B.TECH

Electronics and Communication Engineering

JBIET-R24

Academic Regulations & Detailed Syllabus

JBIET Academic Regulations –R25

Applicable to

B.Tech Regular Four-Year Degree Programme

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

&

B.Tech (Lateral Entry Scheme)

(For the Batches admitted from the Academic Year 2026-27)

J.B. INSTITUTE OF ENGINEERING AND TECHNOLOGY

(UGC AUTONOMOUS)

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

Telangana, India

J.B. INSTITUTE OF ENGINEERING AND TECHNOLOGY

(UGC Autonomous)

JBIET Academic Regulations - R25

Applicable to

B.Tech Regular Four-Year Degree Programme

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

&

B.Tech (Lateral Entry Scheme)

(For the Batches admitted from the Academic Year 2026- 27)

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

J. B. Institute of Engineering and Technology (hereinafter referred to as JBIET) Academic Regulations JB-R25 are given here under. These regulations approved by the Academic Council shall be in force and applicable from the academic year 2025-26 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 2025-26.

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. A student after securing admission shall complete the B.Tech. programme in a minimum period of four academic years and a maximum period of eight academic years starting from the date of commencement of first year first semester, failing which student shall forfeit seat in B.Tech. course. Each student has to secure a minimum of 160 credits out of 164 credits for successful completion of the undergraduate programme and award of the B.Tech. degree.

3.2. UGC/ AICTE/NEP-2020/JNTUH specified definitions/ descriptions are adopted appropriately for various terms and abbreviations used in these academic regulations/ norms.

3.2.1 Semester Scheme: The undergraduate programme is of four academic years and there shall be two semesters in each academic year. There shall be a minimum of 15 weeks of instruction, excluding the midterm and semester-end exams. Around 15 instruction hours, 30 instruction hours and 45 hours of learning need to be followed per one credit of theory course, practical course and project/field-based learning respectively. In each semester, there shall be 'Continuous Internal Evaluation (CIE)' and 'Semester End Examination (SEE)' under Choice Based Credit System (CBCS). The curriculum/course structure suggested by AICTE/JNTUH is followed as a reference document.

3.2.2 Credit Courses: All courses offered in each semester are to be registered by the student. Against each course in the course structure, the L: T: P: C (lecture periods: tutorial periods: practical periods: credits) pattern has been defined.

- One credit is allocated for one hour per week in a semester for lecture (L) or Tutorial (T) session.
- One credit is allocated for two hours per week in a semester for Laboratory/ Practical (P) session.
- One credit is allocated for three hours per week in a semester for Project/Mini-Project session.
- For example, a theory course with three credit weightage requires three hours of classroom instruction per week, totalling approximately 45 hours of instruction over the entire semester.

3.2.3 Subject Course Classification: All subjects/courses offered for the undergraduate programme in E&T (B.Tech. degree programmes) are broadly classified as follows.

S. No.	Broad Course Classification	Course Group/ Category	Course Description
1	Foundation Courses (FnC)	BS – BasicSciences	Includes Mathematics, Physics and Chemistry courses
2		ES- Engg. Sciences	Includes Fundamental Engineering Courses
3		HS – Humanities and Social sciences	Includes courses related to Humanities, Social Sciences and Management
4	Core Courses (CoC)	PC– Professional Core	Includes core courses related to the parent branch of Engineering.
5	Elective Courses(EIC)	PE – Professional Electives	Includes elective courses related to the parent branch of Engineering.
6		OE – Open Electives	Elective courses which include inter-disciplinary courses or courses in an area outside the parent branch of Engineering.
7	Project Core	PW- Project Work	B.Tech. Project Work

8	Other Core Courses (OCC)	Industry Training/ Internship/ Industry Oriented Mini project/ Skill Development Courses	Industry Training/ Internship/ Industry Oriented Mini-Project/Skill Development Courses
9		Seminar	Seminar based on core contents related to parent branch of Engineering.
10	Skill Development Courses (SDC)	--	Courses designed to help individuals gain, improve, or refine specific skills
11	Value Added Courses (VAC)	--	Courses to build professional values, traditional knowledge and sensitization of societal issues

4.0 Mandatory Induction Programme

An induction program of one week duration for the UG students entering the institution, right at the start shall be implemented. Normal classes commence only after the induction programme is conducted. Following activities could be part of the induction programme: i) Physical Activity, ii) Creative Arts, iii) Imparting Universal Human Values, iv) Literary Activities, v) Lectures by Eminent People, vi) Visits to Local Areas and vii) Familiarization to department as well as entire institute and viii) Making students understand Innovative practices at the college premises etc.

5.0 Course Registration

5.1 A faculty advisor / mentor shall be assigned to a group of around 20 students, who will advise the students about the undergraduate programme, its course structure and curriculum, choices/options of the courses, based on their competence, progress, pre-requisites and interest.

5.2 The academic section of the college invites ‘registration forms’ from students before the beginning of the semester ensuring ‘date and time stamping’. The registration requests for semester courses shall be completed two weeks before the commencement of SEEs (Semester End Examinations) of the preceding semester.

5.3 A student can apply for registration, only after obtaining the ‘written approval’ from faculty advisor/mentor, 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/ mentor and the student.

5.4 A student shall register for all the courses offered in a semester as specified in the course structure.

5.5 Course options exercised through registration are final and cannot be changed; further, alternative choices also will not be considered. However, if the course that has already been listed for registration by the Head of the Department in a semester could not be offered due to any inevitable or unexpected reasons, then the student shall be allowed to have alternative choice either for a new course (subject to offering of such a course), or for another existing course. Such alternative arrangements will be made by the Head of the Department, with due notification and time-framed schedule, within a week, but before the commencement of classwork of the semester.

5.6 The Head of the Department / Course Coordinator should review vacant slots in the timetable of each section once in every week or fortnight. The vacant slots in the time-table may be allocated to the subject teachers who could not take classes in proportion to the number of weeks completed from the commencement of the semester.

5.7 Two faculty members may be allocated for the tutorial session of Mathematics-1 course for better interaction/practice and to minimise the failures in the subject.

5.8 Professional Electives: The students have to choose six Professional Electives (PE-I to PEVI) from the six baskets of professional electives given.

Students have the flexibility to choose from the list of professional electives offered by the JBIET or opt to register for the equivalent Massive Open Online Courses (MOOCs) with prior approval of the courses from Board of Studies and Academic Council.

5.9 Open Electives: Students have to choose three Open Electives (OE-I, II & III) from three baskets of Open Electives given by other than the parent department. However, the student can opt for an Open Elective course offered by his parent department, if the student has not studied that course so far. Similarly, Open Elective courses being studied should not match with any courses of the forthcoming semesters.

5.10 Provision for Early Registration of MOOCs: For a professional elective in a semester, students are allowed to register for an equivalent MOOCs course listed from time to time by the University one semester in advance. For example, a Professional Elective of III Year II Sem shall be allowed to register under MOOCs platform in III year I Sem.

The credits earned in one semester in advance can be submitted in the subsequent semester for the assessment. The students who have registered in advance in an equivalent MOOCs course and fail to secure any pass grade in the MOOCs course, can register for the regular course offered in the following semester of their course structure.

5.11 Conversion of Marks Secured in MOOCs into Grades: Marks secured in the internal and external evaluations of a MOOCs course shall be scaled to 40 and 60 marks respectively. The sum of these two components shall be considered as the total marks out of 100. The corresponding grade shall then be determined as per the marks-to-grades conversion rules specified in Clause 10.3.

5.12 MOOCs are allowed only for professional elective courses and for a few Minors & Honors courses

5.13 Additional learning resources: Students are encouraged to acquire additional course-related knowledge by auditing learning resources from MOOCs platforms for each course offered in their course structure. These additional courses are not meant for earning credits but are intended to enhance knowledge. They are categorized into three types: prerequisite, reinforcement, and aspirational. Prerequisite courses help students gain familiarity and provide sufficient background. Reinforcement courses aim to offer different perspectives on learning, while aspirational courses focus on next-level or advanced learning.

6.0 Rules to offer Elective courses

6.1 An elective course may be offered to the students, only if a minimum of 50% of class strength opts for it.

6.2 Same elective course for different sections may be offered by different faculty members. The selection of elective course by students will be based on first come first serve and / or CGPA criterion.

6.3 If the number of students registrations are more than the strength of one section, then it is choice of the concerned Department to offer the same course for more than one section based on the resources available in the department.

7.0 Attendance requirements:

7.1 A student shall be eligible to appear for the semester-end examinations, if the student acquires a minimum of 75% of aggregate attendance of all the courses for that semester.

7.2 Shortage of attendance in aggregate upto 10% (securing 65% and above but below 75%) in each semester may be condoned by the college academic committee on genuine and valid grounds, based on the student's representation with supporting evidence.

7.3 A stipulated fee shall be payable for condoning of shortage of attendance as notified.

7.4 Two hours of attendance for each theory course shall be considered, if the student appears for the mid-term examination of that course.

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

7.6 Students whose shortage of attendance is not condoned in any semester, are not eligible to take their semester-end examinations of that semester. They get detained and will not be promoted to the next semester. Their registration for that semester shall stand cancelled, including internal marks. They may seek re-registration for that semester in the next academic year.

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

8.0 Criteria for Earning of Credits in a Course

8.1 A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each course, if the student secures 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 course.

8.2 A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to Field Based Research Project / Industry Oriented Mini Project /

Internship, 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/she (i) does not submit a report on Field-Based Research Project/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 Field-Based Research Project / Industry Oriented Mini Project / Internship evaluations.

8.3 A student eligible to appear in the semester-end examination for any course, is absent from it or failed (thereby failing to secure 'C' grade or above) may re-appear for that course in the supplementary examination as and when it is conducted. In such cases, internal marks assessed in continuous internal evaluation (CIE) earlier for that course will be carried over and added to the marks obtained in the SEE supplementary/make-up examination. If the student secures sufficient marks for passing, 'C' grade or above shall be awarded as specified in clause 10.3.

9.0 Distribution of Marks and Evaluation

9.1 The performance of a student in every course (including Value Added Courses and Skill Development Courses, Laboratory/Practical and Project Work) will be evaluated for 100 marks each, with 40 marks allotted for CIE (Continuous Internal Evaluation) and 60 marks for SEE (Semester End-Examination), irrespective of the credits allocated.

9.2 Continuous Internal Evaluation (CIE)

9.2.1 Theory Courses:

For theory courses, 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, totalling to 30 marks. Total duration of mid-term examination is two hours.

1. 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 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).

While the first mid-term examination shall be conducted on 50% of the syllabus, the second mid-term examination shall be conducted on the remaining 50% of the syllabus. Questions will be drawn from the mid-term exam syllabus, ensuring uniform coverage of all topics. The remaining 10 marks of Continuous Internal Evaluation are distributed as follows:

2. Five marks for the assignment for 5 marks. Student shall submit two assignments and the average of 2 Assignments each for 5 marks shall be taken. The first assignment should be submitted before the conduct of the first mid-term examination, and the second assignment should be submitted before the conduct of the second mid-term examination.

3. Five marks for the Viva-Voce/PPT/Poster Presentation/ Case Study on a topic in the concerned subject. This assessment shall be completed before II Mid-Term Examination.

9.2.2 Engineering Drawing and Computer Aided Drafting Course:

For this course, 20 marks will be allocated for day-to-day assessments conducted during drawing practice sessions, and another 20 marks will be allocated for the mid-term examination. In the mid-term examination, students shall attempt any four out of six given questions. The first mid-term exam will be conducted in the conventional mode using a drawing board, while the second mid-term exam will be conducted using a CAD package.

9.3 A **Computer-Based Test (CBT)** in each course is available for students who either:

1. missed one of the two mid-term examinations due to unavoidable circumstances, or
2. attended both mid-term examinations but wish to improve their internal marks.

The CBT will be conducted at the end of the semester and will carry a total of 30 marks. The marks obtained in the CBT will be considered equivalent to those obtained in one mid-term examination. Zero marks will be awarded to students who are absent from the mid-term examination. The average of the best two scores from the three exams (the two mid-term exams and the CBT), combined with other internal assessment components, will constitute the Continuous Internal Improvement (CII) marks for that specific course.

9.4 Semester End Examination for theory courses

9.4.1 Theory Courses:

The semester end examinations (SEE), for theory courses, will be conducted for 60 marks consisting of two parts viz. i) Part- A for 10 marks and ii) Part - B for 50 marks.

- Part-A is compulsory, consists of five short answer questions covering all units of syllabus; each question carries two marks.
- Part-B consists of five questions carrying 10 marks each. There shall be two questions asked in the question paper from each unit with either-or choice and the student should answer either of the two questions. The student shall answer one question from each of five units.

9.4.2 Engineering Drawing and Computer Aided Drafting Course:

Question paper consists of five questions carrying 12 marks each. There shall be two questions asked in the question paper from each unit with either-or choice and the student should answer either of the two questions. The student shall answer one question from each of five units. There shall be no section with short answer questions.

9.4.3 Duration of SEE:

The duration of Semester End Examination of theory and drawing courses is 3 hours.

9.5 Semester End Examination for Practical Courses

For practical courses there shall be a Continuous Internal Evaluation (CIE) during the semester for 40 marks and semester-end examination for 60 marks. The breakup of the continuous internal evaluation for 40 marks is as follows:

1. 10 marks for a write-up on day-to-day experiments in the laboratory (in terms of aim, components/procedure, expected outcome).
2. 10 marks for viva-voce (or) tutorial (or) case study (or) application (or) poster presentation of the course concerned.
3. 10 marks for the internal practical examination conducted by the laboratory teacher concerned.
4. 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 submission which shall be evaluated after completion of laboratory course and before semester end practical examination.

The Semester End Examination for practical courses shall be conducted with an external examiner and the laboratory course teacher. The external examiner shall be appointed from the college outside their cluster and not from a group colleges.

In the Semester End Examination for practical courses held for 3 hours, rubrics of evaluation for 60 marks is as given below:

1. 10 marks for write-up
2. 15 for experiment/program
3. 15 for evaluation of results
4. 10 marks for presentation on another experiment/program in the same laboratory course and
5. 10 marks for viva-voce on concerned laboratory course.

For any change of experiment, 5 marks will be deducted from the total of 60 marks. If second time change of experiment is requested, another five marks will be deducted from the 60 marks. No third change will be permitted.

9.6 Field-based Research Project:

There shall be a Field-based Research Project in the intervening summer between II-II and III-I Semesters. Students will register for this project immediately after II Year II Semester examinations and pursue it during summer vacation. The Field-based Research Project shall be submitted in a report form and presented before the committee in III year I semester. It shall be evaluated for 100 external marks. The evaluation committee shall consist of an External Examiner, Head of the Department, Supervisor of the Project and a Senior Faculty Member of the department. There shall be no internal marks for Field-based Research Project. Student shall have to earn 40% marks, i.e 40 marks out of 100 marks. The student is deemed to have failed, if he (i) does not submit a report on the Project, or (ii) does not make a presentation of the same before the committee as per schedule, or (iii) secures less than 40% marks in this course.

9.7 Internship/Industry Oriented Mini Project:

There shall be an Internship/Industry Oriented Mini Project in collaboration with an industry from their specialization. Students shall register for this project immediately after III Year II Semester Examinations and pursue it during summer vacation. Internship should be carried out at an organization (or) Industry. The Industry Oriented Mini Project

shall be submitted in a report form and presented before the committee in IV Year I Semester before the semester end examination. It shall be evaluated for 100 external marks. The committee consists of an External Examiner, Head of the Department, Supervisor of the Industry Oriented Mini Project/Internship, and a Senior Faculty Member of the Department.

9.7.1 For evaluating industry-oriented mini-projects, it is preferable to appoint an external examiner from the industry, ideally from one of the organizations/ industries with which the institute has established / proposing to establish collaborations.

9.8 UG Project Work:

9.8.1 The UG project work shall be initiated at the beginning of the IV Year II Semester, and the duration of the project work is one semester. The student must present in consultation with his/her supervisor, the title, objective and plan of action of his/her Project work to the departmental committee for approval within two weeks from the commencement of IV Year II Semester. Only after obtaining the approval of the departmental committee, the student can start his/her project work.

9.8.2 Student has to submit project work report at the end of IV Year II Semester. The project work shall be evaluated for 100 marks. Out of which 40 marks and 60 marks are allocated for CIE and External Evaluation respectively.

9.8.3 For internal evaluation, the departmental committee consisting of Head of the Department, Project Supervisor and a Senior Faculty Member shall evaluate the project work for 40 marks.

- The distribution of marks is as follows:
- Objective(s) of the work done - 05 Marks
- Methodology adopted - 15 Marks
- Results and Discussions - 15 Marks
- Conclusions and Outcomes - 05 Marks

Total - 40 Marks

9.8.4 The External Evaluation shall be conducted by the external examiner for a total of 60 marks. It shall comprise the presentation of the work, communication skills, and viva-voce, with a weightage of 20 marks, 15 marks, and 25 marks respectively.

The topics for main Project shall be different from the topic of Industry Oriented Mini Project/ Internship/SDC. The student is deemed to have failed, if he (i) does not submit a report on the Project, or (ii) does not make a presentation of the same before the External Examiner as per schedule, or (iii) secures less than 40% marks in the sum total of the CIE and SEE taken together.

9.8.5 For conducting viva-voce exam of project work, University appoints an external examiner. The external examiner may be selected from the list of experts submitted by the Principal of the College.

9.8.6 A student who has failed, may re-appear once for the above evaluation, when it is scheduled again; if student fails in such 'one re-appearance' evaluation also, he/she has to appear for the same in the next subsequent year, as and when it is scheduled.

9.9 Skill Development Courses:

Four Skill Development Courses are included in the Curriculum in II-1, II-2, III-1 and III-2 semesters. Each Skill Development Course carries one credit. The evaluation pattern will be same as that of a laboratory course including the internal and external assessments.

The objective of Skill Courses is to develop the cognitive skills as well as the psycho-motor skills.

9.10 Value-Added Courses:

The evaluation of Value-Added Courses shall be similar to that of theory courses. However, the scheduling of these mid-term exams and semester-end examinations may not be combined with main-stream examinations. One hour /45 mins proctored mid-term examination shall be conducted in the regular class by the same subject teacher. It should not impact the conduct of other classes on that day.

10.0 Grading Procedure

10.1 Absolute grading system is followed for awarding the grades to each course.

10.2 Grades will be awarded to indicate the performance of students in each Theory, Laboratory, Industry-Oriented Mini Project/ Internship/ Skill development course and Project Work. Based on the percentage of marks obtained (Continuous Internal

Evaluation plus Semester End Examination, both taken together) as specified in clause 8 above, a letter grade shall be given as explained in the following clause.

10.3 To measure the performance of a student, a 10-point grading system is followed. The mapping between the percentage of marks secured and the corresponding letter grade is as follows:

Range of % of Marks Secured in a Course	Letter Grade	Grade Points (GP)
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

10.4 A student shall be declared successful or 'passed' in a semester, if he/she secures 'C' grade or above in every course (ie GP ≥ 5)

10.5 A student who has obtained an 'F' grade in any course shall be deemed to have 'failed' and is required to re-appear for a supplementary exam as and when conducted. In such cases, internal marks in those courses will remain the same as those obtained earlier.

10.6 To a student who has not appeared for an examination in any course, 'Ab' grade will be allocated in that course, and he/she is deemed to have 'Failed'. Such student will be required to re-appear for supplementary/make-up exam as and when conducted. The internal marks in those courses will remain the same as those obtained earlier.

10.7 The students earn a Grade Point (G) in each course, on the basis of letter grade secured in that course. Every student who passes a course will receive grade point GP ≥ 5 ('C' grade or above).

10.8 The 'Credit Points' (C) are computed by multiplying the grade point with credits for a given course.

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

10.9 The Semester Grade Point Average (SGPA) is calculated only when all the courses offered in a semester are cleared by a student. It is calculated by dividing the sum of credit points (∑ CG) secured from all courses registered in a semester, by the total number of credits registered during that semester. SGPA is rounded off to two decimal places. SGPA for each semester is thus computed as

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

where 'i' is the course indicator index (considering all courses in a semester), 'N' is the no. of courses 'registered' for the semester (as listed under the course structure of the branch), C_i is the no. of credits allotted to the i^{th} course, and G_i represents the grade points (GP) corresponding to the letter grade awarded for that i^{th} course.

