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

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

J. B. Institute of Engineering and Technology (hereinafter referred to as JBIET) Academic Regulations JB-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.
5	Project Core	PW- Project Work	B.Tech. Project Work

6	Other Core Courses (OCC)	Industry Training/ Internship/ Industry Oriented Mini project/ Skill Development Courses	Industry Training/ Internship/ Industry Oriented Mini-Project/Skill Development Courses
7		Seminar	Seminar based on core contents related to parent branch of Engineering.
8	Skill Development Courses (SDC)	--	Courses designed to help individuals gain, improve, or refine specific skills
9	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.

The scheduling of the semester-end examinations shall also be intimated by the University time to time.

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 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 atany 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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JBIET-R25	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech-ECM
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.	N1100C	Engineering Chemistry	3	0	0	3
3.	N1100D	English for Skill Enhancement	3	0	0	3
4.	N1104A	Electronic Devices and Circuits	3	0	0	3
5.	N1105A	Programming for Problem Solving	3	0	0	3
6.	N11002	Engineering Chemistry Lab	0	0	2	1
7.	N11051	Programming for Problem Solving Lab	0	0	2	1
8.	N11003	English Language and Communication Skills Lab	0	0	2	1
9.	N11031	Engineering Workshop	0	0	2	1
10.		Induction Program				
		Total	**15**	**1**	**8**	**20**

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.	N1200B	Advanced Engineering Physics	3	0	0	3
3.	N1203A	Engineering Drawing and Computer Aided Drafting	2	0	2	3
4.	N1202A	Basic Electrical Engineering	3	0	0	3
5.	N1205A	Data Structures	3	0	0	3
6.	N12001	Advanced Engineering Physics Lab	0	0	2	1
7.	N12051	Data Structures Lab	0	0	2	1
8.	N12053	Python Programming Lab	0	0	2	1
9.	N12021	Basic Electrical Engineering Lab	0	0	2	1
10.	N12121	IT Workshop	0	0	2	1
		Total	**14**	**0**	**12**	**20**

B. Tech Course Structure

II Year I Semester						
S. No	**Code**	**Course Title**	**L**	**T**	**P**	**Credits**
1.	N2105A	Discrete Mathematics	3	0	0	3
2.	N2104D	Digital Logic Design	3	0	0	3
3.	N2112B	Object Oriented Programming through java	3	0	0	3
4.	N2119B	Pulse Design and Circuits	3	0	0	3
5.	N2112C	Database Management Systems	3	0	0	3
6.	N210EA	Innovation and Entrepreneurship	2	0	0	2
7.	N21122	Object Oriented Programming through java Lab	0	0	2	1
8.	N21192	Pulse Design and Circuits Lab	0	0	2	1
9.	N21123	Database Management Systems Lab	0	0	2	1
10.	N21052	Node Js/React JS/ Django	0	0	2	1
11.	N2100D	Environmental Science	1	0	0	1
		Total	**18**	**0**	**8**	**20**

II Year II Semester						
S. No	**Code**	**Course Title**	**L**	**T**	**P**	**Credits**
1.	N2200A	Computer oriented Statistical Methods	3	0	0	3
2.	N2205A	Operating Systems	3	0	0	3
3.	N2219A	Analog Communications	3	0	0	3
4.	N2205C	Computer Networks	3	0	0	3
5.	N2204E	Electronic Circuit Analysis	3	0	0	3
6.	N22001	Computational Mathematics Lab	0	0	2	1
7.	N22051	Operating Systems Lab	0	0	2	1
8.	N22052	Computer Networks Lab	0	0	2	1
9.	N22045	Electronic Circuit Analysis Lab	0	0	2	1
10.	N22721	Data Visualization	0	0	2	1
11.	N2200D	Lingua skills for Professionals B2	2	0	0	0
		Total	**15**	**0**	**10**	**20**

B. Tech Course Structure

III Year I Semester

S. No	Code	Course Title	L	T	P	Credits
1.	BTECME1	PE-I	3	0	0	3
2.	BTECMO1	OE-I	2	0	0	2
3.	EC405PC	Linear and Digital IC Applications	3	0	0	3
4.	CS304PC	Software Engineering	3	0	0	3
5.	CS503PC	DevOps	3	0	0	3
6.	EC409PC	Linear and Digital IC Applications Lab	0	0	2	1
7.	CS308PC	Software Engineering Lab	0	0	2	1
8.	CS506PC	DevOps Lab	0	0	2	2
9.	CS507PC	Field-Based Research Project	0	0	4	1
10.	CS508SD	UI Design – Flutter/ Android Studio	0	0	2	1
		Total	**15**	**0**	**12**	**21**

III Year II Semester

S. No	Code	Course Title	L	T	P	Credits
1.	CS601PC	Cryptography and Networks Security	3	0	0	3
2.	EC602PC	IoT Architectures and Protocols	3	0	0	3
3.	MS603HS	Business Economics and Financial Analysis	3	0	0	3
4.		Professional Elective-II	3	0	0	3
5.		Open Elective – II	2	0	0	2
6.	CS604PC	Cryptography and Networks Security Lab	0	0	2	1
7.	EC605PC	IoT Architectures and Protocols Laboratory	0	0	2	1
8.	CS606PC	Advanced Data Structures using Python Lab	0	0	2	1
9.	EN607HS	Advanced English Communication Skills Laboratory	0	0	2	1
10.	CS608SD	Prompt Engineering	0	0	2	1
11.	VA600HS	Gender Sensitization Lab*/ Human Values and Professional Ethics*	1	0	0	1
		Total	**15**	**0**	**10**	**20**

IV Year I Semester						
S. No	**Code**	**Course Title**	**L**	**T**	**P**	**Credits**
1.	CS701PC	Natural Language Processing	3	0	0	3
2.	EC702PC	Embedded System Design	3	0	0	3
3.	MS703HS	Fundamentals of Management for Engineers	3	0	0	3
4.		Professional Elective-III	3	0	0	3
5.		Professional Elective – IV	3	0	0	3
6.		Open Elective – III	2	0	0	2
7.	CS704PC	Natural Language Processing Lab	0	0	2	1
8.	EC705PC	Embedded System Design Lab	0	0	2	1
9.	CS706PC / **EC706PC**	Industry Oriented Mini Project/ Internship	0	0	4	2
		Total	**17**	**0**	**8**	**21**

IV Year II Semester						
S. No	**Code**	**Course Title**	**L**	**T**	**P**	**Credits**
1.		Professional Elective – V	3	0	0	3
2.		Professional Elective – VI	3	0	0	3
3.	CS801PC	Project Work	0	0	28	14
		Total	**6**	**0**	**28**	**20**

Professional Elective-I						
S. No	Code	Course Title	L	T	P	Credits
1.	CS511PE	Computer Graphics	3	0	0	3
2.	CS512PE	Introduction to Data Science	3	0	0	3
3.	CS513PE	Software Testing Methodologies	3	0	0	3
4.	CS514PE	Data Mining	3	0	0	3
5.	CS515PE	Web Programming	3	0	0	3
6.	CS516PE	Distributed Systems	3	0	0	3
		Total	**18**	**0**	**0**	**18**

Professional Elective-II						
S. No	Code	Course Title	L	T	P	Credits
1.	EC621PE	5G Communications	3	0	0	3
2.	EC622PE	Electronic Measurements and Instrumentation	3	0	0	3
3.	EC623PE	Low Power VLSI Design	3	0	0	3
4.	EC624PE	Image and Video Processing	3	0	0	3
		Total	**12**	**0**	**0**	**12**

Professional Elective-III						
S. No	Code	Course Title	L	T	P	Credits
1.	EC731PE	Biomedical Signal and Image Processing	3	0	0	3
2.	EC732PE	Wireless Communication Networks	3	0	0	3
3.	EC733PE	Design for Testability	3	0	0	3
4.	EC734PE	Unmanned Aerial Vehicles and Satellite Imaging	3	0	0	3
		Total	**12**	**0**	**0**	**12**
Professional Elective-IV						

B. Tech Course Structure

S. No	Code	Course Title	L	T	P	Credits
1.	CS731PE	Computer Vision	3	0	0	3
2.	CS732PE	Scripting Languages	3	0	0	3
3.	CS733PE	Vulnerability and Penetration Testing	3	0	0	3
4.	CS734PE	Data Stream Mining	3	0	0	3
		Total	**12**	**0**	**0**	**12**

Professional Elective-V

S. No	Code	Course Title	L	T	P	Credits
1.	EC741PE	Artificial Neural Networks and Deep Learning	3	0	0	3
2.	EC742PE	Satellite Communications	3	0	0	3
3.	EC743PE	Analog and Mixed Signal IC Design	3	0	0	3
4.	EC744PE	Biomedical Instrumentation	3	0	0	3
		Total	**14**	**0**	**12**	**20**

Professional Elective-VI

S. No	Code	Course Title	L	T	P	Credits
1.	CS731PE	Augmented Reality & Virtual Reality	3	0	0	3
2.	CS732PE	Agile Methodology	3	0	0	3
3.	CS733PE	Big Data Analytics	3	0	0	3
4.	CS734PE	Quantum Computing	3	0	0	3
5.	CS735PE	Robotic Process Automation	3	0	0	3
6.	CS736PE	Cyber Forensics	3	0	0	1
		Total	**18**	**0**	**0**	**18**

Open Electives-I						
S. No	Code	Course Title	L	T	P	Credits
1.		Introduction to Internet of things	3	0	0	3
2.		Introduction to Nano Technology	3	0	0	3
		Total	**6**	**0**	**0**	**6**

Open Electives-II						
S. No	Code	Course Title	L	T	P	Credits
1.		Introduction to Web Technologies	3	0	0	3
2.		Introduction to Semiconductor Devices	3	0	0	3
		Total	**6**	**0**	**0**	**6**

Open Electives-III						
S. No	Code	Course Title	L	T	P	Credits
1.		Fundamentals of Software Engineering	3	0	0	3
2.		Introduction to Semiconductor Device Fabrication	3	0	0	3
		Total	**6**	**0**	**0**	**6**

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM 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: **[8L]**

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: **[10 L]**

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: **[10 L]**

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: **[10 L]**

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: **[10 L]**

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 BOOK

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.

