B.S. Abdur Rahman®
Crescent
Institute of Science & Technology
Deemed to be University u/s 3 of the UGC Act, 1956

Regulations 2025
Curriculum and Syllabi
(As approved by the 24th Academic Council – August 2025)

B.Tech.
(Electronics & Communication Engineering)

B.S. Abdur Rahman® Crescent Institute of Science & Technology
Deemed to be University u/s 3 of the UGC Act, 1956

REGULATIONS 2025

CURRICULUM AND SYLLABI (I & II semesters)
(as approved by the 24th Academic Council – August 2025)

B.TECH. ELECTRONICS AND COMMUNICATION ENGINEERING

VISION AND MISSION OF THE INSTITUTION

VISION

B.S. Abdur Rahman Crescent Institute of Science and Technology aspires to be a leader in Education, Training and Research in multidisciplinary areas of importance and to play a vital role in the Socio- Economic progress of the Country in a sustainable manner.

MISSION

- To blossom into an internationally renowned Institute.
- To empower the youth through quality and value-based education.
- To promote professional leadership and entrepreneurship.
- To achieve excellence in all its endeavors to face global challenges.
- To provide excellent teaching and research ambience.
- To network with global Institutions of Excellence, Business, Industry and Research Organizations.
- To contribute to the knowledge base through Scientific enquiry, Applied Research and Innovation.

DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

VISION AND MISSION

VISION

Department of Electronics and Communication Engineering envisions to be a leader in providing state of the art education through excellence in teaching, training, and research in contemporary areas of Electronics and Communication Engineering and aspires to meet the global and socio economic challenges of the country.

MISSION

- The Department of Electronics and Communication Engineering endeavours to produce globally competent Engineers prepared to face challenges of the society.
- To enable the students to formulate, design and solve problems in applied science and engineering.
- To provide excellent teaching and research environment using state of the art facilities.
- To provide adequate practical training to meet the requirement of the Electronics & communication industry.
- To train the students to take up leadership roles in their career or to pursue higher education and research.

PROGRAMME EDUCATIONAL OBJECTIVES AND OUTCOMES

B.TECH. (ELECTRONICS AND COMMUNICATION ENGINEERING)

PROGRAMME EDUCATIONAL OBJECTIVES:

PEO 1: Solve real world problems in Electronics and Communication Engineering with acquired knowledge in Basic Sciences and Engineering.

PEO 2: Become a creative, innovative and successful professional Engineer / Entrepreneur in core and related engineering disciplines both nationally and internationally.

PEO 3: Demonstrate professional, ethical behavior and engage in lifelong learning to develop socially relevant products

PEO 4: Pursue Higher Education to choose career path in teaching and research.

PEO 5: Attain leadership roles in industry and capable of handling large cross-functional teams.

PROGRAMME OUTCOMES:

- PO1: Engineering Knowledge: Apply knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems.
- PO2: Problem Analysis: Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development. (WK1 to WK4)
- PO3: Design/Development of Solutions: Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required. (WK5)
- PO4: Conduct Investigations of Complex Problems: Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions. (WK8).
- PO5: Engineering Tool Usage: Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems. (WK2 and WK6)
- PO6: The Engineer and The World: Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, and WK7).
- PO7: Ethics: Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9)

- PO8: Individual and Collaborative Team work: Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams.
- PO9: Communication: Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences
- PO10: Project Management and Finance: Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.
- PO11: Life-Long Learning: Recognize the need for, and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change. (WK8)

PROGRAMME SPECIFIC OUTCOMES

PSO1: Design and develop Electronics and communication subsystem to address complex engineering problems.

PSO2: Analyze and evolve solutions using signal processing, communication, networking, VLSI and embedded systems for contemporary applications

PSO3: Apply modern tools and appropriate techniques to work as an individual/team

REGULATIONS – 2025
B.TECH. DEGREE PROGRAMMES

(Under Choice Based Credit System)

1.0 PRELIMINARY DEFINITIONS & NOMENCLATURE

In these Regulations, unless the context otherwise requires:

i) **"Programme"** means B.Tech. Degree Programme.

ii) **"Branch"** means specialization or discipline of B.Tech. Degree Programme like Civil Engineering, Mechanical Engineering, etc.,

iii) **"Course"** means theory / practical / laboratory integrated theory / seminar / internship / project and any other subject that is normally studied in a semester like English, Mathematics, Environmental Science, Engineering Graphics, Electronic Devices etc.,

iv) **"Institution"** means B.S. Abdur Rahman Crescent Institute of Science and Technology.

v) **"Academic Council"** means the Academic Council, which is the apex body on all academic matters of this Institute.

vi) **"Dean (Academic Affairs)"** means the Dean (Academic Affairs) of the Institution who is responsible for the implementation of relevant rules and regulations for all the academic activities.

vii) **"Dean (Student Affairs**)" means the Dean (Students Affairs) of the Institution who is responsible for activities related to student welfare, conduct of co-curricular, extra-curricular events and discipline in the campus.

viii) **"Controller of Examinations"** means the Controller of Examinations of the Institution who is responsible for the conduct of examinations and declaration of results.

ix) **"Dean of the School"** means the Dean of the School of the department concerned.

x) **"Head of the Department"** means the Head of the Department concerned.

2.0 ADMISSION

2.1a) Candidates for admission to the first semester of the eight semester B. Tech. degree programme shall be required to have passed the Higher Secondary Examination of the 10+2 curriculum (Academic stream) prescribed by the appropriate authority or any other examination of any University or authority accepted by the Institution as equivalent thereto. Grade 12 or equivalent stage of education (Level 4) as per NEP 2020.

2.1 b) The student shall have studied at least any three of the following courses: Physics, Mathematics, Chemistry, Computer Science, Electronics, Information Technology, Biology, Informatics Practices, Biotechnology, Technical Vocational Subjects, Agriculture, Engineering Graphics, Business Studies, Entrepreneurship at 10+2 level. In case if the student has not studied any or all the courses viz., mathematics, physics and chemistry, he / she shall undergo bridge course(s) in the concerned course(s) at 10+2 level knowledge (Level 4 of NEP 2020).

2.2 Notwithstanding the qualifying examination, the candidate might have passed at 10+2, the candidate shall also write an entrance examination prescribed by the Institution for admission to certain programmes. The entrance examination shall test the proficiency of the candidate in the courses considered eligible for admission on the standards prescribed for 10+2 academic stream.

2.3 Candidates for admission to the third semester of the eight semester B.Tech. programme under lateral entry category shall be required to have passed minimum Three years / Two years (Lateral Entry) Diploma examination in any branch of Engineering / Technology or passed B.Sc. Degree from a recognized University as defined by UGC and passed 10+2 examination with Mathematics as a subject or Passed three year Diploma of Vocation Stream (D.Voc) in the same or allied sector or any other examination of any other authority

accepted by the Institution as equivalent thereto.

2.4 The Institution shall offer suitable bridge courses in Mathematics, Physics, Engineering drawing, etc., for the students of diverse backgrounds.

2.5 The eligibility criteria such as marks, number of attempts and physical fitness shall be as prescribed by the Institution in adherence to the guidelines of regulatory authorities from time to time.

2.6 The eligibility and admission criteria prescribed by the respective programme regulating bodies shall be strictly followed for the selection and admission of candidates to the specific programmes.

3.0 BRANCHES OF STUDY

3.1 Regulations are applicable to the following B.Tech. Degree programmes in various branches of Engineering and Technology, each distributed over eight semesters, with two semesters per academic year.

1. Aeronautical Engineering
2. Artificial Intelligence and Data Science
3. Automobile Engineering
4. Biotechnology
5. Civil Engineering
6. Computer Science and Engineering
7. Computer Science and Engineering (Cyber Security)
8. Computer Science and Engineering (Internet of Things)
9. Computer Science and Engineering (Artificial Intelligence and Machine Learning)
10. Electrical and Electronics Engineering
11. Electronics and Communication Engineering
12. Electronics and Computer Engineering
13. Electronics and Instrumentation Engineering
14. Information Technology

15. Mechanical Engineering
16. Polymer Engineering

4.0 STRUCTURE OF THE PROGRAMME

4.1 Every programme has a curriculum with syllabi consisting of theory and practical courses as per AICTE such as,

i) Basic Science Courses - BSC
ii) Humanities and Social Sciences including Management Courses - HSC
iii) Engineering Science Courses - ESC
iv) Professional Core Courses - PCC
v) Professional Elective Courses - PEC
vi) Open Elective Courses - OEC
vii) Laboratory Courses – LC
viii) Laboratory Integrated Theory Courses – LITC
ix) Mandatory Non Credit Courses- MNC
x) Project - PROJ (Project work, seminar and internship in industry or at appropriate workplace)

4.1.1 Mandatory Induction Programme for First Year Students

The first year students upon admission shall undergo a mandatory three-week Induction programme consisting of physical activity, creative arts, universal human values, literary, proficiency modules, lectures by eminent people, visits to local areas, familiarization with departments / schools and centres, etc.,

4.1.2 Personality and Character Development

All students shall enroll, on admission, in any of the following personality and character development programmes or in departmental societies:

- National Cadet Corps (NCC)
- National Service Scheme (NSS)
- National Sports Organization (NSO)
- Youth Red Cross (YRC)

- Rotaract
- Crescent Indian Society Training Development (ISTD – C)
- Crescent Creative Strokes
- Crescent Technocrats club

The training activities / events / camp shall normally be organized during the weekends / vacation period.

4.1.3 Online Courses for Credit Transfer

Students are permitted to undergo department approved online courses under SWAYAM up to 40% of credits of courses in a semester excluding project semester with the recommendation of the Head of the Department / Dean of School and with the prior approval of Dean (Academic Affairs) during his / her period of study. The credits earned through online courses ratified by the respective Board of Studies shall be transferred following the due approval procedures. The online courses can be considered in lieu of core courses and elective courses.

4.1.4 Value Added Courses

The students are permitted to pursue department approved online courses (excluding courses registered for credit transfer) or courses offered / approved by the department as value added courses.

The details of the value added course viz., syllabus, schedule of classes and the course faculty shall be sent to the Dean (Academic Affairs) for approval. The students may also undergo the value added courses offered by other departments with the consent of the Head of the Department offering the course.

These value added courses shall be specified in the consolidated mark sheet as additional courses pursued by the student over and above the curriculum during the period of study.

4.1.5 Industry Internship

The students shall undergo training for a period as specified in the curriculum during the summer vacation in any industry relevant to the field of study.

The students are also permitted to undergo internship at research organizations / eminent academic institutions for the period prescribed in the curriculum during the summer vacation, in lieu of Industrial training.

In any case, the student shall obtain necessary approval from the Head of the Department / Dean of School and the training has to be taken up at a stretch.

4.1.6 Industrial Visit

The student shall undergo at least one industrial visit every year from the second year of the programme. The Heads of Departments / Deans of Schools shall ensure the same.

4.2 Each course is normally assigned certain number of credits:

- one credit per lecture period per week
- one credit per tutorial period per week
- one credit for two to three periods and two credits for four periods of laboratory or practical sessions per week
- one credit for two periods of seminar / project work per week
- one credit for two weeks of industrial training or 80 hours per semester.

4.3 Each semester curriculum shall normally have a blend of lecture courses, laboratory courses, laboratory integrated theory courses, etc.

4.4 The medium of instruction, examinations and project report shall be in English, except for courses in languages other than English.

5.0 DURATION OF THE PROGRAMME

5.1 A student is expected to complete the B.Tech. programme in eight semesters (six semesters in the case of lateral entry scheme), but in any case not more than 14 continuous semesters reckoned from the date of first admission (12 semesters in the case of lateral entry students).

5.2 Each semester shall consist of a minimum of 90 working days including the days of examinations.

5.3 The maximum duration for completion of the programme as mentioned in clause 5.1 shall also include period of break of study vide clause 7.1 so that the student may be eligible for the award of the degree.

6.0 REGISTRATION AND ENROLLMENT

6.1 The students of first semester shall register and enroll for courses at the time of admission by paying the prescribed fees. For the subsequent semesters registration for the courses shall be done by the student one week before the last working day of the previous semester.

6.2 Change of an Elective Course

A student can change an enrolled elective course within 10 working days from the commencement of the course, with the approval of the Dean (Academic Affairs), on the recommendation of the Head of the Department of the student.

6.3 Withdrawal from a Course

A student can withdraw from an enrolled course at any time before the first continuous assessment test for genuine reasons, with the approval of the Dean (Academic Affairs), on the recommendation of the Head of the Department of the student.

7.0 BREAK OF STUDY FROM PROGRAMME

7.1 A student may be allowed / enforced to take a break of study for two semesters from the programme with the approval of Dean (Academic Affairs) for the following reasons:

7.1.1 Medical or other valid grounds

7.1.2 Award of 'I' grade in all the courses in a semester due to lack of attendance

7.1.3 Debarred due to any act of indiscipline

7.2 The total duration for completion of the programme shall not exceed the prescribed maximum number of semesters (vide clause 5.1).

7.3 A student who has availed a break of study in the current semester (odd/even) can rejoin only in the subsequent corresponding (odd/even) semester in the next academic year on approval from the Dean (Academic affairs).

7.4 During the break of study, the student shall not be allowed to attend any regular classes or participate in any activities of the Institution. However, he / she shall be permitted to enroll for the 'I' grade courses and appear for the arrear examinations.

8.0 CLASS ADVISOR AND FACULTY ADVISOR

8.1 Class Advisor

A faculty member shall be nominated by the Head of the Department as class advisor for the class throughout the period of study except first year.

The class advisor shall be responsible for maintaining the academic, curricular and co-curricular records of students of the class throughout their period of study.

However, for the first and second semester, the class advisors (first year class advisors) are nominated by the first year coordinator.

8.2 Faculty Advisor

To help the students in planning their courses of study and for general counseling, the Head of the Department of the students shall attach a maximum of 20 students to a faculty member of the department who shall function as faculty advisor for the students throughout their period of study. Such faculty advisor shall guide the students in taking up the elective courses for registration and enrolment in every semester and also offer advice to the students on academic and related personal matters.

9.0 COURSE COMMITTEE

9.1 Each common theory course offered to more than one group of students shall have a “Course Committee” comprising all the course faculty teaching the common course with one of them nominated as a course coordinator. The nomination of the course coordinator shall be made by the Head of the Department / Dean (Academic Affairs) depending on whether all the course faculty teaching the common course belong to a single department or from several departments. The course committee shall ensure preparation of a common question paper and scheme of evaluation for the tests and semester end examination.

10.0 CLASS COMMITTEE

A class committee is constituted branch wise and semester wise by the Head of the Department / Dean of the School shall normally comprise of faculty members handling the courses, student representatives and a senior faculty member not handling any courses for that class as chairman.

10.1 The composition of class committees for first and second semester is as follows:

i) The first year coordinator shall be the chairman of the class committee

ii) Faculty members of all individual courses of first / second semester

iii) Six student representatives (male and female) of each class nominated by the first year coordinator

iv) The class advisor and faculty advisors of the class

10.2 The composition of the class committee for each branch from 3rd to 8th semester is as follows:

i) One senior faculty member preferably not handling courses for the concerned semester appointed as chairman by the Head of the Department

ii) All the faculty members handling courses of the semester
iii) Six student representatives (male and female) of each class nominated by the Head of the Department in consultation with the relevant faculty advisors
iv) All faculty advisors and the class advisors
v) Head of the Department

10.3 The class committee shall meet at least three times during the semester. The first meeting shall be held within two weeks from the date of commencement of classes, in which the components of continuous assessment for various courses and the weightages for each component of assessment shall be decided for the first and second assessment. The second meeting shall be held within a week after the date of first assessment report, to review the students' performance and for follow up action.

10.4 During these two meetings, the student members shall meaningfully interact and express opinions and suggestions to improve the effectiveness of the teaching-learning process, curriculum and syllabi, etc.

