





UNDERGRADUATE DEGREE PROGRAMME

B. Tech - Electronics and Computer Engineering

CURRICULUM & SYLLABUS

REGULATIONS 2026

Effective from the Academic Year
2026-2027

Department of Electronics and Communication Engineering
School of Engineering
VISTAS

PALLAVARAM



VELS

INSTITUTE OF SCIENCE, TECHNOLOGY & ADVANCED STUDIES (VISTAS)
(Deemed to be University Estd. u/s 3 of the UGC Act, 1956)
PALLAVARAM, THALAMBUR, PERIYAPALAYAM, THIRUVANMIYUR - CHENNAI



VISION OF THE INSTITUTION
To make the Institute an epitome of excellence in higher education by effectively providing high quality education and rigorous training to students in multiple streams of choice with ample scope for all round development to make them excel in their profession for betterment of the society.

MISSION OF THE INSTITUTION	
M1	Effectively imparting knowledge and inculcating innovative thinking.
M2	Facilitating skill enhancement through add on courses and hands on training.
M3	Doing original, socially relevant, high quality research.
M4	Instilling the spirit of integrity, equity, professional ethics and social harmony.







DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

VISION OF THE DEPARTMENT
To be a centre of excellence in the field of Electronics and Communication Engineering (ECE) equipped with the state of art technologies to produce highly competent, resourceful and ethical young professionals who create innovative solutions to the needs of the society and excel in the varied professional trends globally.

MISSION OF THE DEPARTMENT	
M1	To impart strong theoretical and experimental fundamentals in electronics and communication engineering that enable students to be competent in the growing technical demands and challenges.
M2	To facilitate appropriate technical exposure on the latest and cutting-edge technological trends through academic and collaborative interactions with industry, academia and research organizations.
M3	To foster an environment of excellence in theoretical and applied research evident through product development, patents, projects, publications in SCI and WOS journals, books and conferences.
M4	To participate in the development of the nation through social and ethical commitments by promising innovation, research and entrepreneurship.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)	
PEO1	Apply leadership and technological expertise to create ethical and sustainable remedies for real-world challenges in the field of Electronics and Communication Engineering
PEO2	Emerge as highly competent innovators and researchers with interdisciplinary and multidisciplinary expertise in R&D organizations.
PEO3	Contribute to economic development through entrepreneurial initiatives and job creation.
PEO4	Engage as a lifelong learner to adapt to evolving technologies, and uphold human values by contributing responsibly to society

PROGRAMME SPECIFIC OUTCOMES (PSO)	
PSO1	Design and analyze the concepts and applications in the field of Communication, Cognitive Networks, Signal Image processing, Embedded systems, Data Science and Artificial Intelligence to find solutions to the real-world problems.
PSO2	Demonstrate the acquired professional and competitive skills for successful Career, demonstrating the practice of Professional Ethics and the concerns for Social and Environmental impact technologies.

PROGRAMME OUTCOMES (POs)	
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 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 independent and life-long learning in the broadest context of technological change. (WK8)

COMPETENCIES AND PERFORMANCE INDICATORS

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.			
Competency		**Performance Indicator**	
1.1	Demonstrate competence in mathematical modelling	1.1.1	Apply mathematical techniques such as Calculus, Linear Algebra, Probability theory and Random process, Fourier series, Fourier Transform, Laplace Transform, and Z-Transform to solve problems.
		1.1.2	Apply advanced mathematical techniques to model and solve Electronics and Communication engineering problems.
1.2	Demonstrate competence in basic sciences	1.2.1	Apply laws of natural science to an engineering problem.
1.3	Demonstrate competence in engineering fundamentals	1.3.1	Apply fundamental engineering concepts to solve engineering problems
1.4	Demonstrate competence in specialized engineering knowledge to the program	1.4.1	Apply Electronics and Communication engineering concepts to solve 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)			
2.1	Demonstrate an ability to identify and formulate complex engineering problem	2.1.1	2.1.1 Articulate problem statements and identify objectives
		2.1.2	2.1.2 Identify engineering systems, variables, and parameters to solve the problems
		2.1.3	2.1.3 Identify the mathematical, engineering and other relevant knowledge that applies to a given problem
2.2	Demonstrate an ability to formulate a solution plan and methodology for an engineering problem	2.2.1	Reframe complex problems into interconnected sub-problems
		2.2.2	Identify, assemble and evaluate information and resources.
		2.2.3	Identify existing processes/solution methods for solving the problem, including forming justified approximations and assumptions
		2.2.4	Compare and contrast alternative solution processes to select the best process.

2.3	Demonstrate an ability to formulate and interpret a model	2.3.1	Combine scientific principles and engineering concepts to formulate model/s (mathematical or otherwise) of a system or process that is appropriate interms of applicability and required accuracy.
		2.3.2	Identify assumptions (mathematical and physical) necessary to allow modeling of a system at the level of accuracy required.
2.4	Demonstrate an ability to execute a solution process and analyze results	2.4.1	Apply engineering mathematics and computations to solve mathematical models
		2.4.2	Produce and validate results through skillful use of contemporary engineering tools and models
		2.4.3	Identify sources of error in the solution process, and limitations of the solution.
		2.4.4	Extract desired understanding and conclusions consistent with objectives and limitations of the analysis
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 as required. (WK5)			
3.1	Demonstrate an ability to define a complex/ open-ended problem in engineering terms	3.1.1	Recognize that need analysis is key to good problem definition
		3.1.2	Elicit and document, engineering requirements from stakeholders
		3.1.3	Synthesize engineering requirements from a review of the state-of-the-art
		3.1.4	Extract engineering requirements from relevant engineering Codes and Standards such as IEEE, ISO, ITU-R, ITU-T etc.
		3.1.5	Explore and synthesize engineering requirements considering health, safety risks, environmental, cultural and societal issues
		3.1.6	Determine design objectives, functional requirements and arrive at specifications
3.2	Demonstrate an ability to generate a diverse set of alternative design solutions	3.2.1	Apply formal idea generation tools to develop multiple engineering design solutions
		3.2.2	Build models/prototypes to develop a diverse set of design solutions
		3.2.3	Identify suitable criteria for the evaluation of alternate design solutions
3.3	Demonstrate an ability to select an optimal design scheme for further development	3.3.1	Apply formal decision-making tools to select optimal engineering design solutions for further development
		3.3.2	Consult with domain experts and stakeholders to select candidate engineering design solution for further development

3.4	Demonstrate an ability to advance an engineering design to defined end state	3.4.1	Refine a conceptual design into a detailed design within the existing constraints (of the resources)
		3.4.2	Generate information through appropriate tests to improve or revise the design
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)			
4.1	Demonstrate an ability to conduct investigations of technical issues consistent with their level of knowledge and understanding	4.1.1	Define a problem, its scope and importance for purposes of investigation
		4.1.2	Examine the relevant methods, tools and techniques of experiment design, system calibration, data acquisition, analysis and presentation
		4.1.3	Apply appropriate instrumentation and/or software tools to make measurements of physical quantities
		4.1.4	Establish a relationship between measured data and underlying physical principles.
4.2	Demonstrate an ability to design experiments to solve open-ended problems	4.2.1	Design and develop an experimental approach, specify appropriate equipment and procedures
		4.2.2	Understand the importance of the statistical design of experiments and choose an appropriate experimental design plan based on the study objectives
4.3	Demonstrate an ability to analyze data and reach a valid conclusion	4.3.1	Use appropriate procedures, tools and techniques to conduct experiments and collect data
		4.3.2	Analyze data for trends and correlations, stating possible errors and limitations
		4.3.3	Represent data (in tabular and/or graphical forms) so as to facilitate analysis and explanation of the data, and drawing of conclusions
		4.3.4	Synthesize information and knowledge about the problem from the raw data to reach appropriate conclusions
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)			
5.1	Demonstrate an ability to identify/ create modern engineering tools, techniques and resources	5.1.1	Identify modern engineering tools and techniques and resources for engineering activities.
		5.1.2	Create/adapt/modify/extend tools and techniques to solve engineering problems

5.2	Demonstrate an ability to select and apply discipline-specific tools, techniques and resources	5.2.1	Identify the strengths and limitations of tools for (i) acquiring information, (ii) modeling and simulating, (iii) monitoring system performance, and (iv) creating engineering designs.
		5.2.2	Demonstrate proficiency in using discipline-specific tools
5.3	Demonstrate an ability to evaluate the suitability and limitations of tools used to solve an engineering problem	5.31	Discuss limitations and validate tools, techniques and resources
		5.3.2	Verify the credibility of results from tool use with reference to the accuracy and limitations, and the assumptions inherent in their use.
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)			
6.1	Demonstrate an ability to describe engineering roles in a broader context, e.g. pertaining to the environment, health, safety, legal and public welfare	6.1.1	Identify and describe various engineering roles; particularly as pertains to protection of the public and public interest at the global, regional and local level
6.2	Demonstrate an understanding of professional engineering regulations, legislation and standards	6.2.1	Interpret legislation, regulations, codes, and standards relevant to your discipline and explain its contribution to the protection of the public
6.3	Demonstrate an understanding of the impact of engineering and industrial practices on social, environmental and in economic contexts	6.3.1	Identify risks/impacts in the life-cycle of an engineering product or activity
		6.3.2	Understand the relationship between the technical, socio-economic and environmental dimensions of sustainability
6.4	Demonstrate an ability to apply principles of sustainable design and development	6.4.1	Describe management techniques for sustainable development
		6.4.2	Apply principles of preventive engineering and sustainable development to an engineering activity or product relevant to the discipline
PO7: Ethics: Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9)			
7.1	Demonstrate an ability to recognize ethical dilemmas	7.1.1	Identify situations of unethical professional conduct and propose ethical alternatives
7.2	Demonstrate an ability to apply the Code of Ethics	7.2.1	Identify tenets of the IEEE professional code of ethics.
		7.2.2	Examine and apply moral & ethical principles to known case studies

PO8: Individual and Collaborative Team Work: Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams.			
8.1	Demonstrate an ability to form a team and define a role for each member	8.1.1	Recognize a variety of working and learning preferences; appreciate the value of diversity on a team
		8.1.2	Implement the norms of practice (e.g., rules, roles, charters, agendas, etc.) of effective team work, to accomplish a goal.
8.2	Demonstrate effective individual and team operations--communication, problem-solving, conflict resolution and leadership skills	8.2.1	Demonstrate effective communication, problem-solving, conflict resolution and leadership skills
		8.2.2	Treat other team members respectfully
		8.2.3	Listen to other members
		8.2.4	Maintain composure in difficult situations
8.3	Demonstrate success in a team-based project	8.3.1	Present results as a team, with smooth integration of contributions from all individual efforts
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.			
9.1	Demonstrate an ability to comprehend technical literature and document project work	9.1.1	Read, understand and interpret technical and non-technical information.
		9.1.2	Produce clear, well-constructed, and well-supported written engineering documents.
		9.1.3	Create flow in a document or presentation - a logical progression of ideas so that the main point is clear.
9.2	Demonstrate competence in listening, speaking, and presentation	9.2.1	Listen to and comprehend information, instructions, and viewpoints of others
		9.2.2	Deliver effective oral presentations to technical and non-technical audiences
9.3	Demonstrate the ability to integrate different modes of communication	9.3.1	Create engineering-standard figures, reports and drawings to complement writing and presentations
		9.3.2	Use a variety of media effectively to convey a message in a document or a presentation
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.			

10.1	Demonstrate an ability to evaluate the economic and financial performance of an engineering activity	10.1.1	Describe various economic and financial costs/benefits of an engineering activity
		10.1.2	Analyze different forms of financial statements to evaluate the financial status of an engineering project
10.2	Demonstrate an ability to compare and contrast the costs/benefits of alternate proposals for an engineering activity	10.2.1	Analyzeandselectthemostappropriateproposalbased oneconomicandfinancial considerations.
10.3	Demonstrate an ability to plan/manage an engineering activity within time and budget constraints	10.3.1	Identify the tasks required to complete an engineering activity, and the resources required to complete the tasks.
		10.3.2	Use project management tools to schedule an engineering project, so it is completed on time and on budget.
PO11: Life-Long Learning: Recognize the need for, and have the preparation and ability for independent and life-long learning in the broadest context of technological change. (WK8)			
11.1	Demonstrate an ability to identify gaps in knowledge and a strategy to close these gaps	11.1.1	Describe the rationale for the requirement for continuing professional development
		11.1.2	Identify deficiencies or gaps in knowledge and demonstrate an ability to source information to close this gap
11.2	Demonstrate an ability to identify changing trends in engineering knowledge and practice	11.2.1	Identify historic points of technological advance in engineering that required practitioners to seek education in order to stay current
		11.2.2	Recognize the need and be able to clearly explain why it is vitally important to keep current regarding new developments in your field.
11.3	Demonstrate an ability to identify and access sources for new information	11.3.1	Source and comprehend technical literature and other credible sources of information
		11.3.2	Analyze sourced technical and popular information for feasibility, viability, sustainability, etc.
PSO 1: Design and analyze the concepts and applications in the field of Communication, Cognitive Networks, Signal & Image processing, Embedded systems, Data Science and Artificial Intelligence to find solutions to the real world problems.			
12.1	Demonstrate an ability to investigate complex problems	12.1.1	Identify problem statements in the various applications of Electronics and Communication Techniques

		12.1.2	Articulate the problems to the listeners with probable solutions for the same
12.2	Demonstrate an ability to design and evaluate solutions systematically	12.2.1	Systematically evaluate and choose the optimal solution
		12.2.2	Investigate all the probable solutions towards the solution of the identified problem
		12.2.3	Specify the design tools that may help in finding the solution
PSO 2: Demonstrate the acquired professional and competitive skills for successful carrier, demonstrating the practice of Professional Ethics and the concerns for Social and Environmental impact technologies.			
13.1	Demonstrate an ability to develop solutions using engineering principles and practices	13.1.1	Describe the rationale for choosing solutions based on engineering principles
		13.1.2	Conduct feasibility analysis, cost-benefit analysis for finding solutions
13.2	Demonstrate an ability to understand the social and economic impact of technology	13.2.1	Design solutions for engineering problems by considering it's effect and society and environment
		13.2.2	Recognize the economic impact of the various process and methods in designing solutions.

