JBIET Academic Regulations –R24

Applicable to

B.Tech Regular Four Year Degree Programme

(For the Batches admitted from the Academic Year 2024- 25)

&

B.Tech (Lateral Entry Scheme)

(For the Batches admitted from the Academic Year 2025-26)

J.B. INSTITUTE OF ENGINEERING AND TECHNOLOGY

(UGC AUTONOMOUS)

Bhaskar Nagar, Yenkapally (V), Moinabad (M), Hyderabad – 500075,

Telangana, India

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Offered under **Choice Based Credit System (CBCS)**

J**.** B**.** Institute of Engineering and Technology (hereinafter referred to as JBIET) academic regulations JB-R24 are given here under. These regulations approved by the Academic Council shall be in force and applicable from the academic year 2024-25 onwards.

1.0 Under-Graduate Degree Programme in Engineering & Technology

J. B. Institute of Engineering and Technology (JBIET) offers a 4-Year (8 Semesters) Bachelor of Technology (B. Tech) Degree Programme for regular students under Choice Based Credit System (CBCS) in the following branches of Engineering with effect from the academic year 2024-25.

S. No.	Branch Code	Branch Name
1	**01**	Civil Engineering (CE)
2	**02**	Electrical and Electronics Engineering (EEE)
3	**03**	Mechanical Engineering (ME)
4	**04**	Electronics and Communication Engineering (ECE)
5	**05**	Computer Science and Engineering (CSE)
6	**12**	Information Technology (IT)
7	**19**	Electronics and Computer Engineering (ECM)
8	**66**	Computer Science and Engineering (Artificial Intelligence and Machine Learning)-CSE(AI&ML)
9	**67**	Computer Science and Engineering (Data Science)-CSE(DS)
10	**72**	Artificial Intelligence and Data Science (AI&DS)
11	**73**	Artificial Intelligence and Machine Learning (AI&ML)

2.0 Eligibility for Admission

2.1. Admission to the undergraduate (UG) programme shall be made either on the basis of the merit rank obtained by the qualified student in entrance test conducted by the Telangana State Government (EAPCET) or the University or on the basis of any other order of merit approved by the College, subject to reservations as prescribed by the government from time to time.

2.2. The medium of instruction for the entire Undergraduate Programme in Engineering &Technology is English only.

3.0 B. Tech Programme Structure

3.1 Semester Scheme*:* Each Undergraduate (**UG**) Programme is of 4 Academic Years (8 Semesters) with the Academic Year divided into two Semesters of 22 weeks (≥90 instructional days) each. Each Semester is having "**Continuous Internal Evaluation (CIE)**" and "**Semester End Examination (SEE)**" under Choice Based Credit System (CBCS) and Credit Based Semester System (CBSS) as indicated by UGC. The guidelines issued by JNTUH, AICTE and NEP-2020 are followed while designing curriculum / course structure.

3.2 Choice Based Credit System (CBCS): Choice Based Credit System (CBCS) is introduced in line with UGC guidelines in order to promote:

- Student centred learning
- Students to learn courses of their choice
- Interdisciplinary learning

A student has a choice of registering for courses comprising program core, professional electives, open electives, value added, skill-oriented courses etc. Besides, choice is also offered to students for registering courses to earn Minor in Engineering / Honours degree.

3.3 Minimum Duration: The minimum (normal) duration of the B. Tech. Programme for the student securing admission under Regular mode is Four Academic Years (8 Semesters) and for the student admitted under Lateral Entry Scheme is Three Academic Years (6 Semesters) starting from the commencement of the First Year First Semester.

3.4 Maximum Duration: A student admitted under Regular mode shall complete the B. Tech Programme in a maximum period of Eight Academic Years (16 Semesters) and the student admitted under Lateral Entry Scheme shall complete the B. Tech Programme in a maximum period of Six Academic Years (12 Semesters) starting from the date of commencement of First Year First Semester. failing which student shall forfeit seat in B.Tech course. Each student shall secure 160 credits for regular students and 120 credits for Lateral Entry students (with CGPA ≥ 5) for the completion of the undergraduate programme and award of the B.Tech. degree.

4.0 Course Classification

The curriculum for B. Tech Programme includes various curricular components like Foundation Courses (BS, HS and ES), Core Courses (PC, PW), Elective Courses (PE & OE), Audit Courses (AC), Mandatory Courses (MC) etc. The details of these courses and typical breakup of credits for each category is mentioned in the tables given below.

4.1 Classification

S. No.	Broad Course Classification	Course Group/ Category	Course Description
1	Foundation Courses (FnC)	BS – BasicSciences	Includes Mathematics, Physics and Chemistrysubjects
2		ES- Engg. Sciences	Includes fundamental engineering subjects
3		HS – Humanities and Social sciences	Includes subjects related to Humanities, Socialsciences and Management
4	Core Courses (CoC)	PC– Professional Core	Includes core subjects related to the parent Discipline/ department/ branch of Engineering.
5		PW- Project Work	B. Tech project or UG project or UG major project or Project Stage I & II
6		Industry Training/ Internship/ Industry Oriented Mini-project/ Mini- Project/ Skill Development Courses	Industrial training/ Summer Internship/ Industry Oriented Mini-project/Mini-project
7	Elective Courses(ElC)	PE – Professional Electives	Includes elective subjects related to the parent discipline/ department/ branch of Engineering.
8		OE – OpenElectives	Elective subjects which include inter-disciplinary subjects or subjects in an

			area outside the parent discipline/ department/ branch of Engineering.
9	Seminar	Seminar	Seminar/ Colloquium based on core contents related to parent discipline/ department/ branchof Engineering.
10	Minor Courses	-	1 or 2 Credit Courses (subset of HS)
11	Audit courses (AC)	-	Value Added Course / Audit Courses (Non-Credit)
12	Mandatory Courses (MC)	-	Mandatory Courses (Non-credit)

4.2 Typical Breakup of Credits for each Category:

S.No	Category	Breakup of Credits
1	Humanities and Social Sciences (HS)- including Management.	**10**
2	Basic Sciences (BS)- Courses including Mathematics, Physics and Chemistry.	**22**
3	Engineering Sciences (ES)-Courses including Workshop, Drawing, Basics of Electrical / Electronics /Mechanical / Computer Engineering.	**22**
4	Professional Core (PC)-Courses relevant to the chosen specialization / branch.	**59**
5	Professional Electives (PE)-Courses relevant to the chosen specialization / branch.	**18**
6	Open Elective (OE) - Courses from other technical and / or emerging subject areas.	**12**
7	Mini-project / Project Work / Internship / Industrial training / Seminar	**17**
8	Mandatory Courses / Audit Courses.	**Non-Credit**
TOTAL		**160**

5.0 Credit System

5.1 The student has to register for all the courses offered in a Semester. The credits assigned for each course are indicated in an L: T: P: C (Lecture periods: Tutorial periods: Practical periods: Credits) pattern as follows:

- Theory Courses: One Lecture Hour (L) per week in a semester: 01 Credit
- Practical Courses: One Practical Hour (P) Per week in a semester: 0.5 Credit
- Tutorial: One Tutorial Hour (T) Per week in a semester: 01 Credit
- Mandatory Courses: No CREDIT is awarded.
- Audit Courses: No CREDIT is awarded.

6.0 Course Registration

6.1. A faculty advisor or mentor shall be assigned to a group of 20 students, who can advise the students about the Programme, it's course structure and curriculum, choice/option for subjects/ courses, based on their competence, progress, pre-requisites and interest.

6.2 Before the commencement of every semester, all the students shall register for the courses offered in that semester through online registration process

6.3 A student can apply for registration, only after obtaining the 'written approval' from faculty advisor, which should be submitted to the college academic section through the Head of the Department. A copy of it shall be retained with the Head of the Department, faculty advisor and the student.

6.4 If any student fails to register courses in a semester, he/she shall undergo the courses as per the course structure decided by the Head of the Department.

6.5 A student may be permitted to register for all the subjects/ courses in a semester as specified in the course structure with maximum additional subject(s)/course(s) limited to 6 Credits (any 2 elective subjects), based on progress and SGPA/ CGPA, and completion of the 'pre-requisites' as indicated for various subjects/ courses, in the department course structure and syllabus contents.

6.6 Choice for 'additional subjects/courses', not more than any 2 elective subjects in any Semester, must be clearly indicated, which needs the specific approval and signature of the Faculty Advisor/Mentor/HOD.

6.7 If any student submits ambiguous choices or multiple options or erroneous entries during registration for the subject(s) / course(s) under a given / specified course group / category as listed in the course structure, the subject / courses decided by the Head of the Department will be final.

6.8 After registering for a course, a student shall attend the classes, to satisfy the attendance requirements, earn Continuous Internal Evaluation (CIE) Marks and appear in Semester End Examinations (SEE).

6.9 Subject / course options exercised while registration is final and cannot be changed or inter- changed; further, alternate choices also will not be considered. However, if the subject / course that has already been listed for registration by the Head of the Department in a semester could not be offered due to any unforeseen or unexpected reasons, then the student shall be allowed to have alternate choice either for a new subject (subject to offering of such a subject), or for another existing subject (subject to availability of seats). Such alternate arrangements will be made by the Head of the Department, with due notification and time-framed schedule, within the first week after the commencement of class-work for that semester.

6.10 Dropping of subjects/ courses may be permitted, only after obtaining prior approval from the faculty advisor/ counselor 'within a period of 15 days' from the beginning of the current semester.

6.11 Open Electives: The students have to choose requisite number of open electives (as prescribed in the course structure) from the list of open electives. However, the student can opt for an Open Elective subject offered by his/her own (parent) department, if the student has not registered and not studied that subject under any category (Professional Core, Professional Electives, Mandatory Courses etc.) offered by parent department in any semester. Open Elective subjects already studied should not repeat/should not match with any category (Professional Core, Professional Electives, Mandatory Courses etc.) of subjects even in the forthcoming semesters.

6.12 Professional Electives: The students have to choose six Professional Electives (PE-I to VI) from the list of professional electives given.

6.13 Subjects/ courses to be offered (Professional Electives and Open Electives) shall be offered to the students if a minimum of 30 students register for that course.

6.14 More than one faculty member may offer the same subject (lab/ practical may be included with the corresponding theory subject in the same semester) in any semester. However, selection of choice for students will be based on - '**first come first serve** basis and CGPA criterion' (i.e. the first focus shall be on early entry from the student for registration in that semester, and the second focus, if needed, will be on CGPA of the student).

6.15 If more entries for registration of a subject come into picture, then the Head of the Department concerned shall decide, whether or not to offer such a subject/ course for two (or multiple) sections.

6.16 In case of options coming from students of other departments/ branches/ disciplines (not considering open electives), first priority shall be given to the student of the 'parent department'.

7.0. Academic Requirements

7.1 Attendance Requirements

7.1.1 A student shall be eligible to appear for the Semester End Examinations, if the student acquires a minimum of 75% of attendance in aggregate of all the subjects / courses (including attendance in Mandatory Courses and Audit Courses) for that semester. Two periods of attendance for each theory subject shall be considered if the student appears for the mid-term examination of that subject.

7.1.2 Shortage of attendance in aggregate up to 10% (65% and above, and below 75%) in each semester may be condoned by the College Academic Committee (CAC) on genuine and valid grounds, based on the student's representation with supporting evidence.

7.1.3 Shortage of attendance below 65% in aggregate **shall in no case be condoned**.

7.1.4 A stipulated condonation fee as decided by the CAC is payable for condoning shortage of attendance.

7.1.5 Students whose shortage of attendance is not condoned in any semester are not eligible to take their end examinations of that semester. They get detained and their registration for that semester shall stand cancelled, including all academic credentials (internal marks etc.) of that semester. They will not be promoted to the next semester. They may seek re-registration for all those subjects registered in that semester in which the student is detained, by seeking re-admission into that semester as and when offered; if there are any professional electives and/ or open electives, the same may also be re-registered if offered. However, if those electives are not offered in later semesters, then alternate electives may be chosen from the **same** set of elective subjects offered under that category**.**

7.1.6 A student detained in a semester due to shortage of attendance may be readmitted in the same semester as and when offered in the forthcoming academic years for fulfilment of academic requirements. **The academic regulations under which a student has been readmitted shall be applicable.**

7.1.7 A student fulfilling the attendance requirement in the present semester shall not be eligible for readmission into the same class.

7.2 Course Passing Standards

The following academic requirements have to be satisfied, in addition to the attendance requirements mentioned in Item No. 7.1.

7.2.1 A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course, if student secures not less than 35% (14 marks out of 40 marks) in the Continuous Internal Evaluation (CIE), not less than 35% (21 marks out of 60 marks) in the semester end examinations (SEE), and a minimum of 40% (40 marks out of 100 marks) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together; in terms of letter grades, this implies securing 'C' grade or above in that subject/ course.

7.2.2 A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to Real-time Research Project (or) Field Based Research Project (or) Industry Oriented Mini Project (or) Internship (or) Seminar, if the student secures not less than 40% marks (i.e. 40 out of 100 allotted marks) in each of them. The student is deemed to have failed, if he (i) does not submit a report on Industry Oriented Mini Project/Internship, or (ii) not make a presentation of the same before the evaluation committee as per schedule, or (iii) secures less than 40% marks in Real-time Research Project (or) Field Based Research Project (or) Industry Oriented Mini Project (or) Internship evaluations.

7.2.3 A student may reappear once for each of the above evaluations, when they are scheduled again; if the student fails in such 'one reappearance' evaluation also, the student has to reappear for the same in the next subsequent semester, as and when it is scheduled.

7.2.4 Recounting/Revaluation: Students shall be permitted to apply for Recounting /Revaluation of the Semester End Examination answer scripts within a stipulated period after payment of the prescribed fee. After completion of the process of Recounting /Revaluation, the records are updated with changes if any, and the student shall be issued a revised grade sheet. If there are no changes, the same will be shown in the student examination portal.

7.3 Promotion Rules:

Promotion Rules for Regular/Lateral Entry Students

S. No.	Promotion	Conditions to be fulfilled
1	First year first semester to first year second semester	Regular course of study of first year first semester.
2	First year second semester to second year first semester	**Regular Students:** Regular course of study of first year second semester and must have secured at least 20 credits out of 40 credits i.e., 50% credits up to first year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
3.	Second year first semester to second year second semester	Regular course of study of second year first semester.
4	Second year second semester to third year first semester	**Regular Students:** Regular course of study of second year second semester and must have secured at least 48 credits out of 80 credits i.e., 60% credits up to second year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
		Lateral Entry Students: Regular course of study of second year second semester and must have secured at least 24 credits out of 40 credits i.e., 60% credits up to second year second semester from all the relevant regular and supplementary examinations, whether the student takesthose examinations or not.

5	Third year first semester to third year second semester	Regular course of study of third year first semester.
6	Third year second semester to fourth year first semester	**Regular Students:** Regular course of study of third year second semester and must have secured at least 72 credits out of 120 credits i.e., 60% credits up to third year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
		Lateral Entry Students: Regular course of study of third year second semester and must have secured at least 48 credits out of 80 credits i.e., 60% credits up to third year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
7	Fourth year first semester to fourth year second semester	Regular course of study of fourth year first semester.

7.4 Credit Requirements

The following credit requirements must be satisfied, in addition to the attendance requirements mentioned in item No. 7.1.

7.4.1 A student should earn credits allotted for each of the course by securing minimum marks designated as passing standard for that course.

7.4.2 A student shall be admitted under regular scheme, register for all 160 credits offered and has to earn all the credits (A student admitted under Lateral entry scheme shall register for all 122 credits offered and all the credits). However, the student shall be eligible to avail the benefits that the JNTUH University announces such as exemption of subjects and grace marks for batches admitted during the academic years same as these students.

7.4.3 A student shall register for all mandatory courses mentioned in the curriculum and get minimum pass marks (i.e., 40% of total marks) to get the degree. Grade points obtained in these courses will not be considered for awarding class.

7.4.4 A student detained due to lack of credits, shall be promoted to the next academic year only after acquiring the required number of academic credits. The academic regulations under which the student has been readmitted shall be applicable to him.

8.0. Evaluation-Distribution and Weightage of marks

8.1 The performance of a student in all theory and Laboratory courses shall be evaluated for 100 marks each, with **40 marks** allotted for **Continuous Internal Evaluation (CIE)** and **60 marks** for **Semester End-Examination (SEE).**

The details of course-wise allotment of marks are given below.

S. No.	Course	Marks	
		CIE	SEE
1	Theory courses	40	**60**
2	Laboratory courses	40	**60**
3	Mandatory courses	100	--
4	Audit Courses	--	--
5	Internship- I	50	--
6	Internship- II	50	--
7	Mini Project	50	--
8	Project Stage - I	100	--
9	Seminar	50	--
10	**Project Stage - II**	**40**	**60**

8.2 Continuous Internal Evaluation (CIE)

8.2.1 Theory Courses: For theory courses, during the semester there shall be 2 **mid- term examinations** (**internal exams of 30 marks each**), **2 assignments carrying 5 marks each and Subject Viva-Voce/PPT/Poster Presentation/ Case Study on a topic in the concerned subject for 5 marks.**

S. No	Component	Frequency of Evaluation	Marks for Each test	Final Marks (Average)
1	**Mid Examinations**	2	30	30
2	**Assignments**	2	5	5
4	**Viva-Voce/PPT/Poster Presentation/ Case Study**	1		5
			Total	40

Mid-term Examinations (30 marks): In CIE, for theory subjects, during a semester, there shall be two mid-term examinations. Each Mid-term examination consists of two parts i) Part – A for 10 marks, ii) Part – B for 20 marks with a total duration of 2 hours as follows:

Mid Term Examination for 30 marks:

a. Part - A : Objective/quiz paper for 10 marks.
b. Part - B : Descriptive paper for 20 marks.

The objective/quiz paper is set with multiple choice, fill-in the blanks and match the following type of questions for a total of 10 marks. The descriptive paper shall contain 6 full questions out of which, the student has to answer 4 questions, each carrying 5 marks. The average of the two mid-term examinations shall be taken as the final marks for mid- term examination (for 30 marks).

The Mid-I shall be conducted after first spell of instructions covering the syllabus of Modules I and II. The Mid-II shall be conducted after second spell of instructions covering the syllabus of Modules III, IV and V.

Assignments (5 marks): There shall be two assignments for 5 marks each. Assignment- 1 shall be submitted before I-mid examinations covering the topics from Module-1 and Module-2, and the Assignment-2 shall be submitted before II-mid examinations covering the topics from Module-3, Module-4 and Module-5. The assignments are used to test the student in Bloom's higher order thinking skills. The average of the two assignments shall be taken as the final marks for assignment (for 5 marks).

Viva-Voce/ PPT /Poster Presentation/ Case Study (5 Marks): Subject Viva-Voce/PPT/Poster Presentation/ Case Study on a topic in the subject concerned for 5 marks before II Mid-Term Examination.

8.2.2 If a student is absent for any mid-term Examination on medical grounds / due to any emergency / unavoidable circumstances, the student may be permitted to apply for makeup examinations within a week after completion of Mid-Term Examinations. A sub- committee with the following composition will look into such cases. Student shall pay Rs.200 per subject as registration fee in which he/she is appearing for re-examination.

S. No	Faculty Member	Designation
1	Concerned Head of the Department	Chairman
2	Faculty nominated by Principal	Member
3	Senior faculty member of the concerned Department	Member
4	Class Teacher of the class/section	Member

8.2.3 The Student, in each subject, shall have to earn 35% of marks (i.e. 14 marks out of 40 marks) in CIE, 35% of marks (i.e. 21 marks out of 60) in SEE and overall, 40% of marks (i.e. 40 marks out of 100 marks) both CIE and SEE marks put together.

8.2.4 The student is eligible to write Semester End Examination of the concerned subject, if the student scores ≥ 35% (14 marks) of 40 Continuous Internal Examination (CIE) marks.

8.2.5 In case, the student appears for Semester End Examination (SEE) of the concerned subject but not scored minimum 35% of CIE marks (14 marks out of 40 internal marks), his performance in that subject in SEE shall stand cancelled inspite of appearing the SEE.

8.3 Semester End Examinations (SEE)

8.3.1 Theory Courses

The Semester End Examinations (SEE), for theory subjects, will be conducted for 60 marks consisting of two parts viz. **i) Part- A for 10 marks, ii) Part - B for 50 marks.**

- Part-A is a compulsory question which consists of ten sub-questions from all units carrying equal marks.
- Part-B consists of five questions (numbered from 2 to 6) carrying 10 marks each. Each of these questions is from each unit and may contain sub-questions. For each question there will be an "either" "or" choice, which means that there will be two questions from each unit and the student should answer either of the two questions.
- The duration of Semester End Examination is 3 hours.

8.3.2 Laboratory Courses

Continuous Internal Evaluation (CIE): The continuous internal evaluation for laboratory courses during the semester is evaluated for 40 marks and 60 marks for Semester End Examination. Out of the 40 marks for internal evaluation:

i. A write-up on day-to-day experiment in the laboratory (in terms of aim, components/procedure, expected outcome) which shall be evaluated for 10 marks

ii. 10 marks for viva-voce (or) tutorial (or) case study (or) application (or) poster presentation of the course concerned.

iii. The remaining 10 marks are for Laboratory Report/Project and Presentation, which consists of the Design (or) Software / Hardware Model Presentation (or) App Development (or) Prototype Presentation submission which shall be evaluated after completion of laboratory course and before semester end practical examination.

iv. Internal laboratory examination (ILE) for 10 marks shall be conducted by the faculty member handling the laboratory. ILE shall be conducted after Second spell of instructions.

S.No	Component	Marks
1	Day-to-Day Evaluation	30
2	Internal Examination	10
	Total	40

8.3.3 Semester End Examination for Laboratory Courses The performance of the student in laboratory courses shall be evaluated for **60 marks** jointly by Internal and External Examiners for 3 hours duration. The total 60 marks are divided and allocated as shown below:

- 10 marks for write-up
- 15 for experiment/program
- 15 for evaluation of results

- 10 marks for presentation on another experiment/program in the same laboratory course and
- 10 marks for viva-voce on concerned laboratory course.

8.3.4 Evaluation of Elements of CE/ME/EEE/ECE/CSE etc course: The internal evaluation is for 50 marks, and it shall take place during I Mid-Term examination and II Mid-Term examination. The average marks of two Mid-Term examinations is the final for 50 marks. Student shall have to earn 40%, i.e 20 marks out of 50 marks from average of the two examinations. There shall be NO external evaluation. The student is deemed to have failed, if he (i) is absent as per schedule, or (ii) secures less than 40% marks in this course.
CSE/IT and Allied branches: The Continuous Internal Evaluation (CIE) will be for 50 marks. Each Mid-Term examination consists of two parts i) Part – A for 20 marks, ii) Part – B for 20 marks with a total duration of 2 hours.
Part A: Objective/quiz paper is set with multiple choice, fill-in the blanks and match the following type of questions for a total of 20 marks. Part B: Descriptive paper shall contain 6 full questions out of which, the student has to answer 4 questions, each carrying 5 marks. The remaining 10 marks of Continuous Internal Evaluation are for Assignment (5 marks) and Subject Viva-Voce/PPT/Poster Presentation/ Case Study (5 marks) and the evaluation pattern will remain same as for other theory subjects.

CE/ME/EEE/ECE branches: the Continuous Internal Evaluation (CIE) will be for 50 marks. Out of the 50 marks for internal evaluation:
a) A write-up on day-to-day experiment in the laboratory (in terms of aim, components/procedure, expected outcome) which shall be evaluated for 10 marks
b) 10 marks for viva-voce (or) tutorial (or) case study (or) application (or) poster presentation of the course concerned.
c) Internal practical examination conducted by the laboratory teacher concerned shall be evaluated for 15 marks.
d) The remaining 15 marks are for Laboratory Report/Project and Presentation, which consists of the Design (or) Software / Hardware Model Presentation (or) App Development (or) Prototype Presentation submission which shall be evaluated after completion of laboratory course and before semester end practical examination.

8.4 Internship: Students should undergo two Internships. Internship-I shall be carried out under the guidance of professors from Science and Basic Engineering Subjects, with topics having some social relevance. The Internship-I is to be taken up during the summer vacation after I Year II Semester Examination and it will be evaluated in II Year I semester for 50 marks. However, the process might be initiated before the end of I Year II Semester by the concerned department. The students admitted under Lateral Entry Scheme (LES) shall carry out internship in the area of their Diploma specialization under the guidance of a faculty member of that department immediately in the first month, after their joining of the course. The Internship-II is to be taken up during the summer vacation after II Year II Semester examination and it will be evaluated in III Year I semester for 50 marks. However, the

process might be initiated before the end of II Year II Semester by the concerned department.

For both the Internships, the student shall submit a report on the training undergone. The internships shall be evaluated by a three-member committee constituted by the Head of Department to assess the student performance on the following parameters. There shall be no Semester End Examinations for the Internships.

Parameter	Marks
Internship report	15
Quality of work	15
Presentation	15
Viva-Voce	5
Total	50

8.5 Industry Oriented Mini Project: A student is required to undergo a Mini Project of his/her choice during the vacation after III Year II Semester Examination by applying theoretical concepts to develop a practical component /element/system that includes design/ testing/ analysis. The performance of a student in the Mini Project shall be evaluated in IV Year I Semester by a three-member committee constituted by the HoD as per the following parameters:

Parameter	Marks
Mini Project report	15
Quality of work	15
Presentation	15
Viva-Voce	5
Total	50

The performance of a student in Mini Project shall be evaluated based on two reviews, each carrying 50 marks. The average marks of these two reviews will be awarded. **There shall be no Semester End Examination** for the Industry Oriented Mini Project.

8.6 Seminar: There is a seminar in IV Year II Semester for 50 Marks. The student shall deliver a seminar on any emerging topic of his / her choice from the core technical domain. The student shall submit a duly-certified seminar report. A three-member committee constituted by the HoD will evaluate the seminar report submitted by the student. **There shall be no Semester End Examination**.

If a student is absent for seminar on medical grounds / due to any emergency / unavoidable circumstances, the student may be permitted to reappear within a month.

8.7 Project Work: The student is required to undertake a Project Work by using the knowledge acquired by him / her during the course of study. The student is expected to

design and build a complete system or subsystem on his / her area of interest. The Project Work consists of two parts namely, Project Stage -I (Project Survey) and Project Stage – II (Project Implementation). Project Stage – I is carried out during IV Year I Semester and the Project Stage – II during IV Year II Semester. A project work shall be taken up by a batch of students not exceeding 4 members under the guidance of a faculty supervisor.

For Project Stage – I, the Project Review Committee (PRC) consisting of the Head of the Department, Project Coordinator, Project supervisor and one senior faculty member shall evaluate the Project Work for 50 marks before II Mid Examination of IV-I Semester. **There shall be no End Semester Evaluation for Project Phase-I**. The student is deemed to have failed, if he

(i) does not submit a report on Project Stage - I or does not make a presentation of the same before the evaluation committee as per schedule

(ii) Secures less than 40% marks in the CIE.

A student who has failed may reappear once for the above evaluation, when it is scheduled again; if he/she fails in such 'one reappearance' evaluation also, he/she has to reappear for the same in the next subsequent semester, as and when it is scheduled.

For Project Stage – II, Project Review Committee (PRC) consisting of the Head of the Department, Project supervisor, Project Coordinator and a senior faculty member **shall evaluate for 40 marks as continuous evaluation**. The External Examiner shall **evaluate the Project work for 60 marks as Semester End Examination**. Out of 40 internal marks, the departmental committee consisting of Head of the Department, Project Supervisor and a Senior Faculty Member shall evaluate the project work for 20 marks and Project Supervisor shall evaluate for 20 marks.

The student is deemed to have failed, if he (i) does not submit a report on Project Stage - II, or does not make a presentation of the same before the External Examiner as per schedule, or (ii) Secures less than 40% marks in the sum total of the CIE and SEE taken together. The student is deemed to have failed, if he

(i) does not submit a report on Project Stage - II, or does not make a presentation of the same before the external examiner as per schedule.

(ii) Secures less than 40% marks in the sum total of the CIE and SEE taken together.

A student who has failed may reappear once for the above evaluation, when it is scheduled again; if student fails in such 'one reappearance' evaluation also, he/she must reappear for the same in the next subsequent semester, as and when it is scheduled.

For conducting Viva-Voce of Project Stage – II, the principal selects the External Examiner from the list of experts in the relevant branch of engineering submitted by the concerned Head of the Department.

8.8 A student shall be given only one time chance to re-register for a maximum of two subjects in a semester:

If the internal marks secured by a student in the Continuous Internal Evaluation marks for 40 (Sum of average of two mid-term examinations consisting of Objective & descriptive parts, Average of two Assignments & Subject Viva-voce/ PPT/ Poster

presentation/ Case Study on a topic in the concerned subject) are less than 35% and failed in those subjects. A student must re-register for the failed subject(s) for 40 marks within four weeks of commencement of the classwork in next academic year. In the event of the student taking this chance, his Continuous Internal Evaluation marks for 40 and Semester End Examination marks for 60 obtained in the previous attempt stand cancelled.

8.8 Mandatory Courses (MC)

Mandatory courses carry "ZERO" credit. There shall be NO Semester-end examination. However, attendance in Mandatory Curses shall be considered while calculating aggregate attendance in a semester. The Continuous Internal Evaluation (CIE) shall be conducted and evaluated for 40 marks similar to the theory courses. In addition to this an internal Examination for 60 marks covering the syllabus from all five modules is conducted. The student shall be declared to have passed the mandatory courses only when he/she secures 40% marks in the internal evaluation carried out for 100 marks. If the student fails, a re-examination shall be conducted for such candidates in the following semester before the supplementary examinations. The performance of the student shall be indicated in the grade sheets "PASS" (or) "FAIL" only. The student should pass all the mandatory courses, for the award of B.Tech degree.

8.9 Audit Courses (AC)

Audit courses carry **zero** credits. There shall be No mid-term and Semester End Examination. However, attendance in audit courses shall be considered while calculating aggregate attendance in a semester. The student should study all the audit courses. No credits will be assigned to these courses. A separate certificate will be issued by the Head of the institution on satisfactory completion of Audit Courses.

The student may be permitted to register Mandatory courses and Audit courses as MOOCs offered by SWAYAM / NPTEL / EdX / Coursera / Udacity / Udemy /upgrad/ Khan Academy / Edureka / QEEE etc. The student shall submit weekly assessment report to the faculty coordinator as mentioned in 9.1 and the same shall be considered for internal marks and attendance.

9.0 Massive Open Online Courses (MOOCs)

A student shall be permitted to register BOS approved list of online / self-study course in lieu of the Professional Electives; Open Electives from Massive Open Online Courses (MOOCs) offered by SWAYAM / NPTEL / EdX / Coursera / Udacity / Udemy /upgrad/ Khan Academy / Edureka / QEEE etc. However, the syllabus of the MOOC course shall be approved by the concerned BOS. No formal lectures will be delivered for a self-study course.

9.1 One faculty member for each course shall be nominated as coordinator by the Department to monitor the progress made by the student. The coordinator needs to carry out the conversion of grades awarded to the student in internal and external examinations by the MOOCs offering institution into corresponding grades of JBIET. If any student fails

to successfully complete the MOOC course in the first attempt, he/she shall complete it in the supplementary examination conducted by the college in the subsequent semesters. The question paper pattern and evaluation process for the examination of such subjects for MOOC courses will be similar to that of any other theory course offered under R24.

10.0. Grading Procedure

10.1 Grades will be awarded to indicate the performance of students in each Theory subject, Laboratory / Practical, Seminar, Industry Oriented Mini Project, and Project Stage - I & II. Based on the percentage of marks obtained (Continuous Internal Evaluation plus Semester End Examination, both taken together) as specified in item 8 above, a corresponding letter grade is given.

10.2 As a measure of the performance of a student, a 10-point Absolute Grading System using the following letter grades (as per UGC/AICTE guidelines) and corresponding percentage of marks is followed:

% of Marks Secured in a Subject/Course (Class Intervals)	Letter Grade (UGC Guidelines)	Grade Points
Greater than or equal to 90%	O (Outstanding)	10
80 and less than 90%	A+ (Excellent)	9
70 and less than 80%	A (Very Good)	8
60 and less than 70%	B+ (Good)	7
50 and less than 60%	B (Average)	6
40 and less than 50%	C (Pass)	5
Below 40%	F (FAIL)	0
Absent	Ab	0

Credit Points (CP) = Grade Point (GP) x Credits …. for a course

A student passes the subject/ course only when GP ≥ 5 ('C' grade or above).