10.10 If a student earns more than 160 credits, only the courses corresponding to the best 160 credits shall be considered for the computation of CGPA of B.Tech. degree.

10.11 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 for the courses correspond to best 160 credits out of all registered courses in all semesters, and the total number of credits correspond to those selected courses. CGPA is rounded off to two decimal places. CGPA is thus computed at the end of each semester, from the I year II semester onwards, as per the formula

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

where 'M' is the total no. of courses corresponding to the best 160 credits from the courses registered in all eight semesters, 'j' is the course indicator index (takes into account all courses from 1 to 8 semesters), C_j is the no. of credits allotted to the j^{th} course, and G_j represents the grade points (GP) corresponding to the letter grade awarded for that j^{th} course.

Illustration of calculation of SGPA:

Course	Credits	Letter Grade	Grade Points	Credit Points
Course 1	4	A	8	4 x 8 = 32
Course 2	3	O	10	3 x 10 = 30
Course 3	3	C	5	3 x 5 = 15
Course 4	3	B	6	3 x 6 = 18
Course 5	3	A	8	3 x 8 = 24
Course 6	2	A+	9	2 x 9 = 18
Course 7	1	C	5	1 x 5 = 5
Course 8	1	O	10	1 x 10 = 10
	20			152

$$SGPA = \frac{152}{20} = 7.6$$

The CGPA of the entire B.Tech. programme shall be calculated considering the best 160 credits earned by the student.

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

10.13 SGPA of a semester will be mentioned in the semester Memorandum of Grades if all courses of that semester are cleared in first attempt. Otherwise, the SGPA shall be mentioned only on the Memorandum of Grades in which sitting he passed his last exam in that semester.

11.0 Declaration of Results and issue of Grade Memo

11.1 While declaring the results, the web-version should display the marks earned by the students with the internal and external marks break-up. However, in the memorandum of grades, the marks need not be shown.

11.2 After the completion of each semester, a certificate of memorandum of grades shall be issued to all the registered students, indicating the letter grades and credits earned. It will show the details of the courses registered (course code, course title, no. of credits), letter grade and credits earned.

12.0 Withholding of Results

12.1 If the student has not paid the fees to the JBIET at any stage, or has dues pending due to any reason whatsoever, or if any case of indiscipline is pending, the result of the student may be withheld, and the student will not be allowed to go into the next higher semester. The request to university for award or issue of the degree may also be withheld in such cases.

13.0 Supplementary Examinations:

13.1 At the end of each semester, along with regular semester examinations, supplementary examinations shall be conducted for the students who have back-log subjects.

13.2 Advanced supplementary examinations in IV Year II Semester courses may be conducted for those who failed in any course offered in IV Year II Semester. It may enable the students to receive their B.Tech. provisional certificate at an early date. Advanced supply examinations may be scheduled within one month period after the declaration of the final semester results. There shall be no supplementary examination in the successive semester. The students who could not secure any pass grade in advance supplementary examinations have to wait for regular series examination of next batch to write their back-log examination.

14.0 Promotion Rules

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 and fulfilment of attendance requirement.
2	First year second semester to second year first semester	(i) Regular course of study of first year second semester and fulfilment of attendance requirement (ii) Must have secured at least 25% of the total 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 and fulfilment of attendance requirement.
4	Second year second semesterto third year first semester	(i) Regular course of study of second year second semester and fulfilment of attendance requirement. (ii) Must have secured at least 25% of the total credits up to second year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
5	Third year first semester to third year second semester	Regular course of study of third year first semester and fulfilment of attendance requirement.
6	Third year second semester to fourth year	Regular course of study of third year second semester and fulfilment of attendance

	first semester	requirement.
7	Fourth year first semester to fourth year second semester	Regular course of study of fourth year first semester and fulfilment of attendance requirement.

15.0 Re-admission after Detention

i) A student detained due to lack of credits, shall be promoted to the next academic year only after acquiring the required number of credits.

ii) A student detained due to shortage of attendance shall be admitted in the same semester in the successive academic years.

iii) When a student is readmitted in the following academic years, the academic regulations under which the student seeks re-admission shall only be applicable to this student, not the academic regulations in which he got admitted in his/her first year of study.

16.0 Credit Exemption

A student (i) shall register for all courses covering 164 credits as specified and listed in the course structure and (ii) earn 160 or more credits to successfully complete the undergraduate programme.

- Best 160 credits shall be considered for CGPA computation. The student can avail exemption of courses totaling up to 4 credits other than Professional core courses, Laboratory Courses, Seminars, Project Work and Field Based Research Project / Industry Oriented Mini Project / Internship, for optional drop out from these 164 credits registered.
- The semester grade point average (SGPA) of each semester shall be mentioned at the bottom of the grade card, when all the subjects in that semester have been passed by the student.
- Credits earned by the student in either a Minor or Honors program cannot be counted towards the required 160 credits for the award of the B.Tech. degree.

17.0 Award of Degree

17.1 A student who registers for all the courses specified in the course structure and secures the required number of 160 credits within 8 academic years from the date of commencement of the first academic year, shall be declared to have qualified for the award of B.Tech. degree by JNTUH in the branch of Engineering selected at the time of admission.

17.2 A student who qualifies for award of the degree by JNTUH as listed in item 17.1 shall be placed in the following classes.

17.3 A student with final CGPA (at the end of the undergraduate programme) ≥ 7.5, and fulfilling the following conditions - shall be placed in 'First Class with Distinction':

(i) Should have passed all the courses in 'First Appearance'.

(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.

A student not fulfilling any of the above conditions with final CGPA ≥ 7.5 shall be placed in 'First Class'.

17.4 Students with final CGPA (at the end of the undergraduate programme) ≥ 6.5 but < 7.5 shall be placed in 'First Class'.

17.5 Students with final CGPA (at the end of the undergraduate programme) ≥ 5.5 but < 6.5, shall be placed in 'Second Class'.

17.6 All other students who qualify for the award of the degree (as per item 17.1), with final CGPA (at the end of the undergraduate programme) ≥ 5.00 but < 5.5, shall be placed in 'pass class'.

17.7 Grace Marks

Grace marks shall be given to those students who complete the course work of four year B. Tech. degree, not secured pass grade in not more than three subjects and adding a specified grace marks enables the student to pass the subject(s) as well as gets eligibility to receive the provisional degree certificate.

Grace marks for students admitted under the R-25 Academic Regulations should not exceed 0.15% of the total maximum marks in all eight semesters (excluding the marks allocated for value added courses and skill development courses).

18.0 Award of Gold Medals

18.1 Students fulfilling the conditions listed under item 17.3 alone will be eligible for award of 'Gold Medal' during Graduation Day.

18.2 If more than one student secures the same highest CGPA, then the following tie resolution criteria, in the same order of preference shall be followed for selecting the Gold Medal winner, until the tie is resolved: 1) more number of times secured highest SGPAs, ii) more number of O and A+ grades in that order and iii) highest SGPA in the order of first semester to eight semester.

19.0 Conversion of CGPA into equivalent Percentage of Marks

19.1 The following formula shall be used for the conversion of CGPA into equivalent marks, whenever it is necessary

Percentage (%) of Marks = (Final CGPA – 0.5) x 10

20.0 Honours and Minor Degree Programs

Honours and Minor Degree programs will be available in all branches of B.Tech. degree. Minor Degree programs will commence from II Year II Semester and continue till IV Year I semester and Honours Degree programs will commence from III Year I Semester and continue till IV Year II semester.

Only the JNTUH approved Minors and Honors shall be offered.

21.0 Multiple Entry Multiple Exit Scheme (MEME)

21.1 Exit Option after Second Year:

Students enrolled in the 4-Year B.Tech. program are permitted to exit the program after successful completion of the second year (B.Tech. II Year II Semester). The students who desire to exit after the II year shall formally inform the exit plan one semester in advance i.e. at the commencement of II Year II Semester itself. Such students need to fulfil the additional requirements as specified in Clause 21.2 described below.

Upon fulfilling the requirements like earning all the credits up to II Year II Semester and successfully completing the additional requirements, the students will be awarded a 2-Year Undergraduate (UG) Diploma in the concerned engineering branch.

21.2 Additional Requirements for Diploma Award

To qualify for the diploma under the exit option, students must also complete 2 additional credits through one of the following University-prescribed pathways:

Work-based Vocational Course:

Participation in a practical, hands-on vocational training program relevant to the engineering field, typically conducted during the summer term.

Internship/Apprenticeship:

Completion of a minimum 8-week internship or apprenticeship in their related field to gain practical industry exposure.

In addition, students must clear any associated course(s) and submit the internship/ apprenticeship report as per the schedule and guidelines.

21.3 Re-entry into the B.Tech. Program

Students who have exited the B.Tech. program with a 2-Year UG Diploma may apply for re-entry into the Third Year (Fifth Semester) of the B.Tech. program. Re-entry is subject to the following conditions:

- The student must surrender the awarded UG Diploma Certificate.

- Students who wish to rejoin in III Year must join the same B.Tech. program. Before rejoining, students should check for continuation of the same branch at the college. If the specific branch is closed then student should consult the University for the possible alternative solutions.

- Re-registered students will be governed by the academic regulations in effect at the time of re-entry, regardless of the original regulations under which they were admitted.

If a student opts to continue his/her studies without a gap after being awarded the diploma, they must register for the third-year courses before the commencement of classwork.

21.4 Break in Study and Maximum Duration

Students are allowed to take a break of up to four years after completion of II Year II Semester with prior University permission through the Principal of the college.

Re-entry after such a break is subject to the condition that the student completes all academic requirements within twice the duration of the program (i.e., within 8 years for a 4-year B.Tech. program).

22.0 Transitory Regulations for the students re-admitted in R-25 Regulations:

22.1 Transitory regulations are applicable to the students detained due to shortage of attendance as well as detained due to the shortage of credits and seek permission to re-join the B.Tech. programme, where R-25 regulations are in force.

22.2 A student detained due to shortage of attendance and re-admitted in R-25 regulations: Such students shall be permitted to join the same semester, but in R-25 Regulations.

22.3 A student detained due to shortage of credits and re-admitted in R-25 regulations: Such students shall be promoted to the next semester in R-25 regulations, only after acquiring the required number of credits as per the corresponding regulations of his/her previous semester.

22.4 A student who has failed in any course in a specific regulation has to pass those courses in the same regulations.

22.5 If a student is readmitted to R-25 Regulations and has any course with 80% of syllabus common with his/her previous regulations, that particular course in R-25 Regulations will be substituted by an equivalent course of R-24 or R-22 regulations approved by BOS, AC followed by JNTUH. All these details are summarized in a set of look-up Table; one set for each B. Tech. branch.

22.6 Look Up Table of equivalence courses

22.6.1 A lookup table will be provided for the benefit of students. This lookup table will include all the courses to be registered by students who have been re-admitted under the R-25 Academic Regulations from the R-24 and R-22 Academic Regulations. Separate lookup tables will be provided for the following categories of students:

1. Students re-admitted into the I Year II Semester of the R-25 Regulations
2. Students re-admitted into the II Year I Semester of the R-25 Regulations
3. Students re-admitted into the II Year II Semester of the R-25 Regulations
4. Students re-admitted into the III Year I Semester of the R-25 Regulations
5. Students re-admitted into the III Year II Semester of the R-25 Regulations
6. Students re-admitted into the IV Year I Semester of the R-25 Regulations
7. Students re-admitted into the IV Year II Semester of the R-25 Regulations

For every B.Tech. branch there shall be separate set of seven lookup tables.

22.7 The R-25 Academic Regulations are applicable to a student from the year of re-admission. However, the student is required to complete the study of B.Tech. degree within the stipulated period of eight academic years from the year of first admission.

23.0 Student Transfers

23.1 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.

23.2 The transferred students shall be given a chance to write CBTs for getting CIE component in the equivalent course(s) as per the clearance letter issued by the JNTUH.

24.0 Value Added Courses

24.1 Faculty members who have received a certificate in Innovation and Entrepreneurship / Entrepreneurship from a reputed foundation/organization may be given preference to teach the "Innovation and Entrepreneurship" course. This certificate course should include an assessment. Total training duration (online or physical), excluding assessment, should be at least 30 hours. Faculty members from all disciplines with innovative mindset and aptitude to co-create an entrepreneurial ecosystem are eligible to teach this subject.

24.2 Faculty members who have credited a course on Intellectual Property Rights in their UG or PG programme or credited an equivalent course in MOOCs platform/ reputed foundation/ organization in which assessment is a part, may be given preference to teach the elective course on Intellectual Property Rights.

24.3 To ensure quality delivery and standardization in teaching the Indian Knowledge System (IKS) and other value-added courses, the following guidelines must be adhered to: i) faculty members must undergo a Faculty Development Program (FDP) organized by UGC-MMTTC (Malaviya Mission Teacher Training Centre), or Any other recognized and competent institution/organization offering similar certified programs, ii) the total instructional duration of the FDP should be a around 32 hours or more, III) all sessions in the FDP must be conducted by certified and qualified resource persons with recognized expertise in the respective domains, iv) A formal assessment component must be included as part of the FDP.

25.0 Mapping with the Sustainable Development Goals

All the courses specified in the course structure of every programme are mapped with the one or more sustainable development goals.

26.0 Scope

26.1 The academic regulations should be read as a whole, for the purpose of any interpretation.

26.2 In case of any doubt or ambiguity in the interpretation of the above rules, the decision of Principal, JBIET is final.

26.3 The Institution may change or amend the academic regulations, course structure or syllabi at any time, and the changes or amendments made shall be applicable to all students with effect from the dates notified by the Institution authorities.

26.4 Where the words "he", "him", "his", occur in the regulations, they include "she", "her", "hers".

27.0 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.
	Gives assistance or guidance or receives it from any other student	Expulsion from the examination hall

(b)	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.	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	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.

	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	
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	Expulsion from the examination hall

	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. (LATERAL ENTRY SCHEME) FROM THE AY 2026-27

Eligibility for the award of B.Tech. Degree (LES)

1. The LES students after securing admission shall pursue a course of study for not less than three academic years and not more than six academic years.
2. The student shall register for 123 credits and secure 120 credits with CGPA ≥ 5 from II year to IV-year B.Tech. programme (LES) for the award of B.Tech. degree.
3. The students, who fail to fulfil the requirement for the award of the degree in six academic years from the year of admission, shall forfeit their seat in B.Tech.
4. The attendance requirements of B.Tech. (Regular) shall be applicable to B.Tech. (LES).

5. Promotion rule

S. No.	Promotion	Conditions to be fulfilled
1	Second year first semester to second year second semester	Regular course of study of second year first semester and fulfilment of attendance requirement.
2	Second year second semester to third year first semester	(i) Regular course of study of second year second semester and fulfilment of attendance requirement. (ii) Must have secured at least 25% of the total credits up to second year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.
3	Third year first semester to third year second semester	Regular course of study of third year first semester and fulfilment of attendance requirement.
4	Third year second semester to fourth year first semester	Regular course of study of third year second semester and fulfilment of attendance requirement.
5	Fourth year first semester to fourth year second semester	Regular course of study of fourth year first semester and fulfilment of attendance requirement.

6. All the other regulations as applicable to B.Tech. 4-year degree course (Regular) will hold good for B. Tech. (Lateral Entry Scheme).
7. LES students are not permitted to exit the B.Tech. program after completion of second year (B.Tech. II Year II Semester).

JBIET-R24	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech-ECE
B. Tech Course Structure		

I Year I Semester						
S. No	**Code**	**Course Title**	**L**	**T**	**P**	**Credits**
1	M110A	Matrices and Calculus	3	1	0	4
2	M110D	Engineering Chemistry	3	1	0	4
3	M110C	English For Skill Enhancement	3	0	0	3
4	M115B	Programming for Problem Solving	3	0	0	3
5	M1141	Elements of Electronics and Communication	0	0	2	1
6	M1103	English Language and Communication Skills Lab	0	0	2	1
7	M1102	Chemistry Laboratory	0	0	2	1
8	M1151	Programming for Problem Solving Lab	0	0	2	1
9	M1132	Computer Aided Engineering Graphics	0	0	4	2.5
10	M11AC2	Human Values and Professional Ethics	2	0	0	-
		Total	**14**	**2**	**12**	**20.5**

I Year II Semester						
S. No	**Code**	**Course Title**	**L**	**T**	**P**	**Credits**
1	M120A	Differential Equations and Vector Calculus	3	1	0	4
2	M120B	Applied Physics	3	1	0	4
3	M122A	Basic Electrical Engineering	3	0	0	3
4	M124A	Basic Electronics Engineering	3	0	0	3
5	M1201	Physics Laboratory	0	0	2	1
6	M1221	Basic Electrical Engineering LAB	0	0	2	1
7	M1241	Basic Electronics Engineering LAB	0	0	2	1
8	M1231	Engineering Workshop and Digital fabrication Practices	0	0	4	2.5
9	M12AC1	Lingua skills for Professional-B1	2	0	0	0
		Total	**14**	**2**	**10**	**19.5**

B. Tech Course Structure

II Year I Semester						
S. No	**Code**	**Course Title**	**L**	**T**	**P**	**Credits**
1	M210B	Fourier and Complex Variables	3	1	0	4
2	M212D	Network Analysis	3	0	0	3
3	M214A	Analog Circuits	3	0	0	3
4	M214B	Signals and Systems	3	0	0	3
5	M214C	Probability Theory and Stochastic Process	3	0	0	3
6	M2123	Network Analysis lab	0	0	2	1
7	M2141	Analog Circuits Lab	0	0	2	1
8	M2142	Basic simulation Lab	0	0	2	1
9	M2143	Internship-1	0	0	2	1
10	M21MC1	Environmental Science (Mandatory Course-I)	2	0	0	0
		Total	**17**	**1**	**8**	**20**

II Year II Semester						
S. No	**Code**	**Course Title**	**L**	**T**	**P**	**Credits**
1	M224G	Linear Control Systems	3	1	0	4
2	M224E	Analog and Digital Communications	3	1	0	4
3	M224B	Electromagnetic waves and Transmission Lines	3	0	0	3
4	M224F	Digital Electronics	3	0	0	3
5	M224D	Integrated Circuit and Applications	3	0	0	3
6	M2241	Analog and Digital Communications Lab	0	0	2	1
7	M2244	Digital Electronics Lab	0	0	2	1
8	M2243	IC Application Lab	0	0	2	1
9	M22MC2	Gender Sensitization (Mandatory Course-II)	2	0	0	0
10	M22AC1	Lingua skills for Professional-B2	2	0	0	0
		Total	**17**	**2**	**6**	**20**

III Year I Semester						
S. No	**Code**	**Course Title**	**L**	**T**	**P**	**Credits**
1	M31EA	Business Economics and Financial Analysis	3	1	0	4
2	BTECEE1	PE-1	3	0	0	3
3	BTECEO1	OE-1	3	0	0	3
4	M314A	Microprocessors and Microcontrollers	3	0	0	3
5	M314B	Digital Signal Processing	3	1	0	4
6	M3142	Microprocessors and Microcontrollers lab	0	0	2	1
7	M3141	DSP Lab	0	0	2	1
8	M3143	Internship-2	0	0	2	1
9	M31MC4	Cyber security (Mandatory Course -III)	2	0	0	0
10	M31AC4	Foundations of Entrepreneurship (Audit course -III)	2	0	0	0
Total			**19**	**1**	**6**	**20**

III Year II Semester						
S. No	**Code**	**Course Title**	**L**	**T**	**P**	**Credits**
1	BTECEE2	PE-II	3	0	0	3
2	BTECEE3	PE-III	3	0	0	3
3	BTECEO2	OE-II	3	0	0	3
4	M324B	VLSI Design	3	1	0	4
5	M324C	Computer Networks	3	1	0	4
6	M3241	VLSI Design Lab	0	0	2	1
7	M3201	Life Skills and Professional Skills	0	0	4	2
8	M32MC3	Artificial Intelligence (Mandatory Course -IV)	2	0	0	0
9	M32AC3	Indian Constitution (Audit course -IV)	2	0	0	0
		Total	**22**	**2**	**6**	**20**

IV Year I Semester						
S. No	**Code**	**Course Title**	**L**	**T**	**P**	**Credits**
1	BTECEE4	PE-IV	3	0	0	3
2	BTECEE5	PE-V	3	0	0	3
3	BTECEO3	OE-III	3	0	0	3
4	M414A	Microwave Engineering	3	0	0	3
5	M414C	Antenna and wave propagation	3	0	0	3
6	M4141	Microwave Engineering Lab	0	0	2	1
7	M4142	Industry oriented Mini Project	0	0	4	2
8	M4143	Major Project Stage-I	0	0	4	2
9	M41MC4	Programmable Logic Controllers (Mandatory -V)	2	0	0	0
		Total	**17**	**0**	**10**	**20**

