B.TECH

Electronics and Communication Engineering

JBIET-R25

Academic Regulations &

I & II 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

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JBIET Academic Regulations - R25

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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.*

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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-R25	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	N1100A	Matrices and Calculus	3	1	0	4
2	N1100B	Advanced Engineering Physics	3	0	0	3
3	N1105A	Programming for Problem Solving	3	0	0	3
4	N1102C	Introduction to Electrical Engineering	2	0	0	2
5	N1103A	Engineering Drawing and Computer Aided Drafting	2	0	2	3
6	N1100D	English for Skill Enhancement	3	0	0	3
7	N11001	Advanced Engineering Physics Lab	0	0	2	1
8	N11051	Programming for Problem Solving Lab		0	2	1
9	N11003	English Language and Communication Skills Lab	0	0	2	1
10		Induction Program				
		Total Credits	**16**	**01**	**08**	**21**

I Year II Semester						
S. No	**Code**	**Course Title**	**L**	**T**	**P**	**Credits**
1	N1200A	Ordinary Differential Equations and Vector Calculus	3	0	0	3
2	N1200C	Engineering Chemistry	3	0	0	3
3	N1205C	Python Programming & Data Structures	3	0	0	3
4	N1204A	Electronic Devices and Circuits	3	0	0	3
5	N1202C	Network Analysis and Synthesis	3	0	0	3
6	N12002	Engineering Chemistry Lab	0	0	2	1
7	N12052	Applied Python Programming & Data Structures Lab	0	0	2	1
8	N12041	Electronic Devices and Circuits Lab	0	0	2	1
9	N12021	Basic Electrical Engineering Lab	0	0	2	1
10	N12031	Engineering Workshop	0	0	2	1
11	N1200F	Lingua skills for Professionals B1	2	0	0	0
		Total Credits	**15**	**0**	**10**	**20**

B. Tech Course Structure

II Year I Semester						
S. No	**Code**	**Course Title**	**L**	**T**	**P**	**Credits**
1	N2104A	Probability Theory and Stochastic Processes	3	0	0	3
2	N2104B	Signals and Systems	3	0	0	3
3	N2104C	Electronic Circuit Analysis	3	0	0	3
4	N2104D	Digital Logic Design	3	0	0	3
5	N2104E	Control Systems	2	0	0	2
6	N21041	Modelling and Simulation Lab	0	0	2	1
7	N21042	Electronic Circuit Analysis Lab	0	0	2	1
8	N21043	Digital Logic Design Lab	0	0	2	1
9	N21054	Linux and Shell Scripting	0	0	2	1
10	N2100D	Environmental Science	1	0	0	1
		Total Credits	**15**	**0**	**08**	**19**

II Year II Semester						
S. No	**Code**	**Course Title**	**L**	**T**	**P**	**Credits**
1	N2200B	Numerical Methods and Complex Variables	3	0	0	3
2	N2204A	Electromagnetic Fields and Transmission Lines	3	0	0	3
3	N2204B	Analog and Digital Communications	3	0	0	3
4	N2205F	Computer Organization and Operating Systems	3	0	0	3
5	N2204C	Linear and Digital IC Applications	3	0	0	3
6	N22001	Computational Mathematics Lab	0	0	2	1
7	N22041	Analog and Digital Communications Lab	0	0	2	1
8	N22042	Linea rand Digital IC Applications Lab	0	0	2	1
9	N22055	Web and Mobile Applications	0	0	2	1
10	N220EA	Innovation and Entrepreneurship	2	0	0	2
11	N2200D	Lingua Skills for professionals B2				
		Total Credits	**17**	**0**	**08**	**21**

B. Tech Course Structure

III Year I Semester						
S. No	**Code**	**Course Title**	**L**	**T**	**P**	**Credits**
1	N3104A	Digital Signal Processing	3	0	0	3
2	N3104B	RISC and Microcontroller architectures	3	0	0	3
3	N3104C	CMOS VLSI Design	3	0	0	3
4	PE-ECE1	Professional Elective-I	3	0	0	3
5	OE-ECE1	Open Elective-I	2	0	0	2
6	N31041	RISC and Microcontroller Interfacing Laboratory	0	0	2	1
7	N31042	CMOS VLSI Design Laboratory	0	0	2	1
8	N31043	Digital Signal Processing Laboratory	0	0	2	1
9	N31044	Field-based Research Project	0	0	4	2
10	N31045	FPGA based System Design	0	0	2	1
11	N3100A	Indian Knowledge System	1	0	0	1
Total Credits			**15**	**0**	**12**	**21**

III Year II Semester						
S. No	**Code**	**Course Title**	**L**	**T**	**P**	**Credits**
1	N3204A	Antenna Design and Wave Propagation	3	0	0	3
2	N3204B	Computer Networks & IoT Architectures and Protocols	3	1	0	4
3	N320EA	Business Economics and Financial Analysis	3	0	0	3
4	PE-ECE2	Professional Elective-II	3	0	0	3
5	OE-ECE2	Open Elective–II	2	0	0	2
6	N32041	Advanced Communications Lab	0	0	2	1
7	N32042	IoT Architectures and Protocols Laboratory	0	0	2	1
8	N32043	VLSI Design Verification Laboratory	0	0	2	1
9.	N32001	English for Employability Skills Lab	0	0	2	1
10	N32044	4/5G Practical Lab/Robotic Lab/Drone Lab	0	0	2	1
11.	N3200B	Gender Sensitization*/Human Values and Professional Ethics*	1	0	0	0.5+0.5
		Total Credits	**15**	**1**	**10**	**21**

IV Year I Semester						
S. No	**Code**	**Course Title**	**L**	**T**	**P**	**Credits**
1	N4104A	Microwave and Optical Communications	3	0	0	3
2	N4104B	Embedded System Design	3	0	0	3
3	N410EC	Fundamentals of Management for Engineers	3	0	0	3
4	PE-ECE3	Professional Elective-III	3	0	0	3
5	PE-ECE4	Professional Elective–IV	3	0	0	3
6	OE-ECE3	Open Elective–III	2	0	0	2
7	N41041	Microwave and Optical Communications Laboratory	0	0	2	1
8	N41042	Embedded System Design Lab	0	0	2	1
9	N41043	Industry Oriented Mini Project/Internship	0	0	4	2
		Total Credits	**17**	**0**	**08**	**21**

IV Year II Semester						
S. No	**Code**	**Course Title**	**L**	**T**	**P**	**Credits**
1	PE-ECE5	Professional Elective–V	3	0	0	3
2	PE-ECE6	Professional Elective–VI	3	0	0	3
3	N42041	Project Work	0	0	28	14
		Total Credits	**06**	**0**	**28**	**20**

PROFESSIONAL ELECTIVES:

PROFESSIONAL ELECTIVE-I						
S. No	**Code**	**Course Title**	**L**	**T**	**P**	**Credits**
1	N3104G	Sustainability for Electronics	3	0	0	3
2	N3173C	Artificial Intelligence and Machine Learning	3	0	0	3
3	N3104H	Information Theory and Coding	3	0	0	3
4	N3104I	Radar Engineering	3	0	0	3

PROFESSIONAL ELECTIVE-II						
S. No	**Code**	**Course Title**	**L**	**T**	**P**	**Credits**
1	N3273D	Artificial Neural Networks and Deep Learning	3	0	0	3
2	N3204D	CMOS Fabrication and Technology	3	0	0	3
3	N3204E	Satellite Communications	3	0	0	3
4	N3204F	Unmanned Aerial Vehicles	3	0	0	3

PROFESSIONAL ELECTIVE-III						
S. No	**Code**	**Course Title**	**L**	**T**	**P**	**Credits**
1	N4104D	Low Power VLSI Design	3	0	0	3
2	N4104E	Image and Video Processing	3	0	0	3
3	N4104F	Wireless Communication Networks	3	0	0	3
4	N4104G	Design for Testability	3	0	0	3

PROFESSIONAL ELECTIVE-IV						
S. No	**Code**	**Course Title**	**L**	**T**	**P**	**Credits**
1	N4104H	Analog and Mixed Signal IC Design	3	0	0	3
2	N4173C	Natural Language Processing	3	0	0	3
3	N4104I	5GCommunications	3	0	0	3
4	N4104J	Biomedical Instrumentation	3	0	0	3

PROFESSIONAL ELECTIVE-V						
S. No	**Code**	**Course Title**	**L**	**T**	**P**	**Credits**
1	N4204A	Intelligent e-Computer Aided Design	3	0	0	3
2	N4204B	Biomedical Signal and Image Processing	3	0	0	3
3	N4205N	Network Security and cryptography	3	0	0	3
4	N4204C	SOC Architecture	3	0	0	3

PROFESSIONAL ELECTIVE-VI						
S. No	**Code**	**Course Title**	**L**	**T**	**P**	**Credits**
1	N4204D	DSP Processors and Architectures	3	0	0	3
2	N4205L	Large Language Models	3	0	0	3
3	N4204E	Qunatum Technologies	3	0	0	3
4	N4204F	RF Circuit Design	3	0	0	3

OPEN ELECTIVES:

OPEN ELECTIVE-I						
S. No	**Code**	**Course Title**	**L**	**T**	**P**	**Credits**
1	N3104OA	Principles of Communication	3	0	0	3
2	N3104OB	Fundamentals of Cyber Physical Systems	3	0	0	3

OPEN ELECTIVE-II						
S. No	**Code**	**Course Title**	**L**	**T**	**P**	**Credits**
1	N3204OA	Fundamentals of Image Processing	3	0	0	3
2	N3204OB	Automotive Electronics	3	0	0	3

OPEN ELECTIVE-III						
S. No	**Code**	**Course Title**	**L**	**T**	**P**	**Credits**
1	N4104OA	Introduction to wireless Communications	3	0	0	3
2	N4104OB	Electronics for Health Care	3	0	0	3

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech CSE I Year-I Sem			
Course Code: N1100A	MATRICES AND CALCULUS (COMMON TO: CE, EEE, ME, ECE, CSE, IT, ECM, CSE(AIML), CSE(DS), AIDS & AIML)	L	T	P	C
		3	1	0	4

Pre-Requisites: Mathematical Knowledge at pre-university level

Module 1: Matrices: **[08L]**

Rank of a matrix by Echelon form and Normal form – Inverse of Non-singular matrices by Gauss Jordan method. System of linear equations: Solving system of Homogeneous and Non-Homogeneous equations. Gauss Seidel Iteration Method.

Module 2: Eigen values and Eigen vectors: **[10L]**

Eigen values – Eigen vectors and their properties – Diagonalization of a matrix – Cayley-Hamilton Theorem (without proof) – Finding inverse and power of a matrix by Cayley-Hamilton Theorem. Quadratic forms and Nature of the Quadratic Forms – Reduction of Quadratic form to canonical form by Orthogonal Transformation.

Module 3: Single Variable Calculus: **[10L]**

Limits and Continuity of functions and its properties. Mean value theorems: Rolle's theorem – Lagrange's Mean value theorem with their Geometrical Interpretation and applications – Cauchy's Mean value Theorem – Taylor's and Maclaurin's series (All the theorems without proof).

Curve Tracing: Curve tracing in cartesian coordinates.

Module 4: Multivariable Calculus-I: **[10L]**

Definitions of Limit and continuity – Partial Differentiation: Euler's Theorem – Total derivative – Jacobian – Functional dependence & independence. Applications: Maxima and minima of functions of two variables and three variables using method of Lagrange multipliers.

Module 5: Multivariable Calculus-II **[10L]**

Evaluation of Double Integrals (Cartesian and polar coordinates) – change of order of integration (only Cartesian form) – Change of variables for double integrals (Cartesian to polar). Evaluation of Triple Integrals- Change of variables for triple integrals (Cartesian to Spherical and Cylindrical polar coordinates). Applications: Areas by double integrals and volumes by triple integrals.

Text Books

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 45th Edition, 2020.
2. R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, 5th Editon, 2019.

Reference Books

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10th Edition, John Wiley & Sons, 2020.
2. Maurice D. Weir, Joel Hass, Christopher Heil, Przemyslaw Bogacki, Thomas' Calculus, 13th Edition, Pearson, Reprint, 2024.
3. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, 8th Edition, 2016.
4. H. K. Dass and Er. Rajnish Verma, Higher Engineering Mathematics, S. Chand and Company Limited, New Delhi, 2014.

E-Resources

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

Course Objectives:

To learn

1. Concept of a rank of the matrix and applying this concept to know the consistency and solving the system of linear equations.
2. Concept of eigen values and eigen vectors and to reduce the quadratic form to canonical form.
3. Geometrical approach to the mean value theorems and their application to the mathematical

problems.
4. Finding maxima and minima of functions of two and three variables.
5. Evaluation of multiple integrals and their applications.

Course Outcomes:

After learning the contents of this paper, the student must be able to
CO1: Compute the rank of a matrix and analyze the solution of the system of equations.
CO2: Determine Eigenvalues and Eigenvectors of matrices and apply orthogonal transformations to reduce quadratic forms into canonical form.
CO3: Apply the Mean Value Theorems to solve engineering problems.
CO4: Find the extreme values of functions of two variables with/ without constraints.
CO5: Evaluate the multiple integrals and apply the concept to find areas, volumes.

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech CSE I Year-I Sem			
Course Code: N1100B	ADVANCED ENGINEERING PHYSICS (COMMON TO: CE, EEE, ME, ECE, CSE, IT, ECM, CSE(AIML), CSE(DS), AIDS, AIML)	L	T	P	C
		3	0	0	3

Pre-Requisites: 10+2 Physics

Course Objectives:

1. The students should be able to
2. To study crystal structures, defects, and material characterization techniques like XRD and SEM.
3. To understand fundamental concepts of quantum mechanics and their applications in solids and nanomaterials.
4. To introduce quantum computing principles, quantum gates, and basic quantum algorithms.
5. To learn the properties and applications of magnetic and dielectric materials.
6. To explore the working and applications of lasers and fibre optics in modern technology.

UNIT - I: Crystallography & Materials Characterization [10L]

Introduction: Unit cell, space lattice, basis, lattice parameters; crystal structures, Bravais lattices, packing factor: SC, BCC, FCC; Miller indices, inter-planar distance; defects in crystals (Qualitative): point defects, line defects, surface defects and volume defects. concept of nanomaterials: surface to volume ratio, X -ray diffraction: Bragg's law, powder method, calculation of average crystallite size using Debye Scherrer's formula, scanning electron microscopy (SEM): block diagram, working principle.

UNIT - II: Quantum Mechanics [10L]

Introduction, de-Broglie hypothesis, Heisenberg uncertainty principle, physical significance of wave function, postulates of quantum mechanics: operators in quantum mechanics, eigen values and eigen functions, expectation value; Schrödinger's time independent wave equation, particle in a 1D box, Bloch's theorem (qualitative), Kronig-Penney model (qualitative): E-k diagram, concepts of group velocity and phase velocity, formation of energy bands, origin of bandgap, classification of solids, concept of discrete energy levels and quantum confinement in nanomaterials.

UNIT - III: Quantum Computing [9L]

Introduction, linear algebra for quantum computation, Dirac's Bra and Ket notation and their properties, Hilbert space, Bloch's sphere, concept of quantum computer, classical bits, Qubits, multiple Qubit system, quantum computing system for information processing, evolution of quantum systems, quantum measurements, entanglement, quantum gates, challenges and advantages of quantum computing over classical computation, quantum algorithms: Deutsch-Jozsa, Grover.

UNIT - IV: Magnetic and Dielectric Materials [10L]

Introduction to magnetic materials, origin of magnetic moment-classification of magnetic materials, hysteresis, Weiss domain theory of ferromagnetism, soft and hard magnetic materials, synthesis of ferrimagnetic materials using sol-gel method, applications: magnetic hyperthermia for cancer treatment, magnets for EV, Giant Magneto Resistance (GMR) device.

Introduction to dielectric materials, types of polarization (qualitative): electronics, ionic & orientation; ferroelectric, piezoelectric, pyroelectric materials and their applications: Ferroelectric Random-Access Memory (Fe-RAM), load cell and fire sensor.

UNIT - V: Laser and Fibre Optics [9L]

Introduction to laser, characteristics of laser, Einstein coefficients and their relations, metastable state, population inversion, pumping, lasing action, Ruby laser, He-Ne laser, Nd:YAG laser, semiconductor diode laser, applications: Bar code scanner, LiDAR for autonomous vehicle.

Introduction to fibre optics, total internal reflection, construction of optical fibre, acceptance angle, numerical aperture, classification of optical fibres, losses in optical fibre, applications: optical fibre for communication system, sensor for structural health monitoring.

Text Books

1. Walter Borchardt-Ott, Crystallography: An Introduction, Springer.
2. Charles Kittel, Introduction to Solid State Physics, John Wiley & Sons, Inc.
3. Thomas G. Wong, Introduction to Classical and Quantum Computing, Rooted Grove

Reference Books

1. Jozef Gruska, Quantum Computing, McGraw Hill
2. Michael A. Nielsen & Isaac L. Chuang, Quantum Computation and Quantum Information, Cambridge University Press.
3. John M. Senior, Optical Fiber Communications Principles and Practice, Pearson Education Limited. Introduction to Solid State Physics, Charles Kittel, Wiley Eastern, 2019.

E-Resources

- https://shijuinpallotti.wordpress.com/wp-content/uploads/2019/07/optical-fiber communications-principles-and-pr.pdf
- https://www.geokniga.org/bookfiles/geokniga-crystallography_0.pdf
- https://dpbck.ac.in/wp-content/uploads/2022/10/Introduction-to-Solid-State-PhysicsCharles Kittel.pdf
- https://www.thomaswong.net/introduction-to-classical-and-quantum-computing-1e4p.pdf
- https://www.fi.muni.cz/usr/gruska/qbook1.pdf
- https://profmcruz.wordpress.com/wp-content/uploads/2017/08/quantum-computation-and quantum-information-nielsen-chuang.pdf

Course Outcomes

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

CO1: Analyze crystal structures, identify defects, and apply XRD and SEM techniques for material characterization.

CO2: Apply quantum mechanical principles to explain particle behaviour and energy band formation in solids.

CO3: Understand quantum computing concepts, use quantum gates, and explain basic quantum algorithms.

CO4: Classify magnetic and dielectric materials and explain their properties, synthesis, and applications.