10.3 The Semester Grade Point Average (SGPA) is calculated by dividing the sum of Credit Points (Σ CP) secured from all subjects/ courses registered in a semester, by the total number of Credits registered during that semester. SGPA is rounded off to two decimal places. SGPA is thus computed as given below:

$$SGPA = \frac{\sum_{i=1}^{N} C_i G_i}{\sum_{i=1}^{N} Ci} \text{ for each Semester}$$

where 'i' is the subject indicator index (takes into account all subjects in a semester), 'N' is the no. of subjects 'registered' for the semester (as specifically required and listed under the course structure of the parent department), C_i is the no. of credits allotted to the i^{th} subject, and G_i represents the grade points (GP) corresponding to the letter grade awarded for that i^{th} subject.

10.4 The Cumulative Grade Point Average (CGPA) is a measure of the overall cumulative performance of a student in all semesters considered for registration. The CGPA is the ratio of the total credit points secured by a student in all registered courses in all semesters, and the total number of credits registered in all the semesters. CGPA is rounded off to two decimal places. CGPA is thus computed from the I Year II Semester onwards at the end of each semester as per the formula.

$$CGPA = \frac{\sum_{j=1}^{M} C_j G_j}{\sum_{j=1}^{M} C_j} \text{ for all S number of semesters registered}$$

(i.e., up to and inclusive of S semesters, S ≥ 2),
where 'M' is the total no. of subjects (as specifically required and listed under the course structure of the parent department) the student has 'registered' i.e., from the 1st semester onwards up to and inclusive of the 8th semester, 'j' is the subject indicator index (takes into account all subjects from 1 to 8 semesters), C_j is the no. of credits allotted to the j^{th} subject, and G_j represents the grade points (GP) corresponding to the letter grade awarded for that j^{th} subject. After registration and completion of I Year I Semester, the SGPA of that semester itself may be taken as the CGPA, as there are no cumulative effects.

Illustration of calculation of SGPA:

Course/Subject	Credits	Letter Grade	Grade Points	Credit Points
Course 1	4	A	8	4 x 8 = 32
Course 2	4	O	10	4 x 10 = 40
Course 3	4	C	5	4 x 5 = 20
Course 4	3	B	6	3 x 6 = 18
Course 5	3	A+	9	3 x 9 = 27
Course 6	3	C	5	3 x 5 = 15
	21			152

$$SGPA = \frac{152}{21} = 7.24$$

Illustration of calculation of CGPA up to 3rd semester:

Semester	Course/ Subject Title	Credits Allotted	Letter Grade Secured	Corresponding Grade Point (GP)	Credit Points(CP)
I	Course 1	3	A	8	24
I	Course 2	3	O	10	30
I	Course 3	3	B	6	18
I	Course 4	4	A	8	32
I	Course 5	3	A+	9	27
I	Course 6	4	C	5	20
II	Course 7	4	B	6	24
II	Course 8	4	A	8	32
II	Course 9	3	C	5	15
II	Course 10	3	O	10	30
II	Course 11	3	B+	7	21
II	Course 12	4	B	6	24
II	Course 13	4	A	8	32
II	Course 14	3	O	10	30
III	Course 15	2	A	8	16
III	Course 16	1	C	5	5
III	Course 17	4	O	10	40
III	Course 18	3	B+	7	21
III	Course 19	4	B	6	24
III	Course 20	4	A	8	32
III	Course 21	3	B+	7	21
	Total Credits	69		Total Credit Points	518

$$CGPA = \frac{518}{69} = 7.51$$

The above illustrated calculation process of CGPA will be followed for each subsequent semester until 8th semester. The CGPA obtained at the end of 8th semester will become the final CGPA secured for entire B.Tech. Programme.

10.5 For merit ranking or comparison purposes or any other listing, only the 'rounded off' values of the CGPAs will be used.

10.6 SGPA and CGPA of a semester will be mentioned in the semester Memorandum of Grades if all subjects of that semester are passed in first attempt. Otherwise the SGPA and CGPA is mentioned only on the Memorandum of Grades in which sitting the student passed his/her last exam in that semester. However, Mandatory Courses will not be taken into consideration.

11.0 Award of Degree

A student is declared to have 'qualified' for the award of B. Tech. degree by JNTUH, in the chosen branch of Engineering selected at the time of admission, if he/she fulfills the following conditions.

11.1 The student shall pursue a programme of study for not less than four academic years and not more than eight academic years. In case of lateral entry students, student shall pursue a programme of study for not less than three academic years and not more than six academic years.

11.2 The student shall register for 160 credits and has to secure all 160 credits (122 credits in case of lateral entry students). Marks obtained in all 160 credits shall be considered for the award of the class based on aggregate of grades. Also, the student should appear and complete all mandatory courses prescribed.

11.3 However, the students are eligible to avail the benefits such as exemption of credits that degree awarding University (JNTUH) announces to the students admitted during this period

12.0 Award of Class

12.1 A student who qualifies for the award of the degree as is placed in the following classes. A student with final CGPA (at the end of the undergraduate programme) > 8.00, and fulfilling the following conditions - shall be placed in '**First Class with Distinction**'.
However, he

- **(i) Should have passed all the subjects/courses in 'First Appearance' within the first 4 academic years (or 8 sequential semesters) from the date of commencement of first year first semester.**
- (ii) **Should not have been detained or prevented from writing the semester end examinations in any semester due to shortage of attendance or any other reason**.

12.2 A student not fulfilling any of the above conditions with final CGPA > 8 shall be placed in 'First Class'.

12.3 Students with final CGPA (at the end of the undergraduate programme) ≥7.0 but < 8.00 shall be placed in 'First Class'.

12.4 Students with final CGPA (at the end of the undergraduate programme) ≥ 6.00 but < 7.00, shall be placed in 'Second Class'.

12.5 All other students who qualify for the award of the degree with final CGPA (at the end of the undergraduate programme) ≥ 5.00 but < 6, shall be placed in 'pass class'.

12.6 A student with final CGPA (at the end of the undergraduate programme) < 5.00 will not be eligible for the award of the degree.

13.0 Award of 2-Year B.Tech. Diploma Certificate

13.1 A student is declared to have 'qualified' for the award of **2-Year B.Tech. Diploma Certificate** by JNTUH, in the chosen branch of Engineering selected at the time of admission if he/she fulfils the following conditions.

1. When a student wants to exit from 4-Year B. Tech. programme, he/she has to fulfil all the academic requirements and earn all the registered 80 credits (within 4 years from the date of admission) up to B. Tech. – II Year – II Semester to be eligible for **2-Year UG Diploma Certificate**.
2. The student once opted and awarded 2-Year UG Diploma Certificate, the student will be permitted to join in B. Tech. III Year I Semester and continue for completion of remaining years of study for 4-Year B. Tech. Degree ONLY in the next academic year along with next batch students. However, if any student wishes to continue the study after opting for exit, he/she should register for the subjects/courses in III Year I Semester before commencement of classwork for that semester.

13.2 The students, who exit the 4-Year B. Tech. program after II Year of study and wish to re-join the B.Tech. program, must submit the 2 -Year B. Tech. (UG) Diploma Certificate awarded to him, subject to the eligibility for completion of Course/Degree.

13.3 Lateral Entry students are not eligible for 2-Year B. Tech. Diploma Certificate

13.4 Multiple Entry and Multiple Exit: As a part of the National Education Policy (NEP) 2020, the students are allowed to enter and exit their academic programs at various stages with recognized certifications. If a student wishes to exit from 4-Year B. Tech. programme after I Year, then a certificate will be issued by the principal indicating all the subjects studied during I Year provided he/she has to fulfil all the academic requirements and earn all the registered 40 credits within 2 years from the date of admission.

14.0 Break of Study from a Programme (Gap Year)

14.1 A student is permitted to go on break of study for a maximum period of two years either as two breaks of one year each or a single break of two years after completion of II- year II semester.

14.2 In case, a student wishes to extend the gap year for one more consecutive year, he/she shall be permitted with the prior approval of the Principal on the recommendations of the Head of the Department prior to the beginning of the semester in which he/she has taken break of study.

14.3 The student shall apply for break of study in advance, in any case, not later than the last date of the first assessment period in a semester. The gap year concept is introduced for start-up (or) incubation of an idea, National/International Internships, and professional volunteering. Student taking break of study shall submit an application to the Principal through the Head of the department. A committee shall be appointed by the Principal in this regard. Based on the recommendations of the committee, the Principal shall decide whether to permit the student to avail the gap year or not.

14.4 Students permitted to rejoin the programme after break of study shall be governed by the Curriculum and Regulations in force at the time of rejoining. The students rejoining in new regulations shall apply to the Principal in the prescribed format through the Head of the Department, at the beginning of the readmitted semester for registering additional / equivalent courses to comply with the curriculum in-force.

14.5 The period of break of study shall be counted in the maximum period of graduation (i.e the maximum period of graduation is 8 years for Regular admitted students and 6 years for Lateral Entry admitted students availing Gap Year).

14.6 If a student has not reported to the college after completion of the approved period of break of study he is deemed to be detained in that semester. Such students are eligible for readmission into the semester when offered next.

15.0 Transitory Regulations:

The transitory guidelines are applicable to the students

15.1 Who have been detained due to lack of attendance in any semester, shall be permitted the join the corresponding semester.

15.2 Students detained due to shortage of credits, shall be promoted to the next semester only after acquiring the required credits as per the corresponding regulations of his / her admission

15.3 Students who have discontinued and wish to continue the Programme, are eligible for admission into the unfinished semester.

15.4 If a student readmitted to JB-R24 Regulations, has already studied any subject with 80% of syllabus common in his / her previous regulations, that particular subject in JB-R24 Regulations will be substituted by another subject to be suggested by the BOS concerned. If the readmitted student has not studied the pre-requisite subjects for any subject offered in JB-R24 regulations, remedial classes shall be arranged by the concerned HoD.

16. 0 Transfer of Students from other Colleges / Universities

Transfer of students from other Colleges or Universities are permitted subject to the rules and regulations of Telangana State Council for Higher Education (Technical Education Department) and JNTUH in vogue.

17.0 Malpractices Rules

Disciplinary Action For / Improper Conduct in Examinations

	Nature of Malpractices/Improper conduct	Punishment
	If the student:	
1.(a)	Possesses any item accessible in the examination hall like paper, note book, programmable calculators, cell phones, pager, palm computers or any other form of material concerned with or related to the subject of the examination (theory or practical) in which student is appearing but has not made use of (material shall include any marks on the body of the student which can be used as an aid in the subject of the examination)	Expulsion from the examination hall and cancellation of the performance in that subject only.
(b)	Gives assistance or guidance or receives it from any other student orally or by any nonverbal cues or communicates through cell phones with any student or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that subject only of all the students involved. In case of an outsider, he will be handed over to the police and a case is registered against him.
2.	Has copied in the examination hall from any paper, book, programmable calculators, palm computers or any other form of material relevant to the subject of the examination (theory or practical) in which the student is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the student has already appeared including practical examinations and project work and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year.
3.	Smuggles in the answer book or additional sheet or takes out or arranges to send out the question paper during the examination or answer book or additional sheet, during or after the examination.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the student has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The student is also debarred for two consecutive semesters from class work and all End examinations. The continuation of the course by the student is subject to the academic regulations in connection with

		forfeiture of seat.
4.	Uses objectionable, abusive or offensive language in the answer paper or in letters to the examiners or writes to the examiner requesting him to award pass marks.	Cancellation of the performance in that subject.
5.	Refuses to obey the orders of the chief superintendent/ assistant superintendent / any officer on duty or misbehaves or creates disturbance of any kind in and around the examination hall or organizes a walk out or instigates others to walk out, or threatens the officer-in charge or any person on duty in or outside the examination hall of any injury to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer-in- charge, or any person on duty in or outside the examination hall or any of his relations, or indulges in any other act of misconduct or mischief which result in damage to or destruction of property in the examination hall or any part of the college campus or engages in any other act which in the opinion of the officer on duty amounts to use of unfair means or misconduct or has the tendency to disrupt the orderly conduct of the examination	In case of students of the college, they is expelled from examination halls and cancellation of their performance in that subject and all other subjects the student(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year. The students also are debarred and forfeit their seats. In case of outsiders, they will be handed over to the police and a Police case is registered against them.
6.	Leaves the exam hall taking away answer script or intentionally tears off the script or any part thereof inside or outside the examination hall.	Expulsion from the examination hall and cancellation of performance in that subject and all the other subjects the student has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that Semester/year. The student is also debarred for two consecutive semesters from class work and all End examinations. The continuation of the course by the student is subject to the academic regulations in connection with forfeiture of seat.
7.	Possesses any lethal weapon or firearm in the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the student has already appeared

		including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The student is also debarred and forfeits the seat.
8.	If student of the college, who is not a candidate for the particular examination or any person not connected with the college indulges in any malpractice or improper conduct mentioned in clause 6 to 8.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the student has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year. The student is also debarred and forfeits the seat. Person(s) who do not belong to the college will be handed over to police and, a police case will be registered against them.
9.	Comes in a drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the student has already appeared including practical examinations and project work and shall not be permitted for the remaining examinations of the subjects of that semester/year
10.	Copying detected on the basis of internal evidence, such as, during valuation or during special scrutiny.	Cancellation of the performance in that subject and all other subjects the student has appeared including practical examinations and project work of that semester/year examinations.

- *If any malpractice is detected which is not covered in the above clauses 1 to 10 shall be referred to the Malpractice Committee for further action and to impose suitable punishment.*

Academic Regulations for *B. Tech. with Honours programme*

1. Objectives

The key objectives of offering B. Tech. with Honours programme are:

- To expand the domain knowledge of the students laterally and vertically to cope up with Education 4.0.
- To enhance the employability of undergraduate students as per Industry 4.0 standards.
- To provide an opportunity to students to pursue their higher studies in wider range ofspecializations.

2. Academic Regulations for B. Tech. Honours degree

1) The weekly instruction hours, internal & external evaluation and award of grades are on par with regular 4-Years B. Tech. programme.
2) For B. Tech with Honours programme, a student needs to earn additional 20 credits (over and above the required 160 credits for B. Tech degree). The broad guidelines for the courses of Honours programme, their respective credits weightage and semester-wise break-up of the course are enclosed as Annexure. **All these 20 credits need to be completed in III year I Semester to IV year I Semester only.**
3) After registering for the Honours programme, **if a student is unable to pass all courses in first attempt and earn the required 20 credits, he/she shall not be awarded Honours degree**. However, if the student earns all the required 160 credits of B. Tech., he/she will be awarded only B. Tech degree in the concerned branch.
4) There is no transfer of credits from courses of Honours programme to regular B. Tech. degreecourse & vice versa.
5) These 20 credits are to be earned from the additional courses offered by the host department in the college or from a closely related department in the college as well as from the MOOCS platform.
6) **Guidelines for courses selected under MOOCs platform :**
    a) Prior to registration of MOOCS courses, formal approval of the courses, by the Head of the Department is essential. Head of the Department before the issue of approval considers the parameters like the institute / agency which is offering the course, syllabus, credits, duration of the programme and mode of evaluation etc.
    b) Department wise MOOCs finalized are to be consolidated and needs to be

approved by BOS before commencement of the semester.

c) Minimum credits for a MOOCS course must be equal to or more than the credits specified in the Honours course structure provided by the JBIET.

d) Only Pass-grade/marks or above shall be considered for inclusion of grades in the Honours grade memo.

e) Any expenses incurred for the MOOCS courses are to be met by the students only.

7) The **choice to opt/take the Honours programme is purely on the choice of the students**.

8) The student shall be given a **choice of withdrawing all the courses registered and/or the credits earned for Honours programme at any time**; and in that case the student will be awardedonly B. Tech. degree in the concerned branch on earning the required credits of 160.

9) The students of every branch can choose Honours programme in their respective branches if they are eligible for the Honours program**. A student who chooses an Honours programme is not eligible to choose a Minor programme and vice-versa.**

10) Students can register for the Honours programme only if they fulfill the **eligibility criteria.**

11) A student can graduate with Honours if he/she fulfils the requirements for his/her regular B. Tech. programme as well as fulfils the requirements for Honours programme.

12) The record of students registered and pursuing their Honours programs branch-wise is sent to JNTUH once the enrolment process is complete.

13) The department shall prepare the time-tables for each Honours programme offered at their respective departments without any overlap/clash with other courses of study in therespective semesters.

3. Eligibility conditions of the students for the Honours degree

a) A student can opt for B.Tech. degree with Honours, if she/he passed all subjects in first attempt in all the semesters till the results announced and **maintaining 7.5 or moreCGPA.**

b) **If a student fails in any registered course of either B. Tech. or Honours in any semester of four years programme, he/she will not be eligible for obtaining Honours degree**. He willbe eligible for only B. Tech. degree

c) Prior approval of mentor and Head of the Department for the enrolment into Honours programme, before commencement of III year I Semester (V Semester), is mandatory.

d) If more than 30% of the students in a branch fulfil the eligibility criteria (as stated above), the number of students given eligibility is limited to 30%. The criteria to be followed for choosing 30% candidates in a branch may be the **CGPA secured bythe students till II year I semester.**

e) Successful completion of 20 credits earmarked for honours programme with at least 7.5 CGPA along with successful completion of 160 credits earmarked for

regular B. Tech. Programme with at least 7.5 CGPA and passing all subjects in first attempt gives the eligibility for the award of B. Tech. (Honours) degree.

f) For CGPA calculation of B. Tech. course, the 20 credits of Honours programme will not beconsidered.

4. Registration for the course in Honours programme

a) At the beginning of each semester, just before the commencement of classes, students shall register for the courses which they wish to take in that semester.

b) The students should choose a course from the list against each semester (from Honours course structure) other than the courses they have studied/registered for regular B.Tech programme. No course should be identical to that of the regular B. Tech. course. The students should take the advice of faculty mentors while registering for a course atthe beginning of semester.

c) The maximum No. of courses for the Honours is limited to two in a semester along with regular semester courses.

d) The students need to register the Honours degree by paying an registration fee of Rs. 1000/- per one credit.

e) A fee for late registration will be imposed as per the norms of JNTUH.

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Academic Regulations for Honours degree in B. Tech. programs

S. No.	Year / Semester	Course to be chosen from/studied	Mode of Learning	No. of Credits
1	III-I	PE-1	Blended/Conventional	4
2	III-I	PE-2	Blended/Conventional	4
3	III-II	PE-3	Blended/Conventional	4
4	III-II	MOOC Platform (PE-4 or an Inter disciplinary subject)	MOOCS	2
5	IV-I	PE-5	Blended/Conventional	4
6	IV-I	MOOC Platform (PE-6 or an Inter disciplinary subject)	MOOCS	2
	Total Credits			**20**

Note:

- The attendance and evaluation scheme for Honours degree courses will be same as the regular B. Tech. courses.
- If the blended course option is chosen, for the subjects in any semester, the learning should be partially in online mode and partially in offline mode. The Continuous Internal Evaluation (CIE) and Semester End Examination (SEE) shall be carried out by JBIET.

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Academic Regulations for *B. Tech. with Minors programme*

1. Objectives

The key objectives of offering B. Tech. with Minor programme are:

- To expand the domain knowledge of the students in one of the other branches ofengineering.
- To increase the employability of undergraduate students keeping in view of betteropportunity in interdisciplinary areas of engineering & technology.
- To provide an opportunity to students to pursue their higher studies in the inter-disciplinaryareas in addition to their own branch of study.
- To offer the knowledge in the areas which are identified as emerging technologies/thrustareas of Engineering.

2. Academic Regulations for B. Tech. Minors degree

- The weekly instruction hours, internal & external evaluation and award of grades are on par with regular 4-Years B. Tech. programme.
- For B. Tech with Minors programme, a student needs to earn additional 20 credits (over andabove the required 160 credits for B. Tech degree). The broad guidelines for the courses of Minors programme, their respective credits weightage and semester-wise break-up of thecourse are enclosed as Annexure. **All these 20 credits need to be completed in III year I Semester to IV year I Semester only.**
- After registering for the Minors programme, **if a student is unable to pass all courses in first attempt and earn the required 20 credits, he/she shall not be awarded Minors degree**.However, if the student earns all the required 160 credits of B. Tech., he/she will be awarded only B. Tech degree in the concerned branch.
- There is no transfer of credits from courses of Minors programme to regular B. Tech. degreecourse & vice versa.
- These 20 credits are to be earned from the additional courses offered by the host department in the college or from a closely related department in the college as well as from the MOOCS platform.

3. Guidelines for courses selected under MOOCs platform :

a. Prior to registration of MOOCS courses, formal approval of the courses, by the Head of the Department is essential. Head of the Department before the issue of approval considers the parameters like the institute / agency which is offering the course, syllabus, credits, duration of the programme and mode of evaluation etc.

b. Department wise MOOCs finalized are to be consolidated and needs to be approved by BOS before commencement of the semester.
c. Minimum credits for a MOOCS course must be equal to or more than the credits specified in the Minors course structure provided by the JBIET.
d. Only Pass-grade/marks or above shall be considered for inclusion of grades in the Minors grade memo.
e. Any expenses incurred for the MOOCS courses are to be met by the students only.

4. The **choice to opt/take the Minors programme is purely on the choice of the students**.

5. The student shall be given a **choice of withdrawing all the courses registered and/or the credits earned for Minors programme at any time**; and in that case the student will be awarded only B. Tech. degree in the concerned branch on earning the required credits of 160.
6. The students of every branch can choose Minors programme in different branches if they are eligible for the Minors programme**. A student who chooses an Minors programme is not eligible to choose a Honours program and vice-versa.**
7. Students can register for the Minors programme only if they fulfill the **eligibility criteria.**
8. A student can graduate with Minors if he/she fulfils the requirements for his/her regular B. Tech. programme as well as fulfils the requirements for Minors programme.

9. The record of students registered and pursuing their Minors programs branch-wise is sent to JNTUH once the enrolment process is complete.
10. The department shall prepare the time-tables for each Minors programme offered at their respective departments without any overlap/clash with other courses of study in therespective semesters.

11. Eligibility conditions of the students for the Minors degree

g) A student can opt for B.Tech. degree with Minors, if she/he passed all subjects in first attempt in all the semesters till the results announced and **maintaining 7.5 or moreCGPA.**

h) **If a student fails in any registered course of either B. Tech. or Minors in any semester of four years programme, he/she will not be eligible for obtaining Minors degree**. He willbe eligible for only B. Tech. degree

i) Prior approval of mentor and Head of the Department for the enrolment into Minors programme, before commencement of III year I Semester (V Semester), is mandatory.

j) If more than 30% of the students in a branch fulfil the eligibility criteria (as stated above), the number of students given eligibility is limited to 30%. The criteria to be followed for choosing 30% candidates in a branch may be the **CGPA secured bythe students till II year I semester.**

k) Successful completion of 20 credits earmarked for Minors programme with at least 7.5 CGPA along with successful completion of 160 credits earmarked for regular B. Tech. Programme with at least 7.5 CGPA and passing all subjects in first attempt gives the eligibility for the award of B. Tech. (Minors) degree.

l) For CGPA calculation of B. Tech. course, the 20 credits of Minors programme will not beconsidered.

12. Registration for the course in Minors programme

f) At the beginning of each semester, just before the commencement of classes, students shall register for the courses which they wish to take in that semester.

g) The students should choose a course from the list against each semester (from Minors course structure) other than the courses they have studied/registered for regular B.Tech programme. No course should be identical to that of the regular B. Tech. course. The students should take the advice of faculty mentors while registering for a course atthe beginning of semester.

h) The maximum No. of courses for the Minors is limited to two in a semester along with regular semester courses.

i) The students need to register the Minors degree by paying an registration fee of Rs. 1000/- per one credit.

j) A fee for late registration will be imposed as per the norms of JNTUH.

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Academic Regulations for Minors degree in B. Tech. programs

S. No.	Year / Semester	Course to be chosen from/studied	Mode of Learning	No. of Credits
1	III-I	PE-1	Blended/Conventional	4
2	III-I	PE-2	Blended/Conventional	4
3	III-II	PE-3	Blended/Conventional	4
4	III-II	MOOC Platform (PE-4 or an Inter disciplinary subject)	MOOCS	2
5	IV-I	PE-5	Blended/Conventional	4
6	IV-I	MOOC Platform (PE-6 or an Inter disciplinary subject)	MOOCS	2
	Total Credits			**20**

Note:

- The attendance and evaluation scheme for Minors degree courses will be same as the regular B. Tech. courses.

- If the blended course option is chosen, for the subjects in any semester, the learning should be partially in online mode and partially in offline mode. The Continuous Internal Evaluation (CIE) and Semester End Examination (SEE) shall be carried out by JBIET.

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B. Tech Course Structure

I Year I Semester

S. No	Code	Course Title	L	T	P	C	Category	Common Subject (Y/N)	Approving BOS
1.	M110A	Matrices and Multiple Integrals	3	1	0	4	BS	Y	Maths
2.	M110D	Engineering Chemistry	3	1	0	4	BS	Y	Chemistry
3.	M110C	English	3	0	0	3	HS	Y	English
4.	M115B	Programming for Problem Solving	3	0	0	3	ES	Y	CSE
5.	M1171	Elements of Electronics and Computer Engineering	2	0	0	1	ES	N	ECM
6.	M1103	English Language and Communication Skills Lab	0	0	2	1	HS	Y	English
7.	M1102	Chemistry Lab	0	0	2	1	BS	Y	Chemistry
8.	M1151	Programming for Problem Solving Lab	0	0	2	1	ES	Y	CSE
9.	M1132	Computer Aided Engineering Graphics	0	0	4	2.5	ES	Y	MECH
10.	M11AC2	Human Values and Professional Ethics	2	0	0	-	AC	Y	MBA
		Total	**16**	**2**	**10**	**20.5**			

I Year II Semester									
S. No	**Code**	**Course Title**	**L**	**T**	**P**	**C**	**Category**	**Common Subject (Y/N)**	**Approving BOS**
1.	M120A	Differential Equations and Vector Calculus	3	1	0	4	BS	**Y**	**Maths**
2.	M120B	Applied Physics	3	1	0	4	BS	**Y**	**Physics**
3.	M122A	Basic Electrical Engineering	3	0	0	3	ES/PC	**Y**	**EEE**
4.	M124A	Basic Electronics Engineering	3	0	0	3	ES/PC	**Y**	**ECE**
5.	M1201	Physics Lab	0	0	2	1	BS	**Y**	**Physics**
6.	M1221	Basic Electrical Engineering Lab	0	0	2	1	ES/PC	**Y**	**EEE**
7.	M1241	Basic Electronics Engineering Lab	0	0	2	1	ES/PC	**Y**	**ECE**
8.	M1231	Engineering Workshop and Digital fabrication Practices	1	0	3	2.5	ES	**Y**	**MECH**
9.	M12AC1	Cambridge Lingua skills	2	0	0	0	AC	**Y**	**ENGLISH**
		Total	**14**	**2**	**6**	**19.5**			

II Year I Semester									
S. No	**Code**	**Course Title**	**L**	**T**	**P**	**C**	**Category**	**Common Subject (Y/N)**	**Approving BOS**
1.	M210A	Probability and Statistics	3	1	0	4	BS	**Y**	**Maths**
2.	M217A	Switching Theory and Logic Design	3	1	0	4	ES	**N**	**ECM**
3.	M217B	Analog Electronics	3	0	0	3	PC	**N**	**ECM**
4.	M215A	Data Structures	3	0	0	3	PC	**N**	**CSE**
5.	M217C	Computer Organization	3	0	0	3	PC	**N**	**ECM**
6.	M2171	Analog Electronics Lab	0	0	2	1	PC	**N**	**ECM**
7.	M2152	Data Structures Lab	0	0	2	1	PC	**N**	**CSE**
8.	M2173	Internship-1	0	0	2	1	PW	**Y**	**ECM**
9.	M21MC1	Environmental Science (Mandatory Course-I)	2	0	0	0	MC	**Y**	**English**
		Total	**17**	**2**	**6**	**20**			

II Year II Semester									
S. No	**Code**	**Course Title**	**L**	**T**	**P**	**C**	**Category**	**Common Subject (Y/N)**	**Approving BOS**
1.	M2219A	Pulse and Digital Circuits	3	1	0	4	ES	**N**	**ECM**
2.	M226A	Object Oriented Programming through Java	3	0	0	3	PC	**Y**	**IT**
3.	M225A	Operating Systems	3	0	0	3	PC	**Y**	**CSE**
4.	M225B	Design and Analysis of Algorithms	3	0	0	3	PC	**Y**	**CSE**
5.	M2219C	Analog Communications	3	0	0	3	PC	**N**	**ECM**
6.	M2272	Pulse and Digital Circuits Lab	0	0	2	1	PC	**N**	**ECM**
7.	M2261	Object Oriented Programming through Java Lab	0	0	3	1.5	PC	**Y**	**IT**
8.	M2252	Operating Systems Lab	0	0	3	1.5	PC	**Y**	**CSE**
9.	M22MC2	Gender Sensitization (Mandatory Course-II)	2	0	0	0	MC	**Y**	**English**
		Total	**17**	**1**	**6**	**20**			

III Year I Semester									
S. No	**Code**	**Course Title**	**L**	**T**	**P**	**C**	**Category**	**Common Subject (Y/N)**	**Approving BOS**
1.	BTECME1	PE-I	3	0	0	3	PE	**N**	**CSE**
2.	BTECMO1	OE-I	3	0	0	3	OE	**N**	
3.	M316B	Database Management Systems	3	0	0	3	PC	**Y**	**IT**
4.	M315A	Python Programming	3	0	0	3	PC	**N**	**CSE**
5.	M327B	Linear and Digital IC Applications	3	1	0	4	PC	**N**	**ECM**
6.	M3151	Python Programming Lab	0	0	2	1.5	PC	**N**	**CSE**
7.	M3271	Linear and Digital IC Applications Laboratory	0	0	3	1	PC	**N**	**ECM**
8.	M3173	Internship-2	0	0	2	1	PW	**Y**	**ECM**
9.	M31MC4	Cyber Security (Mandatory Course -III)	2	0	0	0	MC	**Y**	**IT**
10.	M31AC4	Foundations of Entrepreneurship (Audit course - III)	2	0	0	0	AC	**Y**	**MBA**
		Total	**19**	**1**	**7**	**19.5**			

III Year II Semester									
S. No	**Code**	**Course Title**	**L**	**T**	**P**	**C**	**Category**	**Common Subject (Y/N)**	**Approving BOS**
1.	M32EA	Business Economics & Financial Analysis	3	1	0	4	HS	**Y**	**MBA**
2.	BTECME2	PE-II	3	0	0	3	PE	**N**	**ECE**
3.	BTECME3	PE-III	3	0	0	3	PE	**N**	**ECM**
4.	BTECMO2	OE-II	3	0	0	3	OE	**N**	
5.	M324A	Microprocessors and Microcontrollers	3	0	0	3	PC	**Y**	**ECE**
6.	M3241	Microprocessors and Microcontrollers Lab	0	0	2	1	PC	**Y**	**ECE**
7.	M3162	Database Management Systems lab	0	0	3	1.5	PC	**Y**	**IT**
8.	M3201	Life Skills and Professional Skills Lab	0	0	4	2	HS	**Y**	**English**
9.	M32MC3	Artificial Intelligence (Mandatory Course -IV)	2	0	0	0	MC	**Y**	**IT**
10.	M32AC3	Indian Constitution (Audit course -IV)	2	0	0	0	AC	**Y**	**MBA**
		Total	**19**	**1**	**9**	**20.5**			

IV Year I Semester									
S. No	**Code**	**Course Title**	**L**	**T**	**P**	**C**	**Category**	**Common Subject (Y/N)**	**Approving BOS**
1.	BTECME4	PE-IV	3	0	0	3	PE	**N**	**ECM**
2.	BTECME5	PE-V	3	0	0	3	PE	**N**	**ECM**
3.	BTECMO3	OE-III	3	0	0	3	OE	**N**	
4.	M416C	Object Oriented Analysis and Design	3	0	0	3	PC	**N**	**IT**
5.	M417A	Internet of Things	3	0	0	3	PC	**Y**	**ECM**
6.	M4172	Industry Oriented Mini Project	0	0	4	2	PW	**Y**	**ECM**
7.	M4173	Major Project Phase-I	0	0	4	2	PW	**Y**	**ECM**
8.	M4164	Object Oriented Analysis and Design Lab	0	0	2	1	PC	**N**	**IT**
9.	M41MC5	Computer Forensics (Mandatory Course-V)	2	0	0	0	MC	**Y**	**CSE**
		Total	**17**	**0**	**10**	**20**			

IV Year II Semester									
S. No	**Code**	**Course Title**	**L**	**T**	**P**	**C**	**Category**	**Common Subject (Y/N)**	**Approving BOS**
1.	BTECME6	PE-VI	3	0	0	3	PE	**N**	**ECM**
2.	BTECMO4	OE-IV	3	0	0	3	OE	**N**	
3.	M425C	Cloud Computing	3	0	0	3	PC	**N**	**CSE**
4.	M4271	Major Project Phase-II	0	0	20	10	PW	**Y**	**ECM**
5.	M4272	Seminar	0	0	2	1	PW	**Y**	**ECM**
		Total	**9**	**0**	**22**	**20**			

S. No	Code	Course Title	L	T	P	C	Category	Common Subject (Y/N)	Approving BOS
1.	M324C	Cellular and Mobile Communications	3	0	0	3	PE-I	Y	ECE
2.	M324K	Communication Systems	3	0	0	3	PE-I	N	ECE
3.	M324J	Wireless Sensor Networks	3	0	0	3	PE-I	Y	ECE

S. No	Code	Course Title	L	T	P	C	Category	Common Subject (Y/N)	Approving BOS
1.	M315E	Computer Networks	3	0	0	3	PE-II	N	CSE
2.	M415G	Block Chain Technology	3	0	0	3	PE-II	N	CSE
3.	M316A	Software Engineering	3	0	0	3	PE-II	N	CSE

S. No	Code	Course Title	L	T	P	C	Category	Common Subject (Y/N)	Approving BOS
1.	M325A	Compiler Design	3	0	0	3	PE-III	N	CSE
2.	M327C	Cryptography and Network Security	3	0	0	3	PE-III	N	ECM
3.	M327D	Data Science	3	0	0	3	PE-III	N	ECM

S. No	Code	Course Title	L	T	P	C	Category	Common Subject (Y/N)	Approving BOS
1.	M414B	VLSI Design	3	0	0	3	PE-IV	N	ECE
2.	M327E	Fibre Optic Communications	3	0	0	3	PE-IV	N	ECM
3.	M327F	Image Processing and Pattern Recognition	3	0	0	3	PE-IV	N	ECM

S. No	Code	Course Title	L	T	P	C	Category	Common Subject (Y/N)	Approving BOS
1.	M416D	Data Warehousing and Data Mining	3	0	0	3	PE-V	Y	IT
2.	M417B	Neural Networks	3	0	0	3	PE-V	N	ECM
3.	M41DB	Big Data Analytics	3	0	0	3	PE-V	N	AIDS

S. No	Code	Course Title	L	T	P	C	Category	Common Subject (Y/N)	Approving BOS
1.	M427A	Storage Area Networks	3	0	0	3	PE-VI	N	ECM
2.	M425F	Android Application Development	3	0	0	3	PE-VI	N	CSE
3.	M42AB	Deep Learning	3	0	0	3	PE-VI	N	AIML

Open Electives									
S. No	Code	Course Title	L	T	P	D	Credits	Category	Approving BOS
1	M317OG	Introduction to Natural Language Processing	3	0	0	0	3	OE-I	ECM
2	M327OG	Introduction to Mobile Application Development	3	0	0	0	3	OE-II	ECM
3	M417OG	Introduction to Image Processing	3	0	0	0	3	OE-III	ECM
4	M427OG	Introduction to Sensors and Transducers	3	0	0	0	3	OE-IV	ECM

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM I Year-I Sem			
Course Code: **M110A**	**MATRICES AND CALCULUS** (COMMON TO: CE, EEE, ME, ECE, CSE, IT, ECM, CSE(DS), CSE(AIML), AIML, AIDS & MIE)	L	T	P	C
		3	**1**	**0**	**4**

Pre-Requisites: Mathematical Knowledge at pre-university level

Module 1: Matrices and system of equations [10L]

Types of Matrices, Symmetric, Skew-symmetric, rank of a matrix by Echelon form and Normal form, Gauss elimination, Inverse of non-singular matrices by Gauss-Jordan method. System of linear equations, solving system of Homogeneous and Non-Homogeneous equations.