INSTITUTE OF SCIENCE, TECHNOLOGY & ADVANCED STUDIES (VISTAS)
(Deemed to be University Estd. u/s 3 of the UGC Act, 1956)
PALLAVARAM, THALAMBUR, PERIYAPALAYAM, THIRUVANMIYUR - CHENNAI

SCHOOL OF ENGINEERING

UG REGULATIONS – 2026

VELS INSTITUTE OF SCIENCE TECHNOLOGY AND ADVANCED STUDIES

VELS INSTUTUTE OF SCIENCE, TECHNOLOGY & ADVANCED STUDIES SCHOOL OF ENGINEERING

UG REGULATIONS – 2026

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VELS INSTITUTE OF SCIENCE, TECHNOLOGY & ADVANCED STUDIES (VISTAS)

(Deemed to be University Estd. u/s 3 of the UGC ACT, 1956)

SCHOOL OF ENGINEERING UG REGULATIONS - 2026

Effective from the academic year 2026-2027 and applicable to the students to be admitted in School of Engineering, **Vels Institute of Science, Technology & Advanced Studies (VISTAS),** Chennai.

1. PRELIMINARY DEFINITIONS AND NOMENCLATURE

In these Regulations, unless the context otherwise requires:

- "**Programme**" refers to the Degree Programme that is B.Tech.
- "**Discipline**" refers to specialization or branch of B.Tech. Degree Programme, like Electronics and Communication Engineering, Computer Science and Engineering etc.
- "**Course**" refers to theory or laboratory subject like Engineering Physics, Computer Programming etc.
- **"Registrar"** refers to the authority of the Institution who is responsible for all academic activities of the Departments for implementation of relevant rules and regulations.
- **"Controller of Examinations"** refers to the authority of the Institution who is responsible for all activities related to examinations.
- **"Institution"** refers to VELS INSTITUTE OF SCIENCE, TECHNOLOGY AND ADVANCED STUDIES (VISTAS**),** CHENNAI.

2. ADMISSION

2.1 First semester of the B.Tech. Degree Programme:

Passed 10+2 examination with Physics/ Mathematics/ Chemistry/ Computer Science/ Electronics/ Information Technology/ Biology/ Informatics Practices/ Biotechnology/ Technical Vocational subject/ Agriculture/ Engineering Graphics/ Business Studies/ Entrepreneurship as per table 8.4 Agriculture stream (for Agriculture Engineering) Obtained at least 45% marks (40% marks in case of candidates belonging to reserved category) in the above subjects taken together.

OR

Passed D.Voc. Stream in the same or allied sector.

Admission to the B.Tech. programmes shall be offered to candidates who satisfy the eligibility criteria prescribed by AICTE and have qualified in the **VISTAS Scholastic Aptitude Test (VSAT)** conducted by the University.

The selection of candidates shall be based on their performance in VSAT and/or academic performance in the qualifying examination, as prescribed by the University from time to time.

Candidates shall have passed the Higher Secondary Examination (10+2 pattern) or its equivalent with Physics, Chemistry, and Mathematics as compulsory subjects and shall satisfy the minimum eligibility requirements stipulated by VISTAS and the statutory authorities.

2.2 Lateral entry to second year

Passed Minimum THREE years / TWO years (Lateral Entry) Diploma examination with at least 45% marks (40% marks in case of candidates belonging to reserved category) in ANY branch of Engineering and Technology.

OR

Passed B.Sc. Degree from a recognized University as defined by UGC, with at least 45% marks (40% marks in case of candidates belonging to reserved category) and passed 10+2 examination with Mathematics as a subject.

OR

Passed B.Voc/3-year D.Voc. Stream in the same or allied sector.

2.3 Lateral entry to third year

Candidates with a UG Diploma in Engineering are eligible for lateral entry admission directly into the third year of the relevant undergraduate engineering programme.

2.4 Lateral entry to final year

Candidates with a B.Voc. degree in the relevant discipline are eligible for lateral entry admission directly into the final year of the corresponding undergraduate programme.

3. PROGRAMMES OFFERED

A candidate may be offered a programme in any one of the branches of study approved by the Institution.

4. STRUCTURE OF THE PROGRAMMES

4.1 Curriculum and Syllabi

Every Programme will have curriculum with syllabi consisting of theory and practicals such as:

COURSE CATEGORY	DESCRIPTION AND SPECIFIC DETAILS
Basic Science Course (BSC)	Mathematics, Physics, Chemistry, Biology, etc.
Program Core Courses (PCC)	Allows students to pursue a secondary interest (e.g., Cyber Security, Management, or even Performing Arts).
Professional Elective Course (PEC)	core courses relevant to the chosen specialization/branch.
Multi-disciplinary Core Courses (MDC)	Courses on sciences, humanities, or social sciences.
Multi-disciplinary Elective Courses (MDE)	Courses from other branches which a student can choose from the list specified in the curriculum of the students B. Tech. Programmes.
Skill Enhancement Courses (SEC)	Courses on hands-on technical skills, **employability skills**, soft skills, and life skills.
Ability Enhancement Courses (AEC)	Courses on language proficiency and communication skills.
Value-Added Courses (VAC)	Courses on **Indian Knowledge Systems (IKS)**, Environmental education and constitutional values
Summer Internship (SI)	Mandatory practical exposure in industry
Project Report and Dissertation (PRD)	Course on Mini project, Phase I and II

4.2 Course Components

Each course includes one or more of the following components,

- **Lecture:** Structured classroom teaching focused on theoretical concepts and subject knowledge delivery.
- **Tutorial:** Interactive learning session intended for discussion, problem-solving, clarification, and guided practice.
- **Practical:** Hands-on learning activity designed to apply theoretical knowledge through experiments, demonstrations, or fieldwork.
- **Self-Learning:** Independent learning undertaken by students through reading, online resources, assignments, projects, and self-paced study activities.

4.3 Personality and Character Development

All students will undergo structured professional development courses designed to enhance communication, aptitude, soft skills, leadership, and professional competencies of students from the 3rd to 6th semester, with one course offered in each semester. The courses shall focus on improving confidence, interpersonal skills, teamwork, problem-solving ability, and career readiness.

All students shall enroll, on admission, in any one of the personality and character development programmes (NCC/NSS/NSO/YRC) and undergo training for about 80 hours and attend a camp of about seven days. The training shall include classes on hygiene and

health awareness and also training in first-aid.

National Service Scheme (NSS) will have social service activities in and around the Institution.

National Sports Organization (NSO) will have sports, Games, Drills and Physical exercises.

While the training activities will normally be during weekends, the camp will normally be during vacation period.

4.4 Credit Distribution

Each course is assigned certain number of credits based on the following:

Learning Component	Credit Calculation Basis
Lecture (L)	1 hour of teaching per week = 1 Credit
Tutorial (T)	1 hour of Interactive learning session per week = **1 Credit**
Practical/Lab (P)	2 hours of lab work per week = **1 Credit**

4.5 Pre-requisite for courses

- A prerequisite course is a course that must be successfully completed before a student is permitted to enroll in a designated higher-level course.
- The Course Coordinator and the Department shall verify and approve the fulfillment of prerequisite requirements after the declaration of the End Semester Examination results of the preceding semester.
- A student may be considered eligible for enrollment in the desired course if any one of the following conditions is satisfied:
    - The student has maintained a minimum attendance of 75% in the prerequisite course.
    - The student has secured at least 50% marks in the Continuous Internal Assessment (CIA) examinations of the prerequisite course.
    - The student has successfully completed an online certification in the same or a related subject through NPTEL or any recognized MOOC platform.
- Students who do not satisfy any of the above criteria, or who were unable to meet the requirements due to valid medical reasons supported by appropriate documentation, shall be required to undergo and successfully complete a 30-hour bridge/crash course conducted by the Department before being permitted to register for the desired course.

4.6 Industrial Training / Internship

The students may undergo Industrial training for a period as specified in the Curriculum during summer / winter vacation. In this case the training has to be undergone continuously for the entire period.

The students may undergo Internship at Research organization / University (after due approval from the Department) for the period prescribed in the curriculum during summer / winter vacation, in lieu of Industrial training.

4.7 Industrial Visit

Every student is required to go for at least one Industrial Visit every year starting from the second year of the programme. The Heads of Departments shall ensure that necessary arrangements are made in this regard.

4.8 Medium of Instruction

The medium of instruction is English for all courses, examinations, seminar presentations and project / thesis / dissertation reports.

4.9 Massive Open Online Courses (MOOCs)

- Students opting for an online course shall be required to register for the MOOCs through SWAYAM-NPTEL with the guidance of SPOC/Mentors.
- Credit transfer policy will be applicable to –
  - All UG and PG programmes offered by the Institution.
  - All PCC/PEC/BSC/MDC/MDE/VAC courses offered by the corresponding program.
- Students should have successfully completed the course and received the Marksheet from SWAYAM to opt for credit transfer. They shall apply to the office of the COE through the HOD and SPOC.
- VISTAS shall award the credit of the equivalent core and elective course in the curriculum as credit for the courses completed via SWAYAM/ NPTEL platforms.
- VISTAS shall give the equivalent grade to the students for the credits earned through online learning courses through SWAYAM platform

SWAYAM Range of Marks	SWAYAM/ NPTEL Type of Certificate	Proposed Equivalent Grade Points (VISTAS)	Proposed Letter Grade (VISTAS)	Proposed Description (VISTAS)
90-100	Elite + Gold	10	O	Outstanding
75-89	Elite + Silver	9	A+	Excellent
60-74	Elite	8	A	Very Good

40-59	Successfully Completed	7	B+	Good

- Credits earned through MOOCs will be incorporated in the mark sheet /final mark sheet issued to the student by the Controller of Examination
- Students who have qualified in the examination conducted by the SWAYAM and opting for Credit Transfer shall be exempted from appearing in Continuous and Semester End examinations for the equivalent course.
- VISTAS also permit students to undergo the same courses and appear for Continuous and Semester End Examinations at VISTAS if they desire to do so for a better performance.

4.10 Honors and Minor Degree

- **Honours Degree**

  An Honours Programme enables a student to acquire advanced knowledge and specialization in an emerging, multidisciplinary, or industry-relevant area within the same discipline/department. To earn an Honours credential, the student shall study and successfully complete **additional courses carrying 18–20 extra credits** beyond the credit requirements of the regular degree programme, as specified in the curriculum.

- **Minor Degree**

  A Minor Degree enables a student to gain interdisciplinary knowledge and specialization in a discipline other than the parent department. To earn a Minor Degree, the student shall study and successfully complete **additional courses carrying 18–20 extra credits** beyond the credit requirements of the regular degree programme, as specified in the curriculum of the respective department.

- Students who satisfy the eligibility criteria prescribed by the University may opt to pursue either an **Honours Programme** or a **Minor Degree** in addition to their regular degree programme. The award of an Honours Programme or Minor Degree shall be subject to the successful completion of the prescribed additional courses and the attainment of the required **18–20 extra credits.** The detailed regulations, eligibility requirements, credit requirements, and award criteria shall be governed by the guidelines issued by the University from time to time.

- The Department shall offer Honours or Minor programmes irrespective of the number of students enrolled.
- If a student discontinues Honours:
  - The completed additional courses may be considered in place of Professional Electives.
  - Courses with higher grades will be considered for CGPA calculation.

- The other completed courses will appear in the grade sheet but will not be accounted for CGPA calculation.
- Failed courses or courses with shortage of attendance will not appear in the grade sheet or CGPA calculation.

- If a student discontinues Minor:
  - The completed additional courses may be considered in place of Open Electives.
  - Courses with higher grades will be considered for CGPA calculation.
  - The other completed courses will appear in the grade sheet but will not be accounted for CGPA calculation.
  - Failed courses or courses with shortage of attendance will not appear in the grade sheet or CGPA calculation.

- Students must register for honors or minor degrees separately for these additional courses and pay the prescribed tuition and examination fees.

4.11Semester Abroad and Twinning Programmes

Students may undergo a Semester Abroad / Twinning Programme at approved foreign universities or Institutions having academic collaboration with the Institution. The maximum duration permitted for a Semester Abroad Programme shall be six months, while the maximum duration permitted for a Twinning Programme shall be one year. A maximum of 30% of the total credits prescribed for the degree programme may be earned through the Semester Abroad / Twinning Programme.