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

Course Outcomes

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

CO1. 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.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes (POs)/Program Specific Outcomes (PSOs)												
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**
CO1	3	2	1	-	-	1	1	-	2	1	-	2	-	-
CO2	3	2	2	1	-	1	1	-	2	1	-	2	-	-
CO3	3	2	2	-	-	1	1	-	2	1	-	2	-	-
CO4	3	2	1	1	-	1	1	-	2	1	-	2	-	-
CO5	3	2	1	-	-	1	1	1	2	1	-	2	-	-
Average	**3**	**2**	**1.4**	**1**	**-**	**1**	**1**	**1**	**2**	**2**	**-**	**2**	**-**	**-**

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

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM I Year-I Sem			
Course Code: N1100C	ENGINEERING CHEMISTRY (COMMON TO: CSE, IT, ECM)	L	T	P	C
		3	0	0	3

Pre-Requisites: Chemistry Knowledge at pre-university level

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: [12 L]

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: [9 L]

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: [10 L]

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 thermoplastics 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: [8 L]

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 BOOK

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.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes (POs)/Program Specific Outcomes (PSOs)													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**
CO1	3	2	-	-	-	3	2	-	-	-	-	3	-	-
CO2	3	1	-	-	-	3	2	-	-	-	-	3	-	-
CO3	3	1	-	-	-	3	3	-	-	-	-	3	-	-
CO4	2	-	-	-	-	3	2	-	-	-	-	2	-	-
CO5	3	-	-	-	-	2	3	-	-	-	-	1	-	-
Average	**2.8**	**1.3**	**-**	**-**	**-**	**2.8**	**2.4**	**-**	**-**	**-**	**-**	**2.4**	**-**	**-**

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

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

Pre-Requisites: NIL

Unit-I: **[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-II: **[9 L]**

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-III: **[8 L]**

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-IV: **[8 L]**

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-V: **[8 L]**

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 BOOK

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

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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, the student will be able to:

CO1. Choose appropriate vocabulary in their oral and written communication.

CO2. Demonstrate their understanding of the rules of functional grammar and sentence structures.

CO3. Develop comprehension skills from known and unknown passages.

CO4. Write paragraphs, essays, précis and draft letters.

CO5. Write abstracts and reports in various contexts.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes (POs)/Program Specific Outcomes (PSOs)													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**
CO1	-	-	-	-	-	-	-	-	2	2	-	3		-
CO2	-	-	-	-	-	-	-	-	2	2	-	3		-
CO3	-	-	-	-	-	-	-	-	2	2	-	3		-
CO4	-	-	-	-	-	-	-	-	2	2	-	3		-
CO5	-	-	-	-	-	-	-	-	2	2	-	3		-
Average	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**2**	**-**	**3**		**-**

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

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM I Year-I Sem			
Course Code: N1104A	ELECTRONIC DEVICES AND CIRCUITS	L	T	P	C
		3	0	0	3

Pre-Requisites: NIL

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 BOOK

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.

Course Outcomes

At the end of the course, the student 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.

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM I Year-I Sem			
Course Code: N1104A	PROGRAMMING FOR PROBLEM SOLVING	L	T	P	C
		3	0	0	3

Pre-Requisites: NIL

Unit-I: 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-II: 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-III: 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-IV: 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-V: 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 BOOK

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

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

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 ECM I Year-I Sem			
Course Code: N11051	PROGRAMMING FOR PROBLEM SOLVING LAB	L	T	P	C
		0	0	2	1

Pre-Requisites: NIL

Experiment List:

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.
a. 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:

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:

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

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 algorithm.

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

Pre-Requisites: NIL

Module -I: **[9L]**

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 -II: **[9 L]**

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 -III: **[9 L]**

CALL Lab:
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 IV: **[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 -V: **[9 L]**

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. %20Elementary_text.pdf
6. https://dn720003.ca.archive.org/0/items/4.-cambridge-english-vocabulary-in-use-advanced- 3rd-edition/4.%20Cambridge%20English%20Vocabulary%20in%20Use%20(Advanced)%203r d%20Edition.pdf

Course Outcomes:

At the end of the course, the student 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 ECM I Year-I Sem			
Course Code: N11031	ENGINEERING WORKSHOP	L	T	P	C
		0	0	2	1

Pre-Requisites: NIL

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

TRADES FOR DEMONSTRATION AND EXPOSURE: [9 L]

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 ECM 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	C
		3	0	0	3

Pre-Requisites: Mathematical Knowledge at pre-university level

Module 1: First Order Ordinary Differential Equations: [8L]

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 $x\,V(x)$ – Method of variation of parameters.

Module 3: Laplace Transforms: [10 L]

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 BOOK

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

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

Course Outcomes

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

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

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

CO3. Use the Laplace Transforms techniques for solving 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.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes (POs)/Program Specific Outcomes (PSOs)													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**
CO1	3	2	1	-	-	1	1	-	2	1	-	2	-	-
CO2	3	2	2	1	-	1	1	-	2	1	-	2	-	-
CO3	3	2	2	-	-	1	1	-	2	1	-	2	**-**	-
CO4	3	2	1	1	-	1	1	-	2	1	-	2	-	-
CO5	3	2	1	-	-	1	1	1	2	1	-	2	-	-
Average	**3**	**2**	**1.4**	**1**	**-**	**1**	**1**	**1**	**2**	**1**	**-**	**2**	**-**	**-**

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

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM I Year-II Sem			
Course Code: N1200B	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

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 BOOK

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

1. https://shijuinpallotti.wordpress.com/wp-content/uploads/2019/07/optical-fiber communications-principles-and-pr.pdf
2. https://www.geokniga.org/bookfiles/geokniga-crystallography_0.pdf
3. https://www.thomaswong.net/introduction-to-classical-and-quantum-computing-1e4p.pdf
4. https://www.fi.muni.cz/usr/gruska/qbook1.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.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes (POs)/Program Specific Outcomes (PSOs)													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**
CO1	2	2	1	-	-	-	-	-	-	-	-	-	1	-
CO2	3	1	2	-	-	-	-	-	-	-	-	-	1	-
CO3	2	1	2	-	-	-	-	-	-	-	-	-	1	-
CO4	2	2	1	-	-	-	-	-	-	-	-	-	1	-
CO5	2	2	1	-	-	-	-	-	-	-	-	-	2	-
Average	-	-	-	-	-	-	-	-	-	-	-	-		-

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

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM I Year-II Sem			
Course Code: N1203A	ENGINEERING DRAWING AND COMPUTER AIDED DRAFTING	L	T	P	C
		2	0	2	3

Pre-Requisites: Nil

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 BOOK

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.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes (POs)/Program Specific Outcomes (PSOs)													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**
CO1	3	2	2	2	-	-	-	-	-	-	-	3	2	-
CO2	3	2	2	2	-	-	-	-	-	-	-	3	2	-
CO3	3	2	2	2	-	-	-	-	-	-	-	3	2	-
CO4	3	2	1	3	-	-	-	-	-	-	-	3	3	-
CO5	3	2	1	3	-	-	-	-	-	-	-	3	3	-
Average	**3**	**2**	**1.6**	**2.4**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**2.4**	**-**

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

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM I Year-II Sem			
Course Code: N1202A	BASIC ELECTRICAL ENGINEERING	L	T	P	C
		3	0	0	3

Pre-Requisites: Mathematics

UNIT - I: D.C. CIRCUITS

Electrical circuit elements (R, L and C), voltage and current sources, KVL & KCL, analysis of simple circuits with dc excitation. Superposition, Thevenin and Norton Theorems.

UNIT - II: A.C. Circuits

Representation of sinusoidal waveforms, peak and rms values, phasor representation, real power, reactive power, apparent power, power factor, Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series and parallel), resonance in series R-L-C circuit. Three-phase balanced circuits, voltage and current relations in star and delta connections.

UNIT - III: Transformers:

Construction and working Principle, types, ideal and practical transformer, equivalent circuit, e.m.f. equation, losses in transformers, regulation and efficiency. Auto-transformer and three-phase transformer connections.

UNIT - IV: Electrical Machines:

Construction and working principle of dc machine, characteristics of dc shunt machine. Generation of rotating magnetic field, Construction and working of a three-phase induction motor, Significance of torque- slip characteristics. Single-phase induction motor, Construction and working.

UNIT - V: 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:

1. D.P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 4th Edition, 2019.
2. MS Naidu and S Kamakshaiah, "Basic Electrical Engineering", Tata McGraw Hill, 2nd Edition, 2008.

REFERENCE BOOK

1. P. Ramana, M. Suryakalavathi, G.T. Chandrasheker, "Basic Electrical Engineering", S. Chand, 2nd Edition, 2019.
2. D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.
3. M. S. Sukhija, T. K. Nagsarkar, "Basic Electrical and Electronics Engineering", Oxford, 1st

Edition, 2012.
4. Abhijit Chakrabarthi, Sudipta Debnath, Chandan Kumar Chanda, "Basic Electrical Engineering", 2nd Edition, McGraw Hill, 2021.
5. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
6. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
7. V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989.

E-Resources

1. https://onlinecourses.nptel.ac.in/noc24_ee125/preview
2. https://nptel.ac.in/courses/108105155
3. 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 analyze simple DC circuits.