10.5 The third meeting of the class committee, excluding the student members, shall meet after the semester end examinations to analyse the performance of the students in all the components of assessments and decide their grades in each course. The grades for a common course shall be decided by the concerned course committee and shall be presented to the class committee(s) by the course faculty concerned.

11.0 CREDIT LIMIT FOR ENROLLMENT & MOVEMENT TO HIGHER SEMESTER

11.1 A student can enroll for a maximum of 36 credits during a semester including Redo / Predo courses.

11.2 The minimum credits earned by the student to move to 7^{th} semester

shall not be less than 60 credits (40 credits for lateral entry students).

12.0 ASSESSMENT PROCEDURE AND PERCENTAGE WEIGHTAGE OF MARKS

12.1 Every theory course shall have a total of three assessments during a semester as given below:

Assessments	Course Coverage in Weeks	Duration	Weightage of Marks
Assessment 1	1 to 6	1.5 hours	25%
Assessment 2	7 to 12	1.5 hours	25%
Semester End Examination	Full course	3 hours	50%

12.2 Theory Course

Appearing for semester end theory examination for each course is mandatory and a student shall secure a minimum of 40% marks in each course in semester end examination for the successful completion of the course.

12.3 Laboratory Course

Every practical course shall have 60% weightage for continuous assessments and 40% for semester end examination. However, a student shall have secured a minimum of 50% marks in the semester end practical examination for the award of pass grade.

12.4 Laboratory Integrated Theory (LIT) Courses

For laboratory integrated theory courses, the theory and practical components shall be assessed separately for 100 marks each and consolidated by assigning a weightage of 75% for theory component and 25% for practical component (for a 4 credit LIT course). Grading shall be done for this consolidated mark. Assessment of theory components shall have a total of three assessments with two continuous assessments carrying 25% weightage each and semester end examination carrying 50%

weightage. The student shall secure a separate minimum of 40% in the semester end theory examination. The evaluation of practical components shall be through continuous assessment.

Component	Maximum Marks	Weightage for Final Grade	Mode of Assessment
Theory Component	100	75%	CAT1 (25%) + CAT2 (25%) + SEE (50%)
Practical Component	100	25%	Continuous assessment only
Final Grade Basis	Consolidated	100%	75% Theory + 25% Practical
Pass Requirement	-	-	Minimum 40% in Semester-End Theory Exam (SEE)

Note:

1. Proportionate weightage shall be assigned to LIT courses based on their credit value, whether 2 or 3 credits.

2. In Lab-Integrated Professional Elective courses, the laboratory component shall be assessed by the course faculty.

12.5 The components of continuous assessment for theory / practical / laboratory integrated theory courses shall be finalized in the first class committee meeting.

12.6 Industry Internship

In the case of industry internship, the student shall submit a report, which shall be evaluated along with an oral examination by a committee of faculty members constituted by the Head of the Department. The student shall also submit an internship completion certificate issued by the industry / research / academic organisation. The weightage of marks for industry internship report and viva voce examination shall be 60% and 40% respectively.

12.7 Project Work (Mini and Capstone Project)

Mini project work, shall be carried out individually or as a group activity involving a maximum of four students.

Each group shall identify a suitable topic within their domain, either disciplinary or interdisciplinary, based on the students' abilities and in consultation with the faculty mentor. The topic must lead to the development of a small-scale system or application.

The progress of the mini project shall be evaluated through three periodic reviews: two interim reviews and one final review. A project report shall be submitted by the end of the semester. The reviews shall be conducted by a committee of faculty members constituted by the Head of the Department / Dean of the School.

An oral examination (viva voce) shall be conducted as the semester-end examination by an internal examiner approved by the Controller of Examinations, based on the project report.

The weightage for assessment shall be as follows:

• Periodic Reviews: 50%

- 25% by the Project Guide
- 25% by the Review Committee

• Project Report: 20%

• Viva Voce Examination: 30%

In the case of capstone project work, the project shall be carried out individually or as a group activity, involving a maximum of three or four students.

A committee of faculty members, constituted by the Head of the Department / Dean of the School, shall conduct three periodic reviews during the semester to monitor and assess the progress of the project.

At the end of the semester, students shall submit a project report, based on which a semester-end oral examination (viva voce) shall be conducted by an external examiner approved by the Controller of Examinations.

The assessment weightage shall be as follows:

- Periodic Reviews – 50%
    - 25% by the Project Guide
    - 25% by the Review Committee
- Project Report – 20%
- Viva Voce Examination – 30%.

12.8 Assessment of seminars and comprehension shall be carried out by a committee of faculty members constituted by the Head of the Department.

12.9 For the first attempt of the arrear theory examination, the internal assessment marks scored for a course during first appearance shall be used for grading along with the marks scored in the arrear examination. From the subsequent appearance onwards, full weightage shall be assigned to the marks scored in the semester end examination and the internal assessment marks secured during the course of study shall become invalid.

In case of laboratory integrated theory courses, after one regular and one arrear appearance, the internal mark of theory component is invalid and full weightage shall be assigned to the marks scored in the semester end examination for theory component. **There shall be no arrear or improvement examination for lab components**.

13.0 SUBSTITUTE EXAMINATIONS

13.1 A student who is absent, for genuine reasons, may be permitted to write a substitute examination for any one of the two continuous assessment tests of a course by paying the prescribed substitute examination fee. However, permission to take up a substitute examination will be given under exceptional circumstances, such as accidents, admission to a hospital due to illness, etc. by a committee constituted by the Head of the Department / Dean of the School for that purpose. There is no substitute examination for semester end examinations.

13.2 A student shall apply for a substitute exam in the prescribed form to

the Head of the Department / Dean of the School within a week from the date of assessment test. However, the substitute examination will be conducted only after the last instructional day of the semester.

14.0 ATTENDANCE REQUIREMENT AND SEMESTER / COURSE REPETITION

14.1 A student shall earn 100% attendance in the scheduled contact hours (such as lectures, tutorials, labs, etc.) for that course. However, a **relaxation** of up to 25% in attendance may be granted to account for valid reasons such as medical emergencies, participation in co-curricular or extracurricular activities with prior approval, or other genuine circumstances.

If a student's attendance falls below 75% in a particular course, even after considering the permissible relaxation, they will not be allowed to appear for the semester-end examination in that course. Instead, the student will be awarded an “I” grade (Incomplete) for the course.

14.2 The faculty member of each course shall cumulate the attendance details for the semester and furnish the names of the students who have not earned the required attendance in the concerned course to the class advisor. The class advisor shall consolidate and furnish the list of students who have earned less than 75% attendance, in various courses, to the Dean (Academic Affairs) through the Head of the Department / Dean of the School. Thereupon, the Dean (Academic Affairs) shall officially notify the names of such students prevented from writing the semester end examination in each course.

14.3 If a student’s attendance in any course falls between 65% and 75% due to medical reasons (e.g., hospitalization, illness) or participation in institution-approved events, they may be granted exemption from the minimum attendance requirement and allowed to appear for the

semester-end exam. The student must submit valid documents to the class advisor upon rejoining, with approval from the HoD/Dean. Final approval for **condonation** will be granted by the Vice Chancellor based on the Dean (Academic Affairs)'s recommendation.

14.4 A student who has obtained an **"I"** grade in all the courses in a semester is not permitted to move to the next higher semester. Such students shall **repeat** all the courses of the semester in the subsequent academic year.

14.5 The student awarded **"I"** grade, shall enroll and repeat the course when it is offered next. In case of "I" grade in an elective course either the same elective course may be repeated or a new elective course may be taken with the approval of the Head of the Department / Dean of the School.

14.6 A student who is awarded **"U"** grade in a course shall have the option to either write the semester end arrear examination at the end of the subsequent semesters, or to **redo** the course when the course is offered by the department. Marks scored in the continuous assessment in the redo course shall be considered for grading along with the marks scored in the semester end (redo) examination. If any student obtains "U" grade in the redo course, the marks scored in the continuous assessment test (redo) for that course shall be considered as internal mark for further appearance of arrear examination.

14.7 If a student with "U" grade, who **prefers to redo** any particular course, fails to earn the minimum 75% attendance while doing that course, then he / she is not permitted to write the semester end examination and his / her earlier "U" grade and continuous assessment marks shall continue.

15.0 REDO / PRE-DO COURSES

15.1 A student can register for a maximum of three redo courses per semester without affecting the regular semester classes, whenever

such courses are offered by the concerned department, based on the availability of faculty members and subject to a specified minimum number of students registering for each of such courses.

15.2 The number of contact hours and the assessment procedure for any redo course shall be the same as regular courses, except there is **no provision for any substitute examination and withdrawal from a redo course**.

15.3 A student shall be permitted to pre-do a course offered by the concerned department, provided it does not affect the regular semester class schedule. Such permission shall be granted based on the availability of faculty members, the maximum permissible credit limit of the semester, and the student's fulfillment of the necessary prerequisites for the course. The proposal shall be recommended by the Dean of the School and the Head of the Department, and shall require final approval from the Dean (Academic Affairs).

16.0 PASSING AND DECLARATION OF RESULTS AND GRADE SHEET

16.1 All assessments of a course shall be made on absolute marks basis. The class committee without the student members shall meet to analyse the performance of students in all assessments of a course and award letter grades following the relative grading system. The letter grades and the corresponding grade points are as follows:

Letter Grade	Grade Points
S	10
A	9
B	8
C	7
D	6
E	5
U	0
W	-

I	-
PA	-
FA	-

"W"- denotes withdrawal from the course

"I" - denotes "Incomplete" ie. inadequate attendance in the course and prevention from appearance of semester end examination

"U" - denotes unsuccessful performance in the course.

"PA" - denotes the 'Pass' of the zero credit courses.

"FA" - denotes the 'Fail' of the zero credit courses.

16.2 A student who earns a minimum of five grade points ('E' grade) in a course is declared to have successfully completed the course. Such a course cannot be **repeated by the student for improvement of grade**.

16.3 Upon awarding grades, the results shall be endorsed by the chairman of the class committee and Head of the Department / Dean of the School. The Controller of Examinations shall further approve and declare the results.

16.4 **Within one week** from the date of declaration of result, a student can apply for revaluation of his / her semester end theory examination answer scripts of one or more courses, on payment of prescribed fee, through proper application to the Controller of Examinations. Subsequently, the Head of the Department / Dean of the School offered the course shall constitute a revaluation committee consisting of chairman of the class committee as convener, the faculty member of the course and a senior faculty member having expertise in that course as members. The committee shall meet within a week to revalue the answer scripts and submit its report to the Controller of Examinations for consideration and decision.

16.5 After results are declared, grade sheets shall be issued to each

student, which contains the following details: a) list of courses enrolled during the semester including redo courses / arrear courses, if any; b) grades scored; c) Grade Point Average (GPA) for the semester and d) Cumulative Grade Point Average (CGPA) of all courses enrolled from the first semester onwards.

GPA is the ratio of the sum of the products of the number of credits of courses registered and the grade points corresponding to the grades scored in those courses, taken for all the courses, to the sum of the number of credits of all the courses in the semester.

If C_i, is the number of credits assigned for the i^{th} course and GP_i is

$$GPA = \frac{\sum_{i=1}^{n}(C_i)(GPi)}{\sum_{i=1}^{n} C_i}$$

the Grade Point in the i^{th} course,

Where n = number of courses

The Cumulative Grade Point Average (CGPA) is calculated in a similar manner, considering all the courses enrolled from first semester.

“I”, "W", “PA” and **“FA”** grades are excluded for calculating GPA.

"U", “I”, "W", “PA” and **“FA”** grades are excluded for calculating CGPA.

The formula for the conversion of CGPA to equivalent percentage of marks shall be as follows:

Percentage equivalent of marks = CGPA X 10

16.6 After successful completion of the programme, the degree shall be awarded to the students with the following classifications based on CGPA.

Classification	CGPA
First Class with Distinction	8.50 and above and passing all the courses in first appearance and completing the programme within the prescribed period of 8 semesters for all students (except lateral

	entry students) and 6 semesters for lateral entry students
First Class	6.50 and above and completing the programme within a maximum of 10 semesters for all students (except lateral entry students) and 8 semesters for lateral entry students
Second Class	Others

16.6.1 Eligibility for First Class with Distinction

- A student should not have obtained 'U' or 'I' grade in any course during his/her study
- A student should have completed the UG programme within the minimum prescribed period of study (except clause 7.1.1)

16.6.2 Eligibility for First Class

- A student should have passed the examination in all the courses not more than two semesters beyond the minimum prescribed period of study (except clause 7.1.1)

16.6.3 The students who do not satisfy clause 16.6.1 and clause 16.6.2 shall be classified as second class.

16.6.4 The CGPA shall be rounded to two decimal places for the purpose of classification. The CGPA shall be considered up to three decimal places for the purpose of comparison of performance of students and ranking.

17.0 SUPPLEMENTARY EXAMINATION

Final year students and passed out students can apply for supplementary examination for a maximum of **three** courses thus providing an opportunity to complete their degree programme. Likewise, students with less credits in VI semester can also apply for supplementary examination for a maximum of **three** courses to enable them to earn minimum credits to move to higher semester.

The students can apply for supplementary examination within three weeks of the declaration of results in the **even semester**.

18.0 DISCIPLINE

18.1 Every student is expected to observe discipline and decorum both inside and outside the campus and not to indulge in any activity which tends to affect the reputation of the Institution.

18.2 Any act of indiscipline of a student, reported to the Dean (Student Affairs), through the Head of the Department / Dean of the School concerned shall be referred to a Discipline and Welfare Committee constituted by the Registrar for taking appropriate action.

19.0 MULTI ENTRY AND MULTI EXIT (MEME) FRAMEWORK

In accordance with the provisions of the National Education Policy (NEP) 2020, the programme shall support a Multi Entry – Multi Exit (ME-ME) framework to provide flexibility in the academic pathway of students.

19.1 Exit Option:

19.1.1 Credit Requirement for Award of B.Tech. Degree

To qualify for the award of a B.Tech. degree from the Institute, a student must successfully complete the total credit requirements as prescribed in the approved curriculum of the respective programme. The specific credit requirements are determined by the programme curriculum.

19.1.2 Provision for Multiple Exit

In alignment with NEP 2020 guidelines, the Institute provides students enrolled in undergraduate programmes with the option of multiple exits, subject to the following conditions:

a. Exit at the End of First or Second Year

Students may choose to exit the programme at the end of either the first year or the second year, provided they have fulfilled the prescribed academic requirements.

b. Application for Exit

A student intending to exit must submit a formal written application in the prescribed format at least **eight weeks prior to the scheduled end of the academic year**.

c. Departmental Recommendation

1. Upon receipt of the application, the concerned Department shall evaluate the academic record of the student and recommend the award of a **Certificate or Diploma** as applicable, based on the credits earned.
2. In the case of arrear courses, the Certificate/Diploma will be conferred only after successful clearance of all pending arrears.

d. Notification of Completion

Once a student has fulfilled the requirements for the award of Certificate/Diploma, the Department shall notify the same to Controller of Examinations for further processing and issuance.

19.1.3 Award of Qualifications under Multiple Exit Scheme

1. **Certificate**: Awarded after successful completion of the first year, subject to earning the minimum prescribed first-year credits as per respective curriculum along with a **3-credit Skill Based Course**.
2. **Diploma**: Awarded after successful completion of the second year, subject to earning the minimum prescribed cumulative credits as per the respective curriculum (e.g., 44 credits from the first year + 42 credits from the second year) along with **6 credits of Skill Based Courses**.

19.1.4 Conditions Governing Exit

1. The multiple exit facility is intended strictly for **genuine and exceptional circumstances**, such as prolonged illness, or

securing an employment opportunity necessitating a temporary withdrawal from the programme.

