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 5 parts of 2 marks each from all units and remaining 8 questions of 10 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit No.	Contents
Unit-I	**Introduction:** Concept of Entrepreneurship, Knowledge and skills requirement, Characteristics of successful Entrepreneurs, Role of Entrepreneurship in Economic Development, Entrepreneurship process, Factors Impacting Emergence of Entrepreneurship, Managerial vs. Entrepreneurial Approach, Emergence of Entrepreneurship.
Unit-II	**Creating Entrepreneurial Venture:** Environmental Scanning, Competitor and Industry Analysis, Feasibility Study, Market Feasibility, Technical and Operational Feasibility, Financial Feasibility, Drawing Business Plan, Preparing Project Report, Business Plan to Investors.
Unit-III	**Sources of Finance:** Debt or Equity Financing, Commercial Banks, Venture Capital, Financial Institutions Supporting Entrepreneurs, Legal Issues, Intellectual Property Rights, Patents, Trademarks, Copyrights, Trade Secrets, Licensing, Franchising.
Unit-IV	**Role and Dynamics of MSMEs in India:** Micro, Small and Medium-Sized Enterprises (MSME) in India, Meaning and Nature of MSME in India, Role of MSME in Socio-Economic Development, Problems faced by MSME, Role of Innovation and Entrepreneurship for MSME, Government Initiatives for MSME Sector.

Suggested Readings:

- Entrepreneurship by Hisrich, Robert D., Michae lPeters,and Dean Shepherd,Tata McGraw Hill.
- Entrepreneurship by Barringer, Bruce R., and R.Duane Irel and, Pearson Prentice Hall, New Jersey (USA).
- Entrepreneurship Development and Small Business Enterprises by Charantimath, Poornima, Pearson Education.
- Entrepreneurship by Kuratko, Donald and Richard Hodgetts, Cengage Learning India Pvt. Ltd.
- Essentials of Entrepreneurship and Small Business Management by Scarborough,N.M., and Cornwall, J. R., Pearson, Essex.

Useful Video links:

Unit No	Topics	Links
Unit-I	Introduction	https://youtu.be/ICYqc5_mJ5g?feature=shared
Unit-II	Creating Entrepreneurial Venture	https://youtu.be/fljL-8dTgVY?feature=shared
Unit-III	Sources of Finance	https://youtu.be/_LePYVXT-hY?feature=shared
Unit-IV	Role and Dynamics of MSMEs in India	https://www.youtube.com/watch?v=pEF1lSI340M

Course Code	**MDC-CSA-106A**				
Category	Multidisciplinary Courses				
Course Title	**Basics of Multimedia**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I**
	3	0	0	**3**	
Course Objectives	The objectives of this course are • To introduce the knowledge about the basic's concepts of multimedia and its applications. • To overview the knowledge of its relevance with the internet and its future aspects.				
Assessment	25 Marks				
End Semester Examination	50 Marks				
Total	75 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

Cos	Skills Demonstrated
CO1	Recall the basic concepts of multimedia, including types of media, hardware and software components, file formats and standards in video and image creation.
CO2	Explain the various multimedia components, including image creation, video production, data compression techniques, and the role of hardware and software in multimedia production.
CO3	Apply multimedia skills to create images, videos, and other multimedia content using appropriate software, and implement compression techniques for efficient storage and delivery.
CO4	Analyze multimedia projects, evaluating the effectiveness of design choices, compression algorithms, and production processes to optimize multimedia content for different platforms.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 5 parts of 2 marks each from all units and remaining 8 questions of 10 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit No.	Contents
Unit-I	**Introduction of Multimedia:** Definitions, Basic properties and medium types (Temporal and non-temporal), Multimedia applications, Uses of Multimedia, Introduction to making multimedia, Stages of project, Requirements to make good multimedia, Multimedia skills and training.
Unit-II	**Multimedia Hardware and Software:** Multimedia Hardware, Macintosh and Windows production Platforms, Hardware peripherals connections, Memory and storage devices, Media software basic tools, Making instant multimedia, Multimedia software and Authoring tools, Production standards.
Unit-III	**Image:** Creation of image (BMP & vector), Image colour models, Image file format, Image compression. **Video:** Video broadcast standard (PAL, NTSC), Shooting and editing video, Video file formats, Video tips, Video compression, MPEG standards. **Data Compression**: Introduction, Need, Difference of lossless/ lossy compression techniques, Brief overview to different compression algorithms concern to text, Audio, Video and images.
Unit-IV	**Multimedia-looking towards Future:** Digital communication and new media, Interactive television, digital broadcasting, Digital radio, Multimedia conferencing, Virtual reality, Digital camera, Assembling and delivering a multimedia project planning and costing, Designing and Producing, Content and Talent, Delivering, CD-ROM, The CD family, Production process, CD overview, Media types technology.

Suggested Readings:

- Multimedia Making it work by Tay Vaughan, TMH.
- Multimedia system by Rajneesh Aggarwal, Excel Publication.
- Fundamental of Multimedia by Li & Drew, Pearson Education.
- Multimedia Computing Communications Applications by Ralf Steinmetz and Klara Naharstedt, Pearson.

Useful Video Links:

Unit No.	Topics	Links
Unit-I	Introduction of Multimedia	https://www.youtube.com/watch?v=RR6Ben6qVnE
Unit-II	Multimedia Hardware and Software	https://www.youtube.com/watch?v=0UgCqmnfDHk
Unit-III	Image and Video	https://www.youtube.com/watch?v=5wRPin4oxCo
Unit-IV	Digital Communication	https://youtu.be/4NYt34yNWqU?feature=shared

Course code	**MDC-ASH-108A**				
Category	Multidisciplinary Courses				
Course title	**Introduction to Statistics**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	3	0	0	**3**	
Course Objectives	The objectives of this course are ● To develop foundational knowledge of statistics, including its origin, scope, limitations, and data types, while learning methods for organizing and presenting data effectively. ● To build analytical skills in interpreting data through central tendency, dispersion, index numbers, and time series analysis for practical problem-solving and decision-making.				
Assessment	25Marks				
End Semester Examination	50 Marks				
Total Marks	75 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	**Skills Demonstrated**
CO1	Recall fundamental statistical concepts such as data types, measures of central tendency, measures of dispersion, index numbers, and time series analysis.
CO2	Explain the various statistical measures including arithmetic mean, median, mode, standard deviation, index numbers, and the components of time series analysis.
CO3	Apply statistical techniques to calculate and interpret measures of central tendency, dispersion, index numbers, and time series for real-world datasets.
CO4	Analyze statistical data, identifying trends, patterns, and outliers, and evaluate the suitability of different statistical measures based on the nature of the data.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 5 parts of 2 marks each from all units and remaining 8 questions of 10 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit No.	Contents
Unit-I	**Introduction to Statistics**: Meaning and Scope, Origin, Development and Definition of Statistics, Importance and Scope of Statistics, Limitations and Distrust of Statistics. Data, Primary and Secondary Data, Qualitative and Quantitative Data, Discrete and Continuous Data, Ungrouped and Grouped Data.
Unit-II	**Measures of Central Tendency**: Arithmetic Mean, Weighted Mean, Geometric Mean and Harmonic Mean, Median and Mode, Characteristics for an Ideal Measure of Central Tendency, Merits and Demerits of Measures of Central Tendency.
Unit-III	**Measures of Dispersion**: Range, Inter-quartile Range, Quartile Deviation, Mean Deviation, Standard Deviation and Root Mean Square Deviation, Coefficient of Variation, Measures of Skewness and Kurtosis, Characteristics for an Ideal Measure of Dispersion
Unit-IV	**Index numbers**: Types, uses and their construction. Cost of living index numbers. Test of adequacy of Index numbers. **Time Series**: Components and Models of time series. Measurements of trend and seasonal indices, Forecasting and Estimation.

Suggested Readings:

- Levin, R.I.and Rubin D.S.,Statistics for Management,Pearson Education.
- Gupta,S.P.andGupta,M.P.,BusinessStatistics,Sultan Chand and Sons.
- Sharma,J.K.,BusinessStatistics,Vikas Publication House Pvt.Ltd.
- Jain,T.R.andAggarwal,S.C.,VK Global Publications Pvt.Ltd.
- Davis and Pecar: Business Statistics using Excel,Oxford University Press.

Useful Video links:

Unit No	Topics	Links
Unit-I	Introduction to Statistics	https://www.youtube.com/watch?v=76qRQo-BO-o
Unit-II	Measures of Central Tendency	https://auece.digimat.in/nptel/courses/video/110107114/L09.html
Unit-III	Measures of Dispersion	http://sdnbvc.digimat.in/nptel/courses/video/110106072/L05.html
Unit-IV	Index numbers	http://digimat.in/nptel/courses/video/109104182/L22.html

Course Code	**VAC-114A**				
Category	Value Added Courses				
Course Title	**Digital and Technological Solutions**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I**
	2	0	0	**2**	
Course Objectives	The objectives of this course are • To provide an overview of foundational principles and terminology of digital and technological solutions. • To stay informed about current trends and advancements in digital technology to drive innovation and improvement.				
Assessment	15 Marks				
End Semester Examination	35 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

Cos	Skills Demonstrated
CO1	Recall fundamental concepts of digital systems, communication technologies, e-governance, digital financial tools, and emerging technologies.
CO2	Explain the significance of digital technologies, the working of computer systems, and concepts related to e-commerce and cyber security.
CO3	Apply knowledge of digital systems, communication networks, and e-governance tools to real-world technological and business scenarios.
CO4	Analyze the components of communication systems, digital security threats, and evaluate emerging technologies' impact on society and business.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 7 parts of 1marks each from all units and remaining 8 questions of 7 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Introduction and Evolution of Digital Systems: Role and significance of digital technology, Information and communication technology and tools, Computer system and its working, Software and its types, Operating systems, Types and functions, Problem solving, Algorithms and flowcharts.

Unit-II

Communication Systems: Principles, Model and transmission media, Computer networks and internet, Concepts and applications, WWW, Web browsers, Search engines, Messaging, Email, Social networking, Computer based information system, Significance and types, E-commerce and Digital marketing, Basic concepts, Benefits and challenges

Unit-III

Digital India and E-Governance: Initiatives, Infrastructure, Services and Empowerment, Digital financial tools, Unified payment interface, Aadhar enabled payment system, USSD, Credit / Debit Cards, E-Wallets, Internet banking, NEFT/RTGS and IMPS, Online bill payments and Pos, Cyber security, Threats, Significance, Challenges, Precautions, Safety measures, Tools, Legal and ethical perspectives

Unit-IV

Emerging Technologies and their applications: Overview of cloud computing, Big data, Internet of things, Virtual reality, Block chain and Crypto currency, Robotics, Machine learning and Artificial Intelligence, 3-D Printing, Digital signatures.

Suggested Readings:

- Introduction to Information Technology by V. Rajaraman, 3rd Edition, PHI.
- Fundamentals of Computers by E. Balagurusamy, Tata McGraw Hill.
- Data Communications and Networking by Behrouz A. Forouzan, McGraw Hill.
- Emerging Technologies in Computing: Theory, Practice, and Advances by Pramod Kumar, Anuradha Tomar, and R. Sharmila,Chapman and Hall/CRC Imprint.
- Cloud Computing: Principles and Paradigms by Buvya, Broberg, and Gosciniski, Wiley.
- Artificial Intelligence: A Modern Approach by Russell and Norvig, Pearson Education.
- Internet of Things by Samuel Greengard, MIT Press.
- E-commerce: Concepts, Models, Strategies by C.S.V. Murthy.
- Big Data for Dummies by Hurwitz, Nugent, Halper, and Kaufman, Wiley & Sons - Wiley.

Useful Video Links:

Unit No.	Topics	Links
Unit-I	Evolution of Digital Computer	https://www.youtube.com/watch?v=J8mV_skvhZc
Unit-II	Communication Systems	https://www.youtube.com/watch?v=0TQUaZcBynA&list=PLb2wGSuEdRG8lKGO4q7NXE6QDWISAsBkZ
Unit-III	Digital India & e-Governance	https://www.youtube.com/watch?v=MMlr0AyLYmI
Unit-IV	Emerging Technologies	https://www.youtube.com/watch?v=szDERpTI5lA

Course Code	**VAC-116A**				
Category	Value Added Courses				
Course Title	**Human Values and Ethics**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I**
	2	0	0	**2**	
Course Objectives	The objective of this course are: • To learn the importance of human values like respect, honesty, and compassion. • To encourage responsibility towards the environment and society.				
Assessment	15 Marks				
End Semester Examination	35 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

Cos	Skills Demonstrated
CO1	Recall key concepts of value education, human values, professional ethics, personality development, and global citizenship principles.
CO2	Explain the significance of human values, ethics, and their relationship with personal well-being, society, and global citizenship.
CO3	Apply concepts of ethics, values, and integrated personality theories to practical scenarios in professional and personal contexts.
CO4	Analyze the interplay between values, ethics, professional conduct, and personal development, evaluating their impact on well-being.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 7 parts of 1marks each from all units and remaining 8 questions of 7 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Introduction: Need, Scope and process of value education, Classification of Value Education, Personal Values, Social Values, Moral Values & Spiritual Values, Difference between ideology and values, Harmony with self, society and nature.

Unit-II

Human Values and Ethics: Meaning and nature of human values, Significance of human values in life, Relation between values and ethics, Relevance of Human values, Integrity, Empathy, Lok sangrah, Brahmvihara, Theory of Naya (Jainism),Deontology, Virtue Ethics, Utilitarianism.

Unit-III

Integrated Personality and Well-being: Relationship among self-identity and personality, Integrated personality with the three gunas, Theory of sankhya, Four Antah-karanas (inner instruments) in Yoga, Panchkosha (five sheaths) in Upanishad well-being and its relation to happiness.

Unit-IV

Professional Ethics and Global Citizenship: Nature, Characteristics and scope of professional ethics, Types of professional ethics, Professional values, Trusteship, Inclusiveness, Commitment, Sustainability, Accountability, Transparency, Impartiality, Values for global citizenship, Equality, Justice, Human dignity, Nature and need of competency based education, Types of Competencies, Core competencies, Communication, Teamwork, Planning and achieving goals, Functional competencies, Analytical thinking, Knowledge sharing and learning, Decision making, Partnership building.

Suggested Readings:

- A Foundation Course in Human Values and Professional Ethics by R.R. Gaur, R. Sangal, G.P. Bagaria Excel Books.
- Professional Ethics and Human Values by D.R. Kiran, McGraw Hill Education (India).
- Happiness and Well-Being, NIOS Module V (Health and Well-being).
- Meaning and Well-Being: Indian Perspectives by Kiran Kumar, K. Salagame Journal of Constructivist Psychology.
- An Indian Conception of Wellbeing by S.K. Kiran Kumar in Henry, J. (Ed.), European Positive Psychology Proceedings Leicester, UK: British Psychological Society.
- Identity: Personal and Social by Vivian L. Vignoles (2017), Chapter to appear in Oxford Handbook of Personality and Social Psychology edited by Kay Deaux and Mark Snyder.

Useful Video Links:

Unit No.	Topics	Links
Unit-I	Introduction of value education	https://youtu.be/syZ8nrkDJi0?si=40PLK2orOBzsZRif
Unit-II	Human value and Ethics	https://youtu.be/thHnjYMUiU0?si=XaBRqyFwN1SFLbH3
Unit-III	Integrated Personality and Well-being	https://youtu.be/7dmp4NlvUsw?si=Bag4Hh3SNvYFFEYB
Unit-IV	Professional Ethics	https://youtu.be/0g5jgHmKoBE?si=CtC0YRXnXU6IThdL

Course code	**AEC-102A**				
Category	Ability Enhancement Course				
Course title	**Hindi-I**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	2	0	0	**2**	
Course Objectives	The objectives of this course are • विद्यार्थियों को हिन्दी भाषा के महत्त्व एवं गुणवत्ता से सुविज्ञ करवाकर हिन्दी की ओर उन्मुख करना। • विद्यार्थियों को हिन्दी–भाषा की वैज्ञानिकता के विषय मे बतलाकर इसके गौरव से सुपरिचित करवाना। • हिन्दी भाषा के माध्यम से नवयुवक–नवयुवतियों को राष्ट्रीयता के पुनीतभावों की ओर उन्मुख करना।				
Assessment	15 Marks				
End Semester Exam	35 Marks				
Total Marks	50 Marks				
Duration of Exam	03 Hours				

Course Out comes: After studying this course, the students will be able to

COs	**Skills Demonstrated**
CO1	मौलिक सिद्धांतों की अवधारणाओं को याद करें और समझें, जैसे कि मानकीकरण, मानक और वर्तनी जैसे मूलभूत सिद्धांतों की अवधारणाओं को याद करें और समझें, वास्तविक दुनिया के परिदृश्यों के संदर्भ में उनके घटकों और उनके अनुप्रयोगों की पहचान करें।
CO2	बुनियादी समस्याओं को हल करने और विभिन्न विषयों में उनके महत्व का वर्णन करने के लिए वर्तनी और विसर्ग के सिद्धांतों को लागू करें।
CO3	सृजनात्मक साहित्य के संदर्भ में अर्थ, परिभाषा और स्वरूप की संरचना का विश्लेषण करें; और सिस्टम डिज़ाइन एवं संचार जैसे वास्तविक जीवन के अनुप्रयोगों पर उनके प्रभाव का विश्लेषण करें।
CO4	**अनुवाद** में उपयोग की जाने वाली विभिन्न प्रणालियों की कार्यक्षमता, संरचना और वे जटिल प्रणालियों की समग्र समझ में कैसे योगदान करती हैं, उनकी प्रभावशीलता का विश्लेषण करें।
CO5	**वास्तविक दुनिया की चुनौतियों के आधार पर व्यावहारिक प्रणालियों को डिज़ाइन करने और समस्या-निवारण में** अनुवाद **के ज्ञान को लागू करें।**
CO6	**पत्र प्रस्तुतीकरण** के घटकों और **शोधात्मक** जैसे व्यावहारिक अनुप्रयोगों के बीच संबंधों का विश्लेषण करें, विभिन्न तकनीकी क्षेत्रों में इसके कार्यान्वयन की सफलता को प्रभावित करने वाले प्रमुख कारकों की पहचान करें।

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 7 parts of 1marks each from all units and remaining 8 questions of 7 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit No.	Contents
Unit-I	**लिपि का मानकीकरण,** लिपि का मानकीकरण, मानक वर्णमाला, देवनागरी वर्णमाला, अनुस्वार और विसर्ग, अनुनासिक, वर्तनी की शुद्धता के लिए ध्यान देने योग्य बातें, वर्तनी संबंधी अशुद्धियों के कारण, वर्तनी संबंधी अशुद्धियों को दूर करने के उपाय।
Unit-II	**सृजनात्मक साहित्य का अर्थ** , सृजनात्मक साहित्य का अर्थ, परिभाषा और स्वरूप; आलोचनात्मक साहित्य का अर्थ, परिभाषा और स्वरूप; सृजनात्मक साहित्य का भाषा-विकास में महत्त्व, निबंध लेखन, कहानी लेखन, काव्य लेखन।
Unit-III	**अनुवाद,** अनुवाद : अर्थ, परिभाषा और स्वरूप; अनुवाद का महत्त्व, अनुवादक के गुण, अनुवाद के प्रकार; अनुवाद में कंप्यूटर का योगदान, सीरियलों का हिंदी अनुवाद, बैंकिंग साहित्य का अनुवाद, डबिंग क्षेत्र में अनुवाद, लिप्यंतरण, हिंदी साहित्य का अन्य भाषाओं में अनुवाद, अनुवाद-क्षेत्र में रोजगार।
Unit-IV	**पत्र प्रस्तुतीकरण का अर्थ,** पत्र प्रस्तुतीकरण का अर्थ, पत्र प्रस्तुतीकरण और नवीन शोधात्मक वैचारिकता, पत्र प्रस्तुतीकरण और शिक्षक की भूमिका, प्रस्तोता का मनोबल, वक्तृत्व कला का विकास, शोधात्मक अभिरुचि का विकास।

प्रेरणास्पद पुस्तकें :

- शुद्ध लेखन और हिन्दी का मानक रूप, डॉ. हरिश्चन्द्र वर्मा, विद्याभारती, संस्कृति शिक्षा संस्थान, कुरुक्षेत्र (हरियाणा))
- बृहत् हिन्दीकोश, सम्पादक कालिका प्रसाद, राजवल्लभ सहाय, मुकुन्दीलाल श्रीवास्तव, ज्ञानमण्डल लिमिटेड, वाराणसी
- परिशोध, मुख्य सम्पादक डॉ. लक्ष्मीनारायण शर्मा, मानव-मूल्य विशेषांक, 1993
- भारतीय जीवनमूल्य, डॉ. धर्मपाल मैनी, भारतीय संस्कृति संस्थान, गुड़गांव
- बृहत् प्रशासन शब्दावली, हिन्दी-अंग्रेज़ी, वैज्ञानिक तथा तकनीकी शब्दावली आयोग, नई दिल्ली-110006
- बृहत् प्रशासन शब्दावली, अंग्रेज़ी-हिन्दी, वैज्ञानिक तथा तकनीकी शब्दावली आयोग, नई दिल्ली-110006
- बृहत् पारिभाषिक शब्द-संग्रह, मानविकी, खंड-II, वैज्ञानिक तथा तकनीकी शब्दावली आयोग, केंद्रीय हिंदी निदेशालय, शिक्षा तथा समाज कल्याण मंत्रालय, भारत सरकार
- प्रयोजनमूलक अनुवाद, डॉ. सुरेश सिंहल, मोनिका प्रकाशन, दिल्ली-110053
- अनुवाद सिद्धान्त एवं व्यवहार, डॉ. सुरेश सिंहल, अभिनव प्रकाशन, दिल्ली-6

Useful Video links:

Unit No	Topics	Links
Unit-I	लिपि का मानकीकरण	https://www.youtube.com/watch?v=g1jcWLojnj4&t=2s
Unit-II	सृजनात्मक साहित्य का अर्थ	https://www.youtube.com/watch?v=aUOgArzWtTU
Unit-III	अनुवाद	https://www.youtube.com/watch?v=B1-xF-WBDXI
Unit-IV	प्रस्तुतीकरण का अर्थ	https://www.youtube.com/watch?v=NkXI3lgDkrw

Course code	**AEC-104A**				
Category	Ability Enhancement Course				
Course title	संस्कृत				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	2	0	0	**2**	
Course Objectives	The objectives of this course are • To create awareness of the importance of language. • To develop awareness of the origin and development of a language. • To promote awareness of various language families especially Indo European language family. • To understand the general introduction to Vedic & Classical Sanskrit and their Literature.				
Assessment	15 Marks				
End Semester Examination	35 Marks				
Total Marks	50 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

COs	**Skills Demonstrated**
CO1	Describe the importance of language in communication and its role in shaping human culture, society, and identity.
CO2	Explain the major branches of the Indo-European language family and their historical and geographical significance.
CO3	Analyze the key features and contributions of Vedic Sanskrit literature, and compare it with Classical Sanskrit in terms of structure, style, and content.
CO4	Distinguish between Pali, Prakrit, and Apbhransh languages, and examine their role in shaping Indian religious, cultural, and linguistic history.
CO5	Describe the evolution of Modern Indian languages, and explain the impact of Sanskrit on their vocabulary, grammar, and literary traditions.

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 7 parts of 1marks each from all units and remaining 8 questions of 7 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit No.	Content
Unit-I	General introduction to language भाषा का सामान्य परिचय i. Importance of language भाषा का महत्व ii. Origin and development of language भाषा की उत्पत्ति और विकास iii. Language families भाषा परिवार
Unit-II	General introduction to Indo European language family भारोपीय भाषा परिवार का सामान्य परिचय i. Indo European language family भारोपीय भाषा परिवार ii. Indo-Iranian branch भारत-ईरानी शाखा
Unit-III	General introduction to Vedic and Classical Sanskrit Languages वैदिक तथा लौकिक संस्कृत का सामान्य परिचय i. Vedic Sanskrit and its Literature वैदिक संस्कृत और उसका साहित्य ii. Classical Sanskrit and its literature लौकिक संस्कृत और उस का साहित्य
Unit-IV	General introduction to Pali, Prakrit, Apbhransh and Modern Indian Languages पाली, प्राकृत, अपभ्रंश और आधुनिक भारतीय भाषाओं का सामान्य परिचय i. Pali, Prakrit and Apbhransh languages पाली, प्राकृतऔर अपभ्रंश भाषाएं ii. Modern Indian Languages आधुनिकभारतीयभाषाएं iii. Contribution of Sanskrit to Modern Indian Languages संस्कृत का आधुनिक भारतीय भाषाओं को योगदान

प्रेरणा स्रोत पुस्तकें

- **भाषाविज्ञान एवं भाषा-शास्त्र** – डॉ. कपिल देव द्विवेदी, विश्वविद्यालय प्रकाशन, वाराणसी।
- **भाषाविज्ञान** – डॉ. कर्ण सिंह, साहित्य भंडार, सुभाष बाजार, मेरठ।
- **संस्कृत ध्वनिविज्ञान की एक पुस्तिका** – सी. उहलेनबेक।
- **संस्कृत का भाषावैज्ञानिक परिचय** – बी. के. घोष।
- **भाषा : उसका स्वरूप, विकास और उद्गम** – ओ. जेस्पर्सन।

Useful Video links:

Unit No	Topics	Links
Unit-I	भाषा परिवार	https://www.youtube.com/watch?v=6xUd5hj9qNY
Unit-II	भारोपीय भाषा परिवार	https://www.youtube.com/watch?v=P4NAF1BDmAM
Unit-III	वैदिक संस्कृत और उसका साहित्य	https://www.youtube.com/watch?v=4Bub_2Kmvro
Unit-IV	आधुनिक भारतीय भाषाएं	https://www.youtube.com/watch?v=CfOwGijsFZ0

Annexure 2.18

Ganga Institute of Technology and Management, Kablana
(An Autonomous Institute under Maharshi Dayanand University, Rohtak)

Date: 30.12.2024

Department of Management
Minutes of Meeting Board of Studies

Venue: Board Room, Ganga Institute of Technology and Management, Kablana

Members Present:

Name of the Member	Affiliation/Organization	Designation within Academic Council
Dr Punam Devi	HoD & Professor, MGMT, GITAM, Kablana	Chairman
Dr. Pardeep Ahlawat	Subject Expert (Professor, IMSAR, MDU, Rohtak), University Nominee	Member
Dr. Sanjay Bhayana	Subject Expert (Professor, NIFTEM, Sonipat), Outside Parent University	Member
Dr. Ashutosh Nigam	Subject Expert (Professor, J. C. Bose University of S&T, YMCA, Faridabad)Outside Parent University	Member
Dr. Ashok Sangwan	Industry/ Corporate Sector	Member
Dr. Dipika	Professor, MGMT, GITAM Kablana	Member
Dr. Payush	Professor, MGMT, GITAM Kablana	Member
Dr. Bhawana Yadav	Associate Professor, MGMT, GITAM Kablana	Member
Dr. Manisha	Associate Professor, MGMT, GITAM Kablana	Member
Dr. Deepti	Associate Professor, MGMT, GITAM Kablana	Member
Dr. Anju	Assisstant Professor, MGMT, GITAM Kablana	Member
Mr. Ajay Kumar	Assisstant Professor, MGMT, GITAM Kablana	Member
Ms. Preeti Sharma	Assisstant Professor, MGMT, GITAM Kablana	Member
Mr. Sachin Gupta	Assisstant Professor, MGMT, GITAM Kablana	Member
Mr. Umesh Bhardwaj	Assisstant Professor, MGMT, GITAM Kablana	Member
Ms. Shalu	Assisstant Professor, MGMT, GITAM Kablana	Member
Ms. Manju	Assisstant Professor, MGMT, GITAM Kablana	Member
Ms. Bhumika Samal	Assisstant Professor, MGMT, GITAM Kablana	Member
Ms. Bindu	Assisstant Professor, MGMT, GITAM Kablana	Member
Ms. Annu Dalal	Assisstant Professor, MGMT, GITAM Kablana	Member
Ms. Asha	Assisstant Professor, MGMT, GITAM Kablana	Member

Mr. Joginder Singh Grewal	Assisstant Professor, MGMT, GITAM Kablana	Member
Mr. Gourav	Assisstant Professor, MGMT, GITAM Kablana	Member
Mr. Sidharth	Assisstant Professor, MGMT, GITAM Kablana	Member
Ms. Seema	Assisstant Professor, MGMT, GITAM Kablana	Member
Mr. Angel	Assisstant Professor, MGMT, GITAM Kablana	Member
Ms. Priyanka	Assisstant Professor, MGMT, GITAM Kablana	Member
Ms. Poonam Garg	Assisstant Professor, MGMT, GITAM Kablana	Member
Mr. Kirth Singh	Alumni	Member

Agenda Items Discussed:

1. Introduction of the Members of the Board of Studies

- The meeting began with a warm welcome by Prof. Punam Devi, Chairman, who welcomed the Experts in the Board of Studies nominated by Maharshi Dayanand University, Rohtak and introduced all experts with other members of the **Board of Studies.**

2. Review of the Syllabus Prescribed for 1st Year under Autonomous Status.

- The committee members suggested that the Mission, Vision, and Program Outcomes should be included in the scheme and this suggestion has been implemented.
- It was recommended that at least four cases should be discussed, with one case from each unit and this has been implemented.
- The committee suggested that the objectives should be listed numerically instead of using bullet points and this has been implemented.
- The scheme and syllabus of the MBA and BBA programs were discussed and approved.

3. Panel of examination

- The names of the panel of examiners for the MBA and BBA programs were discussed and finalized.

4. Any Other Item with the Permission of the Chair

- The name of the department for the MBA program was decided as Department of Management Studies."
- The name of the department for the BBA program was decided as Department of Business Studies.

Vote of Thanks: Dr. Dipika expressed a vote of thanks to all the members of the Board of Studies (BoS) for their valuable contributions and support.

The meeting concluded with the Chairman thanking all members for their presence and insights.

Annexure 2.19

GANGA INSTITUTE OF TECHNOLOGY AND MANAGEMENT,
KABLANA (JHAJJAR)
An Autonomous Institute (UGC)
Approved by AICTE, New Delhi and Affiliated to MDU, Rohtak
NAAC 'A' GRADE

GITAM

SCHEME AND SYLLABI
OF
3-4 YEAR
BACHELOR OF BUSINESS ADMINISTRATION PROGRAM
(BBA)

WITH EFFECT FROM THE
SESSION 2024-25

DEPARTMENTS OF BUSINESS STUDIES

VISION

"To become a nationally recognized center for academic excellence by nurturing business skills and potential through expert guidance and comprehensive exposure."

MISSION

- To provide a holistic academic environment.
- To create the awareness about social responsibilities and ethical values for management professionals.
- To enhance management capabilities and employability through continuous interaction with academicians, experts, industrialists and research activities.
- To incubate the skills of decision making, team work, communication and leadership among the students through various activities.

PROGRAM OUTCOMES OF THE MBA PROGRAM

At the end of the BBA Program, Students will be able to:

PO	By the end of the program graduating students should:
PO1	Acquire knowledge and skills in the field of management, accounting, Statistics, marketing, human relations and assistance.
PO2	Apply the entrepreneurial and managerial skills for effective and business management.
PO3	Acquire employability skills through the practical awareness on the IT in management.
PO4	Comprehend applicability of management principles to situation in global business world.
PO5	Develop legal and ethical values and environmental issue for the continuous development of business venture.
PO6	Nurture the key skills like communication and personality.

1. DEFINITION OF CREDIT

1	1 Lecture (L) per week	1 Credit
2	1 Tutorial (T) per week	1 Credit
3	1 Practical (P) per week	0.5 Credit
4	2 Practical (Lab) per week	1 Credit

2. RANGE OF CREDIT

A range of credits from 136 to 144 are required for a student to be eligible to get an undergraduate degree in business administration. A student will be eligible to get Under Graduate degree with Honours or Research, if he/she completes an additional 48 credits.

3. STRUCTURE OF UNDERGRADUATE BUSINESS ADMINISTRATION PROGRAM (BBA)

Sr. No.	Category	Breakup of Credits		
		BBA	BBA (H)	BBA (With Research)
1	Discipline-Specific Courses (DSC) /Major Course	76*	116*	104*
2	Minor(MIC)/ Minor Vocational (MICVOC)/ Skill Enhancement Courses (SEC)/Internship	37*	45*	45*
3	Multidisciplinary Courses	09*	09*	09*
4	Ability Enhancement Course	08*	08*	08*
5	Value Added Course	06*	06*	06*
6	Research Project/Dissertation			12*
	Total Credits	**136***	**184***	**184***

**Minor variation is allowed as per need of the respective disciplines.*

** Students exiting the program after second semester and securing 48 credits including 4 credits of summer internship will be awarded UG Certificate in the relevant Discipline/Subject. Students exiting the program after fourth semester and securing 96 credits including 4 credits of summer internship will be awarded UG Diploma in the relevant Discipline/Subject. Students will be awarded 3-year UG Degree in relevant major Discipline/Subject upon securing 136 credits.*

**Four credits of internship earned by a student during summer internship after 2nd semester or 4th semester will be counted in 5th semester of astudent who pursue 3 year UG Programs without taking exit option.*

4. COURSE CODE AND DEFINITIONS

Sr. No.	Category	Course Code
1	Discipline Specific Course-Major Course	DSC
2	Minor	MIC
3	Skill Enhancement Courses	SEC
4	Internship	INT
5	Multidisciplinary Courses	MDC
6	Ability Enhancement Course	AEC
7	Value Added Course	VAC
8	Research Project	RP
9	Dissertation	DIS

GANGA INSTITUTE OF TECHNOLOGY AND MANAGEMENT,
JHAJJAR (HR.), DELHI-NCR
Scheme of Studies and Examination
BBA – 1st Semester
w.e.f. 2024-25

Sr. No.	Category	CourseCode	Course Title	Hours per week			Total Load Per Week	Credits	Examination Schedule (Marks)				Exam Duration in H
				L	T	P			Assessment	End Semester Examination	Practical	Total	
1	Discipline Specific Course-Major Course	DSC-BBA-101A	Business Organization	3	1	0	4	4	30	70	-	100	3
2	Discipline Specific Course-Major Course	DSC-BBA-103A	Basics of Accounting	3	1	0	4	4	30	70	-	100	3
3	Discipline Relevant Course-Minor	Refer Table No.-I	----------	3	1	0	4	4	30	70	-	100	3
4	Multidisciplinary Courses	Refer Table No.-II	----------	3	0	0	3	3	25	50	-	75	3
5	Ability Enhancement Course	Refer Table No.-III	----------	2	0	0	2	2	15	35	-	50	3
6	Skill Enhancement Course	SEC-101A	Compute Fundamentals and Office Automation Tools	2	0	0	2	2	15	35	-	50	3
		LC-SEC-103A	Computer Fundamentals and Office Automation Tools Lab	0	0	2	2	1	10	-	15	25	3
7	Value Added Course	Refer Table No.-IV	----------	2	0	0	2	2	15	35	-	50	3
Total Credits								**22**				**550**	

Scheme of Studies and Examination
BBA – 2nd Semester
w.e.f. 2024-25

Sr. No.	Category	CourseCode	Course Title	Hours per week			Total Load Per Week	Credits	Examination Schedule (Marks)				Exam Duration in H
				L	T	P			Assessment	End Semester Examination	Practical	Total	
1	Discipline Specific Course-Major Course	DSC-BBA-102A	Managerial Skills	3	1	0	4	4	30	70	-	100	3
2	Discipline Specific Course-Major Course	DSC-BBA-104A	Essentials of Economics	3	1	0	4	4	30	70	-	100	3
3	Discipline Relevant Course-Minor	Refer Table No.-V	----------	3	1	0	4	4	30	70	-	100	3
4	Multidisciplinary Courses	Refer Table No.VI	----------	3	0	0	3	3	25	50	-	75	3
5	Ability Enhancement Course	Refer Table No.-VII	----------	2	0	0	2	2	15	35	-	50	3
6	Skill Enhancement Course	SEC-102A	Business Communication	2	0	0	2	2	15	35	-	50	3
		LC-SEC-104A	Business Communication Lab	0	0	2	2	1	10	-	15	25	3
7	Value Added Course	Refer Table No.-VIII	----------	2	0	0	2	2	15	35	-	50	3
Total Credits								**22**				**550**	

Note:

1. The duration of all the end-term theory examinations shall be 3 hours.
2. The Criteria for awarding the internal assessment throughout the Program shall be as under:
   a) Sessional Examination : 50% of Assessment Marks
   b) Assignments/Presentations/Seminars and Class Participation : 30% of Assessment Marks
   c) Attendance : 20% of Assessment Marks

Attendance%	: Marks
90-100%	: *100% of Attendance marks*
85%-89.99%	: *80% of Attendance marks*
80%-84.99%	: *60% of Attendance marks*
75%-79.99%	: *45% of Attendance marks*
65%-74.99%	: *25% of Attendance marks*
Below 65%	: *0% of Attendance marks*

3. The Criteria for awarding the Internal assessment practical course throughout the Program shall be as under:
   a) Practical Assignments/Practical File : 06 Marks (60% Weightage of Assessment)
   b) Attendance (Criteria as mentioned above in 2(c) : 04 marks (40% Weightage of Assessment)
4. The panel of examiners for end-semester theory/practical examinations shall be prepared and approved by the BOS of Department of Business Studies or Academic Council of Institute.
5. The panel of examiners based on the examiners' expertise/specialization/area of interest for practicum/viva-voce examination shall be recommended by the BOS of Department of Business Studies or Academic Council of the Institute. In case of unavailability of external examiners due to unavoidable circumstances, the Controller of Examinations may allow the conduct of practical examinations by the internal examiners.
6. The panel of examiners for assessment of the Project Reports/Dissertation/Research Project/Summer Internship Reports shall be recommended by the BOS of Department of Business Studies or Academic Council of the Institute.
7. A student while selecting the minor discipline has to ensure that the courses of the opted minor discipline do not match with the major courses of his/her opted program.
8. The Student may choose the multidisciplinary courses other than the courses offered by their Own/respective department.