Courses and credits completed at the host institution shall be approved by the Department and may be transferred to the respective programme as per the norms of the Institution. Students shall comply with the academic and disciplinary regulations of both the parent institution and the host institution during the programme period.

4.12Dual Degree

The programme shall be offered only through institutions having a valid academic collaboration or Memorandum of Understanding (MoU) with the parent institution.

Students opting for a Dual Degree Programme shall fulfill the eligibility criteria and academic requirements prescribed by both participating institutions. The duration, course structure, credit transfer, and degree requirements shall be governed by the regulations approved by the respective institutions. Students shall comply with the academic, disciplinary, and administrative rules of both institutions throughout the period of study.

The award of the dual degree shall be subject to the successful completion of all prescribed credits, project requirements, and assessment criteria of both programmes.

4.13Joint Degree

The Institution may offer Joint Degree Programmes in collaboration with recognized national or international institutions having a valid academic collaboration agreement or Memorandum of Understanding (MoU).

The curriculum, duration of study, credit requirements, and evaluation pattern for the

Joint Degree Programme shall be jointly approved by the participating institutions in accordance with the applicable regulatory norms. Students admitted to the Joint Degree Programme shall comply with the academic, administrative, and disciplinary regulations of all participating institutions. Credits earned at the partner institution shall be transferred and considered for the award of the Joint Degree as per the approved credit transfer policy of the Institution.

The Joint Degree shall be awarded upon successful completion of all prescribed academic requirements, including coursework, project work, internship, and examinations, as specified in the programme regulations.

4.14Two Academic Programmes

A student may be permitted to pursue two academic programmes simultaneously, subject to the regulations and approval of the Institution where one of the two programmes may be pursued in online, open and distance learning, or hybrid mode, as permitted by the applicable regulatory norms.

The student shall satisfy the eligibility, attendance, academic, and examination requirements prescribed for both programmes independently. Credits earned in one programme shall not be transferred to the other programme unless specifically approved by the Institution.

The award of degrees shall be based on the successful completion of all requirements prescribed for the respective programmes.

4.15Transfer of credits from other Institution

Students may be permitted to transfer credits earned from recognized Indian or Foreign Higher Educational Institutions, subject to the norms, conditions, and credit limits prescribed by the UGC.

- Twinning Programme: Credits earned from the Foreign Higher Educational Institution shall not exceed 30% of the total credits of the programme.
- Joint Degree Programme: Students must earn at least 30% of the total credits from each of the Indian and Foreign Higher Educational Institutions.
- Dual Degree Programme: Students must earn at least 30% of the total credits from the Indian Institution.

4.16Advanced and Differential Learners

Students securing a CGPA above 8.0 shall be identified as Advanced Learners and may be permitted to register for a maximum of three additional courses per semester along with flexible attendance provisions from the second year onwards.

Students requiring additional academic support shall be identified as Differential Learners and may be provided with bridge courses, remedial classes, mentoring, and other academic assistance measures

5. DURATION OF THE PROGRAMME

5.1 A student is expected to complete the B.Tech. Programme in 8 semesters (four academic years) but in any case, not more than 14 Semesters.

5.2 To support lifelong learning, the curriculum follows multiple entry multiple exit pathways as described below,

Pathway/ Stage	Qualification Awarded	Additional Requirement	Re-entry & Validity Terms
Exit after Year 1	**Undergraduate (UG) Certificate**	Completion of a minimum of 40 credits followed by an additional **4-credit skill-based exit module** during the summer.	Credits earned are stored in the **Academic Bank of Credits (ABC)** and are typically valid for **7 years**.
Exit after Year 2	**Undergraduate (UG) Diploma**	Completion of a minimum of 80 credits followed by an additional **4-credit skill-based exit module**.	Students can return to the ecosystem to progress to the next level within the valid period.
Exit after Year 3	**B.Voc. degree**	Completion of a minimum of 120 credits followed by an additional **4-credit skill-based exit module**.	Students can return to the ecosystem to progress to the next level within the valid period.
Re-entry	**N/A (Vertical Mobility)**	Redemption of accumulated credits stored against the student's **APAAR ID** in the ABC.	Re-entry after the 7-year validity period requires **re-validation** of prior learning outcomes through fresh assessment.

5.3 Each semester shall normally consist of 90 working days or 450 periods. The Head of the Department shall ensure that every teacher imparts instruction as per the number of periods / hours specified in the syllabus and that the teacher teaches the full content of the specified syllabus for the course being taught.

5.4 The total period for completion of the programme reckoned from the commencement of the first semester to which the candidate was admitted shall not exceed the maximum period specified in clause 5.1 irrespective of the period of break of study (vide clause 18.3) in order that he/she may be eligible for the award of the degree (vide clause 16).

5.5 In special and exceptional cases, a further extension of **one year** may be permitted with the approval of the **Executive Council (EC)**, subject to the recommendation of the

Head of the Institution and compliance with the applicable regulations.

6. ATTENDANCE REQUIREMENTS

6.1 Students are expected to attend all classes regularly and maintain a minimum attendance of 75% in each course.

6.2

6.3 It is the responsibility of every student to monitor their attendance percentage in each course and ensure compliance with the attendance regulations prescribed by VISTAS. Any discrepancy in attendance records should be immediately brought to the notice of the concerned faculty member for necessary correction.

6.4 Attendance relaxation up to 10% may be considered for valid reasons such as medical emergencies, on-duty assignments, extracurricular or extramural activities, permitted academic assignments, job interviews, inter-university sports meets, competitions, and other unforeseen emergencies.

6.5 Students who do not maintain the minimum attendance requirement of 75% in any course will not be permitted to appear for the End Semester Examination for that course.

6.6 The registration for such course(s) will be treated as cancelled, and the student will be awarded an 'I' Grade ('I' indicates Incomplete / Registration cancelled due to shortage of attendance). This grade will remain in the grade sheet until the course is successfully completed.

6.7 Students who fail to maintain the minimum attendance requirement of 75% in one or two courses may be permitted to attend additional classes on payment of the prescribed fee, and shall be allowed to appear for the End Semester Examination upon securing full attendance and satisfactory performance in such classes, as recommended by the course instructor and approved by the Institution.

6.8 A candidate who secures overall attendance between 65% and 74% in that current semester due to medical reasons (prolonged hospitalization / accident / specific illness / Participation in Sports events) may be permitted to appear for the current semester examinations subject to the condition that the candidate shall submit the medical certificate attested by the Dean of the School.

6.9 The overall attendance below 65% shall not be condoned under any circumstances.

6.10 A student whose overall attendance is below 65%, or whose shortage of attendance has not been condoned, shall be detained from appearing for the End Semester Examination of that semester.

6.11 Such a student shall be required to re-register for and repeat the semester/course(s) in accordance with the regulations of the University and shall fulfill the prescribed attendance requirements afresh.

6.12 Students from the second year onwards securing a CGPA of 8.0 and above may be granted flexible attendance, subject to the approval of the Institution, to pursue approved academic, research, internship, innovation, or entrepreneurial activities.

7. CLASS ADVISER AND MENTORS

To help the students in planning their courses of study and for general advice on the academic programme, the Head of the Department of the students will attach a certain number of students to a teacher of the Department who shall function as Class Adviser for those students throughout their period of study. Such Class Advisers shall advise the students and monitor the courses undergone by the students, check the attendance and progress of the students attached to him/her and counsel them periodically. If necessary, the Class adviser may also discuss with or inform the parents about the progress of the students.

Every student will also be allotted a mentor from the faculty of the department to guide him/her personally. The mentors will work in close association with the Class advisor to understand the progress of the students and provide the needed guidance.

8. COURSE COMMITTEE

Each common theory course offered to more than one discipline or class of students shall have a "Course Committee" comprising all the teachers teaching the common course with one of them nominated as Course Coordinator.

The nomination of the course coordinator shall be made by the Head of the Department / Dean depending upon whether all the teachers teaching the common course belong to a single department or to several departments.

The 'Course committee' shall meet in order to arrive at a common scheme of evaluation for the assessments and shall ensure a uniform evaluation.

9. CLASS COMMITTEE

9.1 A Class Committee (CCM) shall be constituted for every class/semester consisting of the HoD, Chairperson, faculty members, and student representatives.

9.2 Each department shall nominate a faculty member as the Class Committee Coordinator to monitor and organize the meetings.

9.3 The Chairperson shall be nominated by the HoD and CCM Coordinator on a rotational basis.

9.4 Student representatives shall be selected based on academic performance, discipline, attendance, and participation in co-curricular/extracurricular activities, ensuring fair representation of all student categories.

9.5 Class Committee Meetings shall be conducted periodically, preferably before every assessment examination, as per the academic schedule.

9.6 The committee shall review syllabus coverage, teaching–learning processes, assessment methods, student performance, attendance, and discipline.

9.7 Student feedback regarding courses, faculty, infrastructure, placement training, and other academic/non-academic matters shall be discussed for continuous improvement.

9.8 Remedial actions, corrective measures, and follow-up plans for academic and student-related issues shall be identified and implemented.

9.9 Minutes of the meeting, including discussions, decisions, and action taken reports, shall be properly documented and maintained in both soft and hard copies.

9.10 The Class Committee shall function as a quality enhancement mechanism to improve academic performance, student support, and the overall teaching–learning environment.

10. SYSTEM OF EXAMINATION

10.1 Performance in each course of study shall be evaluated based on (i) continuous assessment throughout the semester and (ii) End Semester Examinations at the end of the semester.

10.2 Each course, both theory and practical (including project work & Viva voce Examinations) shall be evaluated for a maximum of 100 marks.

10.3 For all theory and practical courses including project work, the continuous assessment will carry 40 marks while the End Semester examination will carry 60 marks.

10.4 Project work may be allotted to a single student or to a group of students not exceeding 4 per group.

10.5 For theory cum practical courses, the practical component will be evaluated during the continuous assessments. End Semester examination will be similar to theory courses for 60 marks.

10.6 The end semester examination (theory and practical) of 3 hours duration shall ordinarily be conducted between November and December during the odd semesters and between April and May during the even semesters.

10.7 The end semester examination for project work shall consist of evaluation of the final report submitted by the student or students of the project group (of not exceeding 4 students) by an external examiner followed by a viva-voce examination conducted separately for each student by a committee consisting of the external examiner, the guide of the project group and an internal examiner.

10.8 For the end semester examination in both theory and practical courses including project work the internal and external examiners shall be appointed by Controller of Examinations.

11. PROCEDURE FOR AWARDING MARKS FOR INTERNAL ASSESSMENT

11.1 Theory Courses

The distribution of internal assessment marks for theory courses shall be as follows:

S.No	Description		Marks
1	Two Continuous Assessment (C.A) Class Tests	(2 x 10)	**20**
2	Model Examination	(1 x 15)	**15**
3	Assignments / Class Seminar	(1 x5)	**05**
Total			**40**

11.2 Practical Courses

Every practical exercise / experiment shall be evaluated based on the exercise / experiment prescribed as per the syllabi and the records of work done maintained. There shall be at least one test during the semester. The criteria for arriving at the continuous assessment marks (40 marks) shall be decided based on the recommendation of the course committee/department advisory committee and shall be announced at the beginning of every semester by the Head of the Department.

11.3 Project Work:

11.3.1 The allotment of guides for eligible UG students must be done before the semester starts. All students are required to do Projects in Reputed Industry / Laboratory to promote academic industrial interaction and to provide professional expertise in selected fields of interest. Under this program, projects are formulated and implemented jointly by specialists from the industries and faculty members of the institute.

11.3.2 The Dean shall constitute a review committee for each branch of study. There shall be three reviews (each 100 Marks) during the semester by the review committee. The student shall make presentation on the progress made by him / her before the committee. The total marks obtained in the three reviews shall be reduced for 3 0 marks and rounded to the nearest integer. (This also implies equal weightage to all the three assessments), 5 marks shall be given for Attendance (Clause 11.3), and 5 marks shall be given for Student's Assesment by Faculty.

11.3.3 The project report shall carry a maximum 20 marks (same mark shall be awarded for the report submitted to every student within the project group) while the viva-voce examination shall carry 40 marks. (Marks are awarded to each student of the project group based on the individual performance in the viva-voce examination).

11.3.4 If a candidate fails to submit the project report on or before the specified deadline, he / she is deemed to have failed in the Project Work and shall re-register for the same in a subsequent semester.

11.3.5 Students who are entrepreneurs with registered startups may be permitted to undertake startup-based innovation activities in lieu of the final year project, subject to approval by the Institution.

11.4 Other Employability Enhancement Courses

11.4.1 The seminar is to be considered as purely INTERNAL (with 100% internal marks only). Every student is expected to present a minimum of 2 seminars per semester before the evaluation committee and for each seminar, marks can be equally apportioned. The three member committee appointed by Head of the Institution will evaluate the seminar and at the end of the semester the marks can be consolidated and taken as the final mark. The evaluation shall be based on the seminar paper (40%), presentation (40%) and response to the questions asked during presentation (20%).

11.4.2 The Industrial / Practical Training, Summer Project, Internship, shall carry 100 marks and shall be evaluated through internal assessment only. At the end of Industrial / Practical training / internship / Summer Project, the candidate shall submit a certificate from the organization where he / she has undergone training and a brief report. The evaluation will be made based on this report and a Viva- Voce Examination, conducted internally by a three member Departmental Committee constituted by the Head of the Institution.