2. Students opting for a temporary exit after the first or second year must obtain **prior approval from the Registrar through the Dean (Academics)**, based on the recommendation of the respective Head of the Department.

19.1.5 Expectation of Programme Continuity

While the option for multiple exits exists, it is generally expected that students admitted to a B.Tech. programme shall pursue their studies continuously until completion of the final degree requirements.

19.2. Entry Option:

Students seeking re-entry into the programme (multi-entry) must submit an application through the proper channel at the beginning of the odd semester. Admission shall be subject to fulfilment of institutional guidelines, credit mapping, and availability of seats.

19.3. Credits Requirement for the Certifications:

Name of the Certificate Programme	Required
Certificate (Level 4.5 as per NEP 2020)	40* - 45
Diploma (Level 5 as per NEP 2020)	80* - 87

* The minimum number of credits that a student must earn (as per the respective curriculum) in order to get the above certification program.

20 ELIGIBILITY FOR THE AWARD OF DEGREE

20.1 A student shall be declared to be eligible for the award of B.Tech. degree provided the student has:

20.1.1 Successfully earned the required number of total credits as specified in the curriculum of the programme of study within a maximum period of 14 semesters (12 semesters for lateral entry)

from the date of admission, **including break of study**.

20.1.2 Successfully completed the requirements of the enrolled professional development activity through various institute level clubs or department level membership in societies.

20.1.3 No dues to the Institution, Library, Hostel, etc.

20.1.4 No disciplinary action pending against him/her.

20.2 The award of the degree must have been approved by the Institution.

21 MINOR DEGREE PROGRAMMES OFFERED FOR STUDENTS

21.1 The students admitted in the following B.Tech. programmes can graduate with a minor degree, which is optional, along with a major degree.

21.2 The eligibility for choosing the minor degree is given as below:

Sl. No.	Minor Degree	Eligible Major Degree Programmes (from other Departments)	Offering Dept.
1.	Artificial Intelligence and Machine Learning	Mechanical Engineering Aeronautical Engineering Polymer Engineering Automobile Engineering Civil Engineering Biotechnology Electrical and Electronics Engg. Electronics and Instrumentation Engg.	CSE
2.	Block Chain		CSE
3.	Cyber Security		IT
4.	Data Science		CSE
5.	Internet of Things (IoT)		ECE

Sl. No.	Minor Degree	Eligible Major Degree Programmes (from other Departments)	Offering Dept.
6.	Virtual & Augmented Reality	Mechanical Engineering Aeronautical Engineering Polymer Engineering Automobile Engineering Civil Engineering Biotechnology Electrical and Electronics Engg. Electronics and Instrumentation Engg. Electronics and Communication Engg.	CSE
7.	Sensor Technology	Mechanical Engineering Aeronautical Engineering Polymer Engineering Automobile Engineering Civil Engineering Biotechnology Electrical and Electronics Engg.	IT
8.	Robotics	Artificial Intelligence and Data Science Computer Science and Engg. (AIML) Computer Science and Engg.(CS) Computer Science and Engg.(IoT) Computer Science and Engineering Information Technology Civil Engineering Biotechnology Electrical and Electronics Engg. Electronics and Instrumentation Engg.	Mech.

Sl. No.	Minor Degree	Eligible Major Degree Programmes (from other Departments)	Offering Dept.
9.	3D Printing	Artificial Intelligence and Data Science Computer Science and Engineering Computer Science and Engg. (AIML) Computer Science and Engg. (CS) Computer Science and Engg. (IoT) Information Technology Biotechnology Electrical and Electronics Engg. Electronics and Instrumentation Engg. Electronics and Communication Engg.	Mech.
10.	Electric Vehicles	Artificial Intelligence and Data Science Computer Science and Engineering Computer Science and Engg.(AIML) Computer Science and Engg.(CS) Computer Science and Engg. (IoT) Information Technology Civil Engineering Biotechnology Electronics and Communication Engg.	EEE
11.	Industrial Automation	Artificial Intelligence and Data Science Computer Science and Engineering Computer Science and Engg. (AIML) Computer Science and Engg. (CS) Computer Science and Engg. (IoT) Computer Science and Engineering Information Technology Mechanical Engineering Aeronautical Engineering Polymer Engineering	EIE

Sl. No.	Minor Degree	Eligible Major Degree Programmes (from other Departments)	Offering Dept.
		Automobile Engineering Civil Engineering Biotechnology Electronics and Communication Engg.	
12.	GIS and Remote Sensing	Artificial Intelligence and Data Science Computer Science and Engg. (AIML) Computer Science and Engg. (CS) Computer Science and Engg. (IoT) Computer Science and Engineering Information Technology Mechanical Engineering Aeronautical Engineering Polymer Engineering Automobile Engineering Biotechnology Electrical and Electronics Engg. Electronics and Instrumentation Engg. Electronics and Communication Engg.	Civil
13.	Computational Biology	Artificial Intelligence and Data Science Computer Science and Engineering Computer Science and Engg. (AIML) Computer Science and Engg. (CS) Computer Science and Engg. (IoT) Information Technology Mechanical Engineering Aeronautical Engineering Polymer Engineering Automobile Engineering Civil Engineering Electrical and Electronics Engg.	Life Sciences

Sl. No.	Minor Degree	Eligible Major Degree Programmes (from other Departments)	Offering Dept.
		Electronics and Instrumentation Engg. Electronics and Communication Engg.	

21.3 A student shall earn an additional 18 to 20 credits for the award of a minor degree.

21.4 A student shall be awarded a minor degree only when he / she completes the requirements for the award of major degree stipulated in the respective programme.

22 POWER TO MODIFY

Notwithstanding all that has been stated above, the Academic Council has the right to modify the above regulations from time to time.

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B.S. ABDUR RAHMAN CRESCENT INSTITUTE OF SCIENCE AND TECHNOLOGY

B.TECH. ELECTRONICS AND COMMUNICATION ENGINEERING

CURRICULUM & SYLLABI, REGULATIONS 2025

(Choice Based Credit System)

I – SEMESTER

S. No	Course Category	Course Code	Course Title	L	T	P	C
1.	HSC	ENE 1181	English for Engineers	3	0	0	3
2.	BSC	MAE 1181	Matrices and Differential Calculus	3	1	0	4
3.	BSC	PHE 1181	Engineering Physics	3	0	2	4
4.	ESC	GEE 1101	Engineering Graphics	2	0	2	3
5.	ESC	GEE 1102	Design thinking	3	0	0	3
6.	ESC	GEE 1103	Digital Manufacturing and Fabrication Laboratory	0	0	2	1
7.	ESC	GEE 1104	Programming for problem solving	2	0	2	3
8.	MNC	GEE 1105	Environmental Sciences (MNC – I)	2	0	0	0
			Credits				**21**

II – SEMESTER

S. No	Course Category	Course Code	Course Title	L	T	P	C
1.	HSC	MAE 1282	Transforms and its Applications	3	1	0	4
2.	BSC	CHE 1181	Chemistry for Engineering Applications*	3	0	2	4
3.	ESC	GEE 1203	Basic Electrical & Instrumentation Engineering	2	0	2	3
4.	ESC	ECE 1201	Electron Devices	3	0	0	3
5.	ESC	ECE 1202	Circuit and Network Analysis	3	1	0	4
6.	PCC	ECE 1203	Electron Devices Laboratory	0	0	2	1
7.	HSC	GEE 1205	Universal Human Values (Humanities - I)	2	0	0	2
			Credits				**21**

III – SEMESTER

S. No	Course Category	Course code	Course Title	L	T	P	C
1.	BSC		Mathematics - III	3	1	0	4
2.	HSC		Humanities Elective - II	3	0	0	3
3.	PCC	ECE 2101	Analog Electronic Circuits	3	0	0	3
4.	PCC	ECE 2102	Digital Electronics	3	0	0	3
5.	PCC	ECE 2103	Signals and Systems	3	0	2	4
6.	PCC	ECE 2104	Data Structures and Algorithms Using C	2	0	2	3
7.	PCC	ECE 2105	Analog Electronic Circuits Laboratory	0	0	2	1
8.	PCC	ECE 2106	Digital Electronics Laboratory	0	0	2	1
9.	HSC	GEE 2101	Soft Skills – I	0	0	2	1
10.	MNC	GEE 2102	Indian Constitution* (MNC-II)	2	0	0	0
11.	PCC		Skill Development Courses*				3*
			Credits				**23**

IV – SEMESTER

S. No	Course Category	Course Code	Course Title	L	T	P	C
1.	PCC	ECE 2201	Python programming*	2	0	2	3
2.	PCC	ECE 2202	Linear integrated circuit	3	0	0	3
3.	PCC	ECE 2203	Digital Signal Processing	3	1	0	4
4.	PCC	ECE 2204	Electromagnetic & Transmission Lines	3	0	0	3
5.	PCC		Program Elective I	3	0	0	3
6.	PCC	ECE 2205	Linear integrated circuit Laboratory	0	0	2	1
7.	PCC	ECE 2206	Digital Signal Processing Laboratory	0	0	2	1
8.	PCC	ECE 2207	Mini Project - I	0	0	4	2
9.	HSC	GEE 2201	Soft Skills – II**	0	0	2	1
10.	MNC	GEE 2202	IKS Course (MNC -III)	2	0	0	0
11.	PCC		Skill Development Courses *				3*
			Credits				**21**

* (Applicable only for Exit category)

V – SEMESTER

S. No	Course Category	Course Code	Course Title	L	T	P	C
1.	PCC	ECE 3101	Microprocessors and Microcontrollers	3	0	0	3
2.	PCC	ECE 3102	Communication Systems	3	1	0	4
3.	PCC	ECE 3103	VLSI Design	3	0	0	3
4.	PEC		Program Elective II	3	0	0	3
5.	PEC		Program Elective III	3	0	0	3
6.	PCC	ECE 3104	Microprocessors and Microcontrollers Programming Laboratory	0	0	2	1
7.	PCC	ECE 3105	Communication Systems Laboratory	0	0	2	1
	PCC	ECE 3106	VLSI Design Laboratory	0	0	2	1
8.	HSC	GEE 3101	Soft Skills – III	0	0	2	1
9.	INT	ECE 3106	Internship I [$]	0	0	2	1
			Credits				**21**

VI – SEMESTER

S. No	Course Category	Course code	Course Title	L	T	P	C
1.	HSC	MSE 3181	Fundamentals of Entrepreneurship	2	0	2	3
2.	PCC	ECE 3201	Computer Networks and security	3	0	0	3
3.	PCC	ECE 3202	Embedded Systems and IoT	3	0	0	3
4.	PCC		Program Elective IV	3	0	0	3
5.	PCC		Program Elective V	3	0	0	3
6.	OEC		Open Elective I	3	0	0	3
7.	PCC	ECE 3203	Computer Networks Laboratory	0	0	2	1
8.	PCC	ECE 3204	Embedded Systems and IoT Laboratory	0	0	2	1
9.	HSC	GEE 3201	Soft Skills – IV	0	0	2	1
			Credits				**21**

VII – SEMESTER

S. No	Course Category	Course Code	Course Title	L	T	P	C
1.	PCC	ECE 4101	Wireless and Optical Communication	3	0	0	3
2.	PCC	ECE 4102	Antenna and Microwave Engineering	3	0	0	3
3.	PEC		Program Elective VI	3	0	0	3
4.	PEC		Program Elective VII	3	0	0	3
5.	PEC		Program Elective VIII	3	0	0	3
6.	OEC		Open Elective II (Optional MOOC)	3	0	0	3
7.	PCC	ECE 4103	Wireless and Optical Communication Laboratory	0	0	2	1
8.	PCC	ECE 4104	Antenna and Microwave Engineering Laboratory	0	0	2	1
9.	PROJ	ECE 4105	Mini Project - II	0	0	6	3
10.	INT	ECE 4106	Internship – II [$]	0	0	0	1
			Credits				**24**

VIII – SEMESTER

S. No	Course Category	Course Code	Course Title	L	T	P	C
1.	PROJ	ECE 4201	Capstone Project	0	0	18	9
			Credits				**9**

Total Credits - 161

[$] 15 days of Industrial training during the summer vacation of second year and third year. The credit will be awarded in the 5th and 7th semester.

LIST OF PROFESSIONAL ELECTIVE COURSES

SEMESTER IV

Sl. No.	Course Group	Course Code	Course Title	L	T	P	C
1.	PEC	ECEX 001	Control Systems	3	0	0	3
2.	PEC	ECEX 002	Sensors Technology	3	0	0	3
3.	PEC	ECEX 003	Computer Architecture	3	0	0	3
4.	PEC	ECEX 004	Structured and Object Oriented Programming	2	0	2	3

For 5th to 7th Semester professional electives are under 'Four' different streams;

1. **RF COMMUNICATION AND SIGNAL PROCESSING**
2. **VLSI AND EMBEDDED SYSTEMS**
3. **ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING**
4. **AUTOMOTIVE ELECTRONICS AND ROBOTICS**

PROFESSIONAL ELECTIVES - 5TH TO 7TH SEMESTER

RF COMMUNICATION AND SIGNAL PROCESSING

Sl. No.	Course Group	Course Code	Course Title	L	T	P	C	SEM
1.	PEC	ECEX 011	Digital Image and Video Processing	2	0	2	3	5
2.	PEC	ECEX 012	Introduction to PCB design	3	0	0	3	5
3.	PEC	ECEX 013	Multimedia Compression Techniques	3	0	0	3	5
4.	PEC	ECEX 014	Biomedical signal processing	3	0	0	3	5
5.	PEC	ECEX 015	Electromagnetic Interference & Compatibility	3	0	0	3	5
6.	PEC	ECEX 016	Satellite Communication	3	0	0	3	6
7.	PEC	ECEX 017	Radar & Navigational Aids	3	0	0	3	6
8.	PEC	ECEX 018	Advanced DSP	3	0	0	3	6
9.	PEC	ECEX 019	Information theory and Error Control Coding	3	0	0	3	6
10.	PEC	ECEX 020	Detection, Estimation and Modulation Theory	3	0	0	3	6
11.	PEC	ECEX 021	Nanoelectronics	3	0	0	3	7
12.	PEC	ECEX 022	Cryptography and Network Security	3	0	0	3	7
13.	PEC	ECEX 023	MIMO Communication	3	0	0	3	7
14.	PEC	ECEX 024	Introduction to MEMS and NEMS	3	0	0	3	7
15.	PEC	ECEX 025	Cognitive radio network	3	0	0	3	7
16.	PEC	ECEX 026	Advanced Antenna Design	3	0	0	3	7
17.	PEC	ECEX 027	Signal Processing for mmWave communication for 5G and beyond	3	0	0	3	7
18.	PEC	ECEX 028	Optical Networks	3	0	0	3	7
19.	PEC	ECEX 029	Microwave Integrated Circuits	3	0	0	3	7

VLSI AND EMBEDDED SYSTEMS

Sl. No.	Course Group	Course Code	Course Title	L	T	P	C	SEM
1.	PEC	ECEX 041	ARM architecture and Programming	3	0	0	3	5
2.	PEC	ECEX 042	Introduction to Industry 4.0	3	0	0	3	5
3.	PEC	ECEX 043	Advanced Digital Logic System Design	2	0	2	3	5
4.	PEC	ECEX 044	Embedded Linux and device driver programming	3	0	0	3	6
5.	PEC	ECEX 045	Verification and Testing Methodologies for VLSI Circuits	3	0	0	3	6
6.	PEC	ECEX 046	Introduction to Embedded Operating System	3	0	0	3	6
7.	PEC	ECEX 047	AI for VLSI	3	0	0	3	6
8.	PEC	ECEX 048	Analog IC Design	3	0	0	3	6
9.	PEC	ECEX 049	Low power VLSI	3	0	0	3	6
10.	PEC	ECEX 050	Multicore Architecture and Parallel Programming	3	0	0	3	7
11.	PEC	ECEX 051	Embedded Machine learning	3	0	0	3	7
12.	PEC	ECEX 052	CMOS Analog Circuit design	3	0	0	3	7
13.	PEC	ECEX 053	Introduction to Cloud Computing and Edge Computing	3	0	0	3	7
14.	PEC	ECEX 054	Nanoscale Devices and Circuit Design	3	0	0	3	7
15.	PEC	ECEX 055	Introduction to Quantum Computing	3	0	0	3	7
16.	PEC	ECEX 056	Generative AI for embedded system	3	0	0	3	7
17.	PEC	ECEX 057	Embedded deep learning	3	0	0	3	7
18.	PEC	ECEX 058	Network on chip	3	0	0	3	7