CO5: Explain the principles of lasers and fibre optics and their applications in communication and sensing.

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech CSE I Year-I Sem			
Course Code: N1105A	PROGRAMMING FOR PROBLEM SOLVING	L	T	P	C
		3	0	0	3

Pre-Requisites: NIL

Course Objectives:

1. To learn the fundamentals of computers.
2. To understand the various steps in program development.
3. To learn the syntax and semantics of the C programming language.
4. To learn the usage of structured programming approaches in solving problems

Unit 1: Overview of C **[10L]**

C Language Elements, Variable Declarations and Data Types, Executable Statements, General Form of a C Program, Arithmetic Expressions, Formatting Numbers in Program Output. Selection Structures: Control Structures, Conditions, if Statement, if Statements with Compound Statements, Decision Steps in Algorithms. Repetition and Loop Statements: Repetition in Programs, Counting Loops and the while Statement, Computing a Sum or Product in a Loop, for Statement, Conditional Loops, Loop Design, Nested Loops, do-while Statement.

Unit 2: Top-Down Design with Functions **[10L]**

Building Programs from Existing Information, Library Functions, Top-Down Design and Structure Charts, Functions without Arguments, Functions with Input Arguments. Pointers and Modular Programming: Pointers and the Indirection Operator, Functions with Output Parameters, Multiple Calls to a Function with Input/ Output Parameters, Scope of Names, Formal Output Parameters as Actual Arguments.

Unit 3: Arrays **[10 L]**

Declaring and Referencing Arrays, Array Subscripts, Using for Loops for Sequential Access, Using Array Elements as Function Arguments, Array Arguments, Searching and Sorting an Array, Parallel Arrays and Enumerated Types, Multidimensional Arrays. Strings: String Basics, String Library Functions: Assignment and Substrings, Longer Strings: Concatenation and Whole-Line Input, String Comparison, Arrays of Pointers.

Unit 4: Recursion **[10L]**

The Nature of Recursion, Tracing a Recursive Function, Recursive Mathematical Functions, Recursive Functions with Array and String Parameters
Structure and Union Types: User-Defined Structure Types, Structure Type Data as Input and Output Parameters, Functions with Structured Result Values, Union Types.

Unit 5: Text and Binary File Pointers **[10L]**

Input/ Output Files - Review and Further Study, Binary Files, Searching a Database. Searching and Sorting: Basic searching in an array of elements (linear and binary search techniques), Basic algorithms to sort array of elements (Bubble, Insertion and Selection sort algorithms).

Text Books

1. Jeri R. Hanly and Elliot B. Koffman, Problem solving and Program Design in C 7th Edition, Pearson.
2. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rd Edition).

Reference Books

1. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India.
2. E. Balagurusamy, Computer fundamentals and C, 2nd Edition, McGraw-Hill.
3. Yashavant Kanetkar, Let Us C, 18th Edition, BPB.
4. R.G. Dromey, How to solve it by Computer, Pearson (16th Impression).
5. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
6. Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edition.
7. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill.

Course Outcomes:

The student will able to learn

CO1: Apply fundamental C programming concepts such as variables, data types, operators, control structures, and loops to develop simple computational solutions.

CO2: Design modular programs using functions, pointers, and structured programming techniques for problem-solving.

CO3: Demonstrate the use of arrays, strings, and associated algorithms (searching and sorting) in solving real-world problems.

CO4: Implement recursive algorithms and utilize user-defined structures and unions for handling complex data.

CO5: Apply files concepts, searching and sorting techniques for data management.

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech CSE I Year-I Sem			
Course Code: N1102C	INTRODUCTION TO ELECTRICAL ENGINEERING (ECE)	L	T	P	C
		2	0	0	2

Pre-Requisites: Mathematics

COURSE OBJECTIVES

COB1: To understand the basic laws, elements, and theorems for analyzing DC circuits.

COB2: To learn sinusoidal waveforms, power concepts, and analysis of single and three-phase AC circuits.

COB3: To study construction, principle, equivalent circuit, and performance of transformers.

COB4: To know the principle and characteristics of DC machines and induction motors.

CO5: To gain knowledge of LT switchgear, earthing, energy consumption, and power factor improvement.

UNIT 1: D.C. CIRCUITS

Introduction to R, L and C elements, Independent voltage and current sources, KVL & KCL, analysis of simple circuits with dc excitation. Superposition, Thevenin and Norton Theorems.

UNIT 2: A.C. Circuits:

Introduction to sinusoidal waveforms, phasor representation, the concept of power and power factor, Analysis of 1-phase RLC series and parallel circuits, resonance in series R-L-C circuit. Three-phase balanced circuits, voltage and current relations in star and delta connections.

UNIT 3: Transformers:

Construction and Principle of operation**,** equivalent circuit, EMF equation, losses, regulation and efficiency. Introduction to Auto – Transformer.

UNIT 4: Electrical Machines:

Principle of operation of DC machine, performance characteristics of dc shunt machine. Principle of operation of a 3-phase induction motor, torque-slip characteristics. Principle of operation of synchronous generator.

UNIT 5: Electrical Installations:

Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing, necessity of earthing, types of earthing. Types of Batteries, Important characteristics of Batteries, Elementary calculations for energy consumption, power factor improvement and battery backup.

TEXT BOOKS

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

T2: MS Naidu and S Kamakshaiah, "Basic Electrical Engineering", Tata McGraw Hill, 2nd Edition, 2008.

REFERENCE BOOKS

R1: P. Ramana, M. Suryakalavathi, G.T. Chandrasheker, "Basic Electrical Engineering", S. Chand, 2nd Edition, 2019.

R2: D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.

R3: M. S. Sukhija, T. K. Nagsarkar, "Basic Electrical and Electronics Engineering", Oxford, 1st Edition, 2012.

R4: Abhijit Chakrabarthi, Sudipta Debnath, Chandan Kumar Chanda, "Basic Electrical Engineering", 2nd Edition, McGraw Hill, 2021.

R5: L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.

R6: E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.

R7: V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.

E-RESOURCES

E1: https://onlinecourses.nptel.ac.in/noc24_ee125/preview

E2: https://nptel.ac.in/courses/108105155

E3: https://onlinecourses.nptel.ac.in/noc25_ee160/preview

COURSE OUTCOMES

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

CO1: Apply KVL, KCL, and theorems (Superposition, Thevenin, Norton) to solve DC circuits.

CO2: Analyze sinusoidal waveforms, phasor representation, and evaluate resonance and star–delta relations in AC circuits.

CO3: Explain construction, operation, equivalent circuit, losses, regulation, and efficiency of transformers.

CO4: Explain the principle of operation and characteristics of DC shunt motor, DC shunt generator, and 3-phase induction motor.

CO5: Identify LT switchgear components, explain types of earthing, and compute energy consumption with power factor improvement.

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech: ME I Year-II Sem			
Course Code:N1103A	ENGINEERING DRAWING AND COMPUTER AIDED DRAFTING	L	T	P	C
		2	0	2	3

Course Objectives:

1. To introduce the fundamentals of engineering drawing and projection systems.
2. To develop skills in constructing orthographic, isometric, and sectional views.
3. To train students in interpreting and creating technical drawings using CAD tools.
4. To familiarize students with dimensioning standards and drafting conventions.
5. To bridge manual drafting techniques with computer-aided drafting practices.

Module 1: Introduction to Engineering Graphics (Conventional)

Conventional: Principles of Engineering Graphics and their Significance, Geometrical Constructions, Scales, Plain and Diagonal, Conic Sections including the Rectangular Hyperbola, General method only. Cycloid, Epicycloid and Hypocycloid.

Module 2: Orthographic Projections (Conventional and Computer Aided)

Conventional: Principles of Orthographic Projections, Conventions, Projections of Points and Lines, Projections of Plane regular geometric figures. Computer aided orthographic projections, points, lines and planes.

Computer Aided: Introduction to Computer aided drafting, views, commands and conics.

Module 3: Projections of Regular Solids (Conventional and Computer Aided)

Conventional: Projection of regular solids - Prism, Cylinder, Pyramid, Cone. Sections or Sectional views of Right Regular Solids, Prism, Cylinder, Pyramid, Cone.

Computer Aided: Computer aided projections of solids, sectional views.

Module 4: Development of Surfaces (Conventional)

Conventional: Prism, Cylinder, Pyramid and Cone.

Module 5: Isometric Projections (Conventional and Computer Aided)

Conventional and Computer Aided: Principles of Isometric Projection, Isometric Scale, Isometric Views, Conventions, Isometric Views of Lines, Plane Figures, Simple Solids. Conversion of Isometric Views to Orthographic Views and Vice- versa i.e. Conversion of orthographic projection into isometric view.

Note:

1. The End Semester Examination will be in conventional mode.
2. CIE – I will be in conventional mode.
3. CIE – II will be using Computer

Text Books

1. Engineering Drawing, N. D. Bhatt, Charotar, 54th Edition, 2023.
2. Engineering Drawing and graphics Using AutoCAD, T. Jeyapoovan and Vikas, S. Chand and company Ltd., 3rdEdition,2010.

REFERENCE BOOKS:

1. Engineering Drawing, Basant Agrawal and C.M. Agrawal, McGraw Hill, 3rd Edition, 2019.
2. Engineering Graphics and Design, WILEY, John Wiley and Sons Inc, 3rdEdition, 2020.
3. Engineering Drawing, M. B. Shah and B.C. Rane, Pearson, 2nd Edition, 2009.

4. Engineering Drawing, N. S. Parthasarathy and Vela Murali, Oxford, 1st Edition, 2015.
5. Computer Aided Engineering Drawing, K. Balaveera Reddy, CBS Publishers, 2nd Edtn, 2015.

Course Outcomes

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

CO1. Understand and apply the principles of orthographic and isometric projections.
CO2. Create sectional views and dimensioned drawings using BIS standards.
CO3. Use CAD software to generate 2D engineering drawings.
CO4. Visualize and construct solid models from 2D views.
CO5. Interpret and produce engineering drawings of mechanical components and assemblies.
CO6. Demonstrate drafting skills for practical and industrial applications.

2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech I Year- I Sem			
Course Code: **N1100D**	**ENGLISH FOR SKILL ENHANCEMENT** (COMMON TO ALL)	L	T	P	D
Credits: 3		**3**	**0**	**0**	**0**

Pre-Requisites: NIL

Course Objectives:

This course will enable the students to:

1. Improve their vocabulary.
2. Use appropriate sentence structures in their oral and written communication.
3. Develop their reading and study skills.
4. Equip students to write paragraphs, essays, précis and draft letters.
5. Acquire skills for Technical report writing.

Unit 1 **(10L)**

Theme: Perspectives

Lesson on 'The Generation Gap' by Benjamin M. Spock from the prescribed textbook titled English for the Young in the Digital World published by Orient Black Swan Pvt. Ltd.

Vocabulary: The Concept of Word Formation -The Use of Prefixes and Suffixes - Words Often Misspelt - Synonyms and Antonyms

Grammar: Identifying Common Errors in Writing with Reference to Parts of Speech particularly Articles and Prepositions — Degrees of Comparison

Reading: Reading and Its Importance- Sub Skills of Reading — Skimming and Scanning.

Writing: Sentence Structures and Types -Use of Phrases and Clauses in Sentences. Importance of Proper Punctuation- Techniques for Writing Precisely —Nature and Style of Formal Writing.

Unit 2 **(9L)**

Theme: Digital Transformation

Lesson on 'Emerging Technologies' from the prescribed textbook titled English for the Young in the Digital World published by Orient BlackSwan Pvt. Ltd.

Vocabulary: Homophones, Homonyms and Homographs

Grammar: Identifying Common Errors in Writing with Reference to Noun-pronoun Agreement and Subject-verb Agreement.

Reading: Reading Strategies-Guessing Meaning from Context — Identifying Main Ideas — Exercises for Practice

Writing: Paragraph Writing — Types, Structures and Features of a Paragraph - Creating Coherence — Linkers and Connectives - Organizing Principles in a Paragraph — Defining- Describing People, Objects, Places and Events — Classifying- Providing Examples or Evidence - Essay Writing - Writing Introduction and Conclusion.

Unit 3 **(8L)**

Theme: Attitude and Gratitude

Poems on 'Leisure' by William Henry Davies and 'Be Thankful' - Unknown Author from the prescribed textbook titled English for the Young in the Digital World published by Orient BlackSwan Pvt. Ltd.

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 — Identifying Topic Sentence and Providing Supporting Ideas - Exercises for Practice.

Writing: Format of a Formal Letter-Writing Formal Letters E.g.., Letter of Complaint, Letter of Requisition, Job Application with CV/Resume —Difference between Writing a Letter and an Email - Email Etiquette.

Unit 4 **(8L)**

Theme: Entrepreneurship

Lesson on 'Why a Start-Up Needs to Find its Customers First by Pranav Jain from the prescribed textbook titled English for the Young in the Digital World published by Orient BlackSwan Pvt. Ltd.

Vocabulary: Standard Abbreviations in English — Inferring Meanings of Words through Context — Phrasal Verbs — Idioms.

Grammar: Redundancies and Clichés in Written Communication — Converting Passive to Active Voice and Vice-Versa.

Reading: Prompt Engineering Techniques— Comprehending and Generating Appropriate Prompts - Exercises for Practice

Writing: Writing Practices- Note Making-Précis Writing.

Unit 5 **(8L)**

Theme: Integrity and Professionalism

Lesson on 'Professional Ethics' from the prescribed textbook titled English for the Young in the Digital World published by Orient BlackSwan Pvt. Ltd.

Vocabulary: Technical Vocabulary and their Usage— One Word Substitutes — Collocations.

Grammar: Direct and Indirect Speech - Common Errors in English (Covering all the other aspects of grammar which were not covered in the previous units)

Reading: Survey, Question, Read, Recite and Review (SQ3R Method) — Inferring the Meaning and Evaluating a Text- Exercises for Practice

Writing: Report Writing - Technical Reports- Introduction — Characteristics of a Report — Categories of Reports Formats- Structure of Reports (Manuscript Format) -Types of Reports - Writing a Technical Report.

Text Books

1. Board of Editors. 2025. English for the Young in the Digital World. Orient Black Swan Pvt. Ltd.

Reference Books

1. Swan, Michael. (2016). Practical English Usage. Oxford University Press. New Edition.
2. Karal, Rajeevan. 2023. English Grammar Just for You. Oxford University Press. New Delhi.
3. 2024. Empowering with Language: Communicative English for Undergraduates. Cengage Learning India Pvt. Ltd. New Delhi.
4. Sanjay Kumar & Pushp Lata. 2022. Communication Skills — A Workbook. Oxford University Press. New Delhi.
5. Wood,F.T. (2007). Remedial English Grammar. Macmillan.
6. Vishwamohan, Aysha. (2013). English for Technical Communication for Engineering Students. Mc Graw-Hill Education India Pvt. Ltd.

E-Resources

1. https://mdu.ac.in/UpFiles/UpPdfFiles/2021/Mar/4_03-02-2021_11-35-30_English-I%20BA1001-1).pdf
2. https://www.swansea.ac.uk/media/Leisure---W-H-Davies.pdf
3. https://www.entrepreneur.com/en-in/starting-a-business/overcome-this-grave-mistake-and-ensure-guaranteed-success/327761
4. Cambridge English
5. BBC Learning English - Learn English with BBC Learning English - Homepage

Course Outcomes

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

1. CO1: Choose appropriate vocabulary in their oral and written communication.
2. CO2: Demonstrate their understanding of the rules of functional grammar and sentence structures.
3. CO3: Develop comprehension skills from known and unknown passages.
4. CO4: Write paragraphs, essays, précis and draft letters.
5. CO5: Write abstracts and reports in various contexts.

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech I Year-I Sem			
Course Code:N11001	**ADVANCED ENGINEERING PHYSICS LAB** COMMON TO: CE, EEE, ME, ECE, CSE, IT, ECM, CSE(AIML), CSE(DS), AIDS, AIML	L	T	P	D
Credits: **1**		**0**	**0**	**2**	**0**

Pre-Requisites: 10+2 Physics basic concepts.

Course Objectives:

1. To provide practical exposure to advanced concepts in solid-state and modern physics.
2. To synthesize and study the physical properties of materials like semiconductors, ferromagnetic, and ferroelectric substances.
3. To perform semiconductor characterization using Hall effect and band gap experiments.
4. To explore the working principles of lasers and optical fibers through hands-on experiments.
5. To develop skills in data analysis, interpretation, and scientific reporting.

List of Experiments:

1. Synthesis of magnetite (Fe3O4) powder using sol-gel method.

2. Determination of energy gap of a semiconductor.

3. Determination of Hall coefficient and carrier concertation of a given semiconductor.

4. Determination of magnetic moment of a bar magnet and horizontal earth magnetic field.

5. Study of B-H curve of a ferro magnetic material.

6. Study of P-E loop of a given ferroelectric crystal.

7. Determination of dielectric constant of a given material.

8. Determination of Curie's temperature of a given ferroelectric material.

9. A) Determination of wavelength of a laser using diffraction grating.

   B) Study of V-I & L-I characteristics of a given laser diode.

10. A) Determination of numerical aperture of a given optical fibre.

    B) Determination of bending losses of a given optical fibre.

Note: Any 8 experiments are to be performed.

Text Books

1. Dr. Narendra, L. Mathakari,"Experiments in Applied Physics" (Physics Lab Manual 4thedition),
2. "Advanced Engineering Physics Lab Resources" By Department of Physics JBIET.

Course Outcomes

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

1. Synthesize and analyze nanomaterials such as magnetite (Fe_3O_4) using chemical methods.
2. Determine key electrical, magnetic, and optical properties of semiconductors and other functional materials.
3. Characterize semiconductors using Hall effect and energy gap measurement techniques.
4. Demonstrate working knowledge of laser systems and optical fiber parameters through experimental study.
5. Apply scientific methods for accurate data collection, analysis, and technical report writing.