12. REQUIREMENTS FOR APPEARING FOR END SEMESTER EXAMINATIONS

A candidate shall be permitted to appear for the End Semester Examinations of any semester commencing from I semester if he/she has satisfied the semester completion requirements (subject to Clause 6) and has registered for examination in all courses of the semester. Registration is mandatory for semester examinations as well as arrear examinations, failing which the candidate will not be permitted to move to the higher semester.

A candidate who has already appeared for any subject in a semester and passed the examination is not entitled to reappear in the same subject for improvement of grades / marks.

13. PASSING REQUIREMENTS

13.1 A candidate who secures not less than 40% of total marks prescribed for the end-semester Examination in both theory and practical courses (including Project work), shall be declared to have passed the Examination.

13.2 If a candidate fails to secure a pass in a particular course, it is mandatory that he/she shall register and reappear for the examination in that course during the subsequent semester when examination is conducted in that course; he/she should continue to register and reappear for the examinations in the failed subjects till he / she secures a pass.

13.3 The continuous assessment marks obtained by the candidate in the first appearance shall be retained and considered valid for all subsequent attempts till the candidate secure a pass.

14. AWARD OF LETTER GRADES

14.1 Grade Conversion Table

The performance of students in each course shall be indicated by Letter Grades and Grade Points based on the range of marks secured, as prescribed in the Grade Conversion Table approved by the Institution.

Range of	Grade Points	Letter Grade	Description
90 – 100	10	O	Outstanding
82 – 89	9	A+	Excellent
75 – 81	8	A	Very Good
67 – 74	7	B+	Good
60 – 66	6	B	Above Average
50 – 59	5	C	Average
40 – 49	4	D	Minimum for Pass
00 – 39	0	RA	Reappear
		AA	Absent

14.2Calculation of GPA and CGPA

The Grade Point Average (GPA) for the semester GRADE POINT AVERAGE [GPA] is calculated as follows,

$$GPA = \frac{\sum(C \times GP)}{\sum(C)}$$

The Cumulative Grade Point Average (CGPA) is calculated as follows,

$$CGPA = \frac{\sum_{i=1}^{n} (C_i \times GP_i)}{\sum_{i=1} C}$$

where,

n - Number of subjects.

C - Credit for the academic courses successfully completed.

GP - Grade point for the academic courses successfully completed.

15. REVALUATION / PHOTOCOPY / REVIEW

15.1 A candidate can apply for revaluation of his/her semester examination answer paper in a theory course, within 2 weeks from the declaration of results, on payment of a prescribed fee through proper application to the Controller of Examinations through the Dean of the School. A candidate can apply for revaluation of answer scripts for not exceeding 5 subjects at a time. The Controller of Examination will arrange for the revaluation and the results will be intimated to the candidate concerned through the Dean of the School. Revaluation is not permitted for practical courses, seminars, practical training and for project work.

15.2 A candidate can apply for photocopy of his/her semester examination answer paper in a theory course, within 2 weeks from the declaration of results, on payment of a prescribed fee through proper application to the Controller of Examinations through the Head of Department. The answer script is to be valued and justified by a faculty member, who handled the subject and recommend for revaluation with breakup of marks for each question. Based on the recommendation, the candidate can register for the revaluation through proper application to the Controller of Examinations. The Controller of Examinations will arrange for the revaluation and the results will be intimated to the candidate concerned through the Head of the Department. Revaluation is not permitted for practical courses and for project work.

15.3 A candidate can apply for revaluation of answer scripts for not exceeding 5 subjects at a time.

15.4 Candidates not satisfied with Revaluation can apply for Review of his/ her examination answer paper in a theory course, within the prescribed date on payment of a prescribed fee through proper application to Controller of Examination through the Head of the Department. Candidates applying for Revaluation only are eligible to apply for Review.

16. ELIGIBILITY FOR THE AWARD OF THE DEGREE

A student shall be declared to be eligible for the award of the Degree if he/she has,

- Successfully gained the required number of total credits as specified in the Curriculum corresponding to his/her Programme within the stipulated time.
- No disciplinary action is pending against him/her.
- Successfully completed the field visit / industrial training, if any, as prescribed in the curriculum.
- The award of the degree must be approved by the Executive Council.

17. CLASSIFICATION OF THE DEGREE AWARDED`

17.1 A candidate who qualifies for the award of the degree having passed the examination in all the courses in his / her first appearance within the specified minimum number of semesters securing a CGPA of not less than 7.5 shall be declared to have passed the examination in First class with Distinction. For the purpose the withdrawal from examination will not be construed as an appearance. Further, the authorized break of study will not be counted for the purpose of classification.

17.2 A candidate who qualifies for the award of the degree having passed the examination in all the courses in his / her first appearance within the specified minimum number of semesters plus one year (two semesters), securing a CGPA of not less than 6.50 shall be declared to have passed the examination in First class. Further, the authorized break of study will not be counted for the purpose of classification.

17.3 All other candidates who qualify for the award of the degree shall be declared to have passed the examination in Second Class.

17.4 Students who have been admitted from other Universities under Inter University Transfer are not eligible for Classification.

18. PROVISION FOR WITHDRAWAL FROM END-SEMESTER EXAMINATION

18.1 A candidate who qualifies for the award of the degree having passed the examination in all the courses in his / her first appearance within the specified minimum number of semesters securing a CGPA of not less than 7.5 shall be declared to have passed the examination in First class with Distinction. For the purpose the withdrawal from examination will not be construed as an appearance. Further, the authorized break of study will not be counted for the purpose of classification.

18.2 A candidate who qualifies for the award of the degree having passed the examination in all the courses in his / her first appearance within the specified minimum number of semesters plus one year (two semesters), securing a CGPA of not less than 6.50 shall be declared to have passed the examination in First class. Further, the authorized break of study will not be counted for the purpose of classification.

18.3 All other candidates who qualify for the award of the degree shall be declared to have passed the examination in Second Class.

18.4 Students who have been admitted from other Universities under Inter University Transfer are not eligible for Classification.

19. PROVISION FOR AUTHORISED BREAK OF STUDY

19.1 Break of Study shall be granted only once for valid reasons for a maximum of one year during the entire period of study of the degree programme. However, in extraordinary situation the candidate may apply for additional break of study not exceeding another one year by paying prescribed fee for break of study. If a candidate intends to temporarily discontinue the programme in the middle of the semester for valid reasons, and to rejoin the programme in a subsequent year, permission may be granted based on the merits of the case provided he / she applies to the Registrar in advance, but not later than the last date for registering for the end semester examination of the semester in question, through the Dean of the School stating the reasons therefor and the probable date of rejoining the programme.

19.2 The candidate permitted to rejoin the Programme after the break shall be governed by the Curriculum and Regulations in force at the time of rejoining. If the Regulations is changed, then, those candidates may have to do additional courses as prescribed by the Dean, School of Engineering.

19.3 The authorized break of study (for a maximum of one year) will not be counted for the duration specified for passing all the courses for the purpose of classification. (Vide Clause 14). However, additional break of study granted will be counted for the purpose of classification.

19.4 The total period for completion of the Programme reckoned from, the commencement of the first semester to which the candidate was admitted shall not exceed the maximum period specified in clause 5.1 irrespective of the period of break of study (vide clause 18.3) in order that he/she may be eligible for the award of the degree.

19.5 If any student is detained for want of required attendance, the period spent in that semester

shall not be considered as permitted 'Break of Study' (Clause 18.3) is not applicable for this case.

20. DISCIPLINE

Every student is required to observe disciplined and decorous behavior both inside and outside the Institution and not to indulge in any inappropriate or unethical activity. The Registrar shall constitute a disciplinary committee consisting of Dean, Two Heads of Department of which one should be from the faculty of the student, to enquire into acts of indiscipline and notify the Institution about the disciplinary action recommended for approval. In case of any serious in disciplinary action which leads to suspension or Dismissal, then a committee shall be constituted by the Institution. In this regard, the member will be nominated by Institution on getting information from the Head of School.

If a student indulges in malpractice in any of the end semester / internal examination he / she shall be liable for punitive action as prescribed by the Institution from time to time.

21. REVISION OF REGULATIONS AND CURRICULUM

The Institution may from time-to-time revise, amend or change the Regulations, Curriculum, Syllabus and scheme of examinations through the Academic Council with the approval of Board of Studies.

ABBREVIATIONS

PCC	Programme Core Courses
AEC	Ability Enhancement Courses
PEC	Professional Elective Courses
MDC	Multidisciplinary Core Courses
MDE	Multidisciplinary Elective Courses
VAC	Value Added Courses
SEC	Skill Enhancement Courses
SI	Summer Internship
PRD	Project Research Dissertation

CURRICULUM STURUCTURE

B.TECH – ELECTRONICS AND COMPUTER ENGINEERING

Total number of Credits: 165

SEMESTER I										
Category	Code	Course Title	Hours/Weeks					Maximum Marks		
			L	T	P	SL	C	CIA	SEE	Total
BSC		Mathematics I - Calculus and Linear Algebra	3	0	2	4	4	40	60	100
BSC		Engineering Physics	3	0	0	3	3	40	60	100
MDC		Engineering Graphics	2	1	0	3	3	40	60	100
PCC		Computer Programming using C and C++	3	0	0	3	3	40	60	100
BSC		Fundamentals of Electronics and Electrical Sciences	3	0	0	3	3	40	60	100
VAC		Universal Human Values – Understanding Harmony	3	0	0	3	3	40	60	100
VAC		Student Induction Program	0	0	0	0	0	0	0	0
BSC		Engineering Physics Lab	0	0	3	3	1.5	40	60	100
PCC		Computer Programming using C and C++ Lab	0	0	3	3	1.5	40	60	100
MDC		Fabrication and Workshop Practices Lab	0	0	3	3	1.5	40	60	100
		Total	18	0	11	27	23.5			

CIA - Continuous Internal Assessment SEE - Semester End Examination
L – Lecture T- Tutorial P- Practical SL - Self- Learning

SEMESTER II										
Category	Code	Course Title	Hours/Weeks					Maximum Marks		
			L	T	P	SL	C	CIA	SEE	Total
AEC		Technical English	2	0	0	2	2	40	60	100
BSC		Mathematics II (Multivariable calculus and Complex Analysis)	3	0	2	4	4	40	60	100
BSC		Engineering Chemistry	3	0	0	3	3	40	60	100
PCC		Digital System Design	3	0	2	3	4	40	60	100
PCC		Introduction to IoT	3	0	0	3	3	40	60	100
PCC		Electronic Devices	3	0	0	3	3	40	60	100
VAC		Constitution of India	1	0	0	1	0	40	60	100
AEC		Technical English Lab	0	0	2	2	1	40	60	100
BSC		Engineering Chemistry Lab	0	0	3	3	1.5	40	60	100
PCC		Electronic Devices Lab	0	0	3	3	1.5	40	60	100
		Total	18	0	12	27	23			

CIA - Continuous Internal Assessment **SEE - Semester End Examination**

***L – Lecture** ***T- Tutorial** ***P- Practical** ***SL - Self- Learning**

SEMESTER III										
Category	Code	Course Title	Hours/Weeks					Maximum Marks		
			L	T	P	SL	C	CIA	SEE	Total
BSC		Mathematics III - Transform and Boundary Value problems	3	1	0	4	4	40	60	100
PEC 1		Professional Elective -1	3	0	0	3	3	40	60	100
PCC		Data Structures and Algorithms	3	0	0	3	3	40	60	100
PCC		Microprocessor and Microcontroller	3	0	0	3	3	40	60	100
SEC		Aptitude and Coding Skills I	2	0	0	2	2	40	60	100
SEC		Design Thinking	2	0	0	2	2	40	60	100
VAC		Gender, Institution and Society	2	0	0	0	0	40	60	100
SEC		Technical oratory	0	0	2	2	0	40	60	100
PCC		Microprocessor and Microcontroller Lab	0	0	3	3	1.5	40	60	100
PCC		Data Structures and algorithms Lab	0	0	4	4	2	40	60	100
		Total	**18**	**1**	**9**	**24**	**20.5**	**-**	**-**	**100**

CIA - Continuous Internal Assessment **SEE - Semester End Examination**
L – Lecture **T- Tutorial** **P- Practical** **SL - Self- Learning**

SEMESTER IV									
Category	Code	Course Title	Hours/Weeks					Maximum Marks		
			L	T	P	SL	C	CIA	SEE	Total
BSC		Mathematics IV- Probability and Random Process	3	1	0	4	4	40	60	100
PCC		Operating Systems	3	0	0	3	3	40	60	100
PCC		Data Communication Networks	3	0	0	3	3	40	60	100
PCC		Signals and Systems	3	0	0	3	3	40	60	100
VAC		Basic Life Skills	2	0	0	2	-	40	60	100
SEC		Aptitude and Coding Skills II	2	0	0	2	2	40	60	100
PCC		Database Management Systems	3	0	0	3	3	40	60	100
PCC		Database Management Systems Lab	0	0	3	3	1.5	40	60	100
PCC		Data Communication Networks Lab	0	0	3	3	1.5	40	60	100
SEC		Curricular and Extracurricular activities (NCC/NSS and other activities)	1	0	0	1	1	-	-	-
		Total	**20**	**1**	**6**	**27**	**22**	**-**	**-**	**-**