ARTIFICIAL INTELLIGENCE and MACHINE LEARNING

Sl. No.	Course Group	Course Code	Course Title	L	T	P	C	SEM
1.	PEC	ECEX 071	Introduction to Artificial Intelligence	2	0	2	3	5
2.	PEC	ECEX 072	Neural Networks and Fuzzy Logic	3	0	0	3	5
3.	PEC	ECEX 073	Computer Vision	2	0	2	3	6
4.	PEC	ECEX 074	Python for Data Science	3	0	0	3	6
5.	PEC	ECEX 075	Machine Learning	3	0	0	3	6
6.	PEC	ECEX 076	Data Science	3	0	0	3	6
7.	PEC	ECEX 077	AI for Medical Image Analysis	3	0	0	3	6
8.	PEC	ECEX 078	MATLAB for AI	3	0	0	3	6
9.	PEC	ECEX 079	GPU architecture and Programming	3	0	0	3	7
10.	PEC	ECEX 080	Pattern Recognition	3	0	0	3	7
11.	PEC	ECEX 081	Deep Learning	3	0	0	3	7
12.	PEC	ECEX 082	Natural Language Processing	3	0	0	3	7
13.	PEC	ECEX 083	Generative AI	3	0	0	3	7
14.	PEC	ECEX 084	Augmented Reality and Virtual Reality	3	0	0	3	7
15.	PEC	ECEX 085	Quantum Computing	3	0	0	3	7
16.	PEC	ECEX 086	Cyber Security	3	0	0	3	7
17.	PEC	ECEX 087	Brain Computer Interface and its Applications	3	0	0	3	7
18.	PEC	ECEX 088	Big Data Analytics	3	0	0	3	7
19.	PEC	ECEX 089	Soft Computing and its Applications	3	0	0	3	7
20.	PEC	ECEX 090	Knowledge Engineering and Expert Systems	3	0	0	3	7
21.	PEC	ECEX 091	Optimization methods for Analytics	3	0	0	3	7

AUTOMOTIVE ELECTRONICS AND ROBOTICS

Sl. No.	Course Group	Course Code	Course Title	L	T	P	C	SEM
1.	PEC	ECEX 101	Principles of Robotics	3	0	0	3	5
2.	PEC	ECEX 102	Fundamentals of Automotive Electronics	3	0	0	3	5
3.	PEC	ECEX 103	Mechatronics	3	0	0	3	6
4.	PEC	ECEX 104	Sensor Technologies for Intelligent Vehicles	3	0	0	3	6
5.	PEC	ECEX 105	Programming for Robotics	3	0	0	3	6
6.	PEC	ECEX 106	Soft Computing techniques for Automotive applications	3	0	0	3	6
7.	PEC	ECEX 107	Advanced Driver Assistance Systems	3	0	0	3	6
8.	PEC	ECEX 108	Machine Learning for Autonomous Driving	3	0	0	3	6
9.	PEC	ECEX 109	Sustainable Transportation Systems	3	0	0	3	6
10.	PEC	ECEX 110	Automotive Networking and protocols	3	0	0	3	7
11.	PEC	ECEX 111	Autonomous Vehicles	3	0	0	3	7
12.	PEC	ECEX 112	Automotive Embedded Systems	3	0	0	3	7
13.	PEC	ECEX 113	Introduction to Robotic operating system	3	0	0	3	7
14.	PEC	ECEX 114	Industrial Robotics	3	0	0	3	7
15.	PEC	ECEX 115	AI for Robotics	3	0	0	3	7
16.	PEC	ECEX 116	Deep Learning for Robotics	3	0	0	3	7
17.	PEC	ECEX 117	Industrial Automation using PLC and SCADA	3	0	0	3	7
18.	PEC	ECEX 118	Control Systems for Vehicles and Robots	3	0	0	3	7
19.	PEC	ECEX 119	IoT in Automotive Systems	3	0	0	3	7

SEMESTER I

ENE 1181	ENGLISH FOR ENGINEERS	L	T	P	C
SDG: 4		3	0	0	3

COURSE OBJECTIVES:

COB1: To develop students' listening skills through exposure to diverse media and enhance comprehension and contextual understanding.

COB2: To enable students to speak effectively in a range of informal and formal contexts.

COB3: To make them analyze academic and technical texts using structured reading techniques.

COB4: To enable them to produce organized, purposeful writing for academic and technical use.

COB5: To equip students with appropriate use of grammar, and technical and academic vocabulary.

MODULE I **L: 10**

L: Listening to short audio-formal & informal conversations - Select episodes from *Learn English Podcasts*, British Council

S: Self Introduction - Present, Past, and Future framework (suggested by Harvard Business Review)

R: Process of reading: Skimming & Scanning, SQ3R

W: Technical Writing- Developing hints, Paragraph Writing (technical)

Grammar & Vocabulary: Prefixes & Suffixes, Articles, Present tense, Prepositions, Subject – Verb Agreement

MODULE II **L: 10**

L: Listening to podcasts - 1. "The impact of online abuse" from *Tech Life,* BBC sounds,

2. How can AI support designers? from *Technology Podcast*.

S:Telephonic conversations (Enquiring& Complaining)

R: Reading long technical texts - Comprehension passages - Select articles from *IEEE Spectrum*, *Techcrunch.com*

W: Jumbled sentences, Process description– Interpretation of Flow chart, Bar chart, Dialogue writing

Grammar & Vocabulary: Transition words, Past tense, Conjunctions, Wh /Yes or No questions, Modal verbs

MODULE III **L: 9**

L: Listening to TED / INK Talks - 1. “The next computer? Your glasses” - ShahramIzadi (TED Talk) 2. “The Society is our Lab” - Sanjay Podder (INK Talk)

S:Extempore-One minute presentation

R: Reading biography (Extracts from ‘Profiles’, The Hindu, Sunday Edition) / Autobiography / Fiction & Note- making

W: Letter seeking permission for Industrial Visit / symposium, Letter of invitation

Grammar & Vocabulary: Homonyms, Degrees of comparison, Future tense

L: 8

MODULE IV

L: Listening to debates & discussions - 1. “Hydrogen vs Battery: The Future of Our Transport”, ”2. “Saudi Arabia’s Economic Shift to Green Energy” from *The Gen-Z Debate* Podcast.

S: Group presentation on general topics

R: Reading magazines and articles (extracts from ‘Sci-Tech’, The Hindu, Sunday Edition)

W: Report writing (Industrial visit report), Argumentative writing

Grammar & Vocabulary: Active, Passive & Impersonal passive voice, Phrasal verbs

L: 8

MODULE V

L: Listening to famous speeches - 1. “Commencement Address at Stanford University” by Steve Jobs 2. “The Voice of Women” by Tejaswini Manogna

S: Debates on Contemporary issues (Agreeing & Disagreeing)

R: Blogs - Articles on Technology, Workforce and Industries from *Deloitte Insights*

W: Book Reviews, Product reviews: Select reviews from “theverge.com”

Grammar & Vocabulary: If clauses, Idioms & Phrases

L: 45 ; Total Hours: 45

TEXT BOOKS:

1. Course material by the Department of English

REFERENCES:

Books:

1) Bailey, Stephen. *Academic Writing: A Practical Guide for Students*. New York: Routledge, 2011.
2) Dutt, P. Kiranmai & Rajeevan, Geeta. *Basic Communication Skills*. Foundation Books, 2013
3) Firth, Matt, Sowton, Chris, et al. *Academic English: An Integrated Skills Course for EAP*. Cambridge University Press, Cambridge, 2012.
4) Perry, Carol Rosenblum. *The Fine Art of Technical Writing*. Create Space Independent Publishing Platform, New Delhi, 2011.
5) Raman, Meenakshi & Sharma, Sangeeta. *Professional English*. Oxford University Press, First Edition, 2018.
6) *Using English: A Coursebook for Undergraduate Engineers and Technologists*. Orient Black Swan Limited, Hyderabad, 2015.

Podcasts:

1) BBC Sounds - Tech Life - available episodes. (n.d.). BBChttps://www.bbc.co.uk/sounds/brand/p01plr2p
2) Podcasts | LearnEnglish. (n.d.). LearnEnglish.https://learnenglish.britishcouncil.org/general-english/audio-series/podcasts
3) Podcasts from The Verge | The Verge.https://www.theverge.com/podcasts
4) *Saudi Arabia's economic shift to green energy*. (2022, July 29). Spotify. https://open.spotify.com/episode/2vjpyVMPjxEswgPxiSoG25
5) Technology Podcast. (n.d.). Thoughtworks.https://www.thoughtworks.com/en-in/insights/podcasts/technology-podcasts
6) *The Gen-Z debate*. (n.d.). Spotify. https://open.spotify.com/show/0ngu1Iheqit2yGWl7c575T

Reviews:

1) Reviews. (2001, May 24). The Verge. https://www.theverge.com/reviews

Famous Speeches:

1) Stanford. (2008, March 8). *Steve Jobs' 2005 Stanford Commencement Address* [Video]. YouTube.https://www.youtube.com/watch?v=UF8uR6Z6KLc

2) *TejaswiniManogna: The Voice of Women*. (2025, May 25). Spotify. https://open.spotify.com/episode/3s4v8SzuDQgKpf0tCEuZQP

Ted / Ink Talks:

1) Izadi, S. (n.d.). *The next computer? Your glasses* [Video]. TED Talks.https://www.ted.com/talks/shahram_izadi_the_next_computer_your_glasses
2) *The society is our lab - INK Talks.*(2021, December 20). INK Talks. https://inktalks.com/talks/the-society-is-our-lab/

Others (Websites & Articles for Reading Skills)

1) Business insights, analysis & perspectives | Deloitte Insights. (n.d.). Deloitte Insights. https://www2.deloitte.com/us/en/insights.html
2) Datta, S. (n.d.). Latest The Hindu Profiles News, Photos, Latest News Headlines about The Hindu Profiles-The Hindu. The Hindu. https://www.thehindu.com/topic/the-hindu-profiles/
3) IEEE Spectrum.https://spectrum.ieee.org/
4) Mukunth, V. (n.d.). Sci-Tech News | latest technological developments. The Hindu.https://www.thehindu.com/sci-tech/
5) TechCrunch. | Startup and technology news.https://techcrunch.com/
6) Wojnicki, A. (2022, August 2). *A simple way to introduce yourself*. Harvard Business Review. https://hbr.org/2022/08/a-simple-way-to-introduce-yourself

COURSE OUTCOMES:

On completion of the course, students will be able to

CO1: Comprehend and interpret a variety of English audio sources.

CO2: Perform effectively in self-introductions, discussions, debates, and collaborative speaking activities.

CO3: Extract relevant information and evaluate content from technical and academic texts using reading strategies.

CO4: Construct academic and technical documents with clarity and coherence.

CO5: Use appropriate vocabulary and grammar in oral and written tasks.

Board of Studies (BoS):	**Academic Council:**
18th BoS of the Department of English	24th AC held on 26.08.2025.

held on 04.06.2025

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1														
CO2														
CO3														
CO4														
CO5														

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

SDG 4: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.

Statement:

The course equips the students with relevant academic and technical communication skills to gain quality employment and entrepreneurial opportunities.

MAE 1181	MATRICES AND DIFFERENTIAL CALCULUS	L	T	P	C
SDG: 4		3	1	0	4

COURSE OBJECTIVES:

COB1: To introduce eigenvalues and eigenvectors of a matrix.

COB2: To demonstrate the application of differential calculus.

COB3: To bring into the light of functions of several variables and its applications.

COB4: To develop the use of ODE solvable techniques necessary for engineering applications.

COB5: To familiarize in solving partial differential equation of first, second and higher orders.

MODULE I MATRICES 9+3

Characteristic equation – Eigenvalues and eigenvectors of a real matrix – Properties of eigenvalues and eigenvectors – Cayley-Hamilton Theorem (without proof) – Orthogonal matrices – Orthogonal transformations of a real symmetric matrix to diagonal form – Reduction of quadratic form to canonical form by orthogonal transformation.

MODULE II DIFFERENTIAL CALCULUS 9+3

Curvature – Cartesian and polar coordinates – Centre and radius of curvature – Circle of curvature – Involutes and evolutes – Envelopes – Evolute as envelope of normals.

MODULE III FUNCTION OF SEVERAL VARIABLES 9+3

Functions of two variables – Partial derivatives – Total differential – Differential of implicit functions – Jacobian – Taylor's series expansion for two variables– Maxima and minima – Constrained maxima and minima by Lagrange's multiplier method.

MODULE IV ORDINARY DIFFERENTIAL EQUATIONS 9+3

Linear differential equations of higher order with constant and variable coefficients – Simultaneous first order linear equations with constant coefficients – Variable coefficients for Euler's type – Equations reducible to homogenous form – Method of variation of parameters.

MODULE V PARTIAL DIFFERENTIAL EQUATIONS 9+3

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – Solution of standard types of first order partial differential equations – Lagrange's linear equation – Linear partial differential equations of second and higher order with constant coefficients.

L – 45; T – 15; TOTAL HOURS – 60

TEXT BOOKS:

1. Ramana B.V, "Higher Engineering Mathematics" Tata McGraw Hill Publishing Co. New Delhi, 2017.
2. B. S. Grewal, "Higher Engineering Mathematics", 45th Edition, Khanna Publishers, New Delhi, 2024.
3. Erwin Kreyszig, "Advanced Engineering Mathematics", 10th Edition, John Wiley and Sons (Asia) Pvt Ltd., 2011 (reprint 2024).

REFERENCES:

1. T. Veerarajan, "Engineering Mathematics", 6th Edition, Tata McGraw Hill Publishing Co., New Delhi, 2018.
2. Jain R. K & Iyengar S. R. K, "Advanced Engineering Mathematics", 5th Edition, Narosa Publishers, 2016.
3. Peter V. O'Neil, "Advanced Engineering Mathematics", 7th Edition, Cengage Learning, 2011.
4. Dennis G. Zill and Warren S. Wright, "Advanced Engineering Mathematics", 7th Edition, Jones & Bartlett (IWAA), Sudbury, 2012.
5. Venkataraman M. K., "Engineering Mathematics", Volume I, 2nd Edition, National Publishing Co., Chennai, 2003.

COURSE OUTCOMES: At the end of the course students will be able to

CO1: use the matrix techniques to compute eigenvalues and eigenvectors of a given matrix.

CO2: apply differential calculus in engineering problems.

CO3: differentiate the functions with more than one variable and their applications.

CO4: solve the differential equations with constant and variable coefficients.

CO5: form and solve the partial differential equations.

Board of Studies (BOS):
17th BOS of Department of Mathematics and Actuarial Science held on 23.06.2025

Academic Council:
24th AC held on 26.08.2025.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1													
CO2	3	1													
CO3	3	1													
CO4	3	2													
CO5	3	2													

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

SDG 4 – Quality Education: Ensure inclusive and equitable quality education and promote lifelong opportunities for all.

Learning various mathematical tools will lead to knowledge of applications in Engineering problems.

PHE 1181	ENIGINEERING PHYSICS	L	T	P	C
SDG: 4		3	0	2	4

COURSE OBJECTIVES:

COB1: To understand the importance of mechanics and properties of matter.