CO2. Analyze single-phase RLC circuits, determine resonance, and explain voltage/current relations in balanced three-phase star and delta systems.

CO3. Explain the construction, principle, EMF equation, and types of transformers, and evaluate their losses, regulation, and efficiency.

CO4. Describe the construction and operation of DC and induction machines, and interpret their characteristics and torque–slip relations.

CO5. Identify LT switchgear components and earthing methods, and compute energy consumption and power factor improvement.

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM I Year-II Sem			
Course Code: N1205A	DATA STRUCTURES	L	T	P	C
		3	0	0	3

Pre-Requisites: Programming for Problem Solving

UNIT - I: Introduction to Data Structures [10L]

Basic Terminology, Classification of Data Structures, Operation on Data Structures, abstract data types, selecting a Data Structure, Linear list – Introduction, singly linked list, Circular Linked Lists, Doubly Linked List, Stacks- Operations, Stack algorithm, Stack ADT, Stack applications, Queues- operations, Queue Algorithm, Queue ADT, Queue Applications.

UNIT - II: Trees [10L]

Introduction, Types of Trees, creating a Binary Tree from a General Tree, traversing a Binary Tree, Binary Search Trees (BST), BST Operations- Searching, Insertion and Deletion, BST ADT, BST Applications, Threaded Binary Trees, AVL Trees, Red –Black Trees, Splay Trees

UNIT - III: Multi way Search Trees [10 L]

Introduction, B Trees, B Trees ADT, 2-3 Trees, 2-3- Tree, B* Tree, B+ Trees Heaps: Binary Heaps, Binomial heaps, Fibonacci heaps, Comparison of Various Heaps, Applications Searching: Introduction, Interpolation Search, Jump search

UNIT - IV: Graphs [10L]

Introduction, Directed Graphs, Bi connected Components, Representation of Graphs, Graph Traversal Algorithms, Graph ADT, and Applications of Graphs
Sorting: Radix Sort, Heap sort, Shell Sort, Tree Sort.

UNIT - V: Hashing and Collision: [10L]

Introduction, Hash Tables, Hash Functions, Different Hash Functions: Division Method, Multiplication Method, Mid-square Method, Folding Method; collisions: Collision Resolution by Open Addressing, Collision Resolution by Chaining

Files and their Organization: Introduction, Data hierarchy, File Attributes, Text and Binary Files, Basic File Operations, File Organization, Indexing.

Text Books:

1. Data Structures: A Pseudocode Approach with C, 2 nd Edition, R. F. Gilberg and B.A.Forouzan, Cengage Learning
2. Data Structure using C– Reema Thareja, 3rd Edition, Oxford University Press

REFERENCE BOOK

1. Data Structures using C – A. S.Tanenbaum, Y. Langsam, and M.J. Augenstein, PHI/Pearson Education.

Course Outcomes

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

CO1. Select suitable data structures to represent and organize data efficiently for solving computational problems.

CO2. Analyze the performance and trade-offs of different data structure implementations.

CO3. Implement fundamental algorithms for searching, sorting, and pattern matching.

CO4. Design solutions using advanced data structures such as trees, heaps and graphs.

CO5. Apply hashing techniques and file organization methods to store, retrieve, and manage data efficiently.

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM I Year-II Sem			
Course Code: N12001	ADVANCED ENGINEERING PHYSICS LAB COMMON TO: CE, EEE, ME, ECE, CSE, IT, ECM, CSE(AIML), CSE(DS), AIDS, AIML	L	T	P	C
		0	0	2	1

Pre-Requisites: 10+2 Physics basic concepts.

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, the student will be able to:

CO1. Synthesize and analyze nanomaterials such as magnetite (Fe_3O_4) using chemical methods.

CO2. Determine key electrical, magnetic, and optical properties of semiconductors and other functional materials.

CO3. Characterize semiconductors using Hall effect and energy gap measurement techniques.

CO4. Demonstrate working knowledge of laser systems and optical fiber parameters through experimental study.

CO5. 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 ECM I Year-II Sem			
Course Code: N12051	DATA STRUCTURES LAB	L	T	P	C
		0	0	2	1

Pre-Requisites: Programming for Problem solving.

List of Experiments:

1. Write a program that uses functions to perform the following operations on singly linked list.:
   i) Creation ii) Insertion iii) Deletion iv) Traversal
2. Write a program that uses functions to perform the following operations on doubly linked list.:
   i) Creation ii) Insertion iii) Deletion iv) Traversal
3. Write a program that uses functions to perform the following operations on circular linked list.:
   i) Creation ii) Insertion iii) Deletion iv) Traversal
4. Write a program that implement stack (its operations) using
   i) Arrays ii) ADT
5. Write a program that implement Queue (its operations) using
   i) Arrays ii) ADT
6. Write a program that implements the following sorting methods to sort a given list of integers in ascending order
   i) Radix Sort, ii) Heap sort, iii) Shell Sort, iv) Tree Sort
7. Write a program to implement the tree traversal methods (Recursive and Non-Recursive).
8. Write a program to implement
   i) Binary Search tree ii) B Trees iii) B+ Trees iv) AVL trees v) Red - Black trees
9. Write a program to implement the graph traversal methods.
10. Write a program to implement the following Hash Functions:
    i) Division Method, ii) Multiplication Method, iii) Mid-square Method, iv) Folding Method

Text Books:

1. Fundamentals of Data Structures in C, 2nd Edition, E. Horowitz, S. Sahni and Susan Anderson Freed, Universities Press.
2. Data Structures using C – A. S. Tanenbaum, Y. Langsam, and M. J. Augenstein, PHI/Pearson Education.

Reference Books:

1. Data Structures: A Pseudocode Approach with C, 2nd Edition, R. F. Gilberg and B. A. Forouzan, Cengage Learning.

Course Outcomes

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

CO1. Implement linear data structures such as linked lists, stacks, and queues using functions and abstract data types.

CO2. Apply advanced sorting algorithms (Radix, Heap, and Shell, Tree sort) to arrange data efficiently.

CO3. Demonstrate tree-based data structures including binary search trees, AVL trees, B-trees, B+ trees, and Red-Black trees with traversal techniques.

CO4. Develop graph representations and apply traversal algorithms for problem solving.

CO5. Apply hashing techniques with various hash functions and collision resolution strategies for efficient data retrieval.

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM I Year-II Sem			
Course Code: N12053	PYTHON PROGRAMMING LAB	L	T	P	C
		0	0	2	1

Pre-Requisites: Programming for Problem solving.

List of Experiments:

1.
   I. Use a web browser to go to the Python website http://python.org. This page contains information about Python and links to Python-related pages, and it gives you the ability to search the Python documentation.
   II. Start the Python interpreter and type help() to start the online help utility.
2. Start a Python interpreter and use it as a Calculator.
3. Write a program to calculate compound interest when principal, rate and number of periods are given.
4. Read the name, address, email and phone number of a person through the keyboard and print the details.
5. Print the below triangle using for loop. 5
   4 4
   3 3 3
   2 2 2 2
   1 1 1 1 1
6. Write a program to check whether the given input is digit or lowercase character or uppercase character or a special character(use 'if-else-if' ladder)
7. Python program to print all prime numbers in a given interval (use break)
8. Write a program to convert a list and tuple into arrays.
9. Write a program to find common values between two arrays.
10. Write a function called palindrome that takes a string argument and returnsTrue if it is a palindrome and False otherwise. Remember that you can use the built-in function len to check the length of a string.
11. Write a function called is_sorted that takes a list as a parameter and returns True if the list is sorted in ascending order and False otherwise.
12. Write a function called has_duplicates that takes a list and returns True if there is any element that appears more than once. It should not modify the original list.
13. Write a function called remove_duplicates that takes a list and returns a new list with only the unique elements from the original. Hint: they don't have to be in the same order.
14. The wordlist I provided, words.txt, doesn't contain single letter words. So you might want to add "I", "a", and the empty string.
15. Write a python code to read dictionary values from the user. Construct a function to invert its content. i.e., keys should be values and values should be keys.
16. Add a comma between the characters. If the given word is 'Apple', it should become 'A,p,p,l,e'
17. Remove the given word in all the places in a string?
18. Write a function that takes a sentence as an input parameter and replaces the first letter of every word with the corresponding upper case letter and the rest of the letters in the word by corresponding letters in lower case without using a built-in function?
19. Writes a recursive function that generates all binary strings of n-bit length
20. Write a python program that defines a matrix and prints
21. Write a python program to perform multiplication of two square matrices
22. How do you make a module? Give an example of construction of a module using different geometrical shapes and operations on them as its functions.
23. Use the structure of exception handling all general-purpose exceptions.
24. Write a function called draw rectangle that takes a Canvas and a Rectangle as arguments and draws a representation of the Rectangle on the Canvas.

25. Add an attribute named color to your Rectangle objects and modify draw_rectangle so that it uses the color attribute as the fill color.
26. Write a function called draw_point that takes a Canvas and a Point as arguments and draws a representation of the Point on the Canvas.
27. Define a new class called Circle with appropriate attributes and instantiate a few Circle objects. Write a function called draw_circle that draws circles on the canvas.
28. Write a python code to read a phone number and email-id from the user and validate it for correctness.
29. Write a Python code to merge two given file contents into a third file.
30. Write a Python code to open a given file and construct a function to check for given words present in it and display on found.
31. Write a Python code to Read text from a text file, find the word with most number of occurrences
32. Write a function that reads a file file1and displays the number of words, number of vowels, blank spaces, lower case letters and uppercase letters.
33. Import numpy, Plotpy and Scipy and explore their functionalities.
34. Install NumPypackage with pip and explore it.
35. Write a program to implement Digital Logic Gates – AND, OR, NOT, EX-OR
36. Write a GUI program to create a window wizard having two text labels, two text fields and two buttons as Submit and Reset.