CIA - Continuous Internal Assessment **SEE - Semester End Examination**

***L – Lecture** ***T- Tutorial** ***P- Practical** ***SL - Self- Learning**

SEMESTER V										
Category	Code	Course Title	Hours/Weeks					Maximum Marks		
			L	T	P	SL	C	CIA	SEE	Total
PCC		Introduction to AI and ML	3	0	0	3	3	40	60	100
PCC		Python Programming	3	0	2	3	4	40	60	100
PCC		Communication Systems	3	0	0	3	3	40	60	100
PEC 3		Professional Elective Course– 2	3	0	0	3	3	40	60	100
PEC 4		Professional Elective Course 3	3	0	0	3	3	40	60	100
SEC		Advanced Aptitude and Coding Skills I	2	0	0	2	2	40	60	100
VAC		Environmental Sciences and SDG Goals	2	0	0	2	2	40	60	100
PCC		Introduction to AI and ML Lab	0	0	3	3	1.5	40	60	100
PCC		Communication Systems Lab	0	0	3	3	1.5	40	60	100
PRD		Mini Project/Industrial Training	0	0	2	2	1	40	60	100
		Total	**19**	**0**	**10**	**27**	**24**			

CIA - Continuous Internal Assessment **SEE - Semester End Examination**
L – Lecture **T- Tutorial** **P- Practical** **SL - Self- Learning**

SEMESTER VI									
Category		Course Title	Hours/Weeks					Maximum Marks		
			L	T	P	SL	C	CIA	SEE	Total
PCC		Embedded Systems Design	3	1	0	4	3	40	60	100
PCC		Introduction to Standards in Electronics and Communication	3	0	0	3	3	40	60	100
PEC 4		Professional Elective Course – 4	3	0	0	3	3	40	60	100
PCC		Design and Analysis of Algorithms (TCP)	3	0	2	5	4	40	60	100
MDE		Multidisciplinary Elective	3	0	0	3	3	40	60	100
AEC		Innovation and Entrepreneurship	2	0	0	2	1	40	60	100
SEC		Advanced Aptitude and Coding Skills II	2	0	0	2	2	40	60	100
PCC		Embedded Systems Design Lab	0	0	3	3	1.5	40	60	100
SI		Internship	0	0	3	3	1	40	60	100
		Total	**19**	**0**	**8**	**28**	**21.5**			

CIA - Continuous Internal Assessment **SEE - Semester End Examination**

***L – Lecture** ***T- Tutorial** ***P- Practical** ***SL - Self- Learning**

SEMESTER VII									
Category	Code	Course Title	Hours/Weeks					Maximum Marks		
			L	T	P	SL	C	CIA	SEE	Total
PCC		Cloud Computing	3	0	0	3	3	40	60	100
PEC		Professional Elective Course 5	3	0	0	3	3	40	60	100
PEC 6		Professional Elective Course 6	3	0	0	3	3	40	60	100
MDE		Multidisciplinary Elective	3	0	0	3	3	40	60	100
PCC		Cloud Computing Lab	0	0	3	3	1.5	40	60	100
PRD		Project Phase I	0	0	6	6	3	40	60	100
SEC		Curricular and Extracurricular activities (NCC/NSS and other activities)	1	0	0	0	1	40	60	100
		Total	13	0	9	21	17.5			

CIA - Continuous Internal Assessment **SEE - Semester End Examination**

***L – Lecture** ***T- Tutorial** ***P- Practical** ***SL - Self- Learning**

SEMESTER VIII									
Category	Code	Course Title	Hours/Weeks					Maximum Marks		
			L	T	P	SL	C	CIA	SEE	Total
MDC		Multidisciplinary Core	3	0	0	3	3	40	60	100
MDC		Multidisciplinary Core	3	0	0	3	3	40	60	100
PRD		Project Phase - II	0	0	14	14	7	40	60	100
		Total	**6**	**0**	**14**	**20**	**13**			

CIA - Continuous Internal Assessment **SEE - Semester End Examination**

***L – Lecture** ***T- Tutorial** ***P- Practical** ***SL - Self- Learning**

PROGRAMME CORE COURSES

Category	Code	Course	L	T	P	SL	C
PCC		Computer Programming using C and C++	3	0	0	3	3
PCC		Computer Programming using C and C++ Lab	0	0	3	3	1.5
PCC		Digital System Design	3	0	2	3	4
PCC		Introduction to IoT	3	0	0	3	3
PCC		Electronic Devices	3	0	0	3	3
PCC		Electronic Devices Lab	-	0	3	3	1.5
PCC		Data Structures and Algorithms	3	0	0	3	3
PCC		Microprocessor and Microcontroller	3	0	0	3	3
PCC		Microprocessor and Microcontroller Lab	0	0	3	3	1.5
PCC		Data Structures and algorithms Lab	0	0	4	3	2
PCC		Operating Systems	3	0	0	3	3
PCC		Data Communication Networks	3	0	0	3	3
PCC		Signals and Systems	3	0	0	3	3
PCC		Database Management Systems	3	0	0	3	3
PCC		Database Management Systems Lab	0	0	3	3	1.5
PCC		Data Communication Networks Lab	0	0	3	3	1.5
PCC		Introduction to AI and ML	3	0	0	3	3
PCC		Python Programming	3	0	2	3	4
PCC		Communication Systems	3	0	0	3	3
PCC		Introduction to AI and ML Lab	0	0	3	3	1.5
PCC		Communication Systems Lab	0	0	3	3	1.5
PCC		Embedded Systems Design	3	1	0	4	3

PCC		Introduction to Standards in Electronics and Communication	3	0	0	3	3
PCC		Design and Analysis of Algorithms (TCP)	3	0	2	5	4
PCC		Embedded Systems Design Lab	0	0	3	3	1.5
PCC		Cloud Computing	3	0	0	3	3
PCC		Cloud Computing Lab	0	0	3	3	1.5
			33	**1**	**29**	**48**	**69.5**

PROFESSIONAL ELECTIVE COURSES

Category	Code	Course	L	T	P	SL	C
PEC		Industrial Applications of Microcontrollers and practice-based approach	3	0	2	5	4
PEC		Cyber physical systems for industrial applications	3	0	2	5	4
PEC		Applied Industrial IOT	3	0	0	3	3
PEC		Drone Technology and its transformative applications – a practitioner's perspective	3	0	0	3	3
PEC		Artificial Intelligence and Edge Computing	3	0	0	3	3
PEC		5G technology for smarter and secure connectivity	3	0	0	3	3
PEC		Advanced Speech and Language Processing	3	0	0	3	3
PEC		Data Exploration and Visualization	3	0	2	5	4
PEC		Data warehousing and mining	3	0	0	3	3
PEC		Essential of data analytics	3	0	2	5	4
PEC		Introduction to Data Science	3	0	0	3	3
PEC		Python for Data science	3	0	0	3	3
PEC		Industrial And Medical IoT	3	0	0	3	3
PEC		Mobile application development for IOT Theory lab	3	0	0	3	3
PEC		Privacy And Security in IOT	3	0	0	3	3
PEC		Robotics & IOT	3	0	0	3	3
PEC		Sensors and Actuators	3	0	0	3	3

PEC		Wearable Computing	3	0	0	3	3
PEC		ML for speech and Audio Processing	3	0	0	3	3
PEC		Android and Web Development	3	0	0	3	3
PEC		Virtual Reality	3	0	0	3	3
PEC		Artificial Intelligence with Python	3	0	2	5	4
PEC		Edge Computing	3	0	0	3	3
PEC		Advanced Computer Architecture	3	0	0	3	3
PEC		Cryptography and Network Security	3	0	0	3	3
PEC		Information Security	3	0	0	3	3
PEC		Applied Cryptography	3	0	0	3	3
PEC		Cyber Security	3	0	2	5	4
PEC		Cyber Physical Systems	3	0	0	3	3
PEC		Computer Vision	3	0	2	5	4

PROFESSIONAL ELECTIVE COURSES

1. INTERNET OF THINGS							
Category	**Code**	**Course**	**L**	**T**	**P**	**SL**	**C**
PEC		Sensors and Actuators	3	0	0	3	3
PEC		Wearable Computing	3	0	0	3	3
PEC		Mobile Application Development for IOT	3	0	0	3	3
PEC		Industrial and Medical IOT	3	0	0	3	3
PEC		Robotics and Internet Of Things	3	0	0	3	3
PEC		Privacy and Security In IOT	3	0	0	3	3
		Total	18	0	0	18	18

2. DATA SCIENCE							
Category	**Code**	**Course**	**L**	**T**	**P**	**SL**	**C**
PEC		Introduction to Data Science	3	0	0	3	3
PEC		Python for Data Science	3	0	0	3	3
PEC		Data Exploration and Visualization	3	0	0	3	3
PEC		Advanced Speech and Language Processing	3	0	0	3	3
PEC		Essential of Data Analytics	3	0	0	3	3
PEC		Data Mining	3	0	0	3	3
		Total	18	0	0	18	18

3. VLSI DESIGN							
Category	**Code**	**Course**	**L**	**T**	**P**	**SL**	**C**
PEC		Hardware Description Languages	3	0	0	3	3
PEC		Low Power VLSI Design	3	0	0	3	3
PEC		Analog VLSI Design	3	0	0	3	3
PEC		CMOS VLSI Design	3	0	0	3	3
PEC		Digital VLSI Design	3	0	0	3	3
PEC		Design For Testability	3	0	0	3	3
		Total	18	-	-	18	18

4. AI FOR EMBEDDED APPLICATIONS							
Category	**Code**	**Course**	**L**	**T**	**P**	**SL**	**C**
PEC		ML For Speech and Audio Processing	3	0	0	3	3
PEC		Android and Web Development	3	0	0	3	3
PEC		Virtual Reality	3	0	0	3	3
PEC		Artificial Intelligence with Python	3	0	0	3	3
PEC		Edge Computing	3	0	0	3	3
PEC		Advanced Computer Architecture	3	0	0	3	3
		Total	18	0	0	18	18

ABILITY ENHANCEMENT COURSES

Category	**Code**	**Course**	**L**	**T**	**P**	**SL**	**C**
AEC		Technical English	2	0	0	1	2
AEC		Technical English Lab	0	0	2	2	1
AEC		Innovation and Entrepreneurship	2	0	0	2	1
AEC		**Total**	**4**	0	**2**	**4**	**4**

VALUE ADDED COURSES

Category	Code	Course	L	T	P	SL	C
VAC		Student Induction Program	0	0	0	0	0
VAC		Universal Human Values – Understanding Harmony	3	0	0	3	3
VAC		Constitution of India	1	0	0	0	0
VAC		Gender , Institution and Society	2	0	0	0	0
VAC		Basic Life Skills	2	0	0	3	0
		Total	8	0	0	6	3

SKILL ENHANCEMENT COURSES

Category	Code	Course	L	T	P	SL	C
SEC		Aptitude and Coding Skills I	2	0	0	2	2
SEC		Design Thinking	2	0	0	0	2
SEC		IDEA Lab	0	0	2	2	0
SEC		Aptitude and Coding Skills II	2	0	0	2	2
SEC		Curricular and Extracurricular activities (NCC/NSS and other activities)	1	0	0	0	1
SEC		Advanced Aptitude and Coding Skills I	2	0	0	2	2
SEC		Advanced Aptitude and Coding Skills II	2	0	0	2	2
SEC		Curricular and Extracurricular activities (NCC/NSS and other activities)	1	0	0	0	1
		Total	**12**	0	**2**	**8**	**12**

BASIC SCIENCE COURSES

Category	Code	Course	L	T	P	SL	C
BSC		Engineering Physics	3	0	0	3	3
BSC		Mathematics I - Calculus and Linear Algebra	3	0	2	4	4
BSC		Fundamentals of Electronics and Electrical Sciences	3	0	0	3	3
BSC		Engineering Physics Lab	0	0	3	3	1.5
BSC		Mathematics II (Multivariable and Complex Analysis)	3	0	2	4	4

BSC		Engineering Chemistry	3	0	0	3	3
BSC		Engineering Chemistry Lab	0	0	3	3	1.5
BSC		Mathematics III - Transform and Boundary Value problems	3	1	0	4	4
BSC		Mathematics IV- Probability and Random Process	3	1	0	4	4
BSC		Environmental Sciences and SDG Goals	2	0	0	2	2
		Total	**23**	**2**	**10**	**28**	**30**

SUMMER INTERNSHIP

Category	Code	Course	L	T	P	SL	C
SI		Internship	0	0	3	3	1
SI		**Total**	**0**	0	**3**	**3**	**1**

PROJECT RESEARCH DISSERTATION

Category	Code	Course	L	T	P	SL	C
PRD		Mini Project	0	0	2	2	1
PRD		Project Phase I	0	0	6	6	3
PRD		Project Phase - II	0	0	14	14	7
		Total	0	0	22	22	11