COB2: To familiarize the concepts of electromagnetic waves.

COB3: To introduce the fundamentals of optics and lasers to students

COB4:.To analyze the acoustics of buildings and applications of ultrasonics.

COB5: To correlate the quantum mechanics principles and its impact in its application

MODULE I PROPERTIES OF MATTER AND MECHANICS **L- 9 T- 0 P- 0**

Elasticity – Hooke's Law-Elastic Moduli-Stress-strain diagram – Factors affecting elasticity – Poisson's ratio - Twisting couple on a wire – Shaft – Torsion pendulum – Bending moment - Depression on a cantilever – Young's modulus by cantilever Uniform and non-uniform bending – I Shape Girders-Viscosity. M.I of a diatomic molecule - torque – rotational dynamics of rigid bodies – conservation of angular momentum – rotational energy state of a rigid diatomic molecule - gyroscope - torsional pendulum – compound pendulum –Introduction to nonlinear oscillations.

MODULE II ELECTROMAGNETIC WAVES **L- 9 T - 0 P - 0**

Nature of electromagnetic waves- Properties of EM waves-Coulomb's law, Gauss's law and applications, Electrostatic potential–Biot-Savart Law and its Applications, Ampere's circuital Law – Applications- Faraday's laws of Induction - Maxwell's displacement current - Maxwell's equations – free space - Concept of displacement current- Various types of waves in EM- spectrum -Applications of EM waves.

MODULE III OPTICS AND LASERS L- 9 T - 0 P- 0

Refractive index-refraction through different media-diffraction (Fresnel and Fraunhofer) and polarization –double refraction–Nicol prism- Interference-Air Wedge – Michelson's Interferometer – Determination of wavelength of light and thickness of thin transparent sheet-Characteristics of Laser – Spontaneous and Stimulated Emissions – Einstein's Coefficients - Population inversion – Pumping Mechanism – Laser Action – Types of Laser: Nd:YAG laser –CO_2 laser and semiconductor laser - Applications : Laser Materials Processing – Holography-Medical applications.

MODULE IV ACOUSTICS & ULTRASONICS L-9 T-0 P-0

Basic requirement for the acoustically good halls - Reverberation and time of reverberation – Sabine's formula for reverberation time - Absorption coefficient and its measurement - Factors affecting the architectural acoustics and their remedy-Sound absorbing materials - Introduction to Ultrasonics - Properties - Production methods – Magnetostriction Oscillator method- Piezoelectric Oscillator method – Detection of Ultrasonics –Thermal method – Piezoelectric method – Kundt's tube method – Applications of Ultrasonics – Acoustic Grating – SONAR – Depth of sea – Velocity of blood flow - Ultrasonic Flaw detector.

MODULE V QUANTUM PHYSICS L-9 T-0 P-0

Black body radiation – Planck's theory of radiation – Deduction of Wien's displacement law and Rayleigh – Jean's law from Planck's theory –– Dual nature of matter – de-Broglie wavelength – Theory of Compton's effect – Davison and Germer experiment-Schrodinger wave equation – Time independent and time dependent wave equation-Physical significance of wave function –– Particle in one dimensional box – Introduction to Quantum computing

PRACTICALS **P : 30**

List of Experiments

1. Determination of rigidity modulus of the given wire using Torsional pendulum.
2. Determination of acceleration due to gravity using compound pendulum.
3. Determination of Young's modulus of the beam by uniform / non-uniform bending method.
4. Determination of Young's modulus of the beam by cantilever method.
5. To determine the frequency of an electrically maintained tuning fork using a vibration generator. (Melde's experiment)
6. Determination of thickness of a thin wire / sheet using Air Wedge method.
7. Determination wavelength of spectral lines of mercury source using spectrometer grating method.
8. Determination of wavelength of laser light using semiconductor laser diffraction.
9. Determination of angle of divergence of a laser beam using semiconductor diode laser and He-Ne laser.
10. Determination of particle size of lycopodium powder using semiconductor laser.
11. Determination of Planck's constant using photoelectric effect.
12. Determination of velocity of ultrasonic waves in the liquid using ultrasonic interferometer.
13. Determination of velocity of ultrasonic waves by acoustic grating.
14. Determination of field along the axis of the coil. (Biot-Sawart Law).
15. Verification Ampère's Circuital Law using a long straight current-carrying conductor and measurement of the magnetic field around it.

L – 45; P – 30 ; TOTAL HOURS – 75

TEXT BOOKS:

1. Richard Wolfson, "Essential University Physics", Pearson (2011)
2. Dale Ewen, Neill Schurter, P.E. Gundersen, "Applied Physics", Pearson (2005)

REFERENCES:

1. D.Kleppner and R.Kolenkow. An Introduction to Mechanics. McGraw Hill Education, 2017.
2. Brij Lal and N. Subramanyam, Properties of Matter, S.Chand & Co, 2003.
3. Brij Lal and N.Subramanyam, Optics and Spectorscopy, S.Chand & Co.,2003.
4. Serway R.A. and Jewett, J.W., Physics for Scientists and Engineers with Modern Physics, Brooks/cole Publishing Co., 2010.
5. Tipler P.A. and Mosca, G.P., Physics for Scientists and Engineers with Modern Physics, W.H. Freeman, 2007.
6. Markert J.T., Ohanian. H. and Ohanian, M., Physics for Engineers and Scientists, W.W. Norton & Co., 2007.

COURSE OUTCOMES:

CO1: grasp the importance of mechanics and the principles of elastic behaviour of materials & apply them to analyze the various substances based on elasticity.

CO2: apply the fundamental principles governing the electromagnetic waves and their impact in technology.

CO3: comprehend the importance & principles of optics and learn the science of lasers and its applications.

CO4: assimilate the ideas of acoustical requirements of buildings, understand principles and generation of ultrasonics and their applications.

CO5: get acquainted with the topics concerning principles of quantum mechanics and correlate the relevance in real time application in devices.

Board of Studies (BoS) :
15th Meeting of BOS held on 18/07/2025

Academic Council:
24th AC held on 26.08.2025

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO 12	PSO1	PSO2
CO1	H	H	M	L	M	M	M	M	M	L	L	H	M	M
CO2	H	H	M	M	M	M	M	M	M	L	L	H	M	M
CO3	H	H	M	L	H	M	M	M	M	L	L	H	M	M
CO4	H	H	M	M	M	M	M	M	M	L	L	H	M	M
CO5	H	H	M	L	H	M	M	M	M	L	L	H	M	M

Note: L - Low Correlation M - Medium Correlation H - High Correlation

SDG 4: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all

Statement:

The modules and topics mentioned in this course are designed to ensure all-inclusive and thorough education with equity to all persons and promote learning opportunities at all times.

GEE 1101	ENGINEERING GRAPHICS	L	T	P	C
SDG: 9		2	0	2	3

COURSE OBJECTIVES:

COB1: To develop basic skills in engineering drawing and orthographic projection using BIS standards, covering projections of points, lines, and planes in different quadrants.

COB2: To visualize and construct orthographic projections of regular solids.

COB3: To impart the ability to generate sectional views and determine the true shape of sections, by enhancing interpretation of internal features.

COB4: To introduce isometric projections by creating isometric views of regular solids and frustums using isometric axes and scale.

COB5: To familiarize with the basics of Computer-Aided Drafting and Design (CADD), and to draw orthographic projection views of simple machine parts.

MODULE I INTRODUCTION TO ENGINEERING DRAWING AND ORTHOGRAPHIC PROJECTION OF POINTS, STRAIGHT LINE AND PLANES — **L: 08 T: 0 P: 10**

Drawing instruments, dimensioning, BIS conventions, types of lines, simple geometric constructions -Scale - Orthographic projection – first angle, second angle, third angle and fourth angle projections - Orthographic projection of points in all quadrants - Projection of straight lines inclined to both reference planes in first quadrant - Projection of plane lamina inclined to both reference planes in first quadrant.

MODULE II ORTHOGRAPHIC PROJECTION OF REGULAR SOLIDS — **L: 06 T: 0 P: 06**

Orthographic projections of solids in first quadrant: Axis inclined to one reference plane -prism, pyramid, cone, and cylinder only– change of position method.

MODULE III SECTIONAL VIEWS OF RIGHT REGULAR SOLIDS — **L: 05 T: 0 P: 04**

Section of solids: prism, pyramid, cone and cylinder– sectional view – true shape of section- cutting simple position solids – section plane inclined to one reference plane only.

MODULE IV ISOMETRIC PROJECTIONS **L: 05 T: 0 P: 04**

Principle of isometric projection: isometric scale – isometric axes- isometric projection and view of prism, pyramid, cylinder, cone, frustums and combination of simple solids.

MODULE V OVERVIEW OF COMPUTER GRAPHICS AND CADD **L: 06 T: 0 P: 06**

Listing the computer technologies that impact on graphical communication, demonstrating knowledge of the theory of CAD software such as: The menu system, Toolbars (Standard, Object Properties, Draw, Modify and Dimension), drawing area, dialog boxes and windows, shortcut menus, command line, status bar, zoom as used in CAD, select and erase objects. - Sketching orthographic views of simple solids and machine parts as per first angle projection

L – 30; T – 0; P – 30; Total Hours: 60

TEXT BOOKS:

1. N.D. Bhatt, “Engineering Drawing”, Charotar Publishing house, 54th Edtion, 2023.
2. Venugopal. K, and V. Prabhu Raja, “Engineering Graphics”, New Age International (P) Ltd., Publication, Chennai, Edition 15th, 2018.

REFERENCES:

1. K.V. Natarajan, “A text book of Engineering Graphics”, Dhanalakshmi publishers, Chennai, 31st Edition, 2018.
2. Agrawal B. & Agrawal C. M., “Engineering Graphics”, TMH Publication, 2017.
3. Jeyapoovan, T., “Engineering Graphics using AutoCAD”, Vikas Publishing House Pvt. Ltd., New Delhi, 7th Edition 2014.
4. AutoCAD Software Theory and User Manuals
5. Engineering graphics You tube Lecture videos link: https://www.youtube.com/user/BSAUNIV/videos
6. Alternative NPTEL / SWAYAM course: (1.) Prof. Nihar Ranjan Patra of IIT Kanpur on Engineering Graphics and (2.) Prof. Rajaram Lakkaraju of IIT KGP on Engineering Drawing and Computer Graphics

COURSE OUTCOMES: After completion of the course, the students should be able to

CO1: Apply BIS standards and conventions to create basic engineering drawings, including projections of points, lines, and planes in various quadrants.

CO2: Construct orthographic projections of regular solids with axes inclined to one reference plane using appropriate methods.

CO3: Interpret and draw sectional views of solids and determine the true shape of sections for given cutting plane conditions.

CO4: Create isometric projections and views of regular solids and frustums using isometric principles and scale.

CO5: Use CAD software tools to generate accurate orthographic views of simple machine parts following first-angle projection standards.

Board of Studies (BoS):
25th BoS of Mechanical held on 09.07.2025.

Academic Council:
24th AC held on 26.08.2025

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

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

SDG 9: Build resilient Infrastructure, promote inclusive and sustainable industrialization and foster innovation.

Understanding various industrial standards for technical drawing and applying orthographic projections to represent simple solids support the development of innovative designs, contributing to sustainable industrialization.

GEE 1102	DESIGN THINKING	L	T	P	C
SDG: 9		3	0	0	3

COURSE OBJECTIVES:

COB1: To impart the basics of design thinking and train the students in identifying the opportunity to develop innovative solutions for problem faced by the society

COB2: To introduce the tools of empathy and inculcate the problem definition phase of design thinking

COB3: To acquaint the idea generation methods used for solving engineering problems

COB4: To develop the culture of making prototype from design concepts

COB5: To familiarize the role of innovation and patents in engineering

MODULE I INTRODUCTION TO DESIGN THINKING **L: 09 T: 0 P: 0**

Importance of design in engineering – Evolution of products – Difference between product, process, system and software – Origin and relevance of design thinking – Stages of design thinking - Customer centric design - Development of user persona – Opportunity and problem identification.

MODULE II PROBLEM DEFINITION **L: 10 T: 0 P: 0**

Empathy: Tools and methods, empathy map, customer journey mapping – Define: Tools used in define phase, 5-WHY method, fish bone diagram, importance of problem framing, Point Of View (POV) statement. Case studies for empathy and problem definition.

MODULE III IDEATION **L: 09 T: 0 P: 0**

Idea generation: Tools and methods – Bench marking, Brainstorming, idea affinity maps, 6-3-5 method, Mind mapping, SCAMPER, Co-design - Case studies on ideation.

MODULE IV PROTOTYPING AND TESTING **L: 09 T: 0 P: 0**

Types of prototypes: Prototype fidelity, Evolutionary vs Throwaway prototypes,

Minimum Viable Prototype, Sketch models, Story boards, Digital prototypes, working prototypes, 3D printed prototypes – User testing with prototypes – Test the design feasibility, capability and usability - Value proposition canvas.

MODULE V INNOVATION **L: 08 T: 0 P: 0**

Creativity and innovation – Role of innovation in Engineering – incremental innovation – Break through innovation - scientific approach to driving innovation – Intellectual property rights – Startups - case studies on innovative products and startups.

L – 45; T – 0; P – 0; Total Hours: 45

TEXT BOOKS:

1. Tim Brown, “Change by Design”, HarperCollins, 2019.
2. Nigel Cross, “Design Thinking”, Berg Publishers, 2011.

REFERENCES:

1. Tom Kelley, “The Art of Innovation”, Profile Books Ltd, London, 2016
2. E. Balagurusamy, “Design Thinking”, McGraw Hill, First Edition, 2024
3. Clive L. Dym, Patrick Little, and Elizabeth J. Orwin, “Engineering Design: A Project Based Introduction”, 4th Edition, Wiley, 2014.
4. Cliff Matthews, “Case Studies in Engineering Design”, John Wiley & Sons Pvt. Ltd, New York, 1998.
5. Eppinger, S. and Ulrich, K., “Product design and development”. McGraw-Hill, 7th Edition 2020.

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

CO1: Explain the basic concepts of design thinking and identify the opportunity for developing innovative solutions for the problem faced by the society

CO2: Empathize to collect customer needs and write problem statement based on design thinking principles

CO3: Generate innovative ideas for solving engineering problems using the tools and methods of design thinking

CO4: Develop and test simple prototypes to verify design viability

CO5: Apply innovative approaches to engineering problems and provide design solutions

Board of Studies (BoS):
25th BoS of Mechanical held on 09.07.2025.

Academic Council:
24th AC held on 26.08.2025

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

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

SDG 9: Industry, Innovation & Infrastructure.

The holistic understanding of Engineering design, Design thinking, Prototypes and Creativity and innovation.
Our industries and infrastructure must be upgraded to meet future challenges. In order to achieve this, we must promote innovative, sustainable technologies while also ensuring equal and universal access to information and financial markets.

GEE 1103	DIGITAL MANUFACTURING AND	L	T	P	C
SDG: 8, 9	FABRICATION LABORATORY	0	0	2	1

COURSE OBJECTIVES:

COB1: To familiarize with the plumbing and sanitary fixtures in a building.

COB2: To understand the materials used in construction, its functions and the structural elements in buildings.

COB3: To provide hands-on experience in fundamental manufacturing processes, including various welding techniques and traditional foundry operations, enabling students to understand material joining and shaping.

COB4: To introduce modern manufacturing technologies like additive manufacturing (3D printing) fostering diverse fabrication methods.

COB5: To provide hands-on experience on basic electrical wiring systems and to ensure safe and effective electrical installations.

COB6: To introduce the active and passive electronic components, wire up simple electronic circuits and test them.

LIST OF EXPERIMENTS:

CIVIL ENGINEERING PRACTICE:

1. Plumbing: Components and tools used in residential plumbing work – Plumbing layout of a typical building – Types of pipes and connection details – plumbing arrangement for washroom and kitchen.