Semester-I

Table No. I (Discipline Relevant Course-Minor)

S. No.	Category	Course Code	Course Title
1	Discipline Relevant Course-Minor	MIC-BBA-105A	Basics of Economics

Table No. II (Multidisciplinary Courses)

S. No.	Category	Course Code	Course Title	Offered By
1	Multidisciplinary Courses	MDC-BBA-101A	Foundations of Management	Department of Business Studies
2		MDC-ASH-103A	Introductory Mathematics	Department of Applied Sciences
3		MDC-BCA-105A	Fundamentals of IT	Department of Computer Application
4		MDC-FTS-107A	Industrial Safety	Department of Fire and Safety

Table No. III (Ability Enhancement Course)

S. No.	Category	Course Code	Course Name
1	Ability Enhancement Course	AEC-101A	General English-I
2		AEC-103A	French

Table No. IV (Value Added Courses)

S. No.	Category	Course Code	Course Title
1	Value Added Course	VAC-113A	Environmental Studies
2		VAC-115A	Health and Wellness

Semester-II

Table No. V (Discipline Relevant Course-Minor)

S. No.	Category	Course Code	Course Title
1	Discipline Relevant Course-Minor	MIC-BBA-106A	Corporate Leadership

Table No. VI (Multidisciplinary Courses)

S. No.	Category	Course Code	Course Title	Offered By
1	Multidisciplinary Courses	MDC-BBA-102A	Marketing Management	Department of Business Studies
2		MDC-BBA-104A	Entrepreneurship and MSME	Department of Business Studies
3		MDC-BCA-106A	Basics of Multimedia	Department of Computer Application
4		MDC-ASH-108A	Introduction to Statistics	Department of Applied Sciences

Table No. VII (Ability Enhancement Course)

S. No.	Category	Course Code	Course Name
1	Ability Enhancement Course	AEC-102A	Hindi-I
2		AEC-104A	Sanskrit

Table No. VIII (Value Added Courses)

S. No.	Category	Course Code	Course Title
1	Value Added Course	VAC-114A	Digital and Technological Solutions
2		VAC-116A	Human Values & Ethics

Course Code	**DSC-BBA-101A**				
Category	Discipline Specific course-Major Course				
Course Title	**Business Organization**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I**
	3	1	0	4	
Course Objectives	The objectives of this course are 1. To understand business concepts, scope, objectives, SWOT analysis, and the role of technology. 2. To explore business organizations including sole proprietorships, partnerships, companies, and franchising. 3. To understand entrepreneurship, focusing on opportunities, business setup, and government support for start-ups. 4. To learn about the government-business interface, including the stock exchange, mergers, acquisitions, and trade associations.				
Assessment	30 Marks				
End Semester Examination	70 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	**Define** fundamental concepts of business organizations.	Level-1 Remember
CO2	**Explain** various forms of business organizations and government policies.	Level-2 Understand
CO3	**Apply** business methods and principles in decision making.	Level-3 Apply
CO4	**Analyze** the methods and principles of organization to solve business problems.	Level-4 Analyze

Note:

1. Examiner will set nine questions in total. Question one will have 7 short questions of 2 marks (each) from all units. Remaining eight questions of 14 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first question being compulsory and selecting one from each Unit.
2. At least four cases will be discussed, one from each unit.

Unit No.	Contents
Unit-I	**Overview Of Business:** Concept, Nature and Scope, Business as a System, Business Objectives, Business Environment Interface, SWOT Analysis (Strengths, Weaknesses, Opportunities, Threats), Distinction Between Business Commerce and Trade (Definitions, Functions and Differences), Role of Technology in Business.
Unit-II	**Forms Of Business Organization:** Sole Proprietorship, Partnership (Types of Partnerships and their Features), Joint Stock Company, Cooperative Societies (Principles and Types), Multinational Corporations (Characteristics and Impact on Global Business), Emerging Trends in Business Structures, Concept of Franchising as a Business Model.
Unit-III	**Entrepreneurship:** Concept and Nature of Entrepreneurship, Entrepreneurial Opportunities in the Contemporary Business Environment, Process of Setting up a Business Enterprise, Choice of a Suitable Form of Business Organization, Government Policies and Support for Start-Ups, Feasibility and Preparation Business Plan.

Unit-IV	**Government and Business Interface:** Stock Exchange in India (Role and Function), Business Combinations, Concept and Causes of Mergers and Acquisitions. **Chambers of Commerce and Industries in India:** Overview of FICCI, CII, Role of Trade Associations and their Influence on Policy Making.

Suggested Readings:

- Business Organization and Management by Basu C, McGraw Hill Education
- Business Organization and Management by T. N Chhabra, Sun India Publications
- The Practice of Management by Peter F. Drucker, Harper & Row, New York
- Business Organization and Management by V. K Kaul, Pearson Education
- Essentials of Management by B. P Singh and A. K Singh, Excel Books Pvt. Ltd

Useful Video Links:

Unit No	Topics	Links
Unit-I	Overview of Business	https://onlinecourses.swayam2.ac.in/nou21_mg03/preview
Unit-II	Forms of Business Organization	https://onlinecourses.swayam2.ac.in/nou21_mg03/preview
Unit-III	Introduction to Entrepreneurship	https://www.youtube.com/watch?v=ICYqc5_mJ5g&t=74s
Unit-IV	Government and Business Interface	https://youtu.be/2jDYW2xd98s?si=RBl7MPPYyRmLb3Zm

Course Code	**DSC-BBA-103A**				
Category	Discipline Specific course-Major Course				
Course Title	**Basics of Accounting**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I**
	3	1	0	**4**	
Course Objectives	The objectives of this course are 1. To understand basic accounting principles including recording transactions and preparing financial accounts. 2. To learn depreciation accounting and computerized accounting using Tally software. 3. To understand corporate financing through shares and debentures, including issues and redemption methods. 4. To understand the preparation of final accounts for a company as per statutory requirements.				
Assessment	30 Marks				
End Semester Examination	70 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	**Define** the fundamental concepts of a financial accounting system and their application in organizations.	Level-1 Remember
CO2	**Describe** the concepts of accounting system.	Level-2 Understand
CO3	**Apply** financial and accounting techniques to solve business problems.	Level-3 Apply
CO4	**Determine** the financial information & provisions to make decisions in the real world.	Level-3 Apply

Note:

1. Examiner will set nine questions in total. Question one will have 7 short questions of 2 marks (each) from all units. Remaining eight questions of 14 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first question being compulsory and selecting one from each Unit.
2. At least four cases will be discussed, one from each unit.

Unit No.	Contents
Unit-I	**Introduction**: Meaning, Advantages and Limitations of Accounting, Branches of Accounting, Users of Financial Accounting Information, Recording of Business Transaction (Including GST Transactions), Ledger, Trial Balance, Preparation of Financial Accounts with Adjustments (Trading Account, Profit and Loss Account, Balance Sheet).
Unit-II	**Accounting Principles and Computerized Accounting System:** Depreciation Accounting, Concept, Purpose, Advantages and Methods (Straight Line Method and Written Down Method), Bank Reconciliation Statement, Computerized Accounts by Using Tally Software.
Unit-III	**Corporate Financing Through Shares and Debentures:** Meaning, Issue of Share, Forfeiture and Surrender of Shares, Issue of Debentures, Methods of Redemption of Debentures (Redemption at Maturity, Redemption by Lump Sum, Redemption by Conversion in to Equity Shares, Redemption by Installments).

Unit-IV	**Final Accounts of a Company and Statutory Provisions:** Statutory Provision Regarding Preparation of Final Accounts of Company, Preparation of Profit and Loss Account and Balance Sheet of Company as per the Requirement of Schedule V1 of the Companies Act, Acquisition of Business and Profit Prior to Incorporation.

Suggested Readings:

- Accounting Text and Cases by R. N. Anthony, D. Hawkins, K. A Merchant, McGraw-Hill Education India
- Accounting and Finance for Non-finance Managers by J.K. Batra, Sage Textbook
- Essentials of Financial Accounting by A. K. Bhattacharyya, PHI Learning
- Financial Accounting: A Managerial Perspective by R.Narayana swamy, PHI Learning
- Financial Accounting by B. K. Goyal, H. N.Tiwari, Taxmann Publication, New Delhi

Useful Video Links:

Unit No	Topics	Links
Unit-I	Introduction	https://youtu.be/B1uFFttAA6o?feature=shared
Unit-II	Accounting Principles	http://sdnbvc.digimat.in/nptel/courses/video/110106050/L03.html
Unit-III	Corporate Financing through Shares and Debentures	https://youtu.be/4JKG5ZZ9T94
Unit-IV	Final Accounts of a Company and Statutory Provisions	http://sdnbvc.digimat.in/nptel/courses/video/110106147/L54.html

Course Code	MIC-BBA-105A				
Category	Discipline Relevant Course-Minor				
Course Title	**Basics of Economics**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I**
	3	1	0	**4**	
Course Objectives	The objectives of this course are 1. To understand the fundamentals of microeconomics, including resources, economic problems, and the production possibility curve. 2. To understand demand and supply analysis, focusing on elasticity and factors affecting demand and supply. 3. To understand consumer behavior through utility and indifference curve analysis, and their impact on equilibrium. 4. To understand cost and revenue analysis in different market structures, including perfect competition, monopoly, and non-price competition.				
Assessment	30 Marks				
End Semester Examination	70 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	**Define** the fundamental concepts of business economics.	Level-1 Remember
CO2	**Interpret** the theories of consumption and production.	Level-2 Understand
CO3	**Apply** the theories and laws of micro economics to solve business problems.	Level-3 Apply
CO4	**Analyze** the process of decision making by consumers and producers.	Level-4 Analyze

Note:

1. Examiner will set nine questions in total. Question one will have 7 short questions of 2 mark (each) from all units. Remaining eight questions of 14 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first question is compulsory and selecting one from each Unit.
2. At least four cases will be discussed, one from each unit.

Unit No.	Contents
Unit-I	**Introduction:** Meaning, Nature and Scope of Microeconomics, Concept of Resources, Meaning and Types of Economy, Difference Between Micro and Macro Economics, Central Problems of An Economy (What, How and For Whom to Produce),Production Possibility Curve, Meaning, Assumptions and its Properties, Shifting of Curve and Opportunity Cost, Characteristics of Various Economic Resources, Factors of Production.
Unit-II	**Demand and Supply Analysis:** Law of Demand, (Market Demand, Determinants of Demand, Demand Schedule), Demand Curve, Types of Goods,(Normal Goods, Inferior Goods, Substitute Goods, Complimentary Goods, Giffen Goods), Price Elasticity of Demand, Factors Affecting Price Elasticity of Demand, Methods to Measure Price Elasticity of Demand, Law of Supply, Determinants of Supply, Elasticity of Supply.
Unit-III	**Consumer Behavior (Utility Analysis):** Meaning of Utility, Marginal Utility, Law of Diminishing Marginal Utility, Law of Equi-Marginal Utility, Conditions of Consumer's Equilibrium. **Consumer Behavior (Indifference Curve Analysis):** Assumptions, Properties of Indifference Curve, Consumer Equilibrium, Short Run and Long Run Production Functions, Law of Variable Proportions, Law of Return to Scale, Factors Affecting the Location of Firms

Unit-IV	**Cost and Revenue:** Total Cost, Total Fixed Cost, Total Variable Cost, Average Cost, Average Fixed Cost, Average Variable Cost, Meaning and Relationship of Total Revenue And Marginal Revenue, Market and Forms of Market, Equilibrium of the Firm and Industry, Perfect Competition, Monopoly, Monopolistic Competition, Discriminating Monopoly, Aspects of Non-Price Competition.

Suggested Readings:

- Modern Microeconomics by A. Kout soyiannis, Macmillan Press, London
- Microeconomics Theory and Applications, by A. Sen, Oxford University Press
- Microeconomic Analysis by H. Varian, W.W. Norton, New York
- Economic Theory and Operations Analysis by W.J. Baumol, Prentice Hall of India, New Delhi
- Barriers to New Competition by J. Bain, Harvard University Press, Harvard
- Microeconomic Theory A Mathematical Approach by J.M. Henderson & R.E. Quandt, McGraw Hill

Useful Video Links:

Unit No	Topics	Links
Unit-I	Introduction	https://youtu.be/vzz2E7fU7Kk?feature=shared
Unit-II	Demand and Supply Analysis	https://youtu.be/6MGjlbn7kO0
Unit-III	Consumer Behavior	https://youtu.be/CG46N6R-bwo?feature=shared
Unit-IV	Cost and Revenue	https://youtu.be/svespJwNQNo

Course Code	**MDC-BBA-101A**				
Category	Multidisciplinary Courses				
Course Title	**Foundations of Management**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I**
	3	0	0	**3**	
Course Objectives	The objectives of this course are 1. To understand the nature, process, functions, and challenges of management, including managerial skills and roles at various levels. 2. To learn about the nature and process of planning, types of plans, strategies, and the decision-making process. 3. To understand organizing, structure, and delegation within an organization. 4. To understand types and techniques of control like budgetary, financial, and quality control.				
Assessment	25 Marks				
End Semester Examination	50 Marks				
Total	75 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	**Describe** a strong foundation to the students on fundamentals of management.	Level-1 Remember
CO2	**Explain** their knowledge of functional areas of management and provide an understanding of various management theories and their applications.	Level-2 Understand
CO3	**Apply** organizational principles to develop effective structures, allocate responsibilities, and manage decision-making.	Level-3 Apply
CO4	**Analyze** various control techniques and assess their effectiveness in monitoring and improving organizational performance.	Level-4 Analyze

Note:

1. Examiner will set nine questions in total. Question one will have 5 short questions of 2 marks (each) from all units, Remaining eight questions of 10 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first question being compulsory and selecting one from each Unit.
2. At least four cases will be discussed, one from each unit.

Unit No.	Contents
Unit-I	**Overview of Management:** Concept, Nature, Process, Managerial levels (Technical, Conceptual, Interpersonal), Skills, Functions and Role of Managers, Challenges of Management.
Unit-II	**Planning:** Nature and Purpose of Planning, Planning Process, Types of Plans, Management By Objectives (MBO), Strategies, Types of Strategies (Corporate Strategy, Business Strategy, Differentiation Strategy, Retrenchment Strategy, Growth Strategy), **Decision Making**: Types of Decision, Decision Making Process, Rational Decision Making.
Unit-III	**Organizing:** Meaning, Nature and Purpose of Organizing, Organization Structure, Departmentation, Span of Control, Centralization and Decentralization, Delegation of Authority and Responsibility.

Unit-IV	**Controlling:** Meaning, Nature and Scope of Control, Types of Control, Control Process, Control Techniques (Budgetary Control, Financial Control, Quality Control, Inventory Control, Statistical Control, Production Control), Cost Control, Effective Control System.

Suggested Readings:

- Management Theory and Practice by C. B. Gupta, Sultan Chand and Sons
- Essentials of Management by Koontz and Wechrich, Tata McGraw-Hill
- Management: Concepts and Strategies by J. S. Chandan, Vikas Publishing House, New Delhi
- Management by Robbins and Coulter, Prentice Hall of India, New Delhi
- Developing Communication Skills by Krishna Mohan and Meera Banerji, Macmillan India Ltd., New Delhi
- Management and Organisational Behaviour by Wendy Blaoisi, Curtis W. Cook, and Phillip L. Hunsaker, McGraw Hill

Useful Video Links:

Unit No	Topics	Links
Unit-I	Introduction to Management	https://youtu.be/TtbImDfUt4c?feature=shared
Unit-II	Decision Making	https://youtu.be/B96-Gpn56sU?feature=shared
Unit-III	Delegation of Authority	https://youtu.be/GlLXV7JLVnk?feature=shared
Unit-IV	Controlling: Issues, Types, Techniques and Importance	https://youtu.be/v7XmhnenEGs?feature=shared

Course Code	MDC-ASH-103A				
Category	Multidisciplinary Courses				
Course Title	**Introductory Mathematics**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I**
	3	0	0	**3**	
Course Objectives	The objectives of this course are 1. To understand the types, representation, and operations on sets, along with the basic laws of indices. 2. To explore matrix operations and determinants in solving linear equations. 3. To understand arithmetic and geometric progressions, their sums, and applications, along with some special sequences. 4. To understand permutation, combination, and the binomial theorem for solving problems.				
Assessment	25 Marks				
End Semester Examination	50 Marks				
Total	75 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	**Recall** the definitions and properties of sets, indices, matrices, determinants, sequences, series, permutations, combinations, and binomial theorem.	Level-1 Remember
CO2	**Explain** the operations on sets, matrix algebra, determinants, sequences, series, and the application of permutation, combination, and binomial theorem principles.	Level-2 Understand
CO3	**Apply** the set theory, matrix operations, determinants, sequence and series calculations, and permutation and combination techniques to solve practical problems.	Level-3 Apply
CO4	**Analyze** the results from set operations, matrix methods, sequences, series, permutations, and combinations to analyze their practical applications and implications.	Level-4 Analyze

Note: Examiner will set nine questions in total. Question one will have 5 short questions of 2 marks (each) from all units. Remaining eight questions of 10 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first question being compulsory and selecting one from each Unit.

Unit No.	Contents
Unit-I	**Theory of Sets :** Meaning and Types of Sets, Representation of Sets, Venn Diagram, Operation on Sets, Union, Intersection and Complements of Sets, Cardinality of Finite Set, Practical Applications of Set Theory, Ordered Pairs, Cartesian Product of Two Sets. **Indices:** Introduction, Law of Indices

Unit-II	**Algebra of Matrices:** Definition, Types of Matrices, Addition, Subtraction, Scalar Multiplication, Multiplication of Matrices and Its Properties. **Determinants:** Introduction, Minors, Co-Factors, Properties of Determinants, Applications of Determinants in Finding Solution of Linear Equations. **Matrices (Continued):** Transpose of Matrix, Symmetric and Skew-Symmetric Matrices, Singular and Non-Singular Matrices and Joint of Matrix, Inverse of Matrix, Solution of System of Linear and Homogeneous Linear Equations by using Matrix Method.
Unit-III	**Sequence and Series:** Sequence , Series and Progression, Arithmetical Progression and Its Representation, Sum of N Terms of an A.P, Arithmetic Mean , Geometrical Progression and Sum of G.P, Geometric Mean, Application of A.P and G.P, Some Special Sequences.
Unit-IV	**Permutation and Combination:** Factorial Notation, Permutation, Circular Permutation, Combination, Practical Problem on Combinations. **Binomial Theorem:** Introduction, General term, Middle term, Absolute term, Coefficient of any Power of x.

Suggested Readings:

- Business Mathematics by Sancheti, D.C., A.M. Malhotra, V.K. Kapoor, Sultan Chand & Sons
- Business Mathematics by Zameerudin, Qazi, S.K. Bhambri, Vikas Publishing House Pvt. Ltd
- Text Book of Business Mathematics by R. Jaya Prakash, Ashish Publishing House
- Business Mathematics by Janardan Dinodia, Dr. Dalip Kumar, Jeevan sons Publications

Useful Video Links:

Unit No	Topics	Links
Unit-I	Introduction to set theory	https://youtube.com/playlist?list=PLEHGYFbPuuMEMCD-8hwgnsZS0xKd8ydic&si=wr6io6TNmtN9CNsa
Unit-II	Arithmetic Progression	https://youtube.com/playlist?list=PLaAhQ2ofZZRD6WKjeCFg890_07QXWNT6i&si=udeAM9Kq_4CZwK_K
Unit-III	Sequence and Series	https://youtube.com/playlist?list=PLVFqK_9GOGXm-1a53f-yONR8XhwGknj9Z&si=YXFrCI3YdJnjYAez
Unit-IV	Permutation and Combination	https://youtu.be/iyIq1YSSA5E?si=Qukhh4uhRDgADByC

Course code	**MDC-BCA-105A**				
Category	Multidisciplinary Courses				
Course title	**Fundamentals of IT**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I**
	3	0	0	3	
Course Objectives:	The objectives of this course are 1. To understand about computer evolution, components, I/O devices, and their applications.. 2. To explore primary and secondary storage, data retrieval, and business data processing. 3. To understand operating systems, data communication, and network protocols. 4. To understand internet basics, web technologies, and email systems.				
Assessment	25 Marks				
End Semester Exam	50 Marks				
Total Marks	75				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to:

CO	Skill Demonstrated	RBT Level
CO1	Define the fundamental concepts of computer systems, including components, storage types, I/O devices, and data communication.	Level-1 Remember
CO2	Explain the role of operating systems, data processing methods, communication protocols, and internet technologies in modern computing.	Level-2 Understand
CO3	Apply knowledge of storage systems, data transmission, and networking protocols in practical computing and communication scenarios.	Level-3 Apply
CO4	Analyze the effectiveness of different computer components, operating systems, and communication methods in optimizing system performance.	Level-4 Analyze

Note: Examiner will set nine questions in total. Question one will have 05 short quesions of 2 marks (each) from all units. Remaining eight questions of 10 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first question being compulsory and selecting one from each Unit.

Unit No.	Content
Unit-I	**Introduction:** Evolution of Computers, Classification of Computers, Block Diagram along Its Components and Characteristics, Usefulness of Computers, Human Being Vs. Computer, Applications of Computers in various Fields, I/O Devices, Role of I/O Devices in a Computer System, Input Units, Keyboard, Pointing Devices, Scanners and Its Types, Voice Recognition Systems, Vision Input System, Touch Screen, Output Units, Monitors and its Types, Printers and its Types, Plotters and Types of Plotters, Sound Cards, Speakers.

Unit-II	**Storage Fundamentals:** Primary V/S Secondary Storage, Data Storage and Retrieval Methods, Primary Storage, RAM, ROM, PROM, EPROM, EEPROM, Secondary Storage, Magnetic Tapes, Magnetic Disks, Cartridge Tape, Hard Disks, Floppy Disks, Optical Disks, Compact Disks, Zip Drive, Flash Drives. **Business Data Processing:** Introduction, Data Storage Hierarchy, Method of Organizing Data, File Types, File Organization, File Utilities, Data Representation and its Conversion.
Unit-III	**Operating Systems:** Operating System basics, Purpose of the Operating System, Types of an Operating System, Providing User Interface, Running Programs, Sharing Information, Managing Hardware Enhancing with Utility Software. **Data Communication:** Communication Process, Data Transmission Speed, Communication Types (Modes), Data Transmission Medias, Modem and its Working, Characteristics, Types of Networks, Network Topology, Computer Protocols.
Unit-IV	**Internet:** Basic Internet Terms, Web Page, Website, Homepage, Browser, URL, Hypertext, ISP, Web Server, HTML, DHTML, XML, Search Engine Application of Internet, Introduction to Client Side and Server Side Scripting. **Electronic Mail:** Introduction, Advantages and Disadvantages, User Ids, Passwords, E-Mail Addresses, Message Components, Message Composition, Web Browsers and Search Engines.

Suggested Readings:

- Computers Today by Donald Sanders, McGraw-Hill Publishers.
- Introduction to Computers by Davis, McGraw-Hill Publishers.
- Fundamentals of Computers by V. Rajaraman, Prentice-Hall India Ltd., New Delhi.
- Computer Fundamentals by A. Goel, Pearson Education.
- Fundamentals of Computers by Reema Thareja, Oxford.

Useful Video links:

Unit No	Topics	Links
Unit-I	Introduction to Computer	https://www.youtube.com/watch?v=LJ5c3AycRIE
Unit-II	Storage Fundamentals	https://www.youtube.com/watch?v=tas2eUavhRE
Unit-III	Operating System	https://www.youtube.com/watch?v=jciGIvn7UfM&list=PL3-wYxbt4yCjpcfUDz-TgD_ainZ2K3MUZ
Unit-IV	Internet	https://youtu.be/YOXwcbwSEUo?si=tzxN6w6N37mdTHF3

Course Code	**MDC-FTS-107A**				
Category	Multidisciplinary Courses				
Course Title	**Industrial Safety**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I**
	3	0	0	**3**	
Course Objectives	The objectives of this course are 1. To familiarize with the safety methodology, education and training for an organization and environment. 2. To know the different types of accident and its preventive methods. 3. To study the rules of safety and safety management system.				
Assessment	25 Marks				
End Semester Examination	50 Marks				
Total	75 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Define safety principles, accident prevention methods, and safety organization structures and functions in industrial environments.	Level-1 Remember
CO2	Explain the importance of safety audits, risk analysis, and the roles of safety committees in maintaining a safe working environment.	Level-2 Understand
CO3	Apply safety management practices, such as accident investigation, safety training, and monitoring safety performance in various industrial scenarios.	Level-3 Apply
CO4	Analyze the effectiveness of safety rules, risk assessment methods, and safety performance indicators in minimizing workplace hazards.	Level-4 Analyze

Note:

1. Examiner will set nine questions in total. Question one will have 05 short questions of 2 marks (each) from all units. Remaining eight questions of 10 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first question being compulsory and selecting one from each Unit.
2. At least four cases will be discussed, one from each unit.

Unit No.	Contents
Unit-I	**Safety:** Introduction to Safety, Need for Integration of Health and Environment Safety, Safety and Productivity, Fundamental of Safety, Important Points for Consideration of Safety, General Instructions for Safety. **Safety Organization:** Objectives, Types and Functions, Safety Committee, Need, Types, Advantages, Safety Audits, Types of Audit, Audit Methodology, Non-Conformity Report, Audit Checklist and Report, Safety in Design and Operations, Inherent and Engineered Safety.
Unit-II	**Accident:** Introduction, Types of Accidents, Causes of Accidents, Principle of Accident Prevention, Accident Investigation, Process of Investigation, Reporting, Analysis, Technique, Mort Capital, Multi Event Sequencing-TOR, Theories of Accident, Onsite and Offsite Emergency Response Plan, Cost of Accident.

Unit-III	**Safety Education and Training:** Importance, various Training Methods, Effectiveness of Training, Behavior Oriented Training, Communication, Purpose, Barrier to Communication, Creating Awareness, Domestic Safety and Training. **Monitoring Safety Performance:** Frequency Rate, Severity Rate, Incidence Rate, Activity Rate and Safety "T" Score, Safety Surveys, Job Safety Analysis (JSA).
Unit-IV	**Risk Analysis Quantification:** Fault Tree Analysis, Event Tree analysis, Logic Symbols, Methodology, Minimal Cut Set Ranking, Fire Explosion and Toxicity Index (FETI), various Indices, Hazard analysis (HAZAN), Failure Mode and Effect Analysis (FMEA). **Safety Rules:** Safety Rules for Industries (Including Management and Labour) Safety Culture, Safety Policy, Safety Management System, Safety Reporting.

Suggested Readings:

- Fundamentals of Industrial Safety & Health by K.U.Mistry, SiddharthPrakashan.
- Safety Management by R.K. Mishra, AITBS Publishers.
- Safety Management in Industry by N.V. Krishnan, Jaico Publishing House, 1997.
- Industrial Safety by Ronald P. Blake, Prentice Hall, New Delhi, 1973.
- Occupational Safety and health by David L. Goetsch, Prentice Hall
- Modern Accident Investigation and Analysis by Ted S. Ferry, John Wiley & Sons
- Fire Safety in Buildings by V K Jain, New Age publishers, New Delhi
- Fundamentals of Fire Safety in Building Design by Dr. Than Singh Sharma, Aayush Publications, N. Delhi

Useful Video links:

Unit No.	Topics	Links
Unit-I	Safety	https://www.youtube.com/watch?v=v-eltsixu4I https://www.youtube.com/watch?v=MQ3xuV98wwM
Unit-II	Accident Investigation	https://youtu.be/VhuZ6M7a8N8
Unit-III	Safety Performance	https://www.youtube.com/watch?v=pwkjK0Zqa3w
Unit-IV	Risk Analysis Quantification	https://www.youtube.com/watch?v=PAh0TPSAZOM https://www.youtube.com/watch?v=ZEShNJX3kcg

Course Code	AEC-101A				
Category	Ability Enhancement Course				
Course Title	General English-I				
Scheme and Credits	L	T	P	Credits	Semester-I
	2	0	0	2	
Course Objectives	The objectives of this course are 1. To build a strong foundation in basic English grammar, including parts of speech, subject-verb agreement, and determiners. 2. To understand the communication process, barriers, and types of communication, while developing strategies for effective interaction. 3. To develop listening, speaking, and reading skills, focusing on active listening, public speaking, and voice modulation. 4. To gain proficiency in writing notices, memos, circulars, and business letters with correct structure and layout.				
Assessment	15 Marks				
End Semester Examination	35 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	**Explain** the basics of English grammar and communication for effective interactions.	Level-1 Remember
CO2	**Describe** the parts of speech, communication barriers, listening strategies and frame technical documents.	Level-2 Understand
CO3	**Apply** grammar rules, communication principles and skills in personal and professional contexts.	Level-3 Apply
CO4	**Apply** the knowledge of grammar and LSRW skills to communicate effectively.	Level-3 Apply

Note:

1. Examiner will set nine questions in total. Question one will have 07 short questions of 1 mark (each) from all units. Remaining eight questions of 7 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first question being compulsory and selecting one from each Unit.
2. At least four cases will be discussed, one from each unit.

Unit No.	Contents
Unit-I	**Basics of English Grammar:** Parts of Speech, Conjunction, Prepositions, Articles, Subject-Verb Agreement and Noun-Pronoun Agreement, Determiners.
Unit-II	**Basics of Communication**: Definition, Nature, Importance of Communication, Communication Process, Barriers to Effective Communication and Overcoming Strategies, Types of Communication, Communication Networks.
Unit-III	**Enhancing LSRW Skills**: Listening Skills, Cognitive Process of Listening, Types of Listening, Active Listening Techniques, Barriers to Effective Listening, Speaking Skills, Public Speaking, Voice Modulation, Reading Skills.
Unit-IV	**Technical Writing:** Notices, Memo, Circulars, Structure and Layout of Business Letters, Structure, Layout and Types of Letters.

Suggested Readings:

- Business Communication Process and Product by Mary Ellen Guffey and Dana Loewy, Cengage Learning
- Effective Communication Skill by John Nielsen, NTC/Contemporary Publishing Company
- Public Speaking for Success by Dale Carnegie, Per Capita Publishing
- Word Power Made Easy by Norman Lewis, Goyal Publishers & Distributors Pvt Ltd.
- English Grammar in Use by Raymond Murphy, Cambridge University Press

Useful Video Links:

Unit No	Topics	Links
Unit-I	Basics of English Grammar	https://youtu.be/3olAICs8N9I?si=B
Unit-II	Basics of Communication	https://youtu.be/J3oVY0O4PYk?si=3a5hO-SUga5II-ZDQ
Unit-III	Enhancing LSRW Skills	https://youtu.be/yyUiEp5ny_Y?si=o0VkCYDW4EP4v3PD
Unit-IV	Technical Writing	https://www.youtube.com/watch?v=BO7j-X87rM8

Course Code	AEC-103A				
Category	Ability Enhancement Course				
Course Title	**French**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I**
	2	0	0	**2**	
Course Objectives	The objectives of this course are 1. To develop foundational language skills necessary for basic communication, including introducing themselves and others, describing places, and talking about their surroundings. 2. To focus on enhancing students' ability to express personal likes, interests, and other simple ideas, ensuring their ability to engage in basic communicative transactions. 3. To achieve a partial A1 level by the end of the semester according to the Common European Framework, which will enable them to handle simple communication in everyday situations.				
Assessment	15 Marks				
End Semester Examination	35 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Define key concepts related to reading, listening, speaking, and writing in English, focusing on everyday communication.	Level-1 Remember
CO2	Explain basic communication techniques for understanding texts, listening to simple conversations, and expressing oneself in writing.	Level-2 Understand
CO3	Apply reading and listening skills to comprehend simple texts and conversations, and write basic personal messages.	Level-3 Apply
CO4	Analyze interactions and communication methods in different contexts, such as monologues, dialogues, and everyday activities.	Level-4 Analyze

Note: Examiner will set nine questions in total. Question one will have 07 short questions of 1 mark (each) from all units. Remaining eight questions of 7 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first question being compulsory and selecting one from each Unit.

Unit No.	Contents
Unit-I	**Reading:** Reading Simple Texts Related to One's Immediate Environment such as Notices, Posters, Catalogs, Fliers, Personal Messages or Emails and Answering Questions on them.
Unit-II	**Listening:** Understanding familiar Words and very Basic Phrases about Oneself, One's Family, and Immediate Concrete Surroundings, such as Very Brief Announcements in Public Spaces, Short, Simple Formal/Informal Conversation, Questions and Instructions When Speakers are Speaking at a Slower Pace.
Unit-III	**Writing:** Guided Writing will Include activities such as, Filling a Form, Writing Simple Phrases (Postcards, Messages, Invitations etc) on everyday Topics.
Unit-IV	**Speaking:** **Monologue**: Describing and Presenting oneself, One's Immediate Environment and the People S/He Knows Using Simple Phrases and Sentences. **Dialogue:** Taking part in a Conversation and Interaction in a Simple way provided the other Person

	is Prepared to Repeat or to Rephrase more Slowly and help Formulate what s/he is trying to say asking simple Questions on familiar Topics or Matters related to one's Immediate Environment. Making simple Purchases in Shops or Obtaining Services that one Requires.

