CMR COLLEGE OF ENGINEERING& TECHNOLOGY

(UGC Autonomous)

Kandlakoya, Medchal Road, Hyderabad – 501 401

ACADEMIC REGULATIONS - R 25

FOR CBCS & OUTCOME BASED B.TECH (REGULAR) PROGRAMMES

(**Effective for the students admitted into I year from the Academic Year 2025-26**)

1.0 Under-Graduate Degree Programme in Engineering & Technology (UGP in E&T)

CMR College of Engineering & Technology is an UGC Autonomous institution affiliated to Jawaharlal Nehru Technological University Hyderabad (JNTUH) offers new regulations termed as R25 regulations for four-year (eight semesters) **Bachelor of Technology** (B.Tech.) degree programme, under Choice Based Credit System (CBCS) with effect from the academic year **2025-26.**

2.0 Eligibility for Admission

2.1 Admissions will be done as per the norms prescribed by the Government of Telangana. The Government orders in vogue shall prevail.

2.2 The candidate should have passed the qualifying examination Intermediate or equivalent on the date of admission.

2.3 Seats in each programme in the college are classified into Category–A (70% of intake) and Category-B (30% of intake) besides Lateral Entry. Category-A seats will be filled by the Convener, TGEAPCET Admissions. Category-B seats will be filled by the College as per the guidelines of the Competent Authority.

2.4 Lateral Entry seats for 10% of the candidates from the approved strength of the course shall be admitted into the III Semester directly based on the rank secured by the candidate in TGECET in accordance with the guidelines from the Competent Authority.

2.5 The medium of instructions for the entire undergraduate programme in Engineering & Technology will be **English** only

3.0 B.Tech. Programme Structure

3.1 A student, after securing admission, shall complete the B.Tech. programme for 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. programme. Each student must secure a minimum of 160 credits out of 164 credits for successful completion of the undergraduate programme and for award of the B.Tech. degree.

3.2 **UGC/ AICTE** 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 with each academic year divided into two semesters. There shall be a minimum of 15 weeks of instruction weeks, excluding the mid-term and semester-end exams. Around 15 instruction hours and 30 instruction hours of learning need to be followed per one credit of theory course and practical course/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) and Credit Based Semester System (CBSS) as indicated by UGC. The curriculum/course structure as suggested by AICTE is followed.

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/Project/Mini Project (P) session.

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)	BSC – Basic Sciences Course	Includes Mathematics, Physics and Chemistry courses
2		ESC - Engineering Sciences Course	Includes Fundamental Engineering Courses
3		HSMC – Humanities and Social Sciences Course	Includes courses related to Humanities, Social Sciences and Management
4	Core Courses (CoC)	PCC – Professional Core Course	Includes core courses related to the parent branch of Engineering.
5	Elective Courses (EℓC)	PEC – Professional Elective Course	Includes elective courses related to the parent branch of Engineering.
6		OEC – Open Elective Course	Elective courses which include inter-disciplinary courses or courses in an area outside the parent branch of Engineering.
7	Project work and Other Core Courses (PROJ)	Project Work	B.Tech. Project Work
8		Industry Training/ Internship/ Industry Oriented Mini- project	Industry Training/ Internship/ Industry Oriented Mini-Project.

9		Seminar	Seminar/ Colloquium based on core contents related to parent branch of Engineering.
10	Skill Development Courses (SDC)	-	Courses designed to help individuals gain, improve, or refine specific skills
11	Value Added Courses (VAC)	-	Courses to build professional values, traditional knowledge and sensitization of societal issues

4.0 Mandatory Induction Programme

An induction program of three weeks duration for the UG students entering the institution, right at the start is proposed. Normal classes start only after the induction programme is over. 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, 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 or 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 through on-line registration, ensuring 'date and time stamping'. The online registration requests for semester courses shall be completed before the commencement of SEEs (Semester End Examinations) of the preceding semester.

5.3 A student can apply for **on-line** 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 be permitted to register for all the courses offered in a semester as specified in the course structure.

5.5 Course options exercised through **on-line** registration are final and **cannot** be changed; further, alternate 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 cannot be offered due to any inevitable or unexpected reasons, then the student shall be allowed to have alternate choice either for a new course (subject to offering such a course), or for another existing course. Such alternate 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 for 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 subject teachers who could not take classes proportional to the number of weeks completed from the commencement of the semester.

5.7 **Professional Electives**: The students must choose six Professional Electives (PE-I to PE-VI) from the six baskets of professional electives given.

Students have the flexibility to choose from the list of professional electives offered by the institute or opt to register for the equivalent Massive Open Online Courses (MOOCS) as suggested by the Institute. MOOCS courses are allowed only for professional electives.

5.8 **Open Electives:** Students must choose three Open Electives (OE-I, II & III) from three baskets of Open Electives given by department other than the parent department. However, the student can opt for an Open Elective course offered by their 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.

5.9 **Provision for Early Registration of MOOCS Courses:**

For a professional elective in a semester, students are allowed to register for an equivalent MOOCS course recommended by the BoS Chairperson and approved by the College Academic Committee one semester in advance. For example, a Professional Elective(s) 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.

5.10 **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 marks for CIE and 60 marks for SEE 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.

5.11 **Additional learning:**

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. The Institute shall notify such courses from time to time through their portal for the benefit of students. 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 15 students opt for it.

6.2 More than **one faculty member** may offer the **same course** in any semester. However, selection of choice for students will be based on - **first come first serve** basis and CGPA criterion.

6.3 If more students register for a course and the number of students exceeds the strength of one section, then the Head of the Department shall decide whether to offer the same course for two or more sections 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 all those subjects registered in that semester in which the student is detained, by seeking re-admission into that semester as and when offered; if there are any professional electives and/ or open electives, the same may also be re-registered if offered. However, if those electives are not offered in later semesters, then alternate electives may be chosen from the same set of elective subjects offered under that category.

7.7 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 05 marks, ii) Part – B for 25 marks, totalling to 30 marks. Total duration of mid-term examination is two hours.

9.2.1.1. Mid Term Examination for 30 marks:

a. Part - A: Objective/quiz paper for 05 marks.

b. Part - B: Descriptive paper for 25 marks.

The objective/quiz paper is set with multiple choice, fill-in the blanks,True or False and match the following type of questions for a total of 5 marks for 10 questions. The descriptive paper shall contain 5 questions with internal choice, each carrying 5 marks. The descriptive paper for first Mid-term examinations would be two questions each from first two units and one question from third unit, and similarly for the second Mid-term examinations it would be one question from third unit and two questions each from fourth and fifth units. 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.

The remaining 10 marks of Continuous Internal Evaluation are distributed as follows:

9.2.1.2. Five marks for the assignment. 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.

9.2.1.3. 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. The Head of the department shall schedule these sessions in their semester plan.

9.2.2 Engineering Graphics and other Drawing Related Courses:

For these courses, 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. The mid-term examination paper shall contain 5 questions with internal choice, each carrying 4 marks. The first Mid-term examination would be two questions each from first two units and one question from third unit, and similarly for the second Mid-term examination it would be one question from third unit and two questions each from fourth and fifth units.

9.3 An internal examination in each course is available for students who missed one of the two mid-term examinations due to unavoidable circumstances and subject to the approval of college academic committee. The internal examination will be conducted at the end of the semester and will carry a total of 30 marks. The marks obtained in the internal examination will be considered equivalent to those obtained in one mid-term Examination which the student has missed. Zero marks will be awarded to students who are absent from the mid-term examination. Only one mid term examination would be conducted even though the student has missed two mid-term examinations, hence the other one would be considered as Zero marks.

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 Graphics and other Drawing Related Courses:

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 a faculty appointed from other colleges.

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

1. 10 marks for write-up

2. 25 for conduct experiment/program

3. 15 for evaluation of results of the conducted experiment / program and

4. 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 must 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.

9.8.4 The External Evaluation shall be conducted by the external examiner for a total of 60 marks. 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 total of the CIE and SEE taken together.

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

the Head of the department.

9.8.6 A student who has failed to appear, may re-appear once for the above evaluation, when it is scheduled again; if student fails to appear in such 'one re-appearance' evaluation also, he/she must appear for the same in the next subsequent semester, 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 like that of theory courses. The scheduling of these mid-term exams and semester-end examinations would be done by the examination branch of the institute.

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

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 $\geq$ 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 (GP) in each course, based on 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'(CP) are computed by multiplying the grade point with credits for a given course.

Credit Points (CP) = Grade Point (GP) x Credits (C)

10.9 The Semester Grade Point Average (SGPA) is calculated only when all the courses offered in a semester are passed by a student. It is calculated by dividing the sum of credit points (∑CP) 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

$$\mathbf{SGPA = \{ \sum_{i=1}^{N} C_i\ G_i \} / \{ \sum_{i=1}^{N} C_i \}}$$

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 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

$$\mathbf{CGPA = \{ \sum_{j=1}^{M} C_j\ G_j \} / \{ \sum_{j=1}^{M} C_j \}}$$

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 (considers 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 x10 = 10
	20			152

SGPA = 152/20 = 7.60

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'** values 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 passed 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 only the grades earned by the student.

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 Institute 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 supplementary 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 for IV year II 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 semester to Third year first semester**	**(i) Regular course of study of second year second semester and fulfilment of attendance requirement.** **(ii) Must have secured at least 25% of the total credits up to second year second semester from all the relevant regular and supplementary examinations, whether the student takes those examinations or not.**
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 first semester**	**Regular course of study of third year second semester and fulfilment of attendance 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 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, Skill Development 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.

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 in the branch of Engineering selected at the time of admission.

17.2 A student who qualifies for award of the degree 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 enable 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 Medals for Academic Toppers

18.1 Students fulfilling the conditions listed under item 17.3 alone will be eligible for award of Medals for Academic Toppers.

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 Medal winner, until the tie is resolved: i) 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 eighth 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 Multiple Entry Multiple Exit Scheme (MEME)

20.1 Exit Option after Second Year:

Students enrolled in the 4-Year B.Tech. programme are permitted to exit the

programme 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 20.2 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.

20.2 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 Institute/University-prescribed pathways:

Work-based Vocational Course:

Participation in a practical, hands-on vocational training programme 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 Institute's schedule and guidelines.

20.3 Re-entry into the B.Tech. Programme

Students who have exited the B.Tech. programme with a 2-Year UG Diploma may apply for re-entry into the Third Year (Fifth Semester) of the B.Tech. programme. 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. programme and same college from which the student exited. Before rejoining, students should check for continuation of the same branch at the college. If the specific branch is closed in the college, 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.

20.4 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 programme (i.e., within 8 years for a 4-year B.Tech. programme from the year of admission into first year).

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

21.1 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-admit the B.Tech. programme, where R-25 regulations are in force.

21.2 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.

21.3 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.

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

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

21.6 Look Up Table of equivalence courses

21.6.1 A lookup table will be provided for the benefit of students and Heads of the departments. 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-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.

21.6.2 Applicability of Look-up Table: The above look-up table shall be applicable for i) students who seek readmission from R-22 regulations to R-25 regulation, however the Heads of Departments need to inform to the Academic and Examination Branches of the college in the specified format, the list of such students and equivalences derived from the transitory regulations.

21.6.3 These look-Up Tables are not applicable for the students who seek transfer to this college from other Universities/Institutes. The equivalent courses for such student transfers would be prepared and recommended by the Chairman of the concerned Board of Studies and the same is forwarded to JNTUH for necessary approval.

21.7 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.

22.0 Student Transfers

22.1 There shall be no branch transfers after the completion of admission process.

22.2 The students seeking transfer from various other Universities/institutions is having back-logs at the previous University/institute, must pass the courses offered at Institute which are equivalent to the failed courses at the previous University/institute.

22.3 The transferred students from other Universities/Institutions, shall be given a chance to write Internal Examination for getting CIE component in the equivalent course(s).

23.0 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.

24.0 Scope

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

24.2 In case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Principal/Vice-Chancellor is final.

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

24.4 Where the words “he”, “him”, “his”, occur in the regulations, they include “she”, “her”, “hers”.

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CMR COLLEGE OF ENGINEERING& TECHNOLOGY

(UGC Autonomous)

Kandlakoya, Medchal Road, Hyderabad – 501 401

ACADEMIC REGULATIONS FOR B.TECH. (LATERAL ENTRY SCHEME) FROM THE AY 2026-27

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

1. The LES students after securing admission shall pursue a course of study for not less than three academic years and not more than six academic years.
2. The student shall register for 124 credits and secure 120 credits with CGPA ≥ 5 from II year to IV-year B.Tech. programme (LES) for the award of B.Tech. degree.
3. The students, who fail to fulfil the requirement for the award of the degree in six academic years from the year of admission, shall forfeit their seat in B.Tech.
4. The attendance requirements of B.Tech. (Regular) shall be applicable to B.Tech. (LES).
5. Promotion rule

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

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

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MALPRACTICE RULES

Disciplinary Action for Malpractices/Improper Conduct in Examinations

	Nature of Malpractices/ Improper conduct	Punishment
1.(a)	Possesses or keeps accessible in examination hall, any paper, note book, programmable calculators, Cell phones, pager, palm computers, smart watches, electronic gadgets or any other form of material concerned with or related to the subject of the examination (theory or practical) in which he is appearing but has not made use of (material shall include any marks on the body of the candidate 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. Confiscation of Cell phones, pager, palm computers, smart watches, electronic gadgets etc. and the same would be handed over only after punishment finalized by Malpractice Committee.
(b)	Gives assistance or guidance or receives it from any other candidate orally or by any other body language methods or communicates through cell phones, pager, palm computers, smart watches, electronic gadgets with any candidate or persons in or outside the exam hall in respect of any matter.	Expulsion from the examination hall and cancellation of the performance in that subject only of all the candidates involved. In case of an outsider, he will be handed over to the police and a case is registered against him. Confiscation of Cell phones, pager, palm computers, smart watches, electronic gadgets etc. and the same would be handed over only after punishment finalized by Malpractice Committee.
2.	Has copied in the examination hall from any paper, book, programmable calculators, palm computers, cell phones, smart watches, electronic gadgets or any other form of material relevant to the subject of the examination (theory or practical) in which the candidate is appearing.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the candidate has already appeared including practical examinations excluding Project work/ Mandatory Courses /Technical Seminar and shall not be permitted to appear for the remaining examinations of the subjects of that Semester/year. The Hall Ticket of the candidate is to be cancelled. Confiscation of Cell phones, pager, palm computers, smart watches, electronic gadgets etc. and the same would be handed over only after punishment finalized by Malpractice Committee.
3.	Impersonates any other candidate in connection with the examination.	The candidate who has impersonated shall be expelled from examination hall. The candidate is also debarred and forfeits the seat. The performance of the original candidate Who has been

		impersonated, shall be cancelled in all the subjects of the examination (including practicals and project work) already appeared and shall not be allowed to appear for examinations of the Remaining subjects of that semester/year. The candidate is also debarred for two consecutive semesters from class work and all end semester examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat. If the imposter is an outsider, he will be handed over to the police and a case is registered against him.
4.	Smuggles 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 candidate 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 candidate is also debarred for two consecutive semesters from class work and all end semester Examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
5.	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
6.	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 or organizes a walk out or instigates others **to** examination hall-walk out, or threatens the officer- in-charge or any person on duty in or outside the examination hall of any injury**,** to his person or to any of his relations whether by words, either spoken or written or by signs or by visible representation, assaults the officer- in-charge, or any person on duty in or outside the	In case of students of the college, they shall be expelled from examination halls and cancellation of their performance in that subject and all other subjects the candidate(s) has (have) already appeared and shall not be permitted to appear for the remaining examinations of the subjects of that semester/year. The candidates are also 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.