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech CSE I Year-I Sem			
Course Code: N11051	PROGRAMMING FOR PROBLEM SOLVING LAB	L	T	P	C
		0	0	2	1

Pre-Requisites: Nil

Course Objectives:

1. To work with an IDE to create, edit, compile, run and debug programs
2. To analyze the various steps in program development.
3. To develop programs to solve basic problems by understanding basic concepts in C like operators, control statements etc.
4. To develop modular, reusable and readable C Programs using the concepts like functions, arrays etc.
5. To Write programs using the Dynamic Memory Allocation concept.
6. To create, read from and write to text and binary files

Experiment 1: Simple numeric problems

a. Write a program for finding the max and min from the three numbers.
b. Write the program for the simple, compound interest.
c. Write a program that prints a multiplication table for a given number and the number of rows in the table. For example, for a number 5 and rows = 3, the output should be:
   5 x 1 = 5
   5 x 2 = 10
   5 x 3 = 15
d. Write a program that shows the binary equivalent of a given positive number between 0 to 255.

Experiment 2: Expression Evaluation

a. 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).
b. Write a program that finds if a given number is a prime number.
c. Write a C program to find the sum of individual digits of a positive integer and test given number is palindrome.
d. A Fibonacci sequence is defined as follows: the first and second terms in the sequence are 0 and 1. Subsequent terms are found by adding the preceding two terms in the sequence. Write a C program to generate the first n terms of the sequence.

Experiment 3: Arrays, Pointers and Functions

a. Write a C program to find the minimum, maximum and average in an array of integers.
b. Write a C program that uses functions to perform the following:
   i. Addition of Two Matrices
   ii. Multiplication of Two Matrices
c. Write a program for reading elements using a pointer into an array and display the values using the array.
d. Write a program for display values reverse order from an array using a pointer.

Experiment 4: Files

a. Write a C program which copies one file to another, replacing all lowercase characters with their uppercase equivalents.
b. Write a C program to merge two files into a third file (i.e., the contents of the first file followed by those of the second are put in the third file).

Experiment 5: Strings

a. Write a C program that uses functions to perform the following operations:
   i. To insert a sub-string into a given main string from a given position.
   ii. To delete n Characters from a given position in a given string
b. 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.)
c. Write a C program that displays the position of a character ch in the string S or – 1 if S doesn't contain ch.

d. Write a C program to count the lines, words and characters in a given text.

Experiment 6: Sorting and Searching

a. Write a C program that uses non-recursive function to search for a Key value in a given list of integers using linear search method.
b. Write a C program that uses non-recursive function to search for a Key value in a given sorted list of integers using binary search method.
c. Write a C program that implements the Bubble sort method to sort a given list of integers in ascending order.
d. Write a C program that sorts the given array of integers using selection sort in descending order
e. Write a C program that sorts the given array of integers using insertion sort in ascending order
f. Write a C program that sorts a given array of names.

Text Books

3. Jeri R. Hanly and Elliot B. Koffman, Problem solving and Program Design in C 7th Edition, Pearson.
4. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rd Edition).

Reference Books

8. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India.
9. E. Balagurusamy, Computer fundamentals and C, 2nd Edition, McGraw-Hill.
10. Yashavant Kanetkar, Let Us C, 18th Edition, BPB.
11. R.G. Dromey, How to solve it by Computer, Pearson (16th Impression).
12. Programming in C, Stephen G. Kochan, Fourth Edition, Pearson Education.
13. Herbert Schildt, C: The Complete Reference, Mc Graw Hill, 4th Edition.
14. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill.

Course outcomes:

The student will learn

CO1: Formulate algorithms for simple problems and translate them into correct C programs.
CO2: Apply debugging techniques to identify, correct syntax errors, and resolve logical errors during program execution.
CO3: Manipulate data efficiently using arrays, strings, structures, and pointers.
CO4: Modularize solutions using functions to enhance reusability and clarity in program design.
CO5: *Apply* file handling operations on text and binary files, and basic searching and sorting algorithms

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech I Year-I / II Sem			
Course Code:N11003	**ENGLISH LANGUAGE and COMMUNICATION SKILLS Lab** (COMMON TO: All Branches)	L	T	P	C
Credits: 1		**0**	**0**	**2**	**1**

Pre-Requisites: NIL

Course Objectives

To train students:

1. To enable students develop their active listening skills.
2. To equip students with necessary training in listening, so that they can comprehend the speech of people from different linguistic backgrounds.
3. To improve their pronunciation and neutralize accent.
4. To enable students express themselves fluently and appropriately.
5. To practise speaking in social and professional contexts.

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

a) **Computer Assisted Language Learning (CALL) Lab:**

b) Interactive Communication Skills (ICS) Lab:

Module 1: **(9L)**

CALL Lab:

Instruction: Speech Sounds-Listening Skill - Importance — Purpose - Types- Barriers- Active Listening

Practice: Listening to Distinguish Speech Sounds (Minimal Pairs) - Testing Exercises

ICS Lab:

Diagnostic Test — Activity titled 'Express Your View'

Instruction: Spoken and Written language - Formal and Informal English - Greetings - Introducing Oneself and Others

Practice: Any Ice-Breaking Activity

Module 2: **(9L)**

CALL Lab:

Instruction: Listening vs. Hearing - Barriers to Listening

Practice: Listening for General Information - Multiple Choice Questions - Listening Comprehension Exercises

ICS Lab:

Instruction: Features of Good Conversation — Strategies for Effective Communication

Practice: Role Play Activity - Situational Dialogues —Expressions used in Various Situations —Making Requests and Seeking Permissions — Taking Leave - Telephone Etiquette

Module 3:

CALL Lab: **(9L)**

Instruction: Errors in Pronunciation — Tips for Neutralizing Mother Tongue Influence (MTI) **Practice:** Differences between British and American Pronunciation —Listening Comprehension Exercises

ICS Lab:

Instruction: Describing Objects, Situations, Places, People and Events

Practice: Picture Description Activity — Looking at a Picture and Describing Objects, Situations, Places, People and Events

Module 4: **(9L)**

CALL Lab:

Instruction: Techniques for Effective Listening

Practice: Listening for Specific Details - Listening - Gap Fill Exercises - Listening Comprehension Exercises (It is essential to identify a suitable passage with exercises for practice.)

ICS Lab:
Instruction: How to Tell a Good Story - Story Star- Sequencing-Creativity
Practice: Activity on Telling and Retelling Stories - Collage

Module 5: (9L)

CALL Lab:
Instruction: Identifying the literal and implied meaning
Practice: Listening for Evaluation - Write the Summary — Listening Comprehension Exercises
ICS Lab:
Instruction: Understanding Non-Verbal Communication
Practice: Silent Speech - Dumb Charades Activity
Post-Assessment Test on 'Express Your View'

Text Books

1. Board of Editors. (2016). ELCS Lab Manual: A Workbook for CALL and ICS Lab Activities. Orient BlackSwan Pvt. Ltd.

Reference Books

1. Shobha, KN & Rayen, J. Lourdes. (2019). Communicative English — A workbook. Cambridge University Press
2. Mishra, Veerendra et al. (2020). English Language Skills: A Practical Approach. Cambridge University Press
3. (2022). English Language Communication Skills — Lab Manual cum Workbook. Cengage Learning India Pvt. Ltd.
4. Ur, Penny and Wright, Andrew. 2022. Five Minute Activities — A Resource Book for Language Teachers. Cambridge University Press.

E-Resources

1. https://dictionary.cambridge.org/dictionary/english/
2. https://www.oxfordlearnersdictionaries.com/definition/english/
3. https://www.scribd.com/doc/310229959/English-in-Mind-1-Workbook-110-pdf
4. https://ia801409.us.archive.org/27/items/cambridge-english-pronunciation-in-use-elementary/Cambridge%20-%20English%20Pronunciation%20in%20Use%20-%20Elementary_text.pdf
5. https://dn720003.ca.archive.org/0/items/4.-cambridge-english-vocabulary-in-use-advanced-3rd-edition/4.%20Cambridge%20English%20Vocabulary%20in%20Use%20(Advanced)%203rd%20Edition.pdf

Course Outcomes

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

CO1: Listen actively and identify important information in spoken texts

CO2: Interpret the speech and infer the intention of the speaker

CO3: Improve their accent for intelligibility

CO4: Speak fluently with clarity and confidence

CO5: Use the language in real life situations

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech I Year-II Sem			
Course Code:N1200A	**ORDINARY DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS** (COMMON TO: CE, EEE, ME, ECE, CSE, IT, ECM, CSE(AIML), CSE(DS), AIDS & AIML)	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites: Mathematical Knowledge at pre-university level

Module 1: First Order Ordinary Differential Equations: [08L]

Exact differential equations – Equations reducible to exact differential equations – linear and Bernoulli's equations – Orthogonal Trajectories (only in Cartesian Coordinates). Applications: Newton's law of cooling – Law of natural growth and decay.

Module 2: Ordinary Differential Equations of Higher Order: [10L]

Higher order linear differential equations with constant coefficients: Non-Homogeneous terms of the type e^{ax}, sin ax, cos ax, polynomials in x, $e^{ax}V(x)$ and $xV(x)$ – Method of variation of parameters.

Module 3: Laplace Transforms:
[10L]

Laplace Transforms: Laplace Transform of standard functions – First shifting theorem – Laplace transforms of functions multiplied by 't' and divided by 't' – Laplace transforms of derivatives and integrals of function – Evaluation of integrals by Laplace transforms – Laplace transform of special functions (Unit step function, Dirac delta function and Periodic functions)– Inverse Laplace transform by different methods, convolution theorem (without proof). Applications: solving Initial value problems by Laplace Transform method.

Module 4: Vector Differentiation: [10L]

Vector point functions and scalar point functions – Gradient – Divergence and Curl – Directional derivatives– Scalar potential functions – Solenoidal and Irrotational vectors- Vector Identities (without proofs).

Module 5: Vector Integration: [10L]

Line, Surface and Volume Integrals. Theorems of Green, Gauss and Stokes (without proofs) and their applications.

Text Books

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 45th Edition, 2020.
2. R.K. Jain and S.R.K. Iyengar, Advanced Engineering Mathematics, Narosa Publications, 5th Editon, 2019.

Reference Books

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10th Edition, John Wiley & Sons, 2020.
2. Maurice D. Weir, Joel Hass, Christopher Heil, Przemyslaw Bogacki, Thomas' Calculus, 13th Edition, Pearson, Reprint, 2024.
3. N.P. Bali and Manish Goyal, A text book of Engineering Mathematics, Laxmi Publications, 8th Edition, 2016.
4. H. K. Dass and Er. Rajnish Verma, Higher Engineering Mathematics, S. Chand and Company Limited, New Delhi, 2014.

E-Resources

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

Course Objectives:

To learn

1. Methods of solving the differential equations of first order and learn about its applications to basic engineering problems.
2. Methods of solving higher order differential equations and learn about its applications to basic engineering problems.
3. The Concepts, properties of Laplace transforms and demonstrate their application in solving ordinary differential equations.
4. The physical quantities involved in engineering field related to vector valued functions.
5. 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

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

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

CO3: Use the Laplace Transforms techniques for solving Ordinary Differential Equations.

CO4: Find the gradient, divergence, curl and its physical interpretations.

CO5: Evaluate the Line, Surface and Volume integrals and converting them from one to another.

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech I Year-II Sem			
Course Code:N1200C	**ENGINEERING CHEMISTRY (ECE, EEE, CSD, CSM, AIML, AIDS)**	L	T	P	C
		3	**0**	**0**	**3**

Pre-Requisites: Chemistry Knowledge at pre-university level

Course Objectives:

1. To develop adaptability to new advances in Engineering Chemistry and acquire the essential skills to become a competent engineering professional.
2. To understand the industrial significance of water treatment, fundamental principles of battery chemistry, and the impact of corrosion along with its control methods for structural protection.
3. To impart foundational knowledge of various energy sources and their practical applications in engineering.
4. To equip students with an understanding of smart materials, , analytical techniques applicable in engineering, industrial, environmental, and biomedical fields.
5. Understand the composition, properties, setting, and hardening processes of Portland cement and gain knowledge about lubricants, refractories.

Module 1: Water and its treatment: [11L]

Introduction- Hardness, types, degree of hardness and units. Estimation of hardness of water by complexometric method - Numerical problems. Potable water and its specifications (WHO) - Steps involved in the treatment of potable water - Disinfection of potable water by chlorination and breakpoint chlorination. Defluoridation - Nalgonda technique.

Boiler troubles: Scales, Sludges and Caustic embrittlement. Internal treatment of boiler feed water - Calgon conditioning, Phosphate conditioning, Colloidal conditioning. External treatment methods - Softening of water by ion- exchange processes. Desalination of brackish water – Reverse osmosis.

Module 2: Electrochemistry and Corrosion: [12L]

Introduction- Electrode potential, standard electrode potential, Nernst equation (no derivation),electrochemical cell - Galvanic cell, cell representation, EMF of cell - Numerical problems. Types of reference electrodes -quinhydrone and calomel electrode.. Construction, working and determination of pH of unknown solution using quinhydrone and calomel electrode.

Corrosion: Introduction- Definition, causes and effects of corrosion – Theories of corrosion, chemical and electrochemical theories of corrosion, Factors affecting rate of corrosion - Nature of the metal, Nature of the corroding environment. Corrosion control methods - Cathodic protection Methods - Sacrificial anode and impressed current methods.

Module 3: Energy sources: [9L]

Batteries: Introduction – Classification of batteries - Primary, secondary and reserve batteries with examples. Construction, working and applications of Lead acid storage battery and Lithium ion battery. Fuel Cells – Differences between a battery and a fuel cell, Construction and applications of Direct Methanol Fuel Cell (DMFC).

Fuels: Introduction and characteristics of a good fuel, Calorific value – Units - HCV, LCV- Dulongs formula - Numerical problems. Fossil fuels: Introduction, Classification, Petroleum - Refining of Crude oil. LPG and CNG composition and uses.

Synthetic Fuels: Fischer-Tropsch process, Introduction and applications of Hythane and Green Hydrogen.

Module 4: Polymers: [10L]

Definition - Classification of polymers: Based on origin and tacticity with examples – Types of polymerization - Addition (free radical addition mechanism) and condensation polymerization. Plastics, Elastomers and Fibers: Definition and applications (PVC,Teflon, Nylon-6,6). Differences between themoplastics and thermo setting plastics.

Conducting polymers: Definition and Classification with examples - Mechanism of conduction in transpoly-acetylene and applications of conducting polymers. Biodegradable polymers:

Polylactic acid and its applications.

Module 5: Engineering Materials and their applications [8L]

Smart materials: Introduction, Classification with examples - Shape Memory Alloys – Nitinol, Piezoelectric materials – quartz and their engineering applications.
Cement: Portland cement, its composition, setting and hardening.
Lubricants: Definition and characteristics of a good lubricant. Properties of lubricants - viscosity, cloud and pour point, flash and fire point.
Refractories: Classification and Characteristics of a good refractory. Properties Refractoriness and RUL.

TEXT BOOKS:

1. Engineering Chemistry by P.C. Jain and M. Jain, Dhanpatrai Publishing Company, 2010.
2. Engineering Chemistry by Rama Devi, Dr. P. Aparna and Rath, Cengage learning, 2025.

REFERENCE BOOKS:

1. Engineering Chemistry: by Thirumala Chary Laxminarayana & Shashikala, Pearson Publications (2020).
2. Engineering Chemistry by Shashi Chawla, Dhanpatrai and Company (P) Ltd. Delhi 2011.
3. Engineering Chemistry by Shikha Agarwal, Cambridge University Press, Delhi 2015.
4. Engineering Analysis of Smart Material Systems by Donald J. Leo, Wiley, 2007.
5. Challenges and Opportunities in Green Hydrogen by Editors: Paramvir Singh, Avinash Kumar Agarwal, Anupma Thakur, R.K Sinha.
6. Raman Spectroscopy in Human Health and Biomedicine, https://www.worldscientific.com/doi/epdf/10.1142/13094

E-Resources:

1. https://doi.org/10.1142/13094 | October 2023
2. https://archive.org/details/EngineeringChemistryByShashiChawla/page/n11/mode/2u

Course Outcomes:

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

CO1. Understand the fundamental properties of water and its applications in both domestic and industrial purposes.
CO2. Gain basic knowledge of electro chemical processes and their relevance to corrosion and its control methods.
CO3. Comprehend the significance and practical applications of batteries and various energy sources, enhancing their potential as future engineers and entrepreneurs.
CO4. Learn the basic concepts and properties of polymers and other engineering materials.
CO5. Apply the knowledge in handling smart materials and biomedical and industrial applications and Assess the suitability of materials like cement, lubricants, and refractories in engineering applications.

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECE I Year-II Sem			
Course Code:N1205C	PYTHON PROGRAMMING AND DATA STRUCTURES (ECE)	L	T	P	C
		3	0	0	3

Pre-Requisites: Basic knowledge of computer fundamentals, C programming

Unit 1: Python Primer

Python Primer: Python overview, objects in Python, Expressions, operators and precedence, Control flow, functions, simple Input and Output, Iterators and generators, additional python conveniences, Scopes and namespaces, Modules and the import statement.

Array-Based Sequences: python's sequence types, low- level arrays, dynamic arrays and amortization, efficiency of python's sequence types: python's list and tuple classes, python's string class.

Unit 2:

Linked lists: Singly linked list, circularly linked list, doubly linked list.

Stacks: The stack abstract data type, Simple array-based stack implementation, reversing data using a stack, implementing stack with a linked list.

Unit 3:

Queues: the queue abstract data type, Array based queue implementation, implementing queue with a linked list.

Double-ended queues: the DE queue abstract data type, implementing a de queue with a circular array, implementing de queue with a linked list, de queues in the python collections module.

Unit 4 :

Trees: tree definitions and properties, tree abstract data type, computing depth and height, binary trees, linked structure for binary tree, Array-based representation of a binary tree, tree traversal algorithms, binary search trees, AVL trees.

Unit 5:

Graph: The graph ADT, Edge list structure, Adjacency list structure, Adjacency map structure, Adjacency matrix structure, Graph traversal algorithms: depth first search, breadth first search, minimum spanning trees

Text Books

1. Michael T. GoodRich, Roberto Tamassia, Michael H. Goldwasser . "Data Structures & Algorithms", John Wiley & sons 2013.
2. Y.Daniel Liang, "Introduction to programming using python", Pearson, 2013

Reference Books

1. Data Structures and Algorithms Using Python by Rance D. Necaise

Course Outcomes:

CO1: Set up React and React Native development environments and build basic applications using components and JSX.

CO2: Implement interactivity in React applications using state, props, and event handling.

CO3: Develop web applications using React Router, APIs, and visualization libraries such as Chart.js.