IV Year II Semester						
S. No	**Code**	**Course Title**	**L**	**T**	**P**	**Credits**
1	BTECEE6	PE-VI	3	0	0	3
2	BTECEO4	OE-IV	3	0	0	3
3	M424A	5G and beyond Communications	3	0	0	3
4	M4242	Seminar	0	0	2	1
5	M4241	Major Project Phase -II	0	0	20	10
		Total	**9**	**0**	**22**	**20**

PROFESSIONAL ELECTIVES:

PROFESSIONAL ELECTIVE-I						
S. No	**Code**	**Course Title**	**L**	**T**	**P**	**Credits**
1	M314C	Telecommunication Switching System & Network	3	0	0	3
2	M314D	IOT & its Applications	3	0	0	3
3	M314E	Information Theory and Coding	3	0	0	3

PROFESSIONAL ELECTIVE-II						
S. No	**Code**	**Course Title**	**L**	**T**	**P**	**Credits**
1	M324D	Cellular & Mobile Communications	3	0	0	3
2	M324E	Adaptive & Wavelet Signal Processing	3	0	0	3
3	M324F	Embedded System Design	3	0	0	3

PROFESSIONAL ELECTIVE-III						
S. No	**Code**	**Course Title**	**L**	**T**	**P**	**Credits**
1	M324F	Digital Image & Video Processing	3	0	0	3
2	M324G	Machine Learning	3	0	0	3
3	M324H	Satellite Communications	3	0	0	3

PROFESSIONAL ELECTIVE-IV						
S. No	**Code**	**Course Title**	**L**	**T**	**P**	**Credits**
1	M414D	Embedded Real Time Operating Systems	3	0	0	3
2	M414E	Fiber Optics Communications	3	0	0	3
3	M414G	Neural Networks and Deep Learning	3	0	0	3

PROFESSIONAL ELECTIVE-V						
S. No	**Code**	**Course Title**	**L**	**T**	**P**	**Credits**
1	M414H	Natural Language Processing	3	0	0	3
2	M414I	Radar Systems	3	0	0	3
3	M414J	Low Power VLSI	3	0	0	3

PROFESSIONAL ELECTIVE-VI						
S. No	**Code**	**Course Title**	**L**	**T**	**P**	**Credits**
1	M424J	System on Chip Architecture	3	0	0	3
2	M424C	Mixed Signal Design	3	0	0	3
3	M424D	Wireless Sensor Networks	3	0	0	3

OPEN ELECTIVES:

OPEN ELECTIVE-I						
S. No	**Code**	**Course Title**	**L**	**T**	**P**	**Credits**
1	M314OD	Mathematical Programming for Engineers	3	0	0	3

OPEN ELECTIVE-II						
S. No	**Code**	**Course Title**	**L**	**T**	**P**	**Credits**
1	M324OD	Quantum Computing	3	0	0	3

OPEN ELECTIVE-III						
S. No	**Code**	**Course Title**	**L**	**T**	**P**	**Credits**
1	M414OD	Principles of Communication	3	0	0	3
2	M414OE	Fundamentals of Audio & Video Electronics and Applications	3	0	0	3

OPEN ELECTIVE-IV						
S. No	**Code**	**Course Title**	**L**	**T**	**P**	**Credits**
1	M424OD	Digital Image and Video Processing for AI	3	0	0	3
2	M424OE	Introduction to Biomedical Electronics	3	0	0	3

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech - ECE 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)	L	T	P	C
		3	**1**	**0**	**4**

Pre-Requisites: Mathematical Knowledge at pre-university level

Course Objectives: To learn

- Types of matrices and their properties.
- Concept of a rank of the matrix and applying this concept to know the consistency and solving the system of linear equations.
- Concept of eigenvalues and eigenvectors and to reduce the quadratic form to canonical form
- Geometrical approach to the mean value theorems and their application to the mathematical problems
- Evaluation of surface areas and volumes of revolutions of curves.
- Evaluation of improper integrals using Beta and Gamma functions.
- Partial differentiation, concept of total derivative
- Finding maxima and minima of function of two and three variables.
- Evaluation of multiple integrals and their applications

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

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 [12 L]

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

- https://nptel.ac.in/courses/111/108/111108098/
- https://nptel.ac.in/courses/111/107/111107108/

Course outcomes:

After learning the contents of this course, the student must be able to

- Write the matrix representation of a set of linear equations and to analyse the solution of the system of equations
- Find the Eigenvalues and Eigen vectors
- Reduce the quadratic form to canonical form using orthogonal transformations.
- Solve the applications on the mean value theorems.
- Evaluate the improper integrals using Beta and Gamma functions
- 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 ECE I Year-I Sem			
Course Code:	**ENGINEERING CHEMISTRY**	L	T	P	C
M110D	(COMMON TO: ECE, CSE, IT & ECM)	**3**	**1**	**0**	**4**

Course Objectives:

The students should be able

- To know the suitablility of water for domestic and industrial purposes.
- To acquire knowledge about different types of batteries and to understand the concepts of corrosion.
- To facilitate successful pursuit of advanced degrees to support interdisciplinary ideas in engineering or other related fields
- Gain the knowledge of chemical reactions those are used in the synthesis of molecules.

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 [12L]

Batteries [7L]

Introduction– Classification of batteries - Primary (Li-MnO_2 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[5L]

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 [9L]

Fuels: Definition, Classification, Characteristics of a good fuel - Types of Calorific value (CV) – Gross and Net CV, Determination of CV using Dulong's formula, Numericals.

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 [10L]

Polymers: Definition–Monomer, Polymer, Polymerization. Types of polymerization – 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.

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

Pre-Requisites: NIL

Course Objectives:
To enable students in
1. Enhancing understanding of key concepts related to language structures and language usage.
2. Ensuring the ability to write grammatically correct and diverse sentences, free from punctuation and spelling errors.
3. Improving students' proficiency in English required for technical education.
4. Building academic competence and confidence to use language effectively.
5. Developing life skills to tackle different challenges.

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(9L)

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 (8L)

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(8L)

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/
3. Cambridge English
4. 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.

AY: 2024-25 Onwards	J. B. INSTITUTE OF ENGINEERING AND TECHNOLOGY (UGC Autonomous)	B. Tech ECE I Year-I Sem			
Course Code: M115B	PROGRAMMING FOR PROBLEM SOLVING (COMMON TO: CE, EEE, ME, ECE, CSE, IT, ECM, CSE(DS), CSE(AIML), AIML & AIDS)	L	T	P	C
		3	0	0	3

Pre-Requisites:

1. Mathematical Knowledge.
2. Analytical Skills.

Course objectives:

The Student will:

- Learn the fundamentals of computers.
- Understand the various steps in program development.
- Understand the syntax and semantics of C programming language.
- Learn the usage of structured programming approach in solving problems.
- Gain the knowledge on searching and sorting methods.

Module 1:

Unit-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, expressions and precedence, Expression evaluation, Storage classes (auto, extern, static and register), type conversion, The main method and command line arguments.

Unit-2: 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:

Unit-1: ARRAYS, STRINGS, STRUCTURES AND PREPROCESSOR:

Arrays: one- and two-dimensional arrays, creating, accessing and manipulating elements of arrays.

Unit-2: 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:

Unit-1: 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,

Unit-2: 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:

Unit-1: 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.

Unit-2: 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:

Unit-1

Basic searching algorithms (linear and binary search techniques),

Unit-2

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

Textbooks

1. Ream Thareja, Programming in C, Oxford university press.
2. B.A. Forouzan and R.F. Gilberg, C Programming and Data Structures, Cengage Learning, (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. Herbert Schildt, C: The Complete Reference, McGraw Hill, 4thEdition
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 ECE I Year-I Sem			
Course Code: M1141	ELEMENTS OF ELECTRONICS AND COMMUNICATION ENGINEERING	L	T	P	C
		0	0	2	1

List of Experiments:

1. Understand the significance of Electronics and communications subjects
2. Identify the different passive and active components
3. Color code of resistors, finding the types and values of capacitors
4. Measure the voltage and current using voltmeter and ammeter
5. Measure the voltage, current with Multimeter and study the other measurements using Multimeter
6. Study the CRO and measure the frequency and phase of given signal
7. Draw the various Lissajous figures using CRO
8. Study the function generator for various signal generations
9. Study of Spectrum analyzer and measure the spectrum
10. Operate Regulated power supply for different supply voltages
11. Study the various gates module and write down the truth table of them
12. Identify various Digital and Analog ICs
13. Observe the various types of modulated signals.

Know the available Softwares for Electronics and communication applications

Course outcomes: Students will be able to:

1. Identify the different components used for electronics applications
2. Measure different parameters using various measuring instruments
3. Distinguish various signal used for analog and digital communications

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECE I Year-II Sem			
Course Code: **M1103**	**ENGLISH LANGUAGE & COMMUNICATION SKILLS LABORATORY** (COMMON TO: ECE, CSE, IT & ECM)	L	T	P	C
		0	**0**	**2**	**1**

Pre-Requisites: NIL

COURSE OBJECTIVES:

To train students:

1. To use accurate and appropriate pronunciation through the practice of phonetic sounds, symbols, word accent and into nation.
2. To improve their fluency in spoken English and neutralize their mother tongue influence through JAM Sessions, Role-play, etc.
3. To comprehend the speech of people of various regions through Listening practice exercises.
   To enable students to transfer information verbally with the right usage of Body language through individual and group activities.
4. To understand nuances of English language by practicing various exercises at Multi-media lab.

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: (9L)

CALL Lab:

The Phoneme: The Syllable.

ICS Lab:

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

Module 3: (9L) 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: (9L)

CALL Lab:

Intonation-Errors in Pronunciation- Neutralizing MTI

ICS Lab:

Introduction to Group Discussion - Mock GD.

Module 5: (9L)

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

Upon successful completion of the course, student will be able to

Neutralize the mother tongue influence in day to communication

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

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

Pre-Requisites:

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 students will be able to:

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

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

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

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

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

AY: 2024-25 Onwards	J. B. INSTITUTE OF ENGINEERING AND TECHNOLOGY (UGC Autonomous)	B. Tech ECE I Year-I Sem			
Course Code: **M1151**	**PROGRAMMING FOR PROBLEM SOLVING LABORATORY** (COMMON TO: CE, EEE, ME, ECE, CSE, IT, ECM, CSE(DS), CSE(AIML), AIML & AIDS)	L	T	P	C
		0	**0**	**2**	**1**

Pre-Requisites:

1. Mathematical Knowledge.
2 Analytical Skills.

Course objectives:

The Student will:

1. Work with an IDE to create, edit, compile, run and debug programs
2. Analyse the various steps in program development.
3. Develop programs to solve basic problems by understanding basic concepts in C like operators, control statements etc.
4. Develop modular, reusable, and readable C Programs using the concepts like functions, arrays etc.
5. Write programs using the Dynamic Memory Allocation concept, files

Lab 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

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECE I Year-II Sem			
Course Code: **M1132**	**COMPUTER AIDED ENGINEERING GRAPHICS** (COMMON TO CE, ME, EEE, AIML, AIDS, CSM & CSD)	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. Appreciate the need of Sectional views of solids and Development of surfaces of solids
CO4. Read and interpret engineering drawings
CO5. 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 ECE I Year-II Sem			
Course Code: M11AC2	HUMAN VALUES AND PROFESSIONAL ETHICS (COMMON TO: CSE(AIML), CSE(DS), AIML, AIDS, CE, EEE & ME)	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.

COURSEOBJECTIVES

1. To enable students appreciate the essential complementarily between 'VALUES' and 'SKILLS'to ensure sustained happiness and prosperity which are the core aspirations of all human beings.
2. To facilitate the development of a Holistic perspective among students towards life, profession and happiness, based on a correct understanding of the Human reality and the rest of existence. Such a holistic perspective forms the basis of Value based living in a natural way.
3. To highlight plausible implications of the above Holistic understanding in terms of ethical human conduct, trustful and mutually satisfying human behaviour and mutually enriching interaction with Nature.

Module I:

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 fulfillment of aspirations of every human being with their correct priority. Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario. Method to fulfill the above human aspirations: understanding and living in harmony at various levels.

Module II:

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 III:

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 fulfillment 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 IV:

Understanding Harmony in the Nature and Existence - Whole existence as Co-existence: Understanding the harmony in the Nature. Interconnectedness and mutual fulfillment 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 V:

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: associally 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 asif 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 Purblishers.
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

1. The students identify the importance of human values and skills for sustained happiness.
2. The students strike a balance between profession and personal happiness/goals.
3. The students realize/explain the significance of trust, mutually satisfying human behavior and enriching interaction with nature.
4. 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 ECE I Year-II Sem			
Course Code: **M120A**	**DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS** **(**COMMON TO: CE, EEE, ME, ECE, CSE, IT, ECM, CSE(DS), CSE(AIML), AIML & AIDS)	L	T	P	C
		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 Objectives:

To learn

- Methods of solving the differential equations of first and higher order.
- Concept, properties of Laplace transforms
- Solving ordinary differential equations using Laplace transforms techniques.
- The physical quantities involved in engineering field related to vector valued functions
- The basic properties of vector valued functions and their applications to line, surface and volume integrals

Course Outcomes:

After learning the contents of this paper, the student must be able to

- Identify whether the given differential equation of first order is exact or not
- Solve higher differential equation and apply the concept of differential equation to real world problems.
- Use the Laplace transforms techniques for solving ODE's.
- 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 ECE I Year-II Sem			
Course Code: **M120B**	**APPLIED PHYSICS** (Common to ECE, CSE, IT, ECM)	L	T	P	C
		3	**1**	**0**	**4**

Pre-Requisites: 10+2 Physics

Course Objectives:

The students should be able to

- Study the characteristics of lasers and optical fibres.
- Understand the basic principles of quantum mechanics and band theory of solids.
- Understand the underlying mechanism involved in construction and working principles of various semiconductor devices.
- Study the fundamental concepts related to the dielectric, magnetic and energy materials.
- Identify the importance of nanoscale, quantum confinement and various fabrications techniques.

Unit-1: LASERs and Optical fibers [10 L]

Module 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.

Module 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.

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

Module 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.

Module 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.

Unit-3: Semiconductor Physics and Devices [9 L]

Module 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.

Module 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.

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

Module 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.

Module 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.

Unit-5: Nanoscience and Characterization Techniques [9 L]

Module 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.

Module 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

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

Reference Books

- P. Bhattacharya, "Semiconductor Optoelectronic Devices", Prentice Hall of India (1997).
- S.O. Pillai, "Solid State Physics", New Age International Publishers
- J. Singh, "Semiconductor Optoelectronics", Physics and Technology, McGraw-Hill Inc. (1995).
- 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.

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

Pre-Requisites: Mathematics and Physics

COURSE OBJECTIVES

The students will

- Apply Kirchhoff's laws to analyse complex DC circuits, demonstrating comprehension and application skills in electrical engineering.
- Analyse the behaviour of AC circuits, showcasing evaluation skills in understanding electrical phenomena, including resonance.
- Explain the principles of transformer operation and analyse their behaviour, applying concepts of electromagnetic induction.
- Select and operate suitable DC motors and three-phase induction motors for various industrial applications, synthesizing motor principles effectively.
- Demonstrate proficiency in basic electrical installations and the use of fundamental measurement instruments for practical electrical applications, ensuring strict adherence to safety protocols and standards.

UNIT 1: DC CIRCUITS AND CIRCUIT ELEMENTS [10 L]

MODULE -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.

MODULE -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.

UNIT 2: AC CIRCUITS [10 L]

MODULE -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.

MODULE -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.

UNIT 3: STATIC ELECTRIC MACHINE [8 L]

MODULE -I: FUNDAMENTALS OF SINGLE-PHASE TRANSFORMER

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

MODULE -II: TRANSFORMER PERFORMANCE AND APPLICATIONS

Losses – efficiency – regulation – applications.

UNIT 4: DC AND AC MACHINES [8 L]

MODULE -I: DC MOTOR

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

MODULE -II: THREE-PHASE INDUCTION MOTOR

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

UNIT 5: ELECTRICAL INSTALLATIONS AND MEASURING INSTRUMENTS [9 L]

MODULE -I: ELECTRICAL INSTALLATIONS: Components of LT switchgear: Switch fuse unit (SFU) – MCB – MCCB – earthing.

MODULE -II: MEASURING INSTRUMENTS: Construction – working principle of PMMC and MI type instruments – advantages – disadvantages – applications.

TEXT BOOKS

T1: D.P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 4th Edition, 2019.

T2: V.K. Mehta and Rohit Mehta, "Principles of Electrical Engineering and Electronics", S. Chand & Company Ltd, 2012.

T3: L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.

T4: A.K.Sawhney, "A course in Electrical and Electronics Measurements and Instrumentation", Dhanapath Rai and Sons., 10th Edition, 2007.

REFERENCE BOOKS

R1: Dr. Ramana Pilla, Dr. M. Suryakalavathi, "Basic Electrical Engineering", S. Chand & Company Ltd, 2018.

R2: V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.

E-RESOURCES

E1: https://onlinecourses.swayam2.ac.in/nou21_ee02/preview

E2: https://nptel.ac.in/courses/108/108/108108076/

E3: 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.

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

Prerequisite: Applied Physics

UNIT - I

Module 1: Diodes: Diode - Static and Dynamic resistances, Equivalent circuit, Diffusion and Transition Capacitances

Module 2: P-N junction diode- Principle of operation and characteristics of a P-N junction diode V-I Characteristics, Diode as a switch- switching times.

UNIT - II

Module 1: Diode Applications: Rectifier - Half Wave Rectifier, Full Wave Rectifier, Bridge Rectifier, Rectifiers with Capacitive and Inductive Filters

Module 2: Clippers-Clipping at two independent levels, Clamper-Clamping Circuit Theorem, Clamping Operation, Types of Clampers.

UNIT - III

Module 1: Bipolar Junction Transistor (BJT): Principle of Operation, Common Emitter, Common Base and Common Collector Configurations

Module 2: Current components of BJT, amplification factors**.** V-I characteristics, Transistor as a switch, switching times

UNIT - IV

Module 1: Junction Field Effect Transistor (FET): Construction, Principle of Operation, Pinch-Off Voltage, Volt- Ampere Characteristic, Determination of FET Parameters from the V-I characteristics

Module 2: Comparison of BJT and FET, FET as Voltage Variable Resistor, MOSFET - Construction & Operation in Enhancement and Depletion modes, MOSFET as a capacitor.

UNIT – V

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 ECE I Year-II Sem			
Course Code: **M1241**	**BASIC ELECTRONICS ENGINEERING LAB** (COMMON TO: EEE, ECE & ECM)	L	T	P	C
		0	**0**	**2**	**1**

List of Experiments (Twelve experiments to be done):

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 ECE I Year-II Sem			
Course Code: **M1121**	**BASIC ELECTRICAL ENGINEERING LABORATORY** (Common to EEE, ECE, CSE, IT, ECM)	L	T	P	C
		0	**0**	**2**	**1**

COURSE OBJECTIVES

The students will

- Proficiently apply fundamental electrical principles, including Ohm's Law and circuit analysis techniques, to determine the values of unknown resistances.
- Demonstrate mastery in validating circuit behaviours through the application of Kirchhoff's Voltage Law and Kirchhoff's Current Law.
- Showcase understanding of time-dependent behaviour in electrical components by investigating the transient responses of series RL and RC circuits to DC excitation.
- Explore resonance phenomena in series RLC circuits, identifying the frequency at which impedance is minimized and current is maximized, thus exhibiting proficiency in frequency-domain analysis.
- Equip students to evaluate the performance characteristics of DC shunt motors and single-phase transformers, enabling them to assess their suitability for specific applications in electrical systems.

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.