	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.	
7.	Leaves the exam hall taking away answer script or intentionally tears of 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 candidate 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 candidate is also debarred for two consecutive semesters from class work and all Semester End Examinations. The continuation of the course by the candidate is subject to the academic regulations in connection with forfeiture of seat.
8.	Possess 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 candidate 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 candidate is also debarred and forfeits the seat.
9.	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.	If the student belongs to the college, expulsion from the examination performance in that subject and all other subjects shall and cancellation of the candidate 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 candidate 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.
10.	Comes in a state of inebriated/drunken condition to the examination hall.	Expulsion from the examination hall and cancellation of the performance in that subject and all other subjects the

		candidate has already appeared including practical examinations and project work and shall not be permitted for other remaining examinations of the subjects of that semester/year.
11.	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 candidate has appeared including practical examinations excluding Project work/ Mandatory Courses /Technical Seminar of that semester/year.
12.	If any malpractice is detected which is not covered in the above clauses 1 to 11 shall be reported to the College Academic Committee for further action to award suitable punishment.	

Malpractices identified by squad or special invigilators

Punishments to the candidates as per the above guidelines.

Malpractice identified at Spot center during valuation

1) The following procedure is to be followed in the case of malpractice cases detected during valuation, scrutiny etc. at spot center. Malpractice is detected at the spot valuation. The case is to be referred to the malpractice committee. Malpractice committee will meet and discuss/question the candidate and based on the evidences, the committee will recommend suitable action on the candidate.
2) A notice is to be served to the candidate(s) involved through the Principal regarding the malpractice and seek explanations.
3) The involvement of staff who are in charge of conducting examinations, invigilators valuing examination papers and preparing / keeping records of documents relating to the examinations in such acts (inclusive of providing in correct or misleading information) that infringe upon the course of natural justice to one and all concerned at the examinations shall be viewed seriously and recommended for award of appropriate punishment after thorough enquiry.
4) Based on the explanation and recommendation of the committee action may be initiated.

Malpractice committee:

(a) Chief Superintendent Chairman
(b) Controller of Examinations Member
(c) Dean Academics Member
(d) Chief Examiner of the Course/ Subject Expert Member
(e) Concerned Head of the Department Member
(f) Observer Member

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CMR COLLEGE OF ENGINEERING & TECHNOLOGY
(UGC AUTONOMOUS)
B. Tech - Electronics & Communication Engineering
CBCS & OUTCOME BASED COURSE STRUCTURE & SYLLABUS
(Effective for the students admitted into I year from the Academic Year 2025-26)

SEMESTER – I							
S. No	**Course Code**	**Course Title**	**Course Category**	**Hours per Week**			**Credits**
				L	**T**	**P**	**C**
1	A500001	Matrices and Calculus	BSC	3	1	0	4
2	A500008	Advanced Engineering Physics	BSC	3	0	0	3
3	A500101	English for Skill Enhancement	HSMC	3	0	0	3
4	A505201	Programming for Problem Solving	ESC	3	0	0	3
5	A503503	Computer Aided Engineering Drawing	ESC	0	1	2	2
6	A500502	Advanced Engineering Physics Laboratory	BSC	0	0	2	1
7	A500504	English Language and Communication Skills Laboratory	HSMC	0	0	2	1
8	A500506	Introduction to Social Innovation	HSMC	0	0	2	1
9	A505501	Programming for Problem Solving Laboratory	ESC	0	0	2	1
10	A505504	IT Workshop	ESC	0	0	2	1
		Induction Program					
		Total:		**12**	**2**	**12**	**20**
		Total hours per Week:		**26**			

SEMESTER - II							
S. No	**Course Code**	**Course Title**	**Course Category**	**Hours per Week**			**Credits**
				L	**T**	**P**	**C**
1	A500002	Ordinary Differential Equations and Vector Calculus	BSC	3	0	0	3
2	A500009	Engineering Chemistry	BSC	3	0	0	3
3	A502202	Basic Electrical Engineering	ESC	3	0	0	3
4	A505205	Data Structures through C	ESC	3	0	0	3
5	A505206	Python Programming	ESC	3	0	0	3
6	A500503	Engineering Chemistry Laboratory	BSC	0	0	2	1
7	A503502	Engineering Exploration and Practice	HSMC	0	0	2	1
8	A502501	Basic Electrical Engineering Laboratory	ESC	0	0	2	1
9	A505506	Data Structures through C Laboratory	ESC	0	0	2	1
10	A505507	Python Programming Laboratory	ESC	0	0	2	1
		Total:		**15**	**0**	**10**	**20**
		Total hours per Week		**25**			
	Total Credits in I Year: 40						

SEMESTER – III							
S. No	Course Code	Course Title	Course Category	Hours per Week			Credits
				L	T	P	C
1	A500005	Numerical Methods and Complex Variables	BSC	3	0	0	3
2	A502204	Network Analysis and Synthesis	ESC	2	0	0	2
3	A504201	Electronic Devices and Circuits	ESC	3	0	0	3
4	A504301	Probability Theory and Stochastic Processes	PCC	3	0	0	3
5	A504302	Signals and Systems	PCC	3	0	0	3
6	A504303	Electromagnetic Fields and Transmission Lines	PCC	3	0	0	3
7	A500501	Computational Mathematics Laboratory	BSC	0	0	2	1
8	A504501	Modelling and Simulation Laboratory	PCC	0	0	2	1
9	A504502	Electronic Devices and Circuits Laboratory	PCC	0	0	2	1
10	A504701	Linux and Shell Scripting	SDC	0	0	2	1
	Total:			**17**	**0**	**8**	**21**
	Total hours per Week:			**25**			

SEMESTER – IV							
S. No	Course Code	Course Title	Course Category	Hours per Week			Credits
				L	T	P	C
1	A502205	Control Systems Engineering	ESC	2	0	0	2
2	A504304	Digital Logic Design	PCC	2	0	0	2
3	A504305	Analog and Digital Communications	PCC	3	0	0	3
4	A504306	Electronic Circuit Analysis	PCC	3	0	0	3
5	A504307	Linear and Digital IC Applications	PCC	3	0	0	3
6	A500507	Social Innovation and Entrepreneurship	HSMC	0	1	2	2
7	A504503	Digital Logic Design Laboratory	PCC	0	0	2	1
8	A504505	Analog and Digital Communications Laboratory	PCC	0	0	2	1
9	A504506	Electronic Circuit Analysis Laboratory	PCC	0	0	2	1
10	A504507	Linear and Digital IC Applications Laboratory	PCC	0	0	2	1
11	A504702	Web and Mobile Applications	SDC	0	0	2	1
12	A500901	Environmental Science	VAC	1	0	0	1
	Total:			**14**	**1**	**12**	**21**
	Total hours per Week			**27**			
	Total Credits in II Year: 42						

SEMESTER – V							
S. No	**Course Code**	**Course Title**	**Course Category**	**Hours per Week**			**Credits**
				L	**T**	**P**	**C**
1		Professional Core Course	PCC	3	0	0	3
2		Professional Core Course	PCC	3	0	0	3
3		Professional Core Course	PCC	3	0	0	3
4		**Professional Elective Course - I**	PEC	3	0	0	3
5		**Open Elective Course -I**	OEC	2	0	0	2
6		Professional Core Course Laboratory	PCC	0	0	2	1
7		Professional Core Course Laboratory	PCC	0	0	2	1
8		Professional Core Course Laboratory	PCC	0	0	2	1
9		Skill Development Course – 3	SDC	0	0	2	1
10		Field-based Research Project	PROJ	0	0	4	2
11	A500902	Indian Knowledge System	VAC	1	0	0	1
	Total:			**15**	**0**	**12**	**21**
	Total hours per Week:			**27**			

SEMESTER – VI							
S. No	**Course Code**	**Course Title**	**Course Category**	**Hours per Week**			**Credits**
				L	**T**	**P**	**C**
1	A500102	Business Economics and Financial Analysis	HSMC	3	0	0	3
2		Professional Core Course	PCC	3	0	0	3
3		Professional Core Course	PCC	3	0	0	3
4		**Professional Elective Course -II**	PEC	3	0	0	3
5		**Open Elective Course – II**	OEC	2	0	0	2
6	A500505	English for Employability Skills Laboratory	HSMC	0	0	2	1
7		Professional Core Course Laboratory	PCC	0	0	2	1
8		Professional Core Course Laboratory	PCC	0	0	2	1
9		Professional Core Course Laboratory	PCC	0	0	2	1
10		Skill Development Course – 4	SDC	0	0	2	1
11	A500903	Gender Sensitization	VAC	1	0	0	1
	A500904	Human Values and Professional Ethics					
	Total:			**15**	**0**	**10**	**20**
	Total hours per Week			**25**			
	Total Credits in III Year: 41						

SEMESTER – VII							
S. No	**Course Code**	**Course Title**	**Course Category**	**Hours per Week**			**Credits**
				L	**T**	**P**	**C**
1	A500103	Fundamentals of Management	HSMC	3	0	0	3
2		Professional Core Course	PCC	3	0	0	3
3		Professional Core Course	PCC	3	0	0	3
4		**Professional Elective Course -III**	PEC	3	0	0	3
5		**Professional Elective Course -IV**	PEC	3	0	0	3
6		**Open Elective Course – III**	OEC	2	0	0	2
7		Professional Core Course Laboratory	PCC	0	0	2	1
8		Professional Core Course Laboratory	PCC	0	0	2	1
9		Industry Oriented Mini Project	PROJ	0	0	4	2
		Summer Internship					
	Total:			**17**	**0**	**8**	**21**
	Total hours per Week:			**25**			

SEMESTER – VIII							
S. No	**Course Code**	**Course Title**	**Course Category**	**Hours per Week**			**Credits**
				L	**T**	**P**	**C**
1		**Professional Elective Course -V**	PEC	3	0	0	3
2		**Professional Elective Course -VI**	PEC	3	0	0	3
3		Project Work	PROJ	0	0	28	14
	Total:			**6**	**0**	**28**	**20**
	Total hours per Week			**34**			
	Total Credits in IV Year: 41						
	Total Credits in B. Tech Electronics and Communication Engineering: 164						

(A500001) MATRICES AND CALCULUS

(Common to All)

B.Tech (ECE): I Semester

L	T	P	C
3	1	0	4

UNIT-I: Matrices

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.

UNIT - II: Eigen values and Eigen vectors

Linear Transformation and Orthogonal Transformation: 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.

UNIT - III: Single Variable Calculus

Limits and Continuous 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 Series (All the theorems without proof).

Definition of Improper Integral: Beta and Gamma functions and their applications.

UNIT - IV: Multivariable Calculus (Partial Differentiation and applications)

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.

UNIT - V: Multivariable Calculus (Integration)

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. Higher Engineering Mathematics (36th Edition), B.S. Grewal, Khanna Publishers, 2010.
2. Advanced Engineering Mathematics (5th Edition), R.K. Jain and S.R.K. Iyengar, Narosa Publications, 2016.

REFERENCES

1. Advanced Engineering Mathematics (9th Edition), Erwin Kreyszig, John Wiley & Sons, 2006.
2. Calculus and Analytic geometry (9th Edition), G.B. Thomas and R.L. Finney, Pearson, Reprint, 2002.

COURSE OUTCOMES:

On completion of the course students will be able to

1. **Formulate** the matrix representation of a system of linear equations and **analyze** the corresponding solution set.
2. **Determine** the eigenvalues and eigenvectors of a matrix, and **reduce** a quadratic form to its canonical form using orthogonal transformations.
3. **Apply** the mean value theorems to solve relevant problems in mathematical analysis. Find solution of improper integrals by using Beta and Gamma function
4. **Find** the extreme values of functions of two variables, both with and without constraints.
5. **Evaluate** multiple integrals and **apply** the concept to calculate areas and volumes.

CO-PO MAPPING

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

(A500008) ADVANCED ENGINEERING PHYSICS

(Common to All)

B.Tech (ECE): I Semester

L	T	P	C
3	0	0	3

UNIT - I: CRYSTALLOGRAPHY

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 & MATERIALS CHARACTERIZATION:

Surface to volume ratio, X -ray diffraction: Bragg's law, powder method, crystallite size - Debye Scherrer's formula, scanning electron microscopy (SEM): block diagram, working principle.

UNIT - II: QUANTUM MECHANICS

Introduction, de-Broglie hypothesis, 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, Kronig-Penny Model (qualitative), classification of solids, concept of discrete energy levels and quantum confinement in nanomaterial.

SEMICONDUCTORS AND DEVICES:

Intrinsic and Extrinsic semiconductors (qualitative), Hall effect, Construction, principle of operation and characteristics of P-N Junction diode. Direct and indirect band gap semiconductors – LED and Solar cells, their structure, materials, working principle and characteristics.

UNIT - III: QUANTUM COMPUTING

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

UNIT - IV: MAGNETIC MATERIALS

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 ferromagnetic materials using sol-gel method, applications: magnets for electric vehicles (EV).

DIELECTRIC MATERIALS:

Introduction to dielectric materials, types of polarization (qualitative): electronic, ionic & orientation; ferroelectric, piezoelectric, pyroelectric materials and their applications: Ferroelectric Random-Access Memory (Fe-RAM), production of Ultrasonics by piezoelectric method.