CO4: Construct mobile applications using React Native components, layouts, and shared state management.

CO5: Integrate web and mobile applications with backend APIs to build cross-platform systems.

AY: 2025-26 Onwards	J. B. INSTITUTE OF ENGINEERING AND TECHNOLOGY (UGC Autonomous)	B. Tech-ECE I Year II Sem.			
Course Code:N1204A	**ELECTRONIC DEVICES AND CIRCUITS** **(ECE)**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Course Overview: This course introduces fundamental semiconductor devices and their behavior, including diodes, BJTs, and FETs. It covers their characteristics, applications, and the analysis of basic electronic circuits. The course also explores rectifiers, voltage regulation, amplifier design, and advanced semiconductor technologies like FinFETs and CNTFETs. Emphasis is placed on developing a strong foundation for analog circuit design and understanding modern device technologies in electronics.

Course Outcomes: By the end of this course, students will be able to:
CO1: Analyze the electrical characteristics and models of semiconductor diodes and apply them in rectifier and clipping circuits.
CO2: Evaluate the operation and configurations of Bipolar Junction Transistors (BJTs) and analyze their input and output characteristics.
CO3: Design appropriate biasing networks for BJTs and determine the operating point for amplifier applications.
CO4: Analyze transistor amplifier circuits using h-parameter models and assess performance for various configurations.
CO5: Analyze the structure, working, and characteristics of JFETs, MOSFETs, and advanced devices like FinFETs and CNTFETs, and compare modern device technologies.

UNIT - I:

Diode Characteristics and Applications: PN junction diode – I-V characteristics, Diode resistance and capacitance, Diode models (Ideal, Simplified, Piecewise Linear), Rectifiers – Half-wave, Full- wave (Center-tap and bridge), Capacitor filter for rectifiers, Clippers and clampers, Zener diode – I-V characteristics and voltage regulation.

UNIT - II:

Bipolar Junction Transistor (BJT): Structure and working principle of BJT, Current components and transistor action, Configurations: Common Base (CB), Common Emitter (CE), Common Collector (CC), Input and output characteristics, Determination of h-parameters from transistor characteristics.

UNIT - III:

BJT Biasing: Need for biasing and stabilization, Load line and operating point, Biasing techniques: Fixed bias, Collector-to-base bias, Voltage divider bias, Stability factors and thermal runaway

UNIT - IV:

Transistor Amplifiers: Transistor as a small-signal amplifier, h-parameter equivalent circuit, CE, CB, CC amplifier analysis using h-parameters, Approximate CE model – with and without emitter bypass capacitor.

UNIT - V:

Special Purpose Diodes: Principle of Operation of – SCR, Tunnel Diode, Varactor Diode, Photo Diode, Solar Cell, LED and Schottky Diode

Field Effect Transistors and Advanced Devices: JFET: Structure, operation, and characteristics, MOSFET: Enhancement and Depletion modes – Structure, operation, and characteristics, Advanced Devices: FinFETs - 3D structure, Scaling advantages, CNTFETs - Structure, ballistic transport, fabrication, Comparison: CMOS vs. FinFET vs. CNTFET.

TEXT BOOKS:

1. Millman, Jacob, and Christos C. Halkias. Electronic Devices and Circuits. Tata McGraw-Hill, 1991.
2. Boylestad, Robert L., and Louis Nashelsky. Electronic Devices and Circuit Theory. Pearson, 11th ed., 2013.
3. Sedra, Adel S., and Kenneth C. Smith. Microelectronic Circuits. Oxford University Press, 7th ed.,

2014.

REFERENCE BOOKS:

1. Bell, David A. Electronic Devices and Circuits. Oxford University Press, 5th ed., 2008.
2. Neamen, Donald A. Electronic Circuit Analysis and Design. McGraw-Hill, 2nd ed., 2001.
3. Salivahanan, S., and N. Suresh Kumar. Electronic Devices and Circuits. McGraw-Hill Education, 4th ed., 2017.
4. Razavi, Behzad. Fundamentals of Microelectronics. Wiley, 2nd ed., 2013.
5. Taur, Yuan, and Tak H. Ning. Fundamentals of Modern VLSI Devices. Cambridge University Press, 2nd ed., 2009.

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech I Year-II Sem			
Course Code:N1202C	**NETWORK ANALYSIS AND SYNTHESIS (ECE)**	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-requisite: Basic Electrical Engineering

COURSE OBJECTIVES

The Course aims:

COB1:	To provide students with a strong foundation in electrical network topology and magnetic circuit concepts.
COB2:	To enable students to understand the transient and steady-state behavior of electrical circuits.
COB3:	To introduce two-port network modeling techniques for analysis of practical electrical systems.
COB4:	To develop an understanding of frequency-selective networks such as filters, attenuators, and equalizers.
COB5:	To familiarize students with classical network synthesis techniques using network functions.

UNIT 1: Network Topology

MODULE -I: Basic cutset and tie set matrices for planar networks, Magnetic Circuits, Self and Mutual inductances, dot convention, impedance, reactance concept, Impedance transformation and coupled circuits, co-efficient of coupling, equivalent T for Magnetically coupled circuits, Ideal Transformer.

UNIT 2: Transient and Steady state analysis

MODULE -I: RC, RL and RLC Circuits, Sinusoidal, Step and Square responses. RC Circuits as integrator and differentiators. 2nd order series and parallel RLC Circuits, Root locus, damping factor, over damped, under damped, critically damped cases, quality factor and bandwidth for series and parallel resonance, resonance curves.

UNIT 3: Two port network parameters

MODULE –I Z, Y, ABCD, h and g parameters, Characteristic impedance, Image transfer constant, image and iterative impedance, network function, driving point and transfer functions – using transformed (S) variables, Poles and Zeros. Standard T,□□, L Sections, Characteristic impedance, image transfer constants, Design of Attenuators, impedance matching network.

UNIT 4: Filters and Attenuators

MODULE -I: Filters: Classification of Filters, Filter Networks, Constant-K Filters-Low pass, high pass, Band pass, band-stop filters, M-derived Filters- T and π filters- Low pass, high pass

MODULE -II: Attenuators: Types – T, π , L, Bridge T and lattice ,Asymmetrical Attenuators T, π , L Equalizers- Types- Series, Shunt, Constant resistance, bridge T attenuation, bridge T phase, Lattice attenuation, lattice Phase equalizers

UNIT 5: Network Synthesis

MODULE -I: Driving point impedance and admittance, transfer impedance and admittance, network functions of Ladder and non ladder networks, Poles, Zeros analysis of network functions, Hurwitz polynomials, Positive Real Functions, synthesis of LC, RC and RL Functions by foster and causer methods.

TEXT BOOKS

T1: Van Valkenburg -Network Analysis, 3rd Ed., Pearson, 216.
T2: JD Ryder - Networks, Lines and Fields, 2nd Ed., PHI, 1999.

REFERENCE BOOKS

1. J. Edminister and M. Nahvi - Electric Circuits, Schaum's Outlines, Mc Graw Hills Education,1999.
2. A. Sudhakar and Shyammohan S Palli - Networks & Circuits, 4th Ed., Tata McGraw- Hill Publications
3. William Hayt and Jack E. Kimmerley - Engineering Circuit Analysis, 6th Ed., William Hayt and Jack E. Kimmerley, McGraw Hill Company

COURSE OUTCOMES

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

CO1: Analyze planar electrical networks using tie-set and cut-set matrices and evaluate magnetic circuits, inductive coupling, and transformer behavior

CO2: Determine transient and steady-state responses of RC, RL, and RLC circuits and assess system behavior using damping, resonance, quality factor, and bandwidth concepts.

CO3: Analyze and model electrical systems using two-port network parameters (Z, Y, ABCD, h, g) and evaluate network functions, poles, and zeros.

CO4: Design and analyze constant-K and m-derived filters, attenuators, and equalizers for impedance matching and frequency-selective applications.

CO5: Synthesize LC, RC, and RL networks using Foster and Causer methods based on positive real functions and Hurwitz polynomials.

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech I Year-II Sem			
Course Code: N12002	**ENGINEERING CHEMISTRY LAB (ECE,EEE, CSD, CSM, AIML,AIDS)**	L	T	P	C
		0	**0**	**2**	**1**

Pre-Requisites: Chemistry Knowledge at pre-university level

Course Description: The course includes experiments based on fundamental principles of chemistry essential for engineering students, aiming to develop practical skills and reinforce theoretical concepts.

Course Objectives:

1. Students will understand and perform experiments based on core chemical principles relevant to engineering applications.
2. Students will learn to estimate the hardness of water to assess its suitability for drinking purposes.
3. Students will acquire the ability to perform acid-base titrations using instrumental methods such as conductometry, potentiometry, and pH metry.
4. Students will gain hands-on experience in synthesizing polymers like Bakelite and Nylon – 6,6 in the laboratory.
5. Students will learn to determine the unknown concentration of potassium permanganate (KMnO4) using a calibration curve.

List of Experiments:

I. Volumetric Analysis:

1. Estimation of Hardness of water by EDTA Complexometry method.
2. Estimation of ferrous iron by dichrometry.

II. Conductometry:

1. Estimation of the concentration of strong acid by Conductometry.
2. Estimation of the concentration of strong and weak acid in an acid mixture by Conductometry.

III. Potentiometry:

1. Estimation of concentration of Fe+2ion by Potentiometry using KMnO4.
2. Estimation of concentration of strong acid with strong base by Potentiometry using Quinhydrone.

IV. pH Metry:

Determination of an acid concentration using pH meter.

V. Colorimetry:

Verification of Lambert-Beer's law using KMnO4.

VI. Preparations:

1. Preparation of Bakelite.
2. Preparation Nylon – 6, 6.

VII. Corrosion:

Determination of rate of corrosion of mild steel in the presence and absence of inhibitor.

VIII. Virtual lab experiments:

1. Construction of Fuel cell and it's working.
2. Smart materials for Biomedical applications
3. Batteries for electrical vehicles.
4. Functioning of solar cell and its applications.

TEXT BOOKS:

1. Lab manual for Engineering chemistry by B. Ramadevi and P. Aparna, S Chand Publications, New Delhi (2022)
2. Vogel's text book of practical organic chemistry 5th edition
3. Inorganic Quantitative analysis by A.I. Vogel, ELBS Publications.
4. College Practical Chemistry by V.K. Ahluwalia, Narosa Publications Ltd. New Delhi (2007).

Course Outcomes:

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

CO1: Develop practical skills through hands-on chemistry experiments relevant to engineering.
CO2: Learn to determine important parameters such as water hardness and the corrosion rate of mild steel under various conditions.
CO3: Apply techniques like conductometry, potentiometry, and pH metry to determine concentrations or equivalence points in acid-base reactions.
CO4: Gain experience in synthesizing polymers such as Bakelite and Nylon-6,6.
CO5: Understand the working principle of colorimetry and the relationship between absorbance and concentration (Beer-Lambert Law).

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECE I Year-II Sem			
Course Code: N12052	**Applied Python Programming and Data Structures Lab (ECE)**	L	T	P	C
		0	**0**	**2**	**1**

Pre-Requisites: Basic knowledge of computer fundamentals, C programming

List of Experiments:

1. Write a Python program to implement bubble sort, selection sort and insertion sort.
2. Write a Python program to implement merge sort, quick sort
3. Write a Python program on linear search and binary search.
4. Write a Python program to implement Singly Linked List
5. Write a Python program to implement Doubly Linked List
6. Write a Python program to implement Circular Linked List
7. Write a Python programs to implement stacks using arrays and linked lists.
8. Write a Python programs to implement queues using arrays and linked lists.
9. Write a Python program to perform Binary Tree traversal operations
10. Write a Python programs to perform Binary search tree operations.
11. Write a Python program to Travers in a graph using Depth first search.
12. Write a Python program to Travers in a graph using breadth first search.

Course Outcomes

CO1: Implement Python programs using basic data structures such as arrays, lists, and strings.
CO2: Apply sorting and searching algorithms using Python.
CO3: Develop programs to implement linked lists, stacks, and queues.
CO4: Construct programs for tree and graph traversal operations.
CO5: Design Python-based solutions to real-world problems using appropriate data structures and algorithms.

AY: 2025-26 Onwards	J. B. INSTITUTE OF ENGINEERING AND TECHNOLOGY (UGC Autonomous)	B. Tech-ECE I Year II Sem.			
Course Code:N12041	**ELECTRONIC DEVICES AND CIRCUITS LAB** **(ECE)**	**L**	**T**	**P**	**C**
		0	**0**	**2**	**1**

Course Overview:

This laboratory course aims to provide hands-on experience and simulation-based learning of semiconductor devices and basic electronic circuits. Students will analyze the characteristics and applications of diodes, BJTs, and FETs, design rectifiers and amplifiers, and simulate modern electronic circuits using software tools. The course bridges theoretical concepts with practical implementation, developing foundational skills essential for analog electronics and circuit analysis.

Course Outcomes (COs): By the end of this course, students will be able to:

CO1: Analyze the I–V characteristics of semiconductor devices such as diodes, BJTs, and FETs.
CO2: Design and evaluate basic rectifier, clipper, clamper, and voltage regulation circuits.
CO3: Demonstrate biasing techniques for BJTs and determine their operating point using DC load line analysis.
CO4: Design and analyze transistor amplifier circuits in various configurations using h-parameter models.
CO5: Simulate and interpret electronic circuits using appropriate simulation tools.

Course Articulation Matrix

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	3	2	2	1	-	-	-	-	-	-
CO2	3	3	3	2	1	1	-	-	-	-	-
CO3	3	3	2	2	1	-	-	-	-	-	-
CO4	3	3	3	2	1	-	-	-	-	-	1
CO5	2	2	2	3	3	-	-	-	-	-	2

List of Experiments

A. Hardware-Based Experiments (7):

1. Study the I–V characteristics of a PN junction diode in forward and reverse bias to determine cut-in voltage and dynamic resistance.
2. Examine the reverse bias characteristics of a Zener diode and demonstrate its application as a voltage regulator under varying conditions.
3. Design and analyze half-wave and full-wave rectifiers (center-tap and bridge) with and without capacitor filters to evaluate ripple factor and output voltage.
4. Implement clipper and clamper circuits to observe waveform shaping through positive, negative, and biased configurations.
5. Plot the input and output characteristics of a BJT in common emitter configuration to determine input/output resistance and current gain.
6. Design and test fixed bias and voltage divider bias circuits to establish a stable operating point for a BJT amplifier and study DC load line behavior.
7. Construct and analyze a Common Base (CB) configuration of a BJT to study input-output characteristics and determine current gain (α) and input/output resistance.

B. Software-Based Simulation Experiments (7):

1. Simulate a full-wave bridge rectifier with capacitor filter to analyze waveform smoothing and ripple reduction in DC power supply design.
2. Simulate a Zener diode-based voltage regulator to study voltage stabilization against varying supply voltages and load resistances.
3. Simulate a common emitter amplifier with and without emitter bypass capacitor to analyze the effect on voltage gain and signal amplification.
4. Simulate BJT operation as a switch and small-signal amplifier to understand its dual functionality in digital and analog applications.
5. Simulate the output and transfer characteristics of a JFET to determine parameters such as pinch-off voltage, drain resistance, and transconductance.
6. Simulate the characteristics of a MOSFET and design a CMOS inverter to study digital switching

behavior and low-power logic design.

7. Simulate the transfer and output characteristics of an enhancement-mode NMOS transistor to analyze threshold voltage, drain current, and switching behavior.

Hardware Requirements:

1. Regulated DC Power Supply (0–30V)
2. Function Generator
3. Digital Multimeter
4. Cathode Ray Oscilloscope (CRO) or DSO
5. Breadboards and Connecting Wires
6. Resistors, Capacitors, Diodes (1N4007, Zener Diodes)
7. BJTs (e.g., BC107, 2N2222), JFETs (e.g., J201), MOSFETs (e.g., IRF540N)
8. Trainer Kits (optional but preferred for ease)

Software Requirements (Any one of the listed tools or equivalent):

1. LTSpice (Free from Analog Devices)
2. NI Multisim (Academic License or Student Version)
3. Proteus Design Suite (Simulation and PCB Design)
4. TINA-TI (Free from Texas Instruments)
5. PSPICE for TI or OrCAD Lite
6. Windows PC or Laptop with minimum 4GB RAM and i3 processor or better

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech I Year-II Sem			
Course Code: N12021	**BASIC ELECTRICAL ENGINEERING LAB ECE**	L	T	P	D
Credits: **1**		**0**	**0**	**2**	**0**

Pre-Requisites: Basic Electrical Engineering

COURSE OBJECTIVES

The course aims:

COB1:	To experimentally verify fundamental electrical laws and theorems.
COB2:	To enable students to understand and experimentally verify the concepts of impedance, current, and resonance in RL, RC, and RLC series circuits.
COB3:	To familiarize students with the measurement of electrical quantities in single-phase and three-phase transformers.
COB4:	To enable students to analyse the performance of transformers and three-phase systems through efficiency, regulation, and power measurement.
COB5:	To study the performance characteristics of DC and AC motors through experimental methods.

List of Experiments

PART- A (compulsory)

1. Verification of Ohm's Law.
2. Verification of KVL and KCL.
3. Verification of Thevenin's and Norton's theorem.
4. Resonance in series RLC circuit.
5. Calculations and Verification of Impedance and Current of RL, RC and RLC series circuits.
6. Measurement of Voltage, Current and Real Power in primary and Secondary Circuits of a Single-Phase Transformer.
7. Performance Characteristics of a DC Shunt Motor.
8. Torque-Speed Characteristics of a Three-phase Induction Motor.

PART-B (any two experiments from the given list)

1. Verification of Superposition theorem.
2. Three Phase Transformer: Verification of Relationship between Voltages and Currents (Star-Delta, Delta-Delta, Delta-star, Star-Star)
3. Load Test on Single Phase Transformer (Calculate Efficiency and Regulation)
4. Measurement of Active and Reactive Power in a balanced Three-phase circuit

COURSE OUTCOMES

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

CO1:	Apply and validate Ohm's Law, KVL, and KCL in practical electrical circuits.
CO2:	Analyse the behaviour of RL, RC, and RLC series circuits by calculating and verifying impedance and current experimentally.
CO3:	Measure voltage, current, and power in transformer circuits and verify the phase and magnitude relationships of voltages and currents for various three-phase transformer connections.
CO4:	Determine the efficiency and regulation of a single-phase transformer and measure active and reactive power in a balanced three-phase circuit.
CO5:	Analyse the performance of a DC shunt motor and evaluate the torque–speed characteristics of a three-phase induction motor.