Module 2: Eigen values, Eigen Vectors [8 L]

Eigen values, Eigen vectors and their properties, Diagonalization of matrix. Calculation of powers of Matrix, Cayley - Hamilton theorem (without proof), Inverse and powers of a matrix using Cayley - Hamilton theorem.

Module 3: Quadratic Forms [8 L]

Definitions of Hermitian, Skew-Hermitian, orthogonal matrices, Unitary Matrices, Linear Transformation and Orthogonal Transformation, Quadratic forms, rank and nature of the quadratic forms, index and signature, reduction of quadratic forms into canonical form using Linear Transformation and Orthogonal Transformations.

Module 4: Mean value theorems and Functions of Multi variables [12 L]

Mean value theorems: Rolle's theorem, Lagrange's Mean value theorem with their Geometrical Interpretation and applications, Cauchy's Mean value Theorem. Taylor's Series
Functions of Multi variables: Limits, Continuity, Partial differentiation, partial derivatives of first and second order, Jacobian, Taylor's theorem of two variables (without proof). Maxima and Minima of two variables, Lagrange's method of undetermined Multipliers.

Module 5: Improper and Multiple Integrals [12L]

Definition of Improper Integrals, Beta functions: Properties and other forms of beta functions (statements only) and problems, Gamma functions: Properties of Gamma functions (statements only), Relation between the Beta and Gamma functions (without proofs) and Evaluation of improper integrals using Beta and Gamma functions
Evaluation of double integrals, change of order of integration, change of variables, evaluation of triple integrals, change of variables.

Text Books

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 2015
2. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons,2006.
3. R.K.Jain & S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, 5th Edition, 2019.

Reference Books

1. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.
2. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi,11thReprint, 2010.

E-Resources

1. https://nptel.ac.in/courses/111/108/111108098/
2. https://en.wikipedia.org/wiki/Eigenvalues_and_eigenvectors
3. https://nptel.ac.in/courses/111/107/111107108/
4. https://www.cheric.org/files/education/cyberlecture/e200303/e200303-301.pdf
5. https://www.whitman.edu/mathematics/calculus_online/chapter16.html

Course outcomes:

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

CO1: Write the matrix representation of a set of linear equations and to analyse the solution of the system of equations

CO2: Find the Eigenvalues and Eigen vectors

CO3: Reduce the quadratic form to canonical form using orthogonal transformations.

CO4: Solve the applications on the mean value theorems.

CO5: Evaluate the improper integrals using Beta and Gamma functions

CO6: Find the extreme values of functions of two variables with/ without constraints

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM I Year-I Sem			
Course Code: **M110D**	**ENGINEERING CHEMISTRY** **(**COMMON TO: EEE, ECE, CSE, IT & ECM**)**	L	T	P	C
		3	**1**	**0**	**4**

Pre-Requisites: NIL

Module 1: Water and Its Treatment [11L]

Introduction – hardness of water – Causes of hardness - Types of hardness- temporary and permanent hardness – Units of hardness of water - Numerical problems – Estimation of hardness of water by complexometric method. Boiler troubles: scale and sludge, causes and effects. Potable water and Industrial water its specifications. Softening of water - Internal treatment of boiler feed water– Calgon conditioning, Phosphate conditioning and Colloidal conditioning. External treatment of water – Ion exchange process. Desalination of brackish water – Reverse osmosis. Steps involved in potable water treatment – Disinfection of water by chlorination, Breakpoint chlorination and Ozonization.

Module 2: Battery and Corrosion [12 L]

Batteries

Introduction– Classification of batteries - Primary (Li-MnO2 cell) and secondary batteries (Lithium ion battery)- Applications

Fuel cells – Methanol - Oxygen fuel cell – Engineering applications

Solar cells –Principle and applications of solar cells

Corrosion

Causes and effects of corrosion–chemical and electrochemical corrosion – mechanism of electrochemical corrosion by hydrogen evolution method, types of corrosion-galvanic and waterline corrosion. Factors influencing rate of corrosion - Corrosion control methods- Cathodic protection – Sacrificial anodic and impressed current cathodic methods - Hot dipping (Galvanizing and Tinning).

Module 3: Chemical Fuels [9 L]

Fuels: Definition, Classification, Characteristics of a good fuel - Types of Calorific value (CV) – Calculation of CV using Dulong's formula, Numerical.

Soild Fuels: Coal - Composition - Proximate & Ultimate Analysis - Significance.

Liquid Fuels: Gasoline and its Composition, Cracking: Fixed bed catalytic cracking method – Knocking, Anti- Knocking agents and its significance, Octane number, Cetane number.

Gaseous Fuels: Composition, characteristics and applications of natural gas, LPG and CNG.

Module 4: Polymers [10 L]

Polymers: Definition–Monomer, Polymer, Polymerization. Types of polymerizations – addition and condensation polymerization with examples.

Plastics: Definition - thermoplastic and thermosetting plastics, compounding and fabrication of plastics (compression and injection moulding). Preparation, Properties and Engineering Applications of PVC. Urea-Formaldehyde.
Fibers: Preparation, Properties and engineering applications of Nylon-6, 6.
Conducting Polymers- Definition, Classification, Applications.

Module 5: Engineering Materials & Drugs [8L]

Nanomaterials
Introduction, Synthesis of Sol-gel method, General Applications of Nanomaterials.
Carbon Nanotubes - Properties and applications.
Portland Cement: Chemical constituents, Manufacturing of Portland cement, Setting and Hardening and applications of cement.
Drugs: Antipyretic (Paracetamol) – Medicinal Applications

Text Books

1. Engineering Chemistry: Prof. Jaya Shree Anireddy, Wiley Publications.
2. Engineering Chemistry: P. C. Jain & M. Jain, Dhanpat Rai Publications, New Delhi.
3. Engineering Chemistry: Shashi Chawla, Dhanpat Rai Publications (2019), New Delhi.

Reference Books

1. Engineering Chemistry by M. Thirumalachary and E. Laxminarayana, Scitech Publications.
2. Text Book of Engineering Chemistry by Cengage Learning, B. Rama Devi, Ch. Venkata Ramana Reddy and Prasanth Rath.
3. Engineering Chemistry (NPTEL Web-book) by B.L. Tembe, Kamaluddin and M.S.Krishnan.

E-Resources

1. https://www.imnh.isu.edu/digitalatlas/hydr/basics/main/chmtxt.
2. https://chem.libretexts.org/Core/.../Electrochemistry/Basics_of_Electrochemistry
3. https://www2.chemistry.msu.edu/faculty/reusch/virttxtjml/polymers.htm
4. https://www.youtube.com/watch?v=W0-CvvAGtEM
5. https://sengerandu.wordpress.com/tutorials/physical-metallurgy/engineering-materials

Course outcomes:

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

CO1: Recognize and select the domestic and industrial problems caused by hard water and also learn about the municipal water treatment using various methods.

CO2: Understand and interpret the important fundamental concepts of electrochemical procedures related to corrosion and its control.

CO3: Rate the fuels and suggest methods for enhancement of the quality of fuels for the required output.

CO4: Identify & recognize the role of polymers in everyday life.

CO5: Apply the Knowledge of engineering materials and drugs in daily life.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes (POs)/Program Specific Outcomes (PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**
CO1	3	-	-	-	-	3	2	-	-	-	-	3	-	-
CO2	3	-	-	-	-	3	2	-	-	-	-	3	-	-
CO3	3	2	-	-	-	3	3	-	-	-	-	3	-	-
CO4	1	2	-	-	-	3	2	-	-	-	-	2	-	-
CO5	3	-	-	-	-	2	3	-	-	-	-	1	-	-
Average	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Correlation: 3–Strong; 2–Medium; 1-Weak

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM I Year-I Sem			
Course Code: **M110C**	**ENGLISH** **(**COMMON TO CSE, IT, ECM, ECE, EEE**)**	L	T	P	C
		3	**0**	**0**	**3**

Pre-Requisites: NIL

Module 1 [10L]

Lesson: 'Toasted English' by R. K. Narayan
Vocabulary: The Concept of Word Formation -The Use of Prefixes and Suffixes - Acquaintance with Prefixes and Suffixes from Foreign Languages to form Derivatives - Synonyms and Antonyms
Grammar: Identifying Common Errors in Writing with Reference to Articles and Prepositions.
Reading: Reading and Its Importance- Techniques for Effective Reading.
Writing: Sentence Structures -Use of Phrases and Clauses in Sentences- Importance of Proper Punctuation- Techniques for writing precisely – Paragraph Writing – Types, Structures and Features of a Paragraph - Creating Coherence-Organizing Principles of Paragraphs in Documents.

Module 2 [9 L]

Lesson: 'Appro JRD' by Sudha Murthy
Vocabulary: Words Often Misspelt - Homophones, Homonyms and Homographs
Grammar: Identifying Common Errors in Writing with Reference to Noun-pronoun Agreement and Subject-verb Agreement.
Reading: Sub-Skills of Reading – Skimming and Scanning – Exercises for Practice
Writing: Nature and Style of Writing- Defining /Describing People, Objects, Places and Events – Classifying- Providing Examples or Evidence.

Module 3 [8 L]

Lesson: Elon Musk
Vocabulary: Words Often Confused - Words from Foreign Languages and their Use in English.
Grammar: Identifying Common Errors in Writing with Reference to Misplaced Modifiers and Tenses.
Reading: Sub-Skills of Reading – Intensive Reading and Extensive Reading – Exercises for Practice.
Writing: Format of a Formal Letter-Writing Formal Letters E.g.., Letter of Complaint, Letter of Requisition, Email Etiquette, Job Application with CV/Resume.

Module 4 [8 L]

Lesson: Art and Literature by Dr. Abdul Kalam
Vocabulary: Standard Abbreviations in English
Grammar: Redundancies and Clichés in Oral and Written Communication.
Reading: Survey, Question, Read, Recite and Review (SQ3R Method) - Exercises for Practice

Writing: Writing Practices- Essay Writing-Writing Introduction and Conclusion -Précis Writing.

Module 5 **[8L]**

Lesson: Go, Kiss the World' by Subroto Bagchi
Vocabulary: Technical Vocabulary and their Usage
Grammar: Common Errors in English (Covering all the other aspects of grammar which were not covered in the previous units)
Reading: Reading Comprehension-Exercises for Practice
Writing: Technical Reports- Introduction – Characteristics of a Report – Categories of Reports Formats- Structure of Reports (Manuscript Format) -Types of Reports - Writing a Report

Text Books

1. "English: Language, Context and Culture" by Orient BlackSwan Pvt. Ltd, Hyderabad. 2022. Print.

Reference Books

1. Swan, M. (2016). Practical English Usage. Oxford University Press.
2. Kumar, S and Lata, P. (2018). Communication Skills. Oxford University Press.
3. Wood, F.T. (2007). Remedial English Grammar. Macmillan.
4. Zinsser, William. (2001). On Writing Well. Harper Resource Book.
5. Hamp-Lyons, L. (2006). Study Writing. Cambridge University Press.
6. Exercises in Spoken English. Parts I –III. CIEFL, Hyderabad. Oxford University Press.

E-Resources

1. https://sharmadkm.wordpress.com/2022/12/11/toasted-english-by-r-k-narayan/
2. https://sharmadkm.wordpress.com/2022/12/20/apro-jrd-summary/ Cambridge English
3. BBC Learning English - Learn English with BBC Learning English - Homepage

Course outcomes:

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

CO1: Expand their vocabulary through mastery of word roots, prefixes, and suffixes.

CO2: Demonstrate proficiency in grammar fundamentals, including sentence structure and parts of speech.

CO3: Exhibit competence in reading and writing skills for effective communication in diverse contexts.

CO4: Apply critical thinking and analytical skills to analyse texts and synthesize information.

CO5: Express themselves confidently and coherently through oral presentations, discussions, and written compositions.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes (POs)/Program Specific Outcomes (PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**
CO1	-	-	-	-	-	-	-	-	2	2	-	3	-	-
CO2	-	-	-	-	-	-	-	-	2	2	-	3	-	-
CO3	-	-	-	-	-	-	-	-	2	2	-	3	-	-
CO4	-	-	-	-	-	-	-	-	2	2	-	3	-	-
CO5	-	-	-	-	-	-	-	-	2	2	-	3	-	-
Average	-	-	-	-	-	-	-	-	**2**	**2**	-	**3**	-	-

Correlation: 3–Strong; 2–Medium; 1-Weak

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM I Year-I Sem			
Course Code: **M115B**	**PROGRAMMING FOR PROBLEM SOLVING (**Common to all**)**	L	T	P	C
		3	**0**	**0**	**3**

Pre-Requisites:

1. Mathematical Knowledge.

2 Analytical Skills.

Module 1

Introduction to Algorithms: steps to solve logical and numerical problems. Representation of Algorithm, Flowchart/Pseudo code with examples, Program design and structured programming.
Introduction to C Programming Language: Basic concepts of a C program, Declaration, Assignment & Print statement, Types of operators and expressions, Programming examples and exercise. variables (with data types and space requirements),
Syntax and Logical Errors in compilation, object and executable code, Operators, expressions and precedence, Expression evaluation, Storage classes (auto, extern, static and register), type conversion, The main method and command line arguments
Bitwise operations: Bitwise AND, OR, XOR and NOT operators Conditional Branching and Loops: Writing and evaluation of conditionals and consequent branching with if, if-else, switchcase, ternary operator, goto, Iteration with for, while, do- while loops.I/O: Simple input and output with scanf and printf, formatted I/O, Introduction to stdin, stdout and stderr.

Module 2: Arrays, Strings, Structures and Preprocessor

Arrays: one- and two-dimensional arrays, creating, accessing and manipulating elements of arrays.
Strings: Introduction to strings, handling strings as array of characters, basic string functions available in C (strlen, strcat, strcpy, strstr etc.), arrays of strings Structures: Defining structures, initializing structures, unions, Array of structures.
Preprocessor: Commonly used Preprocessor commands like include, define, undef, If, ifdef, ifndef.

Module 3: Pointers And File Handling in C

Pointers: Idea of pointers, defining pointers, Pointers to Arrays and Structures, Use of Pointers in self-referential structures, usage of self-referential structures in linked list (no implementation) Enumeration data type. Array of pointers,
Files: Text and Binary files, Creating and Reading and writing text and binary files, appending data to existing files, Writing and reading structures using binary files, Random access using fseek, ftell and rewind functions.

Module 4: Function and Dynamic Memory Allocation

Functions: Designing structured programs, declaring a function, Signature of a function, Parameters and return type of a function, passing parameters to functions, call by value, passing

arrays to functions, passing pointers to functions, idea of call by reference, Some C standard functions and libraries.

Recursion: Simple programs, such as Finding Factorial, Fibonacci series etc., Limitations of Recursive functions.

Dynamic memory allocation: Allocating and freeing memory, Allocating memory for arrays of different data types. Dynamic allocations methods- malloc(), calloc(), realloc(),free()

Module 5: Introduction to Algorithms

Basic searching algorithms (linear and binary search techniques), Basic sorting algorithms (Bubble, Insertion, Quick, Merge and Selection sort algorithms) Basic concept of order of complexity through the example programs

Text Books

1. Ream Thareja, Programming in C, Oxford university press.
2. B.A. Forouzan and R.F. Gilberg, C Programming and Data Structures, Cengage Learning,
3. (3rdEdition).

Reference Books

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India.
2. R.G. Dromey, How to solve it by Computer, Pearson (16thImpression)
3. Stephen G. Kochan, Programming in C, Fourth Edition, PearsonEducation.
4. 4. Herbert Schildt, C: The Complete Reference, McGraw Hill, 4thEdition
5. 5. Byron Gottfried, Schaum‟sOutline of Programming with C,McGraw-Hil

E-Resources

1. https://fresh2refresh.com/c-programming/
2. https://www.studytonight.com/c/
3. https://beginnersbook.com/2014/01/c-tutorial-for-beginners-with examples/
4. https://www.programiz.com/c-programming
5. http://www.gtucampus.com/uploads/studymaterials/Degree%20EngineeringSandipFundaments_of_C.pdf
6. http://cs.indstate.edu/~cbasavaraj/cs559/the_c_programming_language_2.pdf

Course outcomes:

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

CO1: Design the algorithms/flowcharts of C-programs

CO2: Write the Code and test a given logic in C programming language

CO3: Decompose a problem into functions and to develop modular reusable code.

CO4: Make Use of arrays, pointers, strings and structures to write C Programs.

CO5: Apply searching and sorting algorithms.

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM I Year-I Sem			
Course Code: M1171	ELEMENTS OF ELECTRONICS AND COMPUTER ENGINEERING	L	T	P	C
		0	0	2	1

Pre-Requisites: Electronics and Computer Knowledge.

Unit-1

Study of Electronic Components- Different passive and active components, Color code of resistors, finding the types and values of capacitors, Digital and Analog ICs

Unit- 2

Basics of Electronic Measurement Devices- Voltage, current and resistance measuring devices, study of cathode ray oscilloscope.

Unit- 3

Basics of a Computer – Hardware, Software, Generations of computers. Hardware - functional units, Components of CPU, Memory – hierarchy, types of memory, Input and output devices. Software – systems software, application software, packages, frameworks, IDEs.

Unit-4

Software development – waterfall model, Agile, Types of computer languages – Programming, markup, scripting Program Development – steps in program development, flowcharts, algorithms, data structures – definition, types of data structures

Unit- 5

Operating systems: Functions of operating systems, types of operating systems, Device & Resource management
Database Management Systems: Data models, SQL, Database Transactions, data centres

Text Books

1. Basic Electronics, ML Anand S. Chand Publication.
2. Invitation to Computer Science, G. Michael Schneider, Macalester College, Judith L. Gersting University of Hawaii, Hilo, Contributing author: Keith Miller University of Illinois, Springfield.

Reference Books

1. Principles of Electronics, VK Mehta and Rohit Mehta, S. Chand Publication.
2. Fundamentals of Computers, Reema Thareja, Oxford Higher Education, Oxford University Press.
3. Introduction to computers, Peter Norton, 8th Edition, Tata McGraw Hill.

Course outcomes:

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

CO1: Know about electronic components

CO2: Understand the Electronic Measurement Devices

CO3: Know the working principles of functional units of a basic Computer.

CO4: Understand program development, the use of data structures and algorithms in problem solving.

CO5: Know the need and types of operating system, database systems.

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM I Year-I Sem			
Course Code: **M1103**	**ENGLISH LANGUAGE & COMMUNICATION SKILLS LAB (**COMMON TO CSE, IT, ECM, ECE, EEE**)**	L	T	P	C
		0	**0**	**3**	**1**

Pre-Requisites: NIL

English Language and Communication Sills Lab (ELCS) will have two divisions:

a) Computer Assisted Language Learning Lab (CALL)

b) Interactive Communication Skills Lab (ICS)

Module 1 **[9L]**

CALL Lab:

General Indian English (GIE) and Interference of Mother Tongue (MTI) -Differences in British and American Pronunciation.

Introduction to Phonetics – Speech Sounds – Vowels and Consonants; Minimal Pairs

ICS Lab:

Ice-Breaking Activity and JAM Session- Situational Dialogues -Greetings-Taking Leave - Introducing Oneself and Others.

Module 2 **[9 L]**

CALL Lab:

The Phoneme: The Syllable.

ICS Lab:

Features of Good Conversation - Non-verbal Communication- Telephone Etiquette-Role Plays.

Module 3 **[9 L]**

CALL Lab:

Stress-Word and Sentence Stress- Stress Shift- Strong and Weak Forms.

ICS Lab:

Introduction to a structured talk, Presentations Skills-Formal Presentations.

Module 4 **[9 L]**

CALL Lab:

Intonation-Errors in Pronunciation- Neutralizing MTI

ICS Lab:

Introduction to Group Discussion - Mock GD

Module 5 **[8L]**

CALL Lab:

Listening for Specific Details-Listening Comprehension Tests.

ICS Lab:
Introduction to Interview Skills-Mock Interviews.

Text Books

1. ELCS Lab Manual: A Workbook for CALL & ICS Lab Activities; Orient Black Swan

Reference Books

1. Balasubramanian. T (2009), A Textbook of English Phonetics for Indian Students. Macmillan.
2. Bansal. R.K, Harrison J.B. (2008). Spoken English. Orient Black Swan.
3. Ashraf Rizvi M (2010). Effective Technical Communication. McGraw-Hill.

E-Resources

1. https://bbamantra.com/listening/
2. https://en.wikipedia.org/wiki/Phonetics#:~:text=Phonetics%20is%20a%20branch%20of,the%20physical%20properties%20of%20speech.
3. https://www.innovativeteachingideas.com/blog/10-great-activities-to-break-the-ice-with- your-students
4. http://kjtenglishnotes.blogspot.com/2015/10/how-i-became-public-speaker.html
5. https://www.learngrammar.net/english-grammar

Course outcomes:

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

CO1: Differentiate the speech sounds in English and demonstrate accurate pronunciation

CO2: Comprehend and respond to the given texts appropriately

CO3: Improve their effective and empathetic listening ability

CO4: Communicate confidently and effectively in various contexts and different cultures.

CO5: Listen actively, speak fluently and write accurately.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes (POs)/Program Specific Outcomes (PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**
CO1	-	-	-	-	-	-	-	-	3	3	-	2	-	-
CO2	-	-	-	-	-	-	-	-	3	3	-	2	-	-
CO3	-	-	-	-	-	-	-	-	3	3	-	2	-	-
CO4	-	-	-	-	-	-	-	-	3	3	-	2	-	-
CO5	-	-	-	-	-	-	-	-	3	3	-	2	-	-
Average	-	-	-	-	-	-	-	-	**3**	**3**	-	**2**	-	-

Correlation: 3–Strong; 2–Medium; 1-Weak

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM I Year-I Sem			
Course Code: **M1102**	**CHEMISTRY LAB** **(**COMMON TO EEE, ECE, CSE, IT& ECM**)**	L	T	P	C
		0	**0**	**2**	**1**

Pre-Requisites: NIL

List of experiments (Any 10-12 experiments)

Volumetric Analysis:

1. Preparation of standard solution of oxalic acid and standardisation of NaOH.
2. Determination of total hardness of water by complexometric method using EDTA.
3. Determination of chloride content of water by Argentometry.
4. Estimation of Ferrous ion in Mohr's salt using Permanganomerty.
5. Estimation of ferrous ion in Mohr's salt by dichrometry.

Determination of Physico-Chemical Properties:

6. Determination of viscosity of a given liquid by using Ostwald's viscometer.
7. Determination of surface tension of a given liquid using stalagmometer.
8. Determination of partition coefficient of acetic acid between n-butanol and water.

Instrumental methods of Analysis:

9. Estimation of strength of HCl by Conductometric titrations using NaOH.
10. Estimation of strength of HCl by Potentiometric titrations using NaOH.
11. Estimation of Cu+2 in a given sample by colorimetry.
12. Estimation of Mn+2 in given sample by colorimetry.

Synthesis of Nanomaterials, Polymers and drug molecules:

13. Synthesis of Iron Nanoparticles
14. Synthesis of Polymer-Bakelite.
15. Synthesis of drug molecule Aspirin.

Text Books

1. Senior practical physical chemistry, B.D. Khosla, A. Gulati and V. Garg, (R. Chand & Co., Delhi)
2. An introduction to practical chemistry, K.K. Sharma & D.S. Sharma, (Vikas publishing, N. Delhi)
3. "Text book of practical organic chemistry", Vogel's ,5th edition.
4. "Text book on Experiments and calculations in engineering chemistry", S.S. Dara

Course outcomes:

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

CO1: Identify the basic chemical methods to analyse the substances quantitatively & qualitatively.

CO2: Calculate the concentration and amount of various substances using instrumental techniques.

CO3: Synthesize the engineering materials like nanomaterials, polymers and drug molecules.

CO4: Determine the physic-chemical properties like partition co-efficient, surface tension and viscosity.

CO5: Determine the partition coefficient of organic compound in two immiscible liquids.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes (POs)/Program Specific Outcomes (PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Average	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Correlation: 3–Strong; 2–Medium; 1-Weak

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM I Year-I Sem			
Course Code: **M1151**	**PROGRAMMING FOR PROBLEM SOLVING LAB (**COMMON TO ALL**)**	L	T	P	C
		0	**0**	**2**	**1**

Pre-Requisites:

1. **Mathematical Knowledge.**
2. **Analytical Skills.**

List of experiments

1. a) Write a program to find the max and min from the three numbers.

   b) Write a program to read marks from keyboard and your program should display equivalent grade according to following table (if else ladder)

   Marks Grade

   100 – 80 Distinction

   79 – 60 First Class

   59 – 40 Second Class

   < 40 Fail

2. Write a C program, which takes two integer operands and one operator from the user, performs the operation, and then prints the result. (Consider the operators +,-,*, /, % and use Switch Statement)

3. Write a program that finds if a given number is a prime number

4. Write a C program to generate the first n terms of the sequence

5. Write a C program to find the minimum, maximum and average in an array of integers.

6. Write a C program to find Addition and Multiplication of Two Matrices

7. Write a C program to count the number of times a character occurs in a text file. The file name and the character are supplied as command line arguments.

8. Write a C program to determine if the given string is a palindrome or not (Spelled same in both directions with or without a meaning like madam, civic, noon, abcba, etc.)

9. a) Write a C program to implement binary search algorithm

b) Write a C program to implement linear search algorithm.

10. a) Write a C program that implements the Bubble sort method

b) Write a C program that implements the Insertion sort method.

11. Write a C program that implements the Quick sort method.

12. Write a C program that implements the Merge sort method.

13. Recursion: factorial, Fibonacci, GCD.

Case Studies:

1. Implement Hotel Management system in C with the following requirements.

Requirements:

-Provide the information on reserving rooms, book an event, check the features

- Give the login for both admin and user for proper login validation

-Add/View/Edit/Delete user records

-Calculate the bill after checkout of customers

2. Implement Library management system in C with the following requirements.

Requirements:

-To add Book Information

- Display Book Information

-List all the books of the given author

-List the title of the specified Book

-List the count of books in the library

Course outcomes:

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

CO1: Formulate the algorithms for simple problems.

CO2: Examine syntax errors as reported by the compilers.

CO3: Define and manipulate data with arrays, strings, and structures.

CO4: Make use of pointers with different function types.

CO5: Create, read, and write to and from simple text and binary files.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes (POs)/Program Specific Outcomes (PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Average	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Correlation: 3–Strong; 2–Medium; 1-Weak

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM I Year-I Sem			
Course Code: M1132	COMPUTER AIDED ENGINEERING GRAPHICS (Common For All Branches)	L	T	P	C
		1	0	3	2.5

Pre-Requisites: Engineering Mathematics.

Module 1: Principles of Engineering Drawing, Conic Sections, Curves, Scales [12L]

Unit-I: [3L] Introduction to Engineering Graphics: Principles of Engineering Graphics and their Significance. Construction of Plane, Diagonal Scales.
Unit-II: [6L] Conic Sections including the Rectangular Hyperbola – General method only, Cycloid, Epicycloid and Hypocycloid.
Unit-III: [3L] Introduction to Computer aided drafting – views, commands and conics.

Module 2: Orthographic Projections [12L]

Unit-I: [3L] Principles of Orthographic Projections – Conventions.
Unit-II: [3L] Projections of Points and Lines, Projections of Plane regular geometric figures – Circle, Square, Rectangle, Triangle, Pentagon, Hexagon.
Unit-III: [6L] Computer aided orthographic projections – points, lines and planes.

Module 3: Projections of Solids [12L]

Unit-I: [6L] Projections of Right Regular Solids – Prisms and Pyramids of Square, Pentagon, Hexagon;
Unit-II: [6L] Projections of Generated Solids – Cone, Cylinder. Computer aided projections of solids.

Module 4: Sections of Solids, Development of Surfaces of Solids [12L]

Unit-I: [3L] Sectional View of Right Regular Solids – Prisms and Pyramids of Pentagon, Hexagon; Generated solids – Cylinder and Cone.
Unit-II: [6L] Development of Surfaces of Right Regular solids – Prism, cylinder pyramid and cone.
Unit-III: [3L] Computer aided sectional views, Development of surfaces.