UNIT - V: LASER

Introduction to laser, characteristics of laser, Einstein coefficients and their relations, metastable state, population inversion, pumping mechanism, lasing action, Ruby laser, He-Ne laser, CO_2 laser, semiconductor diode laser, applications: Bar code scanner, LIDAR for autonomous vehicle.

FIBER OPTICS

Introduction to Fiber optics, total internal reflection, construction of optical fiber, acceptance angle, numerical aperture, classification of optical fibers, losses in optical fiber (qualitative), applications: optical fibers for communication system.

(A500101) ENGLISH FOR SKILL ENHANCEMENT

(Common to All)

B. Tech (ECE): I Semester	**L**	**T**	**P**	**C**
	3	**0**	**0**	**3**

Unit –I

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

Theme: Digital Transformation

Lesson on '*Emerging Technologies*' from the prescribed textbook titled *English for the Young in the Digital World* published by Orient Black Swan 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

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 Black Swan 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

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 Black Swan 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

Theme: Integrity and Professionalism

Lesson on '*Professional Ethics*' from the prescribed textbook titled *English for the Young in the Digital World* published by Orient Black Swan 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.***

Prescribed Textbook

1. *English for the Young in the Digital World*,Orient BlackSwan Pvt. Ltd, Board of Editors. *2025.*

References:

1. *Practical English Usage*, Swan,Michael, Oxford University Press. New Edition..(2016).

2. *English Grammar Just for You. Karal, Rajeevan.*Oxford University Press. New Delhi (*2023).*

3. *Communication Skills –A Workbook.*Sanjay Kumar & Pushp Lata. Oxford University Press New Delhi (2022).

4. *English for Technical Communication for Engineering Students.*Vishwamohan, AyshaMc Graw-Hill Education India Pvt. Ltd.(2013)

COURSE OUTCOMES:

Students will be able to

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

CO-PO MAPPING

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

(A505201) PROGRAMMING FOR PROBLEM SOLVING

B. Tech (ECE): I Semester

L	T	P	C
3	0	0	3

UNIT - I:

Algorithms & Flowchart: Introduction to Algorithms, Characteristics of Algorithms, Introduction to flowcharts, Various symbols used in flowcharts, Algorithms and Flowcharts for various mathematical problems.

Introduction to C Programming: Executable Statements, General Form of a C Program, C Language Elements, Variable Declarations and Data Types, Operators, Precedence and Associativity, Arithmetic Expressions and its evaluations, Formatting Input/Output statements.

Decision Statements: Control Structures, Conditions, if Statement, if Statements with Compound Statements, Switch-Case statement.

UNIT - II:

Loop Control Statements: Repetition in Programs, Looping Statements – While, do-while, for Loop, Nested Loops, Jumping Statements – Goto, Break and Continue Statements.

Functions: Overview, Library functions, defining a function, accessing a function, function prototype, passing arguments to a function, Scope Rules – Storage Classes.

Recursion: The Nature of Recursion, Tracing a Recursive Function, Recursive Mathematical Functions.

UNIT - III:

Pointers: Pointers and the Indirection Operator, Declaration & Initialization of a pointer, Multiple Calls to a Function with Input/Output Parameters, Formal Output Parameters as Actual Arguments, Pointer – Arithmetic, Pointer to Pointer, Dynamic Memory Allocation.

Arrays: Declaring and Referencing Arrays, Array Subscripts, Using for Loops for Sequential Access, Passing Arrays to Functions, Parallel Arrays, Multidimensional Arrays, Pointers and Arrays.

UNIT - IV:

Strings: String Basics, defining a String, Initialization of Strings, Reading and Writing a String, String Library Functions, Pointers and Strings.

Structures and Unions: Introduction, defining a Structure, processing a Structure, User-Defined Structure Types, Array of Structures, Nested Structures, Self-referential Structures, Structures and Pointers, Structures and Functions, Unions, Enumerated Data type.

UNIT - V:

Text and Binary File Pointers: Input/Output Files – Basic file Operations, Random Access Files, Binary Files, Command Line Arguments.

Searching and Sorting: Basic searching in an array of elements (linear and binary search techniques), Basic algorithms to sort an array of elements (Bubble, Insertion and Selection sort algorithms).

TEXTBOOKS:

1. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
2. Jeri R. Hanly and Elliot B. Koffman, Problem solving and Program Design in C 7th Edition, Pearson

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. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rd Edition)

Course Outcomes: The student will learn to

1. Develop algorithms and flowcharts for solving computational problems and implement them using C language syntax.
2. Write C programs using control structures such as conditional, iterative, and jumping statements.
3. Design modular programs using user-defined functions, recursion, and demonstrate understanding of scope and storage classes.
4. Apply advanced C constructs such as pointers, arrays, strings, and structures to solve real-time problems.
5. Perform file handling operations and implement searching and sorting algorithms using C language.

CO-PO Mapping:

	PO 1	PO 2	PO 3	PO 4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	-	-	3	-	-	-	1	-	1	3	-
CO2	3	3	2	-	3	-	-	-	1	1	2	3	-
CO3	3	3	2	2	3	-	-	-	1	1	2	3	-
CO4	3	3	2	2	3	-	-	-	1	2	2	3	2
CO5	3	3	2	2	3	-	-	-	1	2	2	3	2

(A503503) COMPUTER AIDED ENGINEERING DRAWING

(Common to EEE, ECE, CSE, CSM, CSD)

B. Tech. (ECE): I Semester

L	T	P	C
0	1	2	2

UNIT-I

Introduction to Engineering Drawing:

Principles of Engineering Drawing and their Significance, Geometrical Constructions, Introduction to Computer Aided Drafting Tool, Computer aided drafting of Conic Sections: Ellipse, Parabola and Hyperbola – General Method (eccentricity) only. Computer aided drafting of Cycloid, Epicycloids and Hypocycloid; Computer aided drafting of Scales – Plain & Diagonal Scales

UNIT-II

Orthographic Projections:

Introduction to Principles of Orthographic Projections – Conventions – Projections of Points, Lines, and Projections of Plane regular geometric figures using Computer aided drafting tool.

UNIT-III

Projections of Regular Solids:

Introduction to Regular Solids – Prism, Cylinder, Pyramid, and Cone – Regular views using Computer aided drafting tool.

UNIT-IV

Isometric Projection:

Principles of Isometric Projection – Isometric Scale – Isometric Views –Conventions – Isometric Views of Lines, Plane Figures, Simple and Compound Solids – Isometric Projection of objects having non- isometric lines, Isometric Projection of Spherical Parts using Computer aided drafting tool.

UNIT-V

Conversion of Isometric Views to Orthographic Views and Vice-versa – Conventions, Conversion of orthographic projection into isometric view

TEXTBOOKS:

1. Engineering Drawing, N.D. Bhatt, Charotar Publishers, 54th Edition, 2023
2. Computer Aided Engineering Drawing, K. Balaveera Reddy et al, CBS Publishers, 2nd Edition, 2015

REFERENCE BOOKS:

1. Engineering Drawing, M. B. Shah, B.C. Rane, Pearson, 3rd Edition, 2015
2. Engineering Drawing, Basant Agrawal and C M Agrawal, McGraw Hill, 3rd Edition, 2019
3. Engineering Graphics and Design, WILEY, John Wiley and sons Inc, 3rd Edition, 2020
4. Engineering Drawing and graphics Using AutoCAD, T. Jeyapoovan, Vikas, S.Chand and Company Ltd, 3rd Edition, 2010

COURSE OUTCOMES:

On completion of the course students will be able to:

1. Understand and Apply concepts to construct engineering curves using Computer aided drafting tool
2. Apply the Orthographic projection for Points, Lines and Planes by Drafting tool
3. Construct and interpret Orthographic projections of Solids using Computer aided drafting tool
4. Create the Orthographic view to Isometric view using Computer aided drafting tool
5. Conversion of Orthographic view to Isometric view & vice versa using Computer aided drafting tool

CO-PO MAPPING:

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

(A500502) ADVANCED ENGINEERING PHYSICS LABORATORY
(Common to All)

B.Tech (ECE): I Semester

L	T	P	C
0	0	2	1

(Any 8 experiments are to be performed)

1. Determination of Planck's constant using Photo Electric Effect.
2. Determination of energy gap of a semiconductor.
3. Determination of Hall coefficient and carrier concentration of a given semiconductor.
4. Study of V-I characteristics of a LED
5. Study of V-I characteristics of a Solar Cell and find its Fill factor.
6. Determination of magnetic moment of a bar magnet and horizontal earth magnetic field.
7. Study of B-H curve of a ferromagnetic material.
8. Determination of dielectric constant of a given material.
9. Study of V-I & L-I characteristics of a given laser diode
10. a. Determination of wavelength of a laser using diffraction grating.
    b. Determination of LASER beam divergence
11. a. Determination of numerical aperture of a given optical fiber.
    b. Determination of bending losses of a given optical fiber.

COURSE OUTCOMES:

On completion of the course students will be able to

1. Determine the energy gap using semiconductors using experimental methods.
2. Appreciate **and apply** the principles of **quantum physics** in the field of **optoelectronics**
3. Analyze the variation of Magnetic fields and their properties
4. Examine and interpret the variation of dielectric properties of a material.
5. Demonstrate working knowledge of laser systems and optical fiber parameters through experimental study.

CO-PO Mapping:

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

(A500504) ENGLISH LANGUAGE AND COMMUNICATION SKILLS LABORATORY
(Common to All)

B.Tech (ECE): I Semester

L	T	P	C
0	0	2	1

Exercise – I
CALL Lab:
Instruction: Speech Sounds-Listening Skill - Importance – Purpose - Types- Barriers- Active Listening
Practice: Listening to Distinguish Speech Sounds (Minimal Pairs) - *Testing Exercises*
ICS Lab:
5. **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

Exercise – II
CALL Lab:
Instruction: Listening vs. Hearing - Barriers to Listening
Practice: Listening for General Information -Multiple Choice Questions -*Listening Comprehension Exercises (It is essential to identify a suitable passage with exercises for practice.)*
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

Exercise - III
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 *(A wide range of Materials / Handouts are to be made available in the lab.)*

Exercise – IV
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

Exercise – V
CALL Lab:
Instruction: Identifying the literal and implied meaning
Practice: Listening for Evaluation- Write the Summary –Listening Comprehension Exercises
(It is essential to identify a suitable passage with exercises for practice.)
ICS Lab:
Instruction: Understanding Non-Verbal Communication
Practice: Silent Speech - Dumb Charades Activity

Suggested Software:
1. Punctuation Made Easy by Darling Kindersley.
2. **Free Mobile App**: The official OALD 10th Edition app provides **100 free sample entries.**
3. **Free Access**: Limited to downloadable samples (table of contents, sample pages, copyright information) available on the Cambridge website.

References:
- *Communicative English – A workbook.*Shobha, KN &Rayen, J. Lourdes. Cambridge University

Press.(2019).
- *English Language Communication Skills – Lab Manual cum Workbook.*Cengage Learning India Pvt. Ltd.(2022).
- *Five Minute Activities – A Resource Book for Language Teachers*Ur, Penny and Wright, Andrew.Cambridge University Pres(2022).

Outcomes:

Students will be able to

1. Listen actively and identify important information in spoken texts
2. Interpret the speech and infer the intention of the speaker
3. Improve their accent for intelligibility
4. Speak fluently with clarity and confidence
5. Use the language in real life situations

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

(A500506) INTRODUCTION TO SOCIAL INNOVATION

(Common to all branches)

B.Tech (ECE): I Semester

L	T	P	C
0	0	2	1

WEEK-1

Types and features of community- Rural, Suburban, Urban and Regional

WEEK-2

Service based learning, Aims of Community based projects, Sustainable Development Goals

WEEK-3

Community visit, Report Writing, Resource Diagram, Chapati Diagram, Transect Walk

WEEK-4

The non-profit sector, public sector, the private sector, the informal sector

WEEK-5

Poster presentation on four sectors

WEEK-6

Process of Design Thinking

WEEK-7

Social organizations and enterprises, social movements

WEEK-8

Social softwares and open-source methods

WEEK-9

Introduction to Ethics, moral values, significance of professional ethicscode of conduct for engineers

WEEK-10

Identify ethical dilemmas in different tasks of engineering, applying moral theories and codes of conduct forresolution of ethical dilemmas

WEEK-11

Case studies on Engineering Ethics

WEEK-12

Steps for Patent filing and Startups, Procedure for grants of patents. Indian Scenario of Patenting, International cooperation on Intellectual Property, Documentation, Panel Presentation

TEXT BOOKS:

1. Social Entrepreneurship for the 21st Century: Innovation Across the Non-Profit, Private and Public Sectors; Georgia Levenson Keohane; Tata McGraw Hill
2. Solving Problems with Design Thinking - Ten Stories of What Works (Columbia Business School Publishing) Hardcover – 20 Sep 2013 by Jeanne Liedtka (Author), Andrew King (Author), Kevin Bennett (Author)

REFERENCE BOOKS:

1. Fundamentals of Intellectual Property (English) 1st Edition (Paperback, Dr. Kalyan C. Kankanala) Publisher:Asia Law House ISBN: 9789381849514, 938184951X Edition: 1st Edition, 2012.
2. Indian Patent Law (English, Paperback, Kalyan C. Kankanala) Publisher: Oxford

COURSE OUTCOMES:

On Completion of the course, the students will be able to

1. Identify community issues through community Interaction
2. Illustrate the factors affecting social innovation in various sectors
3. Apply design thinking concept to analyze the community problems
4. Adopt the ethical values in implementing the social innovation
5. Describe the process of property rights and patent filing.

CO-PO MAPPING:

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

(A505501) PROGRAMMING FOR PROBLEM SOLVING LABORATORY

B. Tech (ECE): I Semester

L	T	P	C
0	0	2	1

[Note:The programs may be executed using any available Open Source/ Freely available IDE
Some of the Tools available are:

- *CodeLite: https://codelite.org/*
- *Code::Blocks: http://www.codeblocks.org/*
- *DevCpp : http://www.bloodshed.net/devcpp.html*
- *Eclipse: http://www.eclipse.org*

This list is not exhaustive and is NOT in any order of preference]

Operators and Expressions:

Practice Programs:

- Write a simple program that prints the results of all the operators available in C, Read required operand values from standard input.
- Write a C program to swap the contents of any two operands using suitable bitwise operator.
- Write a C program to compute $s = ut + \frac{1}{2} at^2$ [Read u, t & a values from keyboard].
- Write a C program for the simple and compound interest.