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech: ME I Year – II Sem			
Course Code: N12031	ENGINEERING WORKSHOP	L	T	P	C
		0	0	2	1

Pre-Requisites: Practical skill

Course Objectives:

To introduce students to basic manufacturing processes and workshop practices.

1. To provide hands-on training in carpentry, fitting, welding, sheet metal, and machining
2. To develop skills in using hand tools and measuring instruments.
3. To enhance safety awareness and proper handling of workshop equipment.
4. To build a foundational understanding of industrial production and fabrication.

1. TRADES FOR EXERCISES:

At least two exercises from each trade:

i. **Carpentry:** T- Lap Joint, Dovetail Joint, Mortise and Tenon Joint

ii. **Fitting:** V- Fit, Square Fit and Straight Fit

iii. **Tin Smithy**: Square Tin, Rectangular Tray and Conical Funnel

iv. **Foundry**: Preparation of Green Sand Mould using Single Piece and Split Pattern

v. **Welding Practice:** Arc Welding

vi. **House wiring**: Parallel and Series, Two-way Switch and Tube Light

vii. **Black Smithy**: Round to Square, Fan Hook and S- Hook

2. TRADES FOR DEMONSTRATION AND EXPOSURE:

3D Printing and Machine Shop

TEXT BOOKS:

1. Workshop Practice, B. L. Juneja, Cengage Learning India, 1st edition, 2015.
2. Workshop Practice Manual, K. Venkata Reddy, BS Publication,6th Edition, Rpt.2025.

REFERENCE BOOKS:

1. Workshop Manual, K. Venugopal, Anuradha Publications, 2012th edition, 2012.

Course Outcomes:

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

CO1. Understand the basic manufacturing processes and operations.
CO2. Use hand tools and equipment safely and efficiently.
CO3. Perform basic operations in carpentry, fitting, welding, sheet metal work, and machining
CO4. Read and interpret workshop drawings
CO5. Develop teamwork, time management, and quality awareness in a workshop environment.

AY: 2025-26 Onwards	J. B. INSTITUTE OF ENGINEERING AND TECHNOLOGY (UGC Autonomous)	B. Tech-ECE II Year I Sem.			
Course Code:N2104A	**PROBABILITY THEORY AND STOCHASTIC PROCESSES**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Pre-requisite: Mathematics

Course Objectives:

1. This gives basic understanding of random variables and operations that can be performed on them.
2. To known the Spectral and temporal characteristics of Random Process.
3. To Learn the Basic concepts of Information theory Noise sources and its representation for understanding its characteristics.

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

1. Perform operations on single and multiple Random variables.
2. Determine the Spectral and temporal characteristics of Random Signals.
3. Characterize LTI systems driven by stationary random process by using ACFs and PSDs.
4. Understand the concepts of Noise and Information theory in Communication systems.

UNIT - I

Probability: Probability introduced through Sets and Relative Frequency: Experiments and Sample Spaces, Discrete and Continuous Sample Spaces, Events, Probability Definitions and Axioms, Joint Probability, Conditional Probability, Total Probability, Bay's Theorem, Independent Events.
Random Variables- Definition, Conditions for a Function to be a Random Variable, Discrete, Continuous and Mixed Random Variable, Distribution and Density functions, Properties, Binomial, Poisson, Uniform, Gaussian, Exponential, Rayleigh, Methods of defining Conditioning Event, Conditional Distribution, Conditional Density and their Properties.

UNIT - II

Operations on single Random Variable Expected Value of a Random Variable, Function of a Random Variable, Moments about the Origin, Central Moments, Variance and Skew, Chebychev's Inequality, Characteristic Function, Moment Generating Function, Transformations of a Random Variable - Monotonic and Non-monotonic Transformations of Continuous and Discrete Random Variable, Computer generation of a Random Variable of a given PDF/CDF.

UNIT - III

Multiple random variables and Operations on Multiple random variables: Vector Random Variables, Joint Distribution Function and its Properties, Marginal Distribution Functions, Conditional Distribution and Density– Point and Interval conditioning, Statistical Independence, Sum of Two and more Random Variables, Central Limit Theorem, Equal and Unequal Distribution (Proof not expected).
Expected Value of a Function of Random Variables- Joint Moments about the Origin, Joint Central Moments, Joint Characteristic Functions, Jointly Gaussian Random Variables: Two Random Variables case, N Random Variable case, Properties, Transformations of Multiple Random Variables, Linear Transformations of Gaussian Random Variables.

UNIT IV

Random processes – Temporal characteristics: The Random Process Concept, Classification of Processes, Deterministic and Nondeterministic Processes, Distribution and Density Functions, concept of Stationarity and Statistical Independence. First-Order Stationary Processes, Second- Order and Wide- Sense Stationarity, (N-Order) and Strict-Sense Stationarity, Time Averages and Ergodicity, Mean- Ergodic Processes, Correlation-Ergodic Processes, Autocorrelation Function and Its Properties, Cross- Correlation Function and Its Properties, Covariance Functions, Gaussian Random Processes, Poisson Random Process.
Random Signal Response of Linear Systems: System Response – Convolution, Mean and Mean-squared Value of System Response, autocorrelation Function of Response, Cross-Correlation Functions of Input and Output.

UNIT V

Random processes – Spectral characteristics: The Power Spectrum: Properties, Relationship between Power Spectrum and Autocorrelation Function, The Cross-Power Density Spectrum, Properties, Relationship between Cross-Power Spectrum and Cross-Correlation Function. Spectral Characteristics of System Response: Power Density Spectrum of Response, Cross-Power Density Spectrums of Input and Output.

Noise sources: Resistive / Thermal Noise Source, Arbitrary Noise Sources, Effective Noise Temperature, Noise equivalent bandwidth, Average Noise Figures, Average Noise Figure of cascaded networks, Narrow Band noise, Quadrature representation of narrow band noise & its properties.

TEXT BOOKS:

1. Peyton Z. Peebles - Probability, Random Variables & Random Signal Principles - TMH, 4th Edition
2. Murray R Spiegel, John Schiller, R Alu Srinivasan. – Probability and Statistics – Schaum's Outlines, 2nd Edition, TMH

REFERENCES:

1. P Ramesh Babu - Probability Theory and Random Processes – McGraw Hill Education
2. Athanasios Papoulis and S. Unnikrishna Pillai - Probability, Random Variables and Stochastic Processes – McGraw Hill Education, 4th Edition
3. K. N. Hari Bhat, K. Anitha Sheela and Jayant Ganguly - Probability Theory and Stochastic Processes for Engineers - Pearson, 1st Edition, 2011
4. Taub and Schilling - Principles of Communication systems by (TMH), 2008
5. Y Mallikarjuna Reddy - Probability Theory and Stochastic Processes, 4th Edition, University Press

AY: 2025-26 Onwards	J. B. INSTITUTE OF ENGINEERING AND TECHNOLOGY (UGC Autonomous)	B. Tech-ECE II Year I Sem.			
Course Code: N2104B	**SIGNALS AND SYSTEMS**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Pre-Requisites: Mathematics

Course Objectives: This subject gives the basics of Signals and Systems required for all Electrical Engineering related courses. The objectives of this subject are to:

1. Classify signals and systems and their analysis in time and frequency domains.
2. Study the concepts of distortion less transmission through LTI Systems, convolution and correlation properties.
3. Understand Laplace and Z-transforms their properties for analysis of signals and systems.
4. Identify the need for sampling of CT signals, types and merits and demerits of each type.

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

1. Characterize various signals, systems and their time and frequency domain analysis, using transform techniques.
2. Identify the conditions for transmission of signals through systems and conditions for physical realization of systems.
3. Understand the significance of sampling theorem for baseband and band pass signals for various types of sampling and for different duty cycles.
4. Understand the concept of correlation and PSD functions and their applications.

UNIT - I

Signal Analysis

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, Classification of Signals and systems, Exponential and Sinusoidal signals, Concepts of Impulse function, Unit Step function, Signum function.

UNIT - II

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

Fourier Transforms: Deriving Fourier Transform from Fourier series, Fourier Transform of arbitrary signal, Fourier Transform of standard signals, Fourier Transform of Periodic Signals, Properties of Fourier Transform, Fourier Transforms involving Impulse function and Signum function, Introduction to Hilbert Transform.

UNIT - III

Signal Transmission through Linear Systems: Linear System, Impulse response, Response of a Linear System, Concept of convolution in Time domain and Frequency domain, Graphical representation of Convolution. Extraction of Signal from Noise by Filtering. Linear Time Invariant (LTI) System, Linear Time Variant (LTV) System, Transfer function of a LTI System, Filter characteristic of Linear System, Distortion less transmission through a system, Signal bandwidth, System Bandwidth, Ideal LPF, HPF, and BPF characteristics, Causality and Paley-Wiener criterion for physical realization, Relationship between Bandwidth and risetime. Extraction of Signal from Noise by Filtering.

UNIT - IV

Laplace Transforms: Laplace Transforms (L.T), Inverse Laplace Transform, Concept of Region of Convergence (ROC) for Laplace Transforms, Properties of L.T, Relation between L.T and F.T of a signal, Laplace Transform of certain signals using waveform synthesis.

Correlation: Auto Correlation and Cross Correlation Functions, Relation between Convolution and Correlation, Properties of Correlation Functions, Energy Density Spectrum, Power Density Spectrum, Relation between Autocorrelation Function and Energy/Power Spectral Density Function, Parseval's Theorem, Detection of Periodic Signals in the presence of Noise by Correlation.

UNIT - V

Sampling theorem: Graphical and analytical proof of Sampling Theorem for Base band/Band Limited and Band Pass Signals, Types of Sampling: Impulse Sampling, Natural and Flattop Sampling, Reconstruction of signal from its samples, Effect of under sampling – Aliasing,

Z–Transforms: Concept of Z- Transform of a Discrete Sequence, Distinction between Laplace, Fourier and Z Transforms, Region of Convergence in Z-Transform, Constraints on ROC for various classes of signals, Inverse Z-transform, Properties of Z-transforms.

TEXT BOOKS

1. Signals, Systems & Communications -B.P. Lathi, BS Publications.
2. Signals and Systems – Allan. V. Oppenheim, Allan. S. Willsky with S. Hamid. Nawab, 2nd Ed. Pearson.

REFERENCE BOOKS

1. Signals and Systems–Simon Haykin, Barry Van Veen, 2nd Ed., Wiley.
2. Signals and Systems – A. Rama Krishna Rao, 2008, TMH.
3. Fundamentals of Signals and Systems – Michel J. Roberts, Govind Sharma, 2nd Ed., MGH.
4. Signals, Systems and Transforms - Charles. L. Philips, John M. Parr and Eve A. Riskin, 4th Ed., 2004, Pearson, Prentice Hall.

AY: 2025-26 Onwards	J. B. INSTITUTE OF ENGINEERING AND TECHNOLOGY (UGC Autonomous)	B. Tech-ECE II Year I Sem.			
Course Code:N2104C	**ELECTRONIC CIRCUIT ANALYSIS**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Course Overview:

The Electronic Circuit Analysis course provides foundational and advanced knowledge in the design and analysis of analog electronic circuits. This includes the study of multistage amplifiers, feedback amplifiers, oscillators, power amplifiers, and multivibrators. Emphasis is placed on frequency response, feedback theory, transistor behavior at high frequencies, and waveform generation techniques. The course equips students with the necessary analytical and practical skills required in analog circuit design and communication systems.

Course Outcomes (COs): By the end of this course, students will be able to:

CO1: Analyze and classify multistage amplifier configurations and determine the impact of coupling schemes on amplifier performance and frequency response.

CO2: Apply the hybrid-π transistor model to evaluate high-frequency behavior of common-emitter amplifiers and calculate gain-bandwidth product.

CO3: Examine feedback amplifier types and assess the influence of negative feedback on gain stability, bandwidth, and distortion.

CO4: Design and analyze LC, RC, and crystal oscillators based on the Barkhausen criterion to generate sinusoidal waveforms.

CO5: Design power amplifiers and multivibrator circuits, and evaluate their performance in terms of efficiency, distortion, and waveform generation.

Course Articulation Matrix:

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	3	2	2	1	1	0	0	0	0	0
CO2	3	3	3	2	2	0	0	0	0	0	1
CO3	3	3	3	2	2	1	0	0	0	0	1
CO4	3	3	3	2	2	0	0	0	0	0	1
CO5	3	3	3	2	2	1	0	0	0	0	1

UNIT - I:

Multistage Amplifiers: Classification of Amplifiers, Distortion in Amplifiers, Coupling schemes: RC, Transformer, Direct coupling, Frequency response of multistage amplifiers, Transistor configuration choice in cascade amplifiers, Cascade and Cascode amplifiers, Darlington pair amplifier.

High-Frequency Transistor Model: Hybrid-π model, Hybrid-π parameters: Conductance and capacitances, CE short-circuit current gain, Gain with resistive load and gain-bandwidth product

UNIT - II:

Feedback Amplifiers: Concept and need for feedback in amplifiers, Types and classification of feedback amplifiers, Characteristics of negative feedback: Gain stability, bandwidth, noise, distortion, Voltage series, Voltage shunt, Current series, Current shunt configurations.

UNIT - III:

Oscillators: Principle of positive feedback, Barkhausen Criterion for oscillations, LC Oscillators: Generalized analysis, Hartley, Colpitts, RC Oscillators: RC phase shift, Wien bridge, Crystal oscillator: Working and advantages

UNIT - IV:

Power Amplifiers: Classification: Class A, B, AB, C, Series-fed Class A amplifier, Transformer- coupled Class A amplifier, Class B amplifier: Push-pull, Complementary symmetry, Efficiency calculations and Crossover distortion.

UNIT - V:

Multivibrators: Analysis and design of Bistable, Monostable and Astable multivibrators and Schmitt Trigger using transistors.

Time Base Generators: General features of a time base signal, methods of generating time base waveform,

Miller and Bootstrap time base generators, Linearity improvement techniques

TEXT BOOKS:

1. Millman, Jacob, and Christos C. Halkias. Electronic Devices and Circuits. McGraw-Hill Education, 2008.
2. Bell, David A. Electronic Devices and Circuits. Oxford University Press, 2008.
3. Sedra, Adel S., and Kenneth C. Smith. Microelectronic Circuits. 7th ed., Oxford University Press, 2015.

REFERENCE BOOKS:

1. Boylestad, Robert L., and Louis Nashelsky. Electronic Devices and Circuit Theory. 11th ed., Pearson Education, 2013.
2. Millman, Jacob, and Arvin Grabel. Microelectronics. 2nd ed., McGraw-Hill, 1987.
3. Malvino, Albert Paul. Electronic Principles. 7th ed., McGraw-Hill Education, 2007.
4. Millman, Jacob, and Herbert Taub. Pulse, Digital, and Switching Waveforms. McGraw-Hill Education, 1991.

AY: 2025-26 Onwards	J. B. INSTITUTE OF ENGINEERING AND TECHNOLOGY (UGC Autonomous)	B. Tech-ECE II Year I Sem.			
Course Code:N2104D	DIGITAL LOGIC DESIGN	L	T	P	C
		3	0	0	3

Course Overview

This course introduces students to the fundamental principles of digital logic design. Starting from Boolean algebra and its simplification techniques, it covers the formal analysis and design of combinational and sequential circuits. Additionally, the course addresses memory elements and programmable logic devices, which are essential building blocks for complex digital systems.

Course Outcomes: Upon completion, students will be able to:

CO1: Apply Boolean algebra and minimization techniques to simplify Boolean functions.
CO2: Design combinational circuits using logic gates.
CO3: Analyze latches and flip-flops to design sequential logic circuits.
CO4: Construct synchronous sequential circuits combining flip-flops and logic gates.
CO5: Utilize programmable logic devices in digital system design.

Course Articulation Matrix

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	3	2	2	1	-	-	-	-	-	1
CO2	3	3	3	2	2	-	-	-	-	-	1
CO3	3	3	3	2	2	-	-	-	-	-	1
CO4	3	3	3	2	2	-	-	-	-	-	1
CO5	3	2	3	2	3	-	-	-	-	-	2

UNIT – I:

Number Systems: Binary, Octal, Decimal, Hexadecimal, Fixed-point and Floating-point Number Representations, Complements of Numbers: 1's and 2's Complement, Error Detection and Correction Codes: Parity Check, Hamming Code.

Boolean Algebra and Logic Gates: Axiomatic definitions, basic theorems and properties, Boolean Functions: Canonical and standard forms, Digital Logic Gates Overview.

UNIT - II:

Gate-Level Minimization Techniques: Karnaugh maps: 2, 3, and 4 variables, Sum-of-products (SOP) and product-of-sums (POS) simplification, Don't care conditions, Implementation using NAND and NOR gates.

UNIT - III:

Combinational Logic Circuits: Analysis and design procedures, Binary adder-subtractor and BCD adder, magnitude comparator, decoders, encoders, multiplexers and demultiplexers.

UNIT - IV:

Sequential Logic Circuits: Gated latches, Flip-flops: Clocked S-R, D, T, JK, Master-Slave JK, Design of synchronous and asynchronous counters, Shift registers: types and applications.

UNIT - V:

Synchronous Sequential Logic Moore and Mealy state machines, State diagrams, state tables, and state reduction, Case studies: sequence detector, traffic light controller, vending machine.

Programmable Logic Devices: Memory devices - RAM, ROM, Programmable Logic Arrays (PLA), Programmable Array Logic (PAL)

TEXT BOOK:

1. M. Morris Mano, Michael D. Ciletti, Digital Design with an Introduction to the Verilog HDL, 6th Edition, Pearson Education/PHI, 2017.

REFERENCE BOOKS:

1. Ronald J. Tocci, Neal S. Widmer, Gregory L. Moss, Digital Systems: Principles and Applications, 10th Edition, Pearson Education.
2. Charles H. Roth Jr., Larry L. Kinney, Fundamentals of Logic Design, 6th Edition, Cengage Learning.