Module 5: Isometric Projections, Orthographic Views [12L]

Unit-I: [9L] Principles of Isometric Projections, Isometric Scale, Isometric Views of Simple and Compound Solids; Conversion of Orthographic Views of simple objects to Isometric Views and Vice-versa.
Unit-II: [3L] Conversion of orthographic projection into isometric view using computer aided drafting.

Text Books

1. Bhatt N.D., Panchal V.M. & Ingle P.R., “Engineering Drawing”, Charotar Publishing 2014.
2. Engineering Drawing and graphics Using AutoCAD Third Edition, T. Jeyapoovan, Vikas: S. Chand and company Ltd.
3. K. Venugopal & V. Prabhu Raja, “Engineering Drawing + Auto CAD”, New Age International Publishers. Fifth Edition, 2011.

Reference Books

1. Narayana, K.L. & P Kannaiah, “Text book on Engineering Drawing”, Scitech Publish, 2008
2. Agrawal B. & Agrawal C. M., “Engineering Graphics”, TMH Publn, 2012.

E-Resources

1. https://nptel.ac.in/courses/112/103/112103019/
2. https://urlzs.com/fLJ3T
3. https://urlzs.com/zky46

Course outcomes:

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

CO1: Apply computer aided drafting tools to create 2D and 3D objects

CO2: Sketch conics and different types of solids.

CO3: Read and interpret engineering drawings.

CO4: Conversion of orthographic projection into isometric view and vice versa manually and by using computer aided drafting.

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM I Year-I Sem			
Course Code: **M11AC2**	**HUMAN VALUES AND PROFESSIONAL ETHICS** **(**Common For All Branches**)**	L	T	P	C
		2	**0**	**0**	**0**

Pre-Requisites:

1. **Positive bent of mind.**
2. **Zeal to know the essence of human existence and Nature.**
3. **Interest to know the Scientific and philosophical approach for identification of 'I'.**
4. **Sensitivity towards social and environmental issues.**

Module 1

Course Introduction - Need, Basic Guidelines, Content and Process for Value Education: Understanding the need, basic guidelines, content and process for Value Education. Self-Exploration–what is it? - its content and process; 'Natural Acceptance' and Experiential Validation- as the mechanism for self-exploration. Continuous Happiness and Prosperity- A look at basic Human Aspirations. Right understanding, Relationship and Physical Facilities- the basic requirements for fulfilment of aspirations of every human being with their correct priority. Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario. Method to fulfil the above human aspirations: understanding and living in harmony at various levels.

Module 2

Understanding Harmony in the Human Being - Harmony in Myself!: Understanding human being as a co-existence of the sentient 'I' and the material 'Body'. Understanding the needs of Self ('I') and 'Body' - Sukh and Suvidha. Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer). Understanding the characteristics and activities of 'I' and harmony in 'I'. Understanding the harmony of I with the Body: Sanyam and Swasthya; correct appraisal of Physical needs, meaning of Prosperity in detail. Programs to ensure Sanyam and Swasthya.

Module 3

Understanding Harmony in the Family and Society- Harmony in Human - Human Relationship: Understanding harmony in the Family- the basic unit of human interaction. Understanding values in human-human relationship; meaning of Nyaya and program for its fulfilment to ensure Ubhay-tripti; Trust (Vishwas) and Respect (Samman) as the foundational values of relationship. Understanding the meaning of Vishwas; Difference between intention and competence. Understanding the meaning of Samman, Difference between respect and differentiation; the other salient values in relationship. Understanding the harmony in the society (society being an extension of family): Samadhan, Samridhi, Abhay, Sah-astitva as comprehensive Human Goals. Visualizing a universal harmonious order in society- Undivided Society (Akhand Samaj), Universal Order (Sarvabhaum Vyawastha)- from family to world family!

Module 4

Understanding Harmony in the Nature and Existence - Whole existence as Co- existence: Understanding the harmony in the Nature. Interconnectedness and mutual fulfilment among the four orders of nature-recyclability and self- regulation in nature. Understanding Existence as Co-existence (Sah-Astitva) of mutually interacting units in all-pervasive space. Holistic perception of harmony at all levels of existence.

Module 5

Implications of the above Holistic Understanding of Harmony on Professional Ethics: Natural acceptance of human values. Definitiveness of Ethical Human Conduct. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order. Competence in professional ethics:

Ability to utilize the professional competence for augmenting universal human order, Ability to identify the scope and characteristics of people-friendly andeco- friendly production systems, Ability to identify and develop appropriate technologies and management patterns for above production systems.

Case studies of typical holistic technologies, management models and production systems. Strategy for transition from the present state to Universal Human Order: At the level of individual: as socially and ecologically responsible engineers, technologists and managers At the level of society: as mutually enriching institutions and organizations

Text Books

1. R R Gaur, R Sangal, G P Bagaria, 2009, A Foundation Course in Human Values and Professional Ethics.
2. Prof. KV Subba Raju, 2013, Success Secrets for EngineeringStudents, Smart Student Publications,3rd Edition.

Reference Books

1. Ivan Illich, 1974, Energy & Equity, The Trinity Press, Worcester, and HarperCollins, USA
2. E.F. Schumacher, 1973, Small is Beautiful: a study of economics as if people mattered, Blond & Briggs, Britain.
3. A Nagraj, 1998, Jeevan Vidya ek Parichay, Divya Path Sansthan, Amarkantak.
4. Sussan George, 1976, How the Other Half Dies, Penguin Press. Reprinted 1986, 1991
5. PL Dhar, RR Gaur, 1990, Science and Humanism, Commonwealth Publishers.
6. A.N. Tripathy, 2003, Human Values, New Age International Publishers.
7. Subhas Palekar, 2000, How to practice Natural Farming, Pracheen(Vaidik) Krishi Tantra Shodh, Amravati.
8. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William
9. W. Behrens III, 1972, Limits to Growth – Club of Rome's report, Universe Books.
10. E G Seebauer & Robert L. Berry, 2000, Fundamentals of Ethics for Scientists & Engineers, Oxford University Press

11. M Govindrajran, S Natrajan & V.S. Senthil Kumar, Engineering Ethichs (including Human Values), Eastern Economy Edition, Prentice Hall of India Ltd.

Relevant CDs, Movies, Documentaries & Other Literature:

1. Value Education website, http://www.uptu.ac.in
2. Story of Stuff, http://www.storyofstuff.com
3. Al Gore, An Inconvenient Truth, Paramount Classics, USA
4. Charlie Chaplin, Modern Times, United Artists, USA
5. IIT Delhi, Modern Technology – the Untold Story

Course outcomes:

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

CO1: The students identify the importance of human values and skills for sustained happiness.

CO2: The students strike a balance between profession and personal happiness/goals.

CO3: The students realize/explain the significance of trust, mutually satisfying human behavior and enriching interaction with nature.

CO4: The students develop/propose appropriate technologies and management patterns to create harmony in professional and personal life.

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM I Year-II Sem			
		L	T	P	C
Course Code: **M120A**	**DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS** **(**COMMON TO: CE, EEE, ME, ECE, CSE, IT, ECM, CSE(DS), CSE(AIML), AIML, AIDS & MIE**)**	**3**	**1**	**0**	**4**

Pre-Requisites: Mathematical Knowledge at pre-university level

Module 1: First Order, First Degree ODE and its Applications [10L]

Differential equations of first order and first degree - Exact differential equation, Linear and Bernoulli differential equation, applications of differential equations of first order and first degree - Newton's law of cooling, Law of natural growth and decay, orthogonal trajectories.

Module 2: Second and Higher order ODE with Constant Coefficients: [10L]

Second order linear differential equations with constant coefficients: Solution of Homogenous, nonhomogeneous differential equations, non-Homogeneous terms of the type e^ax, sin(ax), cos (ax), polynomials in x^k, e^ax V(x), xV(x). Method of variation of parameters; Equations reducible to linear ODE with constant Coefficients: Euler-Cauchy equation, Legendre's equation

Module 3: Laplace Transforms [10L]

Laplace transforms, Existence condition, Laplace transform of Elementary functions, Properties of Laplace transforms (Without Proofs), Laplace transform of special functions (Unit step function, Dirac delta function and Periodic function). Inverse Laplace transform and its properties, Convolution theorem (without proof) and its applications, solving linear differential equations with constant coefficients using Laplace transform.

Module 4: Vector differential calculus [9L]

Scalar and vector fields, vector differentiation, level surfaces, gradient of a scalar field, directional derivative, divergence and curl of a vector field, Scalar potential energy, Tangent plane and normal line. Vector Identities (without proofs).

Module 5: **Vector integral calculus**: **[9L]**

Line, surface and volume integrals. Green's theorem in a plane, Gauss-Divergence theorem and Stokes theorem (without proofs).

Text Books

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010
2. R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, 5 th Edition, 2019.

Reference Books

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006
2. G.B. Thomas and R.L. Finney, Calculus and Analytic geometry, 9th Edition, Pearson, Reprint, 2002
3. H. K. Dass and Er. Rajnish Verma, Higher Engineering Mathematics, S Chand and Company Limited, New Delhi
4. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, Reprint, 2008.

E-Resources

1. https://nptel.ac.in/courses/111108098
2. https://www.math.hkust.edu.hk/~machas/differential-equations.pdf
3. https://engineeringmath.online
4. https://www.cheric.org
5. https://www.whitman.edu/mathematics/calculus_online

Course outcomes:

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

CO1: Identify whether the given differential equation of first order is exact or not.

CO2: Solve higher differential equation and apply the concept of differential equation to real world problems.

CO3: Use the Laplace transforms techniques for solving ODE's.

CO4: Evaluate the line, surface and volume integrals and converting them from one to another.

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM I Year-II Sem			
Course Code: **M120B**	**APPLIED PHYSICS** (COMMON TO: CE, EEE, ME, ECE, CSE, IT, ECM, CSE(AIML), CSE(DS), AIDS, AIML, CSC)	L	T	P	C
		3	**1**	**0**	**4**

Pre-Requisites: 10+2 Physics

Module 1: LASERs and Optical fibers [10L]

Unit I: LASERs [5L]

Introduction, Properties of laser beam- Monochromaticity, coherence, directionality and brightness; Einstein co-efficients, Population inversion, Types of Lasers: Ruby laser, He-Ne laser, Semiconductor laser, Applications of lasers.

Unit II: Optical Fibers [5L]

Introduction, Principle and construction of an optical fiber, Total Internal reflection, Acceptance angle, Numerical aperture, Types of optical fibers (Single mode, multimode, step index, graded index), losses in optical fibers, Optical fiber communication system with block diagram and Applications of optical fibres.

Module 2: Fundamentals of Quantum Mechanics and Band theory of solids [10L]

Unit I: Fundamentals of Quantum Mechanics [6L]:

Introduction to quantum physics, Black body radiation, Planck's radiation law, Photoelectric effect, de-Broglie hypothesis, Davisson and Germer's experiment, Concept of wave function, Heisenberg uncertainty principle, Time independent Schrödinger wave equation, Particle in one dimensional infinite potential well.

Unit II: Band theory of solids: [4L]

Free electron theory (Drude & Lorentz, Sommerfeld) (Qualitative), Bloch's theorem, Kronig-Penney model (Qualitative), E-K diagram, Effective mass of electron, Origin of energy bands-classification of solids.

Module 3: Semiconductor Physics and Devices [9L]

Unit I: Semiconductor Physics [5L]

Density of states, Intrinsic semiconductor, Intrinsic carrier concentration, Extrinsic semiconductors (Qualitative), Fermi level and its temperature dependence, Hall effect-Hall coefficient, Applications of Hall effect.

Unit II: Semiconductor Devices [4L]

Direct and indirect bandgap semiconductor, Formation of PN junction, Working of PN junction diode in forward and reverse bias, V-I Characteristics, Zener diode, LED, Photo diode and Solar cell, their structure, working principle and characteristics.

Module 4: Dielectric, Energy and Magnetic materials [10L]

Unit I: Dielectric and Energy materials [5L]

Introduction, Types of polarizations-electronic, ionic and orientation polarizations; Internal field and Clausius-Mossotti, Piezoelectricity, Pyroelectricity and Ferroelectricity and their applications. Energy materials-Materials and electrolytes for super capacitors-Rechargeable ion batteries-Lithium ion and sodium ion batteries, solid fuel cells.

Unit II: Magnetic materials [5L]

Introduction, Origin of magnetic moment, Bohr magneton, Classification of dia, para and ferro magnetic materials on the basis of magnetic moment, Hysteresis curve based on domain theory, Soft and hard magnetic materials, Properties of antiferro and ferri magnetic materials.

Module 5: Nanoscience and Characterization techniques [9L]

Unit I: Nanoscience [5L]

Introduction of nanomaterials, Surface area to Volume ratio, Quantum confinement, Top-down fabrication: Ball milling and Chemical Vapor Deposition (CVD) methods, Bottom-up fabrication: Sol-Gel and Combustion methods.

Unit II: Characterization techniques [4L]

X-Ray Diffraction (XRD), Scanning Electron Microscope (SEM), Transmission Electron Microscope (TEM), Scanning Tunnelling Microscope (STM), Applications of nanomaterials.

Text Books

1. M.N. Avadhanulu and P.G. Kshirsagar, TVS Aruna Murthy “A Text Book Engineering Physics”, S. Chand, 2019.
2. P. K. Palanisamy, “Engineering Physics”, Scitech Publications.
3. Essentials of Nanoscience & Nanotechnology by Narasimha Reddy Katta, Typical Creatives NANO DIGEST, 1st Edition, 2021.
4. Wahab M A, ‘Solid state physics-Structure and properties of materials’ Narosa publication.
5. R.L.Singhal, “ Solid state physics”, KNRN publication.
6. Elementary Solid State Physics , S.L. Gupta and V. Kumar, pragati prakashan, 2019.
7. A.K. Bhandhopadhya-Nano materials, New age international, 1 st edition, 2007.

Reference Books

1. P. Bhattacharya, “Semiconductor Optoelectronic Devices”, Prentice Hall of India (1997).
2. S.O. Pillai, “Solid State Physics”, New Age International Publishers
3. J. Singh, “Semiconductor Optoelectronics”, Physics and Technology, McGraw-Hill Inc. (1995).
4. Introduction to Solid State Physics, Charles Kittel, Wiley Eastern, 2019.

E-Resources

1. http://nptel.ac.in/courses/113104012/
2. http://www.springer.com/physics/journal/340.
3. https://www.researchgate.net/publication/259574083 Lecture Notes on Engineering Physics
4. https://www.researchgate.net/publication/292607115_Applied Physics.

Course outcomes:

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

CO1: Describe the working of various types of lasers and explain the fundamentals of fiber optics.

CO2: Apply Schrodinger time independent wave equation to show energy of a particle in 1D potential box is quantized.

CO3: Explain the working of p-n junction diode in forward bias and reverse bias.

CO4: Classify the magnetic materials into hard and soft magnetic materials based on hysteresis loop area.

CO5: Prepare nanomaterials for applications in various fields of engineering.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes (POs)/Program Specific Outcomes (PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO1 0**	**PO1 1**	**PO1 2**	**PSO 1**	**PSO 2**
CO1	2	2	1	-	-	-	-	-	-	-	-	-	1	-
CO2	3	1	2	-	-	-	-	-	-	-	-	-	1	-
CO3	2	1	2	-	-	-	-	-	-	-	-	-	1	-
CO4	2	2	1	-	-	-	-	-	-	-	-	-	1	-
CO5	2	2	1	-	-	-	-	-	-	-	-	-	2	-
Average	-	-	-	-	-	-	-	-	-	-	-	-		-

Correlation: 3–Strong; 2–Medium; 1-Weak

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM I Year-II Sem			
Course Code: **M122A**	**BASIC ELECTRICAL ENGINEERING (**COMMON TO: CSE, IT, ECE, ECM & EEE**)**	L	T	P	C
		3	**0**	**0**	**3**

Pre-Requisites: Mathematics and Physics

Module 1: DC Circuits and Circuit Elements [10 L]

Unit I: D.C Circuit Concepts and Circuit Elements

Voltage – current – power and energy – active and passive elements – voltage and current sources – source conversions – open circuit – short circuit – statement of Ohm's law - Kirchhoff's Laws – loop current method – node voltage method of solving the electrical network – resistance – laws of resistance – temperature coefficient of resistance – resistors in series and parallel – uses of resistor.

Unit II: Energy Storing Elements

Inductor – inductance – V-I relation – power – energy stored in inductor – inductors in series and parallel – uses of Inductors – capacitor – capacitance – V-I relation – power – energy stored in capacitor – capacitor in series and parallel – uses of capacitor.

Module 2: AC Circuits [10L]

Unit I: Single Phase AC Circuits

Alternating quantity – cycle – time period – frequency – Amplitude – RMS – average value – form and peak factors – phase and phase difference – AC through R, L, C, RL, RC and RLC series circuits – resonance in series RLC circuit.

Unit II: Three Phase AC Circuits

Phase sequence – three phase connections – relationship between line and phase value of voltage and current in star and delta connections – power in three phase circuit.

Module 3: Static Electric Machine [8L]

Unit I: Fundamentals Of Single-Phase Transformer

Single phase transformer – Principle – constructional details – parts – types (core and shell type) – equivalent circuit - EMF equation.

Unit II: Transformer Performance and Applications

Losses – efficiency – regulation – applications.

Module 4: DC and AC Machines [8L]

Unit I: DC Motor

D.C Motor – principle – constructional details – DC series – DC shunt motor – torque current and speed current characteristics – applications.

Unit II: : Three-Phase Induction Motor

Three-phase induction motor – principle – construction – generation of rotating magnetic field – torque slip characteristics.

Module 5: Electrical Installations and Measuring Instruments [9 L]

Unit I: Electrical Installations:

Components of LT switchgear: Switch fuse unit (SFU) – MCB – MCCB – earthing.

Unit II: Measuring Instruments:

Construction – working principle of PMMC and MI type instruments – advantages – disadvantages – applications.

Text Books

1. D.P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 4th Edition, 2019.
2. V.K. Mehta and Rohit Mehta, "Principles of Electrical Engineering and Electronics", S. Chand & Company Ltd, 2012.
3. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
4. A.K.Sawhney, "A course in Electrical and Electronics Measurements and Instrumentation", Dhanapath Rai and Sons., 10th Edition, 2007.

Reference Books

1. Dr. Ramana Pilla, Dr. M. Suryakalavathi, "Basic Electrical Engineering", S. Chand & Company Ltd, 2018.
2. V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989..

E-Resources

1. https://onlinecourses.swayam2.ac.in/nou21_ee02/preview
2. https://nptel.ac.in/courses/108/108/108108076/
3. https://www.electrical4u.com

Course outcomes:

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

CO1: Analyse and solve complex DC circuits using Kirchhoff's laws.

CO2: Calculate and analyse the behaviour of single-phase and three-phase AC circuits, including resonance phenomena.

CO3: Understand the principles of operation and applications of transformers in electrical systems.

CO4: Expertise in the principles and applications of DC motors and three-phase induction motors, enabling them to select and operate suitable machines for various industrial purposes.

CO5: Develop foundational skills in basic electrical installations and using fundamental measurement instruments for practical electrical applications.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes (POs)/Program Specific Outcomes (PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO 2**
CO1	3	3	3	2	1	1	1	-	-	-	-	1	2	1
CO2	3	3	3	2	1	1	1	-	-	-	-	1	2	1
CO3	3	3	3	2	1	1	1	-	-	-	-	1	2	1
CO4	3	3	3	2	1	1	1	-	-	-	-	1	2	1
CO5	3	3	3	2	1	1	1	-	-	-	-	1	2	1
Average	-	-	-	-	-	-	-	-	-	-	-	-		-

Correlation: 3–Strong; 2–Medium; 1-Weak

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM I Year-II Sem			
Course Code: **M124A**	**BASIC ELECTRONICS ENGINEERING (**COMMON TO: ECE, EEE and ECM**)**	L	T	P	C
		3	**0**	**0**	**3**

Pre-Requisites: Applied Physics

Module 1

Unit I: Diodes:
Diode - Static and Dynamic resistances, Equivalent circuit, Diffusion and Transition Capacitances
Unit II: P-N junction diode- Principle of operation and characteristics of a P-N junction diode V-I Characteristics, Diode as a switch- switching times.

Module 2

Unit I: Diode Applications:
Rectifier - Half Wave Rectifier, Full Wave Rectifier, Bridge Rectifier, Rectifiers with Capacitive and Inductive Filters
Unit II: Clippers-Clipping at two independent levels, Clamper-Clamping Circuit Theorem, Clamping Operation, Types of Clampers.

Module 3

Unit I: Bipolar Junction Transistor (BJT): Principle of Operation, Common Emitter, Common Base and Common Collector Configurations
Unit II: Current components of BJT, amplification factors. V-I characteristics, Transistor as a switch, switching times

Module 4

Unit I: Junction Field Effect Transistor (FET):
Construction, Principle of Operation, Pinch-Off Voltage, Volt- Ampere Characteristic, Determination of FET Parameters from the V-I characteristics.
Unit II:
Comparison of BJT and FET, FET as Voltage Variable Resistor, MOSFET -Construction & Operation in Enhancement and Depletion modes, MOSFET as a capacitor.

Module 5

Special Purpose Devices: Zener Diode - Characteristics, Zener diode as Voltage Regulator, Principle of Operation - SCR, Tunnel diode, UJT, Varactor Diode, Photo diode, Solar cell, LED, Schottky diode

Text Books

1. Jacob Millman - Electronic Devices and Circuits, McGraw Hill Education
2. Robert L. Boylestead, Louis Nashelsky- Electronic Devices and Circuits theory, 11th Edition, 2009, Pearson.

Reference Books

1. Horowitz -Electronic Devices and Circuits, David A. Bell – 5thEdition, Oxford.
2. Chinmoy Saha, Arindam Halder, Debaati Ganguly - Basic Electronics-Principles and Applications, Cambridge, 2018.

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM I Year-II Sem			
Course Code: **M1201**	**PHYSICS LAB** **(**COMMON TO: All Branches**)**	L	T	P	C
		0	**0**	**2**	**1**

Pre-Requisites: 10+2 Physics basic concepts

List of Experiments:

1: Energy gap of P-N junction diode

To determine the energy gap of a semiconductor diode.

2. Solar Cell:

To study the V-I Characteristics of solar cell.

3. Light emitting diode and Laser Diode:

Plot V-I characteristics of light emitting diode and Laser diode.

4. Optical fiber:

Determination of Numerical Aperture of an optical fibre.

5. Hall effect:

To determine Hall co-efficient of a given semiconductor.

6. Photoelectric effect

To determine work function of a given material.

7. Dielectric Constant

To determine the Dielectric constant of the given material.

8. LCR Circuit

To determine the Quality factor of LCR Circuit (Series & Parallel).

9. R-C Circuit

To determine the time constant of R-C circuit (Growth and Decay).

10. Melde's Experiment

To determine the frequency of a vibrating bar or turning fork using Melde's arrangement.

11. Torsional Pendulum

To determine the rigidity modulus of the material of the given wire using torsional pendulum.

12. Sonometer

To determine the frequency of AC Supply sonometer.

Note: Any 10 experiments are to be performed.

Text Books

1. Dr. Narendra, L. Mathakari,"Experiments in Applied Physics" (Physics Lab Manual 4th edition) ,
2. "Engineering Physics Lab Resources" by Department of Physics JBIET.

Course outcomes:

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

CO1: Learn the experimental concepts on in LED, Electric and Electronic materials.

CO2: Get the knowledge of fundamentals of Semiconductor physics.

CO3: Design, characterization and study of properties of material help the students to prepare new materials for various engineering applications.

CO4: Be exposed to the phenomena of waves, oscillations and optics.

CO5: Lasers and fiber optics enable the students to apply to various systems like communications, solar cell, photo cells and so on.

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM I Year-II Sem			
Course Code: **M1221**	**BASIC ELECTRICAL ENGINEERING LAB (**COMMON TO: CSE, IT, ECE, ECM & EEE**)**	L	T	P	C
		0	**0**	**2**	**1**

Pre-Requisites: Mathematics and Physics

List of Experiments:

1. Verification of Ohms Law.
2. Determination of unknown resistance.
3. Verification of KVL and KCL.
4. Transient response of series RL and RC circuits using DC excitation.
5. Transient response of RLC series circuit using DC excitation.
6. Resonance in series RLC circuit.
7. Calculations and verification of impedance and current of RL, RC and RLC series circuits.
8. Measurement of voltage, current and real power in primary and secondary circuits of a single-phase transformer.
9. Performance Characteristics of a DC Shunt Motor.
10. Load test on single phase transformer (Calculate Efficiency and Regulation).

Course outcomes:

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

CO1: Apply Ohm's Law and circuit analysis techniques to determine the value of unknown resistances, showcasing proficiency in fundamental electrical principles.

CO2: Validate principles of circuit behaviour using Kirchhoff's Voltage Law and Kirchhoff's Current Law.

CO3: Investigate the transient responses of series RL and RC circuits to DC excitation, demonstrating an understanding of time-dependent behaviour in electrical components.

CO4: Explore resonance phenomena in series RLC circuits, identifying the frequency at which impedance is minimized and current is maximized, showcasing proficiency in frequency-domain analysis.

CO5: Evaluate the performance characteristics of DC shunt motors and single-phase transformers, to assess their suitability for specific applications in electrical systems.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes (POs)/Program Specific Outcomes (PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO1 0**	**PO1 1**	**PO1 2**	**PSO 1**	**PSO 2**
CO1	3	3	3	2	1	1	1	1	1	-	-	1	2	1
CO2	3	3	3	2	1	1	1	1	1	-	-	1	2	1
CO3	3	3	3	2	1	1	1	1	1	-	-	1	2	1
CO4	3	3	3	2	1	1	1	1	1	-	-	1	2	1
CO5	3	3	3	2	1	1	1	1	1	-	-	1	2	1
Average	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Correlation: 3–Strong; 2–Medium; 1-Weak

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM I Year-II Sem			
Course Code: **M1241**	**BASIC ELECTRONICS ENGINEERING LAB (**COMMON TO: ECE, EEE and ECM**)**	L	T	P	C
		0	**0**	**2**	**1**

Pre-Requisites: Applied Physics

List of Experiments:

1. PN Junction diode characteristics A) Forward bias B) Reverse bias.
2. Study of Rectifier characteristics with & without filters
3. Types of Clippers at different reference voltages
4. Types of Clampers at different reference voltages
5. Input and output characteristics of BJT in CB Configuration
6. Input and output characteristics of BJT in CE Configuration
7. Input and output characteristics of MOS FET in CS Configuration
8. Input and output characteristics of MOS FET in CD Configuration
9. Switching characteristics of a transistor
10. Zener diode characteristics and Zener as voltage Regulator
11. SCR Characteristics
12. UJT Characteristics and identify negative region
13. Photo diode characteristics
14. Solar cell characteristics
15. LED Characteristics
    *Design a circuit to switch on and off LED using diode/BJT/FET as a switch.

Major Equipment required for Laboratories:

1. Regulated Power Suppliers, 0-30V
2. 20 MHz, Dual Channel Cathode Ray Oscilloscopes.
3. Functions Generators-Sine and Square wave signals
4. Multimeters, voltmeters and Ammeters
5. Electronic Components and devices

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM I Year-II Sem			
Course Code: **M1231**	**ENGINEERING WORKSHOP AND DIGITAL FABRICATION PRACTICES (**COMMON TO All**)**	L	T	P	C
		1	**0**	**4**	**2.5**

Pre-Requisites: Basic knowledge about tools and different trades

List of Experiments:

1. To make a Half Lap joint from the given Wooden pieces.
2. To make a Dovetail joint from the given Wooden pieces.
3. To make a Rectangular Scoop using the given Sheet metal.
4. To make a Hooper using the given Sheet metal.
5. To perform Parallel and Series wiring connection.
6. To perform Stair case wiring connection.
7. To make a square rod from a given round rod.
8. To make a S- hook from a given round rod.
9. To prepare a sand mould for the given single piece pattern.
10. To prepare a sand mould for the given Split-piece pattern.
11. To make a Straight fitting from the given metal pieces.
12. To make a V- shape fitting from the given metal pieces

Demonstration

13. 3D Printing of modelled component by varying Layer thickness.
14. 3D Printing of modelled component by varying Orientation.
15. 3D Printing of modelled component by varying Infill.

Text Books

1. K. C. John, “Mechanical Workshop Practice”, PHI Publishers, 2nd Edition,2010.
2. Ben Redwood, “The 3D Printing Handbook”, 3D HUBS, 2018.

Course outcomes:

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

CO1: Know the importance of general safety precautions on different shop floors.

CO2: Identify the basic tools and equipment used in fitting, carpentry, sheet metal, machine shop, welding and smithy.

CO3: Familiarize with the production of simple models in carpentry, sheet metal, machine, welding and smithy trades.

CO4: Gain the knowledge on different 3D Printing techniques.

CO5: Perform the printing of the different components using FDM 3D printer.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes (POs)/Program Specific Outcomes (PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**
CO1	-	-	-	-	-	-	-	-	2	2	2	3	3	3
CO2	-	-	-	-	-	-	-	-	2	2	2	3	3	1
CO3	-	-	-	-	-	-	-	-	2	2	2	3	3	3
CO4	-	-	-	-	-	-	-	-	2	2	2	3	3	3
CO5	-	-	-	-	-	-	-	-	2	2	2	3	3	2
Average	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**2**	**2**	**3**	**3**	**2.4**

Correlation: 3–Strong; 2–Medium; 1-Weak

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM I Year-II Sem			
Course Code: **M12AC1**	**CAMBRIDGE LINGUA SKILLS** **(**COMMON TO: CSE, IT, ECM, ECE, EEE**)**	L	T	P	C
		2	**0**	**0**	**0**

Pre-Requisites: Nil

Module 1 **[6L]**

Unit I:
Grammar: Subject-Object, Present Tense
Vocabulary: Words about friendship, communication, work and technology
Pronunciation: Word stress, sentence stress
Unit II:
Everyday English: Opinions and suggestions
- **Listening:** Listening Activity 1, Listening Activity 2
- **Reading:** Reading Activity 1, Reading Activity 2
- **Speaking:** Speaking Activity 1, Speaking Activity 2

Writing: Guide, Email giving news

Module 2 **[6L]**

Unit I:
Grammar: Modals, Phrases of ability, Articles, used to and usually
Vocabulary: Words about relationship and ability
Pronunciation: Linking sounds, Intonation in question tags
Unit II:
Everyday English: Telling a story; Offering and asking for help
- **Listening:** Listening Activity 1, Listening Activity 2
- **Reading:** Reading Activity 1, Reading Activity 2
- **Speaking:** Speaking Activity 1, Speaking Activity 2

Writing: About someone's life, online advertisement

Module 3 **[6L]**

Unit I:
Grammar: Future forms, zero and first conditionals, comparatives and superlatives
Vocabulary: Words about the natural world, environmental issues and food
Pronunciation: Sound and spelling 'a', /ʃ/, /tʃ/
Unit II:
Everyday English: Giving reasons, results and examples; Asking and giving recommendations
- **Listening:** Listening Activity 1, Listening Activity 2
- **Reading:** Reading Activity 1, Reading Activity 2
- **Speaking:** Speaking Activity 1, Speaking Activity 2

Writing: Discussion essay, Review of a restaurant or café.

Module 4 **[6L]**

Unit I:
Grammar: Quantifiers, Reported speech
Vocabulary: Words about buildings and sharing information
Pronunciation: Sounds /t//d//k//g//h//w/
Unit II:
Everyday English: Offers, request, permission; generalising and being vague

- **Listening:** Listening Activity 1, Listening Activity 2
- **Reading:** Reading Activity 1, Reading Activity 2
- **Speaking**: Speaking Activity 1, Speaking Activity 2

Writing: A note with useful information, an email summary of a news story.

Module 5: **[6L]**

Unit I:
Grammar: Passive, Relative clause, Second and third conditionals
Vocabulary: Words about music and sport; expressions with do, make and take
Pronunciation: -ed ending words, mostly confused words
Unit II:
Everyday English: Recommending, Discussing problems and reassuring

- **Listening:** Listening Activity 1, Listening Activity 2
- **Reading:** Reading Activity 1, Reading Activity 2
- **Speaking:** Speaking Activity 1, Speaking Activity 2

Writing: Article, Email with advice

Text Books

1. Doff, Adrian, et al. Empower Second Edition Student's Book with Digital Pack: B1+ Intermediate. Cambridge University Press, 2022.