Additional Programs:

- Write a program that reads the radius of a circle (as a float value) and computes and prints the diameter, the circumference and the area, consider π value as a symbolic constant.
- Write a program that asks the user to enter the total time elapsed, in seconds, since an event and converts the time to hours, minutes and seconds. The time should be displayed as hours: minutes: seconds. [Hint: Use the remainder operator]

Decision statements:

Practice Programs:

- Write a C program for finding the max and min from the given three numbers.
- Write a C program to find the roots of a Quadratic equation.
- 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).

Additional Programs:

- Write a C program to calculate the electricity bill. Read starting and ending meter readings. The charges are as follows:

No. of Units Consumed	**Unit Cost (per unit)**
>=500	5.00 Rs/unit
>=200 to <500	3.50 Rs/unit
>=100 & <200	2.50 Rs/unit
Less than 100	1.50 Rs/unit

- Write a C program to convert years into 1. MINUTES 2. HOURS 3. DAYS 4. MONTHS 5. SECONDS using switch-case statement.

Loop Control Statements:

Practice Programs:

- 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

- Write a C program to print all the prime numbers between the given limits.
- Write a C program to find the sum of individual digits of a positive integer and test given number is palindrome or not.
- Write a C program to construct a pyramid of numbers as follows:

```
1                    a
1  2                 b  b
1  2  3              c  c  c
1  2  3  4           d  d  d  d
```

Additional Programs:

- 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.
- Write a C program to check whether the given year is leap-year or not using goto statement.
- Write a C program to summate the Sin Series of n terms [Hint: input x and n terms]

$$\sin(x) = x - \frac{x^3}{3!} + \frac{x^5}{5!} - \frac{x^7}{7!} + \cdots$$

Functions & Recursion:

Practice Programs:

- Write a C program to find the sum of any two integers, using function.
- Write C programs that uses both recursive and non-recursive functions:
  a. To find the factorial of a given integer.
  b. To find the GCD (greatest common divisor) of two given integers.

Additional Programs:

- Write a C program to check whether the given number is Armstrong or not? using function
- Write a C program to convert the given decimal number into equivalent binary form.

Pointers and Arrays:

Practice Programs:

- Write a C program to perform different arithmetic operations using pointers.
- Write a C program to swap two numbers using call-by-value and call-by-reference concept.
- Write a C program to find the minimum, maximum and average in an array of integers.
- Write a C program that uses functions to perform the Addition of Two Matrices

Additional Programs:

- Write a C program that uses functions to perform the Multiplication of Two Matrices
- Write a program for display values in reverse order from an array using a pointer.
- Write a C program to read and display array elements using pointers only, and compute the minimum, maximum, and average using pointer operations.

Strings:

Practice Programs:

- Write C programs without using String-Handling functions:
  a. to find the length of a given string
  b. to append one string at end of another string
- 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, etc.) without using string handling functions
- Write a C program that displays the position of a character ch in the string S or – 1 if S doesn't contain ch.
- Write a C program to count the lines, words and characters in a given text.

Additional Programs:

- 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

- Write a C program to find the length of a given string including and excluding spaces using pointers.
- Write a C program to read string from keyboard and display it using character pointer.

Structures:

Practice Programs:

- Write a C program to read and display a student structure with the following data items: student_name, student_rno, student_percentage.
- Write a C program to copy the structure elements from one structure variable to another.
- Write a C program to declare pointer to structure and display the contents of the structure.

Additional Programs:

- Write a C program to find the sum of any two complex numbers using function.
- Write a C program to read and display roll number, full name and date of birth of a student using nested structures.
- Write a C program to create enumerated data type for 12 months. Display their values in integer constants.

Files:

Practice Programs:

- Write a C program to write data to text file and read it.
- Write a C program which copies one file to another, replacing all lowercase characters with their uppercase equivalents and read the result file.

Additional Programs:

- 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) using CLA.
- Write a C program to read and display the contents of an existing file by skipping the first n-characters from the beginning of the file. [Hint: Use fseek() funcion]

Sorting and Searching:

Practice Programs:

- 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.
- Write a C program that uses recursive and non-recursive functions to search for a Key value in a given sorted list of integers using binary search method.
- Write a C program that implements the Bubble sort method to sort a given list of integers in ascending order.

Additional Programs:

- Write a C program that sorts the given array of integers using selection sort in descending order
- Write a C program that sorts the given array of integers using insertion sort in ascending order
- Write a C program that sorts a given array of names.

TEXTBOOKS:

1. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
2. Jeri R. Hanly and Elliot B. Koffman, Problem solving and Program Design in C 7th Edition, Pearson

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. B.A. Forouzan and R.F. Gilberg C Programming and Data Structures, Cengage Learning, (3rd Edition)

Course Outcomes: The candidate is expected to be able to:

1. Develop and Execute C programs using basic input/output, operators, and control flow constructs.
2. Solve real-time problems using loops, user-defined functions, and recursion.
3. Apply pointer, array, string, and structure concepts to build efficient C programs.
4. Implement file operations and command-line arguments to read, write, and manipulate data.
5. Write programs for basic searching and sorting techniques using iterative and recursive logic.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	-	-	3	-	-	-	1	-	1	3	-
CO2	3	3	2	-	3	-	-	-	1	1	2	3	-
CO3	3	3	2	2	3	-	-	-	1	1	2	3	2
CO4	3	2	2	2	3	-	-	-	1	2	2	3	2
CO5	3	3	2	2	3	-	-	-	1	2	2	3	-

(A505504) IT WORKSHOP

B. Tech (ECE): I Semester	L	T	P	C
	0	0	2	1

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
7. and Ken Quamme. – CISCO Press, Pearson Education.
8. IT Essentials PC Hardware and Software Labs and Study Guide Third Edition by Patrick Regan
   – CISCO Press, Pearson Education.

Course Outcomes: The student will learn to

1. Perform Hardware troubleshooting
2. Understand Hardware components and inter dependencies
3. Safeguard computer systems from viruses/worms
4. Document/ Presentation preparation
5. Perform calculations using spreadsheet

CO-PO Mapping:

	PO 1	PO 2	PO 3	PO 4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2	2	2	2	3	2	-	2	1	2	2	2	2
CO2	3	2	2	-	3	2	-	-	1	1	2	3	2
CO3	2	2	-	-	3	3	3	-	1	1	2	2	2
CO4	1	-	-	-	2	-	-	2	3	2	2	-	2
CO5	2	2	2	-	3	-	-	-	2	2	2	3	2

(A500002) ORDINARY DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS
(Common to All)

B.Tech (ECE): II Semester

L	T	P	C
3	0	0	3

UNIT-I: First Order Ordinary Differential Equations
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.

UNIT-II: Ordinary Differential Equations of Higher Order
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.

UNIT-III: Laplace Transforms
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 periodic functions – Inverse Laplace transform by different methods, convolution theorem (without proof). Applications: solving Initial value problems by Laplace Transform method.

UNIT-IV: Vector Differentiation
Vector point functions and scalar point functions – Gradient – Divergence and Curl – Directional derivatives – Vector Identities – Scalar potential functions – Solenoidal and Irrotational vectors.

UNIT-V: Vector Integration
Line, Surface and Volume Integrals. Theorems of Green, Gauss and Stokes (without proofs) and their applications

TEXT BOOKS

1. Higher Engineering Mathematics (36th Edition), B.S. Grewal, Khanna Publishers, 2010.
2. Advanced Engineering Mathematics (5th Edition), R.K. Jain and S.R.K. Iyengar, Narosa Publications, 2016.

REFERENCES

1. Advanced Engineering Mathematics (9th Edition), Erwin Kreyszig, John Wiley & Sons, 2006.
2. Calculus and Analytic geometry (9th Edition), G.B. Thomas and R.L. Finney, Pearson, Reprint, 2002.

COURSE OUTCOMES:
On completion of the course students will be able to

1. Determine whether a given first-order differential equation is exact, linear or Bernoulli's and apply the concepts to model and analyze real-world problems.
2. Solve higher-order differential equations and apply Method of variation of parameters.
3. Utilize Laplace transform techniques for solving ordinary differential equations.
4. Find Gradient, Divergence, Curl and Directional derivatives of vector point functions and scalar point functions
5. Evaluate line, surface, and volume integrals in various coordinate systems. Transform one type of integral into another using the appropriate vector integral theorems.

CO-PO MAPPING

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

(A500009) ENGINEERING CHEMISTRY
(Common to EEE, ECE, CSE, CSM, CSD)

B.Tech (ECE): II Semester

L	T	P	C
3	0	0	3

UNIT - I: Water and its treatment

Introduction - Hardness, types, degree of hardness and units. Estimation of hardness of water by EDTA 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, Electrodialysis.

UNIT - II: Electrochemistry and Corrosion

Introduction - Electrode potential, standard electrode potential, Nernst equation (no derivation), electrochemical cell - Galvanic cell, cell representation, EMF of cell - Numerical problems. Types of electrodes, reference electrodes - Primary reference electrode - Standard Hydrogen Electrode (SHE), Secondary reference electrode - Calomel electrode. Construction, working and determination of p^H of unknown solution using SHE and Calomel electrode.

Corrosion: Introduction- Definition, causes and effects of corrosion - Theories of corrosion, chemical and electrochemical theories of corrosion, Types of corrosion: galvanic, waterline and pitting 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.

UNIT - III: Energy sources

Batteries: Introduction - Classification of batteries - Primary, secondary and reserve batteries with examples. Construction, working and applications of Zn-air 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- Dulong's formula - Numerical problems.

Fossil fuels: Introduction, Classification, Petroleum - Refining of Crude oil, Cracking - Types of cracking - Moving bed catalytic cracking. LPG and CNG composition and uses.

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

Biofuels: Biodiesel.

UNIT - IV: Polymers

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, Buna-S, Nylon-6,6). Differences between thermoplastics and thermosetting plastics, Fiber reinforced plastics (FRP).

Conducting polymers: Definition, Classification with examples - Mechanism of conduction in trans-polyacetylene and applications of conducting polymers.

Biodegradable polymers: Polylactic acid and its applications.

UNIT - V: Advanced Functional Materials

Smart materials: Introduction, Classification with examples - Shape Memory Alloys - Nitinol, Piezoelectric materials - quartz and their engineering applications.

Biosensor - Definition, Amperometric Glucose monitor sensor.

Interpretative spectroscopic applications: UV-Visible spectroscopy for Analysis of pollutants in dye industry, IR spectroscopy in night vision-security, Pollution Under Control - CO sensor (Passive Infrared detection), Raman spectroscopy (application) - Tumour detection in medical applications.

TEXTBOOKS:

3. Engineering Chemistry by J. Saroja, and D. Divya, Skytech Publishing Company, 2025.
4. Engineering Chemistry by P.C. Jain and M. Jain, Dhanpatrai Publishing Company, 2010.
5. Engineering Chemistry by Rama Devi, P. Aparna and Rath, Cengage learning, 2025.

REFERENCE BOOKS:

1. Engineering Chemistry: by Thirumala Chary Laxminarayana & Shashikala, Pearson Publications (2020)
2. Engineering Chemistry by Shashi Chawla, Dhanpatrai and Company (P) Ltd. Delhi 2011.
3. Engineering Chemistry by Shikha Agarwal, Cambridge University Press, Delhi 2015.
4. Engineering Analysis of Smart Material Systems by Donald J. Leo, Wiley, 2007.
5. Challenges and Opportunities in Green Hydrogen by Editors: Paramvir Singh, Avinash Kumar Agarwal, Anupma Thakur, R.K Sinha.
6. Raman Spectroscopy in Human Health and Biomedicine, https://www.worldscientific.com/doi/epdf/10.1142/13094
7. E-Content: https://doi.org/10.1142/13094 | October 2023
8. E-books: https://archive.org/details/EngineeringChemistryByShashiChawla/page/n11/mode/2u

COURSE OUTCOMES:

On completion of the course students will be able to

6. Apply the principles of water chemistry to estimate hardness using EDTA and analyze water treatment processes, including disinfection, defluoridation, softening, and desalination methods.
7. Explain electrochemical concepts, determine electrode potentials, and evaluate corrosion mechanisms; propose appropriate corrosion control techniques for engineering applications.
8. Analyze the working and applications of batteries and fuel cells; evaluate the characteristics, calorific value, and environmental impact of fossil fuels, synthetic fuels, and biofuels.
9. Classify polymers, understand polymerization mechanisms, and examine the properties and engineering applications of plastics, elastomers, conducting polymers, and biodegradable polymers.
10. Identify smart materials, piezoelectric materials, and biosensors; utilize spectroscopic techniques (UV-Vis, IR, Raman) for environmental and biomedical applications.

CO-PO MAPPING

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

(A502202) BASIC ELECTRICAL ENGINEERING
(Common to All)

B.Tech (ECE): II Semester

L	T	P	C
3	0	0	3

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. Time-domain analysis of first-order RL and RC circuits.

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: Ideal and practical transformer, equivalent circuit, losses in transformers, regulation and efficiency. Auto-transformer and three-phase transformer connections.

UNIT-IV:
Electrical Machines: Construction and working principle of dc machine, performance 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. Construction and working of synchronous generator.

UNIT-V:
Electrical Installations: Components of LT Switchgear: Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Earthing. Types of Batteries, Important Characteristics for 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 BOOKS:

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

Course Outcomes: On completion of the course students will be able to

1. Understand and analyze basic concepts of DC Circuits
2. Understand and analyze basic concepts of AC Circuits
3. Discus the technical aspects of transformers
4. Study the working principles of Electrical Machines.
5. Introduce components of Low Voltage Electrical Installations

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1											
CO2											
CO3											
CO4											
CO5											

(A505205) DATA STRUCTURES THROUGH C
(Common to EEE, ECE)

B. Tech (ECE): II Semester

L	T	P	C
3	0	0	3

UNIT – I
Introduction to Data Structures: Basic Terminology, Classification of Data Structures, Abstract data types, selecting a Data Structure,
Linear list – Introduction, singly linked list, Circular Linked Lists, Doubly Linked List.

UNIT – II
Stacks- Operations, Stack Implementation – Arrays & ADT,
Stack applications: Conversion and Evaluation of expressions
Queues- operations, Queue Implementation – Arrays & ADT, Queue Applications.