AY: 2025-26 Onwards	J. B. INSTITUTE OF ENGINEERING AND TECHNOLOGY (UGC Autonomous)	B. Tech-ECE II Year I Sem.			
Course Code:N2104E	**CONTROL SYSTEMS**	**L**	**T**	**P**	**C**
		2	**0**	**0**	**2**

Pre-Requisites: Linear Algebra and Calculus, Ordinary Differential Equations and Multivariable Calculus Laplace Transforms, Numerical Methods and Complex variables

Course Objectives:

1. To introduce the fundamental concepts, classifications, and mathematical modeling of control systems for mechanical and electrical domains.
2. To analyze control system behaviour in time and frequency domains and stability criteria using root locus, Bode plot, Nyquist plot, etc.
3. Design and evaluate compensators and controllers to improve system performance.
4. Explain state-space representation, solution of state equations, and assess system controllability and observability.

Course Outcomes: Upon completion of this Course, the students will be able to:

1. Describe open- and closed-loop systems, and develop mathematical models using block diagrams and signal flow graphs.
2. Analyze time response of second-order systems using time-domain specifications, and assess stability using Routh-Hurwitz criterion and root locus techniques.
3. Analyse frequency response plots including Bode, Polar, and Nyquist plots, and investigate system stability.
4. Design compensators and controllers to meet specific performance criteria in control systems.
5. Apply the state-variable approach and analyze controllability and observability.

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	2	2	-	-	-	-	-	-	-	-
CO2	3	3	2	1	1	-	-	-	-	-	-
CO3	3	3	2	1	1	-	-	-	-	-	-
CO4	3	3	3	2	1	-	-	-	-	-	-
CO5	3	3	2	1	1	-	-	-	-	-	-

UNIT - I

Control System fundamentals: Classification of control systems, Open and Closed loop systems. Mathematical modelling of mechanical systems and their conversion into electrical systems. Block diagram reduction and Signal flow graphs.

UNIT - II

Time response Analysis: Transfer function and Impulse response, types of input. Transient response of second order system for step input. Time domain specifications. Types of systems, static error coefficients, Routh - Hurwitz criterion for stability.

Root locus techniques: Analysis of typical systems using root locus techniques. Effect of location of roots on system response.

UNIT - III

Frequency response Analysis: Frequency domain specifications, bode plots, Gain margin and Phase Margin. Polar plot, Nyquist plot, and Nyquist criterion for stability.

UNIT - IV

Compensators and controllers: Introduction to compensators, Lag compensator, Lead compensator, Lag- Lead compensator, Design of compensators using bode plot. Introduction to controllers, P, I, D, PI, PD, PID controllers.

UNIT - V

State space representation: Concept of state and state variables. State models of linear time invariant systems, State transition matrix, Solution of state equations. Controllability and observability.

TEXT BOOKS:

1. I.J. Nagrath and M. Gopal, Control System Engineering, 5ed., New Age Publishers, 2009.
2. Benjamin C. Kuo, Automatic Control Systems, 7ed., PHI, 2010.

REFERENCE BOOKS:

1. K. Ogata, Modern Control Engineering, 2ed., Prentice Hall, 2010.
2. M. Gopal, Control Systems: Principles and Design, Tata McGraw-Hill, 1997.
3. Norman S. Nise, Control Systems Engineering, 5ed., John Wiley & Sons, 2007.
4. A.K. Jairath, Solutions and Problems of Control Systems, CBS Publishers, 2013.
5. A. Nagoor Kani, Control Systems, 2ed., RBA Publications, 2007.

AY: 2025-26 Onwards	J. B. INSTITUTE OF ENGINEERING AND TECHNOLOGY (UGC Autonomous)	B. Tech-ECE II Year I Sem.			
Course Code:N21041	**MODELLING & SIMULATION LAB**	**L**	**T**	**P**	**C**
		0	**0**	**2**	**1**

Note:

- All the experiments are to be simulated using MATLAB or equivalent software
- Minimum of 12 experiments are to be completed / simulated.

Course outcomes:

CO1. Will be able to use a simulation tool for generating, analyzing and performing various operations on Signals / Sequences both in time and Frequency domain

CO2. Will be able to use a simulation tool for Analyzing and Characterizing Continuous and Discrete Time Systems both in Time and Frequency domain along with the concept of Sampling

CO3. Will be able to use a simulation tool for generating different Random Signals; analyze their Characteristics by finding different higher order Moments and noise removal applications

CO4. Will be able to use a simulink for Control System applications

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	2	3	3	3	2	-	-	3	1	-
CO2	3	2	3	3	3	2	-	-	3	1	-
CO3	3	2	3	3	3	2	-	-	3	1	-
CO4	3	2	3	3	3	2	-	-	3	1	-

List of Experiments:

Signals and Systems (Minimum 7 Experiments)

1. Write the code / script for generating various standard viz: Periodic and Aperiodic, Unit Impulse, Unit Step, Square, Saw tooth, Triangular, Sinusoidal, Ramp, Sinc and Nonstandard Signals and Sequences generated from these standard signals /sequences using Waveform synthesis. Also for perform different operations viz: Addition, Multiplication, Scaling, Shifting, Folding, Computation of Energy and Average Power on them.
2. Write the code / script for finding the Even and Odd parts of Signal / Sequence and Real and Imaginary parts of Signal.
3. Write the code / script for finding the output of a System for a given input and Impulse Response and finding Auto Correlation and Cross Correlation of Signals / sequences
4. Write the code / script for Verifying whether a given Continuous/Discrete System is Linear, Time Invariant, Stable and Physically Realizable
5. Write the code / script for obtaining Sinusoidal response and Impulse response of a given Continuous / Discrete LTI System.

a) Plot the Real and Imaginary part and

b) Magnitude and Phase Plot of the response

6. Write the code / script for finding and plotting the Magnitude and Phase Spectrum of any given Signal by finding its Fourier Transform by using the properties where ever required.
7. Write the code / script for finding and plotting the Magnitude and Phase Spectrum of any given Signal by finding its Laplace Transform by using the properties where ever required. Also plot pole-zero diagram in S-plane
8. Write the code/ script for finding and plotting the Magnitude and Phase Spectrum of any given Sequence by finding its Z-Transform by using the properties wherever required. Also plot pole – zero diagram in Z-plane
9. Design a Simulink or equivalent model for

a) Solving Differential Equations

b) Finding the response of any RLC Circuit with different initial Conditions for AC and DC inputs and plot the corresponding responses

10. Gibbs Phenomenon and waveform synthesis

Probability Theory and Stochastic Processes (Minimum 3 Experiments)

11. Write the code / script for generating various Random Variables with different CDFs/ PDFs
12. Write the code / script for generating Gaussian noise and for finding its mean, Skewness, Kurtosis, PDF and PSD.
13. Write the code / script for Verifying Sampling theorem for different sampling rates, Sampling types and Duty Cycles and for plotting the sampled and reconstructed Signals.
14. Write the code / script for Removal of noise from the signal using Cross correlation.
15. Write the code / script for Extraction of Periodic Signal masked by noise using Auto Correlation

Control Systems (Minimum 2 Experiments)

16. Build and Simulate a DC Motor using Simulink
17. Implementation of a PID Controller from equations using Simulink
18. Controllability and Observability

Note: For the experiments with code/scripts written in MATLAB or equivalent (1-8, 11-15), the student can design a user interface or app using MATLAB App Designer or equivalent.

Application on Real Time signals

1. Application of Autocorrelation: GPS Synchronization Satellite communication toolbox is required for this experiment.

Generate the GPS signal. Visualize the GPS signal. Plot of autocorrelation of C/A code and visualize the spectrum of GPS signals. For exact steps, go through the following page: https://www.mathworks.com/help/satcom/ug/gps-waveform-generation.html

2. Sampling of Speech Signals

Record and play speech in MATLAB. For steps, go through the following page: https://in.mathworks.com/help/matlab/import_export/record-and-play-audio.html

Change the sampling rate of the recorded speech signal and play back to see the effect of aliasing. For steps, go through the following page: https://in.mathworks.com/help/signal/ug/changing-signal-sample-rate.html

AY: 2025-26 Onwards	J. B. INSTITUTE OF ENGINEERING AND TECHNOLOGY (UGC Autonomous)	B. Tech-ECE II Year I Sem.			
Course Code:N21042	**ELECTRONIC CIRCUIT ANALYSIS LAB**	**L**	**T**	**P**	**C**
		0	**0**	**2**	**1**

Course Overview:

The Electronic Circuit Analysis Laboratory is designed to provide hands-on experience in designing, building, and analyzing analog electronic circuits. It focuses on the practical implementation of amplifiers, oscillators, power amplifiers, multivibrators, and waveform generators using discrete components and simulation tools. The lab strengthens understanding of frequency response, gain, feedback, waveform shaping, and time base generation.

Course Outcomes (COs): Upon successful completion of this lab, students will be able to:

CO1: Design and analyze multistage and power amplifiers and evaluate their frequency response and efficiency.
CO2: Implement and examine feedback and oscillator circuits and validate theoretical conditions for sustained oscillations.
CO3: Develop and interpret waveform generation circuits such as multivibrators and time base generators.
CO4: Perform simulations to validate analog circuit performance using industry-standard software tools.
CO5: Correlate practical results with theoretical predictions and identify deviations due to real-world constraints.

Course Articulation Matrix:

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	3	3	2	2	1	-	-	-	-	-
CO2	3	3	3	2	2	1	-	-	-	-	-
CO3	3	3	3	2	1	-	-	-	-	-	-
CO4	2	2	3	3	3	-	-	-	-	-	1
CO5	3	3	2	3	2	1	-	-	-	-	1

List of Experiments:

A. Hardware Experiments (7):

Perform practical design, implementation, and waveform analysis of amplifiers, oscillators, power stages, and multivibrators to validate theoretical concepts and observe real-world circuit behavior.

1. Design and analyze a two-stage RC coupled amplifier to demonstrate gain enhancement and study coupling capacitance effects.
2. Design Hartley and Colpitts oscillators for a specified frequency and observe their output waveforms.
3. Design an RC phase shift oscillator and derive the practical gain condition for oscillations at a given frequency.
4. Design a transformer-coupled class A power amplifier, observe input/output waveforms, and calculate efficiency.
5. Design a class B power amplifier, analyze input/output waveforms, and evaluate harmonic distortion.
6. Design a bistable multivibrator, analyze commutating capacitor effects, and record transistor waveforms.
7. Design an astable multivibrator and observe transistor base and collector waveforms.

B. Software Simulations (7):

Use circuit simulation software to design, analyze, and verify the performance of feedback amplifiers, waveform generators, and power amplifier circuits through virtual experimentation and frequency response evaluation.

1. Simulate four feedback amplifier topologies and compare their frequency responses with and without feedback.
2. Simulate a monostable multivibrator and analyze its input/output waveforms.
3. Simulate a Schmitt trigger for gain values greater than and less than one and analyze response behavior.

4. Simulate a bootstrap time base generator using BJT and observe the output sweep waveform.
5. Simulate a Miller sweep circuit using BJT and observe the time base output waveform.
6. Simulate a complementary symmetry push-pull amplifier and verify elimination of crossover distortion.
7. Simulate a single tuned amplifier and determine the quality factor (Q) of its tuned circuit.

Software Requirements:

Simulation Tools: LTspice / Multisim / PSpice / Proteus / NI Multisim Live or equivalent
Operating System: Windows 10/11 or Linux (Ubuntu preferred)
Hardware Requirements:

1. Dual Power Supply (±15V, 0–30V)
2. Function Generator (up to 1 MHz)
3. CRO / DSO (Dual Channel, 20 MHz or more)
4. Digital Multimeters
5. Breadboards and Connecting Wires
6. BJTs: BC107, BC547, BC557, 2N2222, etc.
7. Resistors, Capacitors (Wide range of values)
8. Transformers (for power amplifiers)
9. Inductors, Crystals (1 MHz, 4 MHz, etc.)
10. Heat sinks, transistors for power stages (e.g., TIP41, TIP42 etc.)

AY: 2025-26 Onwards	J. B. INSTITUTE OF ENGINEERING AND TECHNOLOGY (UGC Autonomous)	B. Tech-ECE II Year I Sem.			
Course Code:N21043	DIGITAL LOGIC DESIGN LAB	L	T	P	C
		0	0	2	1

Course Overview

This laboratory course provides hands-on experience with the design, analysis, and simulation of digital circuits. Students begin by constructing and testing basic digital components using logic gate ICs, covering Boolean minimization, arithmetic circuits, code converters, and combinational building blocks. The second part focuses on implementing equivalent and advanced designs using Verilog HDL, exploring various modeling styles—dataflow, behavioral, and structural—along with simulation tools. The course emphasizes both foundational logic principles and modern digital system development practices.

Course Outcomes (COs): After completing this course, students will be able to:
CO1: Analyze and simplify Boolean expressions and implement them using logic gates and ICs. CO2: Design and realize combinational and sequential logic circuits using logic gate hardware. CO3: Model digital systems in Verilog HDL using dataflow, behavioral, and structural styles.
CO4: Simulate and verify digital designs using industry-standard EDA tools and testbenches.
CO5: Build modular and hierarchical designs such as counters, FSMs, and shift registers.

Course Articulation Matrix:

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	3	2	2	2	-	-	-	-	-	1
CO2	3	3	3	2	2	-	-	-	-	-	1
CO3	3	3	3	2	3	-	-	-	-	-	2
CO4	2	2	2	3	3	-	-	-	-	-	2
CO5	3	3	3	2	3	-	-	-	-	-	2

List of Experiments

A. Realization in Hardware Laboratory (Using Logic ICs)

These are fundamental hands-on experiments conducted using logic ICs such as AND, OR, NOT, NAND, NOR, XOR gates, flip-flops, multiplexers, and decoders.

1. Realize and minimize Boolean functions using basic gates and universal gates (NAND/NOR) in SOP/POS form.
2. Design and implement Half Adder, Full Adder, Half Subtractor, and Full Subtractor using logic gates.
3. Construct and analyze basic logic gates (AND, OR, NOT, XOR, XNOR) using only NAND and NOR gates.
4. Design and implement parity bit generators (even and odd) and a 4-input majority logic circuit.
5. Design and implement code converters such as Binary to Gray, Gray to Binary, and BCD to Excess-3 using gates.
6. Design and implement simple combinational circuits: 2-to-1 multiplexer, 1-bit comparator, and 7-segment decoder logic.

B. Verilog HDL-Based Digital Design Experiments (Simulation-Based)

These experiments are implemented using Verilog HDL with different modeling styles (dataflow, behavioral, structural) and simulated using tools like Vivado, ModelSim, or Xilinx ISE.

1. Design and simulate a 2-bit comparator using dataflow modeling; extend it to 4-bit using structural modeling.
2. Implement a 2:1 multiplexer using dataflow modeling and design an 8:1 multiplexer using structural modeling.
3. Design a 2-to-4 decoder using dataflow modeling and realize a 3-to-8 decoder using structural modeling.
4. Implement a given Boolean function using a decoder-based approach in behavioural modeling.
5. Design and simulate a universal n-bit shift register (left, right, hold, parallel load) using behavioural modeling.
6. Design a synchronous MOD-n counter using behavioural modeling with D or JK flip-flops.
7. Design and simulate an asynchronous (ripple) counter for a custom sequence using structural modeling.

8. Implement a sequence detector for a given binary pattern using FSM (Moore/Mealy) in behavioural modeling.

Required Hardware (for Hardware Lab Experiments)

Component	Description
Digital Trainer Kit	Breadboard with power supply and clock generator
Logic ICs	7400 (NAND), 7402 (NOR), 7408 (AND), 7432 (OR), 7486 (XOR), 7404 (NOT), etc.
Flip-Flop ICs	7474 (D Flip-Flop), 7476 (JK Flip-Flop)
MUX/Decoder ICs	74153, 74138, 74139
LEDs, switches, connecting wires	For I/O interface and testing

Required Software Tools (for Verilog HDL Experiments) (Any one of the tool below)

Software	Purpose
Xilinx Vivado	HDL simulation and synthesis (preferred tool)
ModelSim	Verilog simulation and waveform analysis
Xilinx ISE	Legacy support for simulation and FPGA design

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech II Year-I Sem			
Course Code: N21054	**LINUX AND SHELL SCRIPTING LAB (ECE)**	L	T	P	C
		0	**0**	**2**	**1**

Pre-Requisites: Basic knowledge of computer fundamentals, C programming

List of Experiments:

1. Use of Basic UNIX Shell Commands: ls, mkdir, rmdir, cd, cat, touch, file, wc, sort, cut, grep, dd, dfspace, du, ulimit
2. Commands related to inode, I/O redirection and piping, process control commands, mails.
3. Shell Programming: Shell script exercises based on following:
   - (i) Interactive shell scripts
   - (ii) Positional parameters
   - (iii) Arithmetic
   - (iv) if-then-fi, if-then- else-fi, nested if-else
   - (v) Logical operators
   - (vi) else + if equals elif, case structure
   - (vii) while, until, for loops, use of break
4. Write a shell script to create a file. Follow the instructions
   - (i) Input a page profile to yourself, copy it into other existing file
   - (ii) Start printing file at certain line
   - (iii) Print all the difference between two file, copy the two files.
   - (iv) Print lines matching certain word pattern
5. Write shell script for-
   (i) Showing the count of users logged in,
   (ii) Printing Column list of files in your home directory
   (iii) Listing your job with below normal priority
   (iv) Continue running your job after logging out.
6. Write a shell script to change data format. Show the time taken in execution of this script.
7. Write a shell script to print files names in a directory showing date of creation & serial number of the file.
8. Read a number and find whether the number is odd or even.
9. Find out whether file has read, write and execute permission.
10. Read a number and reverse the number for example 123 should output as 321
11. Write Script, using case statement to perform basic math operation as follows + addition - subtraction x multiplication / division
12. Write a shell script to count lines, words, and characters in its input (do not use wc).

AY: 2025 -26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech CE II Year I Sem			
Course Code:N2100D	**ENVIRONMENTAL SCIENCE (Common to ECE, EEE, CSE and ECM)**	L	T	P	C
Credits: 1		**1**	**0**	**0**	**1**

Course Objectives:

1. Understand the components, structure, and functions of ecosystems and their relevance to human society.
2. Comprehend classification, sustainable management, and challenges of natural resources including water, minerals, land, forests, and energy.
3. Grasp the significance, value, and conservation approaches for biodiversity, including threats and legislative frameworks.
4. Analyze types, sources, and impacts of environmental pollution, and learn technological and policy measures for pollution prevention and control.
5. Develop awareness about global environmental challenges, international agreements, and the role of policy, law, and Environmental Impact Assessment (EIA) in sustainable development.