Reference Books

1. Cullen, Pauline, et al. The Official Cambridge Guide to IELTS for Academic and General Training: Student's Book with Answers. with DVD-ROM. Cambridge Univ. Press, 2014.

E-Resources

1. Cambridge English
2. English with Cambridge - YouTube
3. BBC Learning English - Learn English with BBC Learning English - Homepage
4. https://englishonline.britishcouncil.org/

Course outcomes:

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

CO1: Demonstrate a diverse vocabulary repertoire, facilitating better expression and comprehension.

CO2: Exhibit inteligible pronunciation skills, ensuring clearer oral communication.

CO3: Utilise various grammar concepts accurately and coherently.

CO4: Strengthened language skills across listening, speaking, reading, and writing.

CO5: Apply practical language skills effectively in everyday communication scenarios.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes (POs)/Program Specific Outcomes (PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**
CO1	-	-	-	-	-	-	-	-	2	2	-	3	-	-
CO2	-	-	-	-	-	-	-	-	2	2	-	3	-	-
CO3	-	-	-	-	-	-	-	-	2	2	-	3	-	-
CO4	-	-	-	-	-	-	-	-	2	2	-	3	-	-
CO5	-	-	-	-	-	-	-	-	2	2	-	3	-	-
Average	-	-	-	-	-	-	-	-	**2**	**2**	-	**3**	-	-

Correlation: 3–Strong; 2–Medium; 1-Weak

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech II Year-I Sem			
Course Code: **M210A**	**PROBABILITY AND STATISTICS** **(**COMMON TO: CE, ME, CSE, IT, ECM, CSE(AIML), CSE(DS), AIDS, CSE(AIML), AIML)	L	T	P	C
		3	**1**	**0**	**4**

Pre-Requisites: Mathematical Knowledge at the pre-university level

Module 1: Single Random Variables: [12L]

Introduction to Probability, Random Variables, Discrete and Continuous, Probability distributions, mass function/ density function of a probability distribution, mathematical expectation, moments about the origin, central moments.

Module 2: Probability Distributions: [12L]

Binomial, Poisson, Normal, and Exponential distributions and their properties moment generating functions of the above distributions and hence finds the mean and variance.

Module 3: Sampling and Testing of Hypothesis for Large Samples: [15L]

Sampling: Definition of population, sampling, statistic, parameter, Types of sampling, sample mean and Variance, sampling distribution, standard error, sampling distributions of means and variance.
Testing of Hypothesis: Null and Alternative hypothesis, Type I and Type II errors, Critical region, confidence interval, Level of significance, One tailed and Two tailed test.
Large sample tests: Test of hypothesis for single mean and difference between the means, Test of hypothesis for single proportion and difference between the proportions, Tests of significance of difference between sample S.D and population S.D.

Module 4: Testing of Hypothesis for Small Samples: [9L]

Test of significance-t distribution, paired t-test, confidence interval for the t- distribution, test for ratio of variances (F-test), Chi- square test for goodness of fit and independence of attributes.

Module 5: Correlation and Regression: [9L]

Correlation: Types of correlation, Coefficient of correlation, the rank correlation, Covariance of two random variables.
Regression: Regression Coefficient, the lines of Regression.

Text Books

1. S.C Gupta and V.K. Kapoor: Fundamentals of Mathematical Science, 2006.
2. Sheldon M.Ross: Introduction to Probability and Statistics for Engineers and Scientists.

Reference Books

1. R.A Johnson: Miller and Freund's Probability and Statistics for Engineers, Pearson Publishers, 9th Edition, 2017.
2. B.S.Grewal: Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
3. John E. Freund, Benjamin M. Perles: Modern elementary statistics, Pearson, 2014.

Course Outcomes:

After completion of the course, the student should be able to

CO1: Solve problems involving basic probability.

CO2: Evaluate statistical parameters of probability distributions.

CO3: Assess the importance of sampling distribution of a given statistic of a random sample.

CO4: Apply the knowledge of different probability distributions to Test of Hypothesis.

CO5: Calculate correlation, regression, rank correlation coefficients.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes (POs)/Program Specific Outcomes(PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PS O1**	**PS O2**
CO1	2	3	1	1	1			-	-	-	-	1	2	1
CO2	2	3	2	2	2			-	-	-	-	1	2	1
CO3	2	3	1	1	-			-	-	-	-	1	1	1
CO4	2	3	2	2	2			-	-	-	-	1	1	1
CO5	2	3	2	2	-			-	-	-	-	1	2	1
Average	2	3	1.6	1.6	1.6	-	-	-	-	-	-	1	1.6	1

Correlation: 3–Strong; 2–Medium; 1-Weak

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM II Year-I Sem			
Course Code: M217A	SWITCHING THEORY AND LOGIC DESIGN	L	T	P	C
		3	1	0	4

Pre-Requisites: Basics of Boolean algebra

Module 1

Unit-I: Number Systems

Philosophy of Number Systems, Complement Representation of Negative Numbers, Binary Arithmetic

Unit-II: Codes

Binary Codes, Error Detecting & Error Correcting Codes, Hamming codes

Module 2

Unit-I: Boolean Algebra

Fundamental Postulates of Boolean Algebra, Basic theorems and Properties, Switching Functions, Canonical and Standard forms, Algebraic simplification Digital Logic Gates, Properties of XOR gates, Universal Gates, Multilevel NAND/NOR Realizations.

Unit-II: Switching Functions

Minimization of Switching Functions: Map method, Prime implicants, Don't care combinations, Minimal SOP and POS forms, Tabular Method, Prime –Implicant chart, Simplification rules.

Module 3

Unit-I: Combinational Logic Design

Design using conventional logic gates, Encoder, Decoder, Multiplexer, De-Multiplexer, Modular design using IC chips, MUX Realization of switching functions Parity bit generator, Code-converters, Hazards and Hazard Free Realizations

Unit-II: Programmable Logic Devices & Threshold Logic

Basic PLD's-ROM, PROM, PLA, PAL, Realization of Switching functions using PLD's, Capabilities and Limitations of Threshold gate, Synthesis of Threshold functions, Multigate Synthesis.

Module 4

Unit-I: Sequential Circuits – I

Classification of sequential circuits (Synchronous, Asynchronous, Pulse mode, Level mode with examples), Basic Flip-Flops, Triggering and Excitation tables, Steps in Synchronous Sequential Circuit Design, Design of modulo-N Ring & Shift counters, Serial binary adder, Sequence detector.

Unit-II: Sequential Circuits - II

Finite State Machine-Capabilities and Limitations, Mealy and Moore models, Minimization of Completely Specified and Incompletely Specified Sequential Machines, Partition Techniques and Merger chart methods, Concept of Minimal cover table

Module 5

Unit-I: ASM chart

Salient features of the ASM chart, Simple examples, System design using data path and control subsystems

Unit-II:

Examples of Weighing Machine and Binary multiplier.

Text Books

1. Switching & Finite Automata theory – Zvi Kohavi, 2 ed., TMH.
2. Digital Design – Morris Mano, 3 ed., 2006, PHI.
3. Switching Theory and Logic Design – A. Anand Kumar, 2008, PHI

Reference Books

1. An Engineering Approach to Digital Design – Fletcher, PHI.
2. Fundamentals of Logic Design – Charles H. Roth, 5 ed., 2004, Thomson Publications.
3. Digital Logic Applications and Design – John M. Yarbrough,2006, Thomson Publications.

E-Resources

1. https://nptel.ac.in/courses/106/105/106105185/
2. https://www.coursera.org/learn/digital-systems

Course Outcomes:

After completion of the course, the student should be able to

CO1: Manipulate numeric information in different forms, e.g. different bases, signed integers, various codes such as ASCII, gray, and BCD.

CO2: Build Boolean expressions using the theorems and postulates of Boolean algebra and to minimize combinational functions.

CO3: Design and analyse small combinational circuits and to use standard combinational functions/building blocks to build larger more complex circuits.

CO4: Analyze small sequential circuits and devices and to use standard sequential functions/building blocks to build larger more complex circuits.

CO5: Solve various problems using Algorithmic state machines.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes (POs)/Program Specific Outcomes(PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PS O1**	**PS O2**
CO1	3	1	2	1	-	-	-	-	-	-	-	1		2
CO2	3	2	1	-	1	-	-	-	-	-	-	3		2
CO3	3	2	3	2	-	-	-	-	-	-	-	2	2	1
CO4	3	2	3	2	-	-	-	-	-	-	-	2	2	1
CO5	3	1	2	1	1	-	-	-	-	-	-			2
Average	3	1.6	2.2	1.5	1	-	-	-	-	-	-	2		1.6

Correlation: 3–Strong; 2–Medium; 1-Weak

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM II Year-I Sem			
Course Code: **M217B**	**ANALOG ELECTRONICS**	L	T	P	C
		3	**0**	**0**	**3**

Pre-Requisites: Basic of Electronics and circuits

Module 1: Analysis of Small Signal BJT Amplifiers

Unit-I:

Analysis of CE, CC, and CB Amplifiers and CE Amplifier with emitter resistance, low frequency response of BJT Amplifiers, effect of coupling and bypass capacitors.

Unit-II:

Analysis of Cascaded RC Coupled amplifiers, Cascode amplifier, Darlington pair, Frequency response of BJT amplifier. The Hybrid- pi Common Emitter transistor model, CE short circuit current gain with resistive load, single stage CE transistor amplifier response, Gain-bandwidth product. Simple Problems.

Module 2: FET Amplifiers

Unit-I:

Comparison of performance of FET with BJT Amplifiers, Basic Concepts of MOSFET, Characteristics of MOSFET in Enhancement and Depletion mode.

Unit-II:

JFET & MOSFET Small signal model, Analysis of Common source amplifier & Source follower with resistive load using JFET, frequency response.

Module 3: Negative Feedback In Amplifiers

Unit-I:

Classification of amplifiers, Concepts of feedback – Classification of feedback amplifiers – General characteristics of negative feedback amplifiers – Effect of Feedback on Amplifier characteristics

Unit-II:

Voltage series, Voltage shunt, Current series and Current shunt Feedback configurations – Simple problems

Module 4: Positive Feedback In Amplifiers

Unit-I:

Condition for oscillations, RC and LC type Oscillators – Frequency and amplitude stability of oscillators. RC-phase shift and Wien-bridge oscillators

Unit-II:

Generalized analysis of LC oscillators Hartley, Colpitts and Quartz oscillators

Module 5: Large Signal Amplifiers

Unit-I:

Class A Power Amplifier, Maximum Value of Efficiency of Class – A Amplifier, Transformer Coupled Amplifier, Push Pull and Complimentary Symmetry Class B Amplifier.

Unit-II:

Principle of operation of class –C Amplifier, Transistor Power Dissipation, Introduction to Tuned Amplifiers, Q-Factor, Single Tuned Amplifiers.

Text Books

1. Electronic Devices and Circuits, Jacob Millman, Christos C Halkias, TMH
2. Integrated Electronics, Jacob Millman, Christos C Halkias, TMH
3. Electronic Devices and Circuits - S. Salivahanan, N.Suresh Kumar, A Vallavaraj, 2 ed., 2009, TMH.

Reference Books

1. Electronic Devices and Circuit Theory - Robert L.Boylestad, Louis Nashelsky,9 ed.,
2. Electronic Circuit Analysis – K. Lal Kishore, 2004, BSP.
3. Electronic Devices and Circuits, David A. Bell – 5 ed., Oxford University Press..

E-Resources

1. https://nptel.ac.in/courses/108/102/108102095/
2. https://nptel.ac.in/courses/108/102/108102097/
3. https://nptel.ac.in/courses/108/105/108105158/
4. https://nptel.ac.in/courses/122/104/122104013/

Course Outcomes:

After completion of the course, the student should be able to

CO1: Construct the single stage and multistage amplifiers.

CO2: . Design the JFET & MOSFET amplifiers using small signal model.

CO3: Demonstrate the concept of feedback amplifiers.

CO4: Illustrate various types of oscillators.

CO5: Interpret large signal amplifiers and tuned amplifiers.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes (POs)/Program Specific Outcomes(PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO2**
CO1	3	3	1	1	1	-	-	-	-	-	-	1	2	2
CO2	3	3	1	1	1	-	-	-	-	-	-	1	2	2
CO3	3	2	2	2	2	-	-	-	-	-	-	1	2	1
CO4	2	2	2	2	2	-	-	-	-	-	-		1	2
CO5	2	2	2	2	2	-	-	-	-	-	-	1	2	2
Average	2.6	2.4	1.6	1.6	1.6	-	-	-	-	-	-	-	-	-

Correlation: 3–Strong; 2–Medium; 1-Weak

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM II Year-I Sem			
Course Code: **M215A**	**DATA STRUCTURES**	L	T	P	C
		3	**0**	**0**	**3**

Pre-Requisites: C programming language.

Module 1

Basic concepts

Algorithm Specification, Performance analysis - time complexity and space complexity, Asymptotic Notation - Big O, Omega and Theta notations, Introduction to Linear and Non Linear data structures.

Linear list

Singly linked list implementation, insertion, deletion and searching operations on linear list, circular linked list implementation, doubly linked list implementation, insertion, deletion and searching operations. Applications of linked lists.

Module 2

Stacks:

Operations, array and linked representations of stacks, stack applications-infix to postfix conversion, postfix expression evaluation, recursion implementation.

Queues

Operations, array and linked representations. Circular Queue operations, Dequeue, applications of queue.

Module 3

Trees

Terminology, Representation of Trees, Binary tree ADT, Properties of Binary Trees, Binary Tree Representations-array and linked representations, Binary Tree traversals, Threaded binary trees, Binary Heap-Properties, Max and Min Heap, Operations-Insertion and Deletion, Heap sort.

Search Trees

Binary Search tree, Tree traversals, AVL tree – operations, B-tree – operations, B+ trees, Red Black tree.

Module 4

Graphs

Terminology, sequential and linked representation, graph traversals: Depth First Search & Breadth First Search implementation. Minimum spanning trees, Prims and Kruskals method.

Searching and Sorting

Linear Search and Binary Search, Bubble sort, Insertion sort, Quick and Merge sort.

Module 5

Hashing

Hash table, Hash table representations, hash functions, collision resolution techniques- separate chaining, open addressing-linear probing, quadratic probing, double hashing, Re hashing, Extendible hashing,

Pattern matching

Introduction, Brute force, the Boyer –Moore algorithm, Knuth-Morris-Pratt algorithm.

Text Books

1. Data Structures Using C, ReemaThareja, Oxford University Press, 2011 Learning.
2. Introduction to Algorithms, TH Cormen, PHI

Reference Books

1. Data Structures & Algorithm Analysis in C++, Mark Allen Weiss, Pearson Education.
2. Design methods and analysis of Algorithms, SK Basu, PHI.
3. Fundamentals of Computer Algorithms, 2nd Edition, Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, Universities Press.

E-Resources

1. http://masterraghu.com/subjects/Datastructures/ebooks/rema%20thareja.pdf.
2. https://www.slideshare.net/adisesha12/data-structure-ppt-138483078
3. https://lecturenotes.in/subject/81/data-structure-using-c-ds
4. http://www.tutorialspoint.com/data_structures_algorithms
5. http://www.geeksforgeeks.org/data-structures/
6. http://www.coursera.org/specializations/data-structures-algorithms

Course Outcomes:

After completion of the course, the student should be able to

CO1: Demonstrate operations like searching, insertion, deletion, traversing mechanism using linked list.

CO2: Use linear and non-linear data structures like stacks, queues etc.

CO3: Implement different types of tree data structures.

CO4: Implement the concepts of graph data structures.

CO5: Apply the basic searching, sorting and pattern matching Techniques.

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM II Year-I Sem			
Course Code: **M217C**	**COMPUTER ORGANIZATION**	L	T	P	C
		3	**0**	**0**	**3**

Pre-Requisites: Basic Knowledge of Computers

Module 1

Unit-I: Basic Computer Organization

Functions of CPU, I/O units, Memory, Instructions: instruction formats- One Address, Two Addresses, Zero Addresses & Three Addresses & comparison.

Unit-II: Addressing Modes and Interrupts

Addressing modes with numeric examples: program control-status bit conditions, conditional branch instructions, Program interrupts: Types of interrupts.

Module 2

Unit-I: Computer Arithmetic

Introduction, Addition and Subtraction, Multiplication Algorithms, Division Algorithms, Floating - point Arithmetic operations.

Unit-II: Input-Output Organization

Peripheral Devices, Input-Output Interface, Input –Output Processor (IOP), Intel 8089 IOP.

Module 3

Unit-I: Input-Output Interface

Input-Output Interface, I/O bus & modules, I/O Vs memory bus, Isolated Vs memory mapped I/O, Asynchronous data transfer Modes of Transfer-Strobe control.

Unit-II: Input-Output Communications

Handshaking, Asynchronous serial transfer- Asynchronous communication interface, Modes of transfer- Programmed I/O, Interrupt driven I/O, DMA, DMA controller, DMA transfer.

Module 4

Unit-I: Memory Organizations

Memory hierarchy, memories, RAM, ROM chips, Memory Address map, Memory connection to CPU, Associate memory, Cache memory.

Unit-II: Cache and Mapping Techniques

Data cache, instruction cache, miss & hit ratio, Access time, associative, set associative mapping, waiting into cache, introduction to virtual memory

Module 5

Unit-I: Pipeline and Vector Processing

Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline, Vector Processing, Array Processors.

Unit-II: Multi Processors

Characteristics of Multiprocessors, Interconnection Structures, Inter processor arbitration, Inter processor communication, and synchronization.

Text Books

1. Computer Organization–Carl Hamacher, Zvonks Vranesic, Safea Zaky, Edition, McGraw Hill.
2. Computer Systems Architecture–M.Moris Mano, IIIrd Edition, Pearson/PH.

Reference Books

1. ComputerOrganizationandArchitecture–WilliamStallingsSixthEdition, Pearson/PHI
2. Structured Computer Organization–AndrewS.Tanenbaum,4thEdition PHI/Pearson
3. Fundamentals or Computer Organization and Design, Sivaraama Dandamudi Springer Int. Edition.

E-Resources

1. https://nptel.ac.in/courses/106/105/106105163/
2. https://www.coursera.org/learn/comparch.
3. file:///C:/Users/Roshan/Desktop/co/co%201.html#bci
4. file:///C:/Users/Roshan/Desktop/co/co%201.html#idf
5. file:///C:/Users/Roshan/Desktop/co/co%201.html#ca
6. file:///C:/Users/Roshan/Desktop/co/co%201.html#micro
7. file:///C:/Users/Roshan/Desktop/co/co%201.html#mo
8. https://www.geeksforgeeks.org/quiz- cornergq / # Computer % 20 Organization % 20 and %20 Architecture
9. https://practice.geeksforgeeks.org/topics/Computer%20Organization%20and%20Architecture/

Course Outcomes:

After completion of the course, the student should be able to

CO1: Understand the basic components and the design of CPU, ALU and Control Unit.

CO2: Analyse various arithmetic operations and Input –Output devices interfacing processor.

CO3: Knowing the functionality of different I/O devices and how they operate using synchronous and Asynchronous mode.

CO4: Understand how memory is organized to make computer operation fast and in effective way.

CO5: Understanding the concepts of Pipelining and advantages of Multi-processing system.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes (POs)/Program Specific Outcomes(PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO2**
CO1	3	-	3	-	-	-	-	-	-	-	-	-	2	2
CO2	2	-	2	-	-	-	-	-	-	-	-	-	2	2
CO3	2	-	2	-	-	-	-	-	-	-	-	-	2	1
CO4	3	-	3	-	-	-	-	-	-	-	-	-	3	3
CO5	2	-	1	-	-	-	-	-	-	-	-	-	2	1
Average	2.4	-	2.2	-	-	-	-	-	-	-	-	-	2.2	1.8

Correlation: 3–Strong; 2–Medium; 1-Weak

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM II Year-I Sem			
Course Code: **M2171**	**ANALOG ELECTRONICS LAB**	L	T	P	C
		0	**0**	**2**	**1**

Pre-Requisites: Basic Knowledge of Computers

Experiment List

1. Common Emitter Amplifier
2. Common Collector Amplifier
3. Two Stage RC Coupled Amplifier
4. Common Source amplifier
5. Current Shunt and Voltage Series Feedback Amplifier
6. RC Phase Shift Oscillator using Transistors
7. Wien Bridge Oscillator using Transistors
8. Hartley Oscillator
9. Colpitt's Oscillator
10. Class A Power Amplifier
11. Class B Complementary Symmetry Amplifier
12. Single Tuned Voltage Amplifier

Equipment required for Laboratories

1. RPS
2. CRO
3. Function Generators
4. Multimeters
5. Components

Course Outcomes:

After completion of the course, the student should be able to

CO1: Analyse different meters and instruments for measurement of electronic quantities.

CO2: Compute the characteristics of different semiconductor devices like diode, BJT, FET.

CO3: Conduct experiment with various application circuits using diodes.

CO4: Design and experiment with various signals and power amplifier circuits using BJT'S.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes (POs)/Program Specific Outcomes(PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PS O1**	**PS O2**
CO1	3	2	2	1	1	-	-	-	2	2	-	1	3	-
CO2	3	2	2	2	1	-	-	-	2	2	-	1	3	2
CO3	2	2	1	3	3	-	-	-	2	2	-	1	-	3
CO4	2	2	2	3	3	-	-	-	2	2	-	1	-	3
Average	2.5	2	1.7	2.25	2	-	-	-	2	2	-	1	-	2.67

Correlation: 3–Strong; 2–Medium; 1-Weak

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM II Year-I Sem			
Course Code: **M2152**	**DATA STRUCTURES LAB**	L	T	P	C
		0	**0**	**2**	**1**

Pre-Requisites: C programming language

Experiment List

Experiment 1:

Write a C program that uses functions to perform the following operations on singly linked list:
I) Creation II) Insertion III) Deletion IV) Traversal V) merge two single linked lists

Experiment 2:

Write a C program that uses functions to perform the following operations on doubly linked list.
I) Creation II) Insertion III) Deletion IV) Traversal

Experiment 3:

Write a C program that implement stack operations using
I) Arrays II) Linked Lists

Experiment 4:

I) Write a C program to convert infix expression to postfix expression using stack
II) Write a C program to evaluate postfix expression

Experiment 5:

Write a C program to convert infix expression to prefix expression using stack

Experiment 6:

Write a C program to implement linear queue using
I) Arrays II) Linked Lists

Experiment 7:

Write a C program to perform following operations on a circular Queue
I) Insertion II) deletion III) search and count

Experiment 8:

Write a C Program to implement binary tree traversals

Experiment 9:

Write a C Program to implement AVL tree operations

Experiment 10:

Implementation of a Graph representation using Adjacency Matrix

Experiment 11:

I) Write a program to implement Linear Search technique.
II) Write a program to implement Binary Search technique.

Experiment 12:

I) Write a program to implement Bubble sort technique.
II) Write a program to implement Insertion sort technique.

Experiment 13:

I) Write a program to implement Quick sort technique.
II) Write a program to implement Merge sort technique.

Textbooks:

1. Data Structures Using C, ReemaThareja, Oxford University Press, 2011 Learning.
2. Introduction to Algorithms, TH Cormen, PHI

E - Resources:

1. http://masterraghu.com/subjects/Datastructures/ebooks/rema%20thareja.pdf.
2. https://www.slideshare.net/adisesha12/data-structure-ppt-138483078
3. https://lecturenotes.in/subject/81/data-structure-using-c-ds
4. http://www.tutorialspoint.com/data_structures_algorithms
5. http://www.geeksforgeeks.org/data-structures/
6. http://www.coursera.org/specializations/data-structures-algorithms

Course Outcomes:

After completion of the course, the student should be able to

CO1: Demonstrate operations like searching, insertion, deletion, traversing mechanism using linked list.

CO2: Use linear and non-linear data structures like stacks, queues etc.

CO3: Implement different types of tree data structures.

CO4: Implement the concepts of graph data structures.

CO5: Apply the basic searching, sorting and pattern matching Techniques.

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM II Year-I Sem			
Course Code: M22MC1	ENVIRONMENTAL SCIENCE	L	T	P	C
		2	0	0	0

Pre-Requisites: NIL

Module 1

Unit-I: Ecosystem and Natural Resources

Concept, Classification of Resources: Water resources, Land resources, land degradation, Forest resources, Mineral resources, Energy resources. Concept of ecosystem, Classification of ecosystem, Functions of ecosystem. Biodiversity, Level, values, hotspots of biodiversity, Threats to Biodiversity, Conservation of Biodiversity.

Module 2

Unit-I: Global Environmental Problems and Global Efforts

Deforestation, Greenhouse effect, Global Warming, Sea level rise, Ozone depletion. International conventions/protocols: green-belt-development, Concept of Green Building, Clean Development Mechanism (CDM).

Unit-II: Environmental Impact Assessment (EIA) And Environmental Management Plan

Definition of Impact, classification of impacts, methods of baseline data acquisition. Impacts on different components: such as human health resources, air, water, flora, fauna and society, impact assessment methodologies. Environmental management plan (EMP).

Module 3

Unit-I: Environmental Policy, Legislation, Rules and Regulations

Environmental Protection Act: Air (Prevention and control of pollution) Act-1981, Water (Prevention and control of pollution) Act-1974, Forest Conservation Act

Unit-II: Towards Sustainable Future

Concept of Sustainable Development, Threats to Sustainability, Strategies for achieving Sustainable development, Environmental Ethics, Environmental Economics, Concept of Green Computing.

Text Books

1. "Textbook of Environmental Science And Technology" by M Anji Reddy, BS Publications, 2007.
2. "Principles of Environmental Science and Engineering" by Rao P. Venugopala, Prentice Hall India Learning Private Limited (1 January 2006)

Reference Books

1. "Environmental Studies" by Benny Joseph, McGraw Hill Education 2008.
2. "Textbook of Environmental Studies for Undergraduate Courses" by Erach Bharucha 2005, University Grants Commission, University Press

E-Resources

1. https://nptel.ac.in/courses/120/108/120108004/#

Course Outcomes:

After completion of the course, the student should be able to

CO1: Compare the different natural resources available and how to use them.

CO2: Describe about biodiversity.

CO3: Analyze the Global Environmental Problems and Global Efforts.

CO4: Categorize the global environmental problems.

CO5: Prioritize the Sustainable development.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes (POs)/Program Specific Outcomes(PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PS O1**	**PS O2**
CO1	3	3	2	2	-	-	1	-	-	-	-	1	2	1
CO2	-	-	-	-	-	3	3	-	-	-	-	2	1	1
CO3	3	3	2	2	-	-	1	-	-	-	-	1	2	1
CO4	3	3	2	2	-	-	1	-	-	-	-	1	2	1
CO5	-	-	-	-	-	3	3	-	-	-	-	2	2	1
Average	1.8	1.8	1.2	1.2	-	1.2	1.8	-	-	-	-	1.4	1.8	1

Correlation: 3–Strong; 2–Medium; 1-Weak

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech II Year-II Sem			
Course Code: M2219A	PULSE AND DIGITAL CIRCUITS	L	T	P	C
		3	1	0	4

Pre-Requisites: Basic of Electronics and Digital circuits

Module 1:

Unit-I: Linear Wave Shaping

High pass and low pass RC circuits and their response for Sinusoidal, Step, Pulse, Square, & Ramp inputs, High pass RC network as Differentiator, Low pass RC circuit as an Integrator, Attenuators and its application as a CRO Probe, RL and RLC Circuits and their response for Step Input, Ringing Circuit

Unit-II: Non-Linear Wave Shaping

Diode clippers, Transistor clippers, clipping at two independent levels, Clamping Operation, Clamping circuit taking Source and Diode resistances into account, Clamping Circuit Theorem, Practical Clamping Circuits, Effect of diode characteristics on clamping voltage

Module 2:

Unit-I: Switching Characteristics of Devices

Diode as a Switch, Piecewise Linear Diode Characteristics, Diode Switching times, Transistor as a Switch, Transistor in Saturation, Transistor-switching times.

Unit-II: Multivibrators

Analysis and Design of Bistable, Monostable, Astable Multivibrators and Schmitt trigger using Transistors.

Module 3:

Unit-I: Time Base Generators

General features of a Time base Signal, Methods of Generating Time Base Waveform, Miller and Bootstrap Time base Generators-Basic Principles, Transistor Miller Time Base generator, UJT as relaxation oscillator, Transistor Bootstrap Time Base Generator, Transistor Current Time Base Generators, Methods of Linearity improvement.

Module 4:

Unit-I: Synchronization and Frequency Division

Pulse Synchronization of Relaxation Devices, Frequency division in Sweep Circuit, Stability of Relaxation Devices, Astable Relaxation Circuits, Monostable Relaxation Circuits, Synchronization of a Sweep Circuit with Symmetrical Signals, Sine wave frequency division with a Sweep Circuit, A Sinusoidal Divider using Regeneration and Modulation.

Module 5:

Unit-I: Sampling Gates

Basic operating principles of Sampling Gates, Unidirectional and Bi-directional Sampling Gates, Four Diode Sampling Gate, Reduction of pedestal in Gate Circuits, Six Diode Gate, Application of Sampling Gates).

Unit-II: Realization of Logic Gates Using Diodes & Transistors

AND, OR and NOT Gates using Diodes and Transistors, DCTL, RTL, DTL, TTL and CML Logic Families and its Comparison.

Text Books

1. Millman's Pulse, Digital and Switching Waveforms –J. Millman, H. Taub., 2 ed., 2008, TMH.
2. A. Anand Kumar Pulse and Digital Circuits - 2 ed., 2008, PHI.

Reference Books

1. Mothiki S. Prakash Rao, Pulse Digital & Switching Waveforms, 2nd Edition, TMH.
2. Taub and Schilling, Digital Integrated Electronics, Mc-Graw Hill, 1977

E-Resources

1. https://www.youtube.com/watch?v=8VYUgEcmrYQ&list=PL9zyqBvEBmDZauzGV3seHo1xqCAlti9fI
2. https://www.youtube.com/watch?v=6VKTC8A5HdU
3. https://www.youtube.com/watch?v=rCmvrsAgG6Q&list=PLDZhQoU91wvSryndQqT9fbUMJ19RxEoZy

Course Outcomes:

After completion of the course, the student should be able to

CO1: Analyze the characteristics of Linear and Non-Linear wave shaping circuits.

CO2: Design the switching Diode and Transistor devices.

CO3: Differentiate various Multivibrators.

CO4: Construct various Sweeping circuits.

CO5: Evaluate different Logic Gates with various logic families.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes (POs)/Program Specific Outcomes(PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PS O1**	**PS O2**
CO1	3	2	2	1	-	-	-	-	-	-	-	-	-	2
CO2	3	2	-	3	-	-	-	-	-	-	-	-	2	2
CO3	3	2	2	3	-	-	-	-	-	-	-	-	1	2
CO4	3	2	1	2	-	-	-	-	-	-	-	-	-	3
CO5	3	2	2	2	-	-	-	-	-	-	-	-	-	3
Average	3.0	2.0	1.8	2.2	-	-	-	-	-	-	-	-	1.5	2.4

Correlation: 3–Strong; 2–Medium; 1-Weak

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech II Year-II Sem			
Course Code: M226A	OBJECT ORIENTED PROGRAMMING THROUGH JAVA	L	T	P	C
		3	0	0	3

Pre-Requisites: C Programming Knowledge.

Module 1:

Introduction: OOP concepts, history of Java, Java buzzwords, data types, variables, scope and life time of variables, arrays, operators, expressions, control statements, type conversion and casting, simple java program.

Classes and Objects: concepts of classes, objects, constructors, methods, this keyword, garbage collection, overloading methods and constructors, parameter passing, recursion.

String handling: String, String Buffer, String Tokenize.

Module 2:

Inheritance: base class object, subclass, member access rules, super uses, using final with inheritance, method overriding, abstract classes

Interfaces: defining an interface, implementing interface, differences between classes and interfaces and extending interfaces.

Module 3:

Packages: Defining, creating and accessing a package, importing packages, access control, exploring package - java.io

Exception handling: concepts of exception handling, benefits of exception handling, exception hierarchy, checked and unchecked exceptions, usage of-try, catch, throw, throws and finally, built in exceptions, creating own exception sub classes.