UNIT – III
Trees: Introduction, Tree – Terminology, Types of Trees, creating a Binary Tree from a General Tree, traversing a Binary Tree,
Binary Search Trees (BST): Introduction, BST Operations- Searching, Insertion and Deletion, BST Applications, Overview of AVL Trees and Red –Black Trees.

UNIT – IV
Hashing and Collision: 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
Searching: Introduction, Linear search and Binary search, Jump Search

UNIT - V
Graphs: Introduction, Types of Graphs, Representation of Graphs, Graph Traversal Algorithms, Applications of Graphs
Sorting: Quick sort, Merge sort, and Radix sort

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

COURSE OUTCOMES:
On completion of the course students will be able to
1. Explain fundamental concepts, terminology, and classifications of data structures, and select appropriate structures for problem-solving. (Unit I)
2. Implement linear data structures (arrays, linked lists, stacks, queues) and apply them to solve computational problems.
3. Design and analyze tree-based structures (binary trees, BSTs, AVL, Red–Black trees) for efficient storage and retrieval.
4. Apply hashing techniques and searching algorithms to optimize data access and collision resolution.
5. Demonstrate graph representations, traversals, and sorting techniques to solve real-world applications.

CO-PO MAPPING

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

(A505206) PYTHON PROGRAMMING

(Common to All)

B. Tech (ECE): II Semester

L	T	P	C
3	0	0	3

UNIT – I

Introduction to Python Programming: History and features of Python, Installation and setup of Python environment, Python interpreter and help utility, Variables, data types, and operators, Input/output operations, Using Python as a calculator, Writing basic Python programs, Control structures: if, if-else, if-elif-else, Looping constructs: for, while, break, continue, String operations and formatting

UNIT – II

Functions, Recursion and Data Structures: Defining and calling functions, Function parameters and return values, Recursion and recursive functions, Lists, tuples, dictionaries: creation and manipulation, List and dictionary operations, Searching and sorting in lists, Detecting and removing duplicates, Working with arrays using NumPy, Set operations and common value detection

UNIT – III

Object-Oriented Programming and Modules: Classes and objects, Attributes and methods, Constructors and destructors, Inheritance and polymorphism, Creating and using modules, Exception handling: try, except, finally, GUI programming using Tkinter, Drawing shapes on canvas: rectangles, points, circles, Adding attributes like color and position

UNIT – IV

File Handling and Text Processing: Reading and writing text files, File operations: open, read, write, append, Merging file contents, Searching for words in files, Word frequency analysis, Counting vowels, spaces, and case letters, Validating email and phone numbers, Removing and replacing words in strings

UNIT – V

Scientific Libraries and Logic Design: Introduction to NumPy, SciPy, and Matplotlib, Installing and exploring NumPy functionalities, Array operations and plotting basics, Implementing digital logic gates: AND, OR, NOT, XOR, Creating GUI windows with labels, text fields, buttons, Event handling in GUI applications, Recursive generation of binary strings

TEXTBOOKS:

1. Python Programming: A Complete Beginners Guide To Python, Nicholas I. Murphy, ISBN-13: 979-8343258240, Publisher: Independently published
2. Python Programming: Using Problem Solving Approach by Reema Thareja, Oxford University Press

REFERENCE BOOKS:

1. Think Python: How to Think Like a Computer Scientist by Allen B. Downey

Course Outcomes: The student will learn to

1. Understand the foundational concepts of Python programming including syntax, data types, operators, control structures, and string manipulation.
2. Apply functions, recursion, and data structures such as lists, tuples, dictionaries, and arrays to solve computational problems efficiently.
3. Implement object-oriented programming principles using Python classes and modules, and develop GUI applications using Tkinter.
4. Perform file handling operations and text processing tasks including reading, writing, searching, and analyzing textual data.
5. Explore scientific libraries such as NumPy, SciPy, and Matplotlib, and design logic-based applications including digital gates and GUI-based tools.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	1	–	2	–	–	–	–	1	–	3	2
CO2	3	3	2	2	2	–	–	–	–	1	–	3	2
CO3	2	2	3	2	3	–	–	–	–	2	1	2	3
CO4	2	2	2	2	3	–	–	–	–	2	–	2	2
CO5	3	3	3	2	3	–	–	–	–	1	1	3	3

(A500503) ENGINEERING CHEMISTRY LABORATORY

(Common to EEE, ECE, CSE, CSM, CSD)

B.Tech (ECE): II Semester

L	T	P	C
0	0	2	1

I. Volumetric Analysis: Estimation of Hardness of water by EDTA Complexometric method.

II. Conductometry:

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

III. Potentiometry:

1. Estimation of concentration of Fe^{+2} ion by Potentiometry using $KMnO_4$.
2. Estimation of concentration of strong acid with strong base by Potentiometry using quinhydrone

IV. p^H Metry: Determination of an acid concentration using p^H meter.

V. Colorimetry: Verification of Lambert-Beer's law using $KMnO_4$.

VI. Preparations:

1. Preparation of Bakelite.
2. Preparation of bioplastic from Starch.

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

VIII. Virtual lab experiments:

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

TEXTBOOKS:

1. Engineering Chemistry Lab manual (1st edition), J. Saroja, and D. Divya, Skytech Publishing Company (2025)
2. Lab manual for Engineering chemistry (1st edition), B. Ramadevi and P. Aparna, S Chand Publications, New Delhi (2022)

REFERENCE BOOKS:

1. Vogel's textbook of practical organic chemistry (5th edition)
2. Inorganic Quantitative Analysis (3rd edition), A.I. Vogel, ELBS Publications.
3. College Practical Chemistry (1st edition), V.K. Ahluwalia, Narosa Publications Ltd. New Delhi (2007).

VIRTUAL LABS LINKS:

1. https://www.vlab.co.in/broad-area-chemical-sciences
2. https://chemcollective.org/
3. https://phet.colorado.edu/en/simulations/filter?subjects=chemistry&type=html
4. https://www.labster.com/discipline/chemistry

COURSE OUTCOMES:

On completion of the course students will be able to

1. Estimate the hardness of water, concentrations of acids, bases, and metal ions using volumetric, conductometric, potentiometric, and p^H metric techniques.
2. Verify Lambert-Beer's law using colorimetric analysis and interpret spectrophotometric data for chemical quantification.
3. Synthesize polymers such as Bakelite and bioplastics from starch and relate their properties to real-world engineering applications in material science.
4. Evaluate the rate of corrosion of mild steel under different environments and assess the effectiveness of corrosion inhibitors.
5. Simulate the functioning of fuel cells, smart materials, batteries, and solar cells through virtual laboratory simulations and assess their engineering applications.

CO-PO MAPPING

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

(A503502) ENGINEERING EXPLORATION AND PRACTICE
(Common to all branches)

B.Tech (ECE): II Semester

L	T	P	C
0	0	2	1

Week-1: Difference between Science and Engineering, Scientist and Engineer needs and wants various disciplines of engineering, some misconceptions of engineering, Expectation for the 21st century engineer. Significance of team work, Importance of communication in engineering profession

Week-2: Engineering Design Process, Need statement to Problem conversion, Pair wise comparison chart, decision matrix, Concepts of reverse engineering

Week-3: Project management tools: Check list, Time line, Gantt chart, Requirement Analysis

Week-4: Basic Components of a Mechanism, Degrees of Freedom or Mobility of a Mechanism, 4 Bar Chain, Crank Rocker Mechanism, Slider Crank Mechanism

Week-5: 3-D Modelling of a Box with two holes and curvature

Week-6: 3-D Modelling of Electronic Enclosure and Assembly of two parts

Week-7: Introduction to various platform – based development, Introduction to basic components, transducers, actuators and sensors, Introduction to Tinker cad

Week-8: Introduction to Arduino, basics of programming

Week-9: Interfacing Arduino with actuators and transducers

Week-10: Interfacing Arduino with Sensors, Liquid Crystal Display (LCD)

Week-11: Assembly and Crafting the Prototype

Week-12: Test and Validate the Prototype, Documentation, Panel Presentation

TEXT BOOKS:

1. Concepts in Engineering Design –2016; by Sumesh Krishnan (Author), Dr. Mukul Shukla, Publisher: Notion Press.
2. Workshop Practice, B. L. Juneja, Cengage, 2016

REFERENCE BOOKS:

1. A Ghosh and A K Malik: Theory of Mechanism and Machine; East West Press (Pvt) Ltd., New Delhi.
2. Arduino Cook book, 2nd Edition by Michael Margolis: O'Reilly Media
3. Introduction to autocad ® 2017 - 2D and 3D design by Bernd S. Palmand Alf Yarwood, Routledge (Taylor and Francis group)
4. Engineering Fundamentals: An Introduction to Engineering (Mind Tap Course List) 5th Edition by Saeed Moaveni
5. Software Project Management (SIE), (Fifth Edition); Bob Hughes, Mike Cotterell, Rajib Mall; Published by Tata McGraw –Hill Education Pvt. Ltd (2011); ISBN10:0071072748ISBN13:9780071072748

COURSE OUTCOMES:

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

1. Explain the importance of engineering profession in the world.
2. Identifymulti-disciplinaryapproachrequiredinsolvinganengineeringproblem
3. Build a mechanism for a given application
4. Createbasic3D models and animations
5. Design a mechatronic system using Mechanical and Electronic components

CO-PO MAPPING:

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

(A502501) BASIC ELECTRICAL ENGINEERING LABORATORY
(Common to All)

B.Tech (ECE): II Semester

L	T	P	C
0	0	2	1

List of experiments/demonstrations:

PART- A (compulsory)

1. Verification of KVL and KCL
2. Verification of Thevenin's and Norton's theorem
3. Transient Response of Series RL and RC circuits for DC excitation
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. Load Test on Single Phase Transformer (Calculate Efficiency and Regulation)
3. Measurement of Active and Reactive Power in a balanced Three-phase circuit
4. Magnetization Characteristics of DC Shunt Generator.

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 BOOKS:

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
5. Engineering", 2nd Edition, McGraw Hill, 2021.
6. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
7. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
8. V. D. Toro, "Electrical Engineering Fundamentals", Prentice Hall India, 1989

Course Outcomes: On completion of the course students will be able to

1. Verify the basic Electrical circuit Laws through different experiments.
2. Analyze the transient responses of R, L and C circuits for DC input.
3. Calculate the Impedance and Current of RL, RC and RLC series Circuits.
4. Evaluate the performance of Electrical Machines through various testing methods.
5. Measure the Active and Reactive Power in a single-phase transformer.

CO-PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1											
CO2											
CO3											
CO4											
CO5											

(A505506) DATA STRUCTURES THROUGH C LABORATORY

B.Tech (ECE): II Semester

L	T	P	C
0	0	2	1

List of Experiments:

Basic Programs:

1. Write a C program to implement the following operations on to a 1D Array:
   a. INSERT b. DELETE c. SEARCH d. TRAVERSE
2. Write a C program to implement Self-referential Structure.
3. Write a C program to Perform Dynamic Memory Allocation.

Linked List:

1. Write a C program to implement Single linked list i) Insertion ii)Deletion iii)Display
2. Write a function to reverse the nodes of a Single linked list

Additional:

1. Write a program that uses functions to perform the following operations on doubly linked list:
   i) Creation ii) Insertion iii) Deletion iv) Traversal
2. Write a program that uses functions to perform the following operations on circular linked list:
   i) Creation ii) Insertion iii) Deletion iv) Traversal

Stacks & Queues:

1. Write a program that implement Stack (its operations) using Arrays
2. Write a program that implement Queue (its operations) using Arrays
3. Write a program that implement Circular Queue (its operations) using Arrays

Additional:

1. Write C programs to implement Stack ADT using Linked List
2. Write C programs to implement Queue ADT using Linked List
3. Write C programs to implement Circular Queue ADT using Linked List

Applications of Stacks:

1. Write a C program to Convert the given Infix Expression to Postfix Expression.
2. Write a C program to Evaluate the given Postfix Expression.

Binary Trees:

1. Write a C program to create a Binary tree with tree traversals:

i) Pre- Order ii) Post –Order iii) In-Order

2. Write a C program to find height of a Binary tree
3. Write a C program to count the number of leaf nodes in a tree

Binary Search Trees:

1. Write a C program to implement Binary search tree i) Insertion ii) deletion iii) Traversals
2. Write a C Program to Check if a Given Binary Tree is an AVL Tree or Not

Additional:

1. Write a C program to implement AVL tree i) Creation ii) Deletion iii) Traversals

Searching & Hashing:

2. Write a C program to implement i) Linear search ii). Binary search
3. Write a C program to implement different hash methods

Additional:

1. Write a C program to implement Separate chaining
2. Write a C program to implement Jump search
3. Write a C program to implement the following collision resolving techniques:

i) Linear Probing ii) Quadratic Probing

Graphs & Sorting:

1. Write a C program for implementing Graph traversal i) DFS
2. Write a C program for implementing Graph traversal i) BFS
3. Write a C program to implement the following sortings:

i. Radix sort ii. Merge sort

Additional:

1. Write a C program to implement the Quick sort

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 BOOK:

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

COURSE OUTCOMES:

On completion of the course students will be able to

1. Apply fundamental programming concepts to implement basic data structures such as arrays, linked lists, stacks, and queues.
2. Demonstrate the ability to design and implement advanced data structures including trees, graphs, and hash tables.
3. Analyze the efficiency of algorithms for searching, sorting, and traversal operations.
4. Develop modular programs using dynamic memory allocation and self-referential structures to solve real-world problems.
5. Evaluate and compare different data structure techniques for problem-solving, ensuring optimal performance and scalability.

CO-PO MAPPING

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

(A505507) PYTHON PROGRAMMING LABORATORY

(Common to All)

B.Tech (ECE): II Semester

L	T	P	C
0	0	2	1

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.
1. Start a Python interpreter and use it as a Calculator.
2. Write a program to calculate compound interest when principal, rate and number of periods are given.
3. Read the name, address, email and phone number of a person through the keyboard and print the details.
4. Print the below triangle using for loop.

   5
   4 4
   3 3 3
   2 2 2 2
   1 1 1 1 1
5. 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)
6. Python program to print all prime numbers in a given interval (use break)
7. Write a program to convert a list and tuple into arrays.
8. Write a program to find common values between two arrays.
9. 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.
10. 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.
11. 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.
12. 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.
13. The wordlist I provided, words.txt, doesn't contain single letter words. So you might want to add "I", "a", and the empty string.
14. 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.
15. Add a comma between the characters. If the given word is 'Apple', it should become 'A,p,p,l,e'
16. Remove the given word in all the places in a string?
17. 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?
18. Writes a recursive function that generates all binary strings of n-bit length
19. Write a python program that defines a matrix and prints
20. Write a python program to perform multiplication of two square matrices
21. 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.
22. Use the structure of exception handling all general-purpose exceptions.
23. 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.
24. Add an attribute named color to your Rectangle objects and modify draw_rectangle so that it uses the color attribute as the fill color.