Suggested Readings:

- Kizirian, V. M, Daill, E., Berthet, A., Hugot, C., Waendendries, M. Alter Ego + 1. Paris : Hachette.
- Berthet, A., Daill, E., Hugot, C., Waendendries, M. Alter Ego+ 1 ,Cahier d'activités. Paris : Hachette.
- Hachette, Y., Mérieux, R. Latitudes 1, (Livre de l'élève & Cahier d'exercices). Paris : Didier.
- Cocton, M-N., Dupleix, D., Heu, E., Kasazian, E., Ripaud, D.Saison 1, (Livre de l'élève & Cahier d'exercices). Paris : Didier.
- Denyer, M., Garmendia, A., Lions-Olivieri, M-L. Version Originale 1, Livre de l'élève. Paris : Editions Maisons des Langues.
- Magne, M., Lions-Olivieri, M-L. Version Originale 1, Cahier d'exercices. Paris : Editions Maisons des Langues..

Useful Video Links:

Unit No	Topics	Links
Unit-I	French Absolute Beginners Guide	https://www.youtube.com/watch?v=Sk6YQynZ1h8
	Learn how to read in French	https://www.youtube.com/watch?v=sSCEoAWw0q4
Unit-II	French Listening Practice - 50 Everyday French Sentences	https://www.youtube.com/watch?v=Aofb0XEJIks
Unit-III	Learn how to write French with me	https://www.youtube.com/watch?v=9iUiei9YMCk
Unit-IV	Slow and Easy French Conversation Practice	https://www.youtube.com/watch?v=ReVCwcHwnZI

Course Code	**SEC-101A**				
Category	Skill Enhancement Course				
Course Title	**Computer Fundamentals and Office Automation Tool**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I**
	2	0	0	**2**	
Course Objectives	The objectives of this course are 1. To understand the fundamentals of computers, types, hardware, software, memory, and applications in business, education, and healthcare. 2. To understand document creation and editing in MS Word including advanced features like auto-text, mail merge, and formatting tools. 3. To develop skills in using MS Excel by creating and editing worksheets, applying formulas, functions, and creating charts for data analysis. 4. To understand presentation software for creating, editing slides, and using animations and advanced features.				
Assessment	15 Marks				
End Semester Examination	35 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	**Skills Demonstrated**	**RBT Level**
CO1	**Define** basic terms of computer fundamentals and MS Office.	Level-1 Remember
CO2	**Explain** fundamental concepts and applications of computer along with MS Office.	Level-2 Understand
CO3	**Demonstrate** computer fundamentals to operate hardware, software and manage memory system.	Level-3 Apply
CO4	**Apply** MS office tools for documentation, data analysis and engaging presentations.	Level-3 Apply

Note: Note: Examiner will set nine questions in total. Question one will have 07 short questions of 1 mark (each) from all units. Remaining eight questions of 07 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first question being compulsory and selecting one from each Unit.

Unit No.	**Contents**
Unit-I	**Computer Fundamental:** Introduction of Computer with Block Diagram, Advantages, Limitations and Applications of a Computer in Business, Education and Healthcare Field in Computer, Generations of Computer, Types of Computer, Hardware, Software, Memory (Primary Memory, Secondary Memory and Cache Memory), Computer Virus and Antivirus.
Unit-II	**Documentation using MS-Word**: Creating and Editing a Document, Formatting Document, Auto-Text, Autocorrect, Spelling and Grammar Tool, Document Dictionary, Page Formatting, Bookmark, Advance Features of MS-Word, Mail Merge.
Unit-III	**Electronic Spread Sheet**: Introduction to MS-Excel, Creating and Editing Worksheet, Formatting and Essential Operations, Formulas and Functions, Charts.
Unit-IV	**Virtual Presentation Software**: Presentations, Creating Manipulating and Enhancing Slides, Organizational Charts, Excel Charts, Word Art, Layering Art Objects, Working with Animation,

	Adding a Slide to Presentation, Navigating through a Presentation, Slide-Sorter, Slide-Show, Editing Slides.

Suggested Readings:

- Fundamentals of Computers by V. Rajaraman, PHI
- Computer Fundamentals by P. K. Sinha, BPB Publication
- Learn Microsoft Office by Russell A. Stultz, BPB Publication
- Computer Course Windows 7 and Office 2010, by Ravi Kant Taxali, McGraw Hill Education
- Computer Applications in Management by Saxena, Vikas Publication
- Computer Fundamentals by B. Ram, New Age Publications

Useful Video Links:

Unit No	Topics	Links
Unit-I	Computer Fundamental	https://youtu.be/tas2eUavhRE?si=t98GCs7srmiPQkny
Unit-II	Mail merge	https://www.youtube.com/watch?v=M69x9RSPHX0
Unit-III	Electronic Spread Sheet	https://www.youtube.com/watch?app=desktop&si=2IOn7z5e2HvxxE7a&v=3q2eeVLLOd8&feature=youtu.be
Unit-IV	Virtual Presentation Software	https://youtu.be/1GZ3OcOcaVA?si=UBz8q5lS3C0XVVio

Course code	LC-SEC-103A				
Category	Skill Enhancement Course				
Course title	**Computer Fundamentals and Office Automation Tools Lab**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I**
	0	0	2	**1**	
Course Objectives	The objectives of this course are 1. To understand the fundamentals concepts of computer and use the computer in business. 2. To demonstrate the ease to work with MS Office. 3. To develop skills in Microsoft Excel for creating time tables, analyzing student marks, and using charts for data visualization. 4. To explore Microsoft **Access** and its features for managing databases and understanding its applications in data handling.				
Assessment	10 Marks				
End Semester Exam	15 Marks				
Total Marks	25				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

CO	Course Outcomes	RBT Level
CO1	Apply the functionality of MS Word, Power Point, MS Excel and MS Access.	Level-3 Apply
CO2	Analyze various tools of MS Office.	Level-4 Analyze
CO3	Evaluate the MS Office tool in documentation, presentations and data management.	Level-5 Evaluate
CO4	Prepare structured documents, presentations and data sets using MS Office tools.	Level-6 Design

List of Practical's

S. No.	Description
1	To study about MS-Office and its applications
2	Introduction of Microsoft Word and its features.
3	How to insert a flowchart in MS-Word.
4	To prepare curriculum vitae (CV) in MS-Word of a graduate with the specification.
5	How to use mail-merge in MS-Word.
6	To study about Microsoft power point and its features
7	To study about Microsoft Excel and its features

8	To prepare time-table using MS-Excel
9	Analyze the marks of the students of a class using various chart (Line, XY, Bar and Pie) with the help of MS-Excel.
10	To study about MS-Access and its features.

Suggested Readings:

- Fundamentals of Computers by V. Rajaraman , PHI.
- Computer Fundamentals by P.K. Sinha, BPB Publication.
- Learn Microsoft Office by Stultz, A. Russell, BPB Publication.
- Computer Course windows 7 and Office 2010, Taxali, Ravi Kant, McGraw Hill Education.

Useful Video Links:

Topics	Links
Computer Fundamental	https://youtu.be/tas2cUavhREsi=t98GCs7srmiPQkny
Documentation using MS-word	https://youtu.be/1GZ3OcOcaVA?si=UBz8q5lS3C0XVVio
Electronic Spread Sheet	https://enine.digimat.in/nptel/courses/video/110105033/L13.html
Virtual Presentation Software	https://youtu.be/1GZ3OcOcaVA?si=UBz8q5lS3C0XVVio

Course Code	VAC-113A				
Category	Value Added Course				
Course Title	**Environmental Studies**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I**
	2	0	0	**2**	
Course Objectives	The objectives of this course are 1. To understand the basics of environmental studies, ecosystems, and sustainability. 2. To explore renewable and non-renewable resources, their issues, and conservation strategies. 3. To understand biodiversity, its value, threats, and conservation methods. 4. To understand pollution, climate change, and solutions for environmental disasters.				
Assessment	15Marks				
End Semester Examination	35 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	**Recall** key environmental concepts and principles.	Level-1 Remember
CO2	**Describe** the environment, sustainability, natural resources, biodiversity, pollution and disaster.	Level-2 Understand
CO3	**Apply** environmental knowledge to propose solutions for sustainable practice, conversation of natural resources, pollution control and disaster management.	Level-3 Apply
CO4	**Analyze** the structure and function of ecosystem, effect of human activities on natural resources, types of biodiversity and role of individual in environment pollution.	Level-4 Analyze

Note:

1. Examiner will set nine questions in total. Question one will have 07 short questions of 1 mark (each) from all units. Remaining eight questions of 07 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first question is compulsory and selecting one from each Unit.
2. At least four cases will be discussed, one from each unit.

Unit No.	Contents
Unit-I	**Introduction to Environmental Studies**: Multidisciplinary Nature of Environmental Studies, Scope and Importance, Concept of Sustainability and Sustainable Development, Ecosystem, Introduction, Characteristic and Features, Structure and Function of the following Ecosystem- Forest Ecosystem, Aquatic Ecosystems (Ponds, Lakes, Rivers, Oceans).
Unit-II	**Renewable and Non-renewable resources:** Natural Resources and Associated Problems, Forest Resources – (Use and Over-Exploitation, Deforestation, Timber Extraction, Mining, Dams and their Effects on Forest and Tribal People), Water Resources – (Use and Over-Utilization of Surface And Ground Water, Floods, Drought, Conflicts Over Water, Dams Benefits and Problems), Land Resources – (Land as a Resource, Land Degradation, Role of an Individual in Conservation of Natural Resources).

Unit-III	**Biodiversity and its Conservation:** Introduction, Genetic, Species and Ecosystem Diversity, Biogeographically Classification of India, Value of Biodiversity, Consumptive Use, Productive Use, Social Use, Ethical Use, Threats to Biodiversity, Habitat Loss, Poaching of Wildlife, Man Wildlife Conflicts, **Conservation of Biodiversity:** Benefits and Name of the Methods of in-Situ and Ex-Situ Conservation of Biodiversity.
Unit-IV	**Environmental Pollution**: Definition, Causes, Effects and Control Measures of (Air Pollution and Water Pollution), Role of an Individual in Prevention of Pollution, **Disaster Management:** Meaning, Reason and Solutions of Floods, Earthquake, Cyclone and Landslides, Meaning of Climate Change, Reasons and Solution to Greenhouse Gases, Acid Rain and Global Warming.

Suggested Readings:

- Text Book of Environmental Studies by D. K. Asthana, S. Chand Publishing.
- Fundamentals of Environmental Studies by M. Basu, S. Xavier, Cambridge University Press.
- Environment, edited by R. N. Basu, University of Calcutta, Kolkata.
- Environmental Science by T. O. Miller Jr., Wadsworth Publishing Co.
- Environmental Management by K. D. Wagner, W.B. Saunders Co., Philadelphia

Useful Video Links:

Unit No	Topics	Links
Unit-I	Multidisciplinary nature of environmental studies	https://nptel.ac.in/courses/122102006
Unit-II	Renewable and non-renewable resources	https://archive.nptel.ac.in/courses/121/106/121106014
Unit-III	Biodiversity and its conservation	https://nptel.ac.in/courses/129105008
Unit-IV	Environmental Pollution	https://archive.nptel.ac.in/courses/123/105/123105001/

Course Code	VAC-115A				
Category	Value Added Course				
Course Title	**Health and Wellness**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I**
	2	0	0	**2**	
Course Objectives	The objectives of this course are 1. To differentiate between health and wellness, and explore diet, nutrition, and a balanced diet for well-being. 2. To understand malnutrition, unhealthy habits, and mental health issues, and strategies for prevention and de-addiction. 3. To explore yoga, healthy foods, and physical fitness for managing diseases like obesity, hypertension, and diabetes. 4. To understand the impact of modern lifestyle on health and the role of exercise, yoga, and sleep in maintaining wellness.				
Assessment	15 Marks				
End Semester Examination	35 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Define the fundamental concepts of health, wellness, nutrition, mental health and lifestyle management in wellness.	Level-1 Remember
CO2	Explain the interrelationship between malnutrition, modern lifestyle, physical fitness, mental health, and disease prevention strategies.	Level-2 Understand
CO3	Apply health management strategies to promote physical and mental well-being.	Level-3 Apply
CO4	Analyze the effects of modern lifestyle diseases and mental health issues on overall wellness outcomes.	Level-4 Analyze

Note:

1. Examiner will set nine questions in total. Question one will have 07 short questions of 1 mark (each) from all units. Remaining eight questions of 07 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first question being compulsory and selecting one from each Unit.
2. At least four cases will be discussed, one from each unit.

Unit No.	Contents
Unit-I	**Introduction:** Definition and Differentiate Health and Wellness, Importance of Health and Wellness Education, Local, Demographic, Societal Issues and Factors Affecting Health and Wellness, Diet and Nutrition for Health and Wellness, Essential Components of Balanced Diet for Healthy Living with Specific Reference to the Role Of Carbohydrates, Proteins, Fats, Vitamins and Minerals.
Unit-II	**Malnutrition:** Under Nutrition and over Nutrition, Processed Foods and Unhealthy Eating Habits, Body Systems and Common Diseases, Sedentary Lifestyle and its Risk of Disease, Stress, Anxiety, Depression, Factors Affecting Mental Health, Identification of Suicidal Tendencies, Substance Abuse (Drugs, Cigarette, Alcohol),De Addiction, Counseling and Rehabilitation.

Unit-III	**Management of Health and Wellness:** Origin of Yoga, Definition and Scope of Yoga, Limitation, Importance of Yoga, Healthy Foods for Prevention and Progression of Cancer, Hypertension, Cardiovascular, Metabolic Diseases (Obesity, Diabetes, Polycystic Ovarian Syndrome), Types of Physical Fitness and its Health Benefits.
Unit-IV	**Modern Lifestyle:** Modern Lifestyle and Hypo-Kinetic Diseases, Prevention and Management through Exercise, Postural Deformities and Corrective Measures, Spirituality and Mental Health, Role of Yoga, Asana and Meditation in Maintaining Health and Wellness, Role of Sleep in Maintenance of Physical and Mental Health.

Suggested Readings:

- Physical Activity and Health by Claude Bouchard, Steven N. Blair, and William L. Haskell.
- Mental Health Workbook by Emily Attached and Marzia Fernandez.
- Mental Health Workbook for Women: Exercises to Transform Negative Thoughts and Improve Well-being by Nashay Lorick.
- Lifestyle Diseases Management by C. Nyambichu and Jeff Lumiri.
- Physical Activity and Mental Health by Angela Clow and Sarah Edmunds.

Useful Video Links:

Unit No	Topics	Links
Unit-I	Introduction of health and wellness	https://www.youtube.com/watch?v=b_rB4S_D5dU
Unit-II	Malnutrition	https://www.youtube.com/watch?v=Ua-dLw2nFs4
Unit-III	Management of Health and Wellness	https://www.youtube.com/watch?v=wPAXBs38JkE&t=145s
Unit-IV	Modern lifestyle	https://www.youtube.com/watch?v=Y84eLN9q0x8

Course Code	DSC-BBA-102A				
Category	Discipline Specific course-Major Course				
Course Title	**Managerial Skills**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	3	1	0	4	
Course Objectives	The objectives of this course are 1. To understand and apply key managerial skills, with a focus on coordination, interpersonal roles, and effective management techniques. 2. To learn problem-solving strategies, foster creativity, and understand the importance of empowerment and delegation in management. 3. To understand team-building, group behavior, and leadership skills, using techniques like brainstorming and sensitivity training. 4. To improve communication skills, conduct meetings and interviews, and develop self-confidence and motivational skills for managerial effectiveness.				
Assessment	30 Marks				
End Semester Examination	70 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Define key concepts of managerial skills, problem-solving, team dynamics, and communication.	Level 1: Remember
CO2	Explain the significance of managerial skills in fostering effective management.	Level 2: Understand
CO3	Apply managerial skills in the context of delegation and empowerment, group dynamics and communication styles in organizational problem solving.	Level 3: Apply
CO4	Analyze managerial skills in the context of delegation and empowerment, group dynamics and communication styles in organizational decision making.	Level 4: Analyze

Note:

1. Examiner will set nine questions in total. Question one will have 7 short questions of 2 marks (each) from all units. Remaining eight questions of 14 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first question being compulsory and selecting one from each Unit.
2. At least four cases will be discussed, one from each unit.

Unit No.	Contents
Unit-I	**Introduction to managerial skills**: Meaning and concept of managerial skills, Need and its importance, Techniques of skill development for effective management, Application of management skills, Coordination and Interpersonal roles.
Unit-II	**Problem-solving**: Problem-solving, creativity, innovation, steps of analytical problem solving, limitations of analytical problem solving, impediments of creativity, multiple approaches to creativity **Empowering and delegating:** Meaning of empowerment, dimensions of empowerment, how to develop empowerment, inhibitors of empowerment, delegating works.

Unit-III	**Teams and Groups**: Team Building, developing teams and teamwork, advantages of a team, leading a team, team membership, Group Dynamics, Group Behaviour, Cohesion, Importance of Brain Storming, Sensitivity Training, Nominal Group techniques, Leadership and competence development.
Unit-IV	**Communication**: Process of communication, Need and Importance of communication skills, Types of communication, conduct of meetings, Interviews, reporting of projects, reporting of case analysis, Building self confidence, Role of motivation skills in developing managers.

Suggested Readings:

- Essentials of Management by Herald Koontz, Weihrich and Cannice, Tata-McGraw Hill Publishing House.
- Management by A.E. James Stoner, Freeman, Gilberth, Pearson Publishing House.
- Management by Robbins, Coulter, Fernandez Pearson Publishing House.
- Principles of Management by L. Richard Daft:, Cengage Learning India.
- Managerial Skills by V.S.P. Rao Excel Books, New Delhi
- Developing Management skills by David A Whetten, Cameron, PHI
- Managerial Skills by Ramnik Kapoor Path Makers, Bangalore
- Skills development for Business and Management Students by Kevin Gallagher, Oxford
- Business Communication Strategies by Monipally,Muttthukutty Tata McGraw Hill.
- Organisational Behaviour by P. Robbins Stephen, Pearson.

Useful Video Links:

Unit No	Topics	Links
Unit-I	Introduction to managerial skills	https://www.youtube.com/watch?v=iYzpESZbuQQ
Unit-II	Problem-solving	https://www.youtube.com/watch?v=hiqoCvPs_Jc
Unit-III	Teams and Groups	https://www.youtube.com/watch?app=desktop&si=zavzAEqML949-6rt&v=uG-FLOi4OOU&feature=youtu.be
Unit-IV	Communication	http://kcl.digimat.in/nptel/courses/video/109104031/L01.html

Course Code	**DSC-BBA-104A**				
Category	Discipline Specific course-Major Course				
Course Title	**Essentials of Economics**				
Scheme and Credits	**L**	**T**	**P**	**Credits**	**Semester-II**
	3	1	0	**4**	
Course Objectives	The objectives of this course are 1. To understand the nature of economics, economic systems, and key concepts like scarcity, choice, demand, supply, and markets. 2. To understand national income, economic growth, investment, savings, and the impact of government spending on economic outcomes. 3. To understand credit creation, exchange rates, and the effects of international trade and economic integration on growth. 4. To understand examine issues like inflation, poverty, unemployment, income inequality, and environmental concerns, with a focus on India.				
Assessment	30 Marks				
End Semester Examination	70 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	**Skills Demonstrated**	**RBT Level**
CO1	Describe nature and theories of economics in context of Indian economy.	Level 1: Remember
CO2	Associate all economic factors that lead to growth in economy.	Level 2: Understanding
CO3	Establish relation between macroeconomic variables.	Level 3: Apply
CO4	Analyze effectiveness of macroeconomic policies.	Level 4: Analyze

Note:

1. Examiner will set nine questions in total. Question one will have 7 short questions of 2 marks (each) from all units. Remaining eight questions of 14 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first question being compulsory and selecting one from each Unit.
2. At least four cases will be discussed, one from each unit.

Unit No.	**Contents**
Unit-I	**Introduction to Economics**: Nature of Economics, positive and normative economics, diverse fields of economics, economic theory, economic models, economic policy and economic systems (command economies, laissez-faire, mixed systems), scarcity and choice, fundamental problems of economy, demand, supply and markets.
Unit-II	**National Income and Microeconomics Growth**: National Income, economic growth and development, productivity and capital formation, saving and Investment, working of a multiplier, government spending and outcomes.
Unit-III	**The Economics of Banking and International Trade**: The Economics of Central Banking, creation of credit, determination of exchange rate, International trade and economic integration, trade openness and growth.
Unit-IV	**Macroeconomic Challenges in India**: Macroeconomic Challenges (with special reference to India): inflation, income inequality, poverty, unemployment, corruption, human development, and global warming .

Suggested Readings:

- Principles of economics by N. G. Mankiw, Cengage Learning.
- Principles of economics by R. C. Fair & S. M. Oster, Prentice Hall.
- Principles of economics by D. N. Dwivedi, Vikas Publishing House.
- Indian economy by V. K. Puri & S. K. Misra, Himalaya Publishing House.
- Economic Surveys (2001 onwards) by Ministry of Finance, Government of India.

Useful Video Links:

Unit No	Topics	Links
Unit-I	What is Economics	https://youtu.be/g_Q_agzFXi0?feature=shared
	Demand	https://youtu.be/tNHVTBGZkFU?feature=shared
Unit-II	National Income	https://youtu.be/47H9WySA_0o?feature=shared
	Aggregate Demand and Aggregate Supply analysis	https://youtu.be/tAR543xCzCs?feature=shared
Unit-III	Exchange rate Determination	https://youtu.be/mVJCiXIYK5A
	International Trade	https://youtu.be/lQuo_sAkFSo?feature=shared
Unit-IV	Inflation	https://youtu.be/Q8nwkK10pZU?feature=shared
	Unemployment	https://youtu.be/-hjzosdT2P0?feature=shared

Course Code	MIC-BBA-106A				
Category	Discipline Relevant Course-Minor				
Course Title	**Corporate Leadership**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	3	1	0	4	
Course Objectives	The objectives of this course are 1. To understand leadership concepts, including trait, behavioral, contingency, and interactive frameworks. 2. To understand leader traits like power, influence, values, emotional intelligence, and moral leadership. 3. To learn to motivate, empower, communicate, and lead diverse teams effectively. 4. To understand how leaders create vision, shape culture, and drive organizational change.				
Assessment	30 Marks				
End Semester Examination	70 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	**Skills Demonstrated**	**RBT Level**
CO1	Define the fundamental concept of corporate leadership.	Level 1: Remember
CO2	Describe the fundamentals of corporate leadership.	Level 2: Understand
CO3	Apply fundamentals and emergence of entrepreneurship.	Level 3: Apply
CO4	Analyze entrepreneurship concepts in real world scenario.	Level 4: Analyze

Note:

1. Examiner will set ten questions in total. Question one will have 7 short questions of 2 marks (each) from all units. Remaining eight questions of 14 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each Unit.
2. At least four cases will be discussed, one from each unit.

Unit No.	**Contents**
Unit-I	**Introduction**: Concept of Leadership, Trait and Behavioural Approaches, Contingency Approach, Interactive Framework for Analyzing Leadership.
Unit-II	**Focus on Leader**: Leader as an Individual, Power and Influence, Leadership and Values, Emotional Leadership and Leadership, Leadership Behaviour, Courage and Moral Leadership.
Unit-III	**Leader as relationship builder**: Motivation and Empowerment, Leader as Communication Champion, Leading Teams, Leadership Diversity.
Unit-IV	**Leader as social architect**: Creating Vision and Strategic Direction, Shaping Culture and Values, Designing and Leading Learning Organization, Leadership and Change.

Suggested Readings:

- Developing Leadership & Management Skills by Aboobucker Sidheeq Pottenga 24by7 publishing

- Leadership Essentials You Always Wanted To Know by Dr. Carrie A. Picardi, Vibrant publisher

Useful Video Links:

Unit No	Topics	Links
Unit-I	Leadership and Team Effectiveness	https://onlinecourses.nptel.ac.in/noc23_mg28/preview
Unit-II	Focus on Leader	https://www.youtube.com/watch?v=0ZZdqOiXy0s
Unit-III	Leader as relationship builder	https://www.youtube.com/watch?app=desktop&si=NWa5BrpZTc3QluvX&v=FlQJ9AduGVs&feature=youtu.be
Unit-IV	Leader as social architect	https://www.youtube.com/watch?v=GbUooPtYv-g

Course Code	**MDC-BBA-102A**				
Category	Multidisciplinary Courses				
Course Title	**Marketing Management**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	3	0	0	**3**	
Course Objectives	The objectives of this course are 1. To explore the nature, scope, core concepts, tasks of marketing management, and ethical issues in marketing. 2. To learn about consumer buying decisions, customer value, market segmentation, targeting, positioning, and product differentiation strategies. 3. To understand the product life cycle, new product development, branding, packaging, and pricing strategies. 4. To uderstand promotion mix, advertising, sales promotion, public relations, personal selling, and distribution channels.				
Assessment	25 Marks				
End Semester Examination	50 Marks				
Total	75 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Define the core concepts of marketing.	Level 1: Remember
CO2	Describe the fundamentals concepts of Marketing management.	Level 2: Understand
CO3	Apply the fundamental concept of marketing to solve business problems.	Level 3: Apply
CO4	Analyze the marketing concept and strategies for effective decision making.	Level 4: Analyze

Note:

1. **Note:** Examiner will set nine questions in total. Question one will have 5 short questions of 2 marks (each) from all units. Remaining eight questions of 10 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total. First question being compulsory and selecting one from each Unit.
2. At least four cases will be discussed, one from each unit.

Unit No.	Contents
Unit-I	**Introduction to Marketing:** Nature, Scope, Core Concepts of Marketing, Tasks of Marketing Management, Corporate Orientation towards Marketplace, Marketing Environment, Ethical Issues in Marketing.
Unit-II	**Understanding Consumer and Business Markets:** Consumer Buying Decision Process in Consumer and Business Markets, Building Customer Value, Satisfaction and Loyalty, Market Segmentation, Targeting and Positioning Approaches to deal with Market Competition, Tools of Product Differentiation.
Unit-III	**Product and Pricing Decisions:** Product Life Cycle, Product Mix and Product Line Decisions, New Product Development Process, Branding, Packaging and Labeling Decisions, Determinants of Price, Pricing Methods and Strategies.

Unit-IV	**Promotion and Distribution Decisions:** Promotion Mix, Advertising and Sales Promotion, Public Relations, Personal Selling, Channels of Distribution, Functions of Intermediaries, Channel Design Decisions, Selecting Channel Members, Channel Management, Wholesaling And Retailing.

Suggested Readings:

- Marketing Management by Kotler, Philip and Keller, Pearson Education
- Marketing Management in South Asian Perspective by Kotler, Philip, Kevin Keller, A. Koshy, and M. Jha, Pearson Education
- Marketing by Kerin, Hartley, Berkowitz, and Rudelius, TMH
- Marketing: Concepts and Cases by Etzel, Michael J., TMH
- Marketing Management Text and Cases by Dhunna, Mukesh, Wisdom Publications Managing
- Marketing An Applied Approach by Capon, Noel and Singh, Siddharth, Wiley Publications

Useful Video Links:

Unit No	Topics	Links
Unit-I	Introduction to Marketing	https://onlinecourses.nptel.ac.in/noc22_mg57/preview
Unit-II	Understanding consumer and Business markets	https://youtu.be/dptzjrKRAm8?feature=shared
Unit-III	Product and Pricing Decisions	https://youtu.be/obdqjcWFWyc?feature=shared
Unit-IV	Promotion and Distribution Decisions	https://youtu.be/MPZgEJMS97o?feature=shared

Course code	**MDC-BBA-104A**				
Category	Multidisciplinary Courses				
Course title	**Entrepreneurship and MSME**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	3	0	0	**3**	
Course Objectives	The objectives of this course are 1. To explore entrepreneurship concepts, characteristics, and its role in economic development. 2. To learn about feasibility studies, business plans, and market analysis for new ventures. 3. To understand financing options, venture capital, and legal issues like intellectual property rights. 4. To understand the role, challenges, and government initiatives supporting MSMEs in India.				
Assessment	25 Marks				
End Semester Examination	50 Marks				
Total Marks	75				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

CO	Skill Demonstrated	RBT Level
CO1	Define the conceptual framework related to entrepreneurship.	Level 1: Remember
CO2	Describe the fundamentals of entrepreneurship.	Level 2: Understand
CO3	Apply fundamentals and emergence of entrepreneurship.	Level 3: Apply
CO4	Analyze entrepreneurship concepts in real world scenario.	Level 4: Analyze

Note:

1. **Note:** Examiner will set nine questions in total. Question one will have 5 short questions of 2 marks (each) from all units. Remaining eight questions of 10 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total. First question being compulsory and selecting one from each Unit.
2. At least four cases will be discussed, one from each unit.

Unit No.	Content
Unit-I	**Introduction:** Concept of Entrepreneurship, Knowledge and skills requirement, Characteristics of successful Entrepreneurs, Role of Entrepreneurship in Economic Development, Entrepreneurship process, Factors Impacting Emergence of Entrepreneurship, Managerial vs. Entrepreneurial Approach, Emergence of Entrepreneurship.
Unit-II	**Creating Entrepreneurial Venture:** Environmental Scanning, Competitor and Industry Analysis, Feasibility Study, Market Feasibility, Technical and Operational Feasibility, Financial Feasibility, Drawing Business Plan, Preparing Project Report, Business Plan to Investors.
Unit-III	**Sources of Finance:** Debt or Equity Financing, Commercial Banks, Venture Capital, Financial Institutions Supporting Entrepreneurs, Legal Issues, Intellectual Property Rights, Patents, Trademarks, Copyrights, Trade Secrets, Licensing, Franchising.

Unit-IV	**Role and Dynamics of MSMEs in India:** Micro, Small and Medium-Sized Enterprises (MSME) in India, Meaning and Nature of MSME in India, Role of MSME in Socio-Economic Development, Problems faced by MSME, Role of Innovation and Entrepreneurship for MSME, Government Initiatives for MSME Sector.

Suggested Readings:

- Entrepreneurship by Hisrich, Robert D., Michael Peters, and Dean Shepherd, Tata McGraw Hill.
- Entrepreneurship by Barringer, Bruce R., and R. Duane Ireland, Pearson Prentice Hall, New Jersey (USA)
- Entrepreneurship Development and Small Business Enterprises by Charantimath, Poornima, Pearson Education
- Entrepreneurship by Kuratko, Donald and Richard Hodgetts, Cengage Learning India Pvt. Ltd.
- Essentials of Entrepreneurship and Small Business Management by Scarborough, N. M., and Cornwall, J. R., Pearson, Essex

Useful Video links:

Unit No	Topics	Links
Unit-I	Introduction	https://youtu.be/ICYqc5_mJ5g?feature=shared
Unit-II	Creating Entrepreneurial Venture	https://youtu.be/fljL-8dTgVY?feature=shared
Unit-III	Sources of Finance	https://youtu.be/_LePYVXT-hY?feature=shared
Unit-IV	Role and Dynamics of MSMEs in India	https://www.youtube.com/watch?v=pEF1ISI340M

Course code	**MDC-BCA-106A**					
Category	Multidisciplinary Courses					
Course title	**Basics of Multimedia**					
Scheme and Credits	L	T	P	**Credits**	**Semester-1I**	
	3	0	0	3		
Course Objectives:	The objectives of this course are 1. To learn about multimedia definitions, applications, and project creation stages. 2. To explore multimedia hardware, platforms, and authoring tools. 3. To understand image creation, video standards, and data compression techniques. 4. To understand digital communication, interactive media, and multimedia project production.					
Assessment	25 Marks					
End Semester Exam	50 Marks					
Total Marks	75					
Duration of Exam	03 Hours					

Course Outcomes: After studying this course, the students will be able to:

CO	Skill Demonstrated	RBT Level
CO1	Define key concepts of multimedia.	Level 1: Remember
CO2	Describe key multimedia concepts, hardware/software, image, video, and emerging trends.	Level 2: Understand
CO3	Apply multimedia tools effectively for efficient project execution and delivery	Level 3: Apply
CO4	Analyze multimedia tools, trends, and technologies for comprehensive project implementation.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will have 5 short questions of 2 marks (each) from all units. Remaining eight questions of 10 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total. First question being compulsory and selecting one from each Unit.

Unit No.	Content
Unit-I	**Introduction of Multimedia:** Definitions, Basic Properties and Medium Types (Temporal and Non Temporal), Multimedia Applications, Uses of Multimedia, Introduction to Making Multimedia, Stages of Project, Requirements to Make Good Multimedia, Multimedia Skills and Training.
Unit-II	**Multimedia Hardware And Software:** Multimedia Hardware, Macintosh and Windows Production Platforms, Hardware Peripherals Connections, Memory and Storage Devices, Media Software Basic Tools, Making Instant Multimedia, Multimedia Software and Authoring Tools, Production Standards.

Unit-III	**Image:** Creation Of Image (BMP & Vector), Image Colour Models, Image File Format, Image Compression. **Video:** Video Broadcast Standard (PAL, NTSC), Shooting and Editing Video, Video File Formats, Video Tips, Video Compression, MPEG Standards. **Data Compression**: Introduction, Need, Difference of Lossless/Lossy Compression Techniques, Brief Overview to Different Compression Algorithms Concern to Text, Audio, Video and Images.
Unit-IV	**Multimedia-Looking Towards Future:** Digital Communication and New Media, Interactive Television, Digital Broadcasting, Digital Radio, Multimedia Conferencing, Virtual Reality, Digital Camera, Assembling and Delivering a Multimedia Project Planning and Costing, Designing and Producing, Content and Talent, Delivering, CD-ROM, The CD Family, Production Process, CD Overview, Media Types Technology.

Suggested Readings:

- Multimedia Making it work by Tay Vaughan, TMH.
- Multimedia system by Rajneesh Aggarwal, Excel Publication.
- Fundamental of Multimedia by Li & Drew, Pearson Education.
- Multimedia Computing Communications Applications by Ralf Steinmetz and Klara Naharstedt, Pearson.

Useful Video links:

Unit No	Topics	Links
Unit-I	Introduction of Multimedia	https://www.youtube.com/watch?v=GhcMFOHyZfo&list=PLmTmzlfvwSwypTWCV8rVeTK-ie76Y57N_
Unit-II	Multimedia Hardware and Software	https://www.youtube.com/watch?v=WRxRTHb1vT8
Unit-III	Image	https://www.youtube.com/watch?app=desktop&si=CwVqWWw4qe2nuct&v=fy9Pby0Gzsc&feature=youtu.be
Unit-IV	Multimedia-looking towards Future	https://www.youtube.com/watch?app=desktop&si=dNUeu3kXNxueuqKv&v=xOgP4F3O-64&feature=youtu.be

Course code	**MDC-ASH-108A**				
Category	Multidisciplinary Courses				
Course title	**Introduction to Statistics**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	3	0	0	**3**	
Course Objectives	The objectives of this course are 1. To develop foundational knowledge of statistics, including its origin, scope, limitations, and data types, while learning methods for organizing and presenting data effectively. 2. To build analytical skills in interpreting data through central tendency, dispersion, index numbers, and time series analysis for practical problem-solving and decision-making.				
Assessment	25 Marks				
End Semester Examination	50 Marks				
Total Marks	75				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

CO	Skill Demonstrated	RBT Level
CO1	Define statistical concepts, data types, and basic measures.	Level 1: Remember
CO2	Describe the application of statistical methods to interpret and summarize data accurately.	Level 2: Understand
CO3	Apply statistical tools and techniques to solve problems.	Level 3: Apply
CO4	Analyze data and statistical methods in real-world applications.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will have 5 short questions of 2 marks (each) from all units. Remaining eight questions of 10 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total. First question being compulsory and selecting one from each Unit.