MULTIDISCIPLINARY CORE AND ELECTIVE COURSES

Category	Code	Course	L	T	P	SL	C
MDC		Brain Computer Interface and Applications	3	0	0	3	3
MDC		Introduction to Quantum Computing	3	0	0	3	3
MDC		Introduction to cyber Physical Systems	3	0	0	3	3
MDC		Wireless Technology	3	0	0	3	3
MDC		Wearable Biomedical Devices And Its Applications	3	0	0	3	3
MDE		Creative Innovation and Entrepreneurship	3	0	0	3	3
MDE		Professional Ethics for Engineers	3	0	0	3	3
MDC		Engineering Graphics	2	1	0	3	3

MDC		Fabrication and Workshop Practices Lab	0	0	3	3	1.5
MDC		Deep Learning	3	0	0	3	3
MDC		Cyber Security	3	0	0	3	3
MDC		UI and UX Design	3	0	0	3	3
MDC		5G Internet of Things	3	0	0	3	3
MDC		Embedded IoT	3	0	0	3	3
MDC		High Speed Networks	3	0	0	3	3
MDC		Mobile Ad-hoc Networks	3	0	0	3	3
MDC		Remote Sensing	3	0	0	3	3
MDE		Total Quality Management	3	0	0	3	3
MDC		Satellite Communication	3	0	0	3	3
MDC		Wireless Sensor Networks	3	0	0	3	3
MDC		Introduction to MATLAB	3	0	0	3	3
MDC		Radar and Navigational Aids	3	0	0	3	3
MDC		Cognitive Radio Networks	3	0	0	3	3
MDC		Cryptography and Network Security	3	0	0	3	3
MDC		Medical Signal and Image Processing	3	0	0	3	3
MDC		Bio-Medical Electronics	3	0	0	3	3
MDC		Sensor Technology	3	0	0	3	3
MDC		Electronic Sensors	3	0	0	3	3
MDC		Smart IoT Applications	3	0	0	3	3
MDC		Wireless and Mobile Communication	3	0	0	3	3
MDC		Web Technologies	3	0	0	3	3
MDC		Artificial Intelligence with Python	3	0	0	3	3
MDC		Principles of Computer Communication	3	0	0	3	3
MDC		Fundamentals of Internet of Things	3	0	0	3	3
MDE		Robotics and Automation	3	0	0	3	3
MDE		Intelligent and Autonomous Systems	3	0	0	3	3
MDC		Mobile App Development for IoT	3	0	0	3	3
MDC		Industrial and Medical IoT	3	0	0	3	3
MDC		Software Defined Networks	3	0	0	3	3
MDC		Cognitive IoT	3	0	0	3	3
MDE		Disaster Management	3	0	0	3	3
MDE		Indian Knowledge System	3	0	0	3	3
MDE		Introduction to Intellectual Property	3	0	0	3	3
MDE		Principles of Management	3	0	0	3	3

MDE		French	3	0	0	3	3
MDE		Japanese	3	0	0	3	3
MDE		German	3	0	0	3	3

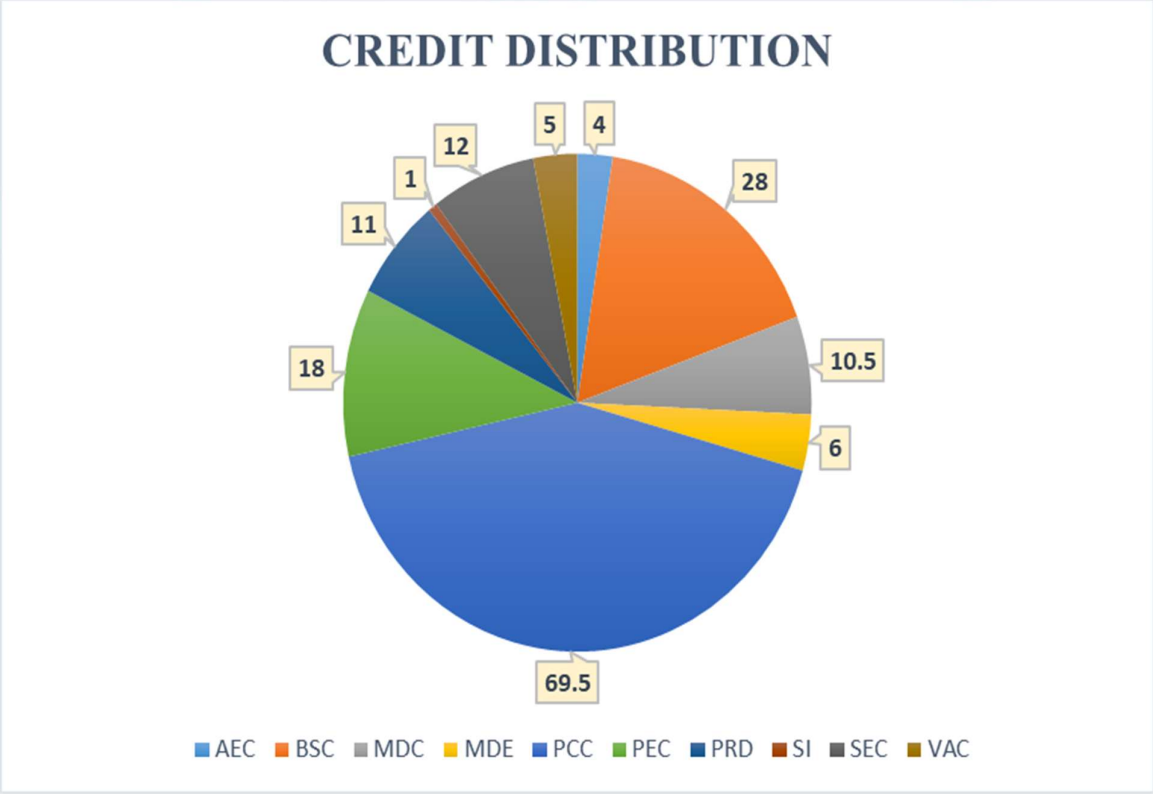
CREDIT DISTRIBUTION

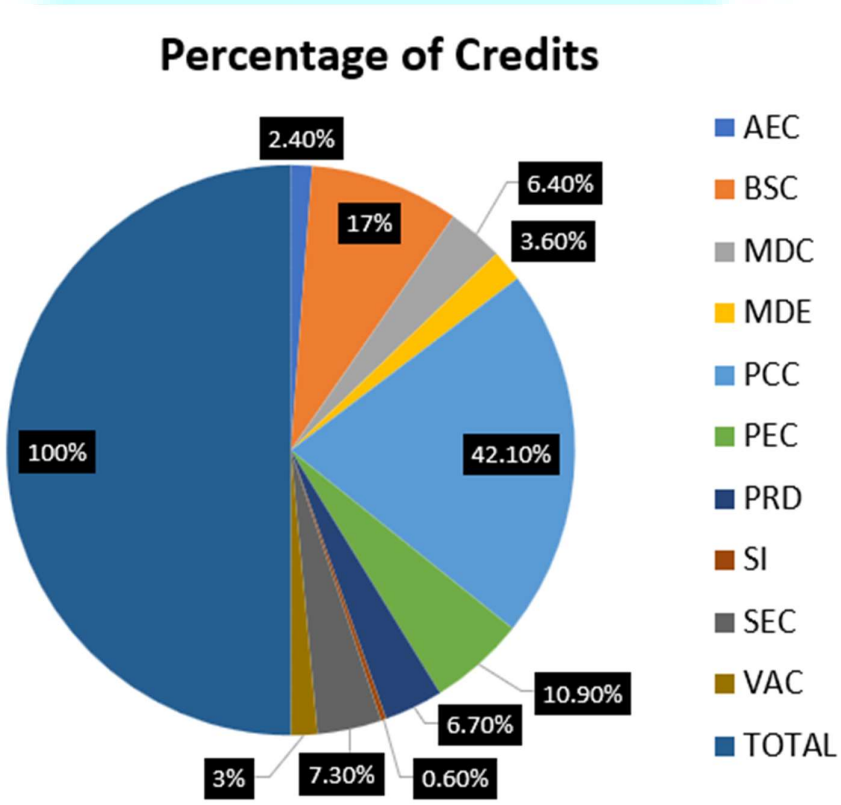
B. Tech - Electronics and Computer Engineering
Four Years

Category	I Sem	II Sem	III Sem	IV Sem	V Sem	VI Sem	VII Sem	VIII Sem	4 Yrs Total Credits
PCC	4.5	11.5	9.5	15	13	11.5	4.5	0	69.5
AEC	0	3	0	0	0	1	0	0	4
BSC	11.5	8.5	4	4	0	0	0	0	28
PEC	0	0	3	0	6	3	6	0	18
MDC	4.5	0	0	0	0	0	0	6	10.5
MDE	0	0	0	0	0	3	3	0	6
VAC	3	0	0	0	2	0	0	0	5
SEC	0	0	4	3	2	2	1	0	12
SI	0	0	0	0	0	1	0	0	1
PRD	0	0	0	0	1	0	3	7	11
Total Credits	23.5	23	20.5	22	24	21.5	17.5	13	165

CREDIT DISTRIBUTION

Category	Description	4 Years Total Credits
AEC	Ability Enhancement Course	4
BSC	Basic Science Courses	28
MDC	Multidisciplinary Core	10.5
MDE	Multidisciplinary Elective	6
PCC	Program Core Courses	69.5
PEC	Professional Elective Courses	18
PRD	Project Research Dissertation	11
SI	Summer Internships	1
SEC	Skill Enhancement Courses	12
VAC	Value Added Courses	5
	Total Credits	**165**




Percentage of Credits
2.40%
17%
6.40%
3.60%
42.10%
100%
10.90%
6.70%
3%
7.30%
0.60%
AEC
BSC
MDC
MDE
PCC
PEC
PRD
SI
SEC
VAC
TOTAL

SEMESTER I

COURSECODE	MATHEMATICS I (CALCULUS AND LINEAR ALGEBRA)		L	T	P	SL	C
			3	0	2	4	4
PRE-REQUISITE	NIL	CO-REQUISITE	NIL				

COURSE OBJECTIVES

- To build knowledge in differential, integral and multivariable calculus for solving engineering and scientific problems.
- To impart fundamental concepts of matrices, vector spaces, eigenvalues, eigenvectors and linear transformations used in engineering applications.
- To provide a strong mathematical foundation for advanced studies in mathematics, data science and engineering disciplines

UNIT I	CALCULUS	12 Hours

Rolle's theorem-Mean value theorems-Taylor's and Maclaurin theorems -Indeterminate forms and L'Hospital's rule-Curvature – cartesian and polar coordinates – Circle of curvature – Involutes and Evolutes – Envelopes –properties of envelopes – Evolute as envelope of normals.

UNIT II	SEQUENCES AND SERIES AND MULTIVARIABLE CALCULUS	12 Hours

Limits of sequence of numbers, Calculation of limits, Infinite series, Tests for convergence, Power series, Taylor and Maclaurin series. Limit continuity, partial derivatives and total derivative, Jacobian-Functional dependence and Independence, Maxima and minima and saddle points, Method of Lagrange multipliers.

UNIT III	INTEGRAL CALCULUS (MULTIPLE INTEGRALS)	12 Hours

Introduction - Double integrals- triple integrals- change of order of integration-change of variables to polar- cylindrical and spherical coordinates-Finding areas (by double integrals) and volumes (by double integrals and triple integrals).

UNIT IV	MATRICES	12 Hours

Introduction, -Types of matrices. Rank of a matrix - echelon form, normal form, consistency system of linear equations (Homogeneous and Non-Homogeneous). Eigen values and Eigenvectors and their properties (without proof), Cayley-Hamilton theorem (without proof), Diagonalisation.

UNIT V	VECTOR SPACES	12 Hours

Vector Space- linear Independence and dependence of vectors, basis, dimension- Linear transformations (maps), range and kernel of a linear map, rank and nullity- Inner product spaces-Gram-Schmidt Orthogonalization.

Total: 60 Hours

Self-Learning: 60 Hours

TEXT BOOKS:

1. Joel R. Hass, Christopher E. Heil, Maurice D. Weir, Przemysław Bogacki, Thomas' Calculus, 15thEdition,Pearson,2022.
2. Ramana B.V. Higher Engineering Mathematics, Tata McGraw Hill New Delhi, First Edition, 2025-26.
3. N.P. Bali and Manish Goyal, A text book of Engineering and Mathematics I, Laxmi Publications, 10th Edition, 2023.

REFERENCE BOOKS:

1. P. Sivaramakrishna Das and C. Vijayakumari, Mathematics-I, Pearson India, 2019.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 11th Edition, Wiley India, 2025.
3. Veerarajan T., Engineering Mathematics for First Year, Tata McGraw-Hill, New Delhi, Latest Reprint.
4. Grewal B.S., "Higher Engineering Mathematics", Khanna Publishers, 45th Edition, New Delhi, 2024

WEB LINKS:

1. https://www.khanacademy.org/math/multivariable-calculus/applications-of-multivariable-derivatives/optimizing-multivariable-functions/a/maximums-minimums
2. https://www.geeksforgeeks.org/rolles-and-lagranges-mean-value-theorem/
3. https://home.iitk.ac.in/~arlal/MTH102/la.pdf

NPTEL LINKS:

1. Engineering Mathematics - I

By Prof. Jitendra Kumar | IIT Kharagpur

https://onlinecourses.nptel.ac.in/noc20_ma37/preview

LIST OF EXPERIMENTS:

Sl.No	List of Experiments
1	Introduction to Calculus through MATLAB – Symbolic Computations
2	Plotting and visualising curves and surfaces
3	Evaluating maxima and minima of functions of several variables
4	Evaluation of maxima and minima, applying the Lagrange multiplier method
5	Evaluation of volume under a surface by double Integral
6	Evaluating triple integrals
7	Evaluation of eigenvalues and eigen vectors

TEXT BOOKS:

1. Ronald L. Lipsman , Jonathan M. Rosenberg, Multivariable Calculus with MATLAB with applications to Geometry and Physics, Springe, 2017.