25. 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.
26. 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.
27. Write a python code to read a phone number and email-id from the user and validate it for correctness.
28. Write a Python code to merge two given file contents into a third file.
29. 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.
30. Write a Python code to Read text from a text file, find the word with most number of occurrences
31. Write a function that reads a file *file1*and displays the number of words, number of vowels, blank spaces, lower case letters and uppercase letters.
32. Import numpy, Plotpy and Scipy and explore their functionalities.
33. Install NumPypackage with pip and explore it.
34. Write a program to implement Digital Logic Gates – AND, OR, NOT, EX-OR
35. 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: The student will learn to

1. Understand and apply basic Python syntax, data types, control structures, and string operations.
2. Develop Python programs using functions, recursion, and data structures like lists, tuples, dictionaries, and arrays.
3. Implement object-oriented programming concepts and GUI applications using Python modules and Tkinter.
4. Perform file handling and text processing operations including reading, writing, searching, and analyzing textual data.
5. Utilize scientific libraries (NumPy, SciPy, Matplotlib) and design logic-based applications including digital gates and GUI tools.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	2	2	2	2	3	2	-	2	1	2	2	2	2
CO2	3	2	2	-	3	2	-	-	1	1	2	3	2
CO3	2	2	-	-	3	3	3	-	1	1	2	2	2
CO4	1	-	-	-	2	-	-	2	3	2	2	-	2
CO5	2	2	2	-	3	-	-	-	2	2	2	3	2

(A500005) NUMERICAL METHODS AND COMPLEX VARIABLES

(Common for EEE and ECE)

B.Tech (ECE): III Semester

L	T	P	C
3	0	0	3

UNIT-I: Fourier series & Fourier Transforms

Fourier series – Dirichlet's Conditions – Half-range Fourier series – Fourier Transforms Definition. Fourier Sine and Cosine transforms (Elementary illustrations)

UNIT-II: Numerical Methods-I

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

UNIT-III: Numerical Methods-II

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

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

UNIT-IV: Complex Differentiation

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

UNIT-V: Complex Integration

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

TEXT BOOKS

1. Higher Engineering Mathematics (36^{th} Edition), B.S. Grewal, Khanna Publishers, 2010.
2. Introductory methods of numerical analysis (4^{th} Edition), S.S. Sastry, PHI, 2005.

REFERENCES

1. Complex Variables, Murray R. Spiegel, Ph.D., Seymour Lipschutz, Ph.D., John J. Schiller, Ph.D., Dennis Spellman, Ph.D., (Schaum's outline)
2. Numerical methods for Scientific and Engineering Computations, M. K. Jain, S.R.K. Iyengar, R.K. Jain, New Age International publishers.

COURSE OUTCOMES:

On completion of the course students will be able to

1. **Express** any periodic function in terms of sine and cosine using Fourier series representation.
2. **Determine** the roots of polynomial and transcendental equations, and **estimate** values for given data using interpolation techniques.
3. **Obtain** numerical solutions for a given first-order ordinary differential equation.
4. **Analyze** complex functions for analyticity and perform differentiation
5. Perform integration using Cauchy's integral and residue theorems.

CO-PO MAPPING

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

(A502204) NETWORK ANALYSIS AND SYNTHESIS

B.Tech (ECE): III Semester

L	T	P	C
2	0	0	2

UNIT - I

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

UNIT - II

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

UNIT - III

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

UNIT-IV

Filters: Classification of Filters, Filter Networks, Constant-K Filters-Low pass, high pass, Band pass, band-stop filters, M-derived Filters- T and π filters- Low pass, high pass Attenuators: Types – T, π , L, Bridge T and lattice ,Asymmetrical Attenuators T, π , L Equalizers- Types- Series, Shunt, Constant resistance, bridge T attenuation, bridge T phase, Lattice attenuation, lattice Phase equalizers

UNIT –V

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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

COURSE OUTCOMES: Upon successful completion of the course, students will be able to:

1. Gain the knowledge on basic RLC circuit's behaviour.
2. Analyse the Steady state and transient analysis of RLC Circuits.
3. Characterization of two port network parameters.
4. Analyse the Design aspect of various filters and attenuators.
5. Analyse and Synthesise different network functions

CO-PO MAPPING

			PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1													
CO2													
CO3													
CO4													
CO5													

(A504201) ELECTRONIC DEVICES AND CIRCUITS

B.Tech (ECE): III Semester

L	T	P	C
3	0	0	3

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.

TEXTBOOKS:

1. Millman, Jacob, and Christos C. Halkias. Electronic Devices and Circuits. Tata McGraw-Hill, 1991.
2. Boylestad, Robert L., and Louis Nashelsky. Electronic Devices and Circuit Theory. Pearson, 11th ed., 2013.
3. Sedra, Adel S., and Kenneth C. Smith. Microelectronic Circuits. Oxford University Press, 7th ed., 2014.

REFERENCE BOOKS:

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

COURSE OUTCOMES:

On completion of the course students will be able to

1. Analyze the characteristics of semiconductor diodes and apply them in rectifier clippers and clipping circuits.
2. Evaluate the operation and configurations of Bipolar Junction Transistors (BJTs) and analyze their input and output characteristics.
3. Design appropriate biasing networks for BJTs and determine the operating point for amplifier applications.
4. Analyze transistor amplifier circuits using h-parameter models and assess performance for various

configurations.

5. Analyze the structure, working, and characteristics of JFETs, MOSFETs, and advanced devices like FinFETs and CNTFETs, and compare modern device technologies

CO-PO Mapping:

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

(A504301) PROBABILITY THEORY AND STOCHASTIC PROCESSES

B.Tech (ECE): III Semester

L	T	P	C
3	0	0	3

UNIT-I:

Probability: Probability introduced through Sets and Relative Frequency: Experiments and Sample Spaces, Discrete and Continuous Sample Spaces, Events, Probability Definitions and Axioms, Joint Probability, Conditional Probability, Total Probability, Bay's Theorem, Independent Events.

Random Variables- Definition, Conditions for a Function to be a Random Variable, Discrete, Continuous and Mixed Random Variable, Distribution and Density functions, Properties, Binomial, Poisson, Uniform, Gaussian, Exponential, Rayleigh, Methods of defining Conditioning Event, Conditional Distribution, Conditional Density and their Properties.

UNIT-II:

Operations on single Random Variable

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

UNIT-III:

Multiple random variables and Operations on Multiple random variables: Vector Random Variables, Joint Distribution Function and its Properties, Marginal Distribution Functions, Conditional Distribution and Density– Point and Interval conditioning, Statistical Independence, Sum of Two and more Random Variables, Central Limit Theorem, Equal and Unequal Distribution (Proof not expected).

Expected Value of a Function of Random Variables- Joint Moments about the Origin, Joint Central Moments, Joint Characteristic Functions, Jointly Gaussian Random Variables: Two Random Variables case, N Random Variable case, Properties, Transformations of Multiple Random Variables, Linear Transformations of Gaussian Random Variables.

UNIT-IV:

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

UNIT-V:

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

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

Text Books:

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

Reference Books:

1. P Ramesh Babu - Probability Theory and Random Processes – McGraw Hill Education
2. Athanasios Papoulis and S. Unnikrishna Pillai - Probability, Random Variables and Stochastic Processes – McGraw Hill Education, 4th Edition
3. K. N. Hari Bhat, K. Anitha Sheela and Jayant Ganguly - Probability Theory and Stochastic Processes for Engineers - Pearson, 1st Edition, 2011

4. Taub and Schilling - Principles of Communication systems by (TMH), 2008
5. Y Mallikarjuna Reddy - Probability Theory and Stochastic Processes, 4th Edition, University Press

Course Outcomes:

After completion of the course students will be able to

1. Understand Fundamental concepts of probability and theorems.
2. Perform operations on single Random variables.
3. Perform operations on multiple Random variables.
4. Determine the Spectral characteristics of Random Signals.
5. Determine the Temporal characteristics of Random Signals and understand the concepts of Noise and information theory in Communication systems.

CO-PO Mapping:

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

(A504302) SIGNALS AND SYSTEMS

B.Tech (ECE): III Semester

L	T	P	C
3	0	0	3

UNIT - I

Signal Analysis

Analogy between Vectors and Signals, Orthogonal Signal Space, Signal approximation using Orthogonal functions, Mean Square Error, Closed or complete set of Orthogonal functions, Orthogonality in Complex functions, Classification of Signals and systems, Exponential and Sinusoidal signals, Concepts of Impulse function, Unit Step function, Signum function.

UNIT - II

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

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

UNIT - III

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

UNIT - IV

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

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

UNIT - V

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

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

TEXT BOOKS

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

REFERENCE BOOKS

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

Pearson, Prentice Hall.
5. Signals and Systems - A. Anand Kumar, PHI Publications, 3 Ed., 2013

Course Outcomes:
Upon the completion of the course the student will be able to

1. Analyze and classify signals and systems using orthogonally and standard signal functions.
2. Apply Fourier series and transforms to represent and interpret signals in time and frequency domains.
3. Evaluate signal behavior through linear systems using convolution, transfer functions, and filtering.
4. Use Laplace transforms and correlation to analyze system responses and detect signals in noise.
5. Implement sampling and Z-transform techniques for discrete-time signal analysis and reconstruction

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	P09	PO10	PO11
CO1	3	2	–	–	2	–	–	–	–	–	2
CO2	3	3	–	2	3	–	–	–	–	–	2
CO3	3	3	2	2	3	–	–	–	–	–	2
CO4	3	3	–	3	3	–	–	–	–	–	2
CO5	3	2	–	2	3	–	–	–	–	–	3

(A504303) ELECTROMAGNETIC FIELDS AND TRANSMISSION LINES

B.Tech (ECE): III Semester

L	T	P	C
3	0	0	3

UNIT – I

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

UNIT – II

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

UNIT – III

Maxwell's Equations (Time Varying Fields): Faraday's Law, Transformer and Motional EMF, Inconsistency in Ampere's Law and Displacement Current Density, Maxwell's Equations in Differential, Integral and Phasor form.

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

UNIT – IV

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

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

UNIT – V

Transmission Lines: Types, Parameters, Transmission Line Equations, Primary & Secondary Constants, Expressions for Characteristic Impedance, Propagation Constant, Phase and Group Velocities, Infinite Line Concepts, Lossless Lines, Types of Distortions, condition for Distortion less transmission lines, Minimum Attenuation, Loading – Types of Loading, Input Impedance, SC and OC Lines, Reflection Coefficient, VSWR, Impedance Transformations - $\lambda/4$, $\lambda/2$, $\lambda/8$ Lines, Smith Chart- Configuration and Applications, Single Stub Matching.

TEXT BOOKS:

1. Matthew N.O. sadiku and S.V. Kulkarni - Principles of Electromagnetics, 4th Ed., Oxford University Press, Aisan Edition, 2015.
2. Umesh Sinha, Satya Prakashan -Transmission Lines and Networks, (Tech. India Publications), New Delhi, 2001.

REFERENCE BOOKS:

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

Course Outcomes

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

1. Explain the concepts of electrostatics using vector calculus and coordinate systems.
2. Explain the magnetic field intensity using Biot-Savart's law and Ampere's law.
3. Explain the concepts of Time varying fields using Maxwell's Equations.
4. Analyze the characteristics of electromagnetic waves and describe Poynting theorem.
5. Summarize the various characteristics of transmission line and applications of Smith chart.

CO-PO MAPPING:

.

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

(A500501) COMPUTATIONAL MATHEMATICS LABORATORY
(Using Python software)
(Common for All Branches)

B. Tech (ECE): III Semester

L	T	P	C
0	0	2	1

Visualize all solutions graphically through programs

Programs:

UNIT-I: Eigen values and Eigenvectors:

WEEK 1

Write a program to find solution of system of homogenous linear equations (trivial and non-trivial)

WEEK 2

Write a program to find solution of system of non-homogenous linear equation (unique and infinite)

WEEK 3

Write a program to obtain the eigen values and eigen vectors for dynamically generated matrix

Write a program to obtain matrix from quadratic form and orthogonalize the matrix

WEEK 4&5

UNIT-II: Solution of Algebraic and Transcendental Equations

Write a program to find real root of a given algebraic/transcendental equation using Bisection method.

WEEK 6&7

Write a program to find real root of a given algebraic/transcendental equation using Newton Raphson Method**.**

UNIT-III: Linear system of equations:

Jacobi's iteration method and Gauss-Seidal iteration method

WEEK 8

Write a program to find solution of given system of linear equations using Jacobi's method

WEEK 9

Write a program to find solution of given system of linear equations using Gauss-Seidal method.

UNIT-IV: First-Order ODEs

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

WEEK 10

Write a program to solve exact and non-exact equations

WEEK 11

Write a program to solve Newton's law of cooling problems and exponential growth/decay

UNIT-V: Higher order linear differential equations with constant coefficients

WEEK 12

Write a program to solve homogeneous ODEs

Write a program to solve non-homogeneous ODEs

WEEK 13

Write a program to solve Partial Derivatives and Jacobian of several variables

WEEK 14

Write a program for finding Maxima and Minima of functions of two variables

TEXT BOOKS

1. The fundamentals of Python: First Programs, Kenneth A. Lambert, Cengage Learnings, 2011.
2. Think Python First Edition, by Allen B. Downey, Orielly publishing.

REFERENCES

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

COURSE OUTCOMES:

On completion of the course students will be able to

1. Develop Python programs to compute the eigenvalues and eigenvectors of a matrix.
2. Implement Python code to solve algebraic and transcendental equations, as well as systems of linear equations.
3. Write Python programs to obtain solutions for first-order ordinary differential equations and higher-order linear differential equations with constant coefficients.
4. Develop Python code to solve partial differential equations
5. Determine maxima and minima of functions.