Course Outcomes:

1. Understand the structure, function, and significance of ecosystems, including energy flow, biogeochemical cycles, and biodiversity conservation through field experiences.
2. Analyze the classification, utilization, and sustainable management of natural resources, along with alternative energy options.
3. Evaluate biodiversity at genetic, species, and ecosystem levels, its values, threats, and conservation methods under national and international frameworks.
4. Identify types, sources, and impacts of environmental pollution, and apply suitable control technologies while assessing global environmental challenges and protocols.
5. Interpret environmental policies, legislation, and the EIA process to propose management plans addressing contemporary environmental and sustainability issues.

UNIT - I

Ecosystems: Definition, Scope, and Importance of ecosystem. Classification, structure, and function of an ecosystem, Food chains, food webs, and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Bio magnification, ecosystem value, services and carrying capacity, Field visits.

UNIT - II

Natural Resources: Classification of Resources: Living and Non-Living resources, **water resources**: use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems. **Mineral resources**: use and exploitation, environmental effects of extracting and using mineral resources, **Land resources**: Forest resources, **Energy resources**: growing energy needs, renewable and non-renewable energy sources, use of alternate energy source, case studies.

UNIT - III

Biodiversity and Biotic Resources: Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, Hot spots of biodiversity. Field visit. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situ conservation. National Biodiversity act.

UNIT - IV

Environmental Pollution and Control Technologies: Environmental Pollution: Classification of pollution, **Air Pollution**: Primary and secondary pollutants, Automobile and Industrial pollution, Ambient

air quality standards. **Water pollution**: Sources and types of pollution, drinking water quality standards. **Soil Pollution**: Sources and types, Impacts of modern agriculture, degradation of soil. **Noise Pollution**: Sources and Health hazards, standards, **Solid waste**: Municipal Solid Waste management, composition and characteristics of e Waste and its management. **Pollution control technologies**: Wastewater Treatment methods: Primary, secondary and Tertiary. Overview of air pollution control technologies, Concepts of bioremediation. **Global Environmental Issues and Global Efforts:** Climate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions / Protocols: Earth summit, Kyoto protocol, and Montréal Protocol. NAPCC-GoI Initiatives.

UNIT - V

Environmental Policy, Legislation & EIA: Environmental Protection act, Legal aspects Air Act- 1981, Water Act, Forest Act, Wild life Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water, biological and Socio-economical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan(EMP). Contemporary Environmental Issues Climate change; Sustainable development goals (SDGs); Global environmental challenges; Environmental policies and international agreements.

TEXT BOOKS:

1. Introduction to Environmental Science by Y. Anjaneyulu, BS. Publications. 2. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.
3. Environmental Studies by R. Rajagopalan, Oxford University Press.

REFERENCE BOOKS:

1. Environmental Science: towards a sustainable future by Richard T. Wright. 2008 PHL Learning Private Ltd. New Delhi.
2. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela. 2008 PHI Learning Pvt. Ltd.
3. Environmental Science by Daniel B. Botkin & Edward A. Keller, Wiley INDIA edition.
4. Environmental Studies by Anubha Kaushik, 4th Edition, New age international publishers.
5. Text book of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications.

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech II Year-II Sem			
Course Code:N2200B	**NUMERICAL METHODS AND COMPLEX VARIABLES** (COMMON TO: EEE & ECE)	L	T	P	D
Credits: **3**		**3**	**0**	**0**	**0**

Pre-Requisites: Mathematics courses of first year of study.

Module 1: Fourier Series & Fourier Transforms: [08L]

Fourier series – Dirichlet's Conditions – Half-range Fourier series – Fourier Transforms: Fourier Integral Theorem (Only statements), Fourier Sine and Cosine transforms (Elementary illustrations).

Module 2: Numerical Methods-I: [10L]

Solution of polynomial and transcendental equations: Bisection method – Iteration Method – NewtonRaphson method and Regula-Falsi method. Finite differences: forward differences – backward differences – central differences – symbolic relations – Interpolation using Newton's forward and backward difference formulae – Lagrange's method of interpolation.

Module 3: Numerical Methods-II: [10L]

Numerical integration: Trapezoidal rule - Simpson's 1/3rd and 3/8th rules.

Ordinary differential equations: Taylor's series – Euler's method – Runge-Kutta method of fourth order for first order ODE.

Module 4: Complex Differentiation: [10L]

Differentiation of Complex functions – Analyticity – Cauchy-Riemann equations (without proof) – Harmonic Functions – Finding harmonic conjugate – Milne-Thomson method – Elementary analytic functions (exponential, trigonometric, logarithm) and their properties.

Module 5: Complex Integration: [10L]

Line integral – Cauchy's theorem – Cauchy's Integral formula – Zeros of analytic functions – Singularities – Taylor's series – Laurent's series. Residues – Cauchy Residue theorem (All theorems without Proof).

Text Books

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 45th Edition, 2020.
2. S.S. Sastry, Introductory methods of numerical analysis, PHI, 4th Edition, 2005.

Reference Books

1. Murray R. Spiegel, Ph.D., Seymour Lipschutz, Ph.D., John J. Schiller, Ph.D., Dennis Spellman, Ph.D., Complex Variables (Schaum's outline).
2. M. K. Jain, S.R.K. Iyengar, R.K. Jain, Numerical methods for Scientific and Engineering Computations, New Age International publishers.
3. Erwin Kreyszig, Advanced Engineering Mathematics, 9thEdition, John Wiley &Sons, 2006.
4. J. W. Brown and R. V. Churchill, Complex Variables and Applications, 7th Edition, Mc-Graw Hill, 2004.

E-Resources

- https://onlinecourses.nptel.ac.in/noc23_ma22/preview
- https://onlinecourses.nptel.ac.in/noc21_ma45/preview
- https://onlinecourses.nptel.ac.in/noc21_ma45/preview
- https://onlinecourses.nptel.ac.in/noc20_ma50/preview
- https://onlinecourses.nptel.ac.in/noc20_ma50/preview

Course Objectives:

To learn

1. Expressing periodic function by Fourier series and a non-periodic function by Fourier transforms.
2. Various numerical methods to find roots of polynomial and transcendental equations.
3. Concept of finite differences and to estimate the value for the given data using interpolation.
4. Evaluation of integrals using numerical techniques.
5. Solving ordinary differential equations of first order using numerical techniques.
6. Differentiation and integration of complex valued functions.
7. Evaluation of integrals using Cauchy's integral formula and Cauchy's residue theorem.
8. Expansion of complex functions using Taylor's and Laurent's series.

Course Outcomes:

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

CO1: Express any periodic function in terms of sine and cosine.

CO2: Determine roots of polynomial and transcendental equations and estimate unknown values from given data using interpolation techniques.

CO3: Find the numerical solutions for a given first order ODE's.

CO4: Analyze the complex function with reference to their analyticity, integration using Cauchy's integral and residue theorems.

CO5: Apply Taylor's and Laurent's series expansions for analyzing complex functions.

AY: 2025-26 Onwards	J. B. INSTITUTE OF ENGINEERING AND TECHNOLOGY (UGC Autonomous)	B. Tech-ECE II Year II Sem.			
Course Code:N2204A	ELECTROMAGNETIC FIELDS AND TRANSMISSION LINES	L	T	P	C
		3	0	0	3

Pre-requisite: Mathematics

Course Objectives:

1. To learn the Basic Laws, Concepts and proofs related to Electrostatic Fields and Magneto static Fields and apply them to solve physics and engineering problems.
2. To distinguish between static and time-varying fields and understand the significance and utility of Maxwell's Equations and Boundary Conditions, and gain ability to provide solutions to communication engineering problems.
3. To analyze the characteristics of Uniform Plane Waves (UPW), determine their propagation parameters and estimate the same for dielectric and dissipative media.
4. To analyze the propagation of waves in transmission line and able to solve transmission line problem using Smith Chart.

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

1. Acquire knowledge of Basic Laws, Concepts and solve problems related to Electrostatic Fields and Magnetostatics Fields.
2. Differentiate the static and time-varying EM fields and apply Maxwell's Equations at different Boundaries.
3. Able to classify conductors and dielectric materials and analyze the Wave Propagations in those mediums.
4. To solve transmission line problems numerically and using smith charts.

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	3	2	1	-	1	-	-	-	1	-
CO2	3	3	2	1	-	1	-	-	-	1	-
CO3	3	3	2	1	-	1	-	-	-	1	-
CO4	3	3	2	1	-	1	-	-	-	1	-

UNIT I – Electrostatics

Review of Coordinate Systems & Vector Calculus, Coulomb's Law, Electric Field Intensity – Fields due to Different Charge Distributions, Electric Flux Density, Gauss Law and its applications, Electric Potential, Relation between E and V, Maxwell's Equations for Electrostatic Fields, Energy Density, Convection and Conduction Currents, Dielectric Constant, Isotropic and Homogeneous Dielectrics, Continuity Equation, Relaxation Time, Poisson's and Laplace's Equations, Capacitors–Parallel Plate, Coaxial, Spherical.

UNIT II - Magnetostatics

Biot-Savart's Law, Ampere's Circuit Law and its applications, Magnetic Flux Density, Maxwell's equations for Magnetostatic Fields, Magnetic Scalar and Vector Potentials, Forces due to Magnetic Fields, Ampere's Force Law.

UNIT III - Maxwell's Equations (Time Varying Fields)

Faraday's Law, Transformer and Motional EMF, Inconsistency in Ampere's Law and Displacement Current Density, Maxwell's Equations in Differential, Integral and Phasor form.

Electric and magnetic Boundary Conditions (Dielectric – Dielectric, Conductor– Dielectric, Conductor– Free Space interfaces).

UNIT IV - EM Wave Characteristics

Wave Equations for Conducting and Perfect Dielectric Media, Uniform Plane Waves–Definitions, Relation between E&H, Wave Propagation in Lossless and Conducting Media, Conductors & Dielectrics – Characterization, Wave Propagation in Good Conductors and Good Dielectrics, Skin Depth, Surface Impedance, Wave Polarization. Poynting Vector and Poynting Theorem.

Reflection and Refraction of Plane Waves – Normal and Oblique Incidences for both Perfect Conductor and Perfect Dielectrics, Brewster Angle, Critical Angle and Total Internal Reflection,

UNIT V Transmission Lines

Types, Parameters, Equivalent Circuit, Transmission Line Equations, Primary & Secondary Constants, Expressions for Characteristic Impedance, Propagation Constant, Phase and Group Velocities, Infinite Line Concepts, Lossless Lines, Types of Distortions, condition for Distortion less transmission lines, Minimum Attenuation, Loading – Types of Loading, Input Impedance, SC and OC Lines, Reflection Coefficient, VSWR,

Impedance Transformations - λ/4, λ/2, λ/8 Lines, Smith Chart- Configuration and Applications, Single Stub Matching.

TEXT BOOKS:

1. Engineering Electromagnetics– William H. Hayt. Jr.and John A.Buck,8thEd., McGrawHill,2014
2. Principles of Electromagnetics –Matthew N.O. Sadiku and S.V. Kulkarni, 6thEd., Oxford University Press, Asian Edition, 2015.

REFERENCES:

1. Electromagnetic Waves and Radiating Systems–E.C. Jordan and K.G. Balmain,2ndEd., PHI,2000.
2. Engineering Electromagnetics – NathanIda, 2ndEd., Springer (India) Pvt. Ltd., New Delhi,2005.
3. Electromagnetic Field Theory Fundamentals –Bhag Singh Guru and Husey in R. Hiziroglu, Cambridge University Press, 2nd Ed., 2006.

AY: 2025-26 Onwards	J. B. INSTITUTE OF ENGINEERING AND TECHNOLOGY (UGC Autonomous)	B. Tech-ECE II Year II Sem.			
Course Code:N2204B	ANALOG AND DIGITAL COMMUNICATIONS	L	T	P	C
		3	0	0	3

Pre-requisite: Signals and Systems 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 theoretical knowledge of each block in AM, FM transmitters and receivers.
4. To understand the concepts of baseband transmissions.

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

1. Design and analyze various Analog and digital Modulation and Demodulation techniques.
2. Understand the effect of noise present in continuous wave Modulation techniques.
3. Understand the concept of Super heterodyne Receiver and Pulse Modulation Techniques
4. Analyze and design the various coding techniques and Base band Transmission.

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	3	3	1	-	3	2	-	-	-	-
CO2	3	3	3	1	-	2	2	-	-	-	-
CO3	3	3	3	1	-	2	2	-	-	-	-
CO4	3	3	3	1	-	3	2	-	-	-	-

UNIT - I

Amplitude Modulation

Need for modulation, Amplitude Modulation: Time and frequency domain description, Generation – Switching modulator, Detection - Envelope detector, DSB-SC Modulation: Generation – Balanced Modulator, Detection- Synchronous detector, COSTAS Loop, SSB Modulation: Time and frequency domain description, Generation – Phase discrimination Method and Demodulation - coherent detection, Vestigial side band modulation and demodulation.

Angle Modulation

Basic concepts of Phase Modulation, Frequency Modulation: Single tone frequency modulation, Spectrum Analysis, Carson's Rule, Generation of FM Waves- Armstrong Method, Detection of FM Waves - Phase locked loop, Comparison of FM and AM.

UNIT - II

Transmitters & Receivers

Classification of Transmitters, AM Transmitters, FM Transmitters, AM Receiver - Super heterodyne receiver, FM Receivers, Stereo FM multiplex reception, Comparison of AM and FM Receiver. Noise analysis in AM, DSB, SSB and FM Modulation System, Threshold effect in Angle Modulation System, Pre- emphasis, and de-emphasis

Pulse Modulation

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

UNIT - III

Detection and Estimation: Model of Digital Communication Systems, Geometric Interpretation of Signals, Gram-Schmidt Orthogonalization, Response of Bank of correlators to Noisy Input, Detection of Known Signals in Noise, Probability of error, Optimum Receivers Using Coherent Detection: Matched filter Receiver and its Properties, Correlation receiver, Detection of signals with unknown Phase in Noise

Base Band Shaping for Data Transmission: Requirements of a line encoding format, various line encoding formats- Unipolar, Polar, Bipolar, Discrete PAM signals, Inter symbol interference, Nyquist's criterion, Correlation coding: Duobinary signaling, Modified Duobinary technique, generalized form of correlation coding, Eye pattern.

UNIT - IV

Digital Modulation Techniques:

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

Digital Modulation formats, Coherent binary modulation techniques (BPSK, BFSK), Coherent quadrature modulation techniques (QPSK), Non-Coherent binary modulation techniques (BFSK, DPSK), QAM, M-ary modulation techniques (PSK, FSK, QAM), Comparison of M-ary digital modulation techniques, power spectra, bandwidth efficiency, constellation diagrams.

UNIT - V

Information theory: Entropy, Information rate, Mutual information, Channel capacity of discrete channel, Shannon-Hartley law; Trade-off between bandwidth and SNR.
Source coding - Huffman coding, Shannon Fano coding, Channel coding - Linear block codes and cyclic codes.

TEXT BOOKS:

1. Electronics Communication Systems-Fundamentals through Advanced-Wayne Tomasi, 5th Edition, PHI, 2009.
2. Digital and Analog Communication System – K. Sam Shanmugam, Wiley, 2019.
3. Principles of Communication Systems - Herbert Taub, Donald L Schiling, Goutam Saha, 3rd Edition, McGraw-Hill, 2008.

REFERENCES:

1. Electronic Communications – Dennis Roddy and John Coolean, 4th Edition, PEA, 2004
2. Electronics & Communication System – George Kennedy and Bernard Davis, TMH, 2004
3. Communication System - Simon Haykin and Michael Moher, Wiley, 5th edition, 2022

AY: 2025-26 Onwards	J. B. INSTITUTE OF ENGINEERING AND TECHNOLOGY (UGC Autonomous)	B. Tech-ECE II Year II Sem.			
Course Code: N2205F	**Computer Organization and Operating Systems**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Co-requisite: A Course on "Digital Electronics".

Course Objectives

1. The purpose of the course is to introduce principles of computer organization and the basic architectural concepts.
2. It begins with basic organization, design, and programming of a simple digital computer and introduces simple register transfer language to specify various computer operations.
3. Topics include computer arithmetic, instruction set design, microprogrammed control unit, pipelining and vector processing, memory organization and I/O systems, and multiprocessors
4. Introduce operating system concepts (i.e., processes, threads, scheduling, synchronization, deadlocks, memory management, file and I/O subsystems and protection)
5. Introduce the issues to be considered in the design and development of operating system.

Course Outcomes

CO1. Understand the basics of instruction sets and their impact on processor design.
CO2. Demonstrate an understanding of the design of the functional units of a digital computer system.
CO3. Evaluate cost performance and design trade-offs in designing and constructing a computer processor including memory.
CO4. Will be able to control access to a computer and the files that may be shared.
CO5. Demonstrate the knowledge of the components of computers and their respective roles in computing.

UNIT - I

Digital Computers: Introduction, Block diagram of Digital Computer, Definition of Computer Organization, Computer Design and Computer Architecture. Register Transfer Language and Micro operations: Register Transfer language, Register Transfer, Bus and memory transfers, Arithmetic Micro operations, logic micro operations, shift micro operations, Arithmetic logic shift unit.
Basic Computer Organization and Design: Instruction codes, Computer Registers Computer instructions, Timing and Control, Instruction cycle, Memory Reference Instructions, Input – Output and Interrupt.

UNIT - II

Microprogrammed Control: Control memory, Address sequencing, micro program example, design of control unit. Central Processing Unit: General Register Organization, Instruction Formats, Addressing modes, Data Transfer and Manipulation, Program Control.