Unit No.	Content
Unit-I	**Introduction to Statistics**: Meaning and Scope, Origin, Development and Definition of Statistics, Importance and Scope of Statistics, Limitations and Distrust of Statistics. Data, Primary and Secondary Data, Qualitative and Quantitative Data, Discrete and Continuous Data, Ungrouped and Grouped Data.
Unit-II	**Measures of Central Tendency**: Arithmetic Mean, Weighted Mean, Geometric Mean and Harmonic Mean, Median and Mode, Characteristics for an Ideal Measure of Central Tendency, Merits and Demerits of Measures of Central Tendency.
Unit-III	**Measures of Dispersion**: Range, Inter-quartile Range, Quartile Deviation, Mean Deviation, Standard Deviation and Root Mean Square Deviation, Coefficient of Variation, Measures of Skewness and Kurtosis, Characteristics for an Ideal Measure of Dispersion
Unit-IV	**Index numbers**: Types, uses and their construction. Cost of living index numbers. Test of adequacy of Index numbers. **Time Series**: Components and Models of time series. Measurements of trend and seasonal indices, Forecasting and Estimation.

Suggested Readings:

- Levin, R.I.and Rubin D.S.,Statistics for Management,Pearson Education.
- Gupta,S.P.and Gupta,M.P.,Business Statistics,Sultan Chand and Sons.
- Sharma,J.K.,Business Statistics,Vikas Publication House Pvt.Ltd.
- Jain,T.R.and Aggarwal,S.C.,VK Global Publications Pvt.Ltd.
- Davis and Pecar: Business Statistics using Excel,Oxford University Press.

Useful Video links:

Unit No	Topics	Links
Unit-I	Introduction to Statistics	https://www.youtube.com/watch?v=76qRQo-BO-o
Unit-II	Measures of Central Tendency	https://auece.digimat.in/nptel/courses/video/110107114/L09.html
Unit-III	Measures of Dispersion	http://sdnbvc.digimat.in/nptel/courses/video/110106072/L05.html
Unit-IV	Index numbers	http://digimat.in/nptel/courses/video/109104182/L22.html

Course code	**AEC-102A**				
Category	Ability Enhancement Course				
Course title	**Hindi-I**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	2	0	0	**2**	
Course Objectives	The objectives of this course are 1ᵘ विद्यार्थियों को हिन्दी भाषा के महत्त्व एवं गुणवत्ता से सुविज्ञ करवाकर हिन्दी की ओर उन्मुख करना। 2ᵘ विद्यार्थियों को हिन्दी–भाषा की वैज्ञानिकता के विषय में बतलाकर इसके गौरव से सुपरिचित करवाना। 3ᵘ हिन्दी भाषा के माध्यम से नवयुवक–नवयुवतियों को राष्ट्रीयता के पुनीत भावों की ओर उन्मुख करना।				
Assessment	15 Marks				
End Semester Exam	35 Marks				
Total Marks	50				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

CO	Skills Demonstrated	RBT Level
CO1	लिपि भाषा और साहित्य के बुनियादी सिद्धांतों का अवलोकन करें।	Level 1: Remember
CO2	भाषा की संरचनाए अर्थ और अभिव्यक्ति के पहलुओं की समझ विकसित करें।	Level 2: Understand
CO3	भाषाई और साहित्यिक सिद्धांतों को वास्तविक जीवन में लागू करने की क्षमता प्राप्त करें।	Level 3: Apply
CO4	भाषा लिपि और साहित्य के विभिन्न पहलुओं का विश्लेषण करके जटिल साहित्यिक और सांस्कृतिक मुद्दों को समझें।	Level 4: Analyze

Note: Examiner will set Nine questions in total. Question one will have 07 short questions of 1 mark (each) from all units. Remaining eight questions of 7 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first question being compulsory and selecting one from each Unit.

Unit No.	Content
Unit-I	**लिपि का मानकीकरण**, मानक वर्णमाला, देवनागरी अंक माला, अनुस्वार और विसर्ग, अनुनासिक, वर्तनी की शुद्धता के लिए ध्यान देने योग्य बातें, वर्तनी संबंधी अशुद्धियों के कारण, वर्तनी संबंधी अशुद्धियों को दूर करने के उपाय
Unit-II	**सृजनात्मक साहित्य का अर्थ**, परिभाषा और स्वरूपः आलोचनात्मक साहित्य का अर्थ, परिभाषा और स्वरूपः सृजनात्मक साहित्य का भाषा–विकास में महत्त्व, निबंध लेखन, कहानी लेखन, काव्य लेखन
Unit-III	**अनुवाद** : अर्थ, परिभाषा और स्वरूपय अनुवाद का महत्त्व, अनुवादक के गुण, अनुवाद के प्रकार : अनुवाद में कंप्यूटर का योगदान, सीरियलों का हिंदी अनुवाद, बैंकिंग साहित्य का अनुवाद, डबिंग क्षेत्र में अनुवाद, लिप्यंतरण, हिंदी साहित्य का अन्य भाषाओं में अनुवाद, अनुवाद–क्षेत्र में रोजगार
Unit-IV	**पत्र प्रस्तुतीकरण का अर्थ**, पत्र प्रस्तुतीकरण और नवीन शोधात्मक वैचारिकता, पत्र प्रस्तुतीकरण और शिक्षक की भूमिका, प्रस्तोता का मनोबल, वक्तृत्व कला का विकास, शोधात्मक अभिरुचि का विकास

प्रेरणास्पद पुस्तकें :

- शुद्ध लेखन और हिन्दी का मानक रूप,डॉ० हरिश्चन्द्र वर्मा, विद्या भारती, संस्कृति शिक्षा संस्थान, कुरुक्षेत्र (हरियाणा)
- बृहत् हिन्दी कोशः, सम्पा० कालिका प्रसाद, राजवल्लभ सहाय, मुकुन्दीलाल श्रीवास्तव, ज्ञानमण्डल लिमिटेड, वाराणसी
- परिशोध, मुख्य सम्पादक, डॉ० लक्ष्मीनारायण शर्मा, मानव–मूल्य विशेषांक, 1993
- भारतीय जीवनमूल्य, डॉ० धर्मपाल मैनी, भारतीय संस्कृति संस्थान, गुड़गाँव
- बृहत् प्रशासन शब्दावली, हिन्दी–अंग्रेजी, वैज्ञानिक तथा तकनीकी शब्दावली आयोग, नई दिल्ली–110006
- बृहत् प्रशासन शब्दावली, अंग्रेजी–हिन्दी, वैज्ञानिक तथा तकनीकी शब्दावली आयोग, नई दिल्ली–110006
- बृहत् पारिभाषिक शब्द–संग्रह, मानविकी, खंड–।।, वैज्ञानिक तथा तकनीकी शब्दावली आयोग, केन्द्रीय हिन्दी निदेशालय शिक्षा तथा समाज कल्याण मंत्रालय, भारत सरकार
- प्रयोजनमूलक अनुवाद, डॉ० सुरेश सिंहल मोनिका प्रकाशन, दिल्ली–110053
- अनुवाद सिद्धान्त एवं व्यवहार, डॉ० सुरेश सिंहल,, अभिनव प्रकाशन, दिल्ली–6

Useful Video links:

Unit No	Topics	Links
Unit-I	लिपि का मानकीकरण	https://www.youtube.com/watch?v=g1jcWLojnj4&t=2s
Unit-II	सृजनात्मक साहित्य का अर्थ	https://www.youtube.com/watch?v=aUOgArzWtTU
Unit-III	अनुवाद	https://www.youtube.com/watch?v=B1-xF-WBDXI
Unit-IV	प्रस्तुतीकरण का अर्थ	https://www.youtube.com/watch?v=NkXI3lgDkrw

Course code	**AEC-104A**				
Category	Ability Enhancement Course				
Course title	संस्कृत				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	2	0	0	**2**	
Course Objectives	The objectives of this course are 1. To create awareness of the importance of language. 2. To develop awareness of the origin and development of a language. 3. To promote awareness of various language families especially Indo European language family. 4. To understand the general introduction to Vedic & Classical Sanskrit and their Literature.				
Assessment	15 Marks				
End Semester Examination	35 Marks				
Total Marks	50				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

CO	Course Outcome	RBT Level
CO1	भाषा के महत्व, विकास, और परिवारों की समझ प्राप्त करें।	Level 1: Remember
CO2	भाषा के विकास, परिवारों और ऐतिहासिक संदर्भों का समग्र दृष्टिकोण प्राप्त करें।	Level 2: Understand
CO3	भाषाई और साहित्यिक ज्ञान को सांस्कृतिक संदर्भ में व्यावहारिक रूप से उपयोग करें।	Level 3: Apply
CO4	भाषा और साहित्य के सिद्धांतों का विश्लेषण करके जटिल सांस्कृतिक मुद्दों को समझें।	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will have 07 short questions of 1 mark (each) from all units. Remaining eight questions of 7 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first question is compulsory and selecting one from each Unit.

Unit No.	Content
Unit-I	General introduction to language भाषा का सामान्य परिचय i. Importance of language भाषा का महत्व ii. Origin and development of language भाषा की उत्पत्ति और विकास iii. Language families भाषा परिवार
Unit-II	General introduction to Indo European language family भारोपीय भाषा परिवार का सामान्य परिचय i. Indo European language family भारोपीय भाषा परिवार

	ii. Indo-Iranian branch भारत-ईरानी शाखा
Unit-III	General introduction to Vedic and Classical Sanskrit Languages वैदिक तथा लौकिक संस्कृत का सामान्य परिचय i. Vedic Sanskrit and its Literature वैदिक संस्कृत और उसका साहित्य ii. Classical Sanskrit and its literature लौकिक संस्कृत और उसका साहित्य
Unit-IV	General introduction to Pali, Prakrit, Apbhransh and Modern Indian Languages पाली, प्राकृत, अपभ्रंश और आधुनिक भारतीय भाषाओं का सामान्य परिचय i. Pali, Prakrit and Apbhransh languages पाली, प्राकृत और अपभ्रंश भाषाएं ii. Modern Indian Languages आधुनिक भारतीय भाषाएं iii. Contribution of Sanskrit to Modern Indian Languages संस्कृत का आधुनिक भारतीय भाषाओं को योगदान

प्रेरणास्पद पुस्तकें :

- भाषा विज्ञान एवं भाषाशास्त्र डॉ0 कपिलदेव द्विवेदी विश्वविद्यालय प्रकाशनए वाराणसी।
- भाषाविज्ञानए डॉ0 कर्णसिंहए साहित्य भण्डारए सुभाष बाजारए मेरे ठ।
- A manual of Sanskrit phonetics by C. Uhlenbeck.
- Linguistic Introduction to Sanskrit by B.K. Ghosh.
- Language, its nature, development and origin, O. Jesperso.

Useful Video links:

Unit No	Topics	Links
Unit-I	भाषा परिवार	https://www.youtube.com/watch?v=6xUd5hj9qNY
Unit-II	भारोपीय भाषा परिवार	https://www.youtube.com/watch?v=P4NAF1BDmAM
Unit-III	वैदिक संस्कृत और उसका साहित्य	https://www.youtube.com/watch?v=4Bub_2Kmvro
Unit-IV	आधुनिक भारतीय भाषाएं	https://www.youtube.com/watch?v=CfOwGijsFZ0

Course Code	**SEC-102A**				
Category	Skill Enhancement Course				
Course Title	**Business Communication**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	2	0	0	**2**	
Course Objectives	The objectives of this course are 1. To understand communication basics, the Seven Cs, and overcome barriers in professional settings 2. To write clear and professional business documents like emails, letters, memos, and reports. 3. To write business reports and deliver clear presentations. 4. To strengthen reading, listening, speaking, and body language for effective communication.				
Assessment	15 Marks				
End Semester Examination	35 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Recall key communication concepts and skills.	Level 1: Remember
CO2	Describe business communication techniques for effective workplace communication.	Level 2: Understand
CO3	Apply communication skills and strategies for effective workplace documentation.	Level 3: Apply
CO4	Analyze communication effectiveness strategies to improve workplace and professional communication skills.	Level 4: Analyze

Note:

1. Note: Examiner will set nine questions in total. Question one will have 07 short questions of 1 mark (each) from all units. Remaining eight questions of 07 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first question being compulsory and selecting one from each Unit.
2. At least four cases will be discussed, one from each unit.

Unit No.	Contents
Unit-I	**Introduction to Business Communication**: Basics of Communication, Seven Cs of Effective Communication, Barriers to Communication, the Ethical Context of Communication.
Unit-II	**Business Communication at the Workplace**: Letter Writing – Component, Layout and Process, E-Mail Communication, Bad News Messages, Persuasive Written Communication, Memos, Notice, Agenda and Minutes of Meeting.
Unit-III	**Report Writing**: Types of Business Reports, the Structure of Reports, Short Reports, Long Reports, Abstracts and Summaries, Proposals
Unit-IV	**Communication Skills**: Reading Skills, Listening Skills, Note Making, Persuasive Speaking, Body Language, Gestures.

Suggested Readings:

- Effective Business Communication by A. Herta Murphy, W. Hildebrandt Herbert & P Jane Thomas, , Tata McGraw Hill, New Delhi
- Professional Communication by Arun Konera, Tata McGraw Hill, New Delhi
- Basic Managerial Skills for All by E.H. McGrath, PHI, New Delhi
- Business Communication by Meenakshi Raman & Prakash Singh, Oxford University Press, New Delhi

Useful Video Links:

Unit No	Topics	Links
Unit-I	Introduction to Business Communication	https://www.youtube.com/watch?v=kvYbk7GeQpg
Unit-II	Business Letter Writing-1	https://www.youtube.com/watch?v=ekFRWnPV6lc&t=2s
Unit-III	Report writing-1	https://www.youtube.com/watch?v=Xp2PVO3do34
Unit-IV	Listening Skills	https://www.youtube.com/watch?v=JIKU_WT0Bls

Course code	**LC-SEC-104A**				
Category	Skill Enhancement Course				
Course title	**Business Communication Lab**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	0	0	2	**1**	
Course Objectives	The objectives of this course are 1. To develop listening and comprehension skills including phoneme recognition and effective communication in everyday situations. 2. To enhance conversational and workplace communication skills, including self-introduction, introducing others, and telephonic communication. 3. To practice public speaking through speeches for special occasions, group discussions, and debates. 4. To improve presentation skills including preparing and delivering effective presentations in various contexts.				
Assessment	10 Marks				
End Semester Examination	15 Marks				
Total	25 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After studying this course, the students will be able to

CO	Course Outcome	RBT Level
CO1	Describe key communication principles and strategies.	Level 2: Understand
CO2	Apply conversational skills to introduce oneself and others in various everyday situations effectively.	Level 3: Apply
CO3	Analyze workplace communication methods and effective telephonic communication strategies.	Level 4: Analyze
CO4	Evaluate various speech formats and conversational skills.	Level 5: Evaluate

List of Experiments:

Sr. No.	Experiment Description
1	Listening Comprehension
2	Recognition of Phonemes in the International Phonetic Alphabet
3	Self- Introduction and Introducing Others
4	Conversational Skills and Dialogues in Everyday Situations.
5	Workplace Communication
6	Telephonic Communication
7	Speeches for Special Occasions (Welcome Speeches, Introduction Speeches, Felicitation Speeches and Farewell Speeches)
8	Group Discussions
9	Debates
10	Presentation Skills

Suggested Readings:

- Effective Business Communication by A. Herta Murphy, W. Hildebrandt Herbert & P Jane Thomas, , Tata McGraw Hill, New Delhi
- Professional Communication by Arun Konera, Tata McGraw Hill, New Delhi
- Basic Managerial Skills for All by E.H. McGrath, PHI, New Delhi
- Business Communication by Meenakshi Raman & Prakash Singh, Oxford University Press, New Delhi

Useful Video links of Virtual Lab:

Topic	Links
Introduction to Business Communication	Introduction to Business Communication - I
Barriers to Communication	Mod-02 Lec-01 Barriers to Communication Lecture-01
Listening Skills	Lecture 13 : Listening Skills : Introduction - YouTube
Body Language	Lecture 15: The Face, Its Expressions and What It Says

Course Code	**VAC-114A**				
Category	Value Added Course				
Course Title	**Digital and Technological Solutions**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	2	0	0	**2**	
Course Objectives	The objectives of this course are 1. To understand about digital technology, software, operating systems, problem-solving methods, and the principles of communication systems, networks, and the internet. 2. To explore the initiatives of Digital India, e-governance services, digital payment systems, and cyber security challenges. 3. To understand technologies like cloud computing, AI, blockchain, IoT, and robotics, and their real-world applications				
Assessment	15 Marks				
End Semester Examination	35 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Recall fundamental concepts of digital systems, communication technologies, e-governance, digital financial tools, and emerging technologies.	Level 1: Remember
CO2	Explain the significance of digital technologies, the working of computer systems, and concepts related to e-commerce and cyber security.	Level 2: Understand
CO3	Apply knowledge of digital systems, communication networks, and e-governance tools to real-world technological and business scenarios.	Level 3: Apply
CO4	Analyze the components of communication systems, digital security threats, and evaluate emerging technologies' impact on society and business.	Level 4: Analyze

Note:

1. Examiner will set nine questions in total. Question one will have 07 short questions of 1 mark (each) from all units. Remaining eight questions of 07 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first question being compulsory and selecting one from each Unit.
2. At least four cases will be discussed, one from each unit.

Unit No.	Contents
Unit-I	**Introduction and Evolution of Digital Systems**: Role and Significance of Digital Technology, Information and Communication Technology and Tools, Computer System and its Working, Software and its Types, Operating Systems, Types and Functions, Problem Solving, Algorithms and Flowcharts.
Unit-II	**Communication Systems:** Principles, Model and Transmission Media, Computer Networks and Internet, Concepts and Applications, WWW, Web Browsers, Search Engines, Messaging, Email, Social Networking, Computer Based Information System, Significance and Types, E-Commerce and Digital Marketing, Basic Concepts, Benefits and Challenges.
Unit-III	**Digital India and E-Governance**: Initiatives, Infrastructure, Services and Empowerment, Digital Financial Tools, Unified Payment Interface, Aadhar Enabled Payment System, USSD, Credit / Debit Cards, E-Wallets, Internet Banking, NEFT/RTGS and IMPS, Online Bill Payments and Pos,

	Cyber security, Threats, Significance, Challenges, Precautions, Safety measures, Tools, Legal and Ethical Perspectives.
Unit-IV	**Emerging Technologies and their applications:** Overview of Cloud Computing, Big Data, Internet of Things, Virtual Reality, Block Chain and Crypto Currency, Robotics, Machine Learning and Artificial Intelligence, 3-D Printing, Digital Signatures.

Suggested Readings:

- Introduction to Information Technology by V. Rajaraman, 3rd Edition, PHI.
- Fundamentals of Computers by E. Balagurusamy, Tata McGraw Hill.
- Data Communications and Networking by Behrouz A. Forouzan, McGraw Hill.
- Emerging Technologies in Computing: Theory, Practice, and Advances by Pramod Kumar, Anuradha Tomar, and R. Sharmila,Chapman and Hall/CRC Imprint.
- Cloud Computing: Principles and Paradigms by Buvya, Broberg, and Gosciniski, Wiley.
- Artificial Intelligence: A Modern Approach by Russell and Norvig, Pearson Education.
- Internet of Things by Samuel Greengard, MIT Press.
- E-commerce: Concepts, Models, Strategies by C.S.V. Murthy.
- Big Data for Dummies by Hurwitz, Nugent, Halper, and Kaufman, Wiley & Sons - Wiley.

Useful Video Links:

Unit No	Topics	Links
Unit-I	Evolution of Digital Computer	https://www.youtube.com/watch?v=J8mV_skvhZc
Unit-II	Communication Systems	https://www.youtube.com/watch?v=0TQUaZcBynA&list=PLb2wGSuEdRG8lKGO4q7NXE6QDWISAsBkZ
Unit-III	Digital India & e-Governance	https://www.youtube.com/watch?v=MMlr0AyLYmI
Unit-IV	Emerging Technologies	https://www.youtube.com/watch?v=szDERpTI5lA

Course Code	VAC-116A				
Category	Value Added Course				
Course Title	**Human Values and Ethics**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	2	0	0	**2**	
Course Objectives	The objectives of this course are 1. To explore the scope and process of value education, focusing on personal, social, moral, and spiritual values. 2. To understand the significance of human values, ethics, and key ethical theories like deontology and utilitarianism. 3. To understand self-identity, personality, and well-being, with a focus on happiness and mental health. 4. To understand professional ethics, global citizenship values, and the importance of competency-based education.				
Assessment	15 Marks				
End Semester Examination	35 Marks				
Total	50 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Recall key concepts of values, ethics, human values.	Level 2: Remember
CO2	Describe the significance of values and ethics.	Level 3: Understand
CO3	Apply theories of ethics, human values to enhance well-being.	Level 4: Apply
CO4	Analyze the relationship between values, professional ethics and competencies for effective decision-making and leadership.	Level 5: Analyze

Note:

1. Examiner will set nine questions in total. Question one will have 07 short questions 1 mark (each) from all units. Remaining eight questions of 07 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first question being compulsory and selecting one from each Unit.
2. At least four cases will be discussed, one from each unit.

Unit No.	Contents
Unit-I	**Introduction:** Need, Scope and Process of Value Education, Classification of Value Education, Personal Values, Social Values, Moral Values & Spiritual Values, Difference between Ideology and Values, Harmony with Self, Society and Nature.
Unit-II	**Human Values and Ethics:** Meaning and Nature of Human Values, Significance of Human Values in Life, Relation between Values and Ethics, Relevance of Human values, Integrity, Empathy, Lok Sangrah, Brahmvihara, Theory of Naya (Jainism),Deontology, Virtue Ethics, Utilitarianism.
Unit-III	**Integrated Personality and Well-being**: Relationship among Self Identity and Personality, Integrated Personality with the three Gunas, Theory of Sankhya, Four Antah-karanas (inner instruments) in Yoga, Panchkosha (Five Sheaths) in Upanishad Well-being and its Relation to Happiness.
Unit-IV	**Professional Ethics and Global Citizenship:** Nature, Characteristics and Scope of Professional Ethics, Types of Professional Ethics, Professional Values, Trusteeship, Inclusiveness, Commitment, Sustainability, Accountability, Transparency, Impartiality, Values for Global Citizenship, Equality, Justice, Human Dignity, Nature and Need of Competency Based Education, Types of

	Competencies, Core Competencies, Communication, Teamwork, Planning and Achieving Goals, Functional Competencies, Analytical Thinking, Knowledge Sharing and Learning, Decision Making, Partnership Building.

Suggested Readings:

- A Foundation Course in Human Values and Professional Ethics by R.R. Gaur, R. Sangal, G.P. Bagaria Excel Books.
- Professional Ethics and Human Values by D.R. Kiran, McGraw Hill Education (India).
- Happiness and Well-Being, NIOS Module V (Health and Well-being).
- Meaning and Well-Being: Indian Perspectives by Kiran Kumar, K. Salagame Journal of Constructivist Psychology.
- An Indian Conception of Wellbeing by S.K. Kiran Kumar in Henry, J. (Ed.), European Positive Psychology Proceedings Leicester, UK: British Psychological Society.
- Identity: Personal and Social by Vivian L. Vignoles (2017), Chapter to appear in Oxford Handbook of Personality and Social Psychology edited by Kay Deaux and Mark Snyder.

Useful Video Links:

Unit No	Topics	Links
Unit-I	Introduction of value education	https://youtu.be/syZ8nrkDJi0?si=40PLK2orOBzsZRif
Unit-II	Human value and Ethics	https://youtu.be/thHnjYMUiU0?si=XaBRqyFwN1SFLbH3
Unit-III	Integrated Personality and Well-being	https://youtu.be/7dmp4NlvUsw?si=Bag4Hh3SNvYFFEYB
Unit-IV	Professional Ethics and Global Citizenship	https://youtu.be/0g5jgHmKoBE?si=CtC0YRXnXU6IThd L

Annexure 2.20

GANGA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, KABLANA (JHAJJAR)

An Autonomous Institute (UGC)

Approved by AICTE, New Delhi and Affiliated to MDU, Rohtak

NAAC 'A' GRADE

GITAM

SCHEME AND SYLLABI

OF

2-YEAR

MASTERS OF BUSINESS ADMINISTRATION PROGRAM

(MBA)

WITH EFFECT FROM THE ACADEMIC SESSION 2024-25

DEPARTMENT OF MANAGEMENT STUDIES

Vision:

GITAM aims to be an outstanding Institute in India through academic excellence in the field of Technology and Management to fulfil the need of the Industry and serve the society.

Mission:

- To provide healthy environment to our students as well as faculty members.
- To achieve excellence in technical education.
- To promote holistic development of students through interaction with alumni, academia, Industry and expert lectures.
- To attract, nurture and retain the best faculty and technical manpower.
- To promote research and development initiative.
- To contribute to the society by inculcating professional ethics in the students.

PROGRAM OUTCOMES OF THE MBA PROGRAM

By the end of the program graduating students should:

PO	By the end of the program graduating students should:
PO1	Apply knowledge of management theories and practices to solve business problems.
PO2	Foster Analytical and critical thinking abilities for data-based decision-making.
PO3	Ability to develop Value-based Leadership ability.
PO4	Ability to understand, analyze, and communicate global, economic, legal, and ethical aspects of business
PO5	Ability to lead themselves and others in the achievement of organizational goals, contributing effectively to a team environment
Additional Program Outcomes (APOs)	
PO6	Adapt to new changes and innovations for lifelong learning.
PO7	Identify and implementing business opportunities for showcasing entrepreneurial skills.

1. DEFINITION OF CREDIT

1	1 Lecture (L) per week	1 Credit
2	1 Tutorial (T) per week	1 Credit
3	1 Practical (P) per week	0.5 Credit
4	2 Practical (Lab) per week	1 Credit

2. RANGE OF CREDIT

A range of credits from 96 to 112 for a student to be eligible to get Post Graduate degree in Management.

3. STRUCTURE OF POSTGRADUATE PROGRAM (MBA)

Sr. No.	Category	Only Course Work Breakup of Credits	Course Work with Research	Only Research work
1	Discipline Specific Courses	80	60	40
2	Skill Enhancement Course/ Vocational Course/ Internship/ Project Work/ Thesis	16	36	56
	Total Credits	**96**	**96**	**96**

** Note*

**Minor variation is allowed as per need of the Program.*

1. The duration of all the end-term theory examinations shall be 3 hours.
2. The Criteria for Assessment of Theory Courses throughout the Program shall be as under:
   a) Sessional Examination : 50% of Assessment Marks
   b) Assignments/Presentations/Seminars and Class Participation : 30% of Assessment Marks
   c) Attendance : 20% of Assessment Marks

Attendance%	: Marks
90-100%	: *100% of Attendance marks*
85%-89.99%	: *80% of Attendance marks*
80%-84.99%	: *60% of Attendance marks*
75%-79.99%	: *45% of Attendance marks*
65%-74.99%	: *25% of Attendance marks*
Below 65%	:*0% of Attendance marks*

3. The Criteria for awarding the Internal assessment practical course throughout the Program shall be as under:
   a) Practical Assignments/Practical File : 60% Weightage of Assessment
   b) Attendance (Criteria as mentioned above in 2(c)) : 40% Weightage of Assessment
4. The panel of examiners for end-semester theory/practical examinations shall be prepared and approved by the BOS of Department of Management Studies or Academic Council of Institute.
5. The panel of examiners (ordinarily not below the rank of Associate Professor) for assessment of the Project reports/Dissertation/Research Project/Summer Internship Reports shall be recommended by the BOS of Department of Management Studies or Academic Council of Institute.

4. COURSE CODE AND DEFINITIONS

Sr. No.	Category	Course Code
1	Discipline Specific Course	DSC
2	Skill Enhancement Course	SEC
3	Vocational Courses	VOC
4	Project	PR
5	Research Thesis/Project	RT
6	Internship	INT

GANGA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, JHAJJAR (HR.), DELHI-NCR

Scheme of Examination

MBA – 1st Semester

w.e.f. 2024-25

Sr. No.	Category	Course Code	Course Title	Hours per week			Total Load Per Week	Credits	Examination Schedule (Marks)				Exam Duration in H
				L	T	P			Assessment	End Semester Examination	Practical	Total	
1	Discipline Specific Course	DSC-MBA-101A	Management Process and Organizational Behaviour	3	1	0	4	4	40	60	-	100	3
2	Discipline Specific Course	DSC-MBA-103A	Finance for Managers	3	1	0	4	4	40	60	-	100	3
3	Discipline Specific Course	DSC-MBA-105A	Strategic Marketing	3	1	0	4	4	40	60	-	100	3
4	Discipline Specific Course	DSC-MBA-107A	Strategic Human Resource Management	3	1	0	4	4	40	60	-	100	3
5	Discipline Specific Course	DSC-MBA-109A	Business Research Methods	3	1	0	4	4	40	60	-	100	3
6	Skill Enhancement Course	SEC-MBA-111A	Business Ethics and Communication Skills	3	0	0	3	3	25	50	-	75	3
		LC-MBA-113A	Business Ethics and Communication Skills Lab	0	0	2	2	1	10	-	15	25	3
	Vocational Course	VOC-MBA-115A	IT for Managers-1	3	0	0	3	3	25	50	-	75	3
		LC-MBA-117A	IT for Managers-1 Lab	0	0	2	2	1	10	-	15	25	3
	Internship	INT-MBA-119A	Internship Report	-	-	-	-	4	50	-	50	100	3
		TOTAL CREDIT						**24**				**600**	

Note:

1. The students are required to choose either Skill-Enhancement Course (**SEC 1)** or Vocational Course **(VOC 1)** or **Internship 1**.

Scheme of Examination
MBA – 2nd Semester
w.e.f. 2024-25

Sr. No.	Category	Course Code	Course Title	Hours per week			Total Load Per Week	Credits	Examination Schedule (Marks)				Exam Duration in H
				L	T	P			Assessment	End Semester Examination	Practical	Total	
1	Discipline Specific Course	DSC-MBA-102A	Managerial Economics	3	1	0	4	4	40	60	-	100	3
2	Discipline Specific Course	DSC-MBA-104A	Business Environment	3	1	0	4	4	40	60	-	100	3
3	Discipline Specific Course	DSC-MBA-106A	Management Information System	3	1	0	4	4	40	60	-	100	3
4	Discipline Specific Course	DSC-MBA-108A	Total Quality Management	3	1	0	4	4	40	60	-	100	3
5	Discipline Specific Course	DSC-MBA-110A	Emotional Intelligence	3	1	0	4	4	40	60	-	100	3
6	Skill Enhancement Course	SEC-MBA-112A	Personality and Soft Skills Development	3	0	0	3	3	25	50	-	75	3
		LC-MBA-114A	Personality and Soft Skills Development Lab	0	0	2	2	1	10	-	15	25	3
	Vocational Course	VOC-MBA-116A	IT for Managers-2	3	0	0	3	3	25	50	-	75	3
		LC-MBA-118A	IT for Managers-2 Lab	0	0	2	2	1	10	-	15	25	3
	Internship	INT-MBA-120A	Internship Report	-	-	-	-	4	50	-	50	100	3
		TOTAL CREDIT						**24**				**600**	

Note

1. Students exiting the Program after the second semester i.e. after the first year on completion of 48 creditswill be awarded PG Diploma in Business Administration.
2. The students are required to choose either Skill-Enhancement Course (SEC 2) or Vocational Course (VOC 2) or Internship 2.
3. Immediately after completing the second semester, the students shall proceed to their Summer Internship (SI). The duration of the internship is 120 hours during summer vacation. The Summer Internship Report (SIR) prepared after SI completion shall be assessed in the third Semester as a compulsory course. The candidates will submit the SIR in the prescribed format designed by the department. The SIR will be evaluated by an examiner appointed by controller of Examination from the approved panel of examiner.

Course Code	**DSC-MBA-101A**					
Category	Discipline Specific Course					
Course Title	**Management Process and Organizational Behaviour**					
Scheme and Credits	L	T	P	**Credits**	**Semester-I**	
	3	1	0	**4**		
Course Objectives	The objectives of this course are 1. To gain a thorough understanding of management by exploring its meaning, nature, processes, key functions, roles, skills, and competencies, emphasizing core competencies, synergy, and emotional intelligence. 2. To examine the origins and different management approaches, focusing on contingency and systems theories, as well as motivation, leadership theories, and the idea of learning organizations. 3. To grasp the basics of organizational behavior, covering interpersonal and group dynamics, team building, and intrapersonal processes such as motivation, attitude, personality, and perception. 4. To understand organizational structure and processes, with an emphasis on job design, organizational climate and culture, and the dynamics of change and development in today's context.					
Assessment	40 Marks					
End Semester Examination	60 Marks					
Total	100 Marks					
Duration of Exam	03 Hours					

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	**Describe** the conceptual framework of management theories and organizational behaviour.	Level-2 Understand
CO2	**Apply** the fundamental aspects of managerial and organizational behaviourial skills.	Level-3 Apply
CO3	**Apply** the managerial and organizational attributes in the organization.	Level-3 Apply
CO4	**Analyze** the aspects of managerial and organizational behaviourial to solve the real business problems.	Level-4 Analyze

Note:

1. Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.
2. At least four cases will be discussed, one from each unit.

Unit No.	Contents
Unit-I	**Introduction to Management**: Definition, Nature and Characteristics, Scope, Role, Functional areas of Management. **Evolution of Management**: Classical Theory, Behavioral Theory and Modern Management Approaches, Managerial Skills, Roles of Management, Managerial Competencies, Core Competencies, Concept of Synergy Emotional Intelligence at Work Place, Management by Objectives, Dynamics in Social Milieu.

Unit-II	**Motivation**: Definition and Characteristics, Theories of Motivation- Need Hierarchy Theory, Two factor Theory, ERG Theory, Acquired need Theory. **Leadership:** Definition and Nature, Theories of Leadership- Contingency Theory, Trait Theory, Behavioral Theory and Situational Theory, Leadership Development for Learning Organizations.
Unit-III	**Foundations and Background of Organizational Behavior**: Classical Management Theory, Human Relations Movement, Modern OB Approaches. **Group Behavior**: Dynamics, Types of Groups, Group Cohesiveness Formation and Stages, Team building and Intrapersonal process. **Attitude**: Definition and Components. **Personality**: Traits of Personality. **Perception**: Meaning and Process of Perception.
Unit-IV	**Organizational Process and Structure**: Work Innovation and Job Design- Job Rotation, Job Enrichment, Job Enlargement, and Work Life Balance. **Organization Climate and Culture**: Communication Patterns, Employee Engagement, Support Systems, Organization Change and Development and Control in Organization.

Suggested Readings:

- Fundamentals of Management by S.P. Robbins, and Decenzo, D.A., Pearson Education
- Management by Hellreigel, Thomson Learning, Bombay
- Management by Koontz, H and Wechrich, H. Tata McGraw Hill
- Management by Stoner, J et. Al, Pearson Education
- Management by Robbins and Coulter,
- Principles of Management by Pravin Durai and Anamalaya Pearson Education.