CO-PO MAPPING

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

(A504501) MODELLING AND SIMULATION LABORATORY

B. Tech (ECE): III Semester

L	T	P	C
0	0	2	1

Note:

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

List of Experiments:

Signals and Systems (Minimum 7 Experiments)

1. Write the code / script for generating various standard viz: Periodic and Aperiodic, Unit Impulse, Unit Step, Square, Saw tooth, Triangular, Sinusoidal, Ramp, Sinc and Nonstandard Signals and Sequences generated from these standard signals /sequences using Waveform synthesis. Also for perform different operations viz: Addition, Multiplication, Scaling, Shifting, Folding, Computation of Energy and Average Power on them.
2. Write the code / script for finding the Even and Odd parts of Signal / Sequence and Real and Imaginary parts of Signal.
3. Write the code / script for finding the output of a System for a given input and Impulse Response and finding Auto Correlation and Cross Correlation of Signals / sequences
4. Write the code / script for Verifying whether a given Continuous/Discrete System is Linear, Time Invariant, Stable and Physically Realizable
5. Write the code / script for obtaining Sinusoidal response and Impulse response of a given Continuous / Discrete LTI System.
    a) Plot the Real and Imaginary part and
    b) Magnitude and Phase Plot of the response
6. Write the code / script for finding and plotting the Magnitude and Phase Spectrum of any given Signal by finding its Fourier Transform by using the properties where ever required.
7. Write the code / script for finding and plotting the Magnitude and Phase Spectrum of any given Signal by finding its Laplace Transform by using the properties where ever required. Also plot pole-zero diagram in S-plane
8. Write the code/ script for finding and plotting the Magnitude and Phase Spectrum of any given Sequence by finding its Z-Transform by using the properties wherever required. Also plot pole – zero diagram in Z-plane
9. Design a Simulink or equivalent model for
    a) Solving Differential Equations
    b) Finding the response of any RLC Circuit with different initial Conditions for AC and DC inputs and plot the corresponding responses
10. Gibbs Phenomenon and waveform synthesis

Probability Theory and Stochastic Processes (Minimum 3 Experiments)

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

Control Systems (Minimum 2 Experiments)

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

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

Application on Real Time signals

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

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

2. Sampling of Speech Signals

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

Course Outcomes:

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

1. Generate, manipulate, and analyze standard and nonstandard signals/sequences, and compute their characteristics using programming and waveform synthesis.
2. Determine and verify system properties, responses, and spectral characteristics using Fourier, Laplace, and Z-transform techniques.
3. Design and simulate models for system analysis in both time and frequency domains using computational tools such as MATLAB/Simulink.
4. Apply statistical and stochastic methods for noise analysis, random process generation, and signal extraction in noisy environments.
5. Implement and analyze control system models, evaluate controllability/observability, and design controllers for practical engineering applications.

CO-PO mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	–	2	3	–	–	–	–	–	2	3
CO2	3	3	–	3	3	–	–	–	–	–	2	3
CO3	3	3	3	3	3	–	–	–	–	–	2	3
CO4	3	3	–	3	3	–	–	–	–	–	2	3
CO5	3	3	3	3	3	–	–	–	–	–	2	3

(A504502) ELECTRONIC DEVICES AND CIRCUITS LABORATORY

B.Tech (ECE): III Semester

L	T	P	C
0	0	2	1

List of Experiments:

A. Hardware-Based Experiments (7):

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

B. Software-Based Simulation Experiments (7):

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

Hardware Requirements:

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

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

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

Course outcomes:

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

1. Analyze the I–V characteristics of semiconductor devices such as diodes, BJTs, and FETs.

2. Design and the evaluate performance parameters for basic rectifier, clipper, clamper, and voltage regulation circuits.
3. Demonstrate biasing techniques for BJTs and determine their operating point using DC load line analysis.
4. Design and analyze transistor amplifier circuits in various configurations.
5. Simulate and interpret electronic circuits using appropriate simulation tools.

CO-PO Mapping:

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

(A504701) LINUX AND SHELL SCRIPTING

B.Tech (ECE): III Semester

L	T	P	C
0	0	2	1

Week 1: Introduction to OS Concepts
Lab Activity: Linux History, Open source software basics & Licenses, Why Linux vs windows Identify system and application software on your PC. Differentiate their roles and explain basic OS functions.

Week 2: Linux Architecture & Kernel Types
Lab Activity: Compare Monolithic and Microkernel architectures using diagrams. Discuss how Linux's structure supports device-level control.

Week 3: Installing Linux (Ubuntu/CentOS)
Lab Activity: Install Linux using Virtual Box or WSL. Document each installation step and troubleshoot any permission or hardware issues.

Week 4: Linux File system & Navigation
Lab Activity: Navigate key directories like /home, /etc, and /var. Create folder structures for a team project.

Week 5: File Permissions & Ownership
Lab Activity: Set permissions on project folders so only group members can access/edit them. Verify permissions using multiple users.

Week 6: User and Group Management
Lab Activity: Create users and groups for a coding team. Set up shared access using group permissions and configure hidden config files.

Week 7: Process Management
Lab Activity: Identify and terminate frozen or unresponsive processes during compilation using commands like ps and top.

Week 8: Process Priorities & Memory Tools
Lab Activity: Adjust priority of background jobs using nice and monitor system memory usage with vmstat and free. Display information about the processes using top and kill the applications/processes with the task id

Week 9: Shell Scripting Basics
Use Case: System Info Script for Lab Login
Lab Activity: Create a shell script that automatically displays system uptime, current date/time, available disk space, and active users each time a lab user logs in. Use variables and echo statements to present the information in a readable format.

Week 10: Loops, Functions, and Cron Jobs
Use Case: Automated Backup Scheduler for Project Folders
Lab Activity: Write a shell script that loops through all user folders in /home and backs them up to a predefined backup location. Add functions for logging success/failure. Schedule it to run daily at 2 AM using cron. Handle missing folders gracefully.

Week 11: Package Management & Archiving
Use Case: Setting Up Developer Environment + Archiving a Project
Lab Activity: Use apt (Ubuntu) or yum (CentOS) to install essential tools like vim, curl, or git. Archive a project directory using tar or zip. Use sha256sum to verify archive integrity before transferring it to another system. Installation of applications using apt, apt-get, yum, dnf, snap, or brew commands. Setup python virtual environment.

Week 12: Text Processing & Networking Utilities
Use Case: Security Log Analysis & Network Check After Intrusion Alert
Lab Activity: Analyze /var/log/auth.log or /var/log/secure to detect failed login attempts using grep, awk, cut, and sort. Use ping, trace route, net stat, nbtstat, arp and scp to check remote system connectivity and transfer reports securely. Concepts of Linux clusters, Virtual machines (virtual box in chapter 3), creating VMs, allocating

resources, interconnection between VMs, Containers concepts

Week 13: Service Management & Disk Mounting
Use Case: Adding Extra Storage without Reboot
Lab Activity: Create a new virtual disk in Virtual Box. Partition and format it. Mount it to /mnt/data and ensure it auto-mounts on reboot. Enable a required service (like ssh or apache2) using system ctl and check its status.

Week 14: Backup & Recovery
Use Case: Disaster Recovery after Accidental Deletion
Lab Activity: Use a backup script to create a backup of critical folders. Simulate file deletion and restore them using your backup. Analyze /var/log/syslog or equivalent to trace user activity that led to the issue.

Week 15: Mini Project – Tool Development
Use Case: Custom Shell Tool for New Employee Onboarding or Admin Task
Lab Activity:
Develop a complete shell-based tool. Examples:
- A user account creation wizard for new employees
- A disk usage monitoring alert system
- A log cleaner tool that archives and clears logs weekly Include user prompts, help menu, error checks, and logging features.

Week 16: Final Demo & Viva
Use Case: Present Your Solution to the Faculty Team
Lab Activity:
Demonstrate your mini project. Explain your code, how it solves the problem, test cases handled, and improvements you'd make. Submit your code with screenshots, logs, and a short user manual or README

Course outcomes:
At the end of the course the student will be able to

1. Understand Linux system structure, OS architecture, and command-line environment.
2. Perform Linux installation and basic administration including file, user, and permission management.
3. Develop shell scripts to automate tasks such as backups, monitoring, and data processing.
4. Use Linux tools for software management, networking, and service configuration.
5. Implement backup, recovery, and basic troubleshooting techniques through practical labs.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1											
CO2											
CO3											
CO4											
CO5											

(A502205) CONTROL SYSTEMS ENGINEERING

B.Tech (ECE): IV Semester

L	T	P	C
2	0	0	2

UNIT - I:
Control System fundamentals: Classification of Control systems, open and closed loop systems. Mathematical modelling of mechanical systems and their conversion into electrical systems. Block diagram reduction and signal flow graphs

UNIT - II:
Time-Domain Analysis with Input-Output Models: Time response of first and second order systems for standard test inputs. Analysis of standard Second order systems with step input, Types of System, Error Analysis for Linear time Invariant Systems, Design specifications for second-order systems based on the time response. Concept of Stability: Routh-Hurwitz Criteria. Relative Stability analysis, Root-Locus technique: Construction of Root-loci.

UNIT - III:
Frequency Domain Analysis: Introduction to frequency response, Relationship between time and frequency response, Concept of Bode plots and construction. Polar plots, Nyquist stability criterion. Relative stability using Nyquist criterion – gain and phase margin

UNT - IV:
Classical Controllers and Compensators: Proportional, Integral and Derivative Controllers- PI, PD and PID controllers, Lead, Lag and Lead-Lag compensators (elementary treatment only).

UNT - V:
State Variable Analysis: Concept of State, State variables and State model. State Representation, Transformation of State variables, Solution of state equations and Complete response of the Systems. Concept of controllability and observability.

TEXT BOOKS:

1. I. J. Nagrath and M. Gopal, “Control Systems Engineering”, New Age International, 2009.
2. B. C. Kuo, “Automatic Control System”, Prentice Hall, 1995.
2. Norman S Nise, “Control Systems Engineering”, Wiley, 2019 8th Edition.

REFERENCE BOOKS:

1. K. Ogata, “Modern Control Engineering”, Prentice Hall, 199 1.
2. K. R. Varmah, “Control Systems”, McGraw Hill Education, 2010.

COURSE OUTCOMES:
After completion of the course student will be able to
1. Find the transfer function and state-space representation of linear time-invariant dynamical systems.
2. Analyze the performance and stability of linear time-invariant systems in both time and frequency domains.
3. Study classical controllers/compensators to improve the performance and stability of linear time invariants systems.

CO-PO MAPPING

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

(A504304) DIGITAL LOGIC DESIGN

B.Tech (ECE): IV Semester

L	T	P	C
2	0	0	2

UNIT I:

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

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

UNIT II:

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

UNIT III:

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

UNIT IV:

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

UNIT V:

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

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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

Course Outcomes: After completion of the course student will be able to

1. Apply Boolean algebra and minimization techniques to simplify Boolean functions.
2. Design combinational circuits using logic gates.
3. Analyze latches and flip-flops to design sequential logic circuits.
4. Construct synchronous sequential circuits combining flip-flops and logic gates.
5. Utilize programmable logic devices in digital system design

CO-PO Mapping:

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

(A504305) ANALOG AND DIGITAL COMMUNICATIONS

B.Tech (ECE): IV Semester

L	T	P	C
3	0	0	3

UNIT - I

Amplitude Modulation

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

Angle Modulation

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

UNIT - II

Transmitters & Receivers

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

Pulse Modulation

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

UNIT - III

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

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

UNIT - IV

Digital Modulation Techniques:

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

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

UNIT - V

Information theory**:** Entropy, Information rate, Mutual information, Channel capacity of discrete channel, Shannon-Hartley law; Trade-off between bandwidth and SNR.

Source coding - Huffman coding, Shannon Fano coding, Channel coding- Linear block codes and cyclic codes.

TEXT BOOKS:

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

REFERENCE BOOKS:

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

Course Outcomes:

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

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

CO-PO Mapping:

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

(A504306) ELECTRONIC CIRCUIT ANALYSIS

B.Tech (ECE): IV Semester

L	T	P	C
3	0	0	3

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: Conductances 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.

Textbooks

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

Reference Books

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

Course Outcomes

At the end Students shall be able to:

1. Analyze multistage amplifiers and apply the hybrid-π transistor model to evaluate high-frequency behaviour of common-emitter amplifiers
2. Examine feedback amplifier types and assess the influence of negative feedback on gain stability, bandwidth, and distortion
3. Design and analyze LC, RC, and crystal oscillators based on the Barkhausen criterion to generate sinusoidal waveforms.
4. Design the power amplifiers and evaluate their performance in terms of efficiency, distortion, and waveform generation.

5. Design Multivibrators and Schmitt trigger circuits and evaluate their performance in terms of efficiency, distortion, and waveform generation.

CO-PO Mapping:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	2	1	1					1	3
CO2	3	3	3	2	1						1	3
CO3	3	3	3	2	1						1	3
CO4	3	3	3	2	1						1	3
CO5	3	3	3	2	1	1					1	3

(A504307) LINEAR AND DIGITAL IC APPLICATIONS

B.Tech (ECE): IV Semester

L	T	P	C
3	0	0	3

UNIT - I

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

UNIT - II

Op-Amp, IC-555 & IC565 Applications: Introduction to Active Filters, Characteristics of Bandpass, Bandreject and All Pass Filters, Analysis of 1st order LPF & HPF Butterworth Filters, Waveform Generators – Triangular, Sawtooth, Square Wave, IC555 Timer-Functional Diagram, Monostable and Astable Operations, Applications, IC565 PLL-Block Schematic, principle and Applications.

UNIT - III

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

UNIT - IV

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

UNIT - V

Sequential Logic IC's and Memories: Familiarity with commonly available 74XX & CMOS40XX Series ICs - All Types of Flip-flops, Synchronous Counters, Decade Counters, Shift Registers.

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

TEXT BOOKS:

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

REFERENCE BOOKS:

1. D. Roy Chowdhury – Linear Integrated Circuits, New Age International(p)Ltd,2nd Ed., 2003.
2. John. F. Wakerly – Digital Design Principles and Practices, 3rdEd., Pearson, ,2009.
3. Salivahana -Linear Integrated Circuits and Applications, TMH, 2008.
4. William D.Stanley- Operational Amplifiers with Linear Integrated Circuits, 4thEd., Pearson Education India, 2009.