Module 4:

Multithreading: differences between multi-threading and multitasking, thread life cycle, creating threads, synchronizing threads, daemon threads, thread groups.

Event Handling: events, event sources, event classes, event listeners, delegation event model, handling mouse and key board events, adapter classes. The AWT class hierarchy, user interface components-labels, buttons, canvas, scrollbars, text components, checkbox, checkbox groups, choices, lists.

Module 5:

Layout manager: layout manager types-border, grid, flow, card and grid bag. Swing: Introduction, limitations of AWT, components, containers.

Exploring swing- JFrame and JComponent, Icons and Labels, Text fields, buttons – The JButton class, Checkboxes, Radio buttons, Combo boxes, Tabbed Panes, Scroll Panes, Trees and Tables.

Text Books

1. Java The complete reference, 8th edition, Herbert Schildt, TMH.
2. Understanding OOP with Java, up dated edition, T.Budd, Pears on education.

Reference Books

1. An Introduction to programming and OO design using Java, J. Nino and F.A. Hosch, John Wiley & sons.
2. An Introduction to OOP, second edition, T. Budd, pearson education.
3. Introduction to Java programming 6th edition, Y. Daniel Liang, pearson education

E-Resources

1. www.javasoft.com
2. www.w3schools.com
3. www.tutorialpoint.com
4. www.oracle.com

Course Outcomes:

After completion of the course, the student should be able to

CO1: Use OOP concepts in problem solving.

CO2: Demonstrate Inheritance and Polymorphism.

CO3: Create user defined Packages and Interfaces.

CO4: Illustrate the concept of Exception handling and Multithreading.

CO5: Design GUI based applications using Applet Programming and Event Handling.

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech II Year-II Sem			
Course Code: M225A	OPERATING SYSTEMS	L	T	P	C
		3	0	0	3

Pre-Requisites:

1. **Programming for Problem solving, Data structures and Algorithms (not mandatory)**
2. **Computer Organization**

Module 1:

Basic Concepts

Overview: OS Introduction, Computer Systems Organization, Computer System Architecture, Operating System Architecture, Resource Management, Virtualization, Distributed Systems, Open-source operating system.

Operating System Structures: Systems Calls, System services, Linkers and Loaders, Operating System Design and Implementation, Operating System structure, Building and Booting an Operating System.

Module 2:

Process Management

Process Concepts: Introduction, Process Scheduling, Interprocess Communication, Communication in Client- Server systems, Thread concepts, Multithreading Model, Scheduling Criteria, Scheduling Algorithms, Algorithm Evaluation.

Process Synchronization: Critical-Section Problem, Peterson's Solution, Synchronization Hardware, Semaphores, Mutex Locks, Semaphores, Monitors, Classic Problems of Synchronization, System Model, Deadlock Characterization, Deadlock Prevention, Detection and Avoidance, Recovery from Deadlock.

Module 3:

Memory Management

Main Memory: Background, Contiguous Memory Allocation, Paging, Page-Table Structure, Swapping, Segmentation.

Virtual Memory: Background, Demand Paging, Page Replacement Algorithms, Frames Allocation, Thrashing.

Module 4:

Storage Management

File system Management: File Concepts, Access Methods and Directory Structure, File Protection, File System Structure, File System Operations, Directory Implementation, Allocation Methods, Free-Space Management, Efficiency and Performance, Recovery

Mass-Storage Structure: Overview, Disk Scheduling, Storage Device Management, Swap-Space Management, Storage Attachment, RAID Structure.

Module 5:

Security and Protection

Security: Security Problem, Program Threats, System and Network Threats, Cryptography as a Security Tool, User Authentication, Implementing Security Defenses, Case Studies: Windows 10.

Protection: Goals of Protection, Principles of Protection, Protection Rings, Domain of Protection, Access Matrix, Implementation of Access Matrix, Revocation of Access Rights, Role-based Access Control, Capability-Based Systems, Language Based Protection.

Text Books

1. Operating System Concepts-Abraham Silberchatz, Peter B. Galvin, Greg Gagne, 7th Edition, John Wiley.
2. Operating Systems a Concept based Approach-D. M. Dhamdhere, 2nd Edition, TMH.

Reference Books

1. Principles of Operating Systems-NareshChauhan, Oxford Higher Education.
2. Operating System A Design Approach-Crowley, TMH.

E-Resources

1. https: // www.tutorialspoint .com/operating_system/
2. https: // www.studytonight.com/operating-system/
3. https: // learn.saylor.com/course/view.php?id=948&sectioned=967
4. https: //nptel.ac.in/courses/106/105/106105214/
5. https://www.edx.org/course/computer-hardware-and-operating-systems

Course Outcomes:

After completion of the course, the student should be able to

CO1: Compare differing structures of operating systems including process management.

CO2: Apply different CPU scheduling algorithms and various Memory management techniques.

CO3: Illustrate the use of Bankers algorithm for deadlock avoidance and File system organization.

CO4: Demonstrate various mass storage management techniques.

CO5: Analyze different aspects of protection and security concepts.

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech II Year-II Sem			
Course Code: **M225B**	**DESIGN AND ANALYSIS OF ALGORITHMS**	L	T	P	C
		3	**0**	**0**	**3**

Pre-Requisites: Knowledge on data structures.

Module 1:

Introduction to algorithms

Algorithm, Pseudo Code for expressing Algorithms, Performance Analysis: Space Complexity, Time Complexity, asymptotic Notations: Big-oh Notation, Omega Notation, Theta Notation, Little- oh Notation.

Disjoint Sets: Disjoint Set Operations, Union and Find Algorithms, Spanning Trees, Connected Components and Biconnected Components

Module 2:

Divide and Conquer

General Method, Applications: Binary Search, Quick Sort, Merge Sort, Stassen's Matrix Multiplication.

Greedy Method

General Method Applications: Job Sequencing with Deadlines, 0/1 Knapsack Problem, Minimum Cost Spanning Trees: Prim's and Kruskal's Algorithms, Single Source Shortest Path Problem, Huffman Codes.

Module 3:

Dynamic Programming

General Method, Principle of Optimality, Applications: Multistage Graphs, Matrix Chain Multiplication, Optimal Binary Search Trees, 0/1 Knapsack Problem, All Pairs Shortest Path Problem, Travelling Sales Person Problem, Reliability Design.

Module 4:

Backtracking

General Method, Applications: Nqueen Problem, Recursive Permutation Generator, Sum of Subsets Problem, Graph Coloring, Hamiltonian Cycles.

Module 5:

Branch and Bound

General Method, Applications: Travelling Sales Person Problem, 0/1 Knapsack Problem, LC Branch and Bound Solution, FIFO Branch and Bound Solution.

NP-Hard and NP-Complete Problems: Basic Concepts, Non-Deterministic Algorithms, NP-Hard and NP-Complete Classes, Cook's Theorem.

Text Books

1. Fundamentals of Computer Algorithms-Ellis Horowitz, Satraj Sahni and Rajasekharam, Galgotia Publications Pvt. Ltd.
2. Introduction to Algorithms-T.H. Cormen, C.E. Leiserso, R. L. Rivest and C. Stein, 2nd Edition, Pearson Education, PHI Pvt. Ltd.

Reference Books

1. Algorithm Design: Foundations, Analysis and Internet Examples-M.T. Goodrich and R. Tomassia, John Wiley and Sons.
2. Introduction to Design and Analysis of Algorithms A strategic Approach-R.C.T. Lee, S.S. Tseng, R.C. Chang and T.Tsai, Mc-Graw Hill.
3. Design and analysis of Algorithms-S. Sridhar, Oxford Higher Education

E-Resources

1. https://nptel.ac.in/courses/106/106/106106131/
2. https://onlinecourses.nptel.ac.in/noc19_cs47/preview
3. http://www.cse.iitd.ernet.in/~ssen/csl356/notes/root.pdf
4. https://www.tutorialspoint.com/design_and_analysis_of_algorithms/design_and_analysis_of_algorithms_tutorial.pdf

Course Outcomes:

After completion of the course, the student should be able to

CO1: Analyze time complexity and space complexity as well as asymptotic notations for a given algorithm, union and find algorithms, connected components and bi-connected components.

CO2: Apply divide and conquer method for solving sorting and searching problems and greedy method to solve variety of problems.

CO3: Make use of dynamic programming to solve a collection of problems.

CO4: Utilize back tracking to solve different types of problems.

CO5: Choose branch and bound to unravel diverse forms of predicaments

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech II Year-II Sem			
Course Code: **M2219C**	**ANALOG COMMUNICATIONS**	L	T	P	C
		3	**0**	**0**	**3**

Pre-Requisites: Fundamentals of Communications

Module 1:

Introduction to communication system, need for modulation, Amplitude Modulation, Definition, Time domain and frequency domain description, power relations in AM waves, Generation of AM waves, square law Modulator, Switching modulator, Detection of AM Waves: Square law detector, Envelope detector.

DSB MODULATION: Double side band suppressed carrier modulators, time domain and frequency domain description, Generation of DSBSC Waves, Balanced Modulators, Ring Modulator, Coherent detection of DSB-SC Modulated waves, COSTAS Loop.

Module 2:

SSB MODULATION: Frequency domain description, Frequency discrimination method for generation of AM SSB Modulated Wave, Time domain description, Phase discrimination method for generating AM SSB Modulated waves. Demodulation of SSB Waves.

Vestigial side band modulation: Frequency description, Generation of VSB Modulated wave, Time domain description, Envelope detection of a VSB Wave pulse Carrier, Comparison of AM Techniques, Applications of different AM Systems.

Module 3:

ANGLE MODULATION: Basic concepts, Frequency Modulation: Single tone frequency modulation, Spectrum Analysis of Sinusoidal FM Wave, Narrow band FM, Wide band FM, Constant Average Power, Transmission bandwidth of FM Wave - Comparison of FM & AM.

Generation of FM Waves: Direct Method: Parametric Variation Method, Varactor Diode, Reactance Modulator, Indirect Method: Armstrong Method, Detection of FM Waves: Balanced Frequency discriminator, zero crossing detector, Phase locked loop, Foster Seeley Discriminator, Ratio detector.

Module 4:

TRANSMITTERS AND RECEIVERS: Radio Transmitters-Classification of Transmitters, AM transmitter block diagram and explanation of each block. FM transmitter block diagram and explanation of each block.

Radio Receiver - Receiver Types - Tuned radio frequency receiver, Superhetrodyne receiver, RF section and Characteristics - Frequency changing and tracking, Intermediate frequency, AGC, FM Receiver, Comparison with AM Receiver, Amplitude limiting,

Module 5:

NOISE: Noise in Analog communication System, Noise in DSB& SSB System, Noise in AM System, Noise in Angle Modulation System, Threshold effect in Angle Modulation System, Pre-emphasis & de-emphasis.
PULSE MODULATION: Types of Pulse modulation, PAM (Single polarity, double polarity) PWM: Generation & demodulation of PWM, PPM, Generation and demodulation of PPM.

Text Books

1. Communication Systems - Simon Haykin, 2 Ed, Wiley Publications.
2. Communication Systems – B.P. Lathi, BS Publication, 2004.

Reference Books

1. Electronic Communication Systems - Modulation and Transmission - Robert J. Schoenbeck, 2nd Edition, PHI.
2. Electronics & Communication System – George Kennedy and Bernard Davis, TMH 2004.
3. Principles of Communication Systems - H Taub & D. Schilling, Gautam Sahe, TMH, 2007, 3rd Edition

Course Outcomes:

After completion of the course, the student should be able to

CO1: Analyze and design various modulation and demodulation of analog systems.

CO2: Analyze the characteristics of noise present in analog systems.

CO3: Determine Signal to Noise Ratio (SNR) performance of various Analog Communication Systems.

CO4: Analyze and design the various Pulse Modulation Systems.

CO5: Design low power AM and FM transmitters.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes (POs)/Program Specific Outcomes(PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PS O1**	**PS O2**
CO1	3	2	2	3	1	-	-	-	-	-	-	2	3	2
CO2	3	2	3	3	1	-	-	-	-	-	-	2	3	2
CO3	3	2	3	2	2	-	-	-	-	-	-	2	3	1
CO4	3	2	2	2	2	-	-	-	-	-	-	2	3	2
CO5	2	2	2	2	2	-	-	-	-	-	-	1	2	2
Average	2.8	2	2.4	2.4	1.6	-	-	-	-	-	-	-	-	-

Correlation: 3–Strong; 2–Medium; 1-Weak

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM II Year-II Sem			
Course Code: M2272	PULSE AND DIGITAL CIRCUITS LAB	L	T	P	C
		0	0	2	1

Pre-Requisites: Basic of Electronics and Digital circuits

Experiment List

1. Linear wave shaping-High Pass circuit.
2. Linear Wave Shaping-Low Pass circuit.
3. Non-Linear wave shaping – Clippers.
4. Non-Linear wave shaping – Clampers.
5. Transistor as a switch.
6. Bistable Multivibrator.
7. Monostable Multivibrator.
8. Astable Multivibrator.
9. Schmitt Trigger.
10. UJT Relaxation Oscillator.
11. Bootstrap Sweep Circuit.
12. Study of Logic Gates & some applications.
13. Sampling Gates.
14. Study of Flip-Flops & some applications.

Equipment required for Laboratories

1. Regulated Power Supply –0-30V
2. CRO 0-20MHz
3. Function Generator, 0-1MHz
4. Components
5. Multimeter

Course Outcomes:

After completion of the course, the student should be able to

CO1: Analyse different meters and instruments for measurement of electronic quantities.

CO2: Compute the characteristics of different semiconductor devices like diode, BJT, FET.

CO3: Conduct experiment with various application circuits using diodes.

CO4: Design and experiment with various signals and power amplifier circuits using BJT'S.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes (POs)/Program Specific Outcomes(PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PS O1**	**PS O2**
CO1	3	2	2	1	1	-	-	-	2	2	-	1	3	-
CO2	3	2	2	2	1	-	-	-	2	2	-	1	3	2
CO3	2	2	1	3	3	-	-	-	2	2	-	1	-	3
CO4	2	2	2	3	3	-	-	-	2	2	-	1	-	3
Average	2.5	2	1.7	2.25	2	-	-	-	2	2	-	1	-	2.67

Correlation: 3–Strong; 2–Medium; 1-Weak

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM II Year-II Sem			
Course Code: M2261	OBJECT ORIENTED PROGRAMMING THROUGH JAVA LAB	L	T	P	C
		0	0	3	1.5

Pre-Requisites: Basic of Electronics and Digital circuits

Experiment List

Experiment 1:

Write java programs that implement the following
a) Constructor b) Parameterized constructor
c) Method overloading d) Constructor overloading.

Experiment 2:

a) Write a Java program that checks whether a given string is a palindrome or not. Ex: MADAM is a palindrome.
b) Write a Java program for sorting a given list of names in ascending order.
c) Write a Java Program that reads a line of integers, and then displays each integer and the sum of all the integers (Use String Tokenizer class of java. Util

Experiment 3:

Write java programs that uses the following keywords
a) this b) super c) static d) final

Experiment 4:

a) Write a java program to implement method overriding
b) Write a java program to implement dynamic method dispatch.
c) Write a Java program to implement multiple inheritance.
d) Write a java program that uses access specifiers

Experiment 5:

a) Write a Java program that reads a file name from the user, then displays information about whether the file exists, whether the file is readable, whether the file is writable, the type of file and the length of the file in bytes.
b) Write a Java program that reads a file and displays the file on the screen, with a line number before each line
c) Write a Java program that displays the number of characters, lines and words in a text file

Experiment 6:

a) Write a Java program for handling Checked Exceptions.
b) Write a Java program for handling Unchecked Exceptions

Experiment 7:

a) Write a Java program that creates three threads. First thread displays "Good Morning" every one second, the second thread displays "Hello" every two seconds and the third thread displays "Welcome" every three seconds.

b) Write a Java program that correctly implements producer consumer problem using the concept of inter thread communication

Experiment 8:

Write a Java program that works as a simple calculator. Use a grid layout to arrange button for the digits and for the +, -, *, % operations. Add a text field to display the result

Experiment 9:

a) Write a Java program for handling mouse events.

b) Write a Java program for handling key events.

Experiment 10:

Write a program that creates a user interface to perform integer divisions. The user enters two numbers in the text fields Num1 and Num 2.

The division of Num1 and Num2 is displayed in the Result field when the Divide button is clicked. If Num1or Num2 were not an integer, the program would throw Number Format Exception. If Num2 were Zero, the program would throw an Arithmetic Exception and display the exception in a message dialog box.

Experiment 11:

a) Write a java program that simulates traffic light. The program lets the user select one of three lights: red, yellow or green. When a radio button is selected, the light is turned on, and only one light can be on at a time No l Light is on when the program starts.

b) Write a Java program that allows the user to draw lines, rectangles and ovals

Experiment 12:

Create a table in Table.txt file such that the first line in the file is the header, and the remaining lines correspond to rows in the table. The elements are separated by commas. Write a java program to display the table using JTable component

Text Books:

1. Java; the complete reference,8th editon, Herbert Scheldt, TMH.
2. Java How to Program, Sixth Edition, H.M. Dietel and P.J. Dietel, Pearson Education/PHI.
3. Introduction to Java programming, Sixth edition, Daniel Liang, Pearson Education.
4. Big Java, 2nd edition, Cay Horstmann, Wiley Student Edition, Wiley India Private Limited

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM II Year-II Sem			
Course Code: **M2252**	**OPERATING SYSTEMS LAB**	L	T	P	C
		0	**0**	**3**	**1.5**

Pre-Requisites: Basic of Electronics and Digital circuits

Experiment List

Experiment 1:

Simulate the following CPU scheduling algorithms
FCFS b) SJF

Experiment 2:

Simulate the following CPU scheduling algorithms
a) Priority b) Round Robin

Experiment 3:

Simulate Bankers Algorithm for Dead Lock Avoidance

Experiment 4:

Simulate Bankers Algorithm for Dead Lock Prevention

Experiment 5:

Simulate all file allocation strategies
a) Sequential b) Indexed c) Linked

Experiment 6:

Simulate MVT and MFT

Experiment 7:

Simulate all File Organization Techniques
a) Single level directory b) Two level

Experiment 8:

Simulate all File Organization Techniques
a) Hierarchical b) DAG

Experiment 9:

Simulate all page replacement algorithms
a) FIFO b) LRU c) Optimal

Experiment 10:

Simulate disk scheduling algorithms.
a) FCFS b) SSTF

Experiment 11:

Simulate disk scheduling algorithms.
a) CSCAN b) CLOOK

Experiment 12:

Experiments on fork, shared memory and semaphores.

Text Books:

1. Principles of Operating Systems-Naresh, Chauhan, Oxford Higher Education.
2. Operating Systems A Design Approach-Crowley, TMH.

E - Resources:

1. https://www.tutorialspoint.com/web_developers_guide/web_basic_concepts.htm
2. https://courses.lumenlearning.com/computerapps/chapter/reading-the-internet /
3. https: // www.tutorialspoint .com/operating_system/
4. https: // www.studytonight.com/operating-system/
5. https: // learn.saylor.com/course/view.php?id=948&sectioned=967
6. https://www.edx.org/course/computer-hardware-and-operating-systems

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM II Year-II Sem			
Course Code: M22MC2	GENDER SENSITIZATION	L	T	P	C
		2	0	0	0

Pre-Requisites: NIL

Module 1: UNDERSTANDING GENDER [6L]

Gender: Why Should We Study It? (*Towards a World of Equals*: Unit -1)
Socialization: Making Women, Making Men (*Towards a World of Equals*: Unit -2)
Introduction. Preparing for Womanhood. Growing up Male. First lessons in Caste. Different Masculinities.

Module 2: GENDER AND BIOLOGY [6L]

Missing Women: Sex Selection and Its Consequences (*Towards a World of Equals*: Unit -4)
Declining Sex Ratio. Demographic Consequences.
Gender Spectrum: Beyond the Binary (*Towards a World of Equals*: Unit -10)
Two or Many? Struggles with Discrimination.

Module 3: GENDER AND LABOUR [6L]

Housework: The Invisible Labour (*Towards a World of Equals*: Unit -3)
"My Mother doesn't Work." "Share the Load."
Women's Work: Its Politics and Economics (*Towards a World of Equals*: Unit -7)
Fact and Fiction. Unrecognized and Unaccounted work. Additional Reading: Wages and Conditions of Work.

Module 4: ISSUES OF VIOLENCE-I [6L]

Sexual Harassment: Say No! (*Towards a World of Equals*: Unit -6)
Sexual Harassment, not Eve-teasing- Coping with Everyday Harassment- Further Reading: "*Chupulu".*
Domestic Violence: Speaking Out (*Towards a World of Equals*: Unit -8)
Is Home a Safe Place? -When Women Unite [Film]. Rebuilding Lives. Additional Reading: New Forums for Justice.

Module 5: ISSUES OF VIOLENCE-II [6L]

Thinking about Sexual Violence (*Towards a World of Equals*: Unit -11)
Blaming the Victim- "I Fought for my Life…."
Additional Reading: The Caste Face of Violence.

Text Books

1. **"*Towards a World of Equals: A Bilingual Textbook on Gender*"** written by A.Suneetha, Uma Bhrugubanda, DuggiralaVasanta, Rama Melkote, Vasudha Nagaraj, Asma Rasheed, Gogu Shyamala, Deepa Sreenivas and Susie Tharu.

Reference Books

1. Raj Paul Singh, Anupama Singh. Gender Sensitization: Issues and Challenges: Raj Publications: 2019.

E-Resources

1. https://www.medicalnewstoday.com/articles/232363
2. https://web.stanford.edu/~eckert/PDF/Chap1.pdf
3. https://open.lib.umn.edu/sociology/chapter/11-1-understanding-sex-and-gender/

Course Outcomes

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

CO1. develop a better understanding of important issues related to gender in contemporary India.

CO2. sensitize to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film.

CO3. attain a finer grasp of how gender discrimination works in our society and how to counter it.

CO4. acquire insight into the gendered division of labour and its relation to politics and economics.

CO5. be better equipped to work and live together as equals.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes (POs)/Program Specific Outcomes (PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**
CO1	-	-	-	-	-	-	-	-	**2**	2	-	**3**	-	-
CO2	-	-	-	-	-	-	-	-	**2**	**2**	-	3	-	-
CO3	-	-	-	-	-	-	-	-	**2**	2	-	3	-	-
CO4	-	-	-	-	-	-	-	-	**2**	2	-	3	-	-
CO5	-	-	-	-	-	-	-	-	**2**	2	-	3	-	-
Average	-	-	-	-	-	-	-	-	**2**	**2**	-	**3**	-	-

Correlation: 3–Strong; 2–Medium; 1-Weak

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM III Year-I Sem			
Course Code: **M315E**	**COMPUTER NETWORKS (Professional Elective-I)**	L	T	P	C
		3	**0**	**0**	**3**

Pre-Requisites: Knowledge on Data Structures

Module 1:

Overview of the Internet: Protocol, Layering Scenario, TCP/IP Protocol Suite: The OSI Model, Internet history standards and administration; Comparison of the OSI and TCP/IP reference model.
Physical Layer: Guided transmission media, wireless transmission media.

Module 2:

Data Link Layer: design issues, Framing, Error Detection and Error Correction, Block Coding, Hamming Distance, CRC, Flow control and error Control, Stop and wait , Sliding window Protocols.
Connecting Devices: Repeaters, Hubs, Switches, Gateways and Bridges - Learning and Spanning tree bridges.
Multi Access protocols- Random access - ALOHA, CSMA, CSMA/CD and CSMA/CA, Ethernet IEEE 802.11

Module 3:

Network Layer: Network layer design issues, Store and forward packet switching, connection less and connection-oriented network services.
Internetworking: Protocols-IPV4 and IPV6, Logical Addressing-IPV4, IPV6, Tunneling and Packet Fragmentation.
Address Mapping: Address Resolution Protocol (ARP), Reverse Address Resolution Protocol (RARP), Dynamic Host Configuration Protocol (DHCP), Internet Control Message Protocol (ICMP) and Internet Group Management Protocol (IGMP)
Routing Algorithms: Shortest Path Finding and Distance Vector Routing Algorithms.

Module 4:

Transport Layer: Process to Process Communication, User Datagram Protocol (UDP), Transmission Control Protocol (TCP), The TCP Connection Establishment, The TCP Connection Release.
Crash recovery, The TCP sliding window, The TCP congestion control, Improving Quality of Service Techniques: Leaky Bucket Algorithm.

Module 5:

Application Layer: Introduction, services, Application layer paradigms.
Applications: Domain Name System (DNS), World Wide Web (WWW), Hypertext Transfer Protocol (HTTP), File Transfer Protocol (FTP), Electronic Mail (E-MAIL), TELNET, Simple Network Management Protocol (SNMP), Secure Shell (SSH).

Text Books

1. Data Communications and Networking - Behrouz A. Forouzan, Fifth Edition TMH, 2013.
2. Computer Networks - Andrew S Tanenbaum, 4th Edition, Pearson Education.

Reference Books

1. Computer Networks, 5E, Peterson, Davie, Elsevier
2. Introduction to Computer Networks and Cyber Security, Chawan-Hwa Wu, Irwin, CRC Publications.
3. Computer Networks and Internets with Internet Applications, Comer.

E-Resources

1. https://lecturenotes.in/subject/2234/Computer_Network
2. http://nptel.ac.in/courses/106102234/
3. https://www.iitg.ernet.in/dgoswami/CN-Notes.pdf
4. http://ocw.mit.edu/index.html.

Course Outcomes

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

CO1. Demonstrate the networking concepts, various Layering approaches, functionalities and some protocols of Link layer.

CO2. Operate with Data link Layers.

CO3. Apply fragmentation, assigning of logical address and judge on routing and congestion.

CO4. Apply the working of IP Protocol, other protocols of internet layer and services of transport layer.

CO5. Demonstrate the services of Application Layer while using popular applications.

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM III Year-I Sem			
Course Code: **M415G**	**BLOCK CHAIN TECHNOLOGY (Professional Elective-I)**	L	T	P	C
		3	**0**	**0**	**3**

Pre-Requisites: Data structures and Cyber Security

Module 1:

Introduction: History, what is block chain, the structure of block chains, types of block chain, block chain applications, block chain lifecycle. Limitations and challenges of block chain.

Module 2:

Crypto currencies: Cryptography, the science behind crypto currencies, Symmetric key cryptography, cryptography hash functions, MAC and HMAC, asymmetric key cryptography Diffie-Hellman key exchange, symmetric vs asymmetric key cryptography, game theory Nash equilibrium, prisoner's dilemma, byzantine Generals' problem, zero-sum games.

Module 3:

Bitcoin: History of Money, working with Bitcoins, the Bitcoin Block chain, Bitcoin network, bitcoin scripts, Full nodes vs SPVs, Bitcoin wallets.

Module 4:

Ethereum: Ethereum as Next-Gen Blockchain, Design Philosophy of Ethereum, Ethereum Blockchain, Ethereum Accounts, Trie Usage, RLP Encoding, Ethereum Transaction Message structure, Ethereum smart contracts, Ethereum Virtual Machine, Ethereum Eco System.

Module 5:

Block chain application development, interacting with bitcoin blockchain, interacting programmatically with ethereum for sending transactions, creating smart account, executing smart contract functions, decentralized application structure. Building an ethereum Dapp.

Text Books

1. Beginning Block chain: A Beginner's Guide to Building Block chain Solutions by Bikram Aditya Singhal, Gautam Dhameja , Priyansu Sekhar Panda.
2. Block chain Technology Explained: The Ultimate Beginner's Guide About Blockchain Wallet, Mining, Bitcoin, Ethereum, Litecoin, Zcash, Monero, Ripple, Dash

Reference Books

1. Block chain Technology: Introduction to Blockchain Technology and its impact on Business Ecosystem
2. Block chain: Bitcoin, Ethereum & Block chain: Beginners Guide to Understanding the Technology Behind Bitcoin & Cryptocurrency.

E-Resources

1. https://nptel.ac.in/noc/courses/noc20/SEM1/noc20-cs01/
2. https://nptel.ac.in/courses/106/105/106105184/
3. https://nptel.ac.in/courses/106/104/106104220

Course Outcomes

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

CO1. Describe the block chain Technology and limitations

CO2. Analyze the history of money and working with Bitcoin and Bitcoin wallets.

CO3. Use cryptography in bitcoin transactions.

CO4. Explain the Design philosophy of Block Chain Technology and Virtual Machine.

CO5. Develop Decentralized applications and building ethereum Dapp.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes (POs)/Program Specific Outcomes (PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**
CO1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	1	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	2	-	-	-	-	-	-	-	-	1	-	-	-
CO5	-	-	3	2	2	-	-	-	-	-	-	-	2	2
Average	**1.5**	**2.0**	**3.0**	**2.0**	**2.0**	**-**	**-**	**-**	**-**	**-**	**1.0**	**-**	**2.0**	**2.0**

Correlation: 3–Strong; 2–Medium; 1-Weak

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM III Year-I Sem			
Course Code: **M316A**	**SOFTWARE ENGINEERING (Professional Elective-I)**	L	T	P	C
		3	**0**	**0**	**3**

Pre-Requisites: NIL

UNIT 1:

Introduction to Software Engineering: The evolving role of software, changing nature of software, software myths. A Generic view of process: Software engineering- a layered technology, a process framework, the capability maturity model integration (CMMI). Process models: The waterfall model, Spiral model, Incremental Process Models, Concurrent Models, Component based development and Agile Development**.**

UNIT 2:

Software Requirements: Functional and non-functional requirements, user requirements, system requirements, interface specification, the software requirements document.
Requirements engineering process: Feasibility studies, requirements elicitation and analysis, requirements validation, requirements management.

UNIT 3:

Design Engineering: Design process and design quality, design concepts, the design model. Creating an architectural design: software architecture, data design, architectural styles and patterns, architectural design, conceptual model of UML, basic structural modeling, use case diagrams, class diagrams, sequence diagrams, collaboration diagrams, activity diagrams and component diagrams.

UNIT 4:

Testing Strategies: A strategic approach to software testing, test strategies for conventional software, black-box and white-box testing, validation testing, system testing, the art of debugging. Metrics for Process and Products: Software measurement, metrics for software quality.

UNIT 5:

Risk management: Reactive Vs proactive risk strategies, software risks, risk identification, risk projection, risk refinement, RMMM. Quality Management: Quality concepts, software quality assurance, software reviews, formal technical reviews, statistical software quality assurance, software reliability, the ISO 9000 quality standards.

Text Books

1. Software Engineering, A practitioner's Approach- Roger S. Pressman, 6th edition, McGraw Hill International Edition.
2. Software Engineering- Sommerville, 7th edition, Pearson Education.
3. The unified modelling language user guide, Grady Booch, James Rumbaugh, Ivar Jacobson, Pearson Education.

Reference Books

1. Software Engineering, an Engineering approach- James F. Peters, Witold Pedrycz, John Wiley.
2. Software Engineering principles and practice- Waman S Jawadekar, The McGraw-Hill Companies.
3. Fundamentals of object-oriented design using UML Meiler page-Jones: Pearson Education.
4. Fundamentals of Software Engineering-Rajib Mall, PHI.

Course Outcomes

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

CO1. Explain the fundamentals of software engineering, software processes, and various process models.

CO2. Elicit, analyze, and document functional and non-functional software requirements.

CO3. Design software architectures and develop UML-based models for system representation.

CO4. Apply testing strategies and software metrics to ensure quality and reliability.

CO5. Manage software risks and implement quality assurance practices to achieve high-quality software products.

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM III Year-I Sem			
Course Code: **M316B**	**DATABASE MANAGEMENT SYSTEMS**	L	T	P	C
		3	**0**	**0**	**3**

Pre-Requisites: NIL

Module 1:

Unit 1: Introduction

Purpose of DBMS, Database System Applications, Database Systems Vs File Systems, View of Data- Data Abstraction, Instances and Schemas. Data Models – The ER Model, Relational Model, Other Data Models. Database Languages, Data Base System Architecture, Types of Data Base Users, Storage Manager, The Query Processor.

Unit 2: Introduction To Database Design.

Database Design and ER diagrams, Beyond ER Design, Entities, Attributes and Entity Sets, Relationships and Relationship Sets, Additional Features of ER Model: Key Constraints, Participation Constraints, Weak Entities, Class Hierarchies, Aggregation, Conceptual Design with the ER Model.