Text Books:

1. Supercharged Python: Take your code to the next level, Overland
2. Learning Python, Mark Lutz, O'reilly.

Reference Books:

1. Python Programming: A Modern Approach, Vamsi Kurama, Pearson.
2. Python Programming A Modular Approach with Graphics, Database, Mobile, and Web Applications, Sheetal Taneja, Naveen Kumar, Pearson
3. Introduction to Python Programming, Gowrishakar S, Veena A, CRC Press
4. Programming with Python, A User's Book, Michael Dawson, Cengage Learning, India Edition
5. Python for Data Science, Dr. Mohd Abdul Hameed, Wiley publications
6. Core Python Programming, Dr. R. Nageswara Rao, Dreamtech press
7. Introduction to Python, Gowrishankar S, Veena A., CRC Press

Course Outcomes

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

CO1. Develop the application specific codes using python.

CO2. Understand Strings, Lists, Tuples and Dictionaries in Python.

CO3. Verify programs using modular approach, file I/O, Python standard library.

CO4. Implement Digital Systems using Python.

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

Pre-Requisites: Basic Electrical Engineering

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 ECM I Year-II Sem			
Course Code: N12121	IT WORKSHOP	L	T	P	C
		0	0	2	1

Pre-Requisites: Basic Electrical Engineering

List of Experiments:

PC Hardware

Task 1: Identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor.

Task 2: Every student should disassemble and assemble the PC back to working condition. Lab instructors should verify the work and follow it up with a Viva. Also students need to go through the video which shows the process of assembling a PC. A video would be given as part of the course content.

Task 3: Every student should individually install MS windows on the personal computer. Lab instructor should verify the installation and follow it up with a Viva.

Task 4: Every student should install Linux on the computer. This computer should have windows installed. The system should be configured as dual boot with both Windows and Linux. Lab instructors should verify the installation and follow it up with a Viva

Internet & World Wide Web

Task1: Orientation & Connectivity Boot Camp: Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP setting. Finally students should demonstrate, to the instructor, how to access the websites and email. If there is no internet connectivity preparations need to be made by the instructors to simulate the WWW on the LAN.

Task 2: Web Browsers, Surfing the Web: Students customize their web browsers with the LAN proxy settings, bookmarks, search toolbars and pop up blockers. Also, plug-ins like Macromedia Flash and JRE for applets should be configured.

Task 3: Search Engines & Netiquette: Students should know what search engines are and how to use the search engines. A few topics would be given to the students for which they need to search on Google. This should be demonstrated to the instructors by the student.

Task 4: Cyber Hygiene: Students would be exposed to the various threats on the internet and would be asked to configure their computer to be safe on the internet. They need to customize their browsers to block pop ups, block active x downloads to avoid viruses and/or worms.

LaTeX and WORD

Task 1 – Word Orientation: The mentor needs to give an overview of LaTeX and Microsoft (MS) office or equivalent (FOSS) tool word: Importance of LaTeX and MS office or equivalent (FOSS) tool Word as word Processors, Details of the four tasks and features that would be covered in each, Using LaTeX and word – Accessing, overview of toolbars, saving files, Using help and resources, rulers, format painter in word.

Task 2: Using LaTeX and Word to create a project certificate. Features to be covered:- Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in both LaTeX and Word.

Task 3: Creating project abstract Features to be covered:-Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Footnote, Hyperlink, Symbols, Spell Check, Track Changes.

Task 4: Creating a Newsletter: Features to be covered:- Table of Content, Newspaper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes, Paragraphs and Mail Merge in word.

Excel

Excel Orientation: The mentor needs to tell the importance of MS office or equivalent (FOSS) tool Excel as a Spreadsheet tool, give the details of the four tasks and features that would be covered in each. Using Excel – Accessing, overview of toolbars, saving excel files, Using help and resources.

Task 1: Creating a Scheduler - Features to be covered: Gridlines, Format Cells, Summation, auto fill, Formatting Text

Task 2: Calculating GPA - Features to be covered:- Cell Referencing, Formulae in excel – average, std. deviation, Charts, Renaming and Inserting worksheets, Hyper linking, Count function, LOOKUP/VLOOKUP**.**

Task 3: Split cells, freeze panes, group and outline, Sorting, Boolean and logical operators,

Conditional formatting

PowerPoint

Task 1: Students will be working on basic power point utilities and tools which help them create basic PowerPoint presentations. PPT Orientation, Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows in PowerPoint.

Task 2: Interactive presentations - Hyperlinks, Inserting –Images, Clip Art, Audio, Video, Objects, Tables and Charts.

Task 3: Master Layouts (slide, template, and notes), Types of views (basic, presentation, slide slotter, notes etc), and Inserting – Background, textures, Design Templates, Hidden slides.

Reference Books:

1. Comdex Information Technology course tool kit Vikas Gupta, WILEY Dreamtech
2. The Complete Computer upgrade and repair book, 3rd edition Cheryl A Schmidt, WILEY Dreamtech
3. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.
4. PC Hardware - A Handbook – Kate J. Chase PHI (Microsoft)
5. LaTeX Companion – Leslie Lamport, PHI/Pearson.
6. IT Essentials PC Hardware and Software Companion Guide Third Edition by David Anfinson and Ken Quamme. – CISCO Press, Pearson Education.
7. IT Essentials PC Hardware and Software Labs and Study Guide Third Edition by Patrick Regan – CISCO Press, Pearson Education.

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM II Year-I Sem			
Course Code: N2105A	DISCRETE MATHEMATICS	L	T	P	C
		3	0	0	3

Pre-Requisites: Mathematics Fundamentals

Unit-I: **[10L]**

Mathematical logic: Introduction, Statements and Notation, Connectives, Normal Forms, Theory of Inference for the Statement Calculus, The Predicate Calculus, Inference Theory of the Predicate Calculus

Unit-II: **[8 L]**

Set theory: Introduction, Basic Concepts of Set Theory, Representation of Discrete Structures, Relations and Ordering, Functions.

Unit-III: **[8 L]**

Algebraic Structures: Introduction, Algebraic Systems, Semi groups and Monoids, Lattices as Partially Ordered Sets, Boolean Algebra.

Unit-IV: **[12 L]**

Elementary Combinatorics: Basics of Counting, Combinations and Permutations, Enumeration of Combinations and Permutations, Enumerating Combinations and Permutations with Repetitions, Enumerating Permutation with Constrained Repetitions, Binomial Coefficient, The Binomial and Multinomial Theorems, The Principle of Exclusion

Unit-V: **[12 L]**

Graph Theory: Basic Concepts, Isomorphism and Subgraphs, Trees and their Properties, Spanning Trees, Directed Trees, Binary Trees, Planar Graphs, Euler's Formula, Multi-graphs and Euler Circuits, Hamiltonian Graphs, Chromatic Numbers, The Four-Color Problem.

Text Books:

3. Discrete Mathematical Structures with Applications to Computer Science: J.P. Tremblay, R. Manohar, McGraw-Hill, 1st ed.
4. Discrete Mathematics for Computer Scientists & Mathematicians: Joe l. Mott, Abraham Kandel, Teodore P. Baker, Prentis Hall of India, 2nd ed.

REFERENCE BOOK

6. Discrete and Combinatorial Mathematics - an applied introduction: Ralph. P. Grimald, Pearson education, 5th edition.
7. Discrete Mathematical Structures: Thomas Kosy, Tata McGraw Hill Publishing co.

Course Outcomes

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

CO1. Develop logically sound and rigorously justified proofs for propositions, theorems, and statements in discrete mathematics.

CO2. Use principles of propositional and predicate logic, as well as set operations, to model, reason, and express precise mathematical and computational statements.

CO3. Solve counting problems on finite and discrete structures.

CO4. Analyze sequences and series, including arithmetic, geometric, and recurrence relations, for problem-solving in discrete mathematics.

CO5. Apply graph theory to solve computing problems.

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM II Year-I Sem			
Course Code: N2104D	Digital Logic Design	L	T	P	C
		3	0	0	3

Pre-Requisites: Basic Electronics

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 Books:

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

REFERENCE BOOK

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.

Course Outcomes

At the end of the course, the student 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.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes (POs)/Program Specific Outcomes (PSOs)													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO 2**
CO1	3	1	2	1	-	-	-	-	-	-	-	1	-	2
CO2	3	2	1	-	1	-	-	-	-	-	-	3	-	2
CO3	3	2	3	2	-	-	-	-	-	-	-	2	2	1
CO4	3	2	3	2	-	-	-	-	-	-	-	2	2	1
CO5	3	1	2	1	1	-	-	-	-	-	-		-	2
Average	**3**	**1.6**	**2.2**	**1.5**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	-	**1.6**

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

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM II Year-I Sem			
Course Code: N2112B	OBJECT ORIENTED PROGRAMMING THROUGH JAVA	L	T	P	C
		3	0	0	3

Pre-Requisites: NIL

UNIT I: [10 L]

Object oriented thinking and Java Basics- Need for oop paradigm, summary of oop concepts, coping with complexity, abstraction mechanisms. History of Java, Java buzzwords, data types, variables, scope and lifetime of variables, arrays, operators, expressions, control statements, type conversion and casting, simple java program, concepts of classes, objects, constructors, methods, access control, this keyword, garbage collection, overloading methods and constructors, parameter passing, recursion, nested and inner classes, exploring String class.