Useful Video Links:

Unit No	Topics	Links
Unit-I	Nature ,Scope and Evolution of Management	https://www.youtube.com/watch?v=TtbImDfUt4c&list=PLLy_2iUCG87DH0iQSVWZ8iamVl5SaLlXQ&index=2
Unit-II	Motivation	https://enine.digimat.in/nptel/courses/video/110105033/L13.html
Unit-III	Introduction to Organizational Behaviour	https://www.youtube.com/watch?v=CRpqsuM36oo&list=PLyqSpQzTE6M8SdzVBPSXRz2K0715DnxXx
Unit-IV	Nature ,Scope and Evolution of Management	https://www.youtube.com/watch?v=vOykcERGw9Y&list=PLLy_2iUCG87DH0iQSVWZ8iamVl5SaLlXQ

Course Code	DSC-MBA-103A				
Category	Discipline Specific Course				
Course Title	**Finance for Managers**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I**
	3	1	0	4	
Course Objectives	The objectives of this course are 1. To understand the basic concepts of accounting, including principles, cycle, financial statements, and standards. 2. To understand how to prepare financial statements, including adjustments and financial ratios. 3. To understand cost accounting techniques, including marginal costing, break-even analysis, and budgeting. 4. To understand investment decisions and capital structure using capital budgeting and cost of capital techniques.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	**Describe** the accounting and financial management fundamental concepts and its application.	Level-2 Understand
CO2	**Apply** the concepts of financial management and accounting systems to prepare and manage financial system.	Level-3 Apply
CO3	**Apply** financial and accounting techniques to solve business problems	Level-3 Apply
CO4	**Analyze** financial information to make decisions in the real world.	Level-4 Analyze

Note:

1. Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.
2. At least four cases will be discussed, one from each unit.

Unit No.	Contents
Unit-I	**Introduction to Accounting**: Meaning, Advantages and Limitations of Accounting, Scope and Nature of Accounting, Types of Accounting, Accounting Concepts and Conventions, An Overview of IFRS and Accounting Standards (AS) in India, Accounting Cycle, Golden Rules of Accounting, Recording of Business Transaction (Journal Entries), Ledger, Trial balance. **Preparation of Financial Accounts;** Trading and P&L A/C and Balance Sheet with Adjustments.
Unit-II	**Analysis of Financial Statements**: Comparative Statements, Common Size Statements. **Ratio Analysis**: Liquidity Ratio, Solvency Ratio, Profitability Ratio, Efficiency Ratio. **Flow Statements;** Preparation of Fund Flow and Cash Flow Statement.
Unit-III	**Cost, Costing and Cost Sheet:** Classifications and Cost Sheet, Marginal Costing Vs. Absorption Costing, CVP Analysis, Break Even Point and Break Even Analysis, Marginal Costing and its Application in Managerial Decision Making (Fixation of Selling Price, Exploring New Market,

	Make or Buy, Product Mix, Operate or Shut Down). **Concept of Budget and Budgetary Control-** Objectives, Merits, and Limitations and Types of Budgets.
Unit-IV	**Capital Budgeting**: Importance, Process, Methods of Capital budgeting, ARR, PI, PBP, NPV and IRR. **Cost of Capital:** Estimation of Components of Cost of Capital, Methods for Calculating Cost of Equity, Cost of Retained Earnings, Cost of Debt and Cost of Preference Capital, Weighted Average Cost of Capital (WACC), Impact of ESG on Cost of Capital.

Suggested Readings:

- Financial Accounting: A Managerial Perspective by R. Narayanaswamy, PHI learning
- Financial Accounting by B. K. Goyal, & H. N. Tiwari, Taxmann Publication, New Delhi.
- Accounting: Text and Cases by R. N. Anthony, D. Hawkins, & K. A. Merchant, McGraw-Hill Education India.
- Financial Accounting by S. N. Maheshwari, S. K. Maheshwari, Vikas Publishing House Pvt. Ltd., New Delhi
- Financial Management by I.M. Pandey, Vikas Publishing House, New Delhi
- Financial Management by Khan and Jain, Tata McGraw Hill, New Delhi
- Cost and Management Accounting by M.E. Thukaram Rao, New Age Publishers

Useful Video Links:

Unit no	Topics	Links
Unit-I	Introduction to Financial Accounting	https://youtu.be/jhtVVJxbPU0
Unit-I	Balance Sheet	https://youtu.be/_6dqb60cItQ?feature=shared
Unit-II	Cash from Financing Activities	https://youtu.be/k_Tyh1x7e9k?feature=shared
Unit-II	Preparing Cash Flow Statements	https://youtu.be/yop2e1PV580?feature=shared
Unit-III	Statement of Cost: An Introduction	https://youtu.be/jg3rncf6U-E?feature=shared
Unit-III	Budgetary Control	https://youtu.be/ALWF34PuqsA?feature=shared
Unit-IV	Cost of Capital	https://youtu.be/JlYY1NxGTQI?feature=shared

Course Code	**DSC-MBA-105A**				
Category	Discipline Specific Course				
Course Title	**Strategic Marketing**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I**
	3	1	0	4	
Course Objectives	The objectives of this course are 1. To understand strategic marketing concepts, marketing mix (7P's) to align marketing and business strategies effectively. 2. To understand the marketing environment using tools like PEST, SWOT, ETOP, and QUEST and buyer behavior models. 3. To understand market segmentation, targeting, positioning strategies, and relationship marketing approaches. 4. To understand marketing strategies across product, branding, pricing, advertising, and distribution.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	**Explain** the Core Marketing Concepts and Frameworks of Strategic Marketing.	Level-2 Understand
CO2	**Apply** marketing strategies and tools for effective business solutions.	Level-3 Apply
CO3	**Analyze** the Impact of Marketing Decisions on Organizational Performance.	Level-4 Analyze
CO4	**Evaluate** the effectiveness of various marketing strategies in decision making.	Level-5 Evaluate

Note:

1. Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.
2. At least four cases will be discussed, one from each unit.

Unit No.	Contents
Unit-I	**Marketing**: Marketing Concepts, Roles of Marketing in Business. **Marketing Mix**: 7P's of Marketing (Product, Price, People, Place, Promotion, Process, Physical evidence). **Strategic Marketing**: Concept, Process, Marketing and Business strategy, Marketing Strategy and Planning Process, Strategic Issues in Marketing.
Unit-II	**Environmental Scanning**: Nature and Structure of Marketing Environment, Environmental Scanning and Analysis-PEST framework, SWOT Analysis, ETOP, QUEST Competitor Analysis, Customer Analysis. **Marketing Information System**: Marketing Cost and Financial Analysis. **Buyer Behavior Models-** The Economic Model, The Psychological Model, The Sociological Model, Howard-Sheth Model, The Engel-Kollat-Blackwell (EKB) Model, Nicosia Model, The Black Box Model, The Cognitive Dissonance Model.

Unit-III	**Strategic Market Management**: Segmenting Markets, Niche Marketing, Market Targeting Strategies, Positioning Strategies, Relationship Strategies, Inter-Organizational Relationships, Influence of Market Position on Strategy, Distribution Strategies and Channel Management. **New Product Development** – Planning, Process and Strategies.
Unit-IV	**Marketing Strategies**: Product Strategies, Branding Strategies, Customer Service Strategy, Pricing Strategies, Advertising Strategies, Sales Promotion Strategies, Direct Marketing Strategies, Marketing Communication Strategies, Sales Force Strategies.

Suggested Readings:

- Strategic Marketing Planning by Colin Gilligan, Richard M.S. Wilson.
- Strategic Marketing by D.W. Cravens and N.F. Piercy, McGraw-Hill, New York.
- Strategic marketing problems by Kerin & Peterson, Cases & Comments, Pearson.
- Marketing Management– Text and Cases by Rajiv Lal, John Quelch and V Rangan, McGraw Hill Education.
- Marketing: Planning, Implementation, Control by Pride and Ferrell, Cengage.
- Marketing Strategies: A contemporary approach by Ranchod & Gurau, Pearson India.
- Strategic Marketing: An Introduction by Tony Proctor, Psychology Press.
- Strategic Marketing by Xavier, Response Books.

Useful Video Links:

Unit No	Topics	Links
Unit-I	Strategic Marketing-Lecture 01 to 37	https://youtu.be/lGjQkqgN95w?feature=shared
Unit-II	Models of Consumers and Models of Consumer Behaviour	https://youtu.be/tmQ5FPT8fJU?feature=shared
Unit-III	Market Segmentation (With Real World Examples)	https://youtu.be/IrJ1cNIfmsk?feature=shared
Unit-III	The Power of Niche Marketing: The Strategy that Scales	https://youtu.be/op9EvzIn8mY?feature=shared
Unit-IV	Branding Strategies	https://youtu.be/LwrGSKnShmk?feature=shared

Course Code	DSC-MBA-107A				
Category	Discipline Specific Course				
Course Title	**Strategic Human Resource Management**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I**
	3	1	0	**4**	
Course Objectives	The objectives of this course are 1. To understand the concept, evolution, components, and various approaches of SHRM 2. To understand the concept of HR evaluation and provide knowledge of the linkages between business strategy and HR strategies. 3. To understand the significance of HRP, its alignment with business strategy, and key HR systems. 4. To explore downsizing, outsourcing, and offshoring strategies, focusing on the ethical competencies in HR decision-making.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	**Describe** the key concepts and strategic importance of SHRM.	Level-2 Understand
CO2	**Apply** strategic HRM tools to enhance organizational decision-making.	Level-3 Apply
CO3	**Implement** distinctive HR practices to address business challenges and enhance HR effectiveness.	Level-3 Apply
CO4	**Analyze** the impact of strategic HRM decisions on organizational performance.	Level-4 Analyze

Note:

1. Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.
2. At least four cases will be discussed, one from each unit.

Unit No.	Contents
Unit-I	**Introduction to Strategic HRM**: Introduction, Components, Objectives and Evolution of SHRM, Difference between Traditional HRM and SHRM, Investment Perspective of Human Resource Management, Challenges in SHRM, Barriers to Strategic HR. **SHRM Approaches**: The Indian context, Integrated system model, HRD framework, HRD as an Approach.
Unit-II	**Human Resource Evaluation**: Concept, Approaches, Purpose, Rationale for HR Evaluation, Linkage between HRM and FirmPerformance, Best Practices and Bundles Approach. **Distinctive HR practices**: Concept, Factors affecting & Importance of HRM Practices, Distinctive HR Practices-HR Outsourcing and Offshoring. **Human Resource Planning-** An overview, Significance, Need, Perspectives and Objectives of HRP, Factors influencing HRP, Business Strategy and HRP, Process of HRP.
Unit-III	**HR Systems**: Staffing Systems, Reward and Compensation Systems, Employee and Career Development Systems,Performance Management Systems.

Unit-IV	**Strategic Options**: Downsizing and Restructuring- Concept, Reasons of Downsizing, Types of Downsizing Strategies, Survivors of Downsizing, Benefits and Consequences of Downsizing, Precautions to be taken while Downsizing. **Outsourcing-** Concept, Reasons for Investing in HR Outsourcing, Stages of HR Outsourcing, HR Outsourcing Functions, Advantages, Disadvantages and Challenges in HR Outsourcing. **Offshoring-** Concept, Types, Objectives, Advantages and Disadvantages of Offshoring. **Corporate Ethics in SHRM** **Competencies of HR Professional in SHRM**

Suggested Readings:

- Strategic Human Resource Management and Development by Ekta Sharma, Pearson Education
- Strategic Human Resources Management by A. Jeffrey Mello, Cengage Learning
- Strategic Human Resources Management by Tanuja Agarwala, Oxford University Press .
- Strategic Management by R. Freed David, Pearson Education.
- Human Resource Management by L. Robert Mathis and H. John Jackson, Thomson South Western
- Strategic Human Resource Management - Text and Cases by K. Prasad, MacMillan India Ltd.
- Strategic Human Resource Management by R. Charles Greer, Pearson Education
- Strategic Human Resource Development by R. Srinivas Kandula, PHI
- Strategic Human Resource Management: An Indian perspective by Anuradha Sharma, Sage ResponseBooks.

Useful Video Links:

Unit No	Topics	Links
Unit-I	SHRM approaches & Models	https://www.youtube.com/watch?v=lCzXWlUCoA8
Unit-II	Human Resource Planning-1	https://www.youtube.com/watch?v=wcP976S8DsM&t=13s
Unit-III	Performance Management System	https://www.youtube.com/watch?v=WYMr8NZdG54
Unit-IV	Organizational restructuring	https://www.youtube.com/watch?v=80qJUZtUtVU
	Outsourcing and off shoring	https://www.youtube.com/watch?v=nZXv0EsbNCw

Course Code	**DSC-MBA-109A**				
Category	Discipline Specific Course				
Course Title	**Business Research Methods**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I**
	3	1	0	**4**	
Course Objectives	The objectives of this course are 1. To acquire knowledge on various kinds of research questions and research designs. 2. To distinguish between qualitative, quantitative and mixed methods of research relate ethical and philosophical considerations 3. To design a good quantitative purpose statement and good quantitative research 4. To understand good practices in conducting a qualitative interview and observation.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	**Skills Demonstrated**	**RBT Level**
CO1	**Describe** the key concepts, scope, and components of business research.	Level-2 Understand
CO2	**Apply** business research methods tools and techniques in business research.	Level-3 Apply
CO3	**Analyze** the various appropriate methodologies of business research to enhance the quality of research.	Level-4 Analyze
CO4	**Evaluate** the results of advanced statistical methods to interpret business research outcomes.	Level-5 Evaluate

Note:

1. Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first question being compulsory and selecting one from each unit.
2. At least four cases will be discussed, one from each unit.

Unit No.	**Contents**
Unit-I	**Introduction to Business Research**: Concept, Nature, Scope (Market Research, Product Research, Financial Research, Consumer Research, Competitive Research, and Operational Research), Need and Managerial value of Business Research. **Components of Research**: Definitions, Concepts, Constructs, Variables, Hypothesis-qualities of good Hypothesis, Process of Research and Structure of Research Proposal.
Unit-II	**Research Design**: Concept and Types (Exploratory, Descriptive, Diagnostic and Experimental). **Sampling Designs and Sampling Procedures**: Reason for Sampling, Sampling Concepts, Sampling Error, Types of Sampling, Sampling Techniques. **Measurement**: Concept, Measurement Scales, Types, Construction of Scales, Reliability & Validity aspects in Measurement.

Unit-III	**Methods of data collection**: Primary data (Interviews, Surveys, Observations, Focus groups, Questionnaires) and Secondary data. **Questionnaires designing:** (Open-ended, Multiple choice questions, Closed-ended questions, Likert scale questions, Rating scale questions). **Data Analysis and Interpretation**: Editing, Coding, Content analysis and Tabulation; **Hypothesis Testing**: (One-tailed test, Two-tailed test), Hypothesis testing- An overview of parametric and non-parametric tests, T-test and Z-test, Cross tabulation, ANOVA, Correlation and Regression.
Unit-IV	**An Overview of Dependent and Interdependent Methods**: Multiple Regressions, Discriminant Analysis, Conjoint Analysis, Factor Analysis, Cluster Analysis. **Ingredients and Constructions of Research Report:** Procedure of preparation of Reference and Bibliography.

Suggested Readings:

- Business Research Methods by Naval Bajpai, Pearson Education
- Business Research Methods by Zikmund, G. Millian, Thomson Learning, Bombay
- Business Research Methods by Cooper, R. Donald and Pamels Schindler, Tata McGraw Hills, New Delhi
- Methods in Research by Geode, J. Millian and Paul K. Hatl, McGraw Hills, New Delhi
- Business Research Method by Sekran, Uma, Miley Education, Singapore
- Research Methodology by C.R. Kothari, New Age International Publishers

Useful Video Links:

Unit No	Topics	Links
Unit-I	Introduction to Business Research	https://youtu.be/UWEElp3gesY?feature
Unit-II	Research design	https://youtu.be/Oo3xskaqzAY?feature
Unit-III	Methods of data collection	https://www.youtube.com/watch?v=M1PYb4QfeoU
Unit-IV	Dependent and Interdependent Method	https://youtu.be/zRFdgmRwBSI?feature=shared

Course Code	SEC-MBA-111A 623				
Category	Skill Enhancement Course				
Course Title	**Business Ethics & Communication Skills**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I**
	3	0	0	**3**	
Course Objectives	The objectives of this course are • To understand business ethics, key ethical theories, and apply ethical decision-making frameworks in business. • To understand ethical dilemmas in business and reflect on the role of professional values in decision-making. • To develop skills in verbal, written, and non-verbal communication, focusing on clarity and overcoming communication barriers. • To understand business report writing, professional documents, and enhance self-presentation and presentation techniques.				
Assessment	25 Marks				
End Semester Examination	50 Marks				
Total	75 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	**Describe** the fundamental concepts of business ethics, communication processes, and their significance in organizational decision-making.	Level-2 Understand
CO2	**Apply** the basic theories & principles of business ethics & communication skills in business context.	Level-3 Apply
CO3	**Analyze** different communication techniques and ethical theories for effective decision making.	Level-4 Analyze
CO4	**Evaluate** the different theories, principles and methods of communication skills & business ethics to solve business problems.	Level-5 Evaluate

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 5 parts of 2 marks each from all units and remaining eight questions of 10 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit No.	Contents
Unit-I	**Business Ethics**: Importance and need for Business Ethics, Theories of Ethics- Normative theory, Descriptive Ethical theory and Virtue Based theory, Ethical Issues in Business. **Ethics and Management**: Ethics and values, Norms, Beliefs, Morality, Ethical Decision Making Process- Framework for Ethical Decision Making.
Unit-II	**Ethical Dilemma and Values**: Concept of Ethical Dilemma, Resolving Ethical Dilemmas, Ethical Dilemmas in different business areas, Professional values for Business- Managerial Values.
Unit-III	**Business Communication:** Definition, Purpose, Importance and Limitations, of Communication, Communication Process, 7 Cs of Communication. **Types of Communication**: Verbal Communication- Advantages and Limitations of verbal Communication, Written Communication – Characteristics, Advantages & Limitations. Nonverbal communication- Sign language, Body language, Kinesics, Proxemics, Process of communication, Barriers and Gateways of Business Communication.

Unit-IV	**Written communication**: Report Writing-Process of Report Writing, Structures of Business Reports. Business Letter- Components and Layout, Types of Letters, Memos, Notices and Circulars, Agenda and Minutes of Meeting, Resume and Curriculum Vitae. **Presentation Skill:** Self-Presentation Skills, Effective Presentation Techniques.

Suggested Readings:

- Business Ethics by CSV Murthy, Himalaya Publishing House
- A Perspectives in Business Ethics by L. Hartman, Chatterjee, McGraw Hill Publishing Co. Ltd
- Business Ethics–An Indian Perspective by Ananda Das Gupta, Springer Publications
- Business Communication by P.D. Chaturvedi, and Mukesh Chaturvedi, Pearson Education
- Basic Managerial Skills for All by E.H. McGrath,, PHI, New Delhi
- Business Communication by K. K. Sinha, Galgotia Publishing Company Ltd.
- Commercial Correspondence and Office Management by R.S.N. Pillai and Bagavathi, S. Chand & Company Ltd.

Useful Video Links:

Unit No	Topics	Links
Unit-I	Ethical Decision Making & its Tools	https://www.youtube.com/watch?v=tma1GDcefeQ
Unit-II	Ethical Dilemmas	https://www.youtube.com/watch?v=eq7EkZNPoMc
Unit-III	Non Verbal Communication	https://www.youtube.com/watch?v=T9BwPbQyZSc
Unit-IV	Written Communication	https://www.youtube.com/watch?v=XbqdhyoUFnw

Course Code	**LC-MBA-113A**				
Category	Skill Enhancement Course				
Course Title	**Business Ethics and Communication Skills Lab**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I**
	0	0	2	**1**	
Course Objectives	The objectives of this course are 1. To understand ethical dilemmas by analyzing real-world business case studies and the decisions made in addressing them. 2. To understand ethical decision-making frameworks in role-playing and hypothetical business situations. 3. To understand effective business communication, including the use of the 7 Cs, non-verbal communication, presentations and written reports. 4. To draft business documents such as letters and resumes, and enhance their self-presentation and presentation skills through workshops and presentations.				
Assessment	10 Marks				
End Semester Examination	15 Marks				
Total	25 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	**Skills Demonstrated**	**RBT Level**
CO2	Explain ethical concepts and communication techniques in business decision-making processes.	Level-2 Understand
CO3	Apply ethical decision-making frameworks and communication strategies to real-world business scenarios and case studies.	Level-3 Apply
CO4	Analyze ethical challenges, communication strategies, and decision-making to improve business problem-solving and professional values.	Level-4 Analyze
CO5	Evaluate the impact of ethics, communication styles, and professional values on business outcomes and organizational effectiveness.	Level-4 Evaluate
CO6	Create business documents, presentations, and communication strategies that reflect ethical values and effective business practices..	Level-6 Create

List of Experiments:

S. No.	**Description**
1	To Analyze a real-world case study that highlights ethical issues in business.
2	To discuss the ethical dilemmas faced and the decisions made.
3	To Conduct role-playing exercises where students navigate ethical dilemmas in hypothetical business situations, utilizing the ethical decision-making process.
4	To organize debates on the importance of specific professional values in various industries.
5	To engage in an activity to reflect on personal and managerial values and how these influence decision-making processes.
6	To facilitate group discussions where students share personal experiences related to ethical dilemmas in the workplace and how they resolved them.

7	To set up a business meeting environment where students can practice the communication process, focusing on clarity and the 7 Cs of communication.
8	To conduct a workshop focused on non-verbal communication, allowing students to practice interpreting and using body language effectively in business contexts.
9	To pair students to give and receive feedback on their communication styles in presentations or written reports, fostering improvement.
10	To host a session where students present on a topic of their choice, incorporating effective presentation techniques and self-presentation skills.
11	To draft various types of business letters (e.g., inquiry, complaint, job application) and review their components and layout.
12	To conduct a workshop where students create and critique resumes and CVs, focusing on formatting and content relevance for job applications.

Suggested Readings:

- Business Ethics by CSV Murthy, Himalaya Publishing House
- A Perspectives in Business Ethics by L. Hartman, Chatterjee, McGraw Hill Publishing Co. Ltd
- Business Ethics–An Indian Perspective by Ananda Das Gupta, Springer Publications
- Business Communication by P.D. Chaturvedi, and Mukesh Chaturvedi, Pearson Education
- Basic Managerial Skills for All by E.H. McGrath,, PHI, New Delhi
- Business Communication by K. K. Sinha, Galgotia Publishing Company Ltd.
- Commercial Correspondence and Office Management by R.S.N. Pillai and Bagavathi, S. Chand & Company Ltd.

Useful Video Links:

Unit No	Topics	Links
Unit-I	Ethical Issues	https://www.youtube.com/watch?time_continue=30&v=cbqMALGwiC0&embeds_referring_euri=https%3A%2F%2Farchive.nptel.ac.in%2F&source_ve_path=Mjg2NjY
Unit-II	Ethical Decision Making	How Do We Decide? Tools for Ethical Decision Making
Unit-III	Non-verbal communication	https://www.youtube.com/watch?v=T9BwPbQyZSc
Unit-IV	Types of business letters	https://www.youtube.com/watch?v=8Q8Ox_jtvTk

Course Code	VOC-MBA-115A				
Category	Vocational Course				
Course Title	**IT for Managers-1**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I**
	3	0	0	**3**	
Course Objectives	The objectives of this course are 1. To understand the fundamentals of computer systems, including their components, types, operating systems, and programming languages. 2. To gain knowledge of internet technology, networking concepts, protocols, and communication methods, including security and data transmission. 3. To develop proficiency in using MS-Word for document management and MS-Excel for data organization and visualization. 4. To learn to create effective presentations in MS-PowerPoint and understand basic database concepts and management using MS-Access.				
Assessment	25 Marks				
End Semester Examination	50 Marks				
Total	75 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	**Skills Demonstrated**	**RBT Level**
CO1	Explain the basic functions of computer fundamentals and MS-office automation tools.	Level 2: Understand
CO2	Demonstrate Various Applications of MS Office and the Internet in Businesses.	Level 3: Apply
CO3	Use MS-Word for document creation, MS-Excel for data manipulation, and MS-PowerPoint for presentation design.	Level 3: Apply
CO4	Categorize various commands and concepts of the Internet and MS Office.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 5 parts of 2 marks each from all units and remaining eight questions of 10 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit No.	**Contents**
Unit-I	**Introduction to Computers**: Characteristics, Capabilities, Limitations and Applications of Computers, Types of Computers; Computer Hardware, Software, Block Diagram of Computer and Overview of Working, Types of Computer language, Generation of Computer languages, Functions and Types of Operating System.
Unit-II	**Internet**: Internetworking, Concepts, Internet Protocol Addresses, WWW Pages & Browsing, Security, Internet Applications, Analog and Digital Signals, Bandwidth, Network Topology, Packet Transmission, Long Distance Communication; E-mail.
Unit-III	**Documentation using MS-Word**: Creating and Editing Document, Formatting Document, Auto-text, Autocorrect, Spelling and Grammar Tool, Document Dictionary, Page Formatting, Bookmark, Advance Features of MS-Word-Mail Merge, Printing Electronic Spread Sheet using MS-Excel. **Introduction to MS-Excel**: Creating and Editing Worksheet, Formatting and Essential

	Operations, Formulas and Functions, Charts.
Unit-IV	**Presentation using MS-PowerPoint**: Presentations, Creating Manipulating and Enhancing Slides, Organizational Charts, Excel Charts, Word Art, Layering Art Objects, Animations and Sounds. **Introduction to database**: Concept, Characteristics, Objectives, Advantages and limitations, Entity, Attribute, Schema, Subschema; Databasemanagement using MS-Access.

Suggested Readings:

- Fundamentals of Computers by V. Rajaraman , PHI.
- Computer Fundamentals by P.K. Sinha, BPB Publication.
- Learn Microsoft Office by Stultz, A. Russell, BPB Publication.
- Computer Course windows 7 and Office 2010, Taxali, Ravi Kant, McGraw Hill Education.
- Computer Applications in Management by Saxena, Vikas Publication, New Delhi..
- Computer Fundamentals by B. Ram, New Age Publications, New Delhi.
- Microsoft Office Complete Reference. BPB Publication.

Useful Video Links:

Unit No	Topics	Links
Unit-I	Introduction to Computers	https://youtu.be/-AP1nNK3bRs?si=geVQi8h6iOQAVqL4
Unit-II	Internet	https://www.youtube.com/watch?v=dJfwgqB3XVE&list=PLiBvgS5MGf05_0mitNoB3fi_RYH0s_0B9
Unit-III	MS Word Basics	https://www.youtube.com/watch?v=KXC_tmlIZMU
Unit-III	World Wide Web	https://www.youtube.com/watch?v=-2hpoIjNSb4
Unit-IV	Presentation using MS-PowerPoint	https://www.youtube.com/watch?v=dJfwgqB3XVE&list=PLiBvgS5MGf05_0mitNoB3fi_RYH0s_0B9

Course Code	**LC-MBA-117A**				
Category	Vocational Course				
Course Title	**IT for Managers-1 Lab**				
Scheme and Credits	L	T	P	**Credits**	**Semester-I**
	0	0	2	**1**	
Course Objectives	The objectives of this course are 1. Understand and apply the basic features of MS-Word, Excel, PowerPoint, and Access for various tasks. 2. Create and format professional documents in MS-Word, including advanced features like mail merge and flowcharts. 3. Analyze data and create visual representations such as charts and tables using MS-Excel. 4. Learn database concepts and create databases using MS-Access.				
Assessment	10 Marks				
End Semester Examination	15 Marks				
Total	25 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO2	Explain the basic functions of computer fundamentals and MS-office automation tools.	Level 2: Understand
CO3	Demonstrate Various Applications of MS Office and the Internet in Businesses.	Level 3: Apply
CO4	Categorize various commands and concepts of the Internet and MS Office.	Level 4: Analyze
CO5	Evaluate the effectiveness of MS-Office tools in creating documents, analyzing data, and managing databases.	Level 5: Evaluate
CO6	Create documents, spreadsheets, presentations, and databases using MS-Office tools.	Level 6: Create

List of Experiments:

S. No.	Description
1	To study about MS-Office and its applications.
2	Introduction of Microsoft Word and its features.
3	How to insert a flowchart in MS-Word.
4	Create curriculum vitae (CV) in MS-Word of a graduate with the specification.
5	How to use mail-merge in MS-Word.
6	To study about Microsoft power point and its features.
7	To study about Microsoft Excel and its features.
8	Create Time-Table using MS-Excel.
9	Analyze the marks of the students of a class using various Chart (Line, XY, Bar and Pie) with the help of MS-Excel.
10	To study about MS-Access and its Features.
11	Calculate HRA, DA, TA, PF, LIC. Gross Salary, Net Salary from the below given data with the help of MS-Excel.

12	Create a data base in Ms-Access.

Suggested Readings:

- Fundamentals of Computers by V. Rajaraman , PHI.
- Computer Fundamentals by P.K. Sinha, BPB Publication.
- Learn Microsoft Office by Stultz, A. Russell, BPB Publication.
- Computer Course windows 7 and Office 2010, Taxali, Ravi Kant, McGraw Hill Education.
- Computer Applications in Management by Saxena, Vikas Publication, New Delhi..
- Computer Fundamentals by B. Ram, New Age Publications, New Delhi.
- Microsoft Office Complete Reference. BPB Publication.

Useful Video Links:

Unit No	Topics	Links
Unit-I	Fundamentals of Computer	https://youtu.be/dTJMXp12d9A?si=-2T2gkx_Rcr-FIA9
Unit-II	Introduction to Computer	https://youtu.be/-AP1nNK3bRs?si=geVQi8h6iOQAVqL4
Unit-II	Analog and Digital Signals, Bandwidth, Network Topology	https://www.youtube.com/watch?v=dJfwgqB3XVE&list=PLiBvgS5MGf05_0mitNoB3fi_RYH0s_0B9
Unit-III	MS Word Basics	https://www.youtube.com/watch?v=KXC_tmlIZMU
Unit-III	World Wide Web	https://www.youtube.com/watch?v=-2hpoIjNSb4
Unit-IV	MS Excel - Viewing Worksheets	https://www.youtube.com/watch?v=CaO28XqxnY0
Unit-IV	MS Access	https://www.youtube.com/watch?v=dZINyYz_wEI&list=PL1dx_7g6scPLQxABsiL36LmHfcjuTsLT1

Course Code	**INT-MBA-119A**					
Category	Internship Course					
Course Title	**Internship-1**					
Scheme and Credits	L	T	P	**Credits**	**Semester-I**	
				4		
Course Objectives	The objectives of this course are 1. To apply theoretical knowledge to real-world situations and gain hands-on experience in the field. 2. To strengthen key skills like communication, teamwork, and problem-solving for career readiness. 3. To understand industry practices, trends, and expectations through direct exposure. 4. To build professional relationships with mentors and peers for future career prospects.					
Assessment	50 Marks					
Pratical Examination	50 Marks					
Total	100 Marks					
Duration of Exam	03 Hours					

Course Outcomes: After successful completion of this course, the students will be able to

COs	**Skills Demonstrated**	**RBT Level**
CO1	Explain workplace processes, industry standards, and theoretical concepts applied during the internship.	Level 2: Understand
CO2	Apply academic knowledge and technical skills to solve real-world challenges in the workplace.	Level 3: Apply
CO3	Analyze complex work problems and propose potential solutions.	Level 4: Analyze
CO4	Evaluate various strategies, providing reasoned judgments and recommendations based on experience.	Level 5: Evaluate
CO5	Develop a network of contacts and collaborate with professionals to enhance career opportunities.	Level 6: Create

Note: The evaluation will be based on two parts: 50 marks for the presentation of the report and 50 marks for the report writing.

Students will be required to undergo Internship Training for **120 hours** during the 1st semester, if they choose the INR-1 option, with the option to select between SEC-1, VOC-1, and INR-1.

The Internship Project (IP) is an optional part of the academic curriculum for MBA 1st semester students. Students who choose Internship-1 as an option must complete the Internship Project for successful completion of the MBA 1st semester. They are required to undergo the internship as per the given duration. Students must work with an organization to gain hands-on experience during the semester. The internship can be undertaken at an organization located within the geographical boundary of the Delhi NCR.

Course Code	**DSC-MBA-102A**				
Category	Discipline specific Courses				
Course Title	**Managerial Economics**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	3	1	0	4	
Course Objectives	The objectives of this course are 1. To equip students with the tools and frameworks to apply economic principles such as marginal analysis, elasticity, and cost analysis to make informed managerial decisions. 2. To understand different market structures, pricing strategies and the impact of consumer behavior and external factors on business. 3. To understand how macroeconomic policies, business cycles and inflation affect business strategy and decision-making.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Define the basic concepts of managerial economics.	Level 1: Remember
CO2	Summarize the role of economics in making effective managerial decision making.	Level 2: understand
CO3	Apply economic theories and models to solve real-life business problems.	Level 3: Apply
CO4	Analyze the impact of economic factors on business operations and decision making.	Level 4: Analyze

Note:

1. Examiner will set nine questions in total, Question one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.
2. At least four cases will be discussed, one from each unit.

Unit No.	Contents
Unit-I	**Nature and Scope of Managerial Economics**: Nature of Marginal Analysis, Cardinal Utility Theory, Indifference Curve Technique and the Theory of Consumer Choice, Consumer Surplus, Price, Income and Substitution effects, Demand Elasticity, Demand Estimation and Forecasting, Relationship between Price Elasticity and Marginal Revenue.
Unit-II	**Law of Variable Proportions**: Laws of Return, Optimal Input Combination, Output-Cost Relations, Engineering Cost Curves, Technological Change and Production Decisions, Revenue Curves of a Firm, Price-output Decisions under Alternative Market Structures, Shut-down Points, Baumol's Sales Maximization Model, Advertising and Price- output Decisions, Alternative Objectives of Business Firms
Unit-III	**Product Differentiation**: Price-output Decision in Multi-plant and Multi-product Firms, General Pricing Strategies, Special Pricing Techniques – Limit Pricing, Peak load Pricing and Transfer Pricing, Dumping Analysis, Pricing of Public Utilities.

Unit-IV	**Risk Analysis**: Investment and Capital Replacement Decisions, Locational Choice of a Firm, Measures of National Income, Business Cycles, Operative aspects of Macroeconomic Policies, Inflation Analysis, Tariff Analysis.

Suggested Readings:

- Managerial Economics by Mark Hirschey, Thomson Learning, Bangalore
- Managerial Economics by V. Agarwal, Pearson Education.
- Pricing-Making Profitable Decisions by Monroe, B. Kent, McGraw-Hill, New York
- Managerial Economics – Economic Tools for Today's DecisionMakers by Keat, B. Paul, and K.Y. Young Philip, Pearson Education.
- Managerial Economics in a Global Economy by Salvatore, Dominick, Thomson Learning, Bangalore

Useful Video Links:

Unit No	Topics	Links
Unit-I	Price Elasticity of Demand	https://www.youtube.com/watch?v=qvuzowVNRAI
Unit-II	Theory of Production	https://www.youtube.com/watch?v=SKv5xuN67uc
	Cost Analysis	https://www.youtube.com/watch?v=ZGjOaAe0cHw
Unit-III	Limit pricing	https://www.youtube.com/watch?v=0VByYhs30t0
	Peak load pricing	https://www.youtube.com/watch?v=BLZ27g-9Wkc
	Transfer pricing	https://www.youtube.com/watch?v=1T_OxYLesg0
	Market failure and government intervention	https://www.youtube.com/watch?v=EEn0gJIoxBI
Unit-IV	Investment and capital replacement decisions	https://www.youtube.com/watch?v=oERxN9OUX_8
	Measures of national income	https://www.youtube.com/watch?v=lTrWMRroPXU

Course Code	**DSC-MBA-104A**				
Category	Discipline Specific Course				
Course Title	**Business Environment**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	3	1	0	**4**	
Course Objectives	The objectives of this course are 1. To understand internal and external factors (political, socio-cultural, legal, technological) influencing organizational strategy. 2. To understand key business laws (e.g., MRTP, CCI, FEMA, SEBI) and their impact on operations. 3. To explore globalization trends, foreign trade policies, and India's economic competitiveness in the global market.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	**Skills Demonstrated**	**RBT Level**
CO1	Define the fundament concept of business environment.	Level 1: Remember
CO2	Describe the conceptual framework of business environment.	Level 2: Understand
CO3	Apply economic and industrial policies to foster entrepreneurship, infrastructure development.	Level 3: Apply
CO4	Analyze business environment factors and policies for effective decision making.	Level 4: Analyze

Note:

1. Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.
2. At least four cases will be discussed, one from each unit.