2. Masonry and Concrete: Materials for cement mortar and concrete – Types of wall materials and their arrangement.

3. Steel rebar for construction – Types and properties.

4. Building Frame: Elements of building frame – Typical Load transfer arrangement – Model Making: Foundation, beam and Column.

MECHANICAL ENGINEERING PRACTICE:

1. Introduction to various weld joints. Fabrication of a simple structures using Lap / Fillet Joints using Arc Welding – Gas cutting (Demo)

2. Foundry operations such as sand mold preparation for simple

Engineering components.

3. Group exercises in 3D Printers.
4. Joints using Drilling – Study exercise.

ELECTRICAL ENGINEERING PRACTICE:

1. Domestic Wiring
2. Staircase Wiring
3. Measurement of Earth Resistance

ELECTRONICS ENGINEERING PRACTICE:

1. Identifications and symbolic representation of active and passive electronic components
2. Soldering and tracing of electronic circuits and checking its continuity
3. Design and testing of electronic circuits using active and passive electronic components.

L – 0; T – 0; P – 30; Total Hours:30

TEXT BOOKS

1. S.Gowri and T.Jeyapoovan, “Engineering Practices Lab Manual – Civil, Mechanical, Electrical, Electronics included”, Vikas Publishing, 5th Edition, 2019.

REFERENCES:

1. SubhransuSekhar Dash &K.Vijayakumar, “Electrical Engineering Practice Lab Manual”, Vijay Nicole Imprints Private Ltd., First Edition, 2013.
2. Raghbir Singh Khandpur, “Printed Circuit Boards: Design, Fabrication, and Assembly”, Tata McGraw-Hill Education, 2005.

COURSE OUTCOMES: After completion of the course, students should be able to

CO1: To recognize the materials used in construction, its functions, and load transfer arrangement of structural elements in a residential building.

CO2: To identify the plumbing and sanitary fixtures, and its arrangement in a residential building.

CO3: Identify and differentiate various weld joint types and demonstrate proficiency in fabricating simple structures using arc welding for lap and fillet joints.

CO4: Demonstrate an understanding of additive manufacturing principles and applications.

CO5: Identify active and passive electronic components and Wire up simple electronic circuits, solder the components and test.

CO6: Apply electrical wiring diagrams to construct domestic and staircase wiring systems

Board of Studies (BoS):
25th BoS of Mechanical held on 09.07.2025.

Academic Council:
24th AC held on 26.08.2025

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3				3				2				
CO2	3				3				2				
CO3	3				3				2				
CO4	3				3				2				
CO5	3				3				2				
CO6	3				3				2				

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

SDG 8: Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all.

SDG 9: Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation.

Equips individuals with practical skills like welding, basic wiring, and electronic circuit for a stable and sustainable livelihood.

Develops essential infrastructure maintenance skills such as plumbing, and masonry, for resilient and functional buildings and sanitation systems.

GEE 1104	PROGRAMMING FOR PROBLEM SOLVING	L	T	P	C
SDG: 4		2	0	2	3

COURSE OBJECTIVES:

COB1: To introduce the basic concepts of computing systems, software, hardware, and programming language evolution.

COB2: To equip students with problem-solving skills using algorithms, flowcharts, and design strategies.

COB3: To enable students to write structured C programs using variables, operators, control structures, and modular programming with functions.

COB4: To gain skills to work with arrays, strings, structures, and unions for solving data manipulation problems.

COB5: To provide an understanding of pointers, memory access, file operations, and advanced C programming constructs.

MODULE I **COMPUTATIONAL THINKING AND PROBLEM SOLVING** **7**

Fundamental of Computing System-History of computing – Hardware – Software – Languages – Machine - Assembly - High-level - Language Translators – Compiler – Interpreter - Linker - Loader – Program Execution – Design - Flowchart – Algorithm – Design techniques - Divide and conquer- Brute Force – Greedy algorithms - Dynamic Programming.

MODULE II **FUNDAMENTALS OF PROGRAMMING USING C** **8**

Introduction to C Programming-Structure of C Program- Applications of C language- Data Types - Variables - Constants - Keywords - Operators: Precedence and Associativity – Expressions - Input and Output operations – Decision making – Branching – Looping statements.

MODULE III **ARRAYS AND FUNCTIONS** **8**

Arrays – One dimensional array - Two and multidimensional array – Strings - String operations – Functions - Category of Functions – Call by value – Call by reference – Recursion - Structures - Unions.

MODULE IV POINTERS AND FILE MANAGEMENT 7

Pointers - Pointer Arithmetic - Pointers and Arrays - Pointers and Strings - Pointers and Functions - File Handling – File Operations - Command Line Arguments - Preprocessor Directives - Enumerated Data Types and Typedef.

PRACTICALS 15

1. I/O statements and operators
2. Decision Making statements
3. Looping statements
4. Single and Two dimensional Arrays
5. String Operations
6. Functions: call, return, passing parameters by (value, reference), passing arrays to function
7. Recursion
8. Structures and Unions
9. Pointers
10. File operations in C using standard I/O functions

L – 30; P- 15;Total Hours – 45

TEXT BOOKS:

1. E. Balagurusamy, *Programming in ANSI C*, 9th edition. New Delhi, India: McGraw-Hill Education India, ISBN-13: 978-9355326720, 2024.
2. Y. Kanetkar, “Let Us C: Authenticate guide to C Programming Language”, 20th edition. New Delhi, India: BPB Publications, ISBN-13 978-9355515513, 2024.
3. Thomas H. Cormen, Charles E. Leiserson , Ronald L. Rivest, Clifford Stein, “Introduction to Algorithms”, 4th edition, ISBN-13: 9780262046305, 2022.
4. Nell Dale and John Lewis, “Computer Science Illuminated”, 7th edition, Jones and Bartlett Learning , ISBN-13:9781284155617, 2020.

REFERENCES:

1. Kernighan, B.W and Ritchie,D.M, “The C Programming language”, 2nd Edition, Pearson Education, ISBN-13:9789332549449, 2015.

2. Ashok. N. kamthane, “Computer Programming”, 1st Edition, Pearson Education, ISBN-13: 9788131704486, 2007.

COURSE OUTCOMES: The students who complete this course will be able to

CO1: Describe the fundamental components of a computing system, evolution of programming languages, and program execution process..

CO2: Develop algorithms and flowcharts using standard problem-solving strategies such as divide and conquer, greedy, brute force, and dynamic programming.

CO3: Write programs in C using basic syntax, data types, operators, control structures, and functions including recursion.

CO4: Implement arrays, strings, structures, and unions to solve real-world programming problems.

CO5: Apply the concepts of pointers, file handling, command-line arguments, and preprocessor directives for efficient C programming.

Board of Studies (BoS) : 25th BoS of CSE held on 07.07.2025

Academic Council: 24th AC held on 26.08.2025

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO1	PSO2
CO1	3	2	1	1	1	-	-	-	3	-	2	3	1	1
CO2	3	3	2	2	1	-	-	-	3	-	2	3	2	3
CO3	3	3	3	2	2	-	-	-	3	2	2	2	3	3
CO4	3	3	3	2	2	3	-	-	3	2	2	2	3	3
CO5	3	3	3	2	3	-	-	-	3	2	2	1	3	3

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

SDG 4: Quality Education focuses on ensuring inclusive and equitable quality education and promoting lifelong learning opportunities.

Statement: Equipping students with essential programming skills in C programming fosters computational thinking, problem-solving abilities, and software development proficiency that are foundational for lifelong learning and future-ready employment in the digital economy.

GEE 1105	ENVIRONMENTAL SCIENCES	L	T	P	C
SDG: 3, 6, 13, 14, 15		2	0	0	0

COURSE OBJECTIVES: To make the student conversant with the

COB1: various natural resources, availability, utilisation and its current scenario.

COB2: diverse ecosystems and its function, importance of biodiversity, its values, threats and conservation.

COB3: types of pollutants and its impacts on the environment and the effects of natural disasters.

COB4: impacts of human population, human health, diseases and immunisation for a sustainable lifestyle.

MODULE I Natural Resources L: 8 T: 0 P: 0

Introduction to Environmental Science - Lithosphere, hydrosphere and atmosphere – Biosphere - Natural Resources: Renewable and non-renewable resources - Natural resources and associated problems: (a) Land resources: soil erosion and desertification (b) Forest resources: deforestation (c) Water resources: conflicts over water, dams: benefits and problems, effects on forest and tribal people, rain water harvesting (d) Mineral resources: environmental effects of extracting and using mineral resources and mining (e) Food resources: changes caused by agriculture and overgrazing, effects of modern agriculture (f) Energy resources: Growing energy needs, renewable and nonrenewable energy sources, use of alternate energy sources.

Case Studies: Case studies in the current scenario in TN/India/across the world

MODULE II Ecosystems and Biodiversity L: 7 T: 0 P: 0

Ecosystems - Concept of an ecosystem and types: Terrestrial Ecosystems: Forest ecosystem, Grassland ecosystem, Desert ecosystem; Aquatic fresh water ecosystems: Ponds and lakes, rivers and streams; Aquatic salt water ecosystems: oceans and estuaries - Food chains, food webs - Energy flow in the ecosystem - Ecological pyramids - Ecological succession - Biodiversity and its conservation: Types: genetic, species and ecosystem diversity - Values of biodiversity - Invasive,

endangered, endemic and extinct species - Hot sports of biodiversity and Red Data book - Threats to biodiversity - Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

Case Studies: Case studies in the current scenario in TN/India/across the world

MODULE III Environmental Pollution and Disaster Management L: 8 T: 0 P: 0

Carbon foot prints - greenhouse effect, global warming and ozone layer depletion - Sources, cause, effects and control measures of (a) Air pollution (b) Water pollution (c) Soil pollution (d) Marine pollution (e) Noise pollution (f) Nuclear Hazards (g) ill-effects of fireworks and upkeep of clean environment - Types of fire and fire extinguishers - Solid waste Management: types, collection, processing and disposal of urban waste, industrial waste, e-waste and biomedical wastes - Disaster management: flood, drought, cyclone, landslide, avalanche, volcanic eruptions, earthquake and tsunami.

Case Studies: Case studies in the current scenario in TN/India/across the world

MODULE IV Human Population, Health and Social Issues L: 7 T: 0 P: 0

Human Population, Population growth and population explosion - Population pyramid among nations - Human Rights and NHRC - Value Education - Environment and human health: air-borne, water borne, infectious diseases, contagious diseases and immunisation (all types of vaccines), covid-19 and bioweapons - Risks due to chemicals in food and water, endocrine disrupting chemicals, cancer and environment - Sustainable development and SDG - Resettlement and rehabilitation of people - Programme for Family, Women and Child welfare.

Case Studies: Case studies in the current scenario in TN/India/across the world

L – 30; T – 0; P – 0; Total Hours: 30

TEXT BOOKS:

1. Erach Bharucha, Textbook for Environmental Studies for Undergraduate Courses of all Branches of Higher Education for University Grants Commission, Orient Blackswan Pvt. Ltd., Hyderabad, India, 2013.
2. Benny Joseph, Environmental Studies, Tata McGraw-Hill Education, India, 2009.
3. Ravikrishnan A, Environmental Science and Engineering, Sri Krishna

Publications, Tamil Nadu, India, 2018.
4. Raman Sivakumar, Introduction to Environmental Science and Engineering, McGraw Hill Education, India, 2009.
5. Venugopala Rao P, Principles of Environmental Science and Engineering, Prentice Hall India Learning Private Limited; India, 2006.
6. Anubha Kaushik and Kaushik C.P., Environmental Science and Engineering, New Age International Pvt. Ltd., New Delhi, India, 2009.

REFERENCES:

1. Masters G.M., Introduction to Environmental Engineering and Science, Prentice Hall, New Delhi, 1997.
2. Henry J.G. and Heike G.W., Environmental Science and Engineering, Prentice Hall International Inc., New Jersy, 1996.
3. Miller T.G. Jr., Environmental Science, Wadsworth Publishing Co. Boston, USA, 2016.
4. Waste to Resources: A Waste Management Handbook, The Energy and Resources Institute, 2014.
5. https://www.teriin.org/article/e-waste-management-india-challenges-and-opportunities.
6. https://green.harvard.edu/tools-resources/how/6-ways-minimize-your-e-waste.
7. https://www.aiims.edu/en/departments-and-centers/central-facilities/265-biomedical/7346-bio-medical-waste-management.html.
8. https://tspcb.cgg.gov.in/Shared%20Documents/Guidelines%20for%20Management%20of%20Healthcare%20Waste%20Waste%20Management%20Rules,%202016%20by%20Health%20Care%20Facilities.pdf.

COURSE OUTCOMES: The student will be able to

CO1: analyse the current scenario of various natural resources and their depletion and suggest remedies to curb the exploitation.

CO2: identify food chains and web and its function in the environment, assess the impacts on the biodiversity and propose solutions to conserve it.

CO3: analyse the types and impacts of pollutants in the environment and propose suitable methods to alleviate the pollutants and the natural disasters.

CO4: assess on the impact of human population and the health related

issues and immunisation practices and sustainable developments for a healthy life.

Board of Studies (BoS):
14th BoS of Chemistry held on 17.07.2025

Academic Council:
24th AC held on 26.08.2025

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

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

SDG 3: Good Health and Well-Being	Ensure healthy lives and promote well-being for all at all ages
SDG 6: Clean Water and Sanitation	Ensure availability and sustainable management of water and sanitation for all
SDG 13: Climate Action	Take urgent action to combat climate change and its impacts
SDG 14: Life Below Water	Conserve and sustainably use the oceans, seas and marine resources for sustainable development
SDG 15: Life on Land	Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss

Statement:

Natural resources, land and water ecosystems, biodiversity and its degradation, pollution and its management to have a sustainable environment.

SEMESTER II

MAE 1282	TRANSFORMS AND ITS APPLICATIONS	L	T	P	C
SDG: 4		3	1	0	4

COURSE OBJECTIVES:

COB1: To develop the knowledge of expressing the function as a series and applications of Fourier series.

COB2: To acquire the knowledge of boundary value problems.

COB3: To introduce techniques and engineering applications of Laplace Transforms.

COB4: To know the Fourier transform techniques.

COB5: To acquaint with Z -Transform techniques for discrete time systems.

MODULE I FOURIER SERIES 9+3

Introduction to Fourier Series – Dirichlet's conditions – General Fourier series – Half range Fourier series –Root mean square value – Parseval's identity – Harmonic analysis.

MODULE II BOUNDARY VALUE PROBLEMS 9+3

Classification of second order linear partial differential equations – Solutions of one dimensional wave and heat equations – Steady state solution of two dimensional heat equation – Fourier series solutions in Cartesian coordinates.

MODULE III LAPLACE TRANSFORM 9+3

Introduction to Laplace transform – Existence of Laplace transform – Properties of Laplace transforms – Initial & Final value theorems – Laplace transform of periodic functions – Inverse Laplace transform – Convolution theorem – Solution of ordinary differential equations – Applications.

MODULE IV FOURIER TRANSFORM 9+3

Fourier integral theorem (without proof) – Fourier transform pair – Fourier sine and cosine transform – Fourier inverse transform – Properties – Convolution theorem – Parseval's identity.

MODULE V Z – TRANSFORM **9+3**

Introduction to Z-transform – Properties of Z-transform – Inverse Z-transform – Convolution theorem – Formation of difference equations – Solving difference equations using Z-transform.

L –45; T–15; TOTAL HOURS – 60

TEXT BOOKS:

1. Ramana B.V, “Higher Engineering Mathematics” Tata McGraw Hill Publishing Co. New Delhi, 2017.
2. B. S. Grewal, “Higher Engineering Mathematics”, 45th Edition, Khanna Publishers, New Delhi, 2024.
3. Erwin Kreyszig, “Advanced Engineering Mathematics”, 10th Edition, John Wiley and Sons (Asia) Pvt Ltd., 2011 (reprint 2024).