UNIT II: [8 L]

Inheritance, Packages and Interfaces – Hierarchical abstractions, Base class object, subclass, subtype, substitutability, forms of inheritance specialization, specification, construction, extension, limitation, combination, benefits of inheritance, costs of inheritance. Member access rules, super keyword uses, using final keyword with inheritance, polymorphism- method overriding, abstract classes, the Object class. Defining, Creating and Accessing a Package, Understanding CLASSPATH, importing packages, differences between classes and interfaces, defining an interface, implementing interface, applying interfaces, variables in interface and extending interfaces.

UNIT III: [8 L]

Exception handling and Multithreading-- Concepts of exception handling, benefits of exception handling, Termination or resumptive models, exception hierarchy, usage of try, catch, throw, throws and finally, built in exceptions, creating own exception subclasses. Differences between multithreading and multitasking, thread life cycle, creating threads, thread priorities, synchronizing threads, inter thread communication, thread groups, daemon threads.

UNIT IV: [12 L]

Exploring String class, Object class, Exploring java.util package, Exploring java.io package Event Handling: Events, Event sources, Event classes, Event Listeners, Delegation event model, handling mouse and keyboard events, Adapter classes. graphics, layout manager – layout manager types – border, grid, flow, card and grid bag.

UNIT V: [12 L]

Swing – Introduction, limitations of AWT, MVC architecture, components, containers, exploring swing- JFrame and JComponent, JLabel, ImageIcon, JTextField, JButton, JCheckBox, JRadioButton, JList, JComboBox, Tabbed Panes, Scroll Panes, Trees, and Tables. Menu Basics, Menu related classes - JMenuBar, JMenu, JMenuItem, JCheckBoxMenuItem, JRadioButtonMenuItem, JSeperator. creating a popup menu.

Text Books:

1. Java the complete reference, 13th edition, Herbert Schildt, Dr. Denny Coward, Mc Graw Hill.
2. Understanding OOP with Java, updated edition, T. Budd, Pearson education.

REFERENCE BOOK

1. An Introduction to programming and OO design using Java, J. Nino and F.A. Hosch, John Wiley & sons.
2. An Introduction to OOP, third edition, T. Budd, Pearson education.

Course Outcomes

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

CO1. Demonstrate programs using control structures, constructors, string handling, and garbage collection.

CO2. Implement inheritance (multilevel, hierarchical, and multiple) using extends and implements keywords.

CO3. Apply multithreading concepts to develop inter-process communication.

CO4. Design graphical user interfaces using AWT or Swing.

CO5. Develop applets that interact with the client environment and deploy on a server.

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM II Year-I Sem			
Course Code: N2119B	PULSE AND DIGITAL CIRCUITS	L	T	P	C
		3	0	0	3

Pre-Requisites: Basic of Electronics and Digital circuits

Module 1

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

Unit-II: Non-Linear Wave Shaping
Diode clippers, Transistor clippers, Clipping at two independent levels, Clamping Operation, Clamping circuit taking Source and Diode resistances into account, Clamping Circuit Theorem, Practical Clamping Circuits, Effect of diode characteristics on clamping voltage.

Module 2:

Unit-I: Switching Characteristics of Devices
Diode as a Switch, Piecewise Linear Diode Characteristics, Diode Switching times, Transistor as a Switch, Transistor in Saturation, Transistor-switching times.

Unit-II: Multivibrators
Analysis and Design of Bistable, Monostable, Astable Multivibrators and Schmitt trigger using Transistors.

Module 3:

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

Module 4:

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

Module 5:

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

Unit-II: Realization of Logic Gates Using Diodes & Transistors:
AND, OR and NOT Gates using Diodes and Transistors, DCTL, RTL, DTL, TTL and CML Logic Families and its Comparison.

Text Books:

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

REFERENCE BOOK

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

E-Resources

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

Course Outcomes

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

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

CO2. Design the switching Diode and Transistor devices.

CO3. Differentiate various Multivibrators.

CO4. Construct various Sweeping circuits.

CO5. Evaluate different Logic Gates with various logic families.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes (POs)/Program Specific Outcomes (PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2	2	1	-	-	-	-	-	-	-	-	-	2
CO2	3	2	-	3	-	-	-	-	-	-	-	-	2	2
CO3	3	2	2	3	-	-	-	-	-	-	-	-	1	2
CO4	3	2	1	2	-	-	-	-	-	-	-	-	-	3
CO5	3	2	2	2	-	-	-	-	-	-	-	-	-	3
Average	3.0	2.0	1.8	2.2	-	-	-	-	-	-	-	-	1.5	2.4

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

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM II Year-I Sem			
Course Code: N2112C	DATABASE MANAGEMENT SYSTEMS	L	T	P	C
		3	0	0	3

Pre-Requisites: NIL

Unit-I: **[10 L]**

Database System Applications: A Historical Perspective, File Systems versus a DBMS, the Data Model, Levels of Abstraction in a DBMS, Data Independence, Structure of a DBMS **Introduction to Database Design:** Database Design and ER Diagrams, Entities, Attributes, and Entity Sets, Relationships and Relationship Sets, Additional Features of the ER Model, Conceptual Design with the ER Model

Unit-II: **[8 L]**

Introduction to the Relational Model: Integrity constraint over relations, enforcing integrity constraints, querying relational data, logical database design, introduction to views, destroying/altering tables and views.
Relational Algebra, Tuple relational Calculus, Domain relational calculus.

Unit-III **[8 L]**

SQL: QUERIES, CONSTRAINTS, TRIGGERS: form of basic SQL query, UNION, INTERSECT, and EXCEPT, Nested Queries, aggregation operators, NULL values, complex integrity constraints in SQL, triggers and active databases.
Schema Refinement: Problems caused by redundancy, decompositions, problems related to decomposition, reasoning about functional dependencies, FIRST, SECOND, THIRD normal forms, BCNF, lossless join decomposition, multivalued dependencies, FOURTH normal form, FIFTH normal form.

Unit-IV: **[12 L]**

Transaction Concept, Transaction State, Implementation of Atomicity and Durability, Concurrent Executions, Serializability, Recoverability, Implementation of Isolation, Testing for serializability, Lock Based Protocols, Timestamp Based Protocols, Validation- Based Protocols, Multiple Granularity, Recovery and Atomicity, Log–Based Recovery, Recovery with Concurrent Transactions.

Unit-V: **[12 L]**

Data on External Storage, File Organization and Indexing, Cluster Indexes, Primary and Secondary Indexes, Index data Structures, Hash Based Indexing, Tree based Indexing, Comparison of File Organizations, Indexes- Intuitions for tree Indexes, Indexed Sequential Access Methods (ISAM),
B+ Trees: A Dynamic Index Structure.

Text Books:

1. Database System Concepts, Silberschatz, Korth, McGraw hill, V edition.3rd Edition
2. Database Management Systems, Raghurama Krishnan, Johannes Gehrke, Tata Mc Graw Hill

REFERENCE BOOK

1. Database Systems design, Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition.
2. Fundamentals of Database Systems, Elmasri Navrate, Pearson Education
3. Introduction to Database Systems, C. J. Date, Pearson Education
4. Oracle for Professionals, The X Team, S. Shah and V. Shah, SPD.
5. Database Systems Using Oracle: A Simplified guide to SQL and PL/SQL, Shah, PHI.
6. Fundamentals of Database Management Systems, M. L. Gillenson, Wiley Student Edition.

Course Outcomes

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

CO1. Describe the concepts of database systems, data models, and ER-based conceptual design.

CO2. Apply relational algebra and relational calculus to formulate queries and enforce integrity constraints.

CO3. Construct SQL queries, triggers, and normalized schemas to maintain data consistency.

CO4. Analyze transactions, concurrency control, and recovery mechanisms to ensure database integrity.

CO5. Implement file organization and indexing techniques for efficient data storage and retrieval.

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM II Year-I Sem			
Course Code: N210EA	INNOVATION AND ENTREPRENEURSHIP	L	T	P	C
		2	0	0	2

Pre-Requisites: NIL

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:

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

7. A. Dale Timpe, Creativity, Jaico Publishing House, 2003.

Course Outcomes

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

CO1. Gain an understanding of the concepts and processes of creativity and appreciate the need for improving the quality of creativity.

CO2. Learn the methods of creative problem solving.

CO3.Orient themselves on developing creative intelligence and unblock their creative energies.

CO4.Learn the concepts and methods of innovation and ideation and the theories of outsourcing new product development.

CO5. Develop a perspective of micro and macro level innovation.

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM II Year-I Sem			
Course Code: N21122	OBJECT ORIENTED PROGRAMMING THROUGH JAVA LAB	L	T	P	C
		0	0	2	1

Note:

1. Use LINUX and MySQL for the Lab Experiments. Though not mandatory, encourage the use of the Eclipse platform.

2. The list suggests the minimum program set. Hence, the concerned staff is requested to add more problems to the list as needed.

Experiment List:

1. Use Eclipse or Net bean platform and acquaint yourself with the various menus. Create a test project, add a test class, and run it. See how you can use auto suggestions, auto fill. Try code formatter and code refactoring like renaming variables, methods, and classes. Try debug step by step with a small program of about 10 to 15 lines which contains at least one if else condition and a for loop.

2. Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +, -,*, % operations. Add a text field to display the result. Handle any possible exceptions like divided by zero.

3.
   A. Develop an applet in Java that displays a simple message.
   B. Develop an applet in Java that receives an integer in one text field, and computes its factorial

4. Value and returns it in another text field, when the button named “Compute” is clicked.

5. Write a Java program that creates a user interface to perform integer divisions. The user enters two numbers in the text fields, Num1 and Num2. The division of Num1 and Num 2 is displayed in the Result field when the Divide button is clicked. If Num1 or Num2 were not an integer, the program would throw a Number Format Exception. If Num2 were Zero, the program would throw an Arithmetic Exception. Display the exception in a message dialog box.

6. Write a Java program that implements a multi-thread application that has three threads. First thread generates a random integer every 1 second and if the value is even, the second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of the cube of the number.