Unit No.	**Contents**
Unit-I	**Introduction to Business Environment**: The Concept of Business Environment, Significance and Nature. **Environment Scanning:** Meaning, Nature and Scope, Environmental Scanning, Interaction between Internal and External Environments, Basic Philosophies of Capitalism and Socialism with their Variants. Concepts of Mixed Economy.
Unit-II	**Business Environment and Business Laws**: Overview of Political, Socio-Cultural, Legal, Technological and Global Environment, Recent Developments with regard to enactment of Business Laws, An Introduction to MRTP, CCI, FEMA, SEBI Act, Consumer Protection Act, The changing dimensions of these Laws and their Impact on Business.
Unit-III	**Economic Environment and Industry Regime:** Economic Environment for Skill Development in Start-Ups and the MSME Sector, Business Opportunities in the Rural Sector, Trends in Service Sector Growth, Public Sector Reforms and Performance, Banking Reforms and Challenges, Infrastructure Development and Policy, Public and Private Partnership, Intellectual Property Regime and the R & D Environment.

Unit-IV	**Globalization Trends And Challenges:** Balance of Payments Trends, Environment for Foreign Trade and Investment, Exchange Rate Movements and their Impact, India's Competitiveness in the World Economy, External Influences on India's Business Environment, Policies with regard to Foreign Trade and Investment.

Suggested Readings:

- Business Environment by Saleem Shaikh, Pearson Education
- Essentials of Business Environment by K. Aswathappa, Himalaya Publishing House, New Delhi.
- Business Environment-Text and Cases by Cherunilam, Francis, Himalaya Publishing House, New Delhi.
- Business Environment Text and Cases by Justin Pual, Tata McGraw Hill, New Delhi
- Economic Environment of Business by S.K. Mishra and V.K. Puri , Himalaya Publishing House, New Delhi.
- Economic Environment of Business by M. Adhikari, Excel Books, New Delhi.
- Indian Economy by Dutt, Ruddra and K.P.M. Sundaram, S. Chand and Co. Ltd., New Delhi.
- Business Environment by Namita Gopal, Tata McGraw Hill, New Delhi

Useful Video Links:

Unit No	Topics	Links
Unit-I	The concept of Business Environment	https://www.youtube.com/watch?v=UmRjpZSPI5A&list=PL92RPe36fLKgPeoIN1pwFbatqS7Q0kA9k
Unit-II	Global business environment	https://www.youtube.com/watch?v=Ciuk6BnbmfQ&list=PLQW7Kx-QndIFKpXhG2jPHpIF6ao-fOA5f
Unit-III	Industrial Policy	https://www.youtube.com/watch?v=ZeD-XLmCXUg
Unit-IV	Globalization trends and challenges	https://www.youtube.com/watch?v=3l8xN15NvHk&list=PLyqSpQzTE6M8vM5OZ4nyO0o3PbqpMB_zg

Course Code	**DSC-MBA-106A**				
Category	Discipline Specific Course				
Course Title	**Management Information System**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	3	1	0	4	
Course Objectives	The objectives of this course are 1. To be able to understand the role of MIS in business decision-making and its structure. 2. To learn to leverage MIS for strategic advantage and process improvement. 3. To develop skills in designing, implementing, and maintaining MIS through the SDLC. 4. To explore the integration of advanced technologies (AI, ERP, CRM, SCM) into business operations.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	**Skills Demonstrated**	**RBT Level**
CO1	Explain the basic concepts and characteristics of Management Information Systems (MIS) and its contributes to decision-making processes.	Level 2: Understand
CO2	Apply the strategic role of MIS in enhancing business processes and achieving organizational goals.	Level 3: Apply
CO3	Apply system development methodologies to design and implement MIS.	Level 3: Apply
CO4	Analyze the role of MIS in organizational processes and its applications in enterprise systems emerging technologies.	Level 4: Analyze

Note:

1. Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.
2. At least four cases will be discussed, one from each unit.

Unit No.	**Contents**
Unit-I	**Data And Information**: MIS- Need and Concepts, Factors Influencing MIS and Characteristics of MIS, Technology of MIS, Structure of MIS, Decision Making and Role of MIS, Data Communication, Basic H/W Required, Channel Features and Concept of Distributed Data Bases, Decision Support System, Overview, Components and Classification, Steps in Constructing a DSS, Role in Business, Group Decision Support System.
Unit-II	**Information System**: Information System for Strategic Advantage, Strategic Role for Information System, Breaking Business Barriers, Business Process Reengineering, Improving Business Qualities.

Unit-III	**Planning for MIS:** System Development Methodologies, Conceptual and Detailed Designs of MIS. Information System Analysis and Design, Information SDLC, Hardware and Software Acquisition, System Testing, Documentation and its Tools, Conversion Methods.
Unit-IV	**System Implementation Strategies and Process**: System Evaluation and Maintenance. Applications– Cross– Functional MIWS, ERP, CRM, SCM, Transaction Processing, Artificial Intelligence Technologies in Business, Neural Network, Fuzzy Logic, Virtual Reality, Executive Information System.

Suggested Readings:

- Management Information Systems by Jawadekar, TMH, N Delhi.
- Management Information System by James Brien, Tata McGraw Hill, Delhi.
- Principles of Management System by Stair, Thomson Learning, Bombay.
- Information Technology and the Networked Economy by Mckeown, Thomson Learning, Bombay.
- Cases in MIS by Brady, Thomson Learning, Bombay.
- Management Information System by Murdick & Ross, PHI, Delhi.
- Management Information System by J. Kanter, PHI, Delhi.

Useful Video Links:

Unit no	Topics	Links
Unit-I	Information Management in the digital world	https://www.youtube.com/watch?v=pqEth2rx1RM
	Decision Support Systems	https://www.youtube.com/watch?v=7k-tL0eoJ7o
Unit-II	Strategic Management	https://www.youtube.com/watch?v=8swTrGXDm-w&t=1s
	Data bases and information management	https://www.youtube.com/watch?v=pL46Mwa_dTY
Unit-III	Aligning IT with business objectives	https://www.youtube.com/watch?v=2RtxuLxfu_0
	Data analytics tools and techniques	https://www.youtube.com/watch?v=M0Ef_bbXx6k
Unit-IV	ERP project management : Challenge , risks and best practices	https://www.youtube.com/watch?v=CvVzst0R12A
	Supplier relationship management	https://www.youtube.com/watch?v=2vgWdgxjaas

Course Code	**DSC-MBA-108A**				
Category	Discipline Specific Course				
Course Title	**Total Quality Management**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	3	1	0	**4**	
Course Objectives	The objectives of this course are 1. To study the key concepts, principles, and practices of Total Quality Management (TQM). 2. To learn the tools and techniques used in TQM, including PDSA, Kaizen, Benchmarking, and the Seven Quality Tools, for continuous improvement and problem-solving. 3. To learn statistical process control (SPC) methods, including Taguchi's design and FMEA, to improve product and process quality 4. To familiarize about international quality standards such as ISO 9000 and EMS 14001, and conduct quality audits and vendor rating systems for performance measurement				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	**Skills Demonstrated**	**RBT Level**
CO1	Explain the key concepts of Total Quality Management .	Level 2: Understand
CO2	Apply TQM tools and techniques to improve organizational quality.	Level 3: Apply
CO3	Use strategies for customer satisfaction, employee involvement, and continuous process improvement.	Level 3: Apply
CO4	Analyze TQM principles, strategies, tools, and systems for effective decision making.	Level 4: Analyze

Note:

1. Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.
2. At least four cases will be discussed, one from each unit.

Unit No.	**Contents**
Unit-I	**TQM Perspective and TQM Implementation**:Quality, Chain Reaction ,Dimensions of Quality, Evolution Of Quality, Quality Control, Quality Assurance, Quality Planning, Quality Improvement, Quality Management, Total Quality Management, Cost Of Quality, Classification of Failure Cost, Reducing Costs, Juran's Model Of Optimum Quality Costs, Analysis of Cost of Quality (COQ) For Improvement, Analysis Of External and Internal Failure Costs ,TQM, Elements Of TQM, Leadership For TQM, Deeming 14 Points For Top Management, TQM Tools And Techniques, Plan-Do-Study-Act (PDSA), Barriers For TQM Implementation.
Unit-II	**TQM principles and Strategies:**Customer Satisfaction & Employee Involvement. Service Quality, Features Of Services, The Kano Model, Employee Motivation, Motivation Theory Of Individual Employees ,Effective Communications, Training And Mentoring ,Recognition And Reward. Continuous Process Improvement and Process Approach. Juran's Tribology, Kaizan, Plan-Do-

	Check-Act (PDCA), Seven Quality Tools ,Business Process Reengineering (BPR) ,Seven Deadly Wastes , Experience Transformation Model, Lean Manufacturing, Kabana System, Cellular Manufacturing, Single Piece Flow, Zero Defects.
Unit-III	Statistical Process Control & TQM Tools :The Seven Quality Control Tools, Standard Normal Distribution, Acceptable Quality Level (AQL), Seven Management Tools, Benchmarking, Quality Function Deployment (QFD), Taguchi's Design, Total Productive Maintenance(TPM), Failure Modes and Effects Analysis (FMEA).
Unit-IV	**Quality Systems:**International Organization for Standardization (ISO) 9000 standard, Environmental Management System 14001 (EMS14001), Quality Awards Supplier Partnership and Performance Measures-Importance Of Suppliers, Selection And Standards, Quality Audit, Product Audit, Vendor Rating System, Plan-Do-Check-Act(PDCA) For Measurements, Performance Measure Design, Balanced Scorecard (BSC).

Suggested Readings:

1. Total Quality Management by Oakland (Butterworth- Heinamann Ltd.)
2. Managing for total quality from Demingto Taguchi and SPC by Logothetis N.(PHI)
3. Total QualityControl by Feigenbaum A.V. (MGH)
4. Total Quality Management by Besterfield Dale H (PearsonEducation)

Useful Video Links:

Unit No.	Topic	Link
UNIT-I	Quality and its dimensions	https://youtu.be/5pMWmU_8lfI?si=hI0dsNsI2yUMLrz1
	Quality Control	https://youtu.be/xQQ2AWs0hT4?si=EKjvfZUQxU53kai2
	Total quality management	https://www.youtube.com/watch?v=yWlAOFs04go
	Deeming 14 Points	https://archive.nptel.ac.in/courses/110/105/110105088/
UNIT-II	Seven Quality Tools	https://www.youtube.com/watch?v=HQiiRh5GoIc
	Lean manufacturing	https://archive.nptel.ac.in/courses/110/107/110107130/
UNIT-III	The Seven Quality Control Tools	https://www.youtube.com/watch?v=6-JVHv5djIc
	FMEA	https://www.youtube.com/watch?v=UOuTBCrW2kY
UNIT-IV	ISO 9000	https://archive.nptel.ac.in/courses/110/104/110104080/
	PDCA	https://www.youtube.com/watch?v=4XYS7_NSvLA

Course Code	DSC-MBA-110A					
Category	Discipline Specific Course					
Course Title	**Emotional Intelligence**					
Scheme and Credits	L	T	P	**Credits**	**Semester-II**	
	3	1	0	**4**		
Course Objectives	The objectives of this course are 1. To understand the key concepts of emotional intelligence, its relationship with IQ, and its impact on personality, diversity, and cultural intelligence. 2. To explore emotional competencies and their role in leadership styles like primal, resonant, and resilient leadership. 3. To understand the emotional phenomena such as empathy, emotional contagion, and burnout, and their effects on branding and organizational behavior. 4. To understand emotional intelligence in individuals and teams, and apply it in decision-making across HR, marketing, and finance.					
Assessment	40 Marks					
End Semester Examination	60 Marks					
Total	100 Marks					
Duration of Exam	03 Hours					

Course Outcomes: After successful completion of this course, the students will be able to

Cos	Skills Demonstrated	RBT Level
CO1	Describe foundational concepts of emotional intelligence and its relevance in workforce cultural diversity.	Level 2: Understand
CO2	Apply emotional intelligence concepts and competency to enhance leadership, and workplace dynamics for effective team management.	Level 3: Apply
CO3	Apply emotional dynamics and social intelligence to improve decision-making and emotional well-being in organizational settings.	Level 3: Apply
CO4	Analyze the role of emotional intelligence in workplace behavior for effective working environment.	Level 4: Analyze

Note:

1. Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.
2. At least four cases will be discussed, one from each unit.

Unit No.	Contents
Unit-I	**Introduction to Emotional Intelligence**: Concept and Significance of Emotional Intelligence, Emotional Quotient and Intelligence Quotient, Multiple Intelligence, Emotional Intelligence and Personality, Models of Emotional Intelligence, Emotional Intelligence and Workforce Diversity, Cultural Intelligence.
Unit-II	**Emotional Competency and Leadership**: Emotional Competency Framework, Personal Competencies, Social Competencies, Emotional Intelligence and Leadership, Primal Leadership, Resonant Leadership, Resilient Leadership, Political Intelligence, Moral Intelligence.

Unit-III	**Emotional Dynamics and Workplace Impact**: Emotional Affectivity, Empathy, Emotional Contagion, Emotional Labour, Emotional Dissonance, Emotional Tagging, Emotional Burnout, Emotional Branding.
Unit-IV	**Social Intelligence and Practical Application of EI**: Social Intelligence, Emotional Intelligence, Assessing Emotional Intelligence, Managing Emotions, Building Emotionally Intelligent Workplaces, Role of Emotional Intelligence in Decision Making, Applications of EmotionalIntelligence in HR, Marketing and Finance.

Suggested Readings:

- Emotional Intelligence— Why It Can Matter More than IQ by Daniel Goleman, Bloomsbury, UK
- Working with Emotional Intelligence by Daniel Goleman, Bloomsbury, London
- Primal Leadership by Daniel Goleman, R Boyatzis and Mckee Annie, Harvard Business School Press,Boston
- Social Intelligence – The New Science of Human Relationships by Daniel Goleman, Bantam Books,New York.
- Resonant Leadership by Richard Boyatzis, and Mckee Annie, Harvard Business Review Press
- Leading with Emotional Intelligence by S. Reldan Nadler, Tata McGraw Hill, New Delhi

Useful Video Links:

Unit No	Topics	Links
Unit-I	Emotional Intelligence	https://www.youtube.com/watch?v=mUG1sHQXRX0&list=PLHRLZtgrF2jlGxPGEdaW87Uqo2-V9CJg3
Unit-II	Difference Between EQ and IQ	https://www.youtube.com/watch?v=OhH5x5B4unE&list=PLHRLZtgrF2jlGxPGEdaW87Uqo2-V9CJg3&index=12
Unit-III	EQ and Empathy	https://www.youtube.com/watch?v=EPPkk4TP_9s&list=PLHRLZtgrF2jlGxPGEdaW87Uqo2-V9CJg3&index=14
Unit-IV	social intelligence	https://www.youtube.com/watch?v=bGtK70ZhJn8

Course Code	SEC-MBA-112A				
Category	Skill Enhancement Course				
Course Title	**Personality and Soft Skills Development**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	3	0	0	**3**	
Course Objectives	The objectives of this course are 1. To develop self-awareness, emotional intelligence, stress management, and key interpersonal skills like conflict resolution, teamwork, and leadership. 2. To enhance communication, problem-solving, creativity, and emotional intelligence for improved decision-making and confidence. 3. To understand team dynamics, cross-cultural communication, professionalism, work ethics, networking, and cultivate a growth mindset for career success.				
Assessment	25 Marks				
End Semester Examination	50 Marks				
Total	75 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	**Skills Demonstrated**	**RBT Level**
CO1	Describe the key principles of personality development and communication skills.	Level 2: Understand
CO2	Apply essential soft skills to enhance professional relationships, problem-solving and personal efficiency in work settings.	Level 3: Apply
CO3	Use personality and soft skills techniques to improve workplace performance.	Level 3: Apply
CO4	Analyze the role of advanced soft skills in leadership, career growth and collaborative work environments.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 5 parts of 2 marks each from all units and remaining eight questions of 10 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit No.	**Contents**
Unit-I	**Personality**: Introduction to Personality, Understanding Self-Concept and Self-Esteem, Emotional Intelligence, Personal Values and Goal Setting, Stress Management and Resilience, Time Management.
Unit-II	**Interpersonal Skills:** Conflict Resolution and Negotiation, Teamwork and Collaboration, Leadership Skills, Professional Etiquette, Networking and Relationship Building.
Unit-III	**Essential Soft Skills**: Introduction to Soft Skills, Communication Skills, Problem-Solving and Critical Thinking, Creativity and Innovation, Work Ethics and Dependability, Emotional Intelligence and Self-Confidence, Managing emotions, empathy and self-regulation.
Unit-IV	**Advanced Soft Skills**: Team Dynamics and Collaboration, Professionalism and Work Ethics, Career Development and Networking, Cross-Cultural Communication, Cultivating Optimism and a Growth Mindset.

Suggested Readings:

- Personality Development and Soft Skill by Barun K. Mitra, Oxford University Press.
- Soft Skills and Professional Communication by S. J. Peter Francis, Tata McGraw-Hill Education,2011.
- Communication and soft skill development by Ashwini Deshpande, Career Publications.
- Communication Skills and Soft Skills: An Integrated Approach, by Suresh Kumar, Sreehari and Savithri, Pearson India.
- Business Communication From Principles To Practice by M. Matthukutty Monippally, McGraw Hill

Useful Video Links:

Unit No	Topics	Links
Unit-I	Emotional Intelligence	https://archive.nptel.ac.in/courses/109/105/109105116/
	Stress Management	https://www.youtube.com/watch?v=BFkQ06pBKjI
Unit-II	Conflict Management	https://www.youtube.com/watch?v=wYb_PKTawE4
Unit-III	Introduction to Soft Skills	https://www.youtube.com/watch?v=DUlsNJtg2L8
Unit-IV	Advanced Soft Skills	https://youtu.be/3Sx96vWfF8w?si=ur6J3KNg9q1a1u-n

Course Code	**LC-MBA-114A**				
Category	Skill Enhancement Course				
Course Title	**Personality and Soft Skill Development Lab**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	0	0	2	**1**	
Course Objectives	The objectives of this course are 1. To improve emotional awareness, empathy, and social skills through quizzes and stress management practices. 2. To create time schedules and prioritize tasks based on urgency and importance. 3. To apply logical reasoning and creative solutions in case studies and role-plays. 4. To practice mock interviews and professional scenarios to improve communication and career development.				
Assessment	10 Marks				
End Semester Examination	15 Marks				
Total	25 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	**Skills Demonstrated**	**RBT Level**
CO1	Describe key concepts of emotional intelligence, stress management, communication skills, and their application in professional settings.	Level 2: Understand
CO2	Apply emotional intelligence, time management, and conflict resolution techniques to improve personal and team performance.	Level 3: Apply
CO3	Analyze case studies, role-plays, and group tasks to assess problem-solving, team dynamics, and leadership strategies.	Level 4: Analyze
CO4	Evaluate career development plans, communication styles, and cultural sensitivity to assess their impact on professional growth.	Level 5: Evaluate

List of Practical's:

Sr. No.	**Description**
1	To Conduct an Emotional Intelligence Quiz, that Reflect on how to Improve Emotional Awareness, Empathy, Stress Management Technique and Social Skills.
2	To Give a List of Tasks with Deadlines, Create a Time Schedule, Prioritizing Based on Urgency and Importance.
3	To Practice Various Stress Management Techniques such as Deep Breathing, Mindfulness, and Progressive Muscle Relaxation, then Reflect on how each affects your Stress Levels and Share Feedback with Peers.
4	To Conduct a Conflict Resolution Role-Play Experiment.
5	To Conduct Role Plays of Professional Scenarios like Job Interviews, Business Meetings and Networking Events to Improve Communication Skills and Body Language.
6	To Conduct Role-Play (e.g., Presenting Ideas, Handling Customer Complaints) and Focus on Improving Clarity, Tone, Body Language, and Active Listening.
7	To Analyze a Case Study and present a Solution, Demonstrating Logical Reasoning and Creative Approaches to Problem-Solving.
8	To Brainstorm Creative Solutions to a given Challenge (e.g., a New Product Idea or Business Solution), followed by a Presentation of their Best Ideas.
9	To Engage in a Group task (e.g., Building a Structure with Limited Materials) to observe Team Roles, leadership styles, and collaboration strategies.

10	To Develop a Personal Career Development Plan and Practice Networking through Mock Interviews or Speed Networking Sessions.
11	To Conduct a Role-Playing Exercise where Students Interact with Peers from Different Cultural Backgrounds, Focusing on Cultural Sensitivity, Communication Styles, and Overcoming Barriers.

Suggested Readings:

- Personality Development and Soft Skill by Barun K. Mitra, Oxford University Press.
- Soft Skills and Professional Communication by S. J. Peter Francis, Tata McGraw-Hill Education, 2011.
- Communication and soft skill development by Ashwini Deshpande, Career Publications.
- Communication Skills and Soft Skills: An Integrated Approach, by Suresh Kumar, Sreehari and Savithri, Pearson India.
- Business Communication From Principles To Practice by M. Matthukutty Monippally, McGraw Hill

Useful Video Links:

Topics	Links
Time Management	https://www.bing.com/videos/riverview/relatedvideo?q=video+lecture+on+time+management&mid=B860E8A75966C5CEBC00B860E8A75966C5CEBC00&FORM=VIRE
Stress management techniques	https://archive.nptel.ac.in/courses/121/105/121105009/
Presentation Skills	https://www.bing.com/videos/riverview/relatedvideo?q=Mod-10+Lec-01+Oral+Presentation+Lecture-01&mid=49650DD5507224BBFFD249650DD5507224BBFFD2&FORM=VIRE
Problem-Solving and Critical Thinking	https://www.youtube.com/watch?v=QahFjscm8ZU

Course Code	**VOC-MBA-116A**				
Category	Vocational Course				
Course Title	**IT for Managers-2**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	3	0	0	**3**	
Course Objectives	The objectives of this course are 1. To grasp IT infrastructure basics, including networks, APIs, mobile tech, and cyber security challenges. 2. To understand how digital technologies transform business processes and build capabilities through cloud services and data governance. 3. To manage big data, implement business intelligence, and use data mining and visualization for decision-making. 4. To understand the impact of networks on business, address privacy issues, and build basic HTML web pages.				
Assessment	25 Marks				
End Semester Examination	50 Marks				
Total	75 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Explain the core concepts of IT infrastructure, including technology, network, business intelligence, and cyber security.	Level 2: Understand
CO2	Applying IT and Web Design Tools to Solve Business Problems and Enhance Management Efficiency.	Level 3: Apply
CO3	Apply IT techniques and business strategies to deliver innovative solutions.	Level 3: Apply
CO4	Analyze IT tools and methodologies to design strategies for business growth and digital transformation.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 5 parts of 2 marks each from all units and remaining eight questions of 10 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit No.	Contents
Unit-I	**Introduction to IT Infrastructure**: Data Networks and Application Programme Interface (API) – Fundamentals, Corporate Network Functions, Business Uses, Wireless and Mobile Infrastructure, Messaging and Collaboration Technology, Data Breaches and Cyber Security Challenges, IT Risk Management, Mobile App and Cloud Security Challenges, Financial Crimes and Fraud Defenses, Sustainability and the Triple Bottom Line Approach Internet Technologies and Search Strategies, Search Technology, Organic Search and Search Engine Optimization, Paid Search Strategies and Metrics, Semantic Web and Search.
Unit-II	**Information Technology in Business**: Digital Technology Transforming Business Processes, Competitive Advantage and SWOT Analysis Building Business Capabilities with Data Governance and Cloud Services, Data Governance Strategy, Enterprise IT Architecture, Information and Decision Support Systems, Data Centers and Cloud Computing, Cloud Services Delivery Model.

Unit-III	**Data Management, Big Data and Business Intelligence:** Data Management Technologies and Techniques, Transaction Processing and Analytics Processing Systems, Dirty Data Costs and Consequences, Data Ownership and Organizational Politics, Data Life Cycle, Big Data Analytics, Data and Text Mining, Data Visualization, Enterprise Data Mashups, Digital Dashboards and Business Intelligence.
Unit-IV	**Networked Economy**: Impact of Computer Networks on Business, Elements of Networked Economy, Using IS Functions to Deal with Business Risks, Privacy, Health and Ethical Issues in Networked Economy, Future of the Networked Economy. **HTML**: Build A Simple HTML Document, Tables, Frames, Links, Adding Multimedia Documents, Home Page. **Lab:** Web Designing In HTML, Internet Surfing.

Suggested Readings:

- Information Technology for Management by Turban, Vonino and wood, Wiley Publications, New Delhi.
- Information Technology and the Networked Economy by McKeown, Thomson Learning
- Data and Network Communication by Miller, Vikas Publishing House, New Delhi.
- Business Driven Technology by Hagg, Baltzan & Philips, TMH, N. Delhi.
- Using HTML by Molly, PHI, Delhi.

Useful Video Links:

Unit No	Topics	Links
Unit-I	Introduction to Computer Networks	https://www.youtube.com/watch?v=lnU-Zw3NEEQ
	IP Addressing (IPv4)	https://www.youtube.com/watch?v=H-R3KUPX1v4
Unit-II	Cloud Computing Case Study with a Commercial Cloud	https://www.youtube.com/watch?v=Mkuf4pTqIdU&list=PLShJJCRzJWxhz7SfG4hpaBD5bKOloWx9J&index=17
Unit-III	Introduction to Data Analytics	https://www.youtube.com/watch?v=9gfER4p1jXM&list=PLReFtKLr0QN7MmQ8pdpQerOe_s8vGJG4&index=2
	Business Analytics For Management Decision	https://www.youtube.com/watch?v=7yHLA6BlnMU&t=2s
Unit-IV	Introduction to HTML and CSS	https://www.youtube.com/watch?v=h_RftxdJTzs
	HTML Advanced	https://www.youtube.com/watch?v=dlkWNdnO8ek&list=TLPQMTExMTIwMjTs6qJY5dSzcA&index=2

Course Code	**LC-MBA-118A**				
Category	Vocational Course				
Course Title	**IT for Managers-2 Lab**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	0	0	2	**1**	
Course Objectives	The objectives of this course are 1. To learn to create and manage email accounts, send/receive emails, and integrate chat systems. 2. To learn to create web pages using HTML, including tables, lists, links, images, and multimedia. 3. To develop interactive pages using forms, anchor tags, and JavaScript for dynamic features like clocks and effects. 4. To create functional websites like resumes, login pages, and savings tables using HTML and JavaScript.				
Assessment	10 Marks				
End Semester Examination	15 Marks				
Total	25 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Explain the core concepts of IT infrastructure, including technology, network, business intelligence, and cyber security.	Level 2: Understand
CO2	Applying IT and Web Design Tools to Solve Business Problems and Enhance Management Efficiency.	Level 3: Apply
CO3	Analyze IT tools and methodologies to design strategies for business growth and digital transformation.	Level 4: Analyze
CO4	Evaluate the functionality and user experience of dynamic web pages created using HTML and JavaScript.	Level 5: Evaluate
CO5	Create interactive and dynamic web pages with multimedia elements, forms, and effects using HTML and JavaScript.	Level 6: Create

List of Experiments:

Sr. No.	Experiment Description
1	To define the stages of create e-mail id on yahoo web site, How will you send and receive e mail.
2	To describe the chatting components on the internet.
3	To create your first web page using notepad in HTML.
4	To create your first web page for image insertion and anchor tag in HTML.
5	To create web page for resume of a student in HTML.
6	To create web page for Table for Savings using HTML.
7	To create web page for ordered list and unordered list.
8	To create login webpage for your college website or company website.
9	To show blinking effect on web page using java script.
10	To design a digital clock on your web page using java script.
11	To create a login form with the help of HTML.

12	How to Insert an Audio and Video file in HTML.

Suggested Readings:

- Information Technology for Management by Turban, Vonino and wood, Wiley Publications, New Delhi.
- Information Technology and the Networked Economy by McKeown, Thomson Learning
- Data and Network Communication by Miller, Vikas Publishing House, New Delhi.
- Business Driven Technology by Hagg, Baltzan & Philips, TMH, N. Delhi.
- Using HTML by Molly, PHI, Delhi.

Useful Video Links:

Topic	Links
How ‹table› Tag works in HTML	https://html-iitd.vlabs.ac.in/exp/tables-in-html/simulation.html
Creating Web Page Layout in HTML	https://html-iitd.vlabs.ac.in/exp/webpage-layout-in-html/simulation.html
Embedding through ‹iframe› Tag	https://html-iitd.vlabs.ac.in/exp/iframe-tag-in-html/simulation.html
<marquee> Tag works in HTML	https://html-iitd.vlabs.ac.in/exp/marquee-tags-in-html/simulation.html

Course Code	**INT-MBA-120A**					
Category	Internship Course					
Course Title	**Internship-2**					
Scheme and Credits	L	T	P	**Credits**	**Semester-II**	
				4		
Course Objectives	The objectives of this course are 1. To apply theoretical knowledge to real-world situations and gain hands-on experience in the field. 2. To strengthen key skills like communication, teamwork, and problem-solving for career readiness. 3. To understand industry practices, trends, and expectations through direct exposure. 4. To build professional relationships with mentors and peers for future career prospects.					
Assessment	50 Marks					
Pratical Examination	50 Marks					
Total	100 Marks					
Duration of Exam	03 Hours					

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Explain workplace processes, industry standards, and theoretical concepts applied during the internship.	Level 2: Understand
CO2	Apply academic knowledge and technical skills to solve real-world challenges in the workplace.	Level 3: Apply
CO3	Analyze complex work problems and propose potential solutions.	Level 4: Analyze
CO4	Evaluate various strategies, providing reasoned judgments and recommendations based on experience.	Level 5: Evaluate
CO5	Develop a network of contacts and collaborate with professionals to enhance career opportunities.	Level 6: Create

Note: The evaluation will be based on two parts: 50 marks for the presentation of the report and 50 marks for the report writing.

Students will be required to undergo Internship Training for **120 hours** during the 1st semester, if they choose the INR-1 option, with the option to select between SEC-2, VOC2, and INR-2.

The Internship Project (IP) is an optional part of the academic curriculum for MBA 2nd semester students. Students who choose Internship-2 as an option must complete the Internship Project for successful completion of the MBA 2nd semester. They are required to undergo the internship as per the given duration. Students must work with an organization to gain hands-on experience during the semester. The internship can be undertaken at an organization located within the geographical boundary of the Delhi NCR.

Annexure 2.21

Multidisciplinary Open & Foundation Elective –I Courses

Students of all M.Tech programmes are required to study one Multidisciplinary open elective course in each of the 2nd and 3rd Semesters and one foundation elective course in 2nd Semester for 2-Years Programmes. They may choose any one of the following courses (excluding the courses offered by the departments of their own subjects, if not stated otherwise).

Table-II
Open Elective

SN	Course Code	Course Name	Offered by Department
1	OEC-130A	Basic of Economics	Management Department
2	OEC-132A	Fundamentals of Management	Management Department
3	OEC-134A	Disaster Management	Civil Engineering
4	OEC-136A	Industrial Safety	Fire Technology and Safety
5	OEC-138A	Indian Literature in Translation-I	Applied Sc. & Humanities (English)
6	OEC-140A	Environmental Issues	Applied Sc. & Humanities (Chemistry)
7	OEC-142A	Quantitative Techniques	Applied Sc. & Humanities (Mathematics)
8	OEC-144A	Sources of Energy-I	Electrical Engineering
9	OEC-146A	Operation Research	Mechanical Engineering
10	OEC-148A	Multimedia Communication	Electronics and Communication Engineering
11	OEC-150A	Introduction to Information Technology	Computer Sc. & Applications
12	OEC-152A	Cyber Forensics and Security	Computer Sc. & Engineering
13	OEC-154A	Computer Science and Principles	Computer Sc. & Engineering
14	OEC-156A	Software Engineering Practice	Computer Sc. & Engineering

Table-III
Foundation Elective

SN	Course Code	Course Name	Offered by Department
1	FEC-158A	Basics of Accounting	Management Department
2	FEC-160A	Basics of E-commerce	Management Department
3	FEC-162A	Elements of Banking	Management Department
4	FEC-164A	Computer Fundamentals	Computer Science and Engineering
5	FEC-166A	Communication and Soft Skills	Applied Science and Humanities (English)
6	FEC-168A	Entrepreneurship Development	Management Department
7	FEC-170A	Electronics Engineering	Electronics and Communication Engineering

Course Code	**OEC-130A**				
Category	Multidisciplinary Open Elective Courses				
Course Title	**Basics of Economics**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	3	0	0	3	
Course Objectives	The objectives of this course are • To make the students aware of the fundamental concepts related to economies, including core economic problems, opportunity costs, and basic consumer behavior principles. • To enable the students to go beyond understanding concepts and start analyzing economic issues.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	**Define** the fundamental concepts of business economics.	Level 1: Remember
CO2	**Interpret** the theories of consumption and production.	Level 2: Understand
CO3	**Apply** the theories and laws of micro economics to solve business problems.	Level 3: Apply
CO4	**Analyze** the process of decision making by consumers and producers.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Introduction: Meaning, Nature and scope of Microeconomics, Concept of resources, Meaning and types of economy, Difference between Micro and Macro-economics, Central problems of an economy (what, how and for whom to produce), Production possibility curve, Meaning, Assumptions and its properties, Shifting of curve and opportunity cost, Characteristics of various economic resources, Factors of production.

Unit-II

Consumer Behavior (Utility Analysis): Meaning of utility, Marginal utility, Law of diminishing marginal utility, Law of equi- marginal utility, Conditions of consumer's equilibrium.

Consumer Behavior (Indifference curve analysis): Assumptions, Properties of indifference curve, Consumer equilibrium, Short run and long run production functions, Law of variable proportions, Law of return to scale, Factors affecting the location of firms.

Unit-III

Demand and Supply Analysis: Law of demand, market demand, determinants of demand, demand schedule, Demand Curve, Types of Goods, Normal goods, Inferior goods, Substitute goods, Complimentary goods, Giffen goods, Price elasticity of demand, Factors affecting price elasticity of demand, Methods to measure price elasticity of demand, Law of supply, Determinants of Supply, Elasticity of supply.

Cost and revenue: Total cost, Total fixed cost, Total variable cost, Average cost, Average fixed cost, Average variable cost, Meaning and relationship of total revenue and marginal revenue, Market and forms of market, Equilibrium of the firm and industry, Perfect competition, Monopoly, Monopolistic competition, Discriminating monopoly, Aspects of non-price competition.