Unit III

Input-Output Organization: Input-Output Interface, Asynchronous data transfer, Modes of Transfer, Priority Interrupt Direct memory Access. Memory Organization: Memory Hierarchy, Main Memory, Auxiliary memory, Associate Memory, Cache Memory

UNIT - IV

Operating System - Introduction, Structures - Simple Batch, Multi-programmed, Time-shared, Personal Computer, Parallel, Distributed Systems, Real-Time Systems, System components, Operating System services, System Calls Process - Process concepts and scheduling, Operations on processes, Cooperating Processes, Threads

UNIT - V

CPU Scheduling - Scheduling Criteria, Scheduling Algorithms, Multiple -Processor Scheduling. System call interface for process management-fork, exit, wait, waitpid, exec.
Deadlocks - System Model, Deadlocks Characterization, Methods for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, and Recovery from Deadlock

TEXT BOOKS:

1. Computer System Architecture – M. Morris Mano, Third Edition, Pearson/PHI.
2. Operating System Principles- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 7th Edition, John Willey

REFERENCE BOOKS

1. Computer Organization – Carl Hamacher, Zvonks Vranesic, SafeaZaky, V th Edition, McGraw Hill.
2. Operating Systems- Internals and Design Principles, William Stallings, Fifth Edition–2005, Pearson Education/PHI

AY: 2025-26 Onwards	J. B. INSTITUTE OF ENGINEERING AND TECHNOLOGY (UGC Autonomous)	B. Tech-ECE II Year II Sem.			
Course Code:N2204C	**LINEAR AND DIGITAL IC APPLICATIONS**	**L**	**T**	**P**	**C**
		3	**0**	**0**	**3**

Pre-requisite: Switching Theory and Logic Design.

Course Objectives: The main objectives of the course are:

1. To introduce the basic building blocks of linear integrated circuits.
2. To introduce the theory and applications of analog multipliers and PLL.
3. To introduce the concepts of waveform generation and introduce some special function ICs.
4. To understand and implement the working of basic digital circuits.

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

1. A thorough understanding of operational amplifiers with linear integrated circuits.
2. Attain the knowledge of functional diagrams and design applications of IC555andIC565.
3. Acquire the knowledge and design the Data converters.
4. Understanding of the different families of digital integrated circuits and their characteristics.

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	3	2	1	-	-	-	-	-	-	-
CO2	3	3	3	1	-	-	-	-	-	-	-
CO3	3	3	3	1	-	-	-	-	-	-	-
CO4	3	3	2	1	-	-	-	-	-	-	-

UNIT - I

Operational Amplifier

Ideal and Practical Op-Amp Characteristics, Features of 741 Op- Amp, Modes of Operation - Inverting, Non-Inverting, Differential, Instrumentation Amplifier, AC Amplifier, Differentiators and Integrators, Comparators, Schmitt Trigger, Introduction to Voltage Regulators, Features of 723 Regulator, Three Terminal Voltage Regulators.

UNIT - II

Op-Amp, IC-555 & IC565 Applications

Introduction to Active Filters, Characteristics of Band pass, Band reject and All Pass Filters, Analysis of 1st order LPF & HPF Butterworth Filters, Waveform Generators – Triangular, Sawtooth, Square Wave, IC555 Timer - Functional Diagram, Monostable and Astable Operations, Applications, IC565 PLL - Block Schematic, principle and Applications.

UNIT - III

Data Converters

Introduction, Basic DAC techniques, Different types of DACs-Weighted resistor DAC, R-2Rladder DAC, Inverted R-2R DAC, Different Types of ADCs - Parallel Comparator Type ADC, Counter Type ADC, Successive Approximation ADC and Dual Slope ADC, DAC and ADC Specifications.

UNIT - IV

Combinational Logic ICs

Specifications and Applications of TTL-74XX & CMOS 40XX Series ICs - Code Converters, Decoders, LED & LCD Decoders with Drivers, Encoders, Priority Encoders, Multiplexers, Demultiplexers, Priority Generators/Checkers, Parallel Binary Adder/Subtractor, Magnitude Comparators.

UNIT - V

Sequential Logic IC's and Memories

Familiarity with commonly available 74XX & CMOS40XX Series ICs– All Types of Flip-flops, Synchronous Counters, Decade Counters, Shift Registers.

Memories - ROM Architecture, Types of ROMS & Applications, RAM Architecture, Static & Dynamic RAMs.

TEXT BOOKS

1. Op-Amps & Linear ICs– Ramakanth A. Gayakwad, PHI, 2003.
2. Digital Fundamentals –Floydand Jain, Pearson Education,8th Ed., 2005.

REFERENCE BOOKS

1. Linear Integrated Circuits –D. Roy Chowdhury, New Age International (p) Ltd, 2ndEd., 2003.
2. Digital Design Principles and Practices–John. F. Wakerly, Pearson 3rd Ed., 2009.
3. Linear Integrated Circuits and Applications – Salivahana, TMH, 2008.
4. OperationalAmplifierswithLinearIntegratedCircuits,4th Ed., William D. Stanley, Pearson Education India, 2009.

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech II Year-II Sem			
Course Code: N22001	**COMPUTATIONAL MATHEMATICS LAB (Using Python/ Scilab software)** (COMMON TO: EEE, ECE & CSE)	L	T	P	D
Credits: **1**		**0**	**0**	**2**	**0**

Pre-Requisites: Matrices, Iterative methods and ordinary differential equations.

*** Visualize all solutions Graphically through programmes**

Module 1: Eigen values and Eigenvectors: [06L]

Programs:

- Finding real and complex Eigen values.
- Finding Eigen vectors.

Module 2: Solution of Algebraic and Transcendental Equations: [06L]

Bisection method, Newton Raphson Method.

Programs:

- Root of a given equation using Bisection method.
- Root of a given equation Newton Raphson Method.
-

Module 3: Linear system of equations: [06L]

Jacobi's iteration method and Gauss-Seidal iteration method.

Programs:

- Solution of given system of linear equations using Jacobi's method.
- Solution of given system of linear equations using Gauss-Seidal method.

Module 4: First-Order ODEs: [08L]

Exact and non-exact equations, Applications: exponential growth/decay, Newton's law of cooling.

Programs:

- Solving exact and non-exact equations.
- Solving exponential growth/decay and Newton's law of cooling problems.
-

Module 5: Higher order linear differential equations with constant coefficients: [06L]

Programs:

- Solving homogeneous ODEs.
- Solving non-homogeneous ODEs.

Text Books

1. Kenneth A. Lambert, The fundamentals of Python: First Programs, 2011, Cengage Learnings.
2. Think Python First Edition, by Allen B. Downey, Orielly publishing.
3. Gilberto E.Urroz, Ordinary Differential Equations with Scilab, 2001.

Reference Books

1. John C. Lusth, An Introduction to Python, The University of Alabama, 2011.
2. Dave Kuhlman, Introduction to Python, 2008.
3. Introduction to Python Programming, William Mitchell, Povel Solin, Martin Novak et al., NCLab Public Computing, 2012.
4. Introduction to Python Programming, ©Jacob Fredslund, 2007.
5. Achuthsankar S Nair & Hema Ramchandran, SCILAB (A Free Software to MATLAB), S Chand Publishing, 2012.

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:

To learn

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: Develop programs in Python/ Scilab to compute Eigenvalues and Eigenvectors.

CO2: Implement numerical methods in Python/ Scilab to solve algebraic and transcendental equations.

CO3: Apply Python/ Scilab to solve linear systems of equations.

CO4: Write code to obtain numerical solutions of first-order ordinary differential equations.

CO5: Implement algorithms to solve higher-order linear differential equations with constant coefficients using Python/ Scilab.

AY: 2025-26 Onwards	J. B. INSTITUTE OF ENGINEERING AND TECHNOLOGY (UGC Autonomous)	B. Tech-ECE II Year II Sem.			
Course Code:N22041	**ANALOG AND DIGITAL COMMUNICATIONS LAB**	**L**	**T**	**P**	**C**
		0	**0**	**2**	**1**

Course Outcomes:

CO1: Will be able to design and implement various Analog modulation and demodulation Techniques and observe the time and frequency domain characteristics of these modulated Signals
CO2: Will be able to design and implement various Pulse modulation and demodulation Techniques and observe the time and frequency domain characteristics of these modulated Signals
CO3: Will be able to understand the concept of aliasing and different types of Sampling with various Sampling rates and duty Cycles by implementing practically
CO4: Will be able to design and implement various Digital modulation and demodulation Techniques and observe the waveforms of these modulated Signals practically

Note:

- Minimum 12 experiments should be conducted.
- All these experiments are to be simulated first either using MATLAB, Commsim or any other simulation package and then to be realized in hardware.

List of Experiments:

1. Generate Amplitude modulated Signal and perform demodulation for different modulation indices. Plot the corresponding waveforms and their spectrum. Compare the modulation index theoretically and practically. Plot the effect of modulating Signal frequency and Amplitude on the modulation index.
2. Generate Frequency modulated Signal and perform demodulation for different modulation indices. Plot the corresponding waveforms and their spectrum. Compare the modulation index theoretically and practically. Plot the effect of modulating Signal frequency and Amplitude on the modulation index.
3. Generate modulated and demodulate DSB-SC Signal for different modulation indices and plot the corresponding waveforms and their spectrum. Compare the modulation index theoretically and practically
4. Generate and demodulate SSB-SC modulated Signal (Phase Shift Method) for different modulation indices and plot the corresponding waveforms and their spectrum. Also calculate theoretically and practically the modulation index in each case
5. Demonstrate the Frequency Division Multiplexing & De multiplexing practically by transmitting at least 4 different signals simultaneously with respect to time and recovering without distortion.
6. Verify Sampling theorem for different sampling rates, Sampling types and Duty Cycles and Plot the sampled and reconstructed Signals. Write the conclusions, based on practical observations
7. Design and implement a Pulse Amplitude Modulator & Demodulator Circuit using 555 timer and plot the corresponding waveforms from the practical observations
8. Design and implement a Pulse Width Modulator & Demodulator Circuit using 555 timer and plot the corresponding waveforms from the practical observations
9. Design and implement a Pulse Position Modulator & Demodulator Circuit using 555 timer and plot the corresponding waveforms from the practical observations
10. Generate PCM Modulated Signal and demodulate it by designing and implementing the corresponding Demodulator. Plot the corresponding waveforms from practical observations
11. Generate Delta Modulated Signal and demodulate it by designing and implementing the corresponding Demodulator. Plot the corresponding waveforms from practical observations.
12. Generate FSK modulated Signal and demodulate it by designing and implementing the corresponding Demodulator. Plot the corresponding waveforms from practical observations.
13. Generate practically Binary PSK modulated Signal and demodulate it by designing and implementing the corresponding Demodulator. Plot the corresponding waveforms from practical observations.
14. Generate practically DPSK modulated Signal and demodulate it by designing and implementing the corresponding Demodulator. Plot the corresponding waveforms from practical observations.
15. Generate practically QPSK modulated Signal and demodulate it by designing and implementing the corresponding Demodulator. Plot the corresponding waveforms from practical observations.
16. Plot Signal Constellation for BPSK, BFSK and QPSK
17. Analyze the performance of BPSK, BFSK and QPSK under noisy environment through constellation diagram
18. Demonstrate ISI through eye diagram

19. Simulate raised cosine signal and duo binary signals
20. Encode data using Shannon Fano /Huffman Coding through Hardware / Simulator
21. Analyze the performance of a Matched filter.

AY: 2025-26 Onwards	J. B. INSTITUTE OF ENGINEERING AND TECHNOLOGY (UGC Autonomous)	B. Tech-ECE II Year II Sem.			
Course Code:N22042	**LINEAR AND DIGITAL IC APPLICATIONS LAB**	**L**	**T**	**P**	**C**
		0	**0**	**2**	**1**

Course Outcomes:

CO1: Design and implementation of various analog circuits using 741 ICs.
CO2: Design and implementation of various Multivibrators using 555 timer
CO3: Design and implement various circuits using digital ICs
CO4: Design and implement ADC, DAC and voltage regulators.

Note:

- Minimum 12experiments should be conducted.
- Verify the functionality of the IC in the given application.

List of Experiments:

1. Design an Inverting and Non-inverting Amplifier using Op Amp and calculate gain.
2. Design Adder and Subtractor using Op Amp and verify addition and subtraction process.
3. Design a Comparator using Op-Amp and draw the comparison results of A=B, A<B, A>B.
4. Design a Integrator and Differentiator Circuits using IC741 and derive the required condition practically.
5. Design a Active LPF, HPF cutoff frequency of 2 KHz and find the roll off of it.
6. Design a Circuit using IC741 to generate sine / square / triangular wave with period of 1 KHz and draw the output waveform.
7. Construct Mono-stable Multivibrator using IC555 and draw its output waveform.
8. Construct Astable Multivibrator using IC 555 and draw its output waveform and also find its duty cycle.
9. Design a Schmitt Trigger Circuit and find its LTP and UTP.
10. Design Frequency modulator and demodulator circuit and draw the respective waveforms.
11. Design Voltage Regulator using IC723, IC 7805 / 7809 / 7912 and find its load regulation factor.
12. Design R-2R ladder DAC and find its resolution and write a truth table with respective voltages.
13. Design Parallel comparator type / counter type / successive approximation ADC and find its efficiency.
14. Design a Gray code converter and verify its truth table.
15. Design an even priority encoder using IC74xx and verify its truth table.
16. Design a 8x1multiplexer using digital ICs.
17. Design a 4-bit Adder / Subtractor using digital ICs and Add / Sub the following bits.
    (i) 1010 (ii) 0101 (iii) 1011
    0100 0010 1001.
18. Design a Decade counter and verify its truth table and draw respective waveforms.
19. Design a Up/downcounterusingIC74163anddrawread/write waveforms.
20. Design a Universal shift register using IC74194 / 195and verify its shifting operation.
21. Design a 16x4 RAM using 74189 and draw its read /write operation.
22. Design a 8x3 encoder / 3x8 decoder and verify its truth table.

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECE II Year-II Sem			
Course Code:N22055	**Web and Mobile Applications (ECE)**	L	T	P	C
		0	**0**	**2**	**1**

Pre-Requisites: Basic knowledge of computer fundamentals, C programming

List of Experiments:

1. Setting up your React development environment
2. Create and run first React Application Build a simple user profile card using React components and JSX..
3. Add interactivity to your profile card by using state to change content, and pass data between components with props.
4. Create a react application for the student management system having registration, login, contact, about pages and implement routing to navigate through these pages.
5. Create a service in react that fetches the weather information from openweathermap.org and the display the current and historical weather information using graphical representation using chart.js
6. Create a TODO application in react with necessary components and deploy it into github
7. Set up a mobile development environment and create your first mobile app that works on both iOS and Android.
8. Recreate the user profile card from the first program, but this time for a mobile screen using React Native's core components and Flexbox layouts.
9. Learn to use the same state management principles across your React and React Native applications.
10. Fetch data from the same backend API used in the sixth program to display blog posts on your mobile app.
11. Combine everything you've learned to build a cross-platform Student Management System with a web interface and a mobile app, all connected to a single API.

Reference Books

1. Robin Wieruch, The Road to React, Self-Published, free online version, 2024.
2. Vasan Subramanian, Pro MERN Stack, Full Stack Web App Development with Mongo, Express, React, and Node, 2nd Edition, A Press.

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech II Year- II Sem			
Course Code: N220EA	INNOVATION AND ENTREPRENEURSHIP	L	T	P	C
		2	0	0	2

1. To highlight the relevance of creative thinking in the context of Innovation and Entrepreneurship.
2. To provide an overview of the models of creative problem solving.
3. To impart knowledge of the models and methods of developing creative intelligence.
4. To provide an overview of innovation management and theories of outsourcing new product development.
5. To provide a micro and macro perspective of innovation.

Course Outcomes: Students will be able to

1. Gain an understanding of the concepts and processes of creativity and appreciate the need for improving the quality of creativity.
2. Learn the methods of creative problem solving.
3. Orient themselves on developing creative intelligence and unblock their creative energies.
4. Learn the concepts and methods of innovation and ideation and the theories of outsourcing new product development.
5. Develop a perspective of micro and macro level innovation.

Unit – I: The Creativity Phenomenon: Creative Cerebration, Creative Personality and Motivation, Creative Environment, Creative Technology, Creativity Training Puzzles of Creativity, Spiritual and Social Roots of Creativity, Essence, Elaborative and Expressive Creativities, Quality of Creativity, Existential, Entrepreneurial and Empowerment Creativities, Criteria for Evaluating Creativity, Credible Evaluation, Improving the Quality of our Creativity.

Unit–II: Mastering Creative Problem Solving: Structuring of ill-defined problems, Creative Problem Solving, Models of Creative Problem Solving, Mechanisms of Divergent Thinking, Useful Mechanisms of Convergent Thinking, Techniques of Creative Problem solving

Unit – III: Creative Intelligence: Creative Intelligence Abilities, A Model of Creative Intelligence, Convergent Thinking Ability, Traits Congenial to Creativity, Creative Personality and Forms of Creativity, Motivation and Creativity, Blocks to Creativity: Fears and Disabilities, Strategies for Unblocking Energy of your Creativity, Designing Creativogenic Environment.

Unit – IV: Innovation Management: Concept of Innovation, Levels of Innovation: Incremental Vs Radical Innovation, Inbound and Outbound Ideation, Open and Other Innovative Ideation Methods. Theories of Outsourcing New Product Development: Transaction Cost, Resource Based, Resource Dependence, Knowledge Based Theories.

Unit – V: Micro and Macro Perspectives of Innovation: Systems Approach to Innovation-Innovation in the context of Emerging Economies, Organizational Factors affecting Innovation at the Firm Level, Leadership and Innovations, Open Innovation, Innovation Framework,

Innovations Developed by Open Technology Communities.

Suggested Readings

- Mike Kennard, *Innovation and Entrepreneurship*, Routledge, 2021.
- Paul Trott, *Innovation Management and New Product Development*, 4e, Pearson, 2018.
- Vinnie Jauhari, Sudanshu Bhushan, *Innovation Management*, Oxford Higher Education, 2014.
- C.S.G. Krishnamacharyulu, R. Lalitha, *Innovation Management*, Himalaya Publishing House, 2010.
- Pradip N. Khandwalla, *Lifelong Creativity, An Unending Quest*, Tata McGraw Hill, 2004.
- Brian Clegg, Paul Birch, *Creativity*, Kogan Page, 2009.
- A. Dale Timpe, *Creativity*, Jaico Publishing House, 2003.

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech II Year-I / II Sem			
Course Code:N2200D	**LINGUASKILL FOR PROFESSIONALS-B2 (Audit Course)** (COMMON TO ALL)	L	T	P	D
Credits: 0		**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.