REFERENCES:

1. T. Veerarajan, “Engineering Mathematics (for Semester III)”, 3rd Edition, Tata McGraw Hill Publishing Co. New Delhi, 2012.
2. R. K. Jain and S. R. K. Iyengar, “Advanced Engineering Mathematics”, 5th Edition, Narosa Publishers, 2016.
3. Peter V. O'Neil, “Advanced Engineering Mathematics”, 7th Edition, Cengage Learning, 2011.
4. Dennis G. Zill and Warren S. Wright, “Advanced Engineering Mathematics”, 7th Edition, Jones & Bartlett (IWAA), Sudbury, 2012.
5. Alan Jeffrey, “Advanced Engineering Mathematics”, 3rd Edition, Academic Press, USA, 2001(2002).

COURSE OUTCOMES: At the end of the course students will be able to

CO1: derive a Fourier series of a given periodic function by evaluating Fourier coefficients.

CO2: solve boundary value problems.

CO3: use Laplace transforms techniques to solve ordinary differential equations.

CO4: apply Fourier transform to evaluate the integrals.

CO5: solve difference equations using Z-transform.

Board Of Studies (BOS):

17th BOS of Department of Mathematics and Actuarial Science held on 23.06.2025

Academic Council:

24th AC held on 26.08.2025

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1													
CO2	3	2													
CO3	3	2													
CO4	2	1													
CO5	2	1													

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

SDG 4 – Quality Education: Ensure inclusive and equitable quality education and promote lifelong opportunities for all.

Learning various mathematical tools will lead to knowledge of applications in engineering problems.

CHE1181	CHEMISTRY FOR ENGINEERING APPLICATIONS	L	T	P	C
SDG: 6, 9		3	0	2	4

COURSE OBJECTIVES: To make the students conversant with

COB1: the basic water quality parameters and the current scenario in terms of TDS, TSS, DO, hardness, alkalinity and their treatment.

COB2: Preparation, properties and applications of various polymers and composites

COB3: Types of corrosion, corrosion rate and control methods

COB4: Metals, nonmetals, alloys and their property and applications

COB5: Different types of sensors, working principle and applications.

MODULE I WATER TECHNOLOGY **L: 9 T: 0 P: 0**

Sources of water - Types of impurities in water: Physical, chemical and biological impurities - Specifications of water for domestic use (recommended by BIS and WHO) - Water Quality Parameters: Physical Characteristics - Colour, Turbidity (Turbidimetry and nephelometry), Taste and Odour (dissolved gases), Total Dissolved Solids (TDS), Total Suspended Solids (TSS) and Chemical Characteristics: Hardness - types and estimation (EDTA method), boiler problems, Acidity and Alkalinity (types) and pH correction, DO, BOD, COD - Water softening: Internal Conditioning (Carbonate, Phosphate, Calgon and colloidal conditioning) and External Conditioning (Ion-exchange process) - Desalination: Reverse Osmosis - Purification using nano and biomaterials - Domestic water treatment (Physical Processes: Screening, Aeration, Coagulation, Sedimentation, Filtration, Disinfection (UV treatment, bleaching powder and breakpoint chlorination)) - Heavy metals in water: Arsenic, Lead, Fluoride, Mercury in water, effects and removal.

MODULE II POLYMERS FOR ENGINEERING APPLICATIONS **L: 9 T: 0 P: 0**

Classification based on source, structure and intermolecular forces (elastomers, fibers, resins, plastics (thermoplastics and thermosetting plastics)) - Society of the Plastics Industry (SPI) Codes - Glass Transition Temperature and its significance - Preparation, properties and applications of: Commodity Polymers: Polyethene (LDPE, HDPE), PVC and PMMA - Engineering Polymers: polycarbonate, Teflon, bakelite, ABS Co-polymer

(Terpolymer) - Conducting polymers (Polyaniline) – Light emitting polymers (Polypyrrole (PPy)) - Biopolymers (PLA) - Dielectric polymers (Polyimide) - Foams (polyurethane) - Polymer blends and alloys (Definition and example) - Compounding and moulding techniques: Types (Injection Moulding and blow Moulding) - Polymers in sensors, self-cleaning and healing polymers (windows).

MODULE III CORROSION AND ITS PREVENTION **L: 9 T: 0 P: 0**

Types of corrosion - dry and wet corrosion - Electrochemical corrosion: galvanic corrosion, differential aeration corrosion and types - Rate of corrosion (weight loss method) - Factors affecting corrosion and determination - Prevention of corrosion: choice of materials and design - Corrosion inhibitors - anodic, cathodic, vapour phase and nano inhibitors - Sacrificial anodic protection and Impressed Current Cathodic Protection - Electroplating and electrolesss plating of PCB.

MODULE IV METALS, ALLOYS, METAL OXIDES AND COMPOSITES **L: 9 T: 0 P: 0**

Metals: copper, iron, aluminium - electrical conductivity and thermal conductivity, electrical wiring, components - phase changing materials heat sink - Alloys: steel (carbon alloy), brass and bronze (copper alloys), titanium alloys, solder (Pb and Sn) and lead-free solder - strength, hardness, and corrosion resistance - Metal oxides and mixed metal oxides: semiconductor, hardness and strength, catalysts, ceramics, clay based insulating materials - Composites: metal matrix composites, metal ceramics composites, metal fiber composites - strength and weight reduction, Fibre reinforced plastics (FRP).

MODULE V SENSORS **L: 9 T: 0 P: 0**

Sensors: Introduction and types - Principle, working and applications of Electrochemical sensors: MEMS and NEMS – Biosensors: construction, working and classification, Advantages - Biochips and genomics - Touch sensor (oximeter and glucometer) - Toxic gas sensor (H_2S and CO (septic tank)) - Smoke sensor - humidity sensor - temperature sensor - alcohol sensor (breathalyser).

PRACTICALS

1. Estimation of hardness in water sample.
2. Estimation of the alkalinity of water sample.
3. Estimation of dissolved oxygen in water sample.

4. Removal of hardness from the water sample by carbonate and phosphate conditioning.
5. Determination of total suspended solids by evaporation method
6. Preparation of polymers - polylactic acid, epoxy resin, PMMA
7. Moulding - Demo
8. Corrosion (acid, base and salt) and control (anodic and cathodic inhibitors)
9. Rate of corrosion (weight loss method)
10. Electroplating of copper on iron nail and determination of plating rate
11. Estimation of metals in alloys (precipitation method)
12. Synthesis of mixed metal oxides/ceramics/FRP
13. Glucose detection and alcohol sensing

L - 45; T - 0; P - 30; Total Hours: 75

TEXT BOOKS:

1. P.C. Jain and Monica Jain, Engineering Chemistry, 17th Edition, Dhanpat Rai Publishing Company Pvt. Ltd., Delhi, 2025 (ISBN: 978-93-5216-213-0).
2. A. Ravikrishnan, Engineering Chemistry, Sri Krishna Hitech Publishing Company, 2018.
3. K. Sesha Maheswaramma, Engineering Chemistry, Pearson India, 2015 (ISBN: 9789332541573).
4. Rajender Singh, Introduction to Basic Manufacturing Process and Workshop Technology, New Age International Pvt. Ltd., 2006 (ISBN:9788122418460, 8122418465).
5. John Vetelino and Aravind Reghu, Introduction to Sensors, CRC Press, 2011 (ISBN: 9781439808528).

REFERENCES:

1. Clair N Sawyer, Perry L McCarty and Gene F Parkin, Chemistry for Environmental engineering and science, McGraw-Hill, Year: 2003 (ISBN: 9780072480665).
2. Mackenzie L. Davis, Michigan State University and David A. Cornwell, Introduction to Environmental Engineering, V Edition, McGraw-Hill, 2013 (ISBN 9780073401140).
3. Fred W. Billmeyer, Textbook of polymer science, John Wiley & Sons, Year: 1984 (ISBN: 9780471031963).
4. Vasant R. Gowariker, N.V. Viswanathan and Jayadev Sreedhar, Polymer Science, V Edition, New Age International Publishers, 2024 (ISBN: 9789389802580)

5. Mars Fontana, Corrosion Engineering, III Edition, McGraw-Hill India, 1986 (ISBN: 9780070607446)
6. David F. Tver and Roger W. Bolz, Encyclopedic Dictionary of Industrial Technology: Materials, Processes and Equipment, Springer US, Year: 1984 (ISBN: 978146159676)
7. John Martin, Materials for engineering, CRC Press, 2006 (ISBN: 9780849387807).
8. Ali A. Ensafi, Electrochemical Biosensors, Elsevier, 2019 (ISBN: 9780128164914).
9. Brian R. Eggins, Chemical Sensors and Biosensors, John Wiley & Sons, Ltd., 2002.

COURSE OUTCOMES: The students will be able to

CO1: Determine hardness, alkalinity, dissolved oxygen, TSS associated with any water and suggest the treatment processes as per water quality.

CO2: Choose the polymers based on properties and application and the method of preparation.

CO3: Identify the type of corrosion and suggest the methods to control it.

CO4: Choose the materials from metals, meta oxides, alloys and composites based on their property and application.

CO5: categorize the sensors based on its applications to real time situation.

Board of Studies (BoS): 14th BoS of Chemistry held on 17.07.2025

Academic Council: 24th AC held on 26.08.2025

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

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

SDG 6: Clean Water and Sanitation	Ensure availability and sustainable management of water and sanitation for all
SDG 9: Industry, Innovation & Infrastructure	Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation

Statement:

Water quality parameters and its treatment methods ensures the availability of clean drinking water, Polymeric and composite materials, metals and alloys as well as sensor systems for sustainable design and industrialization

GEE 1203	BASIC ELECTRICAL AND INSTRUMENTATION ENGINEERING	L	T	P	C
SDG: 3,5,8,12		2	0	2	3

COURSE OBJECTIVES:

COB1: To understand the basic calculations and measurements in DC and AC circuits.

COB2: To familiarize with working and characteristics of different DC and AC machines.

COB3: To impart knowledge on the fundamentals of measuring electrical quantities.

COB4: To expose the students to various sensors and transducers to measure non-electrical quantities.

MODULE I DC & AC CIRCUITS L:9

DC Circuits: Basic electric circuit elements – Independent and dependent sources - Ohm's law- Kirchhoff's law – series and parallel resistive circuits – Voltage and current division – Star & delta transformation – Simple problems.

AC Circuits: Sinusoidal voltage – RMS, average, peak value, peak factor and form factor – single phase RL, RC and RLC circuits – Phasor representation – Power and power factor – Resonance in RLC circuits – Q factor – Simple problems.

MODULE II ELECTRICAL MACHINES L:7

DC machines: Construction and Working principle of DC generator- Characteristics - DC motor- Working principle - Characteristics of DC motor- BLDC motor.

AC machines: Construction and Working principle of single phase transformer- Three phase Transformer connections- single and three phase induction motor.

MODULE III ELECTRICAL MEASUREMENTS L:7

Functional blocks of a measurement system - types of measurements - Direct and indirect measurements – Classification of instruments – Induction type – dynamometer type wattmeter – Energy meter- Types of indicating Instruments. Principles of Electrical Instruments –Multimeter, Oscilloscope - Static and Dynamic characteristics of an instrumentation system – Errors in Measurement – Calibration and Standards.

MODULE IV TRANSDUCERS AND SENSORS L:7

Transducer – Types of transducer - Construction and working of transducer – Sensor- Types of sensors – Elastic sensors – Viscosity, moisture, and pH sensors – sensors based on semiconductor junctions - charge coupled and CMOS image sensors – Biosensors.

L – 30; P – 30; Total Hours: 60

List of experiments:

1. Verification of Kirchhoff's Law
2. Characteristics of resonance in Series RLC circuit
3. Measurements of three phase power and power factor
4. Load characteristics of DC shunt motor
5. Calibration of Single-Phase Energy meter
6. Characteristics of resistive, inductive and capacitive transducers
7. Measurement of pH values of test solutions.
8. Determination of viscosity using Redwood viscometer.

TEXT BOOKS:

1. Giorgio Rizzoni, "Principles and Applications of Electrical Engineering", McGraw Hill Education(India) Private Limited, 6th Edition,2020.
2. S.K.Bhattacharya, "Basic Electrical and Electronics Engineering", 2nd Edition, Pearson India, 2017.
3. Sawhney, A. K., and Puneet Sawhney "A Course in Electrical and Electronic Measurements and Instrumentation" Dhanpat Rai & Company, 19th Edition 2018.

REFERENCES:

1. Del Toro, "Electrical Engineering Fundamentals", Pearson Education, New Delhi, 2nd Edition, 2015.
2. Leonard S. Bobrow and Navneet Gupta, Foundations of Electrical Engineering, Oxford University Press, Asian Edition, 2015.
3. Rajendra Prasad, "Fundamentals of Electrical engineering", Prentice Hall of India, 3rd Edition 2014.

COURSE OUTCOMES: The students will be able to:

CO1: perform the basic calculations in DC & AC circuits to measure the various quantities associated with circuits.

CO2: choose appropriate motor for specific applications based on the motor

characteristics.

CO3: use various devices to measure electrical quantities.

CO4: select appropriate transducer or sensor for applications involving non-electrical quantities.

Board of Studies (BoS):
21st BoS of EEE held on 23.06.2025.

Academic Council:
24th AC held on 26.08.2025

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PSO1	PSO2
CO1	3	2	-	-	2	-	-	-	-	-	-	3	-
CO2	3	3	2	-	2	-	-	-	-	-	-	3	2
CO3	3	-	-	2	3	-	-	-	-	-	-	3	-
CO4	3	-	-	2	2	-	-	-	-	-	-	3	2

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

SDG 3 : Good health and well-being.

Statement :Understanding of the fundamentals of electrical and instrumentation systems can help in designing systems to promote good health and well-being.

SDG 5: Gender equality.

Statement: Acquiring the interdisciplinary knowledge help overcome the gender barriers in work place.

SDG 8: Descent work and economic.

Statement: The learners of this course can get descent work and earn financial benefits and they can work in interdisciplinary areas.

SDG 12: Responsible consumption and production.

Statement: Use of right and energy efficient electric and instrumentation components and devices results is reasonable consumption and production.

ECE 1201	ELECTRON DEVICES	L	T	P	C
SDG: 4,9		3	0	0	3

COURSE OBJECTIVES: The course aims to:

COB1: Introduce the fundamental principles, construction, and characteristics of PN junction diodes and their applications.

COB2: Explain the structure, working, and biasing techniques of Bipolar Junction Transistors (BJTs) for switching and amplification.

COB3: Describe the operation, characteristics, and applications of Field Effect Transistors (JFETs and MOSFETs).

COB4: Familiarize power control devices such as SCR, TRIAC, and DIAC, along with their triggering and protection mechanisms.

COB5: Explore the structure and function of special diodes and optoelectronic devices for voltage regulation, sensing, and communication.

PREREQUISITES:

Fundamentals of physics

MODULE I PN JUNCTION DIODE L:10 T: 0 P: 0

PN junction – Construction, Working, VI characteristics, Energy band diagram – Ideal diode equation, Non-ideal effects in diodes – Static behaviour - depletion width, field profile - Capacitance in diodes. Applications: Design of Clippers, Clampers and Rectifier circuits.

MODULE II BIPOLAR JUNCTION TRANSISTOR L: 10 T: 0 P: 0

Construction, Working, Configurations (CB, CE and CC) and characteristics of BJT – Hybrid model - Current components, Ebers-Moll model– BJT biasing and Q-point stability – AC and DC load lines – Thermal runaway , Early effect – Applications: Switch and amplifier.