Suggested Readings:

- Modern Microeconomics by A. Kout Soyiannis, Macmillan Press, London
- Microeconomics Theory and Applications, by A. Sen, Oxford University Press
- Microeconomic Analysis by H. Varian, W.W. Norton, New York
- Economic Theory and Operations Analysis by W.J. Baumol, Prentice Hall of India, New Delhi
- Barriers to New Competition by J. Bain, Harvard University Press, Harvard
- Microeconomic Theory A Mathematical Approach by J.M. Henderson & R.E. Quandt, McGraw Hill

Useful Video Links:

Unit No.	Topics	Links
Unit-I	Concept of production possibility function	https://youtu.be/vzz2E7fU7Kk?feature=shared
Unit-II	Concepts of Utility	https://youtu.be/6MGjlbn7kO0
Unit-III	Price elasticity of demand	https://youtu.be/CG46N6R-bwo?feature=shared
Unit-IV	Theory of Cost	https://youtu.be/svespJwNQNo

Course Code	OEC-132A				
Category	Multidisciplinary Open Elective Courses				
Course Title	**Fundamentals of Management**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	3	0	0	**3**	
Course Objectives	The objectives of this course are to • Understand management concepts, functions, skills, roles, and challenges in organizational settings. • Learn planning strategies, decision-making processes, and management by objectives for organizational growth. • Grasp organizing principles, structure, delegation, and centralization for efficient resource management. • Learn control techniques and systems to monitor performance, ensure quality, and achieve goals				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Define the fundamental concepts of management.	Level 1: Remember
CO2	Explain the functional areas of management and various management theories.	Level 2: Understand
CO3	Apply organizational principles to develop effective structures, allocate responsibilities, and manage decision-making.	Level 3: Apply
CO4	Analyze management techniques and systems to ensure their organizational effectiveness.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Overview of Management: Concept, Nature, Process, Managerial levels (Technical, Conceptual, Interpersonal), Skills, Functions and Role of managers, Challenges of management.

Unit-II

Planning: Nature and purpose of planning, Planning process, Types of plans, Management by Objectives (MBO), Strategies, types of strategies (Corporate Strategy, Business Strategy, Differentiation Strategy, Retrenchment Strategy, Growth Strategy). Decision making: Types of decision, Decision making process, Rational decision making.

Unit-III

Organizing: Meaning, Nature and purpose of organizing, organization structure, Departmentation, Span of control, Centralization and Decentralization, Delegation of authority and responsibility.

Unit-IV

Controlling: Meaning, Nature and scope of control, Types of control, Control process, Control techniques (Budgetary Control, Financial Control, Quality Control, Inventory Control, Statistical Control, Production Control), Cost Control, Effective control system.

Suggested Readings:

- Management Theory and Practice by C. B. Gupta, Sultan Chand and Sons
- Essentials of Management by Koontz and Wechrich, Tata McGraw-Hill
- Management: Concepts and Strategies by J. S. Chandan, Vikas Publishing House, New Delhi
- Management by Robbins and Coulter, Prentice Hall of India, New Delhi
- Developing Communication Skills by Krishna Mohan and Meera Banerji, Macmillan India Ltd., New Delhi
- Management and Organisational Behaviour by Wendy Blaoisi, Curtis W. Cook, and Phillip L. Hunsaker, McGraw Hill

Useful Video Links:

Unit No.	Topics	Links
Unit-I	Introduction to Management	https://youtu.be/TtbImDfUt4c?feature=shared
Unit-II	Decision Making	https://youtu.be/B96-Gpn56sU?feature=shared
Unit-III	Delegation of Authority	https://youtu.be/GlLXV7JLVnk?feature=shared
Unit-IV	Controlling: Issues, Types, Techniques and Importance	https://youtu.be/v7XmhnenEGs?feature=shared

Course Code	OEC-134A				
Category	Multidisciplinary Open Elective Courses				
Course Title	**Disaster Management**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	3	0	0	3	
Course Objectives	The objectives of this course are to • Make the students familiar with the causes, phases, and types of disasters and effects of natural and human factors on geo-hazards, coastal changes, and seismic activities. • Enable the students to understand forecasting, management, and risk reduction strategies to mitigate their impact. • Make the students aware of causes, characteristics, and risks of earthquakes, volcanic eruptions, and landslides, and explore early warning systems and risk mitigation strategies. • Learn about international efforts and policies for disaster reduction, • including the UN's humanitarian coordination and challenges infinancing and insurance for disaster response.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Define the causes, phases, and types of disasters, including geo-hazards and environmental changes.	Level 1: Remember
CO2	Explain the nature, causes, and risks of floods, cyclones, tsunamis, and earthquakes, including mitigation strategies.	Level 2: Understand
CO3	Apply flood management, risk mitigation techniques, and early warning systems for disaster preparedness and response.	Level 3: Apply
CO4	Analyze the impact of disasters, the role of international policies, and strategies for disaster reduction.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Disaster: Causes and phases of disaster, Rapid onset and slow onset disasters. Nature and responses to geo-hazards, trends in climatology, meteorology and hydrology. Seismic activities. Changes in Coastal zone, coastal erosion, beach protection. Coastal erosion due to natural and manmade structures.

Unit-II

Floods and Cyclones: Causes of flooding, Hazards associated with flooding. Flood forecasting. Flood management, Integrated Flood Management and Information System (IFMIS), Flood control. Water related hazards- Structure and nature of tropical cyclone, Tsunamis – causes and physical characteristics, mitigation of risks.

Unit-III

Earthquakes: Causes and characteristics of ground-motion, earthquake scales, magnitude and intensity, earthquake hazards and risks, Volcanic land forms, eruptions, early warning from satellites, risk mitigation and training. Landslides.

Unit-IV

Mitigation efforts: UN draft resolution on Strengthening of Coordination of Humanitarian Emergency Assistance, International Decade for Natural Disaster Reduction (IDNDR), Policy for disaster reduction, problems of financing and insurance.

Suggested Readings:

- Earthquakes by B.A. Bolt, W. H. Freeman and Company, 1988.
- Disaster Management: A Disaster Manager's Handbook by N.W. Carter, Asian Development Bank, 1992.
- Earthquake: A Natural Disaster by Ashutosh Gautam, Ashok Publishing House, 1994.
- Disaster Risk Reduction in South Asia edited by P. Sahni and M. Malagola, Prentice-Hall of India, 2003.
- Disaster Management edited by V.K. Sharma, Indian Institute of Public Administration (IIPA), 1995.
- Disaster Management Approaches and Strategies by T. Singh, Akansha Publishing House, 2006.
- Towards Basics of Natural Disaster Reduction by D.K. Sinha, Research Book Centre, 2006.
- Environmental Health, Assessing Risk and Reduction Disaster (3rd ed.) by K. Smith, Routledge, 2001.

Useful Video Links:

Unit No.	Topics	Links
Unit-I	Causes and phases of disaster	https://youtu.be/DExlZTfKZAM?si=tG7pJwlsMdska3io
Unit-II	Floods and Cyclones	https://youtu.be/z62WbYrMhRU?si=L0sfH0rgR1DctnVG
Unit-III	Disaster and Disaster Management	https://youtu.be/DExlZTfKZAM?si=5-cQzza7iPZHLAcb
Unit-IV	Disaster Recovery and Build Back Better	https://youtu.be/gQxs2VJPf4o?si=HMdGNwnopAdtrbe2

Course Code	OEC-136A				
Category	Multidisciplinary Open Elective Courses				
Course Title	**Industrial Safety**				
Scheme and Credits	L	T	P	Credits	**Semester-II**
	3	0	0	3	
Course Objectives	The objectives of this course are • To familiarize with the safety methodology, education and training for an organization and environment. • To learn about the different types of accident and its preventive methods. • To make the students familiar with the rules of safety and safety management system.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Define the fundamentals of safety, accident prevention, and safety organizations in industrial environments.	Level 1: Remember
CO2	Explain the importance of safety audits, risk analysis, and the role of safety education and training.	Level 2: Understand
CO3	Apply accident investigation techniques, safety performance metrics, and risk quantification methods.	Level 3: Apply
CO4	Analyze the effectiveness of safety systems, safety rules, and emergency response plans in mitigating risks.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Safety: Introduction to safety, need for integration of health and environment safety,safety and productivity, fundamental of safety, important points for consideration ofsafety, general instructions for safety.

Safety Organization: Objectives, types and functions, safety committee, need, types,advantages, safety audits, types of audit, audit methodology, non-conformity report, audit checklist and report, Safety in design and operations, inherent and engineered safety.

Unit-II

Accident: Introduction, types of accidents, causes of accidents, principle of accident prevention, accident investigation, process of investigation, reporting, analysis, technique, Mort capital, multi event sequencing-TOR, theories of accident, onsite andoffsite emergency response plan, cost of accident.

Unit-III

Safety Education and Training: Importance, various training methods, effectiveness of training, behavior oriented training, communication, purpose, barrierto communication, creating awareness, domestic safety and training.

Monitoring Safety Performance: Frequency rate, severity rate, incidence rate, activity rate, and safety "t" score, Safety surveys, Job Safety Analysis (JSA).

Unit-IV

Risk Analysis Quantification: Fault Tree Analysis, Event Tree Analysis, Logic symbols, methodology, minimal cut set ranking, fire explosion and toxicity index (FETI), various indices, Hazard analysis (HAZAN), Failure Mode and Effect Analysis (FMEA).

Safety Rules: Safety rules for industries (including management and labour) safety culture, safety policy, safety management system, safety reporting.

Suggested Readings:

- Fundamentals of Industrial Safety & Health by K.U.Mistry, Siddharth Prakashan.
- Safety Management by R.K. Mishra, AITBS Publishers.
- Safety Management in Industry by N.V. Krishnan, Jaico Publishing House, 1997.
- Industrial Safety by Ronald P. Blake, Prentice Hall, New Delhi, 1973.
- Occupational Safety and health by David L. Goetsch, Prentice Hall
- Modern Accident Investigation and Analysis by Ted S. Ferry, John Wiley & Sons
- Fire Safety in Buildings by V K Jain, New Age publishers, New Delhi
- Fundamentals of Fire Safety in Building Design by Dr. Than Singh Sharma, Aayush Publications, N.Delhi

Useful Video Links:

Unit No.	Topics	Links
Unit-I	Safety	https://www.youtube.com/watch?v=v-eltsixu4I https://www.youtube.com/watch?v=MQ3xuV98wwM
Unit-II	Accident Investigation	https://youtu.be/VhuZ6M7a8N8
Unit-III	Safety Performance	https://www.youtube.com/watch?v=pwkjK0Zqa3w
Unit-IV	Risk Analysis Quantification	https://www.youtube.com/watch?v=PAh0TPSAZ0M https://www.youtube.com/watch?v=ZESbNJX3kcg

Course Code	OEC-138A				
Category	Multidisciplinary Open Elective Course				
Course Title	**Indian Literature in Translation -I**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	3	0	0	**3**	
Course Objectives	The objective of this course is to familiarize the students with contemporary Indian narratives written in regional languages.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Define the key themes, characters, and cultural contexts in works like *Pinjar* and *The Blue-Necked God*.	Level 1: Remember
CO2	Explain the narrative techniques and socio-political critiques in *Raag Darbari* and *A Suitable Boy*.	Level 2: Understand
CO3	Apply literary analysis to interpret symbolism, characterization, and themes in selected works.	Level 3: Apply
CO4	Analyze the stylistic features and cultural impact of Indian authors in post-colonial literature.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Amrita Pritam: Pinjar (from Pinjar: The Skeleton and Other Stories translated and adapted by Khushwant Singh)

Unit-II

Indira Goswami: The Blue- Necked God (trans. Gayatri Bhattacharya)

Unit-III

Shrilal Shukla: Raag Darbari (trans. Gillian Wright)

Unit-IV

Vikram Seth: A Suitable Boy

Suggested Readings:

- Amrita Pritam: A Biography by Gurvinder Singh, National Book Trust, 2003
- The Partition of India: A Historical Analysis by Ian Talbot, Cambridge University Press, 2000
- Indira Goswami: A Critical Study by S.C. Kar, Sahitya Akademi, 2006
- Raag Darbari: A Sociological Perspective by Shailendra Pandey, Vikas Publishing House, 2001
- Vikram Seth: The Novelist as a Cultural Mediator by John G. Peters, Oxford University Press, 2007
- Postcolonial Theory and the Indian Novel by Rukmini Bhaya Nair, Orient Longman, 2002
- A Suitable Boy: A Critical Companion edited by Meenakshi Bharat and Nivedita Menon, Oxford University Press, 2007

Useful Video Links:

Unit No.	Topics	Links
Unit-I	Pinjar- Amrita Pritam	https://www.youtube.com/watch?v=TSJn_bEmevo https://www.youtube.com/watch?v=bbXL1lHD8E
Unit-II	The blue necked Gods- Indira Goswami	https://www.youtube.com/watch?v=umz1X-re3Ik
Unit-III	Raag Darbari-Srilal Shukla	https://www.youtube.com/watch?v=8sDYddihU08 https://www.youtube.com/watch?v=MhZ2PMW9Sg8
Unit-IV	A Suitable Boy	https://www.youtube.com/watch?v=Oz4WO0Gyz3A

Course Code	OEC-140A				
Category	Multidisciplinary Open Elective Courses				
Course Title	**Environmental Issues**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	3	0	0	**3**	
Course Objectives	The objectives of this course are • To understand the global Environmental issues • To explore regional environmental issues • To assess the Environmental Impact of mining and Oil exploration • To analyze air Pollution, water pollution and their effects • To investigate solid and soil pollution				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Define the causes, effects, and hazards associated with global and regional environmental issues.	Level 1: Remember
CO2	Explain the concepts and methods for managing environmental problems related to pollution and resource depletion.	Level 2: Understand
CO3	Apply strategies for waste management and pollution control in real-world environmental contexts.	Level 3: Apply
CO4	Analyze the impact of human activities on ecosystems and evaluate the effectiveness of mitigation strategies.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Global Environmental Issues: Green House effect – causes and associated hazards, Ozone layer depletion – causes and associated hazards, Deforestation, Human Population Growth. Environmental problems associated with urbanization, industrialization, modernization of agriculture.

Unit-II

Regional Environmental Issues: Forest and Wildlife management, desertification, reclamation of degraded land; Human intervention on wetlands, siltation and eutrophication, reclamation of wetlands, Mining and Environment, Open cast mining, Oil exploration and transportation, Deforestation and their impact on environment.

Unit-III

Air Pollution: Causes of air pollution, Some important pollutants of air (CO, SOX, NOX and HC and Particulates) – their sources and effects on living and non-living organisms.

Water Pollution: Sources of pollution of surface and ground water, Types of water pollutants. Soil Pollution: Introduction, Sources of soil pollution, Pollution and residual toxicity from the application of insecticides, pesticides and fertilizers; Soil erosion.

Unit-IV

Solid Wastes: Environmental, aesthetic and health risk, Sources, quantities and composition of solid wastes, Storage, collection and transportation of urban solid waste, disposal options- sanitary landfills, composting and its variations, anaerobic digestion, incineration and pyrolysis, Vermi composting, Recovery alternative, Monitoring of solid wastes.
Hazardous Wastes: Definition and classification, health and environmental effects, treatment, disposal and management of hazardous wastes, legal frame work for hazardous waste management in India.

Suggested Readings:

- Fundamentals of Environmental Science: G. S. Dhaliwal, G. S. Sangha and P. K. Raina, KalyaniPublication
- Environmental Pollution Control Engineering by C.S. Rao, New Age International (P) Ltd Publishers, latest edition.
- Wastewater Treatment by M.N. Rao and A.K. Dutta, Oxford & IBH, Publishing Co. Pvt. Ltd, N. Delhi.
- Handbook of solid waste Disposal and Management by J. L. Pavani.
- Waste Water Engineering: Treatment, Disposal, Reuse by Metcalf and Eddy Inc.
- Environmental Impact Assessment by L.W. Canter
- Environmental Engineers Handbook by Liu

Useful Video links:

Unit No.	Topics	Links
Unit-I	Green House effect	https://www.youtube.com/watch?v=h3lecZW3XTQ
	Ozone Layer Depletion	https://www.youtube.com/watch?v=UGfLzcF6_ys
	Population Growth.	https://www.youtube.com/watch?v=_R_wPXlRRoE
Unit-II	Forest and Wildlife Management	https://www.youtube.com/watch?v=KVZu-AmcsHw
	Desertification, reclamation of degraded land	https://www.youtube.com/watch?v=YaRkQ6mYNC4
	Mining and Environment	https://www.youtube.com/watch?v=RBJJ0lcQV24
	Deforestation and their impact on environment.	https://www.youtube.com/watch?v=yfXkLjcLfAE
Unit-III	Air Pollution	https://www.youtube.com/watch?v=_KUuOCrJEA4
	Water Pollution	https://www.youtube.com/watch?v=-zoloMKOKxc
Unit-IV	Solid Waste	https://www.youtube.com/watch?v=fsNXIvzDx9w

Course Code	OEC-142-A				
Category	Multidisciplinary Open Elective Courses				
Course Title	**Quantitative Techniques**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	3	0	0	3	
Course Objectives	The objectives of this course are • To acquire knowledge about Probability, Random Variables, various Discrete, Continuous Probability distributions and their properties. • To learn various Statistical methods and techniques to study data samples.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Define and explain the fundamental concepts, measures, and methods of descriptive statistics.	Level 1: Remember
CO2	Describe the concepts and methods for analyzing and fitting probability distributions and statistical models.	Level 2: Understand
CO3	Apply correlation, regression, and statistical techniques to analyze and interpret data sets.	Level 3: Apply
CO4	Analyze data using time series, index numbers, and quality control methods to make informed decisions.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Classification of Data, variable and measurement scales. Presentation of Data. Measures of Central tendency and Dispersion. Skewness and Kurtosis. Measures of Association of Attributes. Correlation and Regression. Principle of Least Squares, Multiple and Partial correlation. Fitting of Polynomial and Exponential Curves.

Unit-II

Random variables: Probability mass function, Probability density function and Cumulative distribution function. Expectation and its properties. Moments, moment generating function and probability generating function. Discrete Probability distributions: Bernoulli, Binomial, Poisson, Negative Binomial, Geometric and Uniform. Continuous Probability distributions: Normal, Exponential, Log Normal andUniform, Fitting of Binomial, Poisson and normal distribution.

Unit-III

Index numbers: Types, uses and their construction. Cost of living index numbers. Testof adequacy of Index numbers.
Time Series: Components and Models of time series. Measurements of trend andseasonal indices, Forecasting and Estimation.

Unit-IV

Statistical Quality Control: Purposes and construction of control charts for variables and attributes using 3 sigma limits and 6 sigma limits. Single and double Sampling Inspection plans. Natural tolerance limit and modified control limits. Vital statistics: Methods of obtaining Demographic data, Measurement of Mortality and Fertility, Complete Life and Abridged Life Tables.

Suggested Readings:

- Outline of Statistics Volume-I & II by A.M. Goon, M.K. Gupta and B. Dasgupta.
- Fundamental of Statistics Volume-I &II by A.M. Goon, M.K. Gupta and B. Dasgupta.
- An Introduction to Probability and Statistics by V. K. Rohtagi, and Md. A. K. Ehsanes Saleh.
- An Introduction to Theory of Statistics by A.M. Mood, F.A. Graybill and D. C. Boes.
- Applied General Statistics by F.E. Croxton and D. J. Cowden.
- The Advanced Theory of Statistics by S. M. Kendall and A. Stuart.

Useful Video Links:

Unit No.	Topics	Links
Unit-I	Measures of Central Tendency	https://youtu.be/XaHFNhHfXwQ?si=oir6QOmcf8ZQLpKa
	Correlation	https://youtu.be/TWd42yUBZkk?si=V6exIc1JCtbRwBEg
	Regression	https://youtu.be/_pbAib0He0Y?si=cG_TU71Js3Pq7jvq
	Miscellaneous	https://onlinecourses.nptel.ac.in/noc22_ma81/preview
Unit-II	Introduction of Probability	https://youtu.be/60vHv2lA4o4
	Random Variables	https://youtu.be/2CP3m3EgL1Q
	Discrete Random variable & Probability Distribution	https://youtu.be/Sv9UYnp9tbs?si=eHqwSJETA5SO3NFI
Unit-III	Index numbers	http://digimat.in/nptel/courses/video/109104182/L22.html
	Time Series	https://gec.digimat.in/nptel/courses/video/109104182/L21.html
Unit-IV	Statistical Quality Control	https://archive.nptel.ac.in/courses/110/101/110101150/
	Vital statistics	https://nptel.ac.in/courses/109104045

Course Code	OEC-144A				
Category	Multidisciplinary Open Elective Courses				
Course Title	**Sources of Energy-I**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	3	0	0	**3**	
Course Objectives	The objectives of this course are to • Understand the principles and applications of renewable energy sources like solar, wind, and geothermal. • Analyze the environmental impact, limitations, and growth potential of alternative energy technologies and systems. • Explore the design, operation, and performance of solar thermal power generation and solar energy systems. • Investigate the thermodynamics and applications of geothermal energy and fuel cells in sustainable energy production.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Define the basic principles and concepts of renewable energy systems and their significance.	Level 1: Remember
CO2	Explain the working, applications, and limitations of solar, geothermal, wind, and fuel cell technologies.	Level 2: Understand
CO3	Apply principles of energy conversion to design efficient renewable energy systems for diverse applications	Level 3: Apply
CO4	Analyze the performance, feasibility, and environmental impact of various renewable energy systems	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Introduction: Limitation of conventional energy sources, need and growth of alternative energy sources, basic scheme and application of direct energyconservation, Solar energy: Introduction, The characteristics of the sun, Definitions related to solar radiations, solar radiation geometry, Estimation of daily solar radiation, Theory of solar cells, Solar cell materials, solar drying, solar furnaces, Solar cooking, solar greenhouse technology, solar thermal power generation, solar cell array.

Unit-II

Solar Thermal Energy: Solar radiations, flat plate collectors and their materials, applications and performance, focusing of collectors and their materials, applications and performance; solar thermal power plants, thermal energy storage for solar heating and cooling, limitations.

Unit-III

Geothermal Energy: Resources of geothermal energy, thermodynamics of geo- thermal energy conversion-electrical conversion, non-electrical conversion, environmental consideration, estimates of geothermal power, nature of

geothermal fields, advantages & disadvantages of geothermal energy forms, applications of geothermal energy, Geothermal power plant.

Fuel Cells: Principle, working of various types of fuel cells, performance and limitations

Unit-IV

Wind Energy: Wind power and its sources: Principle of working of Wind Energy, performance and limitations of energy conversion systems. Site selection, criteria, momentum theory, Wind characteristics.

Suggested Readings:

- Renewal Energy Resources by John Twideu and Tony Weir, BSP Publications, 2006
- Energy Resources: Conventional & Non-Conventional by M.V.R. Koteswara Rao, BSP Publications,2006.
- Non-Conventional Energy Resources by D.S. Chauhan, New Age International.
- Renewal Energy Technologies: A Practical Guide for Beginners by C.S. Solanki, PHI Learning.
- Advances in energy system and Technology by Peter Auer, Vol I & II Edited by Academic Press.
- Non-conventional Energy sources by G.D. Rai, Khanna Publishers
- Introduction to Non-Conventional Energy Resources by A.K. Raja, Scitech Publications.
- Fundamentals of Solar cells: Photovoltaic Solar Energy by A. Fahrenbruch and R. Bube.

Useful Video Links:

Unit No.	Topics	Links
Unit-I	Use, need, growth of Conventional and non-conventional source of energy	https://archive.nptel.ac.in/courses/121/106/121106014/
	Solar Energy	https://archive.nptel.ac.in/courses/115/103/115103123/
	Solar Photo-voltaic devices, Performance and durability of solar devices	https://archive.nptel.ac.in/courses/121/106/121106014/
Unit-II	Solar energy technologies, Solar Thermal devices	https://archive.nptel.ac.in/courses/121/106/121106014/
Unit-III	Geothermal Energy	https://archive.nptel.ac.in/courses/121/106/121106014/
Unit-IV	Wind energy, technology and geographical aspects	https://archive.nptel.ac.in/courses/121/106/121106014/
	Characteristics and Power generation from wind energy	https://archive.nptel.ac.in/courses/103/103/103103206/

Course Code	OEC-146A				
Category	Multidisciplinary Open Elective Courses				
Course Title	**Operations Research**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	3	0	0	**3**	
Course Objectives	The objectives of this course are to • Grasp the knowledge of operations research in aiding decision-making processes, along with its applications across various industries. • Gain knowledge of LP, including problem formulation, solution methods. • Learn various solution methods including North-West corner, Vogel's method, MODI, and Stepping Stone methods, as well as sensitivity analysis in LP. • Develop an understanding of queuing theory and familiarize with project management tools such as PERT and CPM. • Learn foundational concepts of multi-degree freedom systems andvibration modes in various continuous systems				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Define key terms and foundational concepts in operations research.	Level 1: Remember
CO2	Explain various methods and techniques for problem optimization in various real-world scenarios.	Level 2: Understand
CO3	Apply appropriate operations research methods and techniques to solve problems.	Level 3: Apply
CO4	Analyze efficiency and performance of systems under constraints to improve decision-making in complex environments.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Introduction: Definition, role of operations researches in decision making, applications in industry. Concept on O.R. model building - Types & methods.

Linear Programming (LP): Programing definition, formulation, solution - graphicalsimplex Gauss Jordan reduction process in simplex methods, BIG-M methods computational, problem.

Unit-II

Deterministic Model: Transportation model-balanced & unbalanced; North west rule, Vogel's Method, least cost or matrix minimal, stepping stone method, MODI methods, degeneracy, assignment, travelling salesman, problem.

Advanced Topic of LP: Duality, PRIMAL-DUAL, reactions-its solution, shadow price, economic interpretation, dual simplex, post-optimality & sensitivity analysis, problems.

Unit-III

Waiting Line Models: Introduction, queue parameters, M/M/1 queue, performance of queuing systems, applications in industries, problems.

Project Line Models: Network diagram, event activity, defects in network, PERT &CPM, float in network, variance

resources leveling in project problems.

Unit-IV

Multi degrees of Freedom systems and Numerical Methods: Introduction Influence Coefficients, Stiffness Matrix, Flexibility Matrix, Natural frequencies and Normal Modes, Orthogonality of Normal Modes, Dunkerley's Equation, Method of Matrix Iteration, The Holzer Type Problem Geared and Branched Systems, Beams. Normal Mode Vibrations of Continuous System: Vibrating String, Longitudinal Vibrations of Rod, Torsional Vibrations of Rod, Lateral Vibrations of Beam.

Suggested Readings:

- Operation Research – TAHA, PHI, New Delhi.
- Principle of Operations Research – Ackoff, Churchaman, arnoff, Oxford IBH, Delhi.
- Operation Research- Gupta & Sharma, National Publishers, New Delhi.
- Operation Research – Sharma, Gupta, Wiley Eastern, New Delhi.
- Theory of Vibration with Applications W.T. Thomson, Prentice Hall of India.
- Mechanical Vibration: G.K. Grover and S.P. Nigam, Nem Chand and Sons.
- Mechanical Vibrations by J.K. Narwal, Vayu Education of India

Useful Video Links:

Unit No.	Topics	Links
Unit-I	Linear Programming	https://youtu.be/a2QgdDk4Xjw?feature=shared
	Introduction to operations researches	https://youtu.be/BDBhpxRzImI?feature=shared
Unit-II	Transportation Problems	https://youtu.be/Q31jKiEXxdc?feature=shared
	Vogel's Method	https://youtu.be/Ow3XWYnPgSM?feature=shared
Unit-III	Queueing Models	https://youtu.be/xGkpXk-AnWU?feature=shared
	PERT	https://youtu.be/2AObCWhwOKo?feature=shared
	CPM	https://youtu.be/Tm2HhqMu5Jg?feature=shared
Unit-IV	Durkerley's Equation	https://youtu.be/qK9Fayqm6Xf?feature=shared
	Holzer's Method	https://youtu.be/McKDD4Q4dhM?feature=shared
	Torsional Vibration of Rods	https://youtu.be/NkzcQDHQ-MY?feature=shared

Course Code	OEC-148A				
Category	Multidisciplinary Open Elective-I				
Course Title	**Multimedia Communication**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	3	0	0	3	
Course Objectives	The objectives of this course are to • Understand the fundamental elements of multimedia systems. • Learn the representations, perceptions and applications ofmultimedia. • Develop the skills for making multimedia projects.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Define fundamental concepts, applications and standards of multimedia systems.	Level 1: Remember
CO2	Explain the principles of digital audio, video compression and multimedia communication systems	Level 2: Understand
CO3	Apply multimedia technologies, compression techniques and system protocols for real-time applications.	Level 3: Apply
CO4	Analyze the performance and behavior of components, architectures and web based communication methods of multimedia information systems.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Introduction: Concept of Multimedia, Emerging Applications, Multimedia Systems and Appliances. Distributed Multimedia Systems, Synchronization, Orchestration and QOS Architecture standards.

Digital audio representation and processing: Audio in computer applications, its digital representation, transmission and digital processing, speech recognition and generation.

Digital video and image compression: Video compression techniques and standardization of algorithms, JPEG, MPEG, DVI technology.

Unit-II

Multimedia Information Systems: Workstation OS, New OS support, Real Time Mach, Multimedia system service architecture, Media Stream Protocol, service and window system, client control of continuous media, Hyper applications. Multimedia Information systems, File system support, Data Models.

Unit-III

Multimedia communication systems: Public Network services and N/W Protocols, Quick time Movie File (QMF), format, OMFI, MHEG, Format function Real time Interchange, Track Model and Object Model Teleconferencing systems, Shared Amlication Architectures, Embedded Distributed objects, Multimedia conferencing architecture, architecture of team workstation.

Unit-IV

Multimedia and Internet: The internet, client server technology, Communication Protocols, Internet Addressing, WWW, HTML, and Web Authorizing, Web page browsers and development, bandwidth and applications considerations, Design Considerations for Web pages, Accessing Content on internet.

Suggested Readings:

- Multimedia Systems by John F. Koegel Bufod, Addison Wesley, Edition.
- Multimedia Technology and Application by David Hillman, Galgotia Publication.
- Multimedia Communications by Fred Halsall, Pearson Publications
- Multimedia Comm. System: Technology Std. & Network by Rao, Bojkovic & Milovanovic, PHI
- Principles of Multimedia by Ranjan Parkesh, TMH
- Multimedia System Design by P.K. Andleigh, Pearson

Useful Video Links:

nit no	Topics	Links
Unit-I	Introduction to Digital Image Processing	https://www.youtube.com/watch?v=CVV0TvNK6pk&list=PL1F076D1A98071E24
Unit-II	Sampling and Quantization	https://www.youtube.com/watch?v=own93zNYAI4
Unit-III	Multimedia communication systems	https://www.youtube.com/watch?v=JjFiueOn6CY
Unit-IV	Multimedia Networks	https://www.youtube.com/watch?v=KHGxigA8Jko

Course Code	OEC-150A				
Category	Multidisciplinary Open Elective Courses				
Course Title	**Introduction to Information Technology**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	3	0	0	3	
Course Objectives	The objectives of this course are to • Understand the evolution of information technology and its impact on society and business. • Gain knowledge of the components and roles of information systems, including hardware, software, and data. • Evaluate IT infrastructure, including servers, cloud computing, and governance practices for efficient service delivery. • Develop skills in database management, SQL, and administration, focusing on security, backup, and performance optimization.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Define the fundamental concepts and types of information systems in business management.	Level 1: Remember
CO2	Explain the components of information systems and emerging technologies for business decision-making.	Level 2: Understand
CO3	Apply business intelligence techniques and database management to improve business performance.	Level 3: Apply
CO4	Analyze security, control measures, and enterprise applications for managing information systems in organizations.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Evolution of Information Technology: Historical Overview of IT Evolution, Key Milestones in IT History, The Impact of IT on Society and Business, Emerging Trends in Information Technology.

Unit-II

Components of Information Systems: Hardware Components, Memory and Storage Devices, Software Components, System Software vs. Application Software, The Role of Firmware, Data Components Types of Data and Data Representation, Databases and Data Management, People and Procedures, IT Personnel and Their Roles, IT Procedures and Best Practices.

Unit-III

Information Technology Infrastructure: IT Infrastructure Components - Servers and Data Centers Networking Equipment, Cloud Computing Resources, IT Services and Service Models, Infrastructure as a Service (IaaS), Platform as a Service (PaaS), Software as a Service (SaaS), IT Governance and Compliance, ITIL (Information Technology Infrastructure Library), Regulatory and Compliance Frameworks, Green IT and Sustainability, Energy-efficient IT Practices, E-waste Management.

Unit-IV

Database Management Systems: Introduction to Databases - What is a Database, Importance of Databases in IT, Types of Databases (Relational, NoSQL, etc.).SQL Fundamentals - Structured Query Language (SQL), Basic SQL Commands (SELECT, INSERT, UPDATE, DELETE), Database Administration Basics - Database Administration Roles and Responsibilities, Backup and Recovery Procedures, Security and User Permissions, Performance Tuning and Monitoring.

Suggested Readings:

- Discovering Computers by Gary Shelly, Misty Vermaat, and Thomas J. Cashman, Cengage Learning.
- Information Technology for Managers by George Reynolds and Judith S. Reynolds, Pearson Education.
- Systems Analysis and Design by Kenneth E. Kendall and Julie E. Kendall, Pearson Education.
- Information Technology by V. Rajaraman, PHI Learning Private Limited.
- Computer Fundamentals and Information Technology by Alexis Khosla, BPB Publications.
- Information Technology for Management by C.S.V. Murthy, Himalaya Publishing House.
- Information Technology: An Introduction by K.C. Laudon and Jane P. Laudon, Pearson Education India.
- Fundamentals of Information Technology by Leon Albert and Salvator Fernandez, Kalyani Publishers.
- Information Technology: Principles, Practices and Applications by Dinesh Goyal, Tata McGraw-Hill Education.

Useful Video Links:

Unit No.	Topics	Links
Unit-I	The Role of Information Systems in Business	https://www.youtube.com/watch?v=RzVwZosIbqs
	Components of an Information System	https://www.youtube.com/watch?v=sELO4JlJ0g0
	Trends in Information Systems	https://www.youtube.com/watch?v=xjPBd7geC8E
Unit-II	IT Infrastructure and Components	https://www.youtube.com/watch?v=Q3X_th7dq74
	Emerging Technologies in Information Systems	https://www.youtube.com/watch?v=rdEZfPpvDKY
	Business Intelligence and Databases	https://www.youtube.com/watch?v=2CxXM7gn8cA
Unit-III	Information Systems Security	https://www.youtube.com/watch?v=I7nbYVbY5DQ
	Key System Applications: ERP, CRM, SCM	https://www.youtube.com/watch?v=7_LPdttKXPc
	Security Technologies and Tools	https://www.youtube.com/watch?v=bYVZgrwCw6Y
Unit-IV	Decision Support Systems (DSS)	https://www.youtube.com/watch?v=06Rm9O4sNrg
	Intelligent Decision Making	https://www.youtube.com/watch?v=ZK6G6nLs4Jg

Course Code	OEC-152-A				
Category	Multidisciplinary Open Elective Courses				
Course Title	**Cyber Forensics and Security**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	3	0	0	3	
Course Objectives	The objectives of this course are • To understand the types of information systems and evaluate securitythreats to organizational assets. • To apply forensic techniques to protect data and identify vulnerabilities like spyware and adware. • To learn ethical hacking practices, including network, web, andpassword hacking techniques. • To gain proficiency in digital evidence handling and understand legal protocols and cyber laws, including the Information Technology Act2000.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Define the fundamental concepts of information systems, cyber security, and ethical hacking.	Level 1: Remember
CO2	Explain the principles and technologies of cyber security ethical hacking and their role in protecting information systems.	Level 2: Understand
CO3	Apply the concepts and techniques of ethical hacking and cyber security to identify and mitigate vulnerabilities in computer systems and networks.	Level 3: Apply
CO4	Analyze cyber crimes, security standards, and legal frameworks in the context of information technology and forensics.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Introduction to Information Systems: Types of information Systems, Introduction to information security, Need for Information security, Threats to Information Systems, Information Security Investigations. Security threats - Sources of security threats- Motives - Target Assets and vulnerabilities – Consequences of threats- E-mail threats- Web-threats - Intruders and Hackers, Insider threats, Security Threats to E- Commerce, Cyber-crimes.