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECE I Year-II Sem			
Course Code: **M1201**	**PHYSICS LABORATORY** (COMMON TO: ECE, ECM, CSE, IT)	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, students will be able to

1. Learn the experimental concepts on in LED, Electric and Electronics materials.
2. Get the knowledge of fundamentals of Semiconductor physics.
3. Design, characterization and study of properties of material help the students to prepare new materials for various engineering applications.
4. Be exposed to the phenomena of waves, oscillations and optics.
5. 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 ECE I Year-II Sem			
Course Code: **M1231**	**ENGINEERING WORKSHOP AND DIGITAL FABRICATION PHYSICS LABORATORY** (COMMON TO: ECE, ECM)	L	T	P	D
		1	**0**	**3**	**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 modeled component by varying Layer thickness.
14. 3D Printing of modeled component by varying Orientation.
15. 3D Printing of modeled 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 equipments 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.

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECE I Year-II Sem			
Course Code: **M12AC1**	**Linguaskill for Professionals-B1** (COMMON TO: ECE, ECM, CSE, IT)	L	T	P	C
		2	**0**	**0**	**0**

Pre-Requisite: A2 level (CEFR)

COURSE OBJECTIVES:

To enable students

1. Acquire an extensive range of vocabulary related to diverse topics.
2. Enhance pronunciation skills, focusing on specific sounds and intonation patterns
3. Improve the use of various grammar concepts
4. Strengthen listening, speaking, reading, and writing skills across different proficiency levels
5. Develop practical language skills for everyday communication scenarios

Module 1(6L)

UNIT-1

Grammar: Subject-Object, Present Tense

Vocabulary: Words about friendship, communication, work and technology

Pronunciation: Word stress, sentence stress

UNIT-2

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-1

Grammar: Modals, Phrases of ability, Articles, *used to* and *usually*

Vocabulary: Words about relationship and ability

Pronunciation: Linking sounds, Intonation in question tags

UNIT -2

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-1

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-2

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 cafe

Module 4(6L)

UNIT-1

Grammar: Quantifiers, Reported speech

Vocabulary: Words about buildings and sharing information

Pronunciation: Sounds */t//d//k//g//h//w/*

UNIT-2

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-1

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-2

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.

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECE II Year-I Sem			
Course Code: **M210B**	**FOURIER AND COMPLEX VARIABLES (**COMMON TO: EEE & ECE)	L	T	P	C
		3	**1**	**0**	**4**

Pre-Requisites: Ordinary Differential Equations and Vector Calculus.

Course Objectives:

- To learn the calculation of Fourier coefficients of a periodic functions.
- To learn the calculation of Fourier transform of a function.
- To lean analytic functions and their properties.
- To learn concept of complex integration.
- To learn classifications of Singular points and residues.

Module 1: Fourier Series: [10L]

Introduction to infinite series, convergence and divergence, Periodic functions, Dirichlet's condition, Fourier Series of periodic functions, Fourier series of even and odd functions, having arbitrary periods, half range Fourier series.

Module 2: Fourier Transforms: [10L]

Fourier Integral Theorem (statement only), Fourier integral representation of a function, Fourier sine and cosine integral, Complex Fourier transform, Sine and Cosine transforms and their properties (without proofs), Finite Fourier Transform.

Module 3: Functions of Complex Variables: [10L]

Functions of a complex variable, Continuity, Differentiability, Analyticity, Singular point, Cauchy-Riemann equations in Cartesian and polar coordinates (without proofs), Harmonic and conjugate harmonic functions, Milne – Thompson method. Analyticity of Exponential, trigonometric, hyperbolic functions and their properties.

Module 4: Integration of Complex Function, Power Series: [12L]

Line integral, evaluation along a path and by indefinite integration. Cauchy's integral theorem (without proof). Expansion of Taylor's series and Laurent series (without proofs).

Module 5: Residues and Real Integrals: **[12L]**

Classifications of singular points: Isolated singular point, removable, pole of order m, essential singularity. Residues – Evaluation of residue by formulae, Residue theorem (without proofs), Evaluation of real integrals.

Text Books

1. B.S. Grewal: Higher Engineering Mathematics, Khanna Publishers, 36th Edition, 2010.
2. R. V. Churchill and J. W. Brown: Complex Variables and Applications, 7th Ed., Mc-Graw Hill, 2004.

Reference Books

1. Ervin Kreyszig: Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. B. V. Ramana: Higher Engineering Mathematics, 11th Reprint, Tata McGraw-Hill, 2010.
3. Jain, R.K. and Iyenger, S.R.K.: Advanced Engineering Mathematics, 3rd Edition, Narosa publications.

Course Outcomes:

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

CO-1: Demonstrate the Fourier series to study the behaviour of periodic functions and their applications.

CO-2: Solve the problems using Fourier Transforms.

CO-3: Apply Cauchy-Riemann equations to study analyticity of functions.

CO-4: Evaluate contour integrals using Cauchy's integral theorems.

CO-5: Evaluate contour integrals using residue theorem.

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECE II Year-I Sem			
Course Code: M212D	NETWORK ANALYSIS	L	T	P	C
		3	0	0	3

Module 1: Network Topology [8L]

Matrices associated with graphs Basic cut-set, tie-set fundamental circuit matrices forplanar networks, Concept of duality and dual networks.

Module 2: Solution of First and Second order networks [12L]

Dc and Transient response of Series and parallel R-L, R-C, R-L-C circuits, using differential equations and using Laplace Transforms, initial and final conditions, forcedand free response, time constants, transformed network with initial conditions Transfer function representation, series and parallel resonances.

Module 3: Sinusoidal steady state analysis & Theorems [10L]

Representation of sine function as rotating phasor, phasor diagrams, impedances and admittances, AC circuit analysis, effective or RMS values, average power and complex power. Maximum Power Transfer, Milliman's and Compensation theorems with DC Excitation.

Module 4: Passive filters [10L]

Constant k- Filters- Low pass, high pass, band pass and band elimination filter design,m-derived low pass and high pass filter design, Composite filter design, attenuators.

Module 5: Two Port Networks [9L]

Impedance parameters (Z), admittance parameters (Y). Transmission parameters (ABCD) and hybrid parameters (h), terminal pairs, inter relationship of two port parameters, interconnections of two port networks , parallel combination of two port networks.

Text Books

1. Dr. Abhijit Chakrabarti, "Circuit Theory", Dhanpat Rai & Co. (Pvt.) Ltd. Educational & Technical Publications.
2. M. E. Van Valkenburg, "Network Analysis", Prentice Hall, 2006.
3. Shyam Mohan , Sudhakar Electric Circuits Tata Mcgraw hill 5e.
4. John D Ryder , Network lines & Fields.

Reference Books

1. K. V. V. Murthy and M. S. Kamath, "Basic Circuit Analysis", Jaico Publishers, 1999.
2. Hayt & Kammerly Electrical Circuits.
3. Edminister, Circuit theory , schauum series ,McGraw Hill Education, 2013

E-Resources

1. https://mrcet.com/downloads/digital_notes/ECE/II Year/31082020/NETWORK ANALYSIS &TRANSMISSION LINES.pdf
2. https://www.vssut.ac.in/lecture_notes/lecture1423722706.pdf
3. https://www.iare.ac.in/sites/default/files/IARE_NA_LECTURE_NOTES.pdf
4. https://archive.nptel.ac.in/courses/108/105/108105159/

Course Outcomes

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

CO 1. Apply Network topology concepts associated with graphs to networks

CO 2. Solve first and second order networks with differential equationsand Laplace transforms.

CO 3. To Study Sinusoidal steady state analysis using phasors and Theorems.

CO 4. To analyze the Different types passive filters.

CO 5. To educate on Two Port Network and Network Functions.

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECE II Year-I Sem			
Course Code: **M214A**	**ANALOG CIRCUITS**	L	T	P	C
		3	**0**	**0**	**3**

Pre-requisite: Basic Electronics

Course Objectives:

Learn the concepts of, load line analysis and biasing techniques
2. Learn the concepts of high frequency analysis of transistors.
3. To give understanding of various types of amplifier circuits
4. Learn the concepts of small signal analysis of BJT and FET
5. To familiarize the Concept of feedback in amplifiers so as to differentiate between negative and positive feedback.

Module - I BJT Biasing:

Transistor Biasing and Stabilization - Operating point, DC & AC load lines, Biasing - Fixed Bias, Self-Bias, Bias Stability, Bias Compensation using Diode

Analysis and Design of Small Signal Low Frequency BJT Amplifiers: Transistor Hybrid model, Determination of h-parameters from transistor characteristics, Typical values of h- parameters in CE, CB and CC configurations, Transistor amplifying action, Analysis of CE, CC, CB Amplifiers and CE Amplifier with emitter resistance, low frequency response of BJT Amplifiers, effect of coupling and bypass capacitors on CE Amplifier.

Module - II FET- Biasing Techniques

FET Amplifiers: Analysis of CS, CD, CG JFET Amplifiers, comparison of performance with BJT Amplifiers, Basic Concepts of MOSFET Amplifiers, MOS Small signal model, Common source amplifier with resistive, Diode connected and Current source loads, Source follower, Common Gate Stage, Cascode and Folded Cascode Amplifier – frequency response.

Module - III Multistage Amplifiers:

Classification of Amplifiers, Distortion in amplifiers, Different coupling schemes used in amplifiers, Frequency response and Analysis of multistage amplifiers, Cascade RC Coupled amplifiers, Cascode amplifier, Darlington pair. Transistor at High Frequency: Hybrid -model of Common Emitter transistor model, fα, fβ and unity gain bandwidth, Gain-bandwidth product

Module - IV Feedback Amplifiers:

Concepts of feedback – Classification of feedback amplifiers – General characteristics of Negative feedback amplifiers – Effect of Feedback on Amplifier characteristics – Voltage series, Voltage shunt, Current series and Current shunt Feedback configurations – Simple problems.

Module - V Oscillators:

Condition for Oscillations, RC type Oscillators-RC phase shift and Wien-bridge Oscillators, LC type Oscillators –Generalized analysis of LC Oscillators, Hartley and Colpitts Oscillators, Frequency and amplitude stability of Oscillators, Crystal Oscillator.

Text Books:

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

Reference Books:

1. David A. Bell – Electronic Devices and Circuits, 5th Edition, Oxford.
2. Adel S. Sedra, Kenneth C. Smith- Microelectronic Circuits- Theory and Applications, Oxford.
3. Chinmoy Saha, Arindam Halder, Debaati Ganguly -Basic Electronics-Principles and Applications, 2018, Cambridge

E - Resources:

1. https://nptel.ac.in/courses/111/102/111102111/

Course Outcomes:

1. Design the amplifiers with various biasing techniques.
2. Design single stage amplifiers using BJT and FET
3. Design multistage amplifiers and understand the concepts of High Frequency Analysis of BJT.
4. Utilize the Concepts of negative feedback to improve the stability of amplifiers and positive feedback to sustained oscillations
5. Apply concept of oscillations for different applications

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECE II Year-I Sem			
Course Code: M214B	SIGNALS AND SYSTEMS	L	T	P	C
		3	0	0	3

Pre-requisite: Mathematics

Course Objectives:

This course will enable students to:

1. Compare various continuous and discrete-time signals and systems, with respective time and frequency domain.
2. Study the concepts of distortion less transmission through LTI systems, convolution and correlation properties.
3. Gain more familiarity with different types of transformation and their properties which include Fourier Transform, Laplace Transform and Z-Transform.

Module 1

Unit-1: Introduction to Signals

Types of signals: Energy and power signals, continuous and discrete time signals, continuous and discrete amplitude signals. Basic elementary signals: Exponential and Sinusoidal signals, Ramp function, Gate function Concepts of Impulse function, Unit Step function, Sinc Function, Signum function,

Unit-2: Introduction to Systems

System properties: linearity, additivity, homogeneity, shift-invariance, causality, stability, reliability. Linear Shift-Invariant (LSI) systems, characterization of causality and stability of LSI systems.

Module 2

Unit-1: Signal Analysis form Vector concepts

Analogy between Vectors and Signals, Orthogonal Signal Space, Signal approximation using Orthogonal functions, Mean Square Error, Closed or complete set of orthogonal functions, Orthogonality in Complex functions.

Unit-2: Fourier Analysis

Continuous time periodic signals, Fourier series representation. Trigonometric Fourier Series and Exponential Fourier Series, Properties of Fourier Series, Dirichlet's conditions, Complex Fourier spectrum.

Module 3:

Unit-2: Fourier Transform

Fourier Transform of arbitrary signal, standard signals, periodic signals, Fourier Transforms involving Impulse function and Signum function, Properties of Fourier Transform, Introduction to Hilbert Transform.

Unit-2: Laplace Transforms

Review of Laplace Transforms (LT), Concept of Region of Convergence (ROC), Constraints on ROC for various classes of signals, Inverse Laplace Transform, Partial fraction expansion method for inverse LT. Properties of LT, Relation between LT and Fourier Transform.

Module 4

Unit-1: Z-Transforms

Z-Transform of a Discrete Time Sequence, concept of Region of Convergence (ROC), constraints on ROC for various classes of signals, Relation between Laplace, Fourier and Z-Transforms, Inverse Z-Transforms, Properties of Z-Transforms

Unit-2: Signal Transmission through Linear Systems

Transfer function of an LTI system, Filter characteristics of Linear Systems, Distortion less transmission through a system, Signal bandwidth, System bandwidth, Causality and Paley-Wiener criterion for physical realization.

Module 5

Unit-1: Convolution and Correlation of Signals

Concept of convolution in Time domain and Frequency domain, Graphical representation of Convolution, Cross Correlation and Auto Correlation of functions, Properties of Correlation function. Relation between Auto Correlation function and Energy/Power spectral density function

Unit-2: Detection of signals from Noise

Detection of periodic signals in the presence of Noise by Correlation, Extraction of signal from noise by filtering.

Text Books:

1. "Signals, Systems & Communications" - B.P. Lathi, 2009, BSP
2. "Signals and Systems" – A. Rama Krishna Rao – 2008, TMH.

Reference Books:

1. "Fundamentals of Signals and Systems" - Michel J. Robert, 2008, MGH International Edition.
2. "Signals and Systems" - A.V. Oppenheim, A.S. Willsky and S.H. Nawab, 2nd ed., PHI
3. "Signals & Systems" - Simon Haykin and Van Veen,Wiley, 2nd ed. Wiley.

E - Resources:

1. https://ocw.mit.edu/resources/res-6-007-signals-and-systems-spring-2011/lecture-notes/
2. http://nptel.ac.in/courses/117101055
3. http://nptel.ac.in/courses/117104074
4. http://www.tutorialspoint.com/signals_and_systems/
5. https://www.academia.edu/37486178/Signals_and_Systems_2nd_Edition_by_Oppenheim
6. https://mlichouri.files.wordpress.com/2013/10/fundamentals-of-signals-and-systems.pdf
7. http://ieeexplore.ieee.org/xpl/mostRecentIssue.jsp?reload=true&punumber=78
8. http://ieeexplore.ieee.org/xpl/RecentIssue.jsp?punumber=8919
9. http://ieeexplore.ieee.org/xpl/RecentIssue.jsp?punumber=82
10. https://www.globalspec.com/reference/81785/203279/digital-signal-processing-fundamentals-and-applications

Course Outcomes:

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

1. Analyse the properties of Continuous and Discrete signals and systems with their frequency response.
2. Discriminate the concepts of Fourier, Laplace, and Z-Transforms as appropriate for various signals and systems.
3. Develop input output relationship for linear shift invariant system and frequency response of both continuous-time and discrete-time systems using different Transforms.
4. Identify the conditions for distortion less transmission of signals through systems and conditions for physical realization of systems.
5. Apply operations such as convolution and correlation for continuous and discrete time system

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECE II Year-I Sem			
Course Code: M214C	PROBABILITY THEORYAND STOCHASTIC PROCESS	L	T	P	C
		3	0	0	3

Module1: Probability and Random Variable

Unit-I:
Probability: Set theory, Experiments and Sample Spaces, Discrete and Continuous Sample Spaces, Events, Probability Definitions and Axioms, Mathematical Model of Experiments, Joint Probability, Conditional Probability, Total Probability, Bayes' Theorem, and Independent Events.
Unit-II:
The Random Variable: Definition of a Random Variable, Conditions for a Function to be a Random Variable, Discrete and Continuous, Mixed Random Variable.

Module2: Distribution, density functions and Operations on Random Variable

Unit-I:
Distribution and density functions: Distribution and Density functions, Properties, Binomial, Poisson, Uniform, Exponential Gaussian, Rayleigh and Conditional Distribution, Methods of defining Conditioning Event, Conditional Density function and its properties, problems.

Unit-II:
Operation on One Random Variable: Expected value of a random variable, function of a random variable, moments about the origin, central moments, variance and skew, characteristic function, moment generating function, transformations of a random variable, monotonic transformations for a continuous random variable.

Module3: Multiple Random Variables and Operations on Multiple Random Variables

Unit-I:
Multiple Random Variables: Vector Random Variables, Joint Distribution Function and Properties, Joint density Function and Properties, Marginal Distribution and density Functions, conditional Distribution and density Functions, Statistical Independence, Distribution and Density functions of Sum of Two Random Variables and Sum of Several Random Variables, Central Limit Theorem- Unequal Distribution, Equal Distributions.
Unit-II:
Operations on Multiple Random Variables: Expected Value of Function of Random variables, Joint Moments about the Origin, Joint Central Moments, Joint Characteristic Functions, and Jointly Gaussian Random Variables: Two Random Variables case and N Random Variable case, Properties, Transformations of Multiple Random Variables.

Module4: Stochastic Processes-Temporal Characteristics

Unit-I:
The Stochastic process Concept, Classification of Processes, Deterministic and Nondeterministic Processes, Distribution and Density Functions, Statistical Independence and concept of
Stationary: First-Order Stationary Processes, Second-Order and Wide-Sense Stationary. Time Averages and Ergodicity, Mean-Ergodic Processes, Correlation-Ergodic Processes Autocorrelation Function and Its Properties, Cross-Correlation Function and Its Properties, Covariance Functions and its properties, Gaussian Random Processes.
Unit-II:
Linear system Response: Mean and Mean-squared value, Autocorrelation, Cross-Correlation Functions.

Module 5: Stochastic Processes-Spectral Characteristics

Unit-I:

The power Spectrum and its Properties, Relationship between Power Spectrum and Autocorrelation Function, the Cross-Power Density Spectrum and Properties, Relationship between Cross-Power Spectrum and Cross-Correlation Function.

Unit-II:

Spectral characteristics of system response: power density spectrum of response, cross power spectral density of input and output of a linear system

Textbook

1 Probability, Random Variables & Random Signal Principles -Peyton Z. Peebles, TMH, 4th Edition, 2001.
2 ProbabilityandRandomProcesses-ScottMiller,DonaldChilders,2Ed,Elsevier,2012

Reference Books

1. TheoryofprobabilityandStochasticProcesses-PradipKumarGosh,UniversityPress
2. Probability and Random Processes with Application to Signal Processing-Henry Stark and John W. Woods, Pearson Education, 3rdEdition.Probability Methods of Signal and System Analysis- George R. Cooper, Clave D.MC Gillem, Oxford, 3rdEdition,1999.
3. Probability Methods of Signal and System Analysis-George R.Cooper, Clave D.MC Gillem,O xford,3rd Edition,1999.

E-Resources

https://nptel.ac.in/courses/111/102/111102111/

Course Outcomes

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

CO1. Define Simple probabilities using an appropriate sample space.

CO2. Simplify probabilities and expectations from probability density functions (pdfs)

CO3. Define Likelihood ratio tests from pdfs for statistical engineering problems.

CO4. Build Least-square & maximum likelihood estimators for engineering problems.

CO5. Analyze and simplify Mean and covariance functions for simple random processes.

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECE II Year-I Sem			
Course Code: **M2123**	**NETWORK ANALYSIS LAB**	L	T	P	C
		0	**0**	**2**	**1**

List of Experiments

1. Verification of Mesh and Nodal analysis.
2. Verification of Super Position theorem.
3. Verification of Maximum Power Transfer theorem.
4. Verification of Reciprocity theorem.
5. Verification of Compensation theorem.
6. Verification of Milliman's theorem.
7. Verification of Thevenin's & Norton's theorem.
8. Determination of transient response of RL and RC circuits for DC excitation.
9. Frequency response of Series and Parallel resonance circuits.
10. Determination of self, mutual inductances and coefficient of coupling.
11. Determination of Z and Y parameters.
12. Determination Transmission and hybrid parameters.

Course Outcomes

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

CO 1. Apply the knowledge of basic circuital law and simplify the network using reduction techniques.

CO 2. Analyse the circuit using Network simplification theorems.

CO 3. Evaluate transient response, Steady state response for First and Second order systems.