COURSE OUTCOMES

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

COURSE OUTCOMES	DESCRIPTION	KNOWLEDGE LEVEL
CO1	Apply the principles of differential and multivariable calculus, to solve mathematical problems.	**K3**
CO2	Analyze sequences, series, and multivariable functions	**K4**
CO3	Evaluate double and triple integrals for engineering applications	**K5**
CO4	Solve linear algebra problems using concepts of vector spaces.	**K3**
CO5	Apply concepts of matrices and vector spaces for solving problems in linear algebra.	**K3**

COURSE ARTICULATION MATRIX

	PO1	PO2	PO3	P O4	PO5	PO6	PO7	PO 8	PO9	PO 10	PO 11	PSO1	PSO2
CO1	3	2	-	-	3	-	-	-	-	-	-	2	-
CO2	2	3	-	2	-	-	-	-	-	-	-	3	-
CO3	3	3	-	2	3	-	-	-	-	-	-	-	-
CO4	2	3	-	-	3	-	-	-	-	-	-		-
CO5	3	2	-	-	3	-	-	-	-	-	-	-	-
AVG	**2.6**	**2.6**	**-**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**2.5**	**-**

COURSECODE	ENGINEERING PHYSICS		L	T	P	SL	C
			3	0	0	3	3
PRE-REQUISITE	NIL	CO-REQUISITE	ENGINEERING PHYSICS LAB				

COURSE OBJECTIVES

- To learn the basics of electronic materials, semiconducting materials and their interaction with light, new engineered semiconductor devices.
- To apply these fundamental principles to solve practical problems related to materials used for engineering applications

UNIT I	BAND THEORY OF SOLIDS	9 Hours

Energy bands in solids: conductors - semiconductors and insulators – Band gaps in semiconductors - Direct and indirect band gaps semiconductors – Classical free electron theory - Drude and Lorentz classical free electron theory - electrical conductivity and thermal conductivity – Wiedemann-Franz Law –Lorentz number - Fermi distribution function - Effect of temperature on Fermi function – Density of energy states.

UNIT II	SEMICONDUCTORS	9 Hours

Introduction - Properties of semiconductors – Classification of semiconductors – Types: Intrinsic and Extrinsic semiconductor - Carrier concentration of intrinsic and extrinsic (derivation) – Carrier concentration in n type and p type semiconductor – Variation of Fermi level with temperature and impurity concentration.

UNIT III	LIGHT-SEMICONDUCTOR INTERACTION	9 Hours

Optical transitions in bulk semiconductors: Stimulated absorption - spontaneous and stimulated emission – Excitons - Population Inversion - Einstein's A & B coefficient (derivation) – Principle and working of Photovoltaic effect and Solar cells – Applications.

UNIT IV	SEMICONDUCTOR DEVICES AND MEASUREMENT	9 Hours

Semiconductor diodes – Characteristics - construction and working – Types of semiconductor diodes – Light Emitting Diode (LED) – Measurements: Principle and working of UV-Vis spectrophotometer - Hall effect – Hall effect in n-type and p-type semiconductor (derivation) – Experimental determination of Hall coefficient – Applications.

UNIT V	ADVANCED ENGINEERED SEMICONDUCTOR MATERIALS	9 Hours

Metallic glasses, preparation, properties and applications - Shape Memory Alloys – Characteristics, Properties of Ni-Ti alloy - Applications – Quantum nanostructures - Semiconductor Nanomaterials:

- Properties -Synthesis (top-down and bottom-up approach) – Pulsed Laser deposition – Chemical vapour deposition – Applications

Total: 45 Hours

Self-Learning: 45 Hours

TEXT BOOKS:

1. Murugeshan R, Kiruthiga Sivaprasath, 'Modern Physics', S Chand Publisher, 2026.
2. Dr. Mani P, 'A textbook of Engineering Physics – II', Shri Dhanam Publisher, Chennai, 2016
3. Rajendran V, and Marikani A, 'Materials Science', Tata McGraw-Hill publications, New Delhi, 2011
4. Vijaya, M., and Rangarajan, G., 'Materials Science', Tata McGraw-Hill Publications, New Delhi, 2006.

REFERENCE BOOKS:

1. S. M. Sze, Semiconductor Devices: Physics and Technology, Wiley (2008).
2. Charles Kittel 'Introduction to Solid State Physics', John Wiley and Sons, 7th edition, Singapore 2008.
3. Kasap S.O, "Principles of Electronic Materials", 3rd edition, McGraw-Hill Higher Education, 2006.
4. Pradeep T, "A textbook of Nanoscience and Nanotechnology" McGraw-Hill Higher Education, 2012.
5. Palanisamy P.K, 'Materials Science', Scitech publications, Chennai, 2007.
6. J. Singh, Semiconductor Optoelectronics: Physics and Technology, McGraw-Hill Inc. (1995).
7. P. Bhattacharya, Semiconductor Optoelectronic Devices, Prentice Hall of India (1997).

WEB LINKS:

1. https://nptel.ac.in/courses/115102026/2
2. https://nptel.ac.in/courses/115102026/15
3. http://textofvideo.nptel.ac.in/115102026/lec18.pdf
4. https://nptel.ac.in/courses/122103010/34
5. http://orbit.dtu.dk/files/4817236/petersen.pdf

NPTEL LINKS:

1. Fundamentals of Semiconductor devices, IISc Bangalore, Prof. Digbijoy N. Nath
2. Introduction to Semiconductor Devices, Prof. Naresh Kumar Emani, IIT Hyderabad

COURSE OUTCOMES

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

COURSE OUTCOMES	DESCRIPTION	KNOWLEDGE LEVEL

CO1	Identify the behaviour of free electrons in conducting materials.	K3
CO2	Analyse the type of semiconducting materials and their applications.	K4
CO3	Identify the applications of photovoltaic and solar cells.	K3
CO4	Demonstrate the construction and working of various semiconductor devices.	K2
CO5	Develop the design and fabrication of nanostructures.	K3

COURSE ARTICULATION MATRIX

	PO1	PO2	PO3	P O4	PO5	PO6	PO7	PO 8	PO9	PO 10	PO 11	PSO 1	PSO 2
CO1	3	3	2	-	-	-	-	-	-	-	-	3	-
CO2	2	3	-	2	-	-	-	-	-	-	-	2	-
CO3	3	3	3	-	-	-	-	-	-	-	3		-
CO4	2	2	3	-	-	-	-	-	-	-	2		-
CO5	-	2	3	3	-	-	-	-	-	-	3	2	-
AVG	**2.50**	**2.60**	**2.75**	**2.50**	**-**	-	-	-	-	-	**2.66**	**2.33**	-

COURSECODE	ENGINEERING GRAPHICS		L	T	P	SL	C
			2	1	0	3	3
PRE-REQUISITE	NIL	CO-REQUISITE	NIL				

COURSE OBJECTIVES

- To introduce the fundamentals of engineering drawing standards, conventions, and BIS specifications used in engineering practice.
- To develop the ability to visualize and construct orthographic projections of points, lines, planes, and solids.
- To impart knowledge in sectional views and development of surfaces of engineering components.
- To enhance spatial visualization and graphical communication skills through isometric and orthographic projections.
- To provide practical exposure to computer-aided drafting (CAD) tools for preparing engineering drawings and models

UNIT I	ENGINEERING CURVES	9 Hours

Engineering curves used in mechanical and design applications – Construction of conic sections (ellipse, parabola, hyperbola) using eccentricity and auxiliary methods – Cycloid, epicycloid, and hypocycloid with applications in gear tooth profiles – Involute of square and circle with relevance to power transmission – Construction of tangents and normal – CAD tools with engineering applications through component-based examples.		
UNIT II	**PROJECTION OF POINTS, LINES AND PLANE SURFACES**	**9 Hours**
Projection of points and straight lines in all quadrants – Determination of true length and true inclination using Change of Position Methods and auxiliary planes – Projection of plane surfaces such as polygonal plates and circular lamina inclined to reference planes – Visualization techniques for interpreting multi-view drawings – Engineering applications involving structural plates, brackets, and machine elements.		
UNIT III	**PROJECTION OF SOLIDS**	**9 Hours**
Projection of simple solids including prisms, pyramids, cylinders, and cones – Axis inclined to one reference plane using change of position method – Auxiliary views for complex orientations – Visualization-based problem solving using real engineering components and assemblies.		
UNIT IV	**SECTIONS OF SOLIDS AND DEVELOPMENT OF SURFACES**	**9 Hours**
Concept and necessity of sectioning in engineering drawings – Sections of solids by cutting planes inclined to one reference plane – True shape of sections using auxiliary views. Development of lateral surfaces of simple and truncated solids. Applications in sheet metal fabrication and packaging		
UNIT V	**ISOMETRIC PROJECTIONS AND ORTHOGRAPHIC PROJECTIONS**	**9 Hours**
Principles of isometric projection – isometric scale – isometric projections of simple solids, truncated prisms, pyramids, cylinders and cones. General principles of orthographic projection – Need for importance of multiple views and their placement - layout views -Visualization and interpretation of time three dimensional engineering objects from multi-view drawing. Introduction to 2D CAD drafting: basic commands, layers, dimensioning, and drawing standards – Applications in professional engineering documentation		

Total: 45,
Self Learning: 45

TEXT BOOKS:

1. N. D. Bhatt, Engineering Drawing, Charotar Publishing House, Latest Edition,2023
2. K. V. Natarajan, A Textbook of Engineering Graphics, Dhanalakshmi Publishers,2024

REFERENCES:

1. K. Venugopal and V. Prabhu Raja, Engineering Graphics, New Age International Publishers,2024.
2. M. S. Kumar, Engineering Graphics, D. D. Publications,2024.
3. M. B. Shah and B. C. Rana, Engineering Drawing, Pearson Education,2022.
4. Dhananjay A. Jolhe, Engineering Drawing with CAD Applications, Tata McGraw-Hill,2020.
5. David C. Planchard, Engineering Design with SOLIDWORKS, SDC Publications, 2023.

WEB LINKS

1. https://nitc.ac.in/imgserver/uploads/attachments/Ed__5c3343c5-c3f9-468a-b114-8f33556810b4_.pdf
2. https://www.mygreatlearning.com/academy/learn-for-free/courses/engineering-graphics-drawing

NPTEL LINKS

1. https://onlinecourses.nptel.ac.in/e-learning/preview/noc21_me128

COURSE OUTCOMES

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

COURSE OUTCOMES	DESCRIPTION	KNOWLEDGE LEVEL
CO1	Understand the principles of engineering drawing, BIS conventions, scales, lettering, dimensioning, and geometrical constructions.	K2
CO2	Construct and interpret orthographic projections of points, lines, planes, and solids in different positions	K3
CO3	Apply principles of projection to draw and analyze projections of solid objects.	K3
CO4	Analyze and develop sectional and surface development drawings	K4
CO5	Utilize CAD tools for preparing accurate engineering drawings and graphical representations.	K3

COURSE ARTICULATION MATRIX

	PO1	PO2	PO3	P O4	PO5	PO6	PO7	PO 8	PO9	PO 10	PO 11	PSO1	PSO2
CO1	3	2	–	–	=	–	–	–	–	–	-	3	–
CO2	3	3	2	2	2	–	–	–	–	–	-	-	–
CO3	3	3	3	2	2	–	–	–	–	–	2	3	–
CO4	3	3	2	3	2	–	–	–	–	–	2	-	-
CO5	2	2	2	2	3	–	–	–	–	–	3	3	-
AVG	**2.8**	**2.6**	**2.25**	**2.25**	**2.25**	**–**	**–**	**–**	**–**	**–**	**2.3**	**3**	**-**

COURSECODE	COMPUTER PROGRAMMING USING C AND C++		L	T	P	SL	C
			3	0	0	3	3
PRE-REQUISITE	NIL	CO-REQUISITE	COMPUTER PROGRAMMING USING C AND C++ LAB				

COURSE OBJECTIVES

- To impart fundamental knowledge of structured programming concepts and problem-solving techniques using the C programming language.
- To develop programming proficiency in arrays, functions, pointers, structures, and file handling for designing efficient computational solutions.
- To build competency in object-oriented programming concepts using C++ for developing modular, reusable, and scalable applications.

UNIT I	FUNDAMENTALS OF C PROGRAMMING	9 Hours

Introduction to programming paradigms – Overview and applications of C – Structure of a C program – Algorithm and flowchart basics – Data types, variables, constants, and keywords – Operators and expressions – Operator precedence and associativity – Input / Output statements – Conditional statements (if, if-else, nested if) – Switch statement – Looping statements (for, while, do-while) – Preprocessor directives – Compilation and execution process.