COURSE OUTCOMES

Upon successful completion of the course, students will be able to:

1. A thorough understanding of operational amplifiers with linear integrated circuits.
2. Attain the knowledge of functional diagrams and design applications of IC555 and IC565.
3. Acquire the knowledge and design the Data converters.
4. Choose the proper Combinational digital integrated circuits by knowing their characteristics.
5. Choose the proper Sequential digital integrated circuits by knowing their characteristic

CO-PO Mapping:

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

(A500507) SOCIAL INNOVATION AND ENTREPRENEURSHIP
(Common to all branches)

B.Tech(ECE) II Semester

L	T	P	C
0	1	2	2

Week-1
Identify community issues to be addressed, Requirements Analysis: Extensive User requirements analysis, Generating effective System Requirement document
Week-2
Introduction to Innovation & Entrepreneurship, Innovation vs. Invention vs. Creativity, Types of Entrepreneurs (Tech, Social, Green)
Week-3
Social Innovation – Case Studies, Impact of Social Innovation on communities
Week-4
Process of Social Innovation Prompts – identifying needs, Proposals –generating ideas, Prototyping – testing the idea in practice,
Week-5
Sustaining-developing a business model, Scaling and diffusion-growing social innovations, Systematic change
Week-6
Introduction to sustainability, Sustainability leadership, Life cycle assessment, Carbon foot print calculation
Week-7
Business Model & Start-Up Ecosystem Elements of a business model (Canvas model)
Week-8
Identify and map global competitors, review industry trends, and understand market sizing: TAM, SAM, and SOM. Assessing scope and potential scale for the opportunity
Week-9
Types of Start-Ups, Market analysis and feasibility Minimum Viable Product (MVP), Market risks and Marketing strategies, legal aspects in startup, National Innovation Startup Policy (NISP) and its features
Week-10
Government schemes for startups (Startup India, Atal Innovation Mission) Incubators, accelerators
Week-11
Financial planning, budgeting, and cost estimation for the Business model
Week-12
Funding options: Bootstrapping, Angel investors, venture pitching readiness, Documentation, Panel Presentation

TEXT BOOKS:

1. "Innovation and Entrepreneurship" by Peter F.Drucker
2. "Entrepreneurship Development" by S.S.Khanka
3. "Design Thinking" by Tim Brown

REFERENCE BOOKS:

1. AICTE Innovation Cell & Startup India Toolkit
2. Social Enterprise Law: Trust, Public Benefit and Capital Markets By Dana Brakman Reiser & Steven A. Dean
3. Introduction to Sustainability by Robert Brinkmann, Wiley-Blackwell

Course Outcomes:
On the completion of the course, the student will be able to:

1. Understand the fundamentals of innovation, creativity, and entrepreneurs
2. Develop innovative solutions to the community issues
3. Assess market competition, estimate market size, and develop a prototype.
4. Develop a scalable business model
5. Analyze Business and financial planning models and Go-to-Market strategies

CO-PO MAPPING

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

(A504503) DIGITAL LOGIC DESIGN LABORATORY

B.Tech (ECE): IV Semester

L	T	P	C
0	0	2	1

List of Experiments

A. Realization in Hardware Laboratory (Using Logic ICs)

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

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

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

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

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

Required Hardware (for Hardware Lab Experiments)

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

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

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

Course Outcomes:

On completion of the course students will be able to

1. Analyze and simplify Boolean expressions and implement them using logic gates and ICs.
2. Design and realize combinational and sequential logic circuits using logic gate hardware.
3. Model digital systems in Verilog HDL using dataflow, behavioral, and structural styles.
4. Simulate and verify digital designs using industry-standard EDA tools and testbenches.
5. Build modular and hierarchical designs such as counters, FSMs, and shift registers.

CO-PO Mapping:

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

(A504505) ANALOG AND DIGITAL COMMUNICATIONS LABORATORY

B.Tech (ECE): IV Semester

L	T	P	C
0	0	2	1

Note:

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

List of Experiments:

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

Course Outcomes:

On completion of the course students will be able to

1. Design and implement various Analog modulation and demodulation Techniques and observe the time and frequency domain characteristics of these modulated Signals
2. Design and implement various Pulse modulation and demodulation Techniques and observe the time and frequency domain characteristics of these modulated Signals
3. Understand the concept of aliasing and different types of Sampling with various Sampling rates and duty Cycles by implementing practically
4. Design and implement various Digital modulation and demodulation Techniques and observe the waveforms of these modulated Signals practically
5. Demonstrate the Frequency Division Multiplexing & De multiplexing

CO-PO Mapping

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

(A504506) ELECTRONIC CIRCUIT ANALYSIS LABORATORY

B.Tech (ECE): IV Semester

L	T	P	C
0	0	2	1

A. Hardware Experiments (7):

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

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

B. Software Simulations (7):

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

1. Simulate four feedback amplifier topologies and compare their frequency responses with and without feedback.
2. Simulate a monostable multivibrator and analyze its input/output waveforms.
3. Simulate a Schmitt trigger for gain values greater than and less than one and analyze response behaviour.
4. Simulate a bootstrap time base generator using BJT and observe the output sweep waveform.
5. Simulate a Miller sweep circuit using BJT and observe the time base output waveform.
6. Simulate a complementary symmetry push-pull amplifier and verify elimination of crossover distortion.
7. Simulate a single tuned amplifier and determine the quality factor (Q) of its tuned circuit.

Software Requirements:

Simulation Tools: PSpice / NI Multisim Live or equivalent

Operating System: Windows 7/10/11

Hardware Requirements:

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

COURSE OUTCOMES:

On completion of the course students will be able to

1. Design and analyze multistage and power amplifiers and evaluate their frequency response and efficiency.
2. Implement and examine feedback and oscillator circuits and validate theoretical conditions for sustained oscillations.
3. Develop and interpret waveform generation circuits such as multivibrators and time base generators.

4. Perform simulations to validate analog circuit performance using industry-standard software tools.
5. Correlate practical results with theoretical predictions and identify deviations due to real-world constraints.

CO-PO Mapping:

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

(A504507) LINEAR AND DIGITAL IC APPLICATIONS LABORATORY

B.Tech (ECE): IV Semester

L	T	P	C
0	0	2	1

Note:

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

List of Experiments:

1. Design an Inverting and Non-Inverting Amplifier using Op Amp and calculate gain.
2. Design Adder and Subtractor using Op Amp and verify addition and subtraction process.
3. Design a Comparator using Op Amp and draw the comparison results of A=B, A<B, A>B.
4. Design an Integrator and Differentiator Circuits using IC741 and derive the required condition practically.
5. Design an Active LPF, HPF cutoff frequency of 2 KHZ and find the roll off of it.
6. Design a Circuit using IC741 to generate sine/square/triangular wave with period of 1KHZ anddraw the output waveform.
7. Construct Mono-stableMultivibratorusingIC555 and draw its output waveform.
8. Construct Astable Multivibrator using IC555 and draw its output waveform and also find its dutycycle.
9. Design a Schmitt Trigger Circuit and find its LTP and UTP.
10. Design Weighted register DAC and find its resolution and write a truth table with respective voltages.
11. Design VoltageRegulatorusingIC723, IC 7805/7809/7912 and find its load regulation factor.
12. Design R-2R ladder DAC and find its resolution and write a truth table with respective voltages.
13. Design Parallel comparator type/ counter type/ successive approximation ADC and find itsefficiency.
14. Design BCD to 7- Segment Converter and verify its truth table.
15. Verify the functionality of JK Master - Slave flipflop (74LS73).
16. Design a 8x1 multiplexer using digital ICs.
17. Design a Decade counter and verify its truth table and draw respective waveforms.
18. Design a Up/down counter usingIC74163 and draw read/write waveforms.
19. Design a Universal shift register using IC 74194/195 and verify its shifting operation.
20. Design a 16x4 RAM using 74189 and draw its read/write operation.
21. Design a 8x3 encoder/3x8 decoder and verify its truth table.

COURSE OUTCOMES

On completion of the course students will be able to

1. Design and implementation of various analog circuits using 741 ICs.
2. Design and implementation of various Multivibrators using 555 timer.
3. Design and implement various Cominational circuits using digital ICs.
4. Design and implement various Sequential circuits using digital ICs
5. Design and implement ADC, DAC and voltage regulators

CO PO MAPPING

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	1	0	3	3	3	-	-	-	3	3	
CO2	1	0	3	3	3	-	-	-	3	3	
CO3	1	0	3	3	3	-	-	-	3	3	
CO4	1	0	3	3	3	-	-	-	3	3	
CO5	1	0	3	3	3	-	-	-	3	3	

(A504702) WEB AND MOBILE APPLICATIONS

B.Tech (ECE): IV Semester

L	T	P	C
0	0	2	1

Week-by-Week Syllabus

Week 1: Introduction to the Web

Understand web architecture, clients, servers, and workflows. Explore an existing website's structure and elements using browser DevTools.

Week 2: HTML Basics

Learn about different markup languages and their significance. Create a homepage for a static site using paragraphs, headings, lists, links, and images.

Week 3: CSS – Layout & Design Foundations

Apply colors, spacing, and layouts using CSS. Practice Flexbox and Grid techniques by cloning a simple website layout.

Week 4: Introduction to JavaScript

Understand the Document Object Model (DOM) and basic JavaScript constructs. Add interactivity to a webpage with a 'Contact Us' form that dynamically displays/hides details.

Week 5: Combining HTML, CSS, and JavaScript

Integrate skills from previous weeks to start building a personal portfolio website.

Week 6: Responsive Design using Bootstrap

Make your site adapt to different screen sizes (mobile, tablet, desktop) using Bootstrap's grid system and components.

Week 7: Deployment using GitHub

Learn version control basics with Git and GitHub. Publish your portfolio online via GitHub Pages and collaborate with classmates for code reviews.

Week 8: Basic Server Concepts & Node.js

Set up a basic Node.js server to serve web content. Understand server-side fundamentals and simple routing.

Week 9: Introduction to Databases

Learn to store and retrieve data using JSON or SQLite. Save contact form submissions from your portfolio into a database.

Week 10: Introduction to Flutter

Understand Flutter's widget structure and framework basics. Design a simple login and landing page for a mobile app.

Week 11: Mobile App Interactivity

Create a Flutter app that displays a list of events. Add RSVP functionality with confirmation messages.

Week 12: Full-Stack Integration

Build a registration page that saves new members to a database and displays a welcome message. Connect your Flutter app to a database for data-driven functionality.

Week 13: Project Work
Apply all learned skills to build a real-world project such as a club/college event management application integrating both web and mobile interfaces.

Week 14: Final Presentations
Present your completed project to classmates, highlighting key features, responsive design, and integration. Gather peer feedback for improvement.

Mini-Project Example Themes

- Event registration & tracking for college clubs
- Simple inventory tracking system
- Student feedback & announcement portal
- IoT project dashboards (linking to electronics projects)

Reference Books:

1. "Web Technologies: HTML, CSS, JavaScript" – Uttam K. Roy (Oxford University Press)
2. "Web Technology: Theory and Practice" – M.N. Rao & P.S. Rao (Pearson)
3. "Web Technologies: TCP/IP, Web/HTTP, Web Servers, Web Applications, and Cloud Computing" – Achyut S. Godbole & Atul Kahate (McGraw-Hill Education)
4. "Mobile Application Development" – Debasis Samanta & Goutam Kumar Panda (Prentice Hall India)
5. "Full Stack Web Development" – V. Srinivasa Rao (Notion Press).

Course Outcomes:

1. Understand and apply core web technologies (HTML, CSS, JavaScript) for structured, styled, and interactive webpages.
2. Build responsive websites using frameworks like Bootstrap and manage code using Git/GitHub.
3. Create simple server-side functionality using Node.js and store/retrieve data from basic databases.
4. Design and develop mobile applications using Flutter for Android and iOS.
5. Integrate web and mobile development into a functional mini-project with deployment.

(A500901) ENVIRONMENTAL SCIENCE

B.Tech (ECE): IV Semester

L	T	P	C
1	0	0	1

UNIT-I

Environmental Studies: Introduction, Definition, scope and importance, Ecosystems: Introduction, types, characteristic features, structure and functions of ecosystems, Bio-geo chemical cycle, Classification of Eco system.

UNIT-II

Natural Resources: Classification of Resources, Land resources, Land as resource, Common property resources, Land degradation, Soil erosion and desertification, Effects of modern agriculture, fertilizer –pesticide problems, Forest resources, Use and over-exploitation. Mining and dams – their effects on forest and tribal people, Water resources, Use and over- utilization of surface and groundwater, Floods, droughts, Water logging and salinity, Dams –benefits and costs, Conflicts over Water, Energy resources.

UNIT-III

Bio-diversity and its conservation, Value of bio-diversity-consumptive and productive use, social, ethical, aesthetic and option values, Bio-geographical classification of India – India as a mega diversity habitat, Threats to bio-diversity –Hot-spots, habitat loss, poaching of wild life, loss of species, seeds, etc. Conservation of bio-diversity– In-situ and Ex-situ conservation.

UNIT-IV

Environmental Pollution–Local and Global Issues, Nature of thermal pollution and nuclear hazards, Global warming, Acid rain, Ozone depletion, Environmental case studies.

UNIT-V

Environmental Problems in India, Drinking water, sanitation and public health, Effects of the activities on the quality of environment, Water scarcity and groundwater depletion, Controversies on major dams – resettlement and rehabilitation of people: problems and concerns, Rain water harvesting, cloud seeding and watershed management. Economy and Environment, The economy and environment interaction, Economics of development, preservation and conservation, Sustainability: theory and practices, Limits to growth, Equitable use of resources for sustainable life styles, Environmental Impact Assessment.

Text Books

1. Environmental Science (1st edition), Y. Anjaneyulu, B S Publications.
2. Environmental studies (1st edition), Deekshadave, Cengage learning India Pvt. Ltd.

Reference books

1. Environmental sciences and Engineering (1st edition), P. VenugopalRao, PHI learning Pvt. Ltd.,
2. Environmental Science and Technology (1st edition), M. Anji Reddy, B S Publications.
3. Clark, R.S., Marine Pollution, Clanderson Press, Oxford, 2002.
4. Environmental Encyclopedia (Cunningham, W.P., et al., Jaico Publishing House, Mumbai, 2003.

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

1. Acquire the knowledge on environmental science
2. Acquire the knowledge of various natural resources
3. Understand the importance of conservation and preserve the biodiversity
4. Understand the hazardous effects of environmental pollution
5. Develop skills in understanding various environmental problems

CO-PO MAPPING:

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	1	-	-	2	3	1	-	1	-	2
CO2	3	3	2	2	-	2	3	1	-	-	-	2
CO3	2	2	3	1	-	2	3	1	-	-	-	2
CO4	2	3	2	2	-	2	3	1	-	-	-	2
CO5	2	2	3	3	-	3	3	1	-	-	-	2