CO 4. Determine the parameters for the design of various filters.

CO 5. Evaluate two-port network parameters.

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECE II Year-I Sem			
Course Code: **M2141**	**ANALOG CIRCUIT LAB**	L	T	P	C
		0	**0**	**2**	**1**

Pre-Requisites: NIL

Verify any twelve experiments in H/W Laboratory and any two using MultiSIM

List of xperiments:

1. Common Emitter Amplifier
2. Common Collector Amplifier
3. Two Stage RC Coupled Amplifier
4. Current Series and Voltage Shunt Feedback Amplifier
5. RC Phase Shift, Wien Bridge Oscillator using Transistors
6. Hartley and Colpitt's Oscillator
7. Class B Complementary Symmetry Amplifier
8. Class A Power Amplifier (Transformer less)
9. Bistable Multivibrator.
10. Monostable Multivibrator.
11. Astable Multivibrator.
12. Schmitt Trigger.
13. Bootstrap Sweep Circuit

Equipments required for Laboratories:

For Hardware design of Electronic Circuits

- RPS
- CRO
- Function Generators
- Multimeters
- Operating Systems Windows XP.
- Simulation Software (Multisim/Tinaroo) Package.

Course Outcomes:

The student will be able to:

1. Analyze different types of Multistage Amplifiers.
2. Determine performance of Positive and Negative Feedback Amplifiers.
3. Evaluate efficiency of Different Power Amplifiers.
4. Analyze the various Multivibrators.
5. Develop the applications using Time base generators.

*AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECE II Year-I Sem			
Course Code: M2142	BASIC SIMULATION LAB	L	T	P	C
		0	0	2	1

Pre-Requisites:

- Knowledge of Engineering Mathematics, Basics of Vector theory & programming in MATLAB etc.
- idea of Problem Definition, Problem Planning, mathematical Model Formulation, Data collection and analysis, verification, validation and experimental analysis of the problem and implementation.

Verify any twelve experiments

List of Experiments

1. Basic Operations on Matrices.
2. Generation of Various Signals and Sequences (Periodic and Aperiodic), such as Unit Impulse, Unit Step, Square, Saw tooth, Triangular, Sinusoidal, Ramp, Sinc.
3. Operations on Signals and Sequences such as Addition, Multiplication, Scaling, Shifting, Folding, Computation of Energy and Average Power.
4. Finding the Even and Odd parts of Signal/Sequence and Real and Imaginary parts of Signal.
5. Convolution between Signals and sequences.
6. Auto Correlation and Cross Correlation between Signals and Sequences.
7. Verification of Linearity and Time Invariance Properties of a given Continuous/Discrete System.
8. Computation of unit sample, unit step and sinusoidal responses of the given LTI system and verifying its physical reliability and stability properties.
9. Gibbs Phenomenon
10. Finding the Fourier Transform of a given signal and plotting its magnitude and phase spectrum.
11. Waveform Synthesis using Laplace Transform.
12. Generation of Gaussian noise (Real and Complex), Computation of its mean,
13. Distribution and density functions of standard random variables.
14. Sampling Theorem Verification.
15. Removal of noise by Autocorrelation / Cross correlation.
16. Extraction of Periodic Signal masked by noise using Correlation.
17. Verification of Weiner-Khinchin Relations.
18. Checking a Random Process for Stationary in Wide sense.

Course Outcomes

CO1. Analyze the generation of various signals and sequences in MATLAB, including the operations on Signals and Sequences.

CO2. Determine the Convolution and Correlation between Signals and sequences.

CO3. Verify the Linearity, Time Invariance and Stability Properties of a given Continuous/Discrete System.

CO4. Analyze the Waveform Synthesis using Fourier, Laplace and Z-Transform.

CO5. Locate the Zeros and Poles and plotting the Pole-Zero maps in S-plane and Z-Plane for the given transfer function.

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECE II Year-I Sem			
Course Code: **M21MC1**	**ENVIRONMENTAL SCIENCE**	L	T	P	C
		2	**0**	**0**	**0**

Pre-Requisites: Nil.

Course Objectives:

This course will enable students to:

1. Study about the different natural resources available and how to use them.
2. Explain about biodiversity.
3. Discuss about Global Environmental Problems and Global Efforts.
4. Identify the global environmental problems.
5. Explain about sustainable development.

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-2: 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-1: 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-2: 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:

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

1.**Compare** the different natural resources available and how to use them.
2. **Describe** about biodiversity.
3. **Analyze** the Global Environmental Problems and Global Efforts.
4. **Categorize** the global environmental problems.
5. **Prioritize** the Sustainable development

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECE II Year-II Sem			
Course Code: M114G	LINEAR CONTROL SYSTEMS	L	T	P	C
		3	1	0	4

Pre-requisite: Network Theory and Mathematics

Course Objectives:

1.The different ways of system representations such as Transfer function representation.

2.State space representations and to assess the system dynamic response.

3.Assess the system performance using time domain analysis and methods for improving it

4.Stability of the systems by using different types of techniques.

5.Assess the system performance using frequency domain analysis and techniques for improving the performance.

Module 1:

Mathematical Modelling of physical Control Systems-I

Basic elements of control system –Classification–Open and closed loop systems: Position Control Systems, Missile direction Control system.

Transfer function– Mathematical Modelling of Electrical, Mechanical, Electro-Mechanical Systems.

Module 2:

Mathematical Modelling of physical Control Systems-II

Mathematical modeling of Synchronous – AC and DC servomotors– Block diagram Algebra–

Signal flow graphs, Mason 's gain Formula.

State Variable Analysis and Concepts of State Variables:

State space model. Diagonalization of State Matrix. Solution of state equations. Eigen values and Stability Analysis. Concept of controllability and observability.

Module 3:

Time Domain Analysis of Control Systems

Introduction–Typical test signals–Step response analysis of second order systems– Transient response specifications– steady state error constants– Generalized error series.

Module 4:

Stability & Root Locus Techniques

Concept of BIBO stability-absolute stability–Routh-Hurwitz criterion –Relative Stabilty Analysis Root Loci theory– Root Loci Construction.

Module 5:

Frequency Domain Analysis & Design of Control Systems

Introduction– Polar plot –Nyquist stability criterion– Frequency domain indices (Gain margin, Phase margin and bandwidth) – Correlation between frequency and time response– Bode plot. Need of Compensators–Design of lag and lead compensators using Bode plots–Applications

Text Books:

1.I.J.Nagrath and M.Gopal, "Control systems Engineering", 5th edition, New Age International (P) Limited, New Delhi, 2007.

2.K. Ogata, "Modern control engineering", pearson Education, 4th edition,2004.

3.A. NagoorKani, "Control Systems", RBA Publications, 2006

Reference Books:

1.Norman S. Nise, "Control System Engineering", 4th edition, Wiley Student Edition, 2008.

2.B.C.Kuo "Automatic control systems", 8th edition, Wiley Student Edition, 2008.

3.D.K.Cheng, Analysis of linear systems" Narosa Publishing House, New Delhi,2002.

E - Resources:

1. https://nptel.ac.in/courses/107/106/107106081/

2.https://ocw.mit.edu/courses/mechanical-engineering/2-04a-systems-and-controls-spring-2013/lecture-notes-labs/

Course Outcomes:

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

1.Identify the Transfer Function of Open Loop and Closed Loop for Different Control Systems using block diagram and Signal flow graph technique.

2.Estimate non-linear control system for multiple inputs and outputs using state space analysis.

3.Examine the performance of system in time domain and effect of different Controllers.

4.Analyze the system stability by applying different time domain techniques.

5.Analyze the system stability by applying different frequency domain techniques.

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECE II Year-II Sem			
Course Code: M224E	Analog and Digital Communications	L	T	P	C
		3	1	0	4

Prerequisite: Probability theory and Stochastic Processes, Signal and system

Course Objectives:

1. To develop ability to analyze system requirements of Analog and digital communication systems.
2. To understand the generation, detection of various Analog and digital modulation techniques.
3. To acquire the vortical knowledge of each block in AM, FM transmitters and receivers.
4. To understand the concepts of baseband transmissions.

Module 1: Amplitude Modulation

Unit-I:

Need for modulation, Amplitude Modulation - Time and frequency domain description, single tone modulation, power relations in AM waves, Generation of AM waves –, Switching modulator, Detection of AM Waves - Envelope detector.

Unit-II: Binary Codes

DSBSC modulation - time and frequency domain description, Generation of DSBSC Waves - Balanced Modulators, Coherent detection of DSB-SC Modulated waves, COSTAS Loop. SSB modulation - time and frequency domain description, frequency discrimination and Phase discrimination methods for generating SSB, Demodulation of SSB Waves. Principle of Vestigial side band modulation.

Module 2: Angle Modulation

Unit-I:

Basic concepts of Phase Modulation, Frequency Modulation: Single tone frequency modulation, Spectrum Analysis of Sinusoidal FM Wave using Bessel functions, Narrow band FM, Wide band FM, Constant Average Power, Transmission bandwidth of FM Wave

Unit-II:

Generation of FM Signal- Armstrong Method, Detection of FM Signal: Balanced slope detector, Phase locked loop, Comparison of FM and AM., Concept of Pre-emphasis and de-emphasis.

Module 3: Transmitters and Receivers

Unit-I:

Classification of Transmitters, AM Transmitters, FM Transmitters

Unit-II:

Radio Receiver - Receiver Types - Tuned radio frequency receiver, Super heterodyne receiver, RF section and Characteristics - Frequency changing and tracking, Intermediate frequency, Image frequency, AGC, Amplitude limiting, FM Receiver, Comparison of AM and FM Receivers.

Module 4: Pulse Modulation

Unit-I:

Types of Pulse modulation- PAM, PWM and PPM. Comparison of FDM and TDM.

Unit-II:

Pulse Code Modulation: PCM Generation and Reconstruction, Quantization Noise, Non-Uniform Quantization and Companding, DPCM, Adaptive DPCM, DM and Adaptive DM, Noise in PCM and DM.

Module 5: Digital Modulation

Unit-I:
ASK- Modulator, Coherent ASK Detector, FSK- Modulator, Non- Coherent FSK Detector, BPSK Modulator, Coherent BPSK Detection. Principles of QPSK, Differential PSK and QAM.

Unit-II:
Baseband Transmission and Optimal Reception of Digital Signal: A Baseband Signal Receiver, Probability of Error, Optimum Receiver, Coherent Reception, ISI, Eye Diagrams.

Text Books

1. Analog and Digital Communications – Simon Haykin, John Wiley, 2005.

2. Electronics Communication Systems-Fundamentals through Advanced-Wayne Tomasi, 5th Edition, 2009, PHI.

3. Analog and Digital Communication – K. Sam Shanmugam, Willey ,2005

Reference Books

1. Principles of Communication Systems - Herbert Taub, Donald L Schilling, Goutam Saha,3rd Edition, McGraw-Hill, 2008.

2. Electronic Communications – Dennis Roddy and John Coolean , 4th Edition , PEA, 2004

3. Electronics & Communication System – George Kennedy and Bernard Davis, TMH 2004

Course Outcomes: Upon completing this course, the student able to

1. Design and analyze various Analog and Digital Modulation and Demodulation techniques.
2. Model the noise present in continuous wave Modulation techniques.
3. Implement the Super heterodyne Receiver concept and Pulse Modulation Techniques in various applications
4. Analyze and design the base band Transmission

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECE II Year-II Sem			
Course Code: M224B	ELECTROMAGNETIC WAVES AND TRANSMISSION LINES	L	T	P	C
		3	0	0	3

Module 1: Electrostatic

Unit-I:

ELECTROSTATICS: Coulomb's law, electric field intensity, fields due to line and surface charge distributions, electric flux density, Gauss law and applications due to line charge, volume Charge, electric potential.

Unit-II:

Relations between E and V convection and conduction currents, Poisson's and Laplace'sequations, capacitance, parallel plate and spherical capacitors.

Module 2: Magnetic Fields

Unit-I:

STATICMAGNETICFIELDS: Biot savart'slaw, magnetic field intensity due to line current, Ampere's circuital law and its applications.

Unit-II:[4L]

Magnetic fluxdensity, magnetic scalar and vector potentials, inductances.

Module 3: Maxwells Equations

Basic Laws of electromagnetic, Maxwell's equations in point form, integral form and Phasor form

Unit-II:

Electrical and Magnetic boundary conditions at a Boundary Surface - Dielectric-Dielectric and Dielectric-Conductor Interfaces.

Module 4: Uniform Plane Waves

Unit-I:

Uniform plane wave, propagation of wave, wave propagation in partially conducting, good conductors, good dielectrics, velocity, wavelength,skin depth in good conductors.

Unit-II:[5L]

Powerflow and pointing vector,plane waves at a media interface-reflection and refraction at dielectric interface,total internal reflection,snell'slaw.

Module 5: Transmission Lines

Unit-I:

Equations of voltage and current on Transmission line, primary and secondary constants, Reflection coefficient and VSWR.

Unit-II:

Impedance transformation on loss-less and low loss transmission line, Smith chart construction only, single stub matching.

ReferenceBooks

E.C.Jordan & K.G.balmain, Electromagnetic Waves & Radiating Systems, Prentice hall, India.

E-Resources

1.nptel.ac.in/courses/117101056

TextBooks

1. Elements of Electromagnetic Matthew N.O.Sadiku,4ed.,2008,oxforduniv.press.
2. Engineering Electromagnetics William h .hayt jr.andJohna.buck.
3. Networks,lines and fields johnd.ryder,2ed.,1999,phi.
4. Electro magnetic Edminister schauum series.

Course outcomes

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

CO1.Apply electrostatics to derive expressions for Maxwells equation.

CO2.Illustrate the steady magnetic fields to Maxwells equation.

CO3.Express the Maxwells equations in various forms and derive the boundary conditions.

CO4.Describe properties and parameters of Electromagnetic propagation.

CO5.Obtain the transmission lines characteristics and parameters of a Electromagnetic waves and Electrical lines.

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECE II Year-II Sem			
Course Code: M224F	Digital Electronics	L	T	P	C
		3	0	0	3

Course Objectives:

1. To understand common forms of number representation in logic circuits.
2. To learn basic techniques for the design of digital circuits and fundamental concepts used in the design of digital systems.
3. To understand the Realization of Logic Gates Using Diodes
4. To understand the concepts of combinational logic circuits and sequential circuits.
5. gain knowledge of memory device and Programmable logic devices

Module 1: Digital Fundamentals

Unit-I: Number Systems

Analogue Versus Digital, Number systems: Binary, Octal, Decimal and Hexa decimal Number systems and their conversions. Number Representation in Binary- Sign bit Magnitude, 1's and 2's Complement. Floating Point Numbers- Range of Numbers and Precision, Number formats.

Unit-II: Binary Codes

Codes- Weighted and Non-weighted codes and its Properties, BCD, Excess-3, Gray code and their Conversions with binary. Parity check code and Hamming code.

Module 2: Boolean algebra

Unit-I: Basic Digital Circuits

Digital Logic Gates, EX-OR gates, Universal Gates, Multilevel NAND/NOR realizations Boolean Algebra - Fundamental Postulates, Properties and Boolean theorems, Switching Functions-Canonical and Standard form, Minterms and Maxterms. Algebraic Simplification.

Unit-II: Minimization of Switching Functions

Minimization of Boolean functions: Karnaugh Map Method - Up to five Variables, Don't Care Map Entries, Tabular Method-, Prime –Implicant chart, Simplification rules

Module 3: Combinational Logic Design

Unit-I: Arithmetic Circuits

Basic Building Blocks-Adders, Subtractors, BCD Adder, Serial adder, parallel adder,magnitude comparator

Unit-II: Multiplexers and Demultiplexers

Multiplexers, Demultiplexers, Encoders, Priority Encoder, Decoders and Code converters BCD to seven segment converter, Hazards and Hazard Free Relations.

Module 4: Sequential Circuits

Unit-I: Synchronous Sequential Circuits

Basic Architectural Distinctions between Combinational and Sequential circuits, SR Latch, Flip Flops: SR, JK, JK Master Slave, D and T Type Flip Flops, Excitation Table of all Flip Flops, Timing and Triggering Consideration, Conversion from one type of Flip-Flop to another.

Unit-II: Registers and Counters

Shift Registers – Left, Right and Bidirectional Shift Registers, Applications of Shift Registers -

Design and Operation of Ring and Twisted Ring Counter, Operation of Asynchronous and Synchronous Counters.

Module 5: Finite State Machines

Unit-I: capabilities and limitations, Mealy and Moore models, State equivalence and machine minimization, simplification of incompletely specified machines.

Unit-II: Memories and Programmable Logic

ROM, PROM, EPROM, EEPROM, Internal Structure and operation of RAM- Static and Dynamic. Realization of Switching functions using PLD's-ROM, PLA and PAL

Text Books

1. Zvi Kohavi &Niraj K. Jha, - Switching and Finite Automata Theory, 3rd Ed.,Cambridge, 2010.
2. R. P. Jain - Modern Digital Electronics, 3rd Edition, 2007- Tata McGraw-Hill

Reference Books

1. Morris Mano, Fredriac J. Hill, Gerald R. Peterson - Introduction to Switching Theory and Logic Design –3rd Ed., John Wiley & Sons Inc.
2. Charles H. Roth - Fundamentals of Logic Design, 5th ED., Cengage Learning, 2004.

Course Outcomes

At the end of the course, the student will be able to:
Course Outcomes: Upon completing this course, the students will be able to

1. Acquire the knowledge on numerical information in different forms and Boolean Algebra theorems.
2. Apply fundamental postulates and theorems for Minimization of Switching Functions
3. Minimize combinational functions, and design the combinational circuits.
4. Design and analyse sequential circuits for various cyclic functions.
5. Understand Memory operations, programmable logic devices and their use in realization of switching functions.

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECE II Year-II Sem			
Course Code: M224D	INTEGRATED CIRCUITS AND APPLICATION	L	T	P	C
		3	0	0	3

Pre-Requisites: Electronic Devices and Circuits, Switching Theory & Logic Design, Pulse & Digital Circuits.

Module 1:
Unit-I: Linear Applications of OP-AMP
Ideal and Practical Op-Amp, Op-Amp Characteristics, DC and AC Characteristics, Features of 741 Op-Amp, Modes of Operation - Inverting, Non-Inverting, Differential Amplifier. Instrumentation Amplifier, Differentiators and Integrator.

Unit-II: Non-Linear Applications of OP-AMP
Comparators, Schmitt Trigger, Waveform Generators – Triangular, Sawtooth, Square Wave, IC555 Timer -Functional Diagram, Monostable, and Astable Operations-Applications. Introduction to Voltage Regulators Features of 723 Regulator, Three Terminal Voltage Regulators.

Module 2:
Unit-I: Active Filters
Analysis of 1st and 2nd order LPF & HPF Butterworth Filters, Characteristics of Band pass, Band reject Filters

Unit-II: 555 Timer and Phase Locked Loop
Functional Diagram of 555 Timer, Modes of 555 Timer-Monostable Mode and Astable Mode and Its Applications.
IC565 PLL – Block Schematic, Description of Individual Blocks, Applications.

Module 3:
Unit-I: DAC Converters
Introduction, Basic DAC techniques, Different types of DACs-Weighted resistor DAC, R-2R ladder DAC, Inverted R-2R DAC

Unit-II: ADC Converters
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: Sequential Circuits Using TTL 74XX ICS All Types of Flip-flops, Synchronous Counters, Decade Counters, Shift Registers.
Unit-II: Memories
Memories - ROM Architecture, Types of ROMS & Applications, RAM Architecture, Static & Dynamic RAMs.

Module 5:
Unit-I: State of art digital ICs
Elementary knowledge on SOC,ASIC,FPGA Analog IC Design and CMOS RFIC Design.

Unit-II: Applications of Digital ICs
Code Converters, Decoders, Demultiplexers, LED & LCD Decoders with Drivers, Encoders, Priority Encoders, Multiplexers, Demultiplexers, Priority Generators/Checkers, Parallel Binary Adder / Subtractor, Magnitude Comparators.

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, 2ndEd., 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

Analog Electronic Circuits: https://swayam.gov.in/nd1_noc19_ee38/preview

Course Outcomes

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

CO1. Understanding of operational amplifiers with linear integrated circuits.

CO2. Apply the knowledge of the different families of digital integrated circuits and their Characteristics.

CO3. Analyze the functioning of various design circuits using operational amplifiers for various applications.