Unit-II

Cyber Forensics: Cyber Security, Cyber Security roles, Cyber Security Principles, Difference between information Security and Cyber Security, Types of Computer Forensics Technology, Types of Military Computer Forensic Technology, Types of Law Enforcement: Computer Forensic Technology, Types of Business ComputerForensic Technology, Specialized Forensics Techniques, Hidden Data and How to Find It, Spyware and Adware, Encryption Methods and Vulnerabilities, Protecting Data from Being Compromised Internet Tracing Methods, Security and Wireless Technologies, Avoiding Pitfalls with Firewalls Biometric Security Systems.

Unit-III

Ethical Hacking: Essential Terminology, Hacking windows – Network hacking – Webhacking – Password hacking,

and Education in digital evidence, Evidence Collection and Data Seizure: Why Collect Evidence, Collection Options Obstacles, Types of Evidence, The Rules of Evidence, Volatile Evidence, General Procedure, Collection and Archiving, Methods of Collection, Artifacts, Collection Steps, Controlling Contamination: The Chain of Custody, Reconstructing the Attack, The digital crime scene, Investigating Cybercrime, Duties Support Functions and Competencies.

Unit-IV

Cyber Crimes and Cyber Security Standards: Crime incident Handling Basics: Cyber activism, Tracking hackers, clues to cyber-crime, privacy act, search warrants, common terms, organizational roles, procedure for responding to incidents, reporting procedures, legal considerations, Information Technology Act 2000: Scope, jurisdiction, offense and contraventions, powers of police, adjudication, Intellectual property issues in cyberspace, ISO, Copyright Act, Patent Law, Cyber Laws in India.

Suggested Readings:

- Cryptography and Information Security by V.K. Pachghare, PHI Learning Private Limited, India.
- Computer Security: Principles and Practice by William Stallings and Lawrie Brown, Prentice Hall.
- Ethical Decision making and IT: An Introduction with Cases by Earnest A. Kallman, J.P Grillo, McGrawHill Publication.
- Cyber Security and Global Information Assurance: Threat Analysis and Response Solutions by Kenneth J. Knapp, IGI Global.
- Principles of Information Security by Michael E. Whitman, Herbert J. Mattord, Cengage Learning Pub.
- Computer Network Security by Joseph M Kizza, Springer Verlag.

Useful Video links:

Unit No.	Topics	Links
Unit-I	IT Revolution	https://www.youtube.com/watch?v=bwq74PuiH9o
	Internet Security Threats	https://www.youtube.com/watch?v=2tiZ89N4izc
	Authentication Based Attacks	https://www.youtube.com/watch?v=ch-7pCZZzUg
Unit-II	Cyber Security and Privacy	https://www.youtube.com/watch?v=ozsxJCM4BGs
	Cyber Security policy	https://www.youtube.com/watch?v=snROvNy3wf8&list=PLyqSpQzTE6M-jkJEzbS5oHJUp2GWPsq6e&index=16
Unit-III	Introduction to Ethical Hacking	https://www.youtube.com/watch?v=t8nwQ6At0CU&list=PL7AT7LU4byRKMBCEWpeZ4QOd2VWvdlHXU
	MITM Attack	https://www.youtube.com/watch?v=C9Xo31D1J0g&list=PL7AT7LU4byRKMBCEWpeZ4QOd2VWvdlHXU&index=23
Unit-IV	Security Management Governance, risk and compliance	https://www.youtube.com/watch?v=1okOQCY6Bsk
	Cyber Security Technologies	https://www.youtube.com/watch?v=3rkIe2ZkktY

Course Code	OEC-154-A				
Category	Multidisciplinary Open Elective Courses				
Course Title	**Computer Science and Principles**				
Scheme and Credits	L	T	P	Credits	**Semester-II**
	3	0	0	3	
Course Objectives	The objectives of this course are • To be familiar with the fundamental computing concepts including problem-solving, data representation, and abstraction. • To learn web development using HTML, CSS, and JavaScript tocreate interactive web pages. • To understand data mining techniques for extracting patterns and insights from large datasets. • To grasp networking and OS principles, including protocols,resource management and system operations.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Define the fundamental concepts of computer science and engineering.	Level 1: Remember
CO2	Explain the principles and concepts of computer science.	Level 2: Understand
CO3	Apply methods and techniques of computer science to solve engineering problems.	Level 3: Apply
CO4	Analyze network structures, web designing, operating systems, and data mining techniques to identify problems and propose optimal solutions.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Fundamental of Computer Science and Computational Thinking: logical reasoning, problem solving, data representation, processing of data, abstraction, managing complexity, operation of computers and networks, effective Web searching, ethical, legal and social aspects of information technology.

Unit-II

HTML and XTML basics: List, unordered list, nested and ordered list, Basic HTML Tables, Intermediate HTML Table and Formatting, Basic HTML Forms and Formatting, More Complex HTML Forms, Frameset Element, Nested Frameset.

Style Sheets and Graphics: Introduction to Style sheets, Formatting Text by Using Style Sheets, Formatting Paragraphs by Using Style Sheets, Java Script Basics.

Unit-III

Data Mining: Introduction, Motivation, Importance, Knowledge Discovery Process, KDD and Data Mining, Data Mining vs. Query Tools, Kind of Data mining, kind of data, Functionalities, interesting patterns, Classification of data mining systems, Major issues, from Data warehousing to data Mining.

Unit-IV

Computer Networks: Network Fundamentals, Local Area Networks (LAN), Metropolitan Area Networks (MAN), Wide Area Networks (WAN), Wireless Networks, Inter Networks. Reference Models: The OSI model, TCP/IP model. Operating Systems: Main functions of operating systems. Multi Programming, multiprocessing, and multitasking. Deadlock and CPU scheduling algorithms.

Suggested Readings:

- Blown To Bits: Your Life, Liberty and Happiness After the Digital Explosion by Hal Abelson, KenLeeden and Harry Lewis, 2010.
- HTML & CSS: The Complete Reference by Thomas A. Powell, Osborne Media; 5thEdition, 2010.
- Data mining: a knowledge, discovery approach by Krzysztof J. Cios, Witold Pedrycz, Roman W. Swiniarski, Springer, 2007.

Useful Video Links:

Unit No.	Topics	Links
Unit-I	Effective Web searching	https://www.youtube.com/watch?v=yUvmCyM2C40
	Technology and Ethics	https://youtu.be/cVA80jjesSc
Unit-II	HTML	https://youtu.be/QEtWL4lWIL4
	Stylesheets	https://youtu.be/h_RftxdJTzs
Unit-III	Knowledge Discovery Process	https://youtu.be/ykZ-_UGcYWg
	Data Mining and Knowledge Discovery	https://youtu.be/m5c27rQtD2E
Unit-IV	LAN, WAN, MAN	https://youtu.be/u2UboyYSc4Q
	TCP/IP	https://youtu.be/zzXs0EnCin0
	Network Models	https://youtu.be/3DZLItfbqtQ

Course Code	OEC-156-A				
Category	Multidisciplinary Open Elective Courses				
Course Title	**Software Engineering Practices**				
Scheme and Credits	L	T	P	Credits	**Semester-II**
	3	0	0	3	
Course Objectives	The objectives of this course are • To understand software process models and their application indevelopment. • To develop expertise in requirements engineering by effectivelygathering, analyzing, and validating requirements. • Apply design principles and ensure software quality through effective design practices. • To learn software testing and maintenance strategies for ensuringreliable and sustainable software.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Define the key concepts of software engineering processes, models, and agile development practices.	Level 1: Remember
CO2	Explain requirements engineering techniques, including use case development, validation, and modeling strategies.	Level 2: Understand
CO3	Apply software engineering principles in software design and architecture.	Level 3: Apply
CO4	Analyze software engineering, testing, maintenance strategies, and practices for enhancing software quality.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Software Engineering, Software Process, Generic process model, Prescriptive process model-specialized, unified process, Agile Development, Agile Process, Extreme Programming, Other Agile Process Models, Software engineering Knowledge, core, Principles, Principles that guide each framework Activity.

Unit-II

Requirements Engineering, Establishing the Groundwork, Eliciting Requirements, Developing use cases, Building the requirements model, Negotiating, validating Requirements, Requirements Analysis, Requirements Modeling Strategies.

Unit-III

Design Process: Design concepts, Abstraction, Architecture, patterns, Separation of Concerns, Modularity, Information Hiding, Functional Independence, Refinement, Aspects, Refactoring, Object Oriented Design Concepts, Design Classes

Design Model: Data, Architectural, Interface, Component, Deployment Level Design Elements, Software Quality, Software Quality Dilemma, Achieving Software Quality.

Testing: Strategic Approach to software Testing, Strategic Issues, Testing Strategies for Conventional Software, Object oriented software, Web Apps, Validating Testing, System Testing, Art of Debugging, Software Maintenance, Software Supportability, Reengineering, Business Process Reengineering, Software Reengineering, Reverse Engineering, Restructuring, Forward Engineering, Economics of Reengineering.

Suggested Readings:

- Software Engineering – A Practitioner's Approach by Roger S. Pressman, 7th edition, 2010.
- Software Engineering by Ian Sommerville, Pearson Edu, 9th edition, 2010.
- Software Engineering: Principles and Practices by Hans Van Vliet, 2008.
- Software Engineering Fundamentals Oxford University by Ali Behforooz and Frederick J. Hudson,JW&S, 1995.
- An Integrated Approach to software engineering by Pankaj Jalote,Narosa, 1991.

Useful Video Links:

Unit No.	Topics	Links
Unit-I	Introduction of Software Engineering	https://www.youtube.com/watch?v=Ln_LP7c23WM&list=PLbRMhDVUMngf8oZR3DpKMvYhZKga90JVt
	Agile Model of Software Development Life Cycle	https://www.youtube.com/watch?v=x90kIAFGYKE&list=PLbRMhDVUMngf8oZR3DpKMvYhZKga90JVt&index=12
	Emergence of Software Engineering Techniques	https://www.youtube.com/watch?v=eNG4KuovfiI&list=PLbRMhDVUMngf8oZR3DpKMvYhZKga90JVt&index=5
Unit-II	Requirement gathering and analysis	https://www.youtube.com/watch?v=ul6nW1g3xK0&list=PLbRMhDVUMngf8oZR3DpKMvYhZKga90JVt&index=16
	Functional requirements	https://www.youtube.com/watch?v=PR_ZwLfjWrA&list=PLbRMhDVUMngf8oZR3DpKMvYhZKga90JVt&index=17
Unit-III	Introduction to structured analysis and structured design	https://www.youtube.com/watch?v=69PIhEvYmn8&list=PLbRMhDVUMngf8oZR3DpKMvYhZKga90JVt&index=23
	Developing DFD Model	https://www.youtube.com/watch?v=PvYTyXJiwuo&list=PLbRMhDVUMngf8oZR3DpKMvYhZKga90JVt&index=25
	Use Case Modeling	https://www.youtube.com/watch?v=7wo9PHfkyik&list=PLbRMhDVUMngf8oZR3DpKMvYhZKga90JVt&index=31
	An Object-Oriented design process	https://www.youtube.com/watch?v=Ie7qzy3SY-E&list=PLbRMhDVUMngf8oZR3DpKMvYhZKga90JVt&index=40
Unit-IV	Basic concepts in Testing	https://www.youtube.com/watch?v=_9bmWEMhGFU&list=PLbRMhDVUMngf8oZR3DpKMvYhZKga90JVt&index=43
	White box Testing	https://www.youtube.com/watch?v=pXkCkRgPFrc&list=PLbRMhDVUMngf8oZR3DpKMvYhZKga90JVt&index=55
	Software Re engineering	https://www.youtube.com/watch?v=UXERB3xFuo4

Course Code	FEC-158A				
Category	Foundation Elective Courses				
Course Title	**Basics of Accounting**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	3	0	0	3	
Course Objectives	The objectives of this course are • To understand the basics of accounting, including key concepts and accounting equations. • To learn about journalizing and account classifications, and record simple transactions. • To gain the knowledge of preparation of subsidiary books, such as cash, purchase, and sales books. • To make the students familiar with the preparation of financial statements, including trial balances and balance sheets for sole proprietorships.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total	100 Marks				
Duration of Exam	3 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Define the fundamental concepts of a financial accounting system and their application in organizations.	Level 1: Remember
CO2	Describe the concepts of accounting system.	Level 2: Understand
CO3	Apply financial and accounting techniques to solve business problems.	Level 3: Apply
CO4	Analyze the financial information & provisions to make decisions in the real world.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Introduction to Accounting: Concept of Accounting, Accountancy and Book Keeping, Objectives of Accounting, Scope of Accounting, Types of Accounting, Limitations, Basic Accounting Terms, Double Entry System of Book Keeping, GAAP (Generally Accepted Accounting Principal), Basic accounting Equations.

Unit-II

Journalizing: Classification of Accounts, Personal, Real and Nominal; Recording and posting of simple transactions only.

Unit-III

Preparation of Subsidiary Books: Cash Book (single column cash book) PurchaseBook, Sales Book, Purchase Return, Sales Return Book, B/R and B/P Book.

Unit-IV

Preparation of Financial Statements : Preparation of Trial Balance, Preparing the Financial Statements Trading Account, Profit and Loss Account and Balance Sheet of sole proprietary business (Without Adjustment).

- Financial Accounting by D.K. Goyal, Arya Publications Pvt Ltd.
- An introduction to Accounting by S.N. Maheshwari, Vikas Publishing House Pvt. Ltd.
- Basic Accounting: The step-by-step course in elementary accountancy by Nishat Azmat and Andy Lymer
- Accounting Principles by R.N.Anthony and J.S. Reece, D. Richard Irwin, Inc.
- Financial Accounting: Concepts and Applications by J.R. Monga, Mayoor Paper Backs, New Delhi.
- Advanced Accounts by M.C. Shukla, T.S. Grewal and S.C.Gupta, S.Chand & Co., New Delhi.
- Advanced Accountancy by R.L. Gupta, and M. Radhaswamy, Sultan Chand & Sons, New Delhi.

Useful Video links:

Unit No.	Topics	Links
Unit-I	Introduction to Financial Accounting	https://youtu.be/jhtVVJxbPU0
	Types of Accounts	https://youtu.be/vIz8emciXLc?feature=shared
Unit-II	Journalizing: Classification of Accounts, Personal, Real and Nominal	https://www.youtube.com/watch?v=-DU9MoP0mw4
Unit-III	Preparation of Subsidiary Books	https://www.youtube.com/watch?v=XvxsVUNaoUc
Unit-IV	Trial Balance	https://www.youtube.com/watch?v=z_KO49Pk3DM
	Balance Sheet of sole proprietary business (Without Adjustment).	https://www.youtube.com/watch?v=jV-OgNRTTfY

Course Code	FEC-160A				
Category	Foundation Elective Courses				
Course Title	**Basics of E-Commerce**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	3	0	0	3	
Course Objectives	The objectives of this course are • To understand concepts, categories, key components and supporting environment for E-commerce. • To gain the comprehensive understanding of M-Commerce by studying its origin, components, and applications in the mobile commerce landscape. • To make the students familiar with the E-payment technologies by learning about various systems, including online banking, e-wallets, and e-cash. • To analyze the impact of electronic commerce on marketing and e-marketing tools.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Identify key elements of digital business frameworks and their foundational environments.	Level 1: Remember
CO2	Explain the evolution and functionality of E-Commerce business systems.	Level 2: Understand
CO3	Demonstrate the use of advanced digital technologies in E-Commerce.	Level 3: Apply
CO4	Analyze the impact of digital platforms on business strategies and decision-making.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

E-Commerce: Meaning, Concept, Definitions, Origin and Development, Categories of E- Commerce- B2B, B2C, B2G, G2G, G2C; The Constitution of the E- Commerce- Portal of the Network, Customer Relationship Management, Supply Chain Management, Logistic Management, Decision Support; Supporting Environment for E-Commerce- Technical Environment, Legal Environment, Credit Environment and Financial Environment.

Unit-II

M-Commerce: The Origin of M-Commerce, M-Commerce Components, TheDevelopment of M-Commerce, The Application of M-Commerce.

Unit-III

Payment Technologies for E-Commerce: Online Bank, E-Payment Tools, E- Payment System, Intelligent Card, E-check, E-wallet, E-Cash.

Electronic Commerce: Influence on Marketing, Product, Physical Distribution, Price, Promotion, Marketing Communication, Common e-Marketing Tools.

Suggested Readings:

- E-Commerce - An Indian Perspective by P.T. Joseph, PHI
- E-Commerce Strategy, Technologies and Applications by David Whiteley, Tata McGraw Hill
- Frontiers of Electronic Commerce by Ravi Kalakota and B Andrew Whinston, Pearson
- E-commerce by Jeffery F. Rayport, Bernard J. Jaworski, TMCH, 2002.
- Electronic Commerce by E. Frami Turban, JAE Lee, David King and K. Michale Chung, Pearson Education, 2000.

Useful Video Links:

Unit No.	Topics	Links
Unit-I	Introduction to E-Commerce	https://www.bing.com/videos/riverview/relatedvideo?q=Lecture++35+Electronic+Commerce&mid=E04FD94C23F536BC0EBCE04FD94C23F536BC0EBC&FORM=VIRE
Unit-II	M-Commerce	https://www.bing.com/videos/riverview/relatedvideo?&q=+M+commerce+nptel&&mid=84937C989B5D2638A64E84937C989B5D2638A64E&&FORM=VRDGAR
Unit-III	E-Payment System	https://www.youtube.com/watch?v=Tbn1-_gTfC8
Unit-IV	E-Commerce Marketing	https://www.youtube.com/watch?v=qNxP066HaAo

Course Code	FEC-162A				
Category	Foundation Elective Course				
Course Title	**Elements of Banking**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	3	0	0	3	
Course Objectives	The objectives of this course are • To learn about the history, functions, and recent developments in various banking sectors. • To understand the structure of the Indian banking system and the role of different types of banks. • To understand the structure and functions of co-operative banks and regional rural banks. • To outline the role of apex banking institutions like NABARD, NHB, SIDBI, and EXIM Bank.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Define the key concepts, structures, and roles of various banking institutions and their historical and functional significance.	Level 1: Remember
CO2	Explain the evolution, structure, and relationships within the Indian banking system, including commercial, co-operative, and apex banking institutions.	Level 2: Understand
CO3	Apply knowledge of banking operations and systems to differentiate the roles and contributions of commercial, co-operative, and apex banking institutions in India.	Level 3: Apply
CO4	Analyze the impact on the Indian financial ecosystem.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Introduction to Banking: Meaning, Concept, History of Banking, Business of Banking, Functions of Banking, Banker Customer Relationship, Recent Developments inBanking Industry: Corporate Banking, Retail Banking, International Banking, Rural Banking, Non-Banking Financial Intermediaries.

Unit-II

Structure of Commercial Banks in India: Structure of Indian Banking System, Reserve Bank of India, Commercial Banks, Public Sector Banks, Private Sector Banks, Foreign Banks, Indian Banks vs. Foreign Banks.

Unit-III

Structure of Co-operative Banks in India: Co-operative Banks: Meaning, Definitions, Commercial vs. Co-operative Banks, Regional Rural Banks.

Unit-IV

Structure of Apex Banking Institution in India: Meaning, Definitions, National Bank for Agriculture and Rural Development (NABARD), National Housing Bank (NHB), Small Industries Development Bank of India (SIDBI), Export Import Bank of India (EXIM Bank).

Suggested Readings:

- Management of Banking and financial services by Paul Justin and Suresh Padmalatha, TMH.
- Core banking solution by M. Ravathy Sriram and P.K. Bamanan, PHI .
- Elements of Banking and Insurance by Jyotsna Sethi and Nishevan Bhatia, PHI.
- Introduction to Banking by Vijayaragavan Iyengar, Excel Books Pvt. Itd.
- Banking, law and practice by Viganim, BML, Konak Publication
- Banking, theory and practice by K.C. Shekhar, Lakshmy Shekhar, Pearson publications.

Useful Video Links:

Unit No.	Topics	Links
Unit-I	Introduction to Banking	https://www.bing.com/videos/riverview/relatedvideo?&q=Introduction+to+Banking+lecture&&mid=6885EE4A711D46AE5C346885EE4A711D46AE5C34&&FORM=VRDGAR
Unit-II	Structure of Commercial Banking Institution in India	https://www.bing.com/videos/riverview/relatedvideo?q=Structure+of+Commercial+Banking+Institution+in+India&&view=riverview&mmscn=mtsc&mid=33F8F433B6D78008EE0D33F8F433B6D78008EE0D&&aps=0&FORM=VMSOVR
Unit-III	Structure of Banking System	https://www.bing.com/videos/riverview/relatedvideo?q=Chapter+1++Structure+of+Indian+Banking+System++YouTube&mid=2DF705DA7A77597561F42DF705DA7A77597561F4&FORM=VIRE
Unit-IV	National Bank for Agriculture and Rural Development	https://www.youtube.com/watch?v=gUAPtJKq9Q0

Course Code	FEC-164A				
Category	Foundation Elective Courses				
Course Title	**Computer Fundamentals**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	3	0	0	**3**	
Course Objectives	The objectives of this course are to • Understand the development of computing systems, their characteristics, and classifications. Learn number systems and codes. • Gain knowledge about memory types, storage devices, memory and their impact on performance and data management. • Learn the functions of operating systems, system utilities, application software, and user interfaces. • Gain skills in word processing, spreadsheets, and presentations, including formatting, data manipulation, formula creation, and document presentation. • Understand network types, topologies, and applications, and their role in modern communication and data sharing.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Recall the fundamental concepts of computer systems and office tools.	Level 1: Remember
CO2	Explain the basic concepts of computers, office productivity suite, Internet and its impact on society.	Level 2: Understand
CO3	Apply principles, tools and techniques of computer engineering to solve real world problems.	Level 3: Apply
CO4	Analyze the applications of computer technology, its societal impact, and the importance of network security.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Historical Evolution of Computing Systems: Overview of Data Processing, History of Computing, Computer Generations; Characteristics of Computer, Anatomy of Computer,Classification of Computers.

Number Systems and Codes: Introduction, Number Systems and its types, and inter-conversion of Number Systems; ASCII and EBCDIC codes, Types of Input Devices; Output Devices – Printers, Plotters and Monitors.

Unit-II

Memory and Storage Devices: Characteristics of memory systems, memory hierarchy,Types of Memory – RAM, ROM, etc.; Magnetic Disks, Magnetic Tapes, Optical Disks;Concept of Cache Memory and Virtual Memory.

Software and Operating System Concepts: Introduction, Software Types, Language translators, System Utility Software, Application Software; Operating System– Characteristics, its functions, and its classification; User Interfaces – CUI and GUIs, DOS and Windows operating system.

Word Processing Tool: Opening and Closing of documents, Text creation and Manipulation, Moving Around in a Document, Formatting of text, Table handling, Spellcheck, language setting and thesaurus, Handling Multiple Documents, Printing of word document.

Spreadsheet tool: Basics of Spreadsheet; Manipulation of cells, Formulas and Functions, Editing of Spread Sheet, Page setups, header and footer, printing of Spread Sheet.

Slide Presentation Tool: Basics of power point, Preparation and Presentation ofSlides, Slide Show, Formatting and Clip Arts, Taking printouts of presentation /handouts.

Unit-IV

Computer Networks: Basics of Computer networks, types of computer network - LAN, MAN, WAN; Network Topologies and Applications of Computer Networks.

Internet Basics: Concept of Internet, Application of Internet, WWW, Web-sites and URLs, Search Engine, email, Instant Messaging, Web Browsing software, surfing.

Social Concern: Positive and Negative Impacts of Computer Technology, Computer Crimes, Computer Virus-Definition, Types of viruses, Characteristics of viruses, anti- virus software, Computer Applications.

Suggested Readings:

- Handbook of Computer Fundamentals by Nasib Singh Gill, Khanna Books Publishing Co.(P) Ltd., New Delhi, 2016.
- Computer Fundamentals by P.K Sinha, BPB Publications.
- Computing Fundamentals and Programming in C by Nasib Singh Gill, Khanna Book Publishing Co.(P) Ltd.,New Delhi.
- Fundamentals of Computers by V. Rajaraman, PHI.
- Introduction to Computers by Leon, Alexis & Leon, Mathews, Leon Tech World.
- Data Processing and Information Technology by C.S. French, BPB Publications.

Useful Video links:

Unit No.	Topics	Links
Unit-I	Evolution of Computers	https://youtu.be/TS2odp6rQHU
	Number Systems and Codes	https://youtu.be/juJR_JDJRa0
Unit-II	Memory	https://youtu.be/cjNORC_00_A
	Cache Memory	https://youtu.be/OvWZ1uQ767U
Unit-III	Word Processing Tool	https://youtu.be/y-AiPdAYix1
	Slide Presentation Tool	https://youtu.be/KqgyvGxlSxk
Unit-IV	Internet	https://youtu.be/YOXwcbwSEUo
	WWW	https://youtu.be/q9THx--fAFw

Course Code	FEC-166A				
Category	Foundation Elective Courses				
Course Title	**Communication and Soft Skills**				
Scheme and Credits	L	T	P	**Credits**	**Semester-II**
	3	0	0	3	
Course Objectives	The objective of this course is to expose the students to basic communication and soft skills and to familiarize them with behavioral skills and business etiquettes.				
Course Pre-requisite	Basic knowledge of English language				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Describe the fundamental concepts and principles of communication, including verbal, non-verbal communication, and body language.	Level 1: Remember
CO2	Explain the process of effective presentation, audience interaction, and the techniques for structuring and delivering a presentation.	Level 2: Understand
CO3	Apply behavioral skills, including problem-solving, time management, and teamwork, in personal and professional settings.	Level 3: Apply
CO4	Analyze business etiquette and professionalism, including dress, grooming, and etiquette for meetings and special occasions.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Communication Skills: Concept, characteristics and process of communication; 7C's of communication; listening skills, verbal communication, non-verbal communication, body language, art of meeting and greeting, making effective conversation.

Unit-II

Presentation Skills: Difference between speech and presentation, handling of presentation audience questions, holding meetings, group discussion and interviews; structuring a presentation, delivering the presentation; situational presentation.

Unit-III

Behavioral Skills: Positive altitude, self-management, problem solving skills, time management skills, anger management, coping skills, assertiveness team building skills.

Unit-IV

Business Etiquettes: Business dress and grooming, office courtesies, etiquette for special occasions, meeting etiquette, dining etiquette.

Suggested Readings:

- The Effective Presentation by Asha Kaul, Response Books, New Delhi

- Towards Personal Excellence by Seema Sanghi, Response Books, New Delhi
- Developing Soft Skills by Robert M. Sherfield, R. J. Montgomery, and Patricia G. Moody, Pearson Education, New Delhi
- The Essential Guide to Business Etiquette by Lillian Chaney and Janette Martin, Praeger, London

Useful Video links:

Unit No.	Topics	Links
Unit-I	Communication Skills	https://www.youtube.com/watch?v=DUlsNJtg2L8&list=PLLy_2iUCG87CQhELCytvXh0E_y-bOO1_q&index=1
	7C's of communication; listening skills, effective conversation	https://www.youtube.com/watch?v=pLoOmJ_1Pz8&list=PLLy_2iUCG87CQhELCytvXh0E_y-bOO1_q&index=2
	Verbal communication, non-verbal communication	https://www.youtube.com/watch?v=_YMNbAbAUNk&list=PLLy_2iUCG87CQhELCytvXh0E_y-bOO1_q&index=5
	Body language, art of meeting and greeting	https://www.youtube.com/watch?v=EtUWCUWhILU&list=PLLy_2iUCG87CQhELCytvXh0E_y-bOO1_q&index=45
	Etiquette for special occasions, meeting etiquette, dining etiquette	https://www.youtube.com/watch?v=LpO0HCcGKIQ&list=PLLy_2iUCG87CQhELCytvXh0E_y-bOO1_q&index=58
Unit-II	Presentation Skills	https://www.youtube.com/watch?v=ykTuooKDVRU
	Business Etiquette	https://www.youtube.com/watch?v=D1TUh6_obJI&list=PLLy_2iUCG87CQhELCytvXh0E_y-bOO1_q&index=46
Unit-III	Self-management	https://www.youtube.com/watch?v=Jpoj0h4H520&list=PLLy_2iUCG87CQhELCytvXh0E_y-bOO1_q&index=56
	Team building Skills	https://www.youtube.com/watch?v=mjK0YwwT-vs
Unit-IV	Business dress and grooming	https://www.youtube.com/watch?v=5sPXxLYaoHg&list=PLLy_2iUCG87CQhELCytvXh0E_y-bOO1_q&index=57

Course Code	FEC-168A				
Category	Foundation Elective Course				
Course Title	**Entrepreneurship Development**				
Scheme and Credits	L	T	P	Credits	**Semester-II**
	3	0	0	3	
Course Objectives	The objectives of this course are • To learn about the concept of entrepreneurship, required skills, and its role in economic development. • To understand the sources of generating business ideas, feasibility analysis, and business planning. • To gain the knowledge of development of marketing, organizational, and financial plans for new ventures. • To understand the sources of finance and legal aspects of intellectual property rights for entrepreneurs.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Recall fundamental concepts and processes related to entrepreneurship	Level 1: Remember.
CO2	Explain the various elements and dynamics of entrepreneurship.	Level 2: Understand
CO3	Examine plans and strategies for entrepreneurial ventures.	Level 3: Apply
CO4	Analyze the factors and frameworks influencing entrepreneurial process.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Entrepreneurship: Concept, knowledge and skills requirement; characteristics of successful entrepreneurs; Role of entrepreneurship in economic development; entrepreneurship process; factors impacting emergence of entrepreneurship.

Unit-II

Starting the venture: Generating business idea – sources of new ideas, methods of generating ideas, opportunity recognition; environmental scanning, competitor and industry analysis; feasibility study– market feasibility, technical/operational feasibility, financial feasibility: drawing business plan.

Unit-III

Functional plans: Marketing plan – marketing research for the new venture, steps in preparing marketing plan, contingency planning; organizational plan – form of ownership, designing organization structure; financial plan – cash budget, working capital.

Unit-IV

entrepreneurs.

Legal Issues: Intellectual property rights patents, trademarks, copyrights, trade secrets, licensing.

Suggested Readings:

- Entrepreneurship by Hisrich, Robert D., Michael Peters and Dean Shephered, Tata McGraw Hill, New Delhi
- Entrepreneurship by Barringer, Brace R., and R. Duane Ireland, Pearson Prentice Hall, New Jersy (USA)
- Entrepreneurship Development and Small Business by Charantimath, Poornima, Pearson Education, New Delhi
- Entrepreneurship by Lall, Madhurima, and Shikha Sahai, Excel Books, New Delhi

Useful Video Links:

Unit No.	Topics	Links
Unit-I	Role and Importance of Entrepreneur in Economic Development	https://www.youtube.com/watch?v=l9ydpY8Vsek
Unit-II	Feasibility study	https://www.bing.com/videos/riverview/relatedvideo?&q=feasibility+study+in+entrepreneurship+nptel+video+lecture&&mid=38AB0CDBB6F87A962E7338AB0CDBB6F87A962E73&&FORM=VRDGAR
Unit-III	Functional plans	Functional Strategy Within Context of a Firm - YouTube
Unit-IV	Marketing Plan	https://www.youtube.com/watch?v=SWr_eziQC78

Course Code	FEC-170A				
Category	Foundation Elective Course				
Course Title	**Electronics Engineering**				
Scheme and Credits	L	T	P	Credits	Semester-II
	3	0	0	3	
Course Objectives	The objectives of this course are to • Explore principles, behavior and applications of semiconductor devices. • Learn number conversion system and applications of logic gates for designing digital circuits. • Gain knowledge of combinational and sequential circuits.				
Assessment	40 Marks				
End Semester Examination	60 Marks				
Total	100 Marks				
Duration of Exam	03 Hours				

Course Outcomes: After successful completion of this course, the students will be able to

COs	Skills Demonstrated	RBT Level
CO1	Define basic terminologies and concepts related to semiconductor devices.	Level 1: Remember
CO2	Explain the operation, biasing, principles and characteristics of electronic circuits.	Level 2: Understand
CO3	Design electronic circuits using various components for real-life applications.	Level 3: Apply
CO4	Analyze the performance, techniques and stability criteria for optimized operation of electronic devices.	Level 4: Analyze

Note: Examiner will set nine questions in total. Question one will be compulsory. Question one will have 8 parts of 1.5 marks each from all units and remaining eight questions of 12 marks each to be set by taking two questions from each unit. The students have to attempt five questions in total, first being compulsory and selecting one from each unit.

Unit-I

Semiconductor Diode: P-N junction and its V-I Characteristics, P-N junction as a rectifier, Switching characteristics of Diode. Diode as a circuit element, the load-line concept, half -wave and full wave rectifiers, clipping circuits, clamping circuits, filter circuits, peak to peak detector and voltage multiplier circuits.

Unit-II

Transistor: Bipolar junction transistor: operation, characteristics, Ebers-moll model of transistor, CE, CB, CC configurations.

Transistor Biasing: Operating point, bias stability, collector to base bias, self-bias, emitter bias, bias compensation, thermistor & sensistor compensation.

Unit-III

Field Effect Transistors: Junction field effect transistor, pinch off voltage, volt- ampere characteristics, small signal model, MOSFET Enhancement& Depletion mode, V- MOSFET. Common source amplifier, source follower, biasing of FET, applications of FET as a voltage variable resistor (VVR).

Unit-IV

Digital Electronics: Binary, Octal and Hexadecimal number system andconversions, Boolean Algebra, Truth tables of logic gates (AND, OR, NOT) NAND, NOR as universal gates. Difference between combinational circuits and

Suggested Readings:

- Integrated Electronics by Millman & Halkias, McGraw Hill
- Modern Digital Electronics by R.P. Jain, McGraw-Hill
- Electronics Principles by Malvino, McGraw Hill
- Electronics Circuits by Donald L. Schilling & Charles Belove, McGraw Hill
- Electronics Devices & Circuits by Boylestad & Nashelsky, Pearson.
- Electronics Devices & Circuits by J.B. Gupta, Katson Books.

Useful Video Links:

Unit No.	Topics	Video Links
Unit-I	P-N junction and its V-I Characteristics	https://www.youtube.com/watch?v=h0Y9jDKqScQ&list=PLgMDNELGJ1CaNcuuQv9xN07ZWkXE-wCGP
	Clipping circuits, clamping circuits	https://www.youtube.com/watch?v=aQ6tA1z933k
Unit-II	Ebers-moll model of transistor	https://www.youtube.com/watch?v=dro_5MYgkg
	Thermistor & Sensistor compensation	https://www.youtube.com/watch?v=5_MpULxwjjg
Unit-III	Small signal model	https://www.youtube.com/watch?v=PUR4x4yunWk
	Applications of FET as a voltage variable resistor (V V R)	https://www.youtube.com/watch?v=Q0nhtmYT6uA
Unit-IV	Boolean Algebra	https://www.youtube.com/watch?v=oaOm2pnKkyY&list=PLbMVogVj5nJQ-tIzyygzzLLxomzIbIiE4
	Difference between combinational circuits and sequential circuits	https://www.youtube.com/watch?v=ibQBb5yEDlQ