7. Write a Java program for the following:
   Create a doubly linked list of elements.
   Delete a given element from the above list.
   Display the contents of the list after deletion.

8. Write a Java program that simulates a traffic light. The program lets the user select one of three lights: red, yellow, or green with radio buttons. On selecting a button, an appropriate message with "Stop" or "Ready" or "Go" should appear above the buttons in the selected color. Initially, there is no message shown.

9. Write a Java program to create an abstract class named Shape that contains two integers and an empty method named print Area (). Provide three classes named Rectangle, Triangle, and Circle such that each one of the classes extends the class Shape. Each one of the classes contains only the method print Area () that prints the area of the given shape.

10. Suppose that a table named Table.txt is stored in a text file. The first line in the file is the header, and the remaining lines correspond to rows in the table. The elements are separated by commas.

11. Write a java program to display the table using Labels in Grid Layout.

12. Write a Java program that handles all mouse events and shows the event name at the centre of the window when a mouse event is fired (Use Adapter classes).

13. Write a Java program that loads names and phone numbers from a text file where the data is organized as one line per record and each field in a record are separated by a tab (\t). It takes a name or phone number as input and prints the corresponding other value from the hash table (hint: use hash tables).

14. Write a Java program that correctly implements the producer – consumer problem using the concept of inter thread communication.

15. Write a Java program to list all the files in a directory including the files present in all its subdirectories.

Text Books:

1. Java for Programmers, P. J. Deitel and H. M. Deitel, 10th Edition Pearson education.
2. Thinking in Java, Bruce Eckel, Pearson Education.

Reference Books:

1. Java Programming, D. S. Malik and P. S. Nair, Cengage Learning.
2. Core Java, Volume 1, 9th edition, Cay S. Horstmann and G Cornell, Pearson.

Course Outcomes:

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

CO1. Use IDE tools to develop, debug, and manage Java programs efficiently.

CO2. Implement GUI applications and applets with event handling and exception management.

CO3. Develop multithreaded programs to solve concurrency and synchronization problems.

CO4. Manipulate data structures and perform file I/O operations to handle real-world data.

CO5. Integrate object-oriented concepts to design modular and reusable Java applications.

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM II Year-I Sem			
Course Code: N21192	PULSE AND DIGITAL CIRCUITS LAB	L	T	P	C
		0	0	2	1

Pre-Requisites: Basic of Electronics and Digital circuits

Experiment List:

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

Equipment required for Laboratories:

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

Course Outcomes:

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

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

CO2. Analyze the switching characteristics of a Transistor.

CO3. Design various Multivibrators

CO4. Design Boot Strap, Miller Sweep Circuit.

CO5. Design Uni-Directional, Bi-Directional Sampling gates and realize different Logic gates

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes (POs)/Program Specific Outcomes (PSOs)													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	3	1	1	1	-	-	-	1	-	-	-	3	2
CO2	2	3	2	1	2	-	-	-	1	2	-	-	3	2
CO3	2	2	2	2	2	-	-	-	1	2	-	-	3	3
CO4	2	2	2	2	2	-	-	-	1	2	-	-	3	3
Average	1	2	2	2	2	-	-	-	1	2	-	-	2	2

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

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM II Year-I Sem			
Course Code: N21123	DATABASE MANAGEMENT SYSTEMS LAB	L	T	P	C
		0	0	2	1

Pre-Requisites: Basic of Electronics and Digital circuits

Experiment List:

Experiment 1:
Concept design with E-R Model

Experiment 2:
Relational Model

Experiment 3:
Normalization

Experiment 4:
Practicing DDL commands

Experiment 5:
Practicing DML commands

Experiment 6:
Querying (using ANY, ALL, UNION, INTERSECT, JOIN, Constraints etc.)
Nested, Correlated subqueries

Experiment 7:
Queries using Aggregate functions, GROUP BY, HAVING and Creation and dropping of Views.

Experiment 8:
Triggers (Creation of insert trigger, delete trigger, update trigger)

Experiment 9:
Procedures

Experiment 10:
Usage of Cursors

Text Books:

1. Database Management Systems, Raghurama Krishnan, Johannes Gehrke, Tata Mc Graw Hill,3rd Edition
2. Database System Concepts, Silberschatz, Korth, McGraw Hill, V edition

Reference Books:

7. Fundamentals of Database Systems, Elmasri Navrate, Pearson Education
8. Introduction to Database Systems, C.J. Date, Pearson Education

Course Outcomes:

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

CO1. Design conceptual database schemas using the Entity-Relationship (E-R) model and relational model.

CO2. Apply normalization techniques to eliminate redundancy and improve database efficiency.

CO3. Implement database structures using DDL and DML commands.

CO4. Develop complex SQL queries using joins, subqueries, aggregate functions, and views.

CO5. Use advanced database features such as triggers, stored procedures, and cursors for effective data management.

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM II Year-I Sem			
Course Code: N21052	NODE JS/ REACT JS/ DJANGO	L	T	P	C
		0	0	2	1

Pre-Requisites: Basic of Electronics and Digital circuits

Experiment List:

1. Build a responsive web application for shopping cart with registration, login, catalog and cart pages using CSS3 features, flex and grid.

2. Make the above web application responsive web application using Bootstrap framework.

3. Use JavaScript for doing client – side validation of the pages implemented in experiment 1 and experiment 2.

4. Explore the features of ES6 like arrow functions, callbacks, promises, async/await. Implement an application for reading the weather information from openweathermap.org and display the information in the form of a graph on the web page.

5. Develop a java standalone application that connects with the database (Oracle / mySql) and perform the CRUD operation on the database tables.

6. Create an xml for the bookstore. Validate the same using both DTD and XSD.

7. Design a controller with servlet that provides the interaction with application developed in experiment 1 and the database created in experiment 5.

8. Maintaining the transactional history of any user is very important. Explore the various session tracking mechanism (Cookies, HTTP Session)

9. Create a custom server using http module and explore the other modules of Node JS like OS, path, event.

10. Develop an express web application that can interact with REST API to perform CRUD operations on student data. (Use Postman)

11. For the above application create authorized end points using JWT (JSON Web Token).

12. Create a react application for the student management system having registration, login, contact, about pages and implement routing to navigate through these pages.

13. 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

14. Create a TODO application in react with necessary components and deploy it into GitHub.

Reference Books:

1. Jon Duckett, Beginning HTML, XHTML, CSS, and JavaScript, Wrox Publications, 2010.
2. Bryan Basham, Kathy Sierra and Bert Bates, Head First Servlets and JSP, O'Reilly Media, 2nd Edition, 2008.
3. Vasan Subramanian, Pro MERN Stack, Full Stack Web App Development with Mongo, Express, React, and Node ,2nd Edition, APress

Course Outcomes:

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

CO1. Build a custom website using HTML, CSS, Bootstrap, and basic JavaScript.

CO2. Demonstrate advanced JavaScript features and implement database connectivity using JDBC.

CO3. Develop server-side applications using Java technologies.

CO4. Implement server-side functionality using Node.js.

CO5. Design a Single Page Application (SPA) using React.

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM II Year-I Sem			
Course Code: N2100D	ENVIRONMENTAL SCIENCE	L	T	P	C
		1	0	0	1

Pre-Requisites: NIL

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 BOOK

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.

Course Outcomes

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

CO1. Understand the structure, function, and significance of ecosystems, including energy flow, biogeochemical cycles, and biodiversity conservation through field experiences.

CO2. Analyze the classification, utilization, and sustainable management of natural resources, along with alternative energy options.

CO3 Evaluate biodiversity at genetic, species, and ecosystem levels, its values, threats, and conservation methods under national and international frameworks.

CO4. Identify types, sources, and impacts of environmental pollution, and apply suitable control technologies while assessing global environmental challenges and protocols.

CO5. Interpret environmental policies, legislation, and the EIA process to propose management plans addressing contemporary environmental and sustainability issues.

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM II Year-II Sem			
Course Code: N2200A	COMPUTER ORIENTED STATISTICAL METHODS	L	T	P	C
		3	0	0	3

Pre-Requisites: NIL

UNIT I:

Random Variables and Probability Distributions: Concept of a Random Variable – Discrete Probability Distributions – Continuous Probability Distributions – Mean of a Random Variable – Variance of a Random Variable.
Discrete Probability Distributions: Binomial Distribution – Poisson distribution.

UNIT II:

Continuous Distributions and sampling: Uniform Distribution – Normal Distribution – Areas under the Normal Curve – Applications of the Normal Distribution – Normal Approximation to the Binomial Distributions.
Fundamental Sampling Distributions: Random Sampling – Some Important Statistics – Sampling Distributions – Sampling Distribution of Means – Central Limit Theorem.

UNIT III:

Estimation: Introduction – Statistical Inference – Classical Methods of Estimation – Single Sample: Estimating the mean – Standard error of a point estimate. Two samples: Estimating the difference between two means– Single sample: Estimating a proportion – Two samples: Estimating the difference between two proportions– Two samples: Estimating the ratio of two variances.

UNIT IV:

Tests of Hypotheses (Large and Small Samples): Statistical Hypotheses: General Concepts – Testing a Statistical Hypothesis. Single sample: Tests concerning a single mean. Two samples: Tests on two means (Unknown for equal variance). One sample: Test on a single proportion. Two samples: Tests on two proportions. Two- sample tests concerning variances: F-distribution.

UNIT V:

Stochastic Processes and Markov Chains: Introduction to Stochastic processes- Markov process. Transition Probability, Transition Probability Matrix, First order and Higher order Markov process, n-step transition probabilities, Markov chain, Steady state condition, Markov analysis.