CO4. Design various techniques to develop A/D and D/A convertors.

CO5. Acquire hands-on laboratory experience on IC based project kits in above areas according to specifications.

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECE II Year-II Sem			
Course Code: M2241	Analog and Digital Communications Lab	L	T	P	C
		0	0	2	1

Prerequisite:

Students should have a basic understanding of the following topics before performing experiments:

- Probability theory and Stochastic Processes, Signal and Systems
- Communication System
- Basic Electronics topics knowledge like oscillator circuits, amplifier circuits etc..

List of Experiments:

1. Amplitude Modulation & Demodulation
2. Frequency Modulation & Demodulation
3. DSB-SC Modulation & Demodulation
4. SSB-SC Modulator & Demodulation
5. Sampling Theorem
6. Pulse Amplitude Modulation & Demodulation
7. Pulse Width Modulation & Demodulation
8. Pulse Position Modulation & Demodulation
9. PCM Generation and Detection
10. Delta Modulation
11. Amplitude Shift keying : Generation and Detection
12. Frequency Shift Keying: Generation and Detection
13. Phase Shift Keying: Generation and Detection
14. Differential Phase Shifting Keying: Generation and Detection
15. Quadrature Phase Shift Keying: Generation and Detection

Major Equipment required for Laboratories:

1. CROs: 20MHz
2. Function Generators: 1MHz
3. Regulated Power Supplies: 0-30V

Books

1. Couch, Leon W., Muralidhar Kulkarni, and U. Sripati Acharya. *Digital and analog communication systems*. Vol. 8. Upper Saddle River: Pearson, 2013.
2. Yarlagadda, RK Rao. *Analog and digital signals and systems*. Vol. 1. New York: Springer, 2010.
3. Wierer, Jay, and Edward W. Chandler. "Analog and digital communications laboratory experiments using emona TIMS." *2011 ASEE Annual Conference & Exposition*. 2011.

Course Outcomes:

Upon completing this course, the student able to:

1. Design and implement various Analog modulation and demodulation Techniques and observe the time and frequency domain characteristics

2. Design and implement various Pulse modulation and demodulation Techniques and observe the time and frequency domain characteristics
3. Apply different types of Sampling with various Sampling rates and duty Cycles
4. Design and implement various Digital modulation and demodulation Techniques and observe the waveforms of these modulated Signals practically

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECE II Year-II Sem			
Course Code: M2244	DIGITAL ELECTRONICS LAB	L	T	P	C
		0	0	2	1

1. Realization of Logic circuit to generate r's Compliment using Logic Gates.
2. To study basic logic gates and verify truth tables of: AND, OR, NOT, NAND, NOR, EX-OR, EXNOR for 2 Inputs.
3. Verify truth tables of AND, OR, NOT using NAND and NOR gates
4. To realize SOP, POS expressions.
5. To realize Half Adder/Sub tractor and Full Adder/ Subtractor circuits using NAND,NOR gates and verify the truth tables
6. To study BCD to Excess-3 and vice-versa and verify truth table
7. To study binary to gray and gray to binary converter using gates and verify truth tables.
8. To design and implement encoder and decoder using logic gates and study of corresponding ICs.
9. To design and verify truth table of 4 to 1 multiplexer and 1 to 4 Demultiplexer and study of corresponding ICs.
10. Realize 2 bit comparator using gates and 4 bit Comparator IC.
11. Design and construct basic flip flops RS, JK, D and T using gates and verify truth table.
12. Design and construct JK Master-Slave Flip-Flop using gates
13. Realize Asynchronous divide by 4 and Decade counter
14. Realize synchronous Decade Up/Down Counter.
15. Realize RAM (16X4) - Perform read and write operations.

***Verify any twelve experiments**

Course Outcomes

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

CO1. Learn the basics of gates and design simple logic circuits
CO2. Design different combinational circuits and verify their functionalities.
CO3. Design sequential circuits

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECE II Year-II Sem			
Course Code: M2243	INTEGRATED CIRCUIT AND APPLICATION LAB	L	T	P	C
		0	0	2	1

Pre-Requisites: Electronic devices and circuits, Switching Theory & Logic Design, Pulse& Digital Circuits.

List of Experiments:

1. Adder, Subtractor using IC 741 Op-Amp.
2. Inverting, Non-Inverting and Comparator using IC 741 Op-Amp.
3. Integrator and Differentiator using IC 741 Op-Amp.
4. Active Low Pass & High Pass Butterworth Filter.
5. Sample and Hold circuit using Op Amp IC 741 Op-Amp
6. RC-Phase Shift and Wien Bridge Oscillators using IC741Op-Amp.
7. Waveform generators using IC741.
8. IC555 timer - Monostable Mode and Astable Mode of Operations.
9. Schmitt Trigger circuit using IC741and IC555.
10. Lock –in Range and Capture Range of PLL IC 565.
11. Voltage regulator ICs 723, Three terminal voltage regulators using 7805,7809 and7912
12. A/D and D/A Converters.

Course Outcomes

Attend of the course, the student will be able to:

CO1. Identify and use different IC's for the various linear applications of op-amp.
CO2.Design and analyze the various non-linear application of op-amp.
CO3.Design and analyze the various applications of 555timer like oscillators and multi-vibrator circuits.
CO4. Identify the application areas of IC 565 in Communication Systems.
CO5. Identify applications of analog to digital and vice versa in signal processing and communications.

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech II Year-II Sem			
Course Code: M22MC2	GENDER SENSITIZATION (COMMON TO: ECE, CSE, IT, ECM)	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

- https://www.medicalnewstoday.com/articles/232363
- https://web.stanford.edu/~eckert/PDF/Chap1.pdf
- 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.

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech II Year- II Sem			
Course Code: **M22AC1**	**LINGUASKILL FOR PROFESSIONALS-B2 (Audit Course)** (ECE, ECM, CSE, IT)	L	T	P	C
		2	**0**	**0**	**0**

Pre-Requisites: A1-B1 levels (CEFR)

COURSE OBJECTIVES:

To enable students

1. Acquire an extensive range of vocabulary related to diverse topics.
2. Enhance pronunciation skills, focusing on specific sounds and intonation patterns
3. Improve the use of various grammar concepts
4. Strengthen listening, speaking, reading, and writing skills across different proficiency levels
5. Develop practical language skills for everyday communication scenarios

Module 1 **(6L)**

UNIT-1

Grammar: Tenses, Clauses and Conditionals, Questions

Vocabulary: Character adjectives, Words connected with 'get', trying and succeeding

Pronunciation: Letter 'e' and 'g'; Rapid speech, Intonation in Question tags

UNIT-2

Everyday English: Breaking off a conversation; Explaining and checking understanding; Agreeing; giving compliments and responding

- **Listening:** Listening Activity 1, Listening Activity 2 (A1 Level)
- **Reading:** Reading Activity 1, Reading Activity 2 (A1 Level)
- **Speaking:** Speaking Activity 1, Speaking Activity 2 (A1 Level)

Writing: Articles, Guidelines

Module 2 **(6L)**

UNIT-1

Grammar: Multi-word verbs; *used to* and *would*

Vocabulary: Words related to ability, achievements and sports; cause and result

Pronunciation: Constant sounds; sound 'u'; word stress

UNIT -2

Everyday English: Making suggestions; describing photos; expressing disagreement

- **Listening:** Listening Activity 1, Listening Activity 2 (A2 Level)
- **Reading:** Reading Activity 1, Reading Activity 2 (A2 Level)
- **Speaking:** Speaking Activity 1, Speaking Activity 2 (A2 Level)

Writing: Job Application, For and against essay

Module 3 **(6L)**

UNIT-1

Grammar: Infinitives and -ing forms; passives

Vocabulary: Attitude adjectives; words related to natural world and travel

Pronunciation: Sound 'th'; consonant clusters; intonation

UNIT-2

Everyday English: Responding to an idea; Discussing advantages and disadvantages

- **Listening:** Listening Activity 1, Listening Activity 2 (B1 Level)
- **Reading:** Reading Activity 1, Reading Activity 2 (B1 Level)
- **Speaking:** Speaking Activity 1, Speaking Activity 2 (B1 Level)

Writing: Travel blog, Complaint email

Module 4 **(6L)**

UNIT-1

Grammar: *too, enough, so/such*

Vocabulary: Words related to life in cities, money and finance, crime and film

Pronunciation: Sound 'o', 'l'

UNIT-2

Everyday English: Imagining, vague language, encouraging

- **Listening:** Listening Activity 1, Listening Activity 2 (B1+ Level)
- **Reading:** Reading Activity 1, Reading Activity 2 (B1+ Level)
- **Speaking:** Speaking Activity 1, Speaking Activity 2 (B1+ Level)

  Writing: Review, Opinion essay

Module 5 **(6L)**

UNIT-1

Grammar: Relative clause, reported speech

Vocabulary: Words related to health, thought and knowledge

Pronunciation: Sound 'ui'; linking

UNIT-2

Everyday English: Expressing uncertainty, clarifying a misunderstanding, interrupting and announcing a news

- **Listening:** Listening Activity 1, Listening Activity 2 (B2 Level)
- **Reading:** Reading Activity 1, Reading Activity 2 (B2 Level)
- **Speaking:** Speaking Activity 1, Speaking Activity 2 (B2 Level)

  Writing: Story

Text Books

1. Doff, Adrian, et al. *Empower Second Edition Student's Book with Digital Pack: B2 Upper 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 intelligible 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.

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECE III Year-I Sem			
Course Code: M31EA	**Business Economics and Financial Analysis (**COMMON TO: CE, EEE, ME, ECE, CSE, IT, ECM, CSE(DS), CSE(AIML), AIML & AIDS)	L	T	P	C
		3	**1**	**0**	**4**

Pre-Requisites: Mathematical Knowledge at pre-university level

Course Objectives: To learn

1. Understand the market dynamics namely Business, economics, trends in market.
2. Understand the demand elasticity of demand and supply in different market conditions.
3. Learn how organisations make important investment and financing decisions respective to production, cost, and pricing in different markets.
4. Analyze a company's financial statements and come to a reasoned conclusion about the financial situations of the company.
5. Acquire the basics of how to analyze and interpret the financial statements through ratio analysis.

Module 1: Introduction to Business and 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.

Economics: 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

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.
Supply Analysis: Determinants of Supply, Supply Function & Law of Supply.

Module 3: Production, Cost, Market Structures & Pricing

Production Analysis: Factors of Production, Production Function, Production Function with one variable input, two variable inputs, Returns to Scale, Different Types of Production Functions.

Cost analysis: Types of Costs, Short run and Long run Cost Functions.

Market Structures: Nature of Competition, Features of Perfect competition, Monopoly, Oligopoly, Monopolistic Competition.

Pricing: Types of Pricing, Product Life Cycle based Pricing, Break Even Analysis, Cost Volume Profit Analysis.

Module 4: 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: Financial Analysis through Ratios

Concept of Ratio Analysis, Liquidity Ratios, Turnover Ratios, Profitability Ratios, Proprietary Ratios, Solvency, Leverage Ratios (simple problems).
Introduction to Fund Flow and Cash Flow Analysis (simple problems).

Text Books

1. D.D.Chaturvedi,S.L.Gupta,BusinessEconomics-Theoryand Applications, International Book House Pvt. Ltd. 2013.
2. DhaneshKKhatri,FinancialAccounting,TataMcGrawHill,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,SunilKMaheshwari, 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/

Course outcomes:

After learning the contents of this course, the student must be able to

CO 1: Understand the Business Environment of the Economy.

CO 2: Understand microeconomic factors in related to demand analysis and its forecasting

CO 3: Apply the theory of production function and Cost concepts to determine the Break Even Analysis.

CO 4: Remember different market structures, pricing strategies and different forms business organization

CO 5: Interpret the financial statement by using Fundamental accounting concepts and Ratio analysis.

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECE III Year-I Sem			
Course Code: M314A	**MICROPROCESSORS AND MICROCONTROLLERS**	L	T	P	C
		3	**0**	**0**	**3**

Pre-Requisites: Fundamentals of Digital Electronics

Module 1: [12L]

8086 Architecture:
8086 Architecture: 8086 Architecture-Functional diagrams, Register organization, memory segmentation, programming model, memory addresses.

Pin description of 8086
Physical memory organization, signal descriptions of 8086-common function signals, Timing diagrams, interrupts of 8086.

Module 2: [14L]

Instruction set of 8086: Instruction formats, addressing modes, instruction set, assembler directives, macros,

assembly language programming of 8086. Simple programs involving logical, Branch and call instructions, sorting, evaluating arithmetic expressions, string manipulations.

Module 3: [9L]

Introduction to Microcontrollers:
Overview of 8051 Microcontroller, Architecture, I/O Ports, Memory Organization, Addressing Modes and Instruction set of 8051.
8051 Real Time Control:
Programming Timer Interrupts, Programming External Hardware Interrupts, Programming the Serial Communication Interrupts, Programming 8051 Timers and

Module 4: [10L]

I/O And Memory Interface: LCD, Keyboard, External Memory RAM, ROM Interface, ADC, DAC Interface to 8051.

Serial Communication and Bus Interface: Serial Communication Standards, Serial Data Transfer Scheme, On board Communication Interfaces-I2C Bus, SPI Bus, UART; External Communication Interfaces-RS232,USB.

Module 5: [9L]

ARM Architecture: ARM Processor fundamentals, ARM Architecture – Register, CPSR, Pipeline, exceptions and interrupts interrupt vector table.

ARM instruction set: ARM instruction set Data Processing, Branch instructions, load store instructions, Software interrupt instructions, Program status register instructions, loading constants, Conditional execution, Introduction to Thumb instructions.

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.

Reference Books

1. E Ayala, K.J., "The 8051 Microcontroller Architecture, Programming and Applications", Penr 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.

E-Resources

1. https://nptel.ac.in/courses/108/105/108105102
2. https://www.geeksforgeeks.org/microprocessor-tutorials

Course Outcomes

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

CO1. Understand the evolution and architectures of 8086, 8051&ARM processors

CO2. Analyse and understand the instruction set of 8086, 8051&ARM

CO3. Analyse and interface various peripherals for the design of processor/ controller-based systems

CO4.Develop skill in program writing for 8086 & 8051

CO5. Understand serial communication standards

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECE III Year-I Sem			
Course Code: M314B	**DIGITAL SIGNAL PROCESSING**	L	T	P	C
		3	**1**	**0**	**4**

Pre-Requisites: Signals and Systems

Module 1: LTI Systems & their analysis [11L]

Discrete time signals and sequences, energy and power signals, periodicity, discrete time systems properties- linear shift invariant systems, stability and causality, linear constant coefficient difference equations.

Introduction to Z-Transforms, properties of Z-Transforms, Discrete Fourier Series (DFS), Representation of Periodic Sequences using DFS.

Module 2: Discrete Fourier Transforms & Fast Fourier Transforms [13L

Basics of Discrete Time Fourier Transforms (DTFT), Discrete Fourier Transforms (DFT), Properties of DFT, Relation between ZT, DTFT, and DFT. Linear convolution of long sequences using DFT, Computation of DFT: using Over-lap Add method and Over-lap Save method.
Fast Fourier Transforms: Fast Fourier Transforms (FFT) - Radix-2 Decimation-in-Time and Decimation-in- Frequency FFT Algorithms, Inverse FFT.

Module 3: IIR DIGITAL FILTERS [10L]

Butterworth and Chebyshev Analog filter approximations and design. Direct, Canonic, Cascade and Parallel form realization of IIR filters.

Module 4: FIR Digital Filters [10L]

Frequency response characteristics of FIR Digital Filters, Design of FIR Filters using Fourier Method, Window Techniques-Rectangular, hamming, hanning & blackman. Comparison of IIR & FIR filters. Direct, cascade and Linear phase realization of FIR Filters, IIR and FIR Filter Realization.

Module 5: Multi Rate Signalling [9L]

Down sampling, Decimation, Spectrum of Down sampled signals. Anti-aliazing filter
Up sampling, interpolation, Spectrum of Up sampled signals. Sampling Rate Conversion.

Text Books

1. Digital Signal Processing, Principles, Algorithms, and Applications: John G. Proakis, Dimitris G. Manolakis, Pearson Education / PHI, 2007.
2. Discrete Time Signal Processing – A. V. Oppenheim and R.W. Schaffer, PHI, 2009

Reference Books

1. Fundamentals of Digital Signal Processing using Matlab – Robert J. Schilling, Sandra L. Harris, Thomson, 2007
2. Digital Signal Processing – Trun Kumar Rawat, Oxford Publications, 2015
3. Digital Signal Processing - R.Ramesh Babu, SCITECH 5TH Ed.

E-Resources

1. https://nptel.ac.in/courses/117/101/117101084/
2. https://nptel.ac.in/courses/117/101/117101084/
3. https://users.ece.utexas.edu/~rheath/notes/

Course Outcomes

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

CO1. Develop fundamental concepts of discrete time signals, impulse response, sequence and

zero-state solutions.

CO2. distinguish Fourier transforms & Z-transform and understand applications of DFT & FFT in signal processing.

CO3. design Butterworth and Chebyshev digital IIR filters from analog filters.

CO4.design FIR filters using windowing techniques.

CO5. apply the concepts of multi-rate signal processing in different communication systems.

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECE III Year-I Sem			
Course Code:M3142	**MICRO PROCESSORS AND MICROCONTROLLERS LAB**	L	T	P	C
		0	**0**	**2**	**1**

Pre-Requisites: Fundamentals of Digital Electronics

List of Experiments:

1. Programs for 16 bit arithmetic operations 8086(using various addressing modes)
2. Programs for sorting an array for 8086.
3. Programs for searching for a number of characters 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 to 8086 and programming to control stepper motor.
8. Interfacing Matrix/Keyboard to 8086
9. Interfacing Elevator to 8086
10. Programming using arithmetic, logical and bit manipulation instructions of 8051.
11. Program and verify Timer/Counter in 8051.
12. Program and verify interrupt handling in 8051.
13. UART Operation in 8051.

Course outcomes:

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

CO1. Write an arithmetic and logical assembly language programs for 8086&8051
CO2. Interface microcontrollers to various devices.
CO3. Analyze and develop various applications using microcontrollers.
CO4. Program and verify interrupt handling in 8051

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECE III Year-I Sem			
Course Code:M3141	**Digital Signal Processing Lab**	L	T	P	C
		0	**0**	**2**	**1**

Pre-Requisites: MAT LAB Programming

The programs shall be implemented in software (Using MATLAB / Lab view / C programming/OCTAVE Equivalent) and hardware (Using TI / Analog devices / Motorola / Equivalent DSP processors).

List of Experiments:

1. Generation of Sinusoidal waveform / signal based on recursive difference equations.
2. To find DFT / IDFT of given DT signal.
3. To find frequency response of a given system given in (Transfer Function/ Differential equation form).
4. Implementation of FFT of given sequence
5. Determination of Power Spectrum of a given signal(s).
6. Implementation of LP FIR filter for a given sequence.
7. Implementation of HP FIR filter for a given sequence.
8. Implementation of LP IIR filter for a given sequence
9. Implementation of HP IIR filter for a given sequence.
10. Generation of Sinusoidal signal through filtering.
11. Generation of DTMF signals.
12. Implementation of Decimation Process
13. Implementation of Interpolation Process
14. Implementation of I/D sampling rate converters.
15. Audio application such as to plot a time and frequency display of microphone plus a Cosine using DSP. Read a .wav file and match with their respective spectrograms.
16. Impulse response of first order and second order systems.

Note: - Minimum of 12 experiments has to be conducted.

Course Outcomes

At the end of the course, the student will be able to:
CO1. work with MATLAB functions.
CO2. analyze and design different signals and filters.
CO3. provide the basic knowledge of trainer kit TMS320C6713 DSP Processors.
CO4. gain practical knowledge on implementation of different filters.
CO5. design new DSP based projects.

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECE III Year-I Sem			
Course Code: **M31MC4**	**CYBER SECURITY** (Mandatory Course -III)	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 Analysisof 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 IPRissues, 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 ofhackers and other cybercriminals.

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, Hoaxing Wang, Computer and Cyber Security: Principles, Algorithm, Applications, and Perspectives, CRCPress ,ISBN9780815371335, 2018.

Reference Books

1.CyberSecurity Essentials, James Graham ,Richard Howard and RyanOtson, CRC Press.