MODULE III FIELD EFFECT TRANSISTORS L: 9 T: 0 P: 0

JFET - Construction, Types, Working, Transfer and Drain characteristics, Capacitance-Voltage characteristics, regions of operation, Energy-band diagrams - Biasing -DC analysis - Applications: Switch and amplifier.

MOSFET- Construction, Types, Working, characteristics - velocity saturation,

leakage currents, short channel effects, Biasing - Applications: Switch, resistor and amplifier.

MODULE IV POWER CONTROL DEVICES L: 9 T: 0 P: 0

Construction, Working, Triggering methods and switching characteristics - SCR, TRIAC, DIAC, UJT, power MOSFET – Turn-on and turn-off mechanisms – Protection circuits – Applications: Power control, Rectifiers, Inverters and Motor control.

MODULE V SPECIAL DIODES AND OPTOELECTRONIC DEVICES L: 7 T: 0 P: 0

Construction, Characteristics and applications of special diodes: Zener diode, Schottky diode, Tunnel diode, Varactor diode, PIN diode, Photodiode, LDR,LED,OLED, AMOLED, Laser diode, Solar cell.

L – 45; T – 0; P – 0; Total Hours:45

TEXT BOOKS:

1. J. Millman, C.C. Halkias, and SatyabrataJit, Electronic Devices and Circuits, 3rd Edition, Tata McGraw-Hill, 2010.
2. Thomas L. Floyd, Electronic Devices (Conventional Current Version), 10th Edition, Pearson Education, 2018.
3. Pallab Bhattacharya, Semiconductor Optoelectronic Devices, 2nd Edition, Pearson Education, 1997.
4. William Liu, Fundamentals of III-V Devices: HBTs, MESFETs, and HFETs/HEMTs, 1st Edition, Wiley-Interscience, 1999.

REFERENCES:

1. Donald A. Neamen, Semiconductor Physics and Devices: Basic Principles, 4th Edition, McGraw-Hill Education, 2012. ISBN: 9780073529585.
2. Nandita Das Gupta and Amitava Das Gupta, Semiconductor Devices: Modeling and Technology, PHI Learning Pvt. Ltd., 2004. ISBN: 9788120323988.
3. David A. Bell, Electronic Devices and Circuits, 5th Edition, Oxford University Press, 2008. ISBN: 9780195693409.

COURSE OUTCOMES: After successful completion of the course, the student will be able to:

CO1: Explain the construction, working, and applications of PN junction

diodes in rectifier, clipper, and clamper circuits.

CO2: Analyze the input-output characteristics of BJTs and design biasing circuits for stable amplifier operation.

CO3: Demonstrate the operation of JFET and MOSFET devices and use them in analog switch and amplifier configurations.

CO4: Identify and evaluate power control devices (SCR, TRIAC, DIAC) for use in rectification, switching, and motor control.

CO5: Compare the working of special-purpose and optoelectronic diodes and illustrate their use in regulation and communication.

Board of Studies (BOS):
27th BOS of Department of Electronics and Communication held on 26.06.2025

Academic Council:
24th AC held on 26.08.2025

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

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

SDG 4: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.

Statement: This course enables the student to understand the basic characteristics of electronic components, method of biasing, applications helps for lifelong learning of newer technologies and concepts related to the electronic devices.

SDG 9: Build resilient Infrastructure, promote inclusive and sustainable industrialization and foster innovation

Statement: Able to apply the theoretical concepts of electronic devices for the various application of electronic sub domains.

ECE 1202	CIRCUIT AND NETWORK ANALYSIS	L	T	P	C
SDG: 4,9		3	1	0	4

COURSE OBJECTIVES:

COB1: To understand the fundamental components of electric circuits and the concept of network elements

COB2: To learn and apply basic circuit laws and theorems for circuit simplification and analysis.

COB3: To analyze electrical networks using mesh and nodal analysis techniques.

COB4: To study transient and steady-state responses in RL, RC, and RLC circuits for both DC and AC inputs.

COB5: To develop a clear understanding of two-port network parameters and network topology using matrix methods.

PREREQUISITES:

Basic Mathematics

MODULE I BASICS OF CIRCUITS AND NETWORKS L:9 T:3 P: 0

Basic electric circuit elements – Independent and dependent sources - Introduction to networks: Node, Branch, Path, Loop, Active and Passive network elements - Linear relation between voltage and current of Network elements – source Transformation – Kirchhoff's law Network reduction – voltage division – current division.

MODULE II NETWORK THEOREMS AND NETWORK ANALYSIS L:9 T: 3 P: 0

Thevenin's Theorem - Norton's Theorem - Superposition theorem - Maximum power transfer theorem- Substitution theorem-Reciprocity theorem Formation of matrix equations and analysis of complex circuits using Mesh analysis and nodal analysis methods.

MODULE III TRANSIENT ANALYSIS L: 9 T: 3 P: 0

Steady state and transient response – DC response of an RL, RC and RLC circuits - Sinusoidal response of an RL, RC and RLC circuits.

MODULE IV TWO PORT NETWORKS L:9 T: 3 P: 0

Open circuit Impedance (Z) Parameters - short Circuit Admittance(Y) Parameters, Transmission (ABCD) Parameters and Inverse Transmission Parameters-Hybrid (h) Parameters and Inverse Hybrid Parameter Conversion between parameters-interconnection of two-port networks .

MODULE V MODULE V NETWORK TOPOLOGY L:9 T:3 P: 0

Introduction-Tree and co-tree- Twigs and links-Incidence matrix –properties of Incidence matrix-Tie-set matrix-cut-set –tree branch voltage.

L – 45; T – 15; P – 0; Total Hours:45

TEXT BOOKS:

1. William H. Hayt, Jr., J.E. Kemmerly & Steven M. Durbin, "Engineering Circuit Analysis," 10th Edition, McGraw Hill, 2021
2. A. Sudhakar &Shyammohan S. Palli, "Circuits & Networks: Analysis & Synthesis,"5th Edition, Tata McGraw Hill, 2017
3. M.E. Van Valkenburg, "Network Analysis," 3rd Edition, Pearson Education, 2019
4. Someshwar C. Gupta, Jon W. Bayless, Behrouz Peikari, "Circuit Analysis - with Computer Applications to Problem-Solving," Wiley Eastern Ltd., 1991’

COURSE OUTCOMES: After successful completion of the course, the student will be able to:

CO1: Identify and classify various types of electrical sources, elements, and networks.

CO2: Apply Kirchhoff’s laws and classical network theorems to solve electrical circuits.

CO3: Analyze the transient and steady-state responses of first and second-order circuits.

CO4: Evaluate two-port network parameters and convert between different parameter sets.

CO5: Use graph theory concepts like incidence, tie-set, and cut-set matrices for network topology analysis.

Board of Studies (BOS):
27th BOS of Department of Electronics and Communication held on 26.06.2025

Academic Council:
24th AC held on 26.08.2025

COs \ POs/PSOs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2	PSO3
CO1	3	2	2	-	2	-	-	-	-	-	-	3	2	2
CO2	2	3	3	2	2	-	-	-	-	-	-	3	3	2
CO3	3	3	2	2	1	-	-	-	-	-	-	2	3	2
CO4	2	2	3	3	2	-	-	-	-	-	-	2	2	3
CO5	3	3	3	2	2	-	-	-	-	-	-	3	3	3

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

SDG 4: Ensure inclusive and equitable quality education and Promote lifelong learning opportunities for all.

Statement: This course equips students with foundational knowledge and analytical skills in circuit and network theory, fostering critical thinking and problem-solving abilities essential for continuous learning and adaptation in evolving engineering fields.

SDG 9: Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation.

Statement: By applying circuit analysis and network concepts to design and optimize electrical systems, students contribute to the development of innovative, reliable, and efficient electronic infrastructures supporting sustainable industrial growth.

ECE 1203	ELECTRON DEVICES LABORATORY	L	T	P	C
SDG: 4,9		0	0	2	1

COURSE OBJECTIVES:

COB1: To understand the operational principles and V-I characteristics of fundamental semiconductor devices.

COB2: To design and implement basic electronic circuits.

COB3: To analyze the working characteristics of various Opto Electronic Devices

PREREQUISITES:

Fundamentals of physics

List of Experiments: **L: 0 T:0 P: 30**

1. VI Characteristics of PN Junction Diode
2. Application of PN diode (Rectifier / Clipper / Clamper)
3. Zener Diode as Voltage Regulator
4. BJT Characteristics in CE Configuration
5. Characteristics of JFET
6. SCR Characteristics and Gate Triggering
7. Characteristics of TRIAC, DIAC
8. Characteristics of UJT
9. Characteristics of LDR
10. Mini project

L – 00; T – 00; P – 30; Total Hours: 30

TEXT BOOKS:

1. David Bell. Fundamentals of Electronic Devices and Circuits Lab Manual, Oxford University Press 22, November 2009
2. J.Millman, C.C.Halkias, and SatyabrathaJit, “Electronic Devices and Circuits” Tata McGraw Hill, 2nd Ed., 2010.
3. ThomasL .Floyd,” Electronic Devices”, Global Edition, Pearson Education, 2017.

REFERENCES:

1. Donald A.Neaman, “Semiconductor Physics and Devices” 3rd Ed., Tata McGraw Hill 2003.
2. Nandita Das Gupta and Amitava Das Gupta, “Semiconductor Devices– Modeling and Technology”, Prentice Hall of India, 2004.

3. David A Bell,'Electronic Devices and Circuits',5thedition,Oxford University Press, 2008.

COURSE OUTCOMES: After successful completion of the course, the student will be able to:

CO1: Analyze the characteristics of semiconductor and Opto electronic devices

CO2: Design and implement basic electronic circuits

CO3: Evaluate the performance of electronic circuits using appropriate testing methods

CO4: Apply various electronic components and devices in circuit design for practical applications

CO5: Associate with a team and implement applications using electronic devices

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PSO1	PSO2	PSO 3
CO1	2	2	2					2			2	3	2	3
CO2	3	2	3					2			2	3	2	3
CO3	3	3	3					2			2	3	2	3
CO4	3	3	3					2			2	3	2	3
CO5	3	2	3					3			2	2	1	2
CO6	2	2	2					2			2	3	2	3

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

SDG 4: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.

Statement: This course enables the student to understand practically the basic VI characteristics of electronic devices, method of biasing, applications and helps for lifelong learning of newer technologies and concepts related to the electronic devices.

SDG 9: Build resilient Infrastructure, promote inclusive and sustainable industrialization and foster innovation

Statement: Able to apply the practical concepts of electronic devices and its applications in various fields of electronic sub domains.

GEE 1205	UNIVERSAL HUMAN VALUES	L	T	P	C
		2	0	0	2

SDG: 4, 8, 10, 16 and17

COURSE OBJECTIVES:

The objectives of the course are to

COB1: To enable students to grasp the fundamental concepts and significance of value education, fostering positive behavioral changes that enhance their personal growth and professional conduct.

COB2: To examine core human values, the relationship between the self and the body, and how these values can guide ethical behavior in both personal and professional contexts.

COB3: To promote understanding of the principles of harmony within oneself, relationships, families, and society, and how these contribute to a sustainable and balanced life.

COB4: To provide knowledge and insights into the ethical responsibilities of engineers, the significance of engineering ethics, and the importance of leadership and ethical decision-making in the field.

MODULE I INTRODUCTION TO VALUE EDUCATION L: 8

Value Education - Concept, Importance and Need - components of Value Education, Human Rights and Value Education - Self-exploration as the Process for Value Education - Continuous Happiness and Prosperity - The Basic Human Aspirations, Method to Fulfil the Basic Human Aspirations - Strategies for Transition towards Value - based Life and Profession

MODULE II HARMONY IN THE HUMAN BEING L: 7

Meaning and Relevance of Harmony in Human Beings - Core Human Values - Application of Universal Human Values - Understanding The Human Being as Co-Existence of Self (‘I’) And Body - The Needs of Body vs. Self - Fulfilling the Needs of the Self and Body - Understanding the Relationship between Body and Self - the Activities of the Self and the Body - The Mind as a Key Factor in Fostering Harmony in Human Beings - The Influence of Scriptures on the Formation of Human Values.

MODULE III HARMONY IN THE FAMILY, SOCIETY AND NATURE **L: 7**

Components of Harmony in the Human Beings – Harmony in The Family: Understanding Values in Human Relationships - Vision for The Universal Human Order – Harmony in Nature: The Four Orders in Nature - Understanding Harmony in The Society.

MODULE IV THE BASICS FOR ETHICAL CONDUCT OF ENGINEERS **L: 8**

Why Engineers Should Learn About Ethics - Significance of Engineering Ethics - Senses of Engineering Ethics - Engineering Code of Ethics - Commitment: The Foundation of Professional Success in Engineering - Leadership in Engineering and Industry - The Ethical Implications of Technology.

L – 30; Total Hours: 30

TEXT BOOKS

1. Anand, R. (2025). Foundation course in universal human values and professional ethics (1st ed.). CBS Publishers & Distributors. ISBN 978-8197982231
2. Maio, G. R. (2016). The psychology of human values. Routledge.
3. Narayan, S. (2015). *Value Education: A Source Book for Teachers and Educators*. Pearson Education India.
4. Kumar, K. (2016). *Human Rights and Value Education*. National Book Trust.
5. Rao, K. S. (2013). *Ethics in Engineering Education: Value-Based Approach*. I.K. International Publishing House.
6. Bhattacharyya, S. (2014). *Education and Value Systems: A Conceptual Approach*. Academic Publishers.
7. Laszlo, E., & Wilbur, J. B. (Eds.). (1971). Human values and the mind of man: Proceedings. Gordon & Breach.

REFERENCE BOOKS

1. Giri, A. K. (Ed.). (2022). Mahatma Gandhi and Sri Aurobindo. Routledge India.

2. Vasudevan, S. (2018). *Universal Human Values: A Guide for Educators and Students*. Chintan Publications.
3. Schwartz, M. S. (2017). *Ethical Decision Making in Engineering*. Wiley-IEEE Press.
4. Sreenivasan, G. (2012). *Engineering Ethics: Concepts and Cases*. Wadsworth Publishing.
5. Chakrabarty, B. (2019). *Harmony in the Human Being: A Philosophical and Practical Approach*. Orient Black Swan.
6. Slote, M. A. (2013). Education and human values: Reconciling talent with an ethics of care. Routledge. https://doi.org/10.4324/9780203116555

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO 12
CO1		3	3		3	3	3		3		3	3
CO2			3			3	3		3		3	3
CO3	2	2	3			3	3		3		3	3
CO4			3			3	3	3	3		3	3

Note: 1 - Low Correlation 2 - Medium Correlation 3 - High Correlation

SDG 4: Quality Education focuses on value education, which is essential for promoting inclusive and equitable quality education. It emphasizes the development of critical thinking, ethical conduct, and personal growth, all of which are key components of quality education.

SDG 8: Decent Work and Economic Growth highlights the ethical implications of technology that is essential for fostering responsible and ethical behavior in future engineers, and which contributes to decent work and economic growth.

SDG 10: Reduced Inequalities aligns with efforts to reduce inequalities by encouraging ethical behavior, respect for others, and harmonious relationships, which are essential in building inclusive societies.

SDG 16: Peace, Justice, and Strong Institutions promotes peaceful and inclusive societies, access to justice for all, and accountable, effective institutions. It aligns deeply with the principles of value education by emphasizing harmony, ethical conduct, human rights, and social justice.

SDG 17: Partnerships for the Goals integrating ethics into professional education, especially for engineers, students are encouraged to contribute positively to collaborative global efforts in solving complex challenges.

The course syllabus aligns with **SDGs 4, 8, 10, 16 and 17** by focusing on value education, ethics, human rights, harmony, and responsible engineering practices. It contributes to peaceful, just, and inclusive societies through self-awareness, interpersonal harmony, and responsible citizenship aligned with universal human values. These themes are essential for promoting sustainable development, equality, and ethical conduct, which are core elements of the SDGs.