Module 2:

Unit 1: The Relational Model

Introduction to the Relational Model, Integrity Constraints Over Relations, Enforcing Integrity Constraints, Querying Relational Data, Logical Database Design, Introduction to Views, Destroying
/ Altering Tables and Views.

Unit 2: Relational Algebra and Calculus

Relational Algebra - Selection and Projection, Set Operations, Renaming, Joins, Division, More Examples of Algebra Queries. Relational Calculus – Tuple Relational Calculus, Domain Relational Calculus, Expressive Power of Algebra and Calculus.

Module 3:

Unit 1: SQL Queries

Form of Basic SQL Query, Examples of Basic SQL Queries, Union, Intersect and Except. Introduction to Nested Queries, Correlated Nested Queries, Set-Comparison Operators. Aggregative Operators, Null Values, Comparison Using Null Values, Logical Connectives AND, OR and NOT, Impact on SQL Constructs, Outer Joins, Disallowing Null Values. Complex Integrity Constraints in SQL, Triggers and Active Databases.

Unit 2: Schema Refinement

Problems Caused by Redundancy, Decompositions, Problem Related to Decomposition, . Lossless Join Decomposition – Dependency Preserving Decomposition, Functional dependencies,

Reasoning about FDs, Normal Forms-First, Second, Third Normal Forms, BCNF, Multi Valued Dependencies, Forth Normal Form.

Module 4:

Unit 1: Transaction Management

Transaction Concept, Acid Properities , Transaction State , Implementation of Atomicity and Durability, Implementation of Isolation, Concurrent Executions, Serializability, testing for Serializability. Lock – Based Protocols, Timestamp – Based Protocols, Validation – Based Protocols, Multiple Granularity.

Unit 2: Recovery System

Failure Classification, Storage Structure, Recovery and Atomicity, Log – Based Recovery, Recovery with Concurrent Transactions, Buffer Management, Failure with Loss of Non-volatile Storage, Advance Recovery Techniques, Remote Backup Systems.

Module 5:

Unit 1: Storage and Indexing

Data On External Storage, File Organization and Indexing, Cluster Indexes, Primary and Secondary Indexes, Index Data Structures, Hash Based Indexing, Tree Base Indexing, Comparison of File Organizations, Indexes and Performance.

Unit 2: Tree -Structured Indexing

Intuitions for Tree Indexes, Indexed Sequential Access Methods (ISAM), B+ Trees: A Dynamic Index Structure.

Text Books

1. Data Base Management Systems, Raghurama Krishnan, Johannes Gehrke, TATA McGraw-Hill 3rd Edition
2. Data base System Concepts, Silberschatz, Korth, McGraw hill, V edition.

Reference Books

1. Data base Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition.
2. Fundamentals of Database Systems, Elmasri Navrate Pearson Education
3. Introduction to Database Systems, C.J.Date Pearson Education.

E-Resources

1. https://nptel.ac.in/noc/courses/noc18/SEM1/noc18-cs15/
2. https://www.alljntuworld.in/download/database-management-system-dbms-materials- notes/

Course Outcomes

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

CO1. Describe basic concepts of database system.

CO2. Design a data model and schemas in RDBMS.

CO3. Use RDBMS for developing industry applications.

CO4. Apply Structured Query Language (SQL) to perform database operations.

CO5. Analyze functional dependencies for designing a robust database.

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM III Year-I Sem			
Course Code: **M315A**	**PYTHON PROGRAMMING**	L	T	P	C
		3	**0**	**0**	**3**

Pre-Requisites:

1. **Need basic knowledge about computer.**
2. **Need Basic understanding of Programming language.**

Module 1:

Programming paradigms; Structured programming vs object oriented programming, OOPs fundamentals- class, object, abstraction, encapsulation, polymorphism, and inheritance;

Introduction to Python: Getting started to Python- an interpreted high level language, interactive mode and script mode. Variables, Expressions and Statements Values and types, Variables and keywords, statements, evaluating expressions, operators and operands, order of operations, composition.

Functions: Function calls, type conversion, type coercion, pre-defined functions, composition, user define functions, flow of execution, passing parameters, function parameters and scope. Conditionals and recursion modulus operator, Boolean expression, logical operators, conditional execution, alternative execution, chained and nested conditionals, return statement; Recursion, infinite recursion.

Module 2:

Python data structures: Strings Creating, initializing and accessing the elements; String operators, comparing strings using relational operators; String functions and methods. Lists: Concept of mutable lists, creating, initializing and accessing the elements, traversing, appending, updating and deleting elements; List operations; List functions and Methods, list parameters, nested lists, Matrices.

Dictionaries

Concept of key-value pair, creating, initializing and accessing the elements in a dictionary, dictionary operations traversing, appending, updating and deleting elements, Dictionary functions and methods.

Tuples

Mutability and tuples, Immutable concept, creating, initializing and accessing the elements in a tuple, Tuple functions.

Set: operations and methods, **Frozenset:** operations and methods

Module 3:

Object oriented programming using Python: Creating python classes, classes and objects: user defined compound types, objects are mutable, copying; Access modifiers, classes and functions: pure function, modifiers, Classes and methods: object oriented features, optional arguments, initialization method, operator overloading and polymorphism.

Inheritance: Basic Inheritance: extending built-ins, overriding and super; Multiple inheritance: the diamond problem.

Module 4:

Exceptions: Raising exceptions, handling exceptions, exception hierarchy.
Regular Expressions, match, search & replace function, Regular Expression modifiers, Special Character Classes, Repetition Cases, Non-greedy repetition grouping with Parentheses Back-references Anchors.

Module 5:

Files handling and Exceptions: Text files, writing variables, Directories, Pickling;
Database Programming in Python: Connection module, connect MySQL Data base, perform DDL, DML and DQL operations.
Introduction to Machine Learning: With Python, Tasks in Machine Learning Using Python, Applications of Python Machine Learning.

Text Books

1. Python 3 Object Oriented Programming, Dusty Phillips, Packet Publishing, 2010.
2. Programming in Python 3 - A complete Introduction to the Python Language- Second Edition, Mark Summerfield, Addison-Wesley 2010.
3. Introduction to Machine Learning with Python: A Guide for Data Scientists Book by Andreas C. Müller and Sarah Guido Publisher(s): O'Reilly Media, Inc.

Reference Books

1. Programming Python- 4th Edition, Mark Lutz, O'Reilly, 2011.
2. Object-Oriented Programming in Python, Michael H, Goldwasser, David Letscher, Pearson Prentice Hall, 2008.

E-Resources

1. https://www.youtube.com/watch?v=MLP1v80yU14
2. https://pythonprogramming.net/functions-python-3-basics-tutorial/
3. https://www.youtube.com/watch?v=QGLNQwfTO2w
4. https://www.youtube.com/watch?v=ZDa-Z5JzLYM
5. https://www.youtube.com/watch?v=M-t4ILRHnxE

Course Outcomes

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

CO1. Identify basic principles of Python programming language.

CO2. Analyze the use of lists, tuples, and dictionaries in Python programs.

CO3. Apply the concepts of object-oriented programming using Python.

CO4. Use exception handling in Python applications for error handling.

CO5. Evaluate different database operations using Python.

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM III Year-I Sem			
Course Code: **M327B**	**LINEAR AND DIGITAL IC APPLICATIONS**	L	T	P	C
		3	**0**	**0**	**3**

Pre-Requisites: Basic of Electronics and Digital circuits

Module 1:

Unit-I:

Operational Amplifier: Ideal and Practical Op-Amp, Op-Amp Characteristics, DC and AC Characteristics, Features of 741 Op-Amp, Modes of Operation - Inverting, Non-Inverting,

Unit-II:

Differential, Instrumentation Amplifier, AC Amplifier, Differentiators and Integrators, Comparators, Schmitt Trigger, Introduction to Voltage Regulators, Features of 723 Regulator, Three Terminal Voltage Regulators.

Module 2:

Unit-I:

Op-Amp, IC-555 & IC 565 Applications: Introduction to Active Filters, Characteristics of Band pass, Band reject and All Pass Filters, Analysis of 1st order LPF & HPF Butterworth Filters, Waveform Generators – Triangular, Saw tooth, Square Wave

Unit-II:

IC555 Timer -Functional Diagram, Monostable, and Astable Operations, Applications, IC565 PLL – Block Schematic, Description of Individual Blocks, Applications

Module 3:

Unit-I:

Data Converters: Introduction, Basic DAC techniques, Different types of DACs-Weighted resistor DAC, R- 2R ladder DAC, Inverted R-2R DAC

Unit-II:

Different Types of ADCs – Parallel Comparator Type ADC, Counter Type ADC, Successive Approximation ADC and Dual Slope ADC, DAC and ADC Specifications.

Module 4:

Unit-I:

Digital Integrated Circuits: Classification of Integrated Circuits, Comparison of Various Logic Families Combinational Logic ICs – Specifications and Applications of TTL-74XX & Code Converters, Decoders

Unit-II:

Demultiplexers, LED & LCD Decoders with Drivers, Encoders, Priority Encoders, Multiplexers, Demultiplexers, Priority Generators/Checkers, Parallel Binary Adder/Subtractor, Magnitude Comparators

Module 5:

Unit-I:

Sequential Logic IC's and Memories: Familiarity with commonly available 74XX & CMOS 40XX Series ICs – All Types of Flip-flops, Synchronous Counters, Decade Counters, Shift Registers

Unit-II:

Memories - ROM Architecture, Types of ROMS & Applications, RAM Architecture, Static & Dynamic RAMs

Text Books

1. Op-Amps & Linear ICs – Ramakanth A. Gayakwad, PHI, 2003.
2. Digital Fundamentals – Floyd and Jain, Pearson Education, 8th Edition, 2005

Reference Books

1. Linear Integrated Circuits –D. Roy Chowdhury, New Age International (p) Ltd, 2nd Ed., 2003.
2. Op Amps and Linear Integrated Circuits-Concepts and Applications James M. Fiore, Cengage Learning/ Jaico, 2009.
3. Operational Amplifiers with Linear Integrated Circuits by K. Lal Kishore – Pearson, 2009.
4. Linear Integrated Circuits and Applications – Salivahanan, MC GRAW HILL EDUCATION.
5. Modern Digital Electronics – RP Jain – 4/e – MC GRAW HILL EDUCATION, 2010.

E-Resources

1. https://nptel.ac.in/courses/108/108/108108111/

Course Outcomes

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

CO1. Analyse the operational amplifier modes and charecteristics and its applications.

CO2. Design op amp as filters and oscilators, Study the principle and application of IC555, IC565, IC723.

CO3. Illustrate the working of A-to-D & D-to-A techniques using IC's.

CO4. Summarize the digital integrated circuits.

CO5. Design the combinational circuits and sequential circuits.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes (POs)/Program Specific Outcomes (PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	2	2		-	-	-	-	-	-	-	-	-	2	
CO2	2	2	2	-	-	-	-	-	-	-	-	-	3	3
CO3	1	2	2	-	-	-	-	-	-	-	-	-	1	2
CO4	1	2	1	2	-	-	-	-	-	-	-	-	1	2
CO5	2	2	2	-	-	-	-	-	-	-	-	1		3
Average	1.6	2	1.75	2	-	-	-	-	-	-	-	-	1.75	2.5

Correlation: 3–Strong; 2–Medium; 1-Weak

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM III Year-I Sem			
Course Code: **M3151**	**PYTHON PROGRAMMING LAB**	L	T	P	C
		0	**0**	**2**	**1.5**

Pre-Requisites: Knowledge of basic programming

EXPERIMENT 1

i. Write a python program to obtain user input data (int, float, string) and display.
ii. Write a python program to find the roots of a quadratic equation.
iii. Write a python program to perform arithmetic operations (+, -, *, /, %) for given input values and printout the result values.

EXPERIMENT 2

i. Write a python program that use both recursive and non-recursive functions to find the factorial of a given integer
ii. Operators and Operands in Python: (Arithmetic, relational and logical operators), operator precedence, Expressions and Statements.
iii. (Assignment statement); Taking input (using raw input () and input ()) and displaying output (print statement); Putting Comments.

EXPERIMENT 3

i. Write python programs to perform operation on Strings using following functions: len, capitalize, find, isalnum, isalpha, isdigit, lower, islower, isupper, upper, lstrip, rstrip, isspace, istitile, partition, replace, join, split, count, decode, encode, swap case.
ii. Enter the details of 5 Student and display the details sequentially.

EXPERIMENT 4

i. Write python programs to perform List operators: (joining, list slices
ii. Write python programs to perform List functions: len, insert, append, extend, sort, remove, and reverse, pop.
iii. Write python programs to check whether the string is palindrome or not?

EXPERIMENT 5

i. Write python programs to perform Tuple functions: cmp(), len(), max(), min(), tuple()
ii. Write python programs to check whether the word is present in the tuple or not?
iii. Write python programs to take a string as (“1234567890”) and create a pair{(1,2),(3,4),(5,6),(7,8),(9,0)} using tuple.

EXPERIMENT 6

i. Write python programs to perform Dictionary functions & Methods: cmp, len, clear (), get(), has key(), items(), keys(), update(), values() .
ii. Write python programs to Create a list of animal using dictionary variable "animal" and find out if the specific animal present in the list or not?

EXPERIMENT 7

i. Write a python program to create a class, its objects and accessing attributes.
ii. Create a customer class and check the balance and withdraw and deposit some amount.

EXPERIMENT 8

Write a python script to implement robust exception handling.
i. Verify whether the input number is a float or not
ii. Handle exceptions that occur during file operations such as opening a non-existent file

EXPERIMENT 9

Write a python script to demonstrate polymorphism

EXPERIMENT 10

Write a python program to list the files in a directory in python

EXPERIMENT 11

Write a python script to perform file handling operations. open, close, read, append, move

EXPERIMENT12.

Write a GUI program to create a window wizard having two text fields and two buttons as submit and reset.

Text Books

1. Programming in Python 3- A complete Introduction to the Python Language- Second Edition, Mark Summerfiels, Addison-Wesley 2010.
2. Programming Python- 4th Edition, Mark Lutz, O'Reilly, 2011.

Reference Books

1. Object-Oriented Programming in Python, Michael H, Goldwasser, David Letscher, Pearson Prentice Hall, 2008.

E-Resources

1. https://www.tutorialspoint.com/python3/python_strings.htm
2. https://www.youtube.com/watch?v=yCH9CUiXrP0
3. https://www.youtube.com/watch?v=RSl87lqOXDE
4. https://www.youtube.com/watch?v=bSZtsYYwFS0

Course Outcomes

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

CO1. Apply Basic input /output operations for working with different data types in python.

CO2. Design functions for achieving code reusability and string manipulations.

CO3. Create a python program for implementing list, tuple dictionary.

CO4. Demonstrate Class and objects.

CO5. Implement File handling operation.

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM III Year-I Sem			
Course Code: **M3271**	**LINEAR AND DIGITAL IC APPLICATIONS LABORATORY**	L	T	P	C
		0	**0**	**2**	**1**

Pre-Requisites: NIL

Note:

- **Minimum 12 experiments should be conducted.**
- **Verify the functionality of the IC in the given application.**

Design and Implementation of:

1. Design an Inverting and Non-inverting Amplifier using Op Amp and calculate gain.

2. Design Adder and Subtractor using Op Amp and verify addition and subtraction process.

3. Design a Comparator using Op Amp and draw the comparison results of A=B, A<B, A>B.

4. Design a Integrator and Differentiator Circuits using IC741 and derive the required condition practically.

5. Design an Active LPF, HPF cutoff frequency of 2 KHZ and find the roll off of it.

6. Design a Circuit using IC741 to generate sine/square/triangular wave with period of 1KHZ and draw the output waveform.

7. Construct Mono-stableMultivibratorusingIC555 and draw its output waveform.

8. Construct Astable Multivibrator using IC555 and draw its output waveform and also find its duty cycle.

9. Design a Schmitt Trigger Circuit and find its LTP and UTP.

10. Design Frequency modulator and demodulator circuit and draw the respective waveforms.

11. Design VoltageRegulatorusingIC723, IC 7805/7809/7912 and find its load regulation factor.

12. Design R-2R ladder DAC and find its resolution and write a truth table with respective voltages.

13. Design Parallel comparator type/ counter type/ successive approximation ADC and find its efficiency.

14. Design a Gray code converter and verify its truth table.

15. Design an even priority encoder using IC 74xx and verify its truth table.

16. Design a 8x1 multiplexer using digital ICs.

17. Design a 4-bit Adder/Subtractor using digital ICs and Add/Sub the following bits.
(i)1010 (ii)0101 (iii)10110 0100 0010 1001.

18. Design a Decade counter and verify its truth table and draw respective waveforms.

19. Design a Up/down counter usingIC74163 and draw read/write waveforms.

20. Design a Universal shift register using IC 74194/195 and verify its shifting operation.

21. Design a 16x4 RAM using 74189 and draw its read/write operation.

22. Design a 8x3 encoder/3x8 decoder and verify its truth table.

Major Equipment required for Laboratories:

1. 5 V Fixed Regulated Power Supply/ 0-5V or more Regulated Power Supply; Multimeter
2. 20 MHz Oscilloscope with Dual Channel; Bread board and components/Trainer Kit;

Course Outcomes

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

CO1. Design and implementation of various analog circuits using 741 ICs.

CO2. Design and implementation of various Multivibrators using 555 timer.

CO3. Design and implement various circuits using digital ICs.

CO4. Design and implement ADC, DAC and voltage regulators.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes (POs)/Program Specific Outcomes (PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PS O1**	**PS O2**
CO1	1	0	3	3	3	-	-	-	3	3	-	1	1	0
CO2	1	0	3	3	3	-	-	-	3	3	-	1	1	0
CO3	1	0	3	3	3	-	-	-	3	3	-	1	1	0
CO4	1	0	3	3	3	-	-	-	3	3	-	1	1	0
Average	**1**	**0**	**3**	**3**	**3**	**-**	**-**	**-**	**3**	**3**	**-**	**1**	**1**	**0**

Correlation: 3–Strong; 2–Medium; 1-Weak

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM III Year-I Sem			
Course Code: **M31MC4**	**CYBER SECURITY** (IT, CSE, ECM, ECE, MECH, CIVIL, AIDS, CSE(DS), AIML, CSM)	L	T	P	C
		2	**0**	**0**	**0**

Pre-Requisites: NIL

Module 1:

Introduction to Cyber Security: Basic Cyber Security Concepts, layers of security, Vulnerability, threat, Harmful acts, Internet Governance – Challenges and Constraints, Computer Criminals, CIA Triad, Assets and Threat, motive of attackers, active attacks, passive attacks, Software attacks, hardware attacks, Spectrum of attacks, Taxonomy of various attacks, IP spoofing, Methods of defence, Security Models, risk management, Cyber Threats-Cyber Warfare, Cyber Crime, Cyber terrorism, Cyber Espionage, etc., Comprehensive Cyber Security Policy.

Module 2:

Cyberspace and the Law & Cyber Forensics: Introduction, Cyber Security Regulations, Roles of International Law. The INDIAN Cyberspace, National Cyber Security Policy.
Introduction, Historical background of Cyber forensics, Digital Forensics Science, The Need for Computer Forensics, Cyber Forensics and Digital evidence, Forensics Analysis of Email, Digital Forensics Lifecycle, Forensics Investigation, Challenges in Computer Forensics, Special Techniques for Forensics Auditing.

Module 3:

Cybercrime: Mobile and Wireless Devices: Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication service Security, Attacks on Mobile/Cell Phones, Mobile Devices: Security Implications for Organizations, Organizational Measures for Handling Mobile, Organizational Security Policies and Measures in Mobile Computing Era, Laptops.

Module 4:

Cyber Security: Organizational Implications: Introduction cost of cybercrimes and IPR issues, web threats for organizations, security and privacy implications, social media marketing: security risks and perils for organizations, social computing and the associated challenges for organizations.
Cybercrime and Cyber terrorism: Introduction, intellectual property in the cyberspace, the ethical dimension of cybercrimes the psychology, mindset and skills of hackers and other cyber criminals.

Module 5:

Privacy Issues: Basic Data Privacy Concepts: Fundamental Concepts, Data Privacy Attacks, Data linking and profiling, privacy policies and their specifications, privacy policy languages, privacy in different domains- medical, financial, etc.
Cybercrime: Examples and Mini-Cases Examples: Official Website of Maharashtra Government Hacked, Indian Banks Lose Millions of Rupees, Parliament Attack, Pune City Police Bust Nigerian Racket, e-mail spoofing instances.
Mini-Cases: The Indian Case of online Gambling, An Indian Case of Intellectual Property Crime, Financial Frauds in Cyber Domain.

Text Books

1. Nina Godbole and Sunit Belpure, Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Wiley.
2. B. B. Gupta, D. P. Agrawal, Haoxiang Wang, Computer and Cyber Security: Principles, Algorithm, Applications, and Perspectives, CRC Press, ISBN 9780815371335, 2018.

Reference Books

1. Cyber Security Essentials, James Graham, Richard Howard and Ryan Otson,CRC Press.
2. Introduction to Cyber Security, Chwan-Hwa(john) Wu,J. David Irwin, CRC PressT&F Group

E-Resources

1. https://lecturenotes.in/subject/611/cyber-security.
2. https://www.slideshare.net/AvaniPatel61/ppt-on-cyber-security.
3. https://onlinecourses.swayam2.ac.in/ugc19_hs25/preview

Course Outcomes

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

CO1. Demonstrate cybercrimes and how they are planned.

CO2. Develop a framework to secure Mobile and wireless devices.

CO3. Interpret crimes and Acts related to mobile and wireless devices.

CO4. Memorize Computer Forensics and its related matters.

CO5. Identify Cyber Security-Organizational Implications.

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM III Year-I Sem			
Course Code: **M31AC4**	**FOUNDATIONS OF ENTREPRRENEURSHIP**	L	T	P	C
		2	**0**	**0**	**0**

Pre-Requisites: NIL

Module 1:

Understanding Entrepreneurial Mindset- The revolution impact of entrepreneurship- The evolution of entrepreneurship - Functions of Entrepreneurs – types of entrepreneurs – Approaches to entrepreneurship- Process approach- Role of entrepreneurship in economic development- Twenty first century trends in entrepreneurship.

Module 2:

The Individual Entrepreneurial Mind-Set and Personality- The entrepreneurial journey-Stress and the entrepreneur - the entrepreneurial ego - Entrepreneurial motivations-
Motivational cycle – Entrepreneurial motivational behaviour – Entrepreneurial competencies. Corporate Entrepreneurial Mindset, the nature of corporate entrepreneur- conceptualization of corporate entrepreneurship Strategy-sustaining corporate entrepreneurship.

Module 3:

Launching Entrepreneurial Ventures - opportunities identification- Finding gaps in the marketplace – techniques for generating ideas- entrepreneurial Imagination and Creativity- the nature of the creativity process - Innovation and entrepreneurship.
Methods to initiate Ventures- Creating new ventures-Acquiring an Established entrepreneurial venture- Franchising- advantage and disadvantages of Franchising.

Module 4:

Legal Challenges of Entrepreneurship - Intellectual property protection - Patents, Copyrights - Trademarks and Trade secrets - Avoiding trademark pitfalls Feasibility Analysis - Industry and competitor analysis - Formulation of the entrepreneurial Plan. The challenges of new venture start-ups, developing an effective business model – Sources of finance - Critical factors for new venture development - The Evaluation process.

Module 5:

Strategic Perspectives in Entrepreneurship - Strategic planning - Strategic actions-strategic positioning- Business stabilization - Building the adaptive firms. Understanding the growth stage – Internal growth strategies and external growth strategies, Unique managerial concern of growing ventures. Initiatives by the Government of India to promote entrepreneurship, Social and women entrepreneurship -T-hub, J-hub.

Text Books

1. S.S. Khanka, Entrepreneurship Development, S. Chand Publications, 2015. Stuart Read, Effectual Entrepreneurship, Routledge, 2013.
2. Rajeev Roy, Entrepreneurship, 2e, Oxford publications, 2012

Reference Books

1. D F Kuratko and T V Rao, Entrepreneurship- A South-Asian Perspective, Cengage Learning, 2012.
2. Bruce R. Barringer/ R. Duane Ireland, Entrepreneurship Successfully launching new ventures, 4e, Pearson, 2015
3. Nandan .H, Fundamentals of Entrepreneurship, PHI, 2013
4. Madhurima Lal Shikha Sahai – Entrepreneurship, Excel Books.

E-Resources

1. https://nptel.ac.in/courses/127105007

Course Outcomes

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

CO1. Understand the need and significance of Entrepreneurship in the Economy.

CO2. Understand the need and significance of Entrepreneurship in the Economy.

CO3. Develop Business Plan with the required contents.

CO4. Understand contribution of family business and Social Entrepreneurship in the Economy.

CO5. Plan Strategic perspectives in entrepreneurship.

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM III Year-II Sem			
Course Code: **M32EA**	**BUSINESS ECONOMICS & FINANCIAL ANALYSIS**	L	T	P	C
		3	**1**	**0**	**4**

Pre-Requisites: NIL

Module 1: Introduction to Business and Economics:

Unit-I: Introduction to managerial economics, concepts of Managerial Economics:
Business: Structure of Business Firm, Theory of Firm, Types of Business Entities, Limited Liability Companies, Sources of Capital for a Company, Non-Conventional Sources of Finance.

Unit-II: Production & cost Analysis:
Significance of Economics, Micro and Macro Economic Concepts, Concepts and Importance of National Income, Inflation, Money Supply in Inflation, Business Cycle, Features and Phases of Business Cycle. Nature and Scope of Business Economics, Role of Business Economist, Multidisciplinary nature of Business Economics.

Module 2: Demand and Supply Analysis:

Unit-I: Elasticity of Demand:
Elasticity, Types of Elasticity, Law of Demand, Measurement and Significance of Elasticity of Demand, Factors affecting Elasticity of Demand, Elasticity of Demand in decision making, Demand Forecasting: Characteristics of Good Demand Forecasting, Steps in Demand Forecasting, Methods of Demand Forecasting.

Unit-II: Supply Analysis:
Determinants of Supply, Supply Function & Law of Supply.

Module 3: Production, Cost, Market Structures & Pricing:

Unit-I: Production Analysis: Factors of Production, Production Function, Production Function with one variable input, two variable inputs, Returns to Scale, Different Types of Production Functions.

Unit-II: Cost analysis: Recruitment, Selection, Training and Development and Performance.

Unit-III: Market Structures: Nature of Competition, Features of Perfect competition, Monopoly, Oligopoly, Monopolistic Competition.

Unit-IV: Pricing: Types of Pricing, Product Life Cycle based Pricing, Break Even Analysis, Cost Volume Profit Analysis.

Module 4:

Unit-I: Financial Accounting:
Accounting concepts and Conventions, Accounting Equation, Double-Entry system of Accounting, Rules for maintaining Books of Accounts, Journal, Posting to Ledger, Preparation of Trial Balance, Elements of Financial Statements, Preparation of Final Accounts.

Module 5:

Unit-I: Financial Analysis through Ratios:

Concept of Ratio Analysis, Liquidity Ratios, Turnover Ratios, Profitability Ratios, Proprietary Ratios, Solvency, Leverage Ratios (simple problems).

Unit-II:

Introduction to Fund Flow and Cash Flow Analysis (simple problems).

Text Books

1. D.D.Chaturvedi,S.L.Gupta, Business Economics- Theory and Applications, International Book House Pvt. Ltd. 2013.
2. Dhanesh K Khatri, Financial Accounting,Tata McGraw Hill,2011.
3. Geethika Ghosh, Piyali Gosh, Purba Roy Choudhury, Managerial Economics, 2e, Tata McGraw Hill Education Pvt. Ltd. 2012.

Reference Books

1. Paresh Shah, Financial Accounting for Management 2e, OxfordPress,2015.
2. S.N.Maheshwari,Sunil K Maheshwari, Sharad KMaheshwari, Financial Accounting, 5e,Vikas Publications, 2013.

E-Resources

1. https://nptel.ac.in/courses/110/101/110101005/
2. https://sites.google.com/site/economicsbasics/

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM III Year-II Sem			
Course Code: **M324C**	**CELLULAR AND MOBILE COMMUNICATIONS (Professional Elective-II)**	L	T	P	C
		3	**0**	**0**	**3**

Pre-Requisites:

1. Knowledge of Analog and Digital Communication

2. Basic Knowledge of Wireless Communication.

Module 1: Introduction to Cellular Mobile Radio Systems [12L]

Unit-I: [7L]

Limitations of conventional mobile telephone systems, Basic Cellular Mobile System, First, second, third and fourth generation cellular wireless systems, introduction to 5th and 6th generation of mobile communication, comparison and differences. Uniqueness of mobile radio Environment-Long term fading, Factors influencing short term fading.

Unit-II: [5L]

Parameters of mobile multipath Fading-Time dispersion parameters, Coherence bandwidth, Doppler spread and coherence time, Types of small-scale fading.

Module 2: Fundamentals of Cellular Radio System Design [12L]

Unit-I: [7L]

Concept of frequency reuse, Co-channel interference, Co-channel Interference reduction factor, Desired C/I from a normal case in a Omni directional antenna system, system capacity, Trunking and grade of service, Improving coverage and capacity in cellular systems- Cell splitting, Sectoring, Microcell zone concept.

Unit-II: [5L]

Design of antenna system and measurement of real time co-channel interference, Antenna parameters and their effects, Diversity Techniques-Space diversity, Polarization diversity, Frequency diversity, Time diversity. Adjacent channel interference, Near end far end interference, Cross talk, Effects on coverage and interference by power decrease, Antenna height decrease, Effects of cell site components, UHF TV interference.

Module 3: Cell Coverage for Signal and Traffic [10L]

Unit-I: [5L]

Signal reflections in flat and hilly terrain, Effect of human made structures, Phase difference between direct and reflected paths, Constant standard deviation, Straight line path loss slope.

Unit-II: [5L]

General formula for mobile propagation over water and flat open area, Near and long distance propagation, Path loss from a point-to-point prediction model in different conditions, Lee Mode and merits of Lee model.

Module 4: Cell Site and Mobile Antennas [10L]

Unit-I: [5L]

Application of smart antennas in cellular communication, Sum and difference patterns and antenna synthesis, Coverage-Omni directional antennas.

Unit-II: [5L]

Interference reduction- directional antennas for interference reduction, Space diversity antennas, Umbrella pattern antennas, and Minimum separation of cell site antennas, mobile antennas.

Module 5: Channel Assignment [10L]

Unit-I: [5L]

Numbering and grouping, Setup access and Paging channels, Channel assignments to cell sites and mobile units, Channel sharing and Borrowing, Sectorization, Overlaid cells, non fixed channel assignment.

Unit-II: [5L]

Handoff initiation, Types of handoff, delaying handoff, Advantages of handoff, Power difference handoff, forced handoff, Mobile assisted and soft handoff. Intersystem handoff, Introduction to dropped call rates and their evaluation.

Text Books

1. Mobile Cellular Telecommunications – W.C.Y. Lee, Mc Graw Hill, 2nd Edn., 1989.
2. Wireless Communications - Theodore. S. Rapport, Pearson education, 2nd Edn., 2002.

Reference Books

1. Principles of Mobile Communications – Gordon L. Stuber, Springer International, 2nd Ed., 2001.
2. Modern Wireless Communications-Simon Haykin, Michael Moher,Pearson Education, 2005.
3. Wireless communications theory and techniques, Asrar U. H .Sheikh, Springer, 2004.

E-Resources

1. https://nptel.ac.in/courses/106/106/106106167/
2. https://nptel.ac.in/courses/117/104/117104099/

Course Outcomes

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

CO1. Understand Basic Cellular System with fading and non-fading environment.

CO2 Design and Analyse the cellular radio system based on cell coverage and signal traffic.

CO3. Describe the concept of frequency reuse to increase the cellular capacity.

CO4. Demonstrate and apply different mobile antenna in Hilly, Flat terrain etc.