2. Introduction to Cyber Security, Chwan-Hwa(john) Wu,J. David Irwin, CRC Press T&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 it's related matters
CO5. Identify Cyber Security-Organizational Implications

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECE III Year-I Sem			
Course Code: **M31AC4**	**Foundations of Entrepreneurship** (Audit course -III)	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 behavior – 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 market place – 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

Suggested Readings:

- D F Kuratko and T V Rao, Entrepreneurship- A South-Asian Perspective, Cengage Learning, 2012.
- Bruce R. Barringer/ R. Duane Ireland, Entrepreneurship Successfully launching new ventures, 4e, Pearson, 2015
- S. S.Khanka, Entrepreneurship Development, S. Chand Publications, 2015. Stuart Read, Effectual Entrepreneurship, Routledge, 2013.
- Rajeev Roy, Entrepreneurship, 2e, Oxford publications, 2012
- Nandan .H, Fundamentals of Entrepreneurship, PHI, 2013

- Madhurima Lal Shikha Sahai – Entrepreneurship, Excel Books.
- S.K Mohanthy, Fundamentals of Entrepreneurship, Prentice Hall of India, New Delhi.

Course Outcomes

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

1. Understand the need and significance of Entrepreneurship in the Economy
2. Develop Entrepreneurial Competencies
3. Develop Business Plan with the required contents.
4. Understand contribution of family business and Social Entrepreneurship in the Economy.
5. Plan Strategic perspectives in entrepreneurship

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECE III Year-I Sem			
Course Code: M314C	**Telecommunication Switching Systems and Networks** (Professional Electives-I)	L	T	P	C
		3	**0**	**0**	**3**

Pre-Requisites:

Module 1: Switching Systems [10L]

Evolution of Telecommunications; Basics of a switching system, functions of a switching system, Strowger switching components, step by step switching, Design parameters;100 line switching system;1000 line Blocking Exchange; 10,000 Line exchange, Principle of Crossbar switching; Crossbar switch configurations; Cross point Technology, Crossbar Exchange organization; A general trucking; Electronic and digital switching systems.

Telecommunications Traffic Introduction Unit of traffic; congestion; Traffic measurement; A Mathematical model; Lost-call systems- Theory; Traffic performance; Loss systems in Tandem; Use of traffic tables; Queuing systems-the second Erlang distribution; Probability of Delay; Finite Queue capacity; some other useful results; Systems with a single server; Queues in tandem; Delay tables; Applications of Delay formulae.

Module 2: Switching & Networks [9L]

Introduction, Single stage networks; Grading Principles; Two, Three and four stage networks. Basic time division space switching; basic time division time switching; Time multiplexed space switching; Time multiplexed time switching; Combination switching; Three stage Combination switching.

Control of switching systems: call processing functions-sequence of operations; signal exchanges; State transition diagrams; common control; Reliability; Availability and 226 securities, stored program control.

Module 3: [16L]

Customer Line Signalling: Introduction; Customer Line signalling; Audio frequency Junctions and trunk circuits; FDM carrier systems- Out band signalling; Inland (VF) signalling; PCM signalling; Inter Register signalling.

CCITT Signalling: Common channel signalling principles- General signalling networks; CCITT signalling system number 6; CCITT signalling system number 7; High level data link control protocol; Signal units; The signalling information field.

Module 4: Packet Switching **[10L]**

Introduction; Statistical multiplexing; Local and wide Area networks-Bus networks, Ring networks, comparison of bus and Ring networks, Optical fiber Networks; Large scale networks; Datagram and virtual circuits; Routing; Flow control; Standards; Frame relay; Broadband networks-General; Asynchronous Transfer mode; ATM switches.

Module 5: Networks [9L]

Introduction, Analog Networks, Integrated Digital Networks, Integrated services Digital Networks; Cellular Radio Networks; Intelligent Networks; private Networks; charging; Routing-General, Automatic, Alternative routing.

Text Books

1. Telecommunications Switching and Traffic Networks, J.E Flood, Pearson Eduction, 2006.
2. Telecommunications Switching systems and Networks, Tyagarajan Viswanathan, Prentice hall of India Pvt. Ltd., 2006.

Reference Books

1. Digital Telephony, John C Bellamy, John Wiley International Student Edition, 3rd Edition, 2000.
2. Data Communications and Networking, Behrouz A. Ferouzan, TMH, 2nd Edition, 2000.
3. Introduction to Data Communications and Networking, Tomasi, Pearson Education, 1st Edition, 2007.

Course Outcomes

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

CO1: demonstrate switching operation.

CO2: apply the concepts of probability to resolve traffic and network related issues

CO3: solve problems in traffic engineering that covers various systems and blocking models, numbering plan, charging and organize an exchange.

CO4: analyze Switching hierarchy, routing and Transmission plan.

CO5: design ST/TS switches to meet the specifications

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECE III Year-I Sem			
Course Code: M314D	**IOT AND ITS APPLICATIONS** (Professional Electives-I)	L	T	P	C
		3	**0**	**0**	**3**

Pre-Requisites: Embedded System, Basics of Communication

Module 1: [10L]

Definition and Characteristics of IoT, Physical Design of IoT –IoT Protocols, IoT communication models, IoT Communication APIs
IoT enabled Technologies Wireless Sensor Networks, Cloud Computing, Big data analytics, Communication protocols, Embedded Systems, IoT Levels and Templates

Module 2: [9L]

IOT and M2M: Differences between IoT and M2M , Software defined networks, network function virtualization, Difference between SDN and NFV for IoT
Basics of IoT System Management with NETCOZF, YANG- NETCONF, YANG, SNMP NETOPEER.

Module 3: [8L]

Introduction to Python:Language features of Python, Data types, data structures, Control of flow, functions, modules, packaging, file handling
Python Packages file handling, data/time operations, classes, Exception handling, JSON, XML, HTTPLib, URLLib, SMTPLib.

Module 4: [10L]

IOT Physical Devices and Endpoints: Introduction to Raspberry P, Interfacing Raspberry Pi with basic peripherals, Implementation of IoT with Raspberry Pi
Python program with Raspberry PI with focus of interfacing external gadgets, controlling output, reading input from pins.

Module 5: [9L]

Domain Specific IoT:Smart City, Smart Home, Industrial Control, Smart Social Networks Big Data Analytics

Environment, Energy, Retail, Logistics, Agriculture, Industry, Health and Lifestyle.

Text Books

1. Internet of Things - A Hands-on Approach, ArshdeepBahga and Vijay Madisetti, Universities Press, 2015, ISBN: 9788173719547
2. Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD), 2014, ISBN: 9789350239759

Reference Books

1. Internet of Things by Jeeva Bose 1st edition, Khanna publishing.

Course Outcomes

Students will be able to

1. **Understand** the basic building blocks of IoT
2. **Analyze** the difference between M2M and IoT along with IoT system Management
3. **Extend** the knowledge in Logical Design of IoT System using Python
4. **Acquire** knowledge about IoT Physical Devices and End points.
5. **Identify** the IoT Physical Servers and cloud offerings

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECE III Year-I Sem			
Course Code: M314E	**INFORMATION THEORY AND CODING** (Professional Electives-I)	L	T	P	C
		3	**0**	**0**	**3**

Pre-Requisites: Network Theory and Mathematics

Module 1: [10L]

Information Theory

Introduction, Measure of information, Information, Content of message, Average information content of symbols, in long independent sequences and dependent sequences,

Module 2: [9L]

Mathematical Modelling of Physical Control Systems-II:

Mathematical modeling of Synchronous – AC and DC servomotors– Block diagram Algebra– Signal flow graphs, Mason 's gain Formula.

State variables–State variable representation of continuous time system–state equations– transfer function from state variable representation–Solutions of the state equations

Module 3: [8L]

Time Domain Analysis of Control Systems:

Introduction–Typical test signals–Step response analysis of second order systems– Transient response specifications– steady state error constants– Generalized error series, Effect of P, PI & PID Controllers.

Module 4: [10L]

Stability & Root Locus Techniques

Concept of BIBO stability-absolute stability–Routh-Hurwitz criterion –Root Loci theory– Application to systems stability studies–Illustration of the effect of addition of a zero and a pole.

Module 5: [9L]

Domain Specific IoT

Smart City, Smart Home, Industrial Control, Smart Social Networks Big Data Analytics Environment, Energy, Retail, Logistics, Agriculture, Industry, Health and Lifestyle **Frequency Domain Analysis & Design of Control Systems**

Introduction– Polar plot –Nyquist stability criterion– Frequency domain indices (Gain margin, Phase margin and bandwidth) – Correlation between frequency and time response, Bode plot. Need of Compensators–Design of lag and lead compensators using Bode plots–Applications.

Text Books

1. I.J.Nagrath and M.Gopal, "Control systems Engineering", 5th edition, New Age International (P) Limited, New Delhi, 2007.

2. K. Ogata, "Modern control engineering", pearson Education, 4th edition,2004.

3. A. NagoorKani, "Control Systems", RBA Publications, 2006

Reference Books

1. Norman S. Nise, "Control System Engineering", 4th edition, Wiley Student Edition, 2008.

2. B.C.Kuo "Automatic control systems", 8th edition, Wiley Student Edition, 2008.

3. D.K.Cheng, Analysis of linear systems" Narosa Publishing House, New Delhi,2002.

E-Resources

1. https://nptel.ac.in/courses/107/106/107106081/

2.https://ocw.mit.edu/courses/mechanical-engineering/2-04a-systems-and-controls-spring-2013/lecture-notes-labs/

Course Outcomes

Students will be able to
CO 1. Identify the Transfer Function of Open Loop and Closed Loop for Different Control Systems using block diagram and Signal flow graph technique.

CO 2. Estimate non-linear control system for multiple inputs and outputs using state space analysis.

CO3. Examine the performance of system in time domain and effect of different Controllers.

CO 4. Analyze the system stability by applying different time domain techniques.

CO 5. Analyze the system stability by applying different time domain techniques.

JB R24	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech III Year-I Sem			
Course Code: M314OD	**Mathematical Programming for Engineers** (OE-I)	L	T	P	C
		3	**0**	**0**	**3**

Course Outcomes:

On completion of the course, students will be able to

1. Demonstrate familiarity with the MATLAB environment, file handling, and basic operations including help utilities.
2. Create and manipulate matrices, vectors, and arrays using built-in functions and scripts in MATLAB.
3. Write and debug MATLAB programs using control structures, loops, and logical operations.
4. Generate and customize 2D and 3D plots for data visualization and analysis and solve mathematical problems using MATLAB, including linear and nonlinear equations, interpolation, differentiation, and numerical integration

Module- I : Introduction:

Basics of MATLAB, MATLAB windows, Advantages of MATLAB, on-line help, file types.

MATLAB Basics: Variables and Constants –Vectors and Matrices- Arrays - manipulation- Built-in MATLAB Functions. Creating and printing simple plots, Creating, Saving and Executing a Script File, Creating and Executing a function file.

Module- II : Basic Logical Operations and Data types.

Programming Basics: Data types-Operators – Hierarchy of operations, Relational and logical operators, if-end structure, if-else-end structure, if-elseif-else-end structure, switch-case statement, for-end loop, while-end loop, break and continue commands.

Module- III : Scripts and Functions

Script Files, Function Files, Debugging methods in MATLAB. Graphics: Basic 2D plots: Printing labels- grid and axes box- Entering text in a box- Axis control-Style options-Multiple plots-subplots-specialized 2D plots: stem-,bar, hist, pi, stairs, loglog, semilog, polar, comet 3D plots: Mesh, Contour, Surf, Stem3, ezplot.

Module- IV : Numerical Methods Using MATLAB

Numerical Differentiation, Numerical integration- Newton-Cotes integration formulae, Multi-step application of Trapezoidal rule, MATLAB functions for integration. Linear Equations- Linear algebra in MATLAB, Solving a linear system, Gauss Elimination, Finding eigen values and eigen vectors, Matrix factorizations.

Module- V : Nonlinear Equations

System of Non-linear equations, Solving System of Equations Using MATLAB function fsolve, Interpolation-Lagrange Interpolation, Two dimensional Interpolation.

Solution of Ordinary differential Equations (ODEs)-ODE Solvers in MATLAB, Solving First-order equations using ODE23 and ODE45.

Text Books

1. Getting started with MATLAB "A quick introduction for scientist and engineers by Rudra Pratap, Oxford publications.

Reference Books

1. Advanced Guide to MATLAB-Practical Examples in Science and Engineering by S.N.Alam, S.Islam, S.K. Patel-I.K. International Publishing House Pvt. Ltd.
2. Stephen J. Chapman-"MATLAB Programming for Engineers"- 5th Edition- Cengage Learning- 2015. Getting started with MATLAB (Version 9) The Math works.
3. An Introduction to MATLAB® Programming and Numerical Methods for Engineers 1st Edition by Timmy Siauw Alexandre Bayen, Elsevier-18th April 2014.
4. https://nptel.ac.in/courses/103106118/2
5. https://www.udemy.com/numerical-methods/

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECE III Year-II Sem			
Course Code: **M324B**	**VLSI Design**	L	T	P	C
		3	**1**	**0**	**4**

Pre-Requisites: Electronic Circuit Analysis; Switching Theory and Logic Design

Module 1:

Introduction: Introduction to IC Technology – MOS, PMOS, NMOS, CMOS & BiCMOS
Basic Electrical Properties: Basic Electrical Properties of MOS and BiCMOS Circuits: I_{ds} V_{ds} relationships, MOS transistor threshold Voltage, g_m, g_{ds}, Figure of merit; Pass transistor, NMOS Inverter, Various pull ups, CMOS Inverter analysis and design, Bi-CMOS Inverters.

Module 2:

VLSI Circuit Design Processes: VLSI Design Flow, MOS Layers, Stick Diagrams, Design Rules and Layout, Transistors Layout Diagrams for NMOS and CMOS Inverters and Gates, Scaling of MOS circuits.

Module 3:

Gate Level Design: Logic Gates and Other complex gates, Switch logic, Alternate gate circuits, Time delays, Driving large capacitive loads, Wiring capacitance, Fan – in, Fan – out.

Module 4:

Data Path Subsystems: Subsystem Design, Shifters, Adders, ALUs, Multipliers, Parity generators, Comparators, Zero/One Detectors, Counters.

Array Subsystems: SRAM, DRAM, ROM, Serial Access Memories.

Module 5:

Programmable Logic Devices: Design Approach – PLA, PAL, Standard Cells FPGAs, CPLDs.

CMOS Testing: CMOS Testing, Test Principles, Design Strategies for test, Chip level Test Techniques.

Text Books

1. Kamran Eshraghian, Eshraghian Dougles and A. Pucknell - Essentials of VLSI circuits and systems, PHI, 2005
2. Neil H. E Weste, David Harris, Ayan Banerjee - CMOS VLSI Design – A Circuits and Systems Perspective, 3rd Edition, Pearson, 2009.

Reference Books

1. Ming-BO Lin - Introduction to VLSI Systems: A Logic, Circuit and System Perspective, CRC Press, 2011
2. John. P. Uyemura - CMOS logic circuit Design, Springer, 2007.
3. Wayne Wolf - Modern VLSI Design, 3rd Edition, Pearson Education, 1997.
4. K. Lal Kishore, V. S. V. Prabhakar -VLSI Design, I.K International, 2009.

E-Resources

Course Outcomes

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

1. Acquire qualitative knowledge about the fabrication process of integrated circuits using MOS transistors.
2. Draw the layout of any logic circuit which helps to understand and estimate parasitic effect of any logic circuit
3. Design building blocks of data path systems, memories and simple logic circuits using PLA, PAL, FPGA and CPLD.
4. Explore different types of faults that can occur in a system and learn the concept of testing and adding extra hardware to improve testability of system.

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECE III Year-II Sem			
Course Code: **M324C**	**Computer Networks**	L	T	P	C
		3	**1**	**0**	**4**

Pre-Requisites: Knowledge on Digital Logic Design, Computer Organization.

Module 1: [12L]

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: [14L]

Data Link Layer

Design issues, Framing, Error Detection and Error Correction, Block Coding, Hamming Distance, CRC, Flow control and error Control. Protocols: Noiseless Channels, Noisy Channels, HDLC, Point to Point protocol.

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, Controlled access, Channelization. Ethernet IEEE 802.3, IEEE 802.5, IEEE 802.11

Module 3: [9L]

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

ARP, RARP, DHCP, ICMP and IGMP. Routing Algorithms: Shortest Path Finding and Distance Vector Routing Algorithms.

Module 4: [10L]

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: [9L]

Application Layer: Introduction, services, Application layer paradigms.

Applications: DNS, WWW, HTTP, FTP, E-MAIL, TELNET, SNMP

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. "ComputerNetworks",5E, Peterson, Davie, Elsevier

2. "Introduction to Computer Networks and Cyber Security", Chawan -HwaWu, Irwin, CRC Publications.3. 3. "Computer Networks and Internets with Internet Applications", Comer.

E-Resources

Course Outcomes

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

1. Demonstrate the networking concepts, various Layering approaches, functionalities and some protocols of Link layer.
2. Identify how a medium can be shared among multiple devices, Ethernet technologies and internetworking devices used.
3. Identify how to do fragmentation, assign logical address and judge on routing, congestion.
4. Illustrate the working of IP Protocol, other protocols of internet layer and services of transport layer.
5. Explain the transport layer and application layer protocols and their working.

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECE III Year-II Sem			
Course Code: **M3241**	**VLSI DESIGN LAB**	L	T	P	C
		0	**0**	**2**	**1**

Pre-Requisites: Fundamentals of Digital Electronics

Note: A Minimum of 10 programs from Part I and 2 programs from Part II are to be conducted. Design and implementation of the following CMOS digital/analog circuits using NgSpice / Cadence / Mentor Graphics / Synopsys / Equivalent CAD tools. The design shall include Gate-level design, Transistor-level design, Hierarchical design, Verilog HDL/VHDL design, Logic synthesis, Simulation and verification

Part–I: VLSI Front End Design Programs

Programming can be done using any complier, and obtain the simulation, synthesis, place and route and implement into FPGA/CPLD boards. The performance testing may be done using a pattern generator (32 channels) and logic analyzer, apart from verification by simulation with any of the front-end tools.

1. HDL code to realize all the logic gates.
2. Design and Simulation of adder.
3. Design of encoders and decoders.
4. Design of multiplexer and de-multiplexer.
5. Design of code converters and comparators.
6. Design of flip flops: SR, D, JK, T.
7. Design of register using latches and flip flops.
8. Design of shift register of serial- in serial –out, serial in parallel out, parallel in serial out and parallel in parallel out.
9. Design of synchronous and asynchronous counter.
10. Design of Sequence Detector (Finite State Machine- Mealy and Moore Machines).

Part–II: VLSI Back End Design programs:

Design and implementation of the following CMOS digital/analog circuits using Cadence tools/ NgSpice + Magic. Perform layout, physical verification (DRC, LVS) DC/transient analysis.

11. Introduction to layout design rules.
12. Simulation of NMOS & PMOS I–V characteristics. Extraction of threshold voltage, body effect demonstration.
13. CMOS Inverter
    a) DC Analysis: VTC curve, noise margins. Transient Analysis: Delay, rise/fall times.
    b) Layout, physical verification, Layout, for CMOS Inverter.

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

Course Outcomes

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

CO1: Write HDL codes for all digital designs and implement using simulation tools.
CO2: Obtain timing simulation and calculate performance analysis.
CO3: Synthesize combinational and sequential designs.
CO4: Implement physical design in FPGA devices.
CO5: Practice the test pattern generation for Digital circuits.
CO6: Model and characterize basic circuits using CAD

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECE III Year-II Sem			
Course Code: M3201	**LIFE SKILLS AND PROFESSIONAL SKILLS LAB** (COMMON TO ECE, CSE, IT, ECM)	L	T	P	C
		0	**0**	**4**	**2**

Pre-Requisites:

Module 1: COMMUNICATION SKILLS

Introduction- Channel of communication, Process of communication, Language as a tool of communication, levels of communication, the flow of communication, communication networks, Barriers to Communication; Body language – Eye contact, facial expressions, gestures, posture, and body movements.

Module 2: PRESENTATION SKILLS

Nature and Importance of Oral Presentation; Planning the Presentation-Define the Purpose, Analyze the Audience, Analyze the Occasion and Choose a suitable title; Preparing the Presentation-Develop the Central Idea, Develop the Main Ideas, Gather Supporting Material and Plan Visual Aids; Organizing the Presentation-Introduction, Body, Conclusion; Rehearsing the Presentation; Improving Delivery and Choosing Delivery Methods; Handling the Stage Fright.