Text Books:

1. Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers, Keying Ye, Probability & Statistics for Engineers & Scientists, 9th Ed. Pearson Publishers.
2. S C Gupta and V K Kapoor, Fundamentals of Mathematical statistics, Khanna publications.
3. S. D. Sharma, Operations Research, Kedarnath and Ramnath Publishers, Meerut, Delhi.

REFERENCE BOOK

1. T.T. Soong, Fundamentals of Probability and Statistics for Engineers, John Wiley & Sons, 2004.
2. Sheldon M Ross, Probability and statistics for Engineers and scientists, academic press
3. Miller and Freund's, Probability and Statistics for Engineers, 8th Edition, Pearson Educations.

Course Outcomes

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

CO1. Apply the concepts of Random variable and distributions to case studies.

CO2. Formulate and solve problems involving random variables and apply statistical.

CO3 Methods for analysing experimental data.

CO4. Apply concept of estimation and testing of hypothesis to case studies.

CO5. Correlate the concepts of one unit to the concepts in other units.

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM II Year-II Sem			
Course Code: N2205A	OPERATING SYSTEMS	L	T	P	C
		3	0	0	3

Pre-Requisites: 1. A course on "Computer Programming and Data Structures".
2. A course on "Computer Organization and Architecture".

UNIT I:

Operating System - Introduction, Structures - Simple Batch, Multiprogrammed, 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 II:

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.

UNIT III:

Process Management and Synchronization - The Critical Section Problem, Synchronization Hardware, Semaphores, and Classical Problems of Synchronization, Critical Regions, Monitors
Interprocess Communication Mechanisms: IPC between processes on a single computer system, IPC between processes on different systems, using pipes, FIFOs, message queues, shared memory.

UNIT IV:

Memory Management and Virtual Memory - Logical versus Physical Address Space, Swapping, Contiguous Allocation, Paging, Segmentation, Segmentation with Paging, Demand Paging, Page Replacement, Page Replacement Algorithms.

UNIT V:

File System Interface and Operations -Access methods, Directory Structure, Protection, File System Structure, Allocation methods, Free-space Management. Usage of open, create, read, write, close, lseek, stat, ioctl system calls.

Text Books:

1. Operating System Principles- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 7th Edition, John Wiley
2. Advanced programming in the UNIX environment, W.R. Stevens, Pearson education.

REFERENCE BOOK

1. Operating Systems- Internals and Design Principles, William Stallings, Fifth Edition–2005, Pearson Education/PHI
2. Operating System A Design Approach- Crowley, TMH.
3. Modern Operating Systems, Andrew S. Tanenbaum 2nd edition, Pearson/PHI
4. UNIX programming environment, Kernighan and Pike, PHI/ Pearson Education
5. UNIX Internals -The New Frontiers, U. Vahalia, Pearson Education.

Course Outcomes

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

CO1. Describe the structure, components, and services of operating systems.

CO2. Analyze process concepts, scheduling algorithms, and thread management.

CO3 Apply synchronization techniques and interprocess communication mechanisms.

CO4. Implement memory management and virtual memory strategies including paging and segmentation.

CO5. Utilize file system structures, access methods, and related system calls for effective file management.

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM II Year-II Sem			
Course Code: N2219A	ANALOG COMMUNICATIONS	L	T	P	C
		3	0	0	3

Pre-Requisites: Fundamentals of Communications

Module 1

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

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

Module 2:

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

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

Module 3:

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

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

Module 4:

Transmitters And Receivers: Radio Transmitters-Classification of Transmitters, AM transmitter block diagram and explanation of each block. FM transmitter block diagram and explanation of each block.

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

Module 5:

Noise: Noise in Analog communication System, Noise in DSB& SSB System, Noise in AM System, Noise in Angle Modulation System, Threshold effect in Angle Modulation System, Pre-emphasis & de-emphasis.

Pulse Modulation: Types of Pulse modulation, PAM (Single polarity, double polarity) PWM:

Generation & demodulation of PWM, PPM, Generation and demodulation of PPM.

Text Books:

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

REFERENCE BOOK

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

Course Outcomes

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

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

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

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

CO4. Analyze and design the various Pulse Modulation Systems.

CO5. Design low power AM and FM transmitters.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes (POs)/Program Specific Outcomes (PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2	2	3	1	-	-	-	-	-	-	2	3	2
CO2	3	2	3	3	1	-	-	-	-	-	-	2	3	2
CO3	3	2	3	2	2	-	-	-	-	-	-	2	3	1
CO4	3	2	2	2	2	-	-	-	-	-	-	2	3	2
CO5	2	2	2	2	2	-	-	-	-	-	-	1	2	2
Average	**2.8**	**2**	**2.4**	**2.4**	**1.6**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

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

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM II Year-II Sem			
Course Code: N2205C	COMPUTER NETWORKS	L	T	P	C
		3	0	0	3

Pre-Requisites: 1. A course on "Programming for problem solving".
2. A course on "Data Structures".

Unit-I:

Introduction: The Internet, Protocol, Network Edge, Access Networks, Network Core, Packet Switching, Circuit Switching, Delay, Loss, and Throughput in Packet-Switched Networks, Protocol reference models: ISO-OSI, TCP/IP, Types of Network attacks, History of Computer Networking and the Internet.

Unit-II:

Application Layer: Principles of Network Applications, Network Application Architectures, Processes Communicating, Transport Services Available to Applications, Transport Services Provided by the Internet, Application-Layer Protocols, The Web and HTTP, File Transfer: FTP, Electronic Mail in the Internet, SMTP, DNS, Peer-to-Peer Applications, Socket Programming: Creating Network Applications.

Unit-III:

Transport Layer: Transport-Layer Services, Multiplexing and Demultiplexing, Connectionless Transport: UDP, Principles of Reliable Data Transfer, Building a Reliable Data Transfer Protocol, Pipelined Reliable Data Transfer Protocols, Go-Back-N (GBN), Selective Repeat (SR), Connection-Oriented Transport: TCP, The TCP Connection, Segment Structure, Round-Trip Time Estimation and Timeout, Reliable Data Transfer, Flow Control, TCP Connection Management, Principles of Congestion Control, TCP Congestion Control, Fairness.

Unit-IV:

Network Layer: Data and Control plane, Forwarding and Routing 308, Network Service Models, Virtual Circuit and Datagram Networks, Router working, The Internet Protocol (IP): Forwarding and Addressing in the Internet, Datagram Format, IPv4 Addressing, Internet Control Message Protocol (ICMP), IPv6, IP Security, Routing Algorithms- The Link- State (LS) Routing Algorithm, The Distance- Vector (DV) Routing Algorithm, Hierarchical Routing, Routing in the Internet-Intra-AS Routing in the Internet: RIP, Intra-AS Routing in the Internet: OSPF, Inter-AS Routing: BGP, Broadcast and Multicast Routing, Broadcast Routing Algorithms, Multicasting.

Unit-V:

The Link Layer: The Services Provided by the Link Layer, Error-Detection and -Correction Techniques- Parity Checks, Checksum Methods, Cyclic Redundancy Check (CRC), Hamming code, Multiple Access Links and Protocols, Channel Partitioning Protocols, Random Access Protocols, Taking-Turns Protocols, DOCSIS: The Link-Layer Protocol for Cable Internet Access, Switched Local Area Networks, Link-Layer Addressing and ARP, Ethernet, Link- Layer Switches, Virtual Local Area Networks (VLANs), Link Virtualization-Multiprotocol Label Switching (MPLS), Data Center Networking, A Day in the Life of a Web Page Request. Wireless network

characteristics, Wireless LAN.

Text Books:

1. Computer Networking: A Top-Down Approach – James F.Kurose, Keith W. Ross, Pearson
2. Computer Networks -- Andrew S Tanenbaum, David. j. Wetherall, 5th Edition. Pearson/PHI

REFERENCE BOOK

1. Data Communications and Networking – Behrouz A. Forouzan. Third Edition TMH.

Course Outcomes

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

CO1 Identify the fundamentals of computer network technologies.

CO2. Explain the functions of each layer in ISO-OSI and TCP/IP reference models.

CO3. Apply subnetting and routing mechanisms in network design.

CO4. Analyze essential network protocols and their application in network implementation.

CO5. Interpret protocol behaviour through packet traces captured by a sniffer.

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM II Year-II Sem			
Course Code: N2204E	ELECTRONIC CIRCUIT ANALYSIS	L	T	P	C
		3	0	0	3

Pre-Requisites: Basic Electronics

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 BOOK

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

Course Outcomes

At the end of the course, the student 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.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes (POs)/Program Specific Outcomes (PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO11**	**PO12**	**PSO 1**	**PSO2**
CO1	3	3	1	1	1	-	-	-	-	-	-	1	2	2
CO2	3	3	1	1	1	-	-	-	-	-	-	1	2	2
CO3	3	2	2	2	2	-	-	-	-	-	-	1	2	1
CO4	2	2	2	2	2	-	-	-	-	-	-	1	1	2
CO5	2	2	2	2	2	-	-	-	-	-	-	1	2	2
Average	**2.6**	**2.4**	**1.6**	**1.6**	**1.6**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

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

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM II Year-I Sem			
Course Code: N22001	COMPUTATIONAL MATHEMATICS LAB (Using Python/MATLAB software)	L	T	P	C
		0	0	2	1

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

*** Visualize all solutions Graphically through programmes**

Experiment 1:

Eigen values and Eigenvectors:

Programs:

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

Experiment 2:

Solution of Algebraic and Transcendental Equations

Bisection method, Newton Raphson Method

Programs:

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

Experiment 3:

Linear system of equations:

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

Experiment 4:

First-Order ODEs

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

Experiment 5:

Higher order linear differential equations with constant coefficients

Programs:

- Solving homogeneous ODEs
- Solving non-homogeneous ODEs

Text Books:

1. MATLAB and its Applications in Engineering, Rajkumar Basal, Ashok Kumar Geo, Manoj Kumar Sharma, Pearson publication.
2. Kenneth A. Lambert, The fundamentals of Python: First Programs, 2011, Cengage Learnings.
3. Think Python First Edition, by Allen B. Downey, Orielly publishing.