CO5. Apply channel assignment and Handoff mechanisms in cellular system.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes (POs)/Program Specific Outcomes (PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PS O1**	**PS O2**
CO1	3	3	-	-	-	-	-	-	-	-	-	-	-	2
CO2	1	2	2	2	-	-	-	-	-	-	-	-	-	1
CO3	1	2	2	1	-	-	-	-	-	-	-	-	-	1
CO4	2	2	2	2	-	-	-	-	-	-	-	-	-	2
CO5	1	2	2	1	1	-	-	-	-	-	-	-	-	2
Average	**1.6**	**2.2**	**1.6**	**1.2**	**0.2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**1.6**

Correlation: 3–Strong; 2–Medium; 1-Weak

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM III Year-II Sem			
Course Code: **M324K**	**COMMUNICATION SYSTEMS (Professional Elective-II)**	L	T	P	C
		3	**0**	**0**	**3**

Pre-Requisites: NIL

Module 1:

Unit 1: Amplitude Modulation

Introduction tocommunication system, Need for modulation, Time domain and frequency domain representation of Amplitude Modulation, DSB Modulation, SSB modulation. Generation and Reception of AM, DSB Modulation, SSB Modulation.

Unit-II: Vestigial side band modulation:

Frequency description, Generation of VSB Modulated wave, Time domain description, Applications of different AM Systems.

Module 2:

Unit-I: Angle Modulation:

Basic concepts, Frequency Modulation: Single tone frequency modulation, Spectrum Analysis of Sinusoidal FM Wave, Narrow band FM, Wide band FM, Constant Average Power, Transmission bandwidth of FM Wave - Comparison of FM & AM.

Unit II: Generation of FM Waves:

Direct Method: Parametric Variation Method: Varactor Diode, Reactance Modulator, indirect Method: Armstrong Method, Detection of FM Waves: Balanced Frequency discriminator, Zero crossing detector, Phase locked loop, Foster Seeley Discriminator, Ratio detector.

Module 3:

Unit I: Transmitters, Receivers & Pulse Modulation:

Radio Transmitters-Classification of Transmitters, Radio Receiver - Receiver Types - Tuned radio Frequency receiver, Super heterodyne receiver

Unit II: Pulse Modulation:

PAM, PWM and PPM, Introduction to Digital communication systems, PCM Generation and Reconstruction, Quantization Noise, Non-Uniform Quantization and Compounding, DPCM, DM, Noise in DM and Adaptive DM

Module 4:

Unit- I Digital Modulation Techniques:

Introduction, ASK, ASK Modulator, Coherent ASK Detector, Non- Coherent ASK Detector, Generation of FSK, Non-Coherent FSK Detector, Coherent FSK Detector, FSK Detection using PLL, BPSK, Generation of PSK, Coherent PSK Detection, Differential PSK, QPSK, QAM

Unit-II: Baseband Transmission and optimal Reception of Digital Signal:
A Baseband Signal Receiver, Probability of Error, Optimum Receiver, Optimal of Coherent Reception, Probability of Error and Eye Diagrams for ASK, PSK, FSK, Crosstalk.

Module 5:

Unit-I: Source coding & Channel Coding Techniques —
Shannon Fano coding, Huffman Code, variable length coding, Linear Block Codes: Matrix Description of Linear Block codes, Error Detection and Error Correction Capabilities of Linear lock Codes

Unit-II: Cyclic Codes:
Algebraic Structure, Encoding, Syndrome Calculation, Decoding.
Convolution Codes: Encoding, Decoding using State, tree and trellis Diagrams, Decoding using Viterbi Algorithm. Comparison of error rated in Coded and Uncoded Transmission.

Text Books

1. Communication Systems - Simon Haykin, 2 Ed, Wiley Publications.
2. Principles of Communication Systems Herbert Taub, Donald I Schiling, Goutam Saha, 3rd Edition, Mcgraw- Hill, 2008.
3. Digital and Analog Communication Systems – Sam Shanmugani John Wiley, 2005.
4. Digital Communications – John G.Proakis , Masoud Salehi – 511 Edition, Mcgraw-Hill, 2008

Reference Books

1. Electronic Communication Systems - Modulation and Transmission - Robert J. Schoenbeck, 2nd Edition, PHI.
2. Electronics & Communication System – George Kennedy and Bernard Davis, TMH 2004.
3. Digital Communications – IanA.Glover, Peter M. Grant, 2nd Edition,Pearson Edu., 2008.
4. Communication Systems – B.P. Lathi, BS Publication, 2006.

E-Resources

1. http://nptel.ac.in/courses/117102062/4#
2. https://nptel.ac.in/courses/117/101/117101051/
3. https://nptel.ac.in/courses/117/105/117105144/
4. https://nptel.ac.in/courses/108/101/108101113/
5. https://nptel.ac.in/courses/108/102/108102096/

Course Outcomes

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

CO1. Analyze and design various modulation and demodulation of analog and Digital systems.

CO2 Design low power AM and FM transmitters.

CO3. Analyze and design the various Pulse Modulation Systems.

CO4. Analyse the error performance of digital modulation techniques.

CO5. Know about different error detecting and error correcting codes like. block codes, cyclic codes and convolution codes.

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM III Year-II Sem			
Course Code: **M324J**	**WIRELESS SENSOR NETWORKS (Professional Elective-II)**	L	T	P	C
		3	**0**	**0**	**3**

Pre-Requisites: NIL

Module 1:

Unit-I:

Introduction Unique constraints and challenges, advantages of Sensor Networks, Sensor Network Applications, Collaborative Processing, Overview and applications of Wireless Sensor Networks.

Unit-II:

Basic Wireless Sensor Technology-Sensor Node Technology, Sensor Taxonomy, WN operating Environment, WN trends. Radio Propagation primer.

Module 2:

Unit-I:

MAC protocols for Wireless Sensor Networks Introduction, Background, and Fundamentals of MAC protocols.

Unit-II:

MAC protocols for WSNs, Sensor-MAC case study, IEEE 802.15.4 LR-WPANs standard case study.

Module 3:

Unit-I:

Routing protocols for Wireless Sensor Networks Introduction, background, Data dissemination and gathering, routing challenges and design issues, routing strategies in wireless sensor networks. **Unit-II:**

Networking Sensors Key assumptions, Medium Access Control, General Issues, Geographic, Energy-Aware Routing, Attribute-based routing.

Module 4:

UNIT-I:

Transport Control protocols for Wireless Sensor Networks Traditional Transport control protocols, Transport protocol design issues, Examples of existing transport control protocols, performance of transport control protocols.

UNIT-II:

Performance and Traffic Management Introduction, background, WSN Design Issues, Performance Modelling of WSNs, Case Study-Simple computation of the system life span.

Module 5:

UNIT-I:

Network Management for Wireless Sensor Networks Introduction, Network management requirements, traditional network management models, network management design issues, MANNA, Naming and Localization.

UNIT-II:

Operating Systems for Wireless Sensor Networks Introduction, operating system design issues, Examples of operating systems-TinyOS, Mate, MagnetOS, MANTIS, OSPM, EYES OS, SenOS, EMERALDS, PicOS.

Text Books

1. Wireless Sensor Networks- Technology, protocols and applications, KazemSohraby, Daniel Minoli and TaiebZnati, Wiley Student Edition.
2. Wireless Sensor Networks-An Information processing approach, Feng Zhao, Leonidas Guibas, Morgan Kaufmann publications, 2004.

Reference Books

1. Adhoc Mobile Wireless Networks-Principles, Protocols and Applications, Subirkumar Sarkar, T G Basavaraju and C Puttamadappa, Auerbach Publications, Taylor & Francis group.
2. Adhoc Wireless Networks-Architectures and Protocols, C. Siva Ram Murthy and B.S. Manoj, Pearson Education.

Course Outcomes

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

CO1. Compare the different natural resources available and how to use them.

CO2 List and compare personal area network (PAN) technologies such as Zigbee, Bluetooth etc.

CO3. Describe in detail of sensor network architecture, traffic related protocols, transmission technology etc.

CO4. Explain the design considerations for deploying the wireless network infrastructure.

CO5. Understand middleware protocol and network management issues of sensor networks.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes (POs)/Program Specific Outcomes (PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO2**
CO1	1	-	2	-	-	-	-	-	-	-	-	-	-	1
CO2	1	2	-	-	-	-	-	-	-	-	-	-	-	1
CO3	1	-	2	2	-	-	-	-	-	-	-	-	-	1
CO4	1	-	3	-	-	-	-	-	-	-	-	-	-	1
CO5	1	2	-	-	1	-	-	-	-	-	-	-	-	1
Average	**1**	**2**	**2.2**	**2**	**0.2**	-	-	-	-	-	-	-	-	**1**

Correlation: 3–Strong; 2–Medium; 1-Weak

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM III Year-II Sem			
Course Code: **M325A**	**COMPILER DESIGN (Professional Elective-III)**	L	T	P	C
		3	**0**	**0**	**3**

Pre-Requisites: NIL

Module 1:

Overview of Compilation:

Language Processing System, Difference between Compiler and Interpreter, Phases of Compilation, Role of a Lexical Analysis, Input Buffering.

Regular Grammar and Regular expression for common programming language features, Pass and Phases of translation, Bootstrapping, LEX lexical analyser generator.

Module 2:

Parsing:

Context free grammars, Top-down parsing – Backtracking, LL (1), recursive descent parsing, Predictive parsing, and preprocessing steps required for predictive parsing.

Bottom-up parsing-Shift Reduce parsing, Operator precedence parser, SLR, CLR and LALR parsing, Error recovery in parsing, handling ambiguous grammar, YACC – automatic parser generator.

Module 3:

Semantic analysis:

Intermediate forms of source Programs – abstract syntax tree, polish notation and three address codes.

Attributed grammars, Syntax directed translation, Syntax directed definition, Conversion of popular Programming languages language constructs into Intermediate code forms, Type checking.

Module 4:

Symbol Tables:

Symbol table format, organization for block structures languages, Hashing, tree structures representation of scope information. Block structures and non- block structure storage allocation: static, Runtime stack and heap storage allocation,

Code optimization:

Consideration for Optimization, Scope of Optimization, local optimization, loop optimization, frequency reduction, folding, DAG representation.

Module 5:

Data flow analysis:
Flow graph, data flow equation, global optimization, redundant sub expression elimination, Induction variable elements, Live variable analysis, Copy propagation. Object code generation: Object code forms, machine dependent code optimization, register allocation and assignment generic code generation algorithms, DAG for register allocation.

Text Books

1. Principles of compiler design -A.V. Aho .J.D.Ullman; Pearson Education.
2. Modern Compiler Implementation in C- Andrew N. Appel, Cambridge University Press.

Reference Books

1. Lex & yacc , John R. Levine, Tony Mason, Doug Brown, O‟reill
2. Modern Compiler Design, Dick Grune, Henry E. BAL, Cariel T. H. Jacobs, Wiley dreamtech
3. Engineering a Compiler, Cooper & Linda, Elsevier.
4. Compiler Construction, Louden, Thomson. 5. Systems Programming and Operating Systems.

E-Resources

1. https://www.tutorialspoint.com/compiler_design/compiler_design_tutorial.pdf
2. https://nptel.ac.in/courses/106/105/106105190/
3. https://www.slideshare.net/IffatAnjum/lecture-01-introduction-to-compiler
4. https://www.pdfdrive.com/compiler-principles-techniques-and-tools- e6708003.html
5. https://www.alljntuworld.in/download/compiler-design-cd-materials- notes/

Course Outcomes

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

CO1. Design a Lexical Analyser.

CO2. Compare different types of parsing techniques.

CO3. Implement the concepts of Semantic analysis and type checking.

CO4. Apply different code optimization techniques.

CO5. Drive a target code using different code generation techniques.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes (POs)/Program Specific Outcomes (PSOs)												
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PS O1**	**PS O2**
CO1	3	2	2	-	-	-	-	-	-	-	-	-	-	2
CO2	3	2	2	-	-	-	-	-	-	-	-	-	-	2
CO3	3	2	2	-	-	-	-	-	-	-	-	-	-	2
CO4	3	2	2	-	-	-	-	-	-	-	-	-	-	2
CO5	3	2	2	-	-	-	-	-	-	-	-	-	-	2
Average	**3**	**2**	**2**	-	-	-	-	-	-	-	-	-	-	**2**

Correlation: 3–Strong; 2–Medium; 1-Weak

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM III Year-II Sem			
Course Code: **M327C**	**CRYPTOGRAPHY AND NETWORK SECURITY (Professional Elective-III)**	L	T	P	C
		3	**0**	**0**	**3**

Pre-Requisites: Computer organization

Module 1:

UNIT–I: Security Concepts:

Introduction, The need for security, Security approaches, Principles of security, Types of Security attacks, Security services, Security Mechanisms, A model for Network Security

UNIT-II: Cryptography Concepts and Techniques:

Cryptography: Concepts and Techniques: Introduction, plain text and cipher text, substitution techniques, transposition techniques encryption and decryption, symmetric and asymmetric key cryptography, stenography, key range and key size, possible types of attacks.

Module 2:

UNIT–I: Symmetric key Ciphers:

Block Cipher principles, DES, AES, Blowfish, RC5, IDEA, Block cipher operation, Stream ciphers, RC4.

UNIT-II: Asymmetric key Ciphers:

Asymmetric key Ciphers: Principles of public key crypto systems, Algorithms (RSA, DiffieHellman, ECC), Key

Module 3:

UNIT-I: Cryptographic Hash Functions:

Cryptographic Hash Functions: Message Authentication, Secure Hash Algorithm (SHA-512), Message authentication codes: Authentication requirements, HMAC, CMAC, Digital signatures, Elgamal Digital Signature Scheme

UNIT-II: Key Management and Distribution:

Key Management and Distribution: Symmetric Key Distribution Using Symmetric & Asymmetric Encryption, Distribution of Public Keys, Kerberos, X.509 Authentication Service, Public – Key Infrastructure.

Module 4:

UNIT-I: Transport-level Security:

Transport-level Security: Web security considerations, Secure Socket Layer and Transport Layer Security, HTTPS, Secure Shell (SSH)

UNIT-II:

Wireless Network Security: Wireless Security, Mobile Device Security, IEEE 802.11 Wireless LAN, IEEE 802.11i Wireless LAN Security.

Module 5:

UNIT-I: E-Mail Security:

E-Mail Security: Pretty Good Privacy, S/MIME IP Security: IP Security overview, IP Security architecture, Authentication Header, encapsulating security payload, Combining security associations, Internet Key Exchange

UNIT-II: Case Studies on Cryptography and security:

Secure Multiparty Calculation, Virtual Elections, Single sign On, Secure Inter-Branch Payment Transactions, Cross site Scripting Vulnerability

Text Books

1. Cryptography and Network Security - Principles and Practice: William Stallings, Pearson Education, 6th Edition
2. linewa Network Security: Atul Kahate, Mc Graw Hill, 3rd Edition

Reference Books

1. Cryptography and Network Security: C K Shyamala, N Harini, Dr T R Padmanabhan, Wiley India, 1st Edition
2. Cryptography and Network Security: Forouzan Mukhopadhyay, MC Graw Hill, 2nd Edition
3. Information Security, Principles and Practice: Mark Stamp, Wiley India.
4. Principles of Computer Security: WM.Arthur Conklin, Greg White, TMH
5. Introduction to Network Security: Neal Krawetz, CENGAGE Learning
6. Network Security and Cryptography: Bernard Menezes, CENGAGE Learning.

Course Outcomes

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

CO1. Student will be able to understand basic cryptographic algorithms, message and web authentication and security issues.

CO2. Ability to identify information system requirements for both of them such as client and server.

CO3. Ability to understand the current legal issues towards information security.

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM III Year-II Sem			
Course Code: **M327D**	**DATA SCIENCE (Professional Elective-III)**	L	T	P	C
		3	**0**	**0**	**3**

Pre-Requisites: Basic programming, Knowledge on Databases and Mathematics

Module 1:

Unit-I: Introduction:
Introduction to core concepts and technologies: Introduction, Terminology, data science **process**
Unit-II: Classification of Data:
Data science toolkit, Types of data, Example applications.

Module 2:

Unit-I: Data collection management:
Introduction, Sources of data, Data collection and APIs
Unit-II: Data management:
Exploring and fixing data, Data storage and management, using multiple data source

Module 3:

Unit-I: Data analysis:
Introduction, Terminology and concepts, Introduction to statistics, Central tendencies and distributions, Variance, Distribution properties and arithmetic.
Unit-II: Data Analytical Methods:
Samples/CLT, Basic machine learning algorithms, Linear regression, SVM, Naive Bayes.

Module 4:

Unit-I: Data visualization:
Introduction, Types of data visualization, Data for visualization
Unit-II: Data Types and Methods:
Data types, Data encodings, Retinal variables, mapping variables to encodings, Visual encodings.

Module 5:

Unit-I: Applications:
Applications of Data Science, Technologies for visualization, Bokeh (Python), recent trends in various data collection and analysis techniques
Unit-II: Technologies:
Various visualization techniques, application development methods of used in data science

Text Books

1. Cathy O'Neil, Rachel Schutt, Doing Data Science, Straight Talk from The Frontline. O'Reilly, 2013.

Reference Books

1. Jure Leskovek, Anand Rajaraman, Jeffrey Ullman, Mining of Massive Datasets. v2.1, Cambridge
   University Press, 2014.

E-Resources

1. https://en.wikipedia.org/wiki/Data_science
2. https://www.crampete.com/blogs/data-science-course-syllabus/
3. https://www.coursera.org/specializations/jhu-data-science
4. https://www.edx.org/course/subject/data-science

Course Outcomes

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

CO1. Recognize the fundamental concepts of Data Science.

CO2. Understand to apply various Data Collection and storage methods from data sources.

CO3. Evaluate data analysis techniques for applications handling large data.

CO4. Visualize and present the inference of Data and its encoding.

CO5. Learn to think through the Applications of Data Science and Technologies used for Data Visualisation.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes (POs)/Program Specific Outcomes (PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PS O1**	**PS O2**
CO1	3	2	-	-	-	-	-	-	-	-	-	1	2	2
CO2	2	2	3	1	2	-	-	-	-	-	-	-	-	-
CO3	3	2	2	-	-	-	-	-	-	-	-	2	-	2
CO4	3	3	2	2	-	-	-	-	-	-	-	1	-	3
CO5	2	2	2	-	-	-	-	-	-	-	-	1	3	3
Average	**2.6**	**2.2**	**2.25**	**1.5**	**2**	-	-	-	-	-	-	**1.25**	**2.5**	**2.5**

Correlation: 3–Strong; 2–Medium; 1-Weak

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM III Year-II Sem			
Course Code: **M324A**	**MICROPROCESSORS AND MICROCONTROLLERS**	L	T	P	C
		3	**0**	**0**	**3**

Pre-Requisites: Fundamentals of Digital, Computer Organization

Module 1: Architecture of 8086 Microprocessor [10L]

Unit-I: [6L]

Introduction, Microprocessors Vs Microcontrollers, 8086 Internal Architecture: Functional diagram, Register organization, memory segmentation, programming model, memory addresses, physical memory organization

Unit-II: [4L]

Signal description of 8086, Common function signals, minimum mode and maximum mode signals Timing diagrams for minimum mode and maximum mode systems.

Module 2: Instruction set and assembly language programming of [9L]

Unit-I: [5L]

Addressing modes, Instruction formats, Instruction set- Data transfer instructions, String instructions, Logical instructions, Arithmetic instructions, control transfer instructions, Process control instructions.

Unit-II: [4L]

Assembler directives, Procedures and macros Simple assembly language programs.

Module 3: I/O Interface [8L]

Unit-I: [4L]

Parallel I/O Interface 8255 A, Internal block diagram, Operational modes and initialization, interfacing with 8086. Interfacing Analog to Digital Converters (ADCs), Digital to Analog Converters (DACs), Stepper motor interfacing, keyboard and Display.

Unit-II: [4L]

Interfacing with advanced devices: memory interfacing to 8086 and address decoding techniques, 8086 Interrupts - interrupts structure of 8086, vector interrupt table, interrupts service routine.

Module 4: Introduction to Microcontrollers [10L]

Unit-I: [5L]

Overview of 8051 microcontroller architecture, I/O Ports, memory organization, addressing modes and instruction set of 8051, simple programs

Unit-II: [5L]

Interrupts, timer/Counter and serial communication, programming timer Interrupts, programming external hardware interrupts, programming the serial communication interrupts.

Module 5: Applications of 8051 [9L]

Unit-I: [5L]

Design and development of the applications in the area of communications (GSM module, GPS), keil IDE features and RTOS with 8051 in the area of automotive applications

Unit-II: [4L]

Introduction to ARM Processors: ARM processor families, architecture, registers, current program status register, pipeline, exception, interrupts and the vector table; core extension, introduction to ARM instruction set

Text Books

1. D.V.Hall, Microprocessors and interfacing, TMGH,2nd Edition 2006
2. Advanced Microprocessors and peripherals-A.K.Ray and K.M Bhurchandani, TMH, 2nd Edition 2006.
3. Andrew N.Sloss, Domonic Symes, Chris Wright "ARM System Developers Guide Designing and optimizing system software" Elsevier 1st Edition 2004

Reference Books

1. E Ayala, K.J., "The 8051 Microcontroller Architecture, Programming and Applications", Penram International, 2007
2. Mazidi M.A, Mazidi JG, & Rolin D. Mckinlay, "The 8051 Microcontroller & Embedded Systems using Assembly and C ", 2/e, Pearson Education, 2007.
3. Steve Furber., "ARM System-on-Chip Architecture" 2nd Edition Addison-Wesley, 2000.

E-Resources

1. https://nptel.ac.in/courses/106/108/106108100/
2. https://www.youtube.com/watch?v=o6W0opScrKY&list=PLuv3GM6-gsE01L9yDO0e5UhQapkCPGnY3
3. https://www.youtube.com/watch?v=liRPtvj7bFU&list=PL0E131A78ABFBFDD0

Course Outcomes

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

CO1. Understand 8086 microprocessor architecture and its functionalities.

CO2. Design 8086 Microprocessor based systems for real time applications using programming languages like Assembly Language and MASM.

CO3. Design different interfacing applications using microcontrollers and peripherals to 8086 Microprocessor.

CO4. Illustrate the basics of 8051 microcontroller's architecture and its functionalities.

CO5. Design real time microcontroller-based projects.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes (POs)/Program Specific Outcomes (PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PS O1**	**PS O2**
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	2	2	-	1	-	-	-	-	-	-	-	-	-	-
CO3	2	-	2	2	-	-	-	-	-	1	1	-	-	2
CO4	2	-	-	2	-	-	-	-	-	-	-	-	-	-
CO5	2	-	2	1	-	-	-	-	-	-	-	-	-	-
Average	**2**	**2**	**2.**	**1.5**	**-**	**-**	**-**	**-**	**-**	1	1	-	**-**	**2**

Correlation: 3–Strong; 2–Medium; 1-Weak

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM III Year-II Sem			
Course Code: **M3241**	**MICROPROCESSORS AND MICROCONTROLLERS LAB**	L	T	P	C
		0	**0**	**2**	**1**

Pre-Requisites: Basic of Electronics, Digital circuits and C programming.

Note: - Minimum of 12 experiments to be conducted.

Experiment List

1. Programs for 16-bit arithmetic operations 8086(using various addressing modes)
2. Programs for sorting an array for 8086.
3. Programs for searching a number or character in a string for 8086.
4. Programs for string manipulation for 8086.
5. Programs for digital clock design using 8086.
6. Interfacing ADC and DAC to 8086.
7. Interfacing Matrix/Keyboard to 8086.
8. Interfacing Elevator to 8086.
9. Interfacing Traffic Light to 8086.
10. Interfacing to 8086 and programming to control stepper motor
11. Programming using a) arithmetic b) logical and bit manipulation instructions of 8051.
12. Program and verify Timer/Counter in 8051.
13. Program and verify interrupt handling in 8051.
14. UART Operation in 8051.

Software Required

MASM & KEIL

Course Outcomes

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

CO1. Enhance programming skills (8086, 8051) for simple and complex tasks used in various engineering disciplines.

CO2. Design various applications using Microprocessors.

CO3. Apply the knowledge of interfacing techniques to design microprocessor-based systems.

CO4. Program and verify interrupt handling in 8051.

CO5. Demonstrate parallel and serial communication.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes (POs)/Program Specific Outcomes (PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO2**
CO1	-	-	-	-	-	-	-	-	-	-	-	3	-	-
CO2	-	-	-	-	-	-	-	-	-	-	-	3	-	-
CO3	-	-	-	-	-	-	-	-	-	-	-	3	-	-
CO4	-	-	-	-	-	-	-	-	-	-	-	2	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Average	-	-	-	-	-	-	-	-	-	-	-	**2.2**	-	-

Correlation: 3–Strong; 2–Medium; 1-Weak

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM III Year-II Sem			
Course Code: **M3162**	**DATABASE MANAGEMENT SYSTEMS LAB**	L	T	P	C
		0	**0**	**3**	**1.5**

Pre-Requisites: NIL

EXPERIMENT 1.

E-R Model Road way Travels

EXPERIMENT 2.

Concept design with ER Model for Roadway Travels

EXPERIMENT 3.

Relational Model for Roadway Travels

EXPERIMENT 4.

Normalization techniques for Roadway Travels

EXPERIMENT 5.

Installation of My SQL and practicing DDL and DML commands

EXPERIMENT 6.

Querying using Aggregate functions, GROUPBY, HAVING and creation and dropping of views

EXPERIMENT 7.

Create tables for the following schema. Student(snum:integer ,sname:string ,age:integer) Class (name: string ,fid: integer)
Enrolled(snum :integer ,cname:string) Faculty(fid:integer ,fname:string , deptid: integer)

EXPERIMENT 8.

Queries:
Write the following queries in SQL. No duplicates should be printed in any of the answers.

1. Find the names of all juniors (level=Jr) who are enrolled for class taught by professor Harshith.
2. Find the names of all classes that either meet in room128 or have 5 or more students enrolled.
3. Find the names of all students who are enrolled in two classes that meet at same time.
4. Find the names of faculty members who teach in every room in which some class is taught.

5. Find the names of the faculty members for who me the combined enrolment of the classes that they Teach is less than five.

EXPERIMENT 9.

Creation of stored procedures, execution of procedures and modification of procedures.

EXPERIMENT 10.

CASE STUDYE-R MODEL: HOSPITAL MANAGEMENT SYSTEM
The aim of this case study is to design and develop a database for the hospital to maintain the records of various departments, rooms, and doctors in the hospital. As part of the case student shall create E-R diagram, Relational database Schema. Write the necessary SQL Queries and
record the results.

Course Outcomes

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

CO1. Acquire the underlying concepts of database technologies.
CO2. Design and implement a database schema for a given problem-domain.

CO3. Apply Normalization to a database.

CO4. Populate and query a database using SQL DML/DDL commands.

CO5. Declare and enforce integrity constraints on a database using a state-of-the-art RDBMS.

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM III Year-II Sem			
Course Code: **M3201**	**LIFE SKILLS AND PROFESSIONAL SKILLS LAB**	L	T	P	C
		0	**0**	**4**	**2**

Pre-Requisites: NIL

Module 1:

Self-Introduction and Practice Session-Importance of Communication Skills-Advance communication skills needed for effective communication-Self-assessment and self-awareness with required tools and Activity based approach.

Module 2:

Empathy Practice Sessions & Role-plays -Assertive Behaviour-Emotional Intelligence Conflict Resolution and Anger Management.

Module 3:

Social skills and how to handle criticism-Social Interaction Skills – Role-plays- Diversity & Social Responsibility- Positive Attitude- Power of Positive Energy

Module 4:

Leadership-Traits & skill-Activities – Case Studies-Assessments - Team Building skills – Activities –Case studies on Interaction with industry people.

Module 5:

Thinking Out-of-the Box – Case-study & Activity Based- Creativity & Innovation Developing a Vision & Action-plan - Thinking Skills – Various Types of Thinking - Power of Questioning Skills– Practice Sessions & Role plays

Text Books

1. Butterfield, Jeff. Soft Skills for Everyone. Delhi: Cenege., 2010.
2. Raman, Meenakshi and Sangeeta Sharma. Technical Communication-Principles and Practice. Third Edition, New Delhi: UP., 2015.
3. Rizvi, M Ashraf. Effective Technical-Communication. New Delhi: Tata McGraw- Hill., 2005.

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM III Year-II Sem			
Course Code: **M32MC3**	**ARTIFICIAL INTELLIGENCE (Mandatory Course -IV)**	L	T	P	C
		2	**0**	**0**	**0**

Pre-Requisites:

1. **Mathematics, Probability and statistics**
2. **Knowledge in programming Language**

Module 1:

Introduction: AI problems, Agents and Environments, Structure of Agents, Problem Solving Agents

Basic Search Strategies: Problem Spaces, Uninformed Search (Breadth-First, Depth First Search, Depth-first with Iterative Deepening), Heuristic Search (Hill Climbing,
Generic Best-First, A*), Constraint Satisfaction (Backtracking, Local Search)

Module 2:

Advanced Search: Constructing Search Trees, Stochastic Search, A* Search Implementation, Minimax Search, Alpha-Beta Pruning

Basic Knowledge Representation and Reasoning: Propositional Logic, First-Order Logic, Forward Chaining and Backward Chaining, Introduction to Probabilistic Reasoning, Bayes Theorem.

Module 3:

Advanced Knowledge Representation and Reasoning: Knowledge Representation Issues, Non-monotonic Reasoning, Other Knowledge Representation Schemes.

Reasoning Under Uncertainty: Basic probability, Acting Under Uncertainty, Bayes'
Rule, Representing Knowledge in an Uncertain Domain, Bayesian Networks.

Module 4:

Learning: What Is Learning? Rote Learning, Learning by Taking Advice, Learning in Problem Solving, Learning from Examples, Winston's Learning Program, Decision Trees.

Module 5:

Expert Systems: Representing and Using Domain Knowledge, Shell, Explanation, Knowledge Acquisition

Text Books

1. Russell, S. and Norvig, P, Artificial Intelligence: A Modern Approach, Third Edition, Prentice-Hall, 2010

Reference Books

1. Artificial Intelligence, Elaine Rich, Kevin Knight, Shivasankar B. Nair, The McGraw Hill publications, Third Edition, 2009.
2. George F. Luger, Artificial Intelligence: Structures and Strategies for Complex Problem Solving, Pearson Education, 6th ed., 2009.

E-Resources

1. https://www.tutorialspoint.com/artificial_intelligence/artificial_intelligence_pdf_ver sion.htm
2. https://www.alljntuworld.in/download/artificial-intelligence-ai-materials-notes/
3. https://drive.google.com/file/d/1mPiI4jy6YkJRDiCT21xgzN0VDNkrW23X/view
4. https://nptel.ac.in/courses/106/105/106105077/

Course Outcomes

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

CO1. Identify the AI based problems.

CO2. Apply AI techniques for representing the basic problem.

CO3. Apply Advanced AI techniques to solve the problem.

CO4. Analyze Learning and explain various learning techniques.

CO5. Illustrate the use of expert system.

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM III Year-II Sem			
Course Code: **M32AC3**	**INDIAN CONSTITUTION (Audit course -IV)**	L	T	P	C
		2	**0**	**0**	**0**

Pre-Requisites: NIL

Module 1: Evolution of the Indian Constitution

1909 Act, 1919 Act end 1935 Act. Constituent Assemtily Composition and Functions Fundamentals features of the Indian Constitution

Module 2: Union Government

Executive: President. Prime Minister
Council of Minister Executive: Governor, Chief Minister, Council of Minister
Local Government: Panchayat Raj Institutions, Urban Government

Module 3: Rights and Duties

Fundamental Rights. Directive principles. Fundamental Duties.

Module 4: Relation between Federal and provincial units

Union State relations. Administrative, legislative and Financial. Inter State council. NITI Ayog Finance Commission of India.

Module 5: Statutory Institutions

Elections-Election Commission of India, National Human Rights Commission National Commission for Women.

Text Books

1. D.D. Basu, Introduction to the constitution of India. Lexis Nexis. Now Delhi
2. Subhash Kashyap, Our Parliament, National Book Trust. New Delhi.

Reference Books

1. Peu Ghosh Indian Government & Polities. Prentice Hell of India, New Delhi
2. B.Z. Fadia & Kuldeep Fadia, Indian Government & Polices, LexisNexis. New Delhi

Course Outcomes

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

CO1. Know the background of the present constitution of India.

CO2. Understand the working of the union, state and local levels.

CO3. Gain consciousness on the fundamental rights and duties.

CO4. Understand the functioning and distribution of financial resources between center and states.

CO5. Exposed to the realty of hierarchical Indian social structure and the way the grievances the deprived sections can be addressed to raise human dignity in a democratic way.