Module 3: GROUP DISSCUSSIONS

Nature of GD- What is a GD? GD and Debate, Importance of GD skills; Characteristics of successful GDs- Subject knowledge, Oral Communication skills, Leadership skills, Team Management; GD Strategies- Getting the GD Started, Contributing Systematically, Creating a Friendly Cooperative Atmosphere, Moving the Discussion along, Promoting Optimal Participation, Handling Conflict and Effecting Closure; Techniques for Individual Contribution- Topic Analysis, Discussing Problems, Discussing Case Studies; Group Interaction Strategies-Exchanging Opinions, Exchanging Suggestions and Proposals.

Module 4: INTERVIEW SKILLS

The Interview process; Characteristics of the Interview- Planning, Purpose, Conversation, Two-way Interaction and Informality; Pre-interview Preparation Techniques-Self-analysis, Research the Organization, Job Analysis, Revise your Subject Knowledge, Develop the Interview File; Interview Questions- Types of Interview Questions, Answering Strategies; FAQs and Practice; Projecting a positive image; Alternative Interview formats.

Module 5: PROFESSIONAL WRITING SKILLS

Resumes -Resume Design, Parts of Resume, Resume style; Job Applications-opening, body, and closing; E-mail writing-Format, Standard E-mail practices and E-mail writing strategies; Report writing-nature and significance, types of reports, formats of reports; Proposals- types of Proposals, structure of Formal Proposals, parts of a formal Proposals; Technical Articles-types of Technical Articles, Journal articles and Research papers-Review and Research Articles, Elements of Technical Articles and Writing Strategies.

Reference Books

1. Ashraf Rizvi. M. *Effective Technical Communication*. McGraw-Hill: New Delhi: 2010

2. K. R. Lakshminarayanan, *Speak in English,* Scitech Publications, Chennai, 2009. Print.
3. Dr. Alex. K. Soft Skills: *Know yourself and Know the World*. S. Chand & Company Pvt. Ltd: New Delhi: 2014. Print.
4. Raman Meenakshi and Sangeeta Sharma. *Technical Communication: Principles and Practice.* Oxford University Press: New Delhi: 2007.Print.

E-Resources

1. https://www.skillsyouneed.com/ips/communication-skills.html
2. https://www.skillsyouneed.com/presentation-skills.html
3. https://www.coursera.org/articles/presentation-skills
4. https://www.javatpoint.com/group-discussion
5. https://hbr.org/1964/01/strategies-of-effective-interviewing
6. https://en.wikipedia.org/wiki/Professional_writing

Course Outcomes

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

CO1. Learn the importance of communication skills.

CO2. Understand how to give the presentation.

CO3. Participate in GDs by applying appropriate speaking techniques.

CO4. Know the required skills to face interviews.

CO5. Write letters and resumes effectively by applying appropriate writing techniques.

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECE III Year-II Sem			
Course Code: M32MC3	**ARTIFICIAL INTELLIGENCE (Mandatory Course-IV)**	L	T	P	C
		2	**0**	**0**	**0**

Pre-Requisites:

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, Minima 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_version.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:

1. Identify the AI based problems.
2. Apply AI techniques for representing the basic problem.
3. Apply Advanced AI techniques to solve the problem.
4. Analyze Learning and explain various learning techniques.
5. Illustrate the use of expert system.

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECE 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 and 1935 Act. Constituent Assembly: Composition and Functions;

Fundamental 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, New Delhi
2. Subhash Kashyap, Our Parliament, National Book Trust, New Delhi.

Reference Books

1. Peu Ghosh, Indian Government & Politics, Prentice Hall of India, New Delhi.
2. B.Z. Fadia & Kuldeep Fadia, Indian Government & Politics, Lexis Nexis, New Delhi.

E-Resources

- https://onlinecourses.nptel.ac.in/noc24_ph36/preview
- https://onlinecourses.nptel.ac.in/noc24_ma15/preview
- https://help.scilab.org/docs/2025.1.0/en_US/ode.html

Course Objectives:

1. Solve problems of Eigen values and Eigen Vectors using Python/Scilab.
2. Solution of Algebraic and Transcendental Equations using Python/Scilab.
3. Solve problems of Linear system of equations.
4. Solve problems of First-Order ODEs Higher order linear differential equations with constant coefficients.

Course Outcomes:

After learning the contents of this paper, the student must 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: Be able to understand the functioning and distribution of financial resources between the center and states.

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECE III Year-II Sem			
Course Code: **M324D**	**Cellular & Mobile Communication (PE-II)**	L	T	P	C
		3	**0**	**0**	**3**

Pre-Requisites: Knowledge of Analog and Digital Communication, Basic Knowledge of Wireless Communication**.**

Module 1: Introduction to Cellular Mobile Radio Systems

Limitations of conventional mobile telephone systems, Basic Cellular Mobile System, First, second, third and fourth generation cellular wireless systems, introduction to 5^{th} and 6^{th} generation of mobile communication, comparison and differences. Uniqueness of mobile radio Environment-Long term fading, Factors influencing short term fading.

Parameters of mobile multipath Fading-Time dispersion parameters, Coherence bandwidth, Doppler spread and coherence time, Types of small scale fading

Module 2: Cellular System design and fundamentals

Concept of frequency reuse, Co-channel Interference and system capacity. Adjacent channel Interference, power control for reducing interference. 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.

Design of antenna system and measurement of real time co-channel interference, Antenna parameters and their effects, Adjacent channel interference, Near end far end interference, Cross talk, Effects on coverage and interference by power decrease, Antenna height decrease.

Module 3: Cell Coverage for Signal and Traffic

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.

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

Application of smart antennas in cellular communication, Sum and difference patterns and antenna synthesis, Coverage-Omni directional antennas.

Interference reduction- directional antennas for interference reduction, Space diversity antennas, Umbrella pattern antennas, and Minimum separation of cell site antennas, mobile antennas.

Module 5: Frequency Management and Channel Assignment & Handoffs

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.

Channel assignment strategies, handoff strategies, 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.

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECE III Year-II Sem			
Course Code: M324E	ADAPTIVE AND WAVELET SIGNAL PROCESSING (PE-II)	L	T	P	C
		3	0	0	3

Pre-Requisites: DSP, Linear algebra

Module 1: Introduction to Adaptive Signal Processing [10L]

Introduction to adaptive signal processing; Review of basic concepts in signal processing; Adaptive filtering applications; Optimal FIR (Wiener) filter, Method of steepest descent method; Least Mean Square (LMS) algorithm

Normalized LMS algorithm; Recursive Least Squares (RLS) algorithm; Performance analysis of adaptive filters; Practical implementation issues.

Module 2: Adaptive Filter Structures and Algorithms [9L]

Finite Impulse Response (FIR) adaptive filters; Adaptive FIR filter structures: Direct and Transposed forms; Recursive filters: Infinite Impulse Response (IIR) adaptive filters. Sub-band adaptive filters; Block adaptive filters; Adaptive lattice filters; Adaptive filter applications in noise cancellation and echo cancellation.

Module 3: Recursive Estimation and Adaptive Algorithms [8L]

Recursive parameter estimation; Recursive least squares estimation; Kalman filtering and applications Widely Linear estimation; Blind channel equalization; Blind source separation

Module 4: Introduction to wavelet [10L]

Introduction, Origin of Wavelets,Haar Wavelet, Dyadic Wavelet, Dilates and Translates of Haar Wavelets L2 norm of a function

Module 5: Analysis using Wavelet [9L]

Piecewise Constant Representation of a Function, Ladder of Subspaces, Scaling Function of Haar Wavelet, Demonstration: Piecewise constant approximation of functions Vector Representation of Sequences, Properties of Norm, Parseval's Theorem

Text Books

1. S. Haykin, Adaptive filter theory, Prentice Hall, 1986.Education 2010.

Reference Books

1. C. Widrow and S.D. Stearns, Adaptive signal processing, Prentice Hall, 1984.

E-Resources

1. NPTEL: "Adaptive Signal Processing" (https://nptel.ac.in/courses/117/101/117101108/)
2. Tutorialspoint: "Adaptive Signal Processing" (https://www.tutorialspoint.com/adaptive_signal_processing/index.htm)

Course Outcomes

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

CO1. Apply adaptive signal processing techniques to solve real-world problems in signal processing and communications.

CO2. Design and implement adaptive filter structures for noise cancellation, echo cancellation, and equalization.

CO3. Analyze the performance of adaptive filters using metrics such as mean squared error

and convergence rate.

CO4. Evaluate and compare different adaptive algorithms for specific applications.

CO5. Stay updated with the latest advancements in adaptive signal processing and apply them to novel applications.

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECE III Year-II Sem			
Course Code: M324F	**EMBEDDED SYSTEMS DESIGN (PE-II)**	L	T	P	C
		3	**0**	**0**	**3**

Pre-Requisites: Microprocessors and Interfacing, Microcontrollers and Applications, Computer Organization

Module 1: [12L] Introduction to Embedded Systems

Definition of Embedded System, Embedded Systems Vs General Computing Systems, History Of Embedded Systems, Classification, Major Application Areas,
Characteristics of Embedded Systems, purpose of Embedded Systems, Characteristics and Quality Attributes of Embedded Systems.

Module 2: [14L]: Typical Embedded Systems

Core of the Embedded System General Purpose and Domain Specific Processors, ASICS, PLDS, Commercial Off-The-Shelf Components (COTS),

Memory ROM, RAM, Memory according to the type of Interface, Memory Shadowing, Memory selection for Embedded Systems, Sensors and Actuators, Communication Interface: Onboard and External Communication Interfaces.

Module 3: [9L] Embedded Firmware:

Watchdog Timer, Embedded Firmware Design Approaches and Development Languages Design

Approaches Reset Circuit, Brown-out Protection Circuit, Oscillator Unit, Real Time Clock

Module 4: [10L]

Embedded Systems Interfacing
Serial Peripheral Interface (SPI), Universal Serial Bus(USB), CAN, Bluetooth, PCI and AMBA bus protocols.
Real time operating system
POSIX Compliance, Need of RTOS in Embedded system software, Mmultitasking, context switching, IPC, Scheduler policies, Architecture of kernel, task scheduler, ISR, Semaphores, mailbox, message queues, pipes, events, timers, memory management, RTOS services in contrast with traditional OS.

Module 5: [9L]

Compliance, Need of RTOS in Embedded system software, Mmultitasking, context switching, IPC, Scheduler policies, Architecture of kernel, task scheduler, ISR, Semaphores, mailbox, message queues, pipes, events, timers, memory management, RTOS services in contrast with traditional OS.

Text Books

1. Introduction to Embedded Systems - Shibu K.V, McGraw Hill.
2. Qing Li, Elsevier, "Real Time Concepts for Embedded Systems", 2011.

Reference Books

1. Rajkamal, "Embedded Systems, Architecture, Programming and Design", TMH, 2007.
2. Richard Stevens, "Advanced UNIX Programming".138

Course Outcomes

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

CO1. After completion of the course, students will be able to Get Knowledge on Embedded System Concepts.

CO2. Use Different memories and core components in Embedded System to develop the Applications

CO3. Develop and Implement different circuits and development designs in Embedded Applications

CO4. Demonstrate OS concepts and Commands

CO5. Work on Real Time Operating System Concepts used in Embedded System

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECE III Year-II Sem			
Course Code: M324F	**Digital Image and Video Processing (PE-III)**	L	T	P	C
		3	**0**	**0**	**3**

Pre-Requisites: Signals and Systems, Digital Signal Processing

Module 1: Introduction to Digital Image Processing

Digital Image Fundamentals – Elements of visual perception, image sensing and acquisition, image sampling and quantization. Basic relationships between pixels – neighbourhood, adjacency, connectivity, distance measures.

Module 2: Image Enhancement

Intensity Transformation and Spatial Filtering Basic intensity transformations (contrast stretching, histogram equalization) Spatial filtering techniques (smoothing, sharpening)

Frequency Domain Filtering: Fourier Transform and its application in image processing, Low-pass and high-pass filtering in the frequency domain

Module 3: Image Restoration and Reconstruction

Image Restoration: Degradation models and restoration techniques (inverse filtering, Wiener filtering), Noise removal methods (spatial filtering, frequency domain filtering)

Image Reconstruction: Image interpolation techniques, Image reconstruction from projections (computed tomography)

Module 4: Basic Steps of Video Processing

Analog video, Digital video, Time varying image formation model, Geometric image formation, formation and sampling of video signal

Module 5: 2D Motion Estimation

Optical flow, Pixel-based motion estimation, Region-based motion estimation, Multi-resolution motion estimation, Application of motion estimation in video coding

Text Books

1. R.C. Gonzalez and R.E. Woods, Digital Image Processing, Second Edition, Pearson Education, 2008.
2. 2. Yao Wang, Joem Ostarmann, Ya-Qin Zhang, "Video Processing and Communication", 1st Edition, PHI.

Reference Books

1. Anil Kumar Jain, Fundamentals of Digital Image Processing, Prentice Hall of India, 2nd Edition, 2004.
2. Gerard Blanchet, Maurice Charbit, Digital Signal and Image Processing using MATLAB, ISTE.

E-Resources

1. NPTEL: Courses and materials on digital image processing (nptel.ac.in)

2. Lecture notes from various universities in the field of computer science and engineering.

Course Outcomes

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

CO1: Understand the fundamentals process on digital image.

CO2: Mathematically represent the various image processing models and analyze them.

CO3: Process these images for enhancement of certain properties or optimized use of resources.

CO4: Understand the basic steps of video processing.

CO5: Learn mathematical and computational skills needed for understanding the principle of 2-D motion estimation.

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECE III Year-II Sem			
Course Code: M324G	Machine Learning (PE-III)	L	T	P	C
		3	0	0	3

Pre-Requisites: probability

Module 1: [12L]

BASICS Learning Problems Perspectives and Issues Concept Learning Version Spaces and Candidate eEliminations – Inductive bias – Decision Tree learning – Representation – Algorithm – Heuristic Space Search

Module 2: [14L]

NEURAL NETWORKS AND GENETIC ALGORITHMS: Neural Network Representation Problems Perceptions Multilayer Networks and Back Propagation Algorithms – Advanced Topics – Genetic Algorithms Hypothesis Space Search– Genetic Programming – Models of Evolutions and Learning.

Module 3: [9L]

BAYESIAN AND COMPUTATIONAL LEARNING: Bayes Theorem Concept Learning Maximum Likelihood Minimum Description Length Principle Bayes Optimal Classifier Gibbs Algorithm Naïve Bayes Classifier Bayesian Belief Network EM Algorithm Probability Learning Sample Complexity Finite and Infinite Hypothesis Spaces – Mistake Bound Model.

Module 4: [10L]

INSTANT BASED LEARNING: K- Nearest Neighbor Learning Locally weighted Regression Radial Bases Functions – Case Based Learning.

Module 5: [9L]

ADVANCED LEARNING: Learning Sets of Rules Sequential Covering Algorithm Learning Rule Set First Order Rules Sets of First Order Rules Induction on Inverted Deduction Inverting Resolution Analytical Learning Perfect Domain Theories Explanation Base Learning – FOCL Algorithm - Reinforcement Learning Task Learning Temporal Difference Learning

Text Books

1. Tom M. Mitchell, "Machine Learning", McGraw-Hill, 2010
2. Bishop, Christopher. Neural Networks for Pattern Recognition. New York, NY: Oxford University Press, 1995

Reference Books

1. Ethem Alpaydin, (2004) "Introduction to Machine Learning (Adaptive Computation and Machine Learning)", The MIT Press

2. T. astie, R. Tibshirani, J. H. Friedman, "The Elements of Statistical Learning", Springer(2nd ed.), 2009

Course Outcomes

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

1. Develop and apply pattern classification algorithms to classify multivariate data.
2.Develop and apply regression algorithms for finding relationships between data variables.
3.Develop and apply reinforcement learning algorithms for learning to control complex systems.
4.Write scientific reports on computational machine learning methods, results and conclusions.

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECE III Year-II Sem			
Course Code: M324H	SATELLITE COMMUNICATION (PE-III)	L	T	P	C
		3	0	0	3

Pre-Requisites: Analog and Digital communication

Module 1: SATELLITE ORBITS

Introduction to Satellite Communication: Principles and architecture of satellite Communication, Brief history of Satellite systems, advantages, disadvantages, applications and frequency bands used for satellite communication

Orbital Mechanics: Orbital equations, Kepler's laws, Apogee and Perigee for an elliptical orbit, evaluation of velocity, orbital period, angular velocity of a satellite, concepts of Solar day and Sidereal day.

Module 2: SPACE SEGMENT

Spacecraft Technology- Structure, Primary power, Attitude and Orbit control, Thermal control and Propulsion,

Communication Payload and supporting subsystems, Telemetry, Tracking and command- Transponders- The Antenna Subsystem.

Module 3: SATELLITE LINK DESIGN

Basic link analysis, Interference analysis, Rain induced attenuation and interference, Ionosphere characteristics, Link Design with and without frequency reuse.

Module 4 : SATELLITE ACCESS AND CODING METHODS

Modulation and Multiplexing: Voice, Data, Video, Analog – digital transmission system, Digital video Broadcast,

multiple access: FDMA, TDMA, CDMA, DAMA Assignment Methods, compression – encryption, Coding Schemes.

Module 5: SATELLITE APPLICATIONS [9L]

INTELSAT Series, INSAT, VSAT, Mobile satellite services: GSM, GPS, INMARSAT, LEO, MEO, Satellite

Navigational System

GPS Position Location Principles, Differential GPS, Direct Broadcast satellites (DBS/DTH).

Text Books

1. Dennis Roddy, —Satellite Communication‖, 4th Edition, Mc Graw Hill International, 2006.
2. Timothy,Pratt,Charles,W.Bostain,JeremyE.Allnutt,"SatelliteCommunication‖,2nd Edition,Wiley Publications,2002

Reference Books

1. Wilbur L.Pritchard, Hendri G. Suyderhoud, Robert A. Nelson, —Satellite Communication Systems Engineering‖, Prentice Hall/Pearson, 2007.
2. N.Agarwal, —Design of Geosynchronous Space Craft‖, Prentice Hall, 1986.
3. Bruce R. Elbert, —The Satellite Communication Applications‖, Hand Book, Artech House Bostan London, 1997.

Course Outcomes

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

CO1.Visualize the architecture of satellite systems as a means of high speed, high range communication system.

CO2. Illustrate the basic concepts of Orbital mechanics.

CO3. State aspects related to sub-systems in a satellite and satellite link budget.

CO4. Acquire knowledge about modulation and multiple access schemes.

CO5. Describe the typical phenomena in satellite communication and also its applications.

AY: 2024-25 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECE III Year-II Sem			
Course Code: **M324OD**	**Quantum Computing** (OE-II)	L	T	P	C
		3	**0**	**0**	**3**

Pre-Requisites:

Module 1:

Introduction: Elementary quantum mechanics, linear algebra for quantum mechanics, Quantum states in Hilbert space, The Bloch sphere, Density operators, generalized measurements, no-cloning theorem.

Module 2:

Quantum correlations: Bell inequalities and entanglement, Schmidt decomposition, super-dense coding, teleportation.

Module 3:

Quantum cryptography: quantum key distribution

Module 4:

Quantum gates and algorithms: Universal set of gates, quantum circuits, Solovay-Kitaev theorem, Deutsch-Jozsa algorithm, factoring

Module 5:

Programming a quantum computer: The IBMQ, coding a quantum computer using a simulator to carry out basic quantum measurement and state analysis.

Text Books

1. Phillip Kaye, Raymond Laflamme et. al., An introduction to Quantum Computing, Oxford University press, 2007.
2. Chris Bernhardt, Quantum Computing for Everyone, The MIT Press, Cambridge, 2020
3. David McMahon-Quantum Computing Explained-Wiley-Interscience , IEEE Computer Society (2008)

Reference Books

1. Quantum Computation and Quantum Information, M. A. Nielsen & I.Chuang, Cambridge University Press (2013).

2. Quantum Computing, A Gentle Introduction, Eleanor G. Rieffel and Wolfgang H. Polak MIT press (2014)

3. Electronic Communication Systems–Kennedy and Davis, TMH, 4thedition, 2004.

Communication Systems Engineering-John. G. Proakis and Masoud Salehi, PHS,2nd ed. 2004.