4. Introduction to Python Programming, William Mitchell, Povel Solin, Martin Novak et al., NC Lab Public Computing, 2012.
5. Introduction to Python Programming, ©Jacob Fredslund, 2007.

Reference Books:

1. An Introduction to Python, John C. Lusth, The University of Alabama, 2011.
2. Introduction to Python, ©Dave Kuhlman, 2008.

Course Outcomes:

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

CO1. Develop the code to find the Eigen values and Eigen Vectors using Python/MATLAB.

CO2. Develop the code find solution of Algebraic and Transcendental Equations and Linear system of equations using Python/MATLAB.

CO3. Write the code to solve problems of First-Order ODEs Higher order linear differential equations with constant coefficients.

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM II Year-I Sem			
Course Code: N22051	OPERATING SYSTEMS LAB	L	T	P	C
		0	0	2	1

Pre-Requisites:
- A course on "Programming for Problem Solving".
- A course on "Computer Organization and Architecture".

Co-requisite: A course on "Operating Systems"

Experiment 1:

Write C programs to simulate the following CPU Scheduling algorithms
a) FCFS b) SJF c) Round Robin d) priority.

Experiment 2:

Write programs using the I/O system calls of UNIX/LINUX operating system (open, read, write, close, lseek, stat, fork, exit)

Experiment 3:

Write a C program to simulate Bankers Algorithm for Deadlock Avoidance.

Experiment 4:

Write a C program to implement the Producer – Consumer problem using semaphores using UNIX/LINUX system calls.

Experiment 5:

Write C programs to illustrate the following IPC mechanisms
a) Pipes b) FIFOs c) Message Queues d) Shared Memory

Experiment 6:

Write C programs to simulate the following memory management techniques
a) Paging b) Segmentation

Experiment 7:

Write C programs to simulate Page replacement policies
a) FCFS b) LRU c) Optimal

Text Books:

1. Operating System Principles- Abraham Silberchatz, Peter B. Galvin, Greg Gagne 7th Edition, John Wiley.
2. Advanced programming in the Unix environment, W. R. Stevens, Pearson education.

Reference Books:

1. Operating Systems – Internals and Design Principles, William Stallings, Fifth Edition–2005, Pearson Education/PHI.

2. Operating System - A Design Approach-Crowley, TMH.
3. Modern Operating Systems, Andrew S Tanenbaum, 2nd edition, Pearson/PHI.
4. UNIX Programming Environment, Kernighan and Pike, PHI/Pearson Education.
5. UNIX Internals: The New Frontiers, U. Vahalia, Pearson Education.

Course Outcomes:

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

CO1. Implement CPU scheduling algorithms including FCFS, SJF, Round Robin, and Priority scheduling.

CO2. Utilize UNIX/Linux system calls for file operations and process management.

CO3. Apply deadlock avoidance and synchronization techniques using Bankers Algorithm and semaphores.

CO4. Demonstrate interprocess communication mechanisms such as Pipes, FIFOs, Message Queues, and Shared Memory.

CO5. Simulate memory management techniques and page replacement policies including Paging, Segmentation, FCFS, LRU, and Optimal.

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM II Year-II Sem			
Course Code: N22052	COMPUTER NETWORKS LAB	L	T	P	C
		0	0	2	1

Pre-Requisites: NIL

Experiment List:

1. Implement the data link layer framing methods such as character, character- stuffing and bit stuffing.
2. Write a program to compute CRC code for the polynomials CRC-12, CRC-16 and CRC CCIP
3. Develop a simple data link layer that performs the flow control using the sliding window protocol, and loss recovery using the Go-Back-N mechanism.
4. Implement Dijsktra's algorithm to compute the shortest path through a network
5. Take an example subnet of hosts and obtain a broadcast tree for the subnet.
6. Implement distance vector routing algorithm for obtaining routing tables at each node.
7. Implement data encryption and data decryption
8. Write a program for congestion control using Leaky bucket algorithm.
9. Write a program for frame sorting techniques used in buffers.
10. **Wireshark**
    i. Packet Capture Using Wire shark
    ii. Starting Wire shark
    iii. Viewing Captured Traffic
    iv. Analysis and Statistics & Filters.
11. How to run Nmap scan
12. Operating System Detection using Nmap
13. Do the following using NS2 Simulator
    i. NS2 Simulator-Introduction
    ii. Simulate to Find the Number of Packets Dropped
    iii. Simulate to Find the Number of Packets Dropped by TCP/UDP
    iv. Simulate to Find the Number of Packets Dropped due to Congestion
    v. Simulate to Compare Data Rate & Throughput.
    vi. Simulate to Plot Congestion for Different Source/Destination
    vii. Simulate to Determine the Performance with respect to Transmission of Packets

Text Book:

1. Computer Networks, Andrew S Tanenbaum, David. j. Wetherall, 5th Edition. Pearson Education/PHI

Reference Books:

1. An Engineering Approach to Computer Networks, S.Keshav, 2nd Edition, Pearson Education
2. Data Communications and Networking – Behrouz A. Forouzan. 3rd Edition, TMH.

Course Outcomes:

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

CO1. Implement data link layer framing methods.

CO2. Analyze error detection and correction codes.

CO3. Implement and evaluate routing and congestion control techniques.

CO4. Apply encoding and decoding techniques used in the presentation layer.

CO5. Utilize various network tools for simulation and analysis.

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM II Year-Iem			
Course Code: N22045	ELECTRONIC CIRCUIT ANALYSIS LAB	L	T	P	C
		0	0	2	1

Pre-Requisites: Basic of Electronics and Digital circuits

Experiment List:

Course Outcomes:

At the end of the course, the student 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.

Co-PO/PSO Mapping

Course Outcomes	Program Outcomes (POs)/Program Specific Outcomes (PSOs)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	3	3	2	2	1	-	-	-	-	-	-	-	-
CO2	3	3	3	2	2	1	-	-	-	-	-	-	-	-
CO3	3	3	3	2	1	-	-	-	-	-	-	-	-	-
CO4	2	2	3	2	3	-	-	-	-	-	1	-	-	-
CO5	3	3	2	3	2	1	-	-	-	-	1	-	-	-
Average	**2.8**	**2.8**	**2.8**	**2.2**	**2**	**-**	**-**	**-**	**-**	**-**	**1**	**-**	**-**	**-**

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

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM II Year-II Sem			
Course Code: N22721	DATA VISUALIZATION	L	T	P	C
		0	0	2	1

Pre-Requisites: NIL

Experiment List:

1.
a) Using R program to add, sub, mul, divn. (calculator)
b) To check given no is even or odd
c) While and for loops

2. a) Using R program execute a) switch b) find a factorial using Recursion
3. Execute R demo Programs a) array B) matrix and C) list
4. Execute R demo program on a) Data frames b) Common functions used with factor
5. Execute R demo program to read and write csv, excel data, basic plots.
6. Execute R programs Pie chart, histogram, line plot
7. Introduction to various Data Visualization tools
8. Basic Visualization in R
9. Connecting to Data and preparing data for visualization in R
10. Data Aggregation and Statistical functions in R
11. Data Visualizations in R
12. Creating custom charts, cyclical data and circular area charts, Dual Axis charts.

Reference Books:

1. Microsoft Power BI cookbook, Brett Powell, 2nd edition.
2. R Programming for Data Science by Roger D. Peng (References)
3. The Art of R Programming by Norman Matloff Cengage Learning India
4. Data Visualization with R: 111 Examples by Thomas Rahlf, Springer, 2020

Course Outcomes:

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

CO1. Describe the fundamentals of R programming.

CO2. Use R to create basic and advanced data visualizations.

CO3. Apply visualizations to interpret trends and patterns in data.

CO4. Construct effective visualizations to address real-world problems.

CO5. Explore and implement various plotting libraries for enhanced data representation.

AY: 2025-26 Onwards	J. B. Institute of Engineering and Technology (UGC Autonomous)	B. Tech ECM II Year-II Sem			
Course Code: N2200D	LINGUASKILL FOR PROFESSIONALS-B2 (Audit Course) (COMMON TO ALL)	L	T	P	C
		2	0	0	0

Pre-Requisites: A1-B1 levels (CEFR)

Module 1

Unit-I:

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-II:

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:

Unit-I:

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-II:

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:

Unit-I:

Grammar: Infinitives and -ing forms; passives

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

Pronunciation: Sound 'th'; consonant clusters; intonation.

Unit-II:

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:

Unit-I:

Grammar: too, enough, so/such

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

Pronunciation: Sound 'o', 'l'.

Unit-II:

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:

Unit-I:

Basic Grammar: Relative clause, reported speech

Vocabulary: Words related to health, thought and knowledge

Pronunciation: Sound 'ui'; linking.

Unit-II:

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 BOOK

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.

CO-PO/PSO Mapping

Course Outcomes	Program Outcomes (POs)/Program Specific Outcomes (PSOs)													
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**		**PSO2**
CO1	-	-	-	-	-	-	-	-	2	2	-	3		-
CO2	-	-	-	-	-	-	-	-	2	2	-	3		-
CO3	-	-	-	-	-	-	-	-	2	2	-	3		-
CO4	-	-	-	-	-	-	-	-	2	2	-	3		-
CO5	-	-	-	-	-	-	-	-	2	2	-	3		-
Average	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**2**	**-**	**3**	**-**	**-**

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