UNIT II	ARRAYS, STRINGS, AND FUNCTIONS IN C	9 Hours

Arrays: Declaration, initialization, one-dimensional and two-dimensional arrays – String handling: basic operations (length, copy, concatenate, compare) – Introduction to functions: function prototype, definition, function call – Parameter passing (pass by value) – Recursion (basic concepts and examples) – Simple algorithms: linear search, selection sort.

UNIT III	POINTERS AND USER-DEFINED DATA TYPES IN C	9 Hours

Pointers: Declaration, initialization, pointer operators, pointer arithmetic – Arrays and pointers – Passing parameters by reference – Structures: declaration, initialization, nested structures, array of structures – Union and typedef – Storage classes and scope – FILE PROCESSING: Files – Types of file processing: Sequential access, Random access – Sequential access file – Random access file – Command line arguments.

UNIT IV	INTRODUCTION TO C++ AND OBJECT-ORIENTED PROGRAMMING	9 Hours

Transition from C to C++ – Basic structure of C++ program – Input/Output using cin and cout – Introduction to Object-Oriented Programming concepts – Classes and objects – Access specifiers (public, private, protected) – Constructors and destructors (default and parameterized) – Basic examples.

UNIT V	OBJECT-ORIENTED FEATURES AND FILE	9 Hours

	HANDLING IN C++	
Inheritance: single and multilevel inheritance – Function overloading– Introduction to polymorphism – Virtual functions and abstract classes – Exception handling (try, catch, throw) – File handling in C++: file streams, reading and writing text files – Basic introduction to templates.		

Total: 45 Hours

Self-Learning: 45 Hours

TEXT BOOKS:

1. Balagurusamy, E., *Programming in ANSI C*, 9th Edition, McGraw Hill Education (India) Pvt. Ltd., 2024.
2. Kanetkar, Y.P., *Let Us C*, 20th Edition, BPB Publications, 2022
3. Lippman, S.B., Lajoie, J., Moo, B.E., *C++ Primer*, 6th Edition, Addison-Wesley / Pearson, 2024.

REFERENCE BOOKS:

1. King, K.N., C Programming: A Modern Approach, 2nd Edition, W.W. Norton & Company, 2020
2. Stroustrup, B., *A Tour of C++*, 3rd Edition, **2022**

WEB LINKS:

1. Learn-C.org - Learn C - Free Interactive C Tutorial Learn C - Free Interactive C Tutorial
2. GeeksforGeeks - C Programming - https://www.geeksforgeeks.org/c-programming language/
3. GNU C Library Documentation - https://www.gnu.org/software/libc/manual/
4. https://en.cppreference.com/w/cpp

NPTEL LINKS:

1. ” Problem Solving Through Programming In C” by Prof. Anupam Basu, IIT Kharagpur https://nptel.ac.in/courses/106105171
2. Programming in Modern C++ By Prof. Partha Pratim Das IIT Kharagpur https://nptel.ac.in/courses/106105234

COURSE OUTCOMES

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

COURSE OUTCOMES	DESCRIPTION	KNOWLEDGE LEVEL
CO1	Apply fundamental programming concepts, control structures, and operators to develop C programs for computational problem solving.	K3
CO2	Implement arrays, strings, functions, pointers, and user-defined data types in C for structured programming applications.	K4
CO3	Develop programs using file handling techniques and command line arguments for data processing applications.	K4
CO4	Design object-oriented programs using classes, objects, constructors, inheritance, and polymorphism in C++.	K5

CO5	Develop modular C++ applications using exception handling, virtual functions, templates, and file handling concepts.	K5

COURSE ARTICULATION MATRIX

	PO1	PO2	PO3	P O4	PO5	PO6	PO7	PO 8	PO9	PO 10	PO 11	PSO1	PSO2
CO1	3	2	–	–	3	–	–	–	–	–	–	3	–
CO2	3	–	2	–	2	–	–	–	–	–	–		–
CO3	3	3	3	2	-	–	–	–	–	–	–	–	–
CO4	3	3	–	–	3	–	–	–	–	–	–	2	–
CO5	3	–	3	3		–	–	–	–	–	–	3	–
AVG	**3.0**	**2.6**	**2.6**	**2.5**	**2.6**	–	–	–	–	–	–	**2.6**	–

COURSECODE	FUNDAMENTALS OF ELECTRONICS AND ELECTRICAL SCIENCES		L	T	P	SL	C
			3	0	0	3	3
PRE-REQUISITE	NIL	CO-REQUISITE	NIL				

COURSE OBJECTIVES

- To understand the fundamental concepts of electrical and electronic components, circuit laws, and signal characteristics.
- To learn the working principles of semiconductor devices, rectifiers, transistors, and basic digital electronics.
- To study the operation and applications of electrical machines, transformers, batteries, and power supply systems.

UNIT I	INTRODUCTION TO ELECTRONICS AND ELECTRICAL COMPONENTS	9 Hours

Basics – Need for Electronics and Electrical Components - Definition of current and voltage, units of current and voltage, Ohm's law, symbol and relation. Passive components – definition, Characteristics resistor, LDR, inductor, capacitor definition in series and parallel, color coding Switches and Connectors**.** Voltage Divider, Current Divider. Laws – Ohms law, Kirchoffs' current and voltage law Active components – definition Characteristics, Voltage source and current source. Measuring units for Electronics and electrical components DC Signal Properties &Classification and AC Signal Properties **&** Classification - Sinusoidal Signal, Triangular wave, square wave, saw tooth wave, amplitude, frequency, wave length, time period, AC Signal Properties & Classification.

UNIT II	ELECTRONIC DEVICES AND DIGITAL ELECTRONICS	9 Hours
Conductors, insulators and semiconductors with examples. PN junction diode – Symbol, Characteristics, Working principles, Diode as switch, Types of diodes and ratings, Applications. Rectifier – Definition, Need for AC to DC conversion, Half-wave and Full-wave rectifier working principle, Rectifier IC, Applications. Transistor (BJT) - Symbol, Structure, Working principle. Comparison of analog and digital signal. Digital systems, examples- Binary numbers- Boolean identities and laws. - Digital system building blocks: Basic logic gates, symbols and truth tables.		
UNIT III	**ELECTRICAL MACHINES AND ENERGY STORAGE SYSTEMS**	**9 Hours**
Transformer – Definition, Characteristics, working principle, Transformation ratio, Types and applications with their ratings Single phase and three phase Induction motor. Starters – definition, characteristics, Necessity of starters, causes and remedies for a failure of starter. Battery- definition, Types of batteries (Lead acid battery, lithium, sealed maintenance free (SMF) battery, Modular battery), Selection criteria of batteries for different applications. Ampere- Hour Capacity-Efficiency-power supply.		
UNIT IV	**ELECTRONIC HARDWARE**	**9 Hours**
PCB- Definition, construction, types, example. PCB layout, types, single layer, multi-layer, manufacturing of PCB SSI, MSI, LSI, VLSI (Introduction to various technology)-. RTL, DTL, TTL, CMOS, Fan in, Fan out. Cables- Twisted pair, Coaxial cable, fibre optic cable, RJ45 connector, BNC.		
UNIT V	**SENSORS AND ACTUATORS**	**9 Hours**
Sensors- definition Temperature, pressure, humidity, IR and Ultrasonic sensors. Actuators – definitions Servo motors, DC motors, Relay. Case study - Current Limiting (Resistor): Circuit Protection (Fuse), Blinking Lights, Audio Amplifier, Light Switch, water level indicator using Transistor.		

Total: 45 Hours

Self-Learning: 45 Hours

TEXT BOOKS:

1. V.K. Mehta and Rohit Mehta, Principles of Electronics, Latest Edition, S. Chand Publishing, 2022
2. D.P. Kothari and I.J. Nagrath, Basic Electrical Engineering, Fourth Edition, McGraw Hill Education, 2019.
3. Robert L. Boylestad and Louis Nashelsky, Electronic Devices and Circuit Theory, Eleventh Edition, Pearson Education, 2013.

REFERENCE BOOKS:

1. M. Morris Mano and Michael D. Ciletti, Digital Design, Fifth Edition, Pearson Education, 2017
2. Paul Horowitz and Winfield Hill, The Art of Electronics, Third Edition, Cambridge University Press, 2015.
3. B.L. Theraja and A.K. Theraja, Electrical Technology, Volume I & II, Latest Edition, S. Chand Publishing
4. Patranabis, Sensors and Transducers, Second Edition, PHI Learning, 2017.

WEB LINKS:

1. **Electronics Tutorials:** https://www.electronics-tutorials.ws
2. **All About Circuits:** https://www.allaboutcircuits.com

NPTEL LINKS:

1. https://nptel.ac.in/courses/117106087/
2. https://nptel.ac.in/courses/108102042/
3. https://nptel.ac.in/courses/117106086/

COURSE OUTCOMES

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

COURSE OUTCOMES	DESCRIPTION	KNOWLEDGE LEVEL
CO1	Explain the basic concepts of electrical and electronic components.	**K2**
CO2	Describe the working principles of semiconductor devices, electrical machines and digital electronics.	**K2**
CO3	Explore the characteristics of transistors, transformers and power systems.	**K3**
CO4	Identify electronic and electrical hardware concepts for electronic system development	**K4**
CO5	Classify sensors and actuators based on the engineering applications	**K2**

COURSE ARTICULATION MATRIX

	PO1	PO2	PO3	P O4	PO5	PO6	PO7	PO 8	PO9	PO 10	PO 11	PSO 1	PSO2
CO1	2	2	-	2	-	-	-	-	-	-	-	-	-
CO2	-	2	2	-	-	-	-	-	-	-	-	3	-
CO3	3	3	2	3	-	-	-	-	-	-	-	3	-
CO4	-	-	3	3	-	-	-	-	-	-	-	3	-
CO5	2	-	-	2			-	-	-	-	-	2	-
AVG	**2.3**	**2.3**	**2.3**	**2.5**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**2.7**	**-**

COURSECODE	UNIVERSAL HUMAN VALUES (Understanding Harmony)		L	T	P	SL	C
			3	0	0	3	3
PRE-REQUISITE	NIL	CO-REQUISITE	NIL				

COURSE OBJECTIVES.

- To understand the need, significance, and process of value education for achieving continuous happiness and prosperity in human life.
- To develop self-exploration and right understanding about harmony within oneself, including the relationship between the self ('I') and the body.
- To analyse and appreciate harmony in family, society, nature, and existence through mutual trust, respect, and coexistence.
- To apply holistic human values and ethical principles in professional life for developing socially responsible and eco-friendly technologies and management practices.

UNIT I	COURSE INTRODUCTION - NEED, BASIC GUIDELINES, CONTENT AND PROCESS	9 Hours

Understanding the need, basic guidelines, content and process for Value Education, Self-Exploration–what is it? - its content and process; 'Natural Acceptance' and Experiential Validation- as the mechanism for self-exploration, Continuous Happiness and Prosperity- A look at basic Human Aspirations, Right understanding, Relationship and Physical Facilities- the basic requirements for fulfillment of aspirations of every human being with their correct priority, Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario, Method to fulfill the above human aspirations: understanding and living in harmony at various levels.

UNIT II	UNDERSTANDING HARMONY IN THE HUMAN BEING - HARMONY IN MYSELF	9 Hours

Understanding human being as a co-existence of the sentient 'I' and the material 'Body', Understanding the needs of Self ('I') and 'Body' - Sukh and Suvidha, Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer), Understanding the characteristics and activities of 'I' and harmony in 'I', Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail, Programs to ensure Sanyam and Health

UNIT III	UNDERSTANDING HARMONY IN THE FAMILY AND SOCIETY- HARMONY IN HUMAN-HUMAN RELATIONSHIP	9 Hours

Understanding harmony in the Family- the basic unit of human interaction, Understanding values in a human-human relationship; meaning of *Nyaya* and program for its fulfillment to ensure *Ubhay-tripti*; Trust (*Vishwas*) and Respect (*Samman*) as the foundational values of relationship, Understanding the meaning of *Vishwas*; Difference between intention and competence, Understanding the meaning of *Samman*, Difference between respect and differentiation; the other salient values in relationship, Understanding the harmony in the society (society being an extension of family): *Samadhan*, *Samridhi*, *Abhay*, *Sah-astitva* as comprehensive Human Goals, Visualizing a universal harmonious order in

society- Undivided Society (*AkhandSamaj*), Universal Order (*SarvabhaumVyawastha*)- from family to world family!		
UNIT IV	**UNDERSTANDING HARMONY IN THE NATURE AND EXISTENCE**	**9 Hours**
Understanding the harmony in Nature, Interconnectedness and mutual fulfillment among the four orders of nature-recyclability and self-regulation in nature, Understanding Existence as Co-existence (*Sah-astitva*) of mutually interacting units in all-pervasive space, Holistic perception of harmony at all levels of existence.		
UNIT V	**IMPLICATIONS OF THE ABOVE HOLISTIC UNDERSTANDING OF HARMONY ON PROFESSIONAL**	**9 Hours**
Natural acceptance of human values, Definitiveness of Ethical Human Conduct, Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order, Competence in Professional Ethics: a) Ability to utilize the professional competence for augmenting universal human order, b) Ability to identify the scope and characteristics of people-friendly and eco-friendly production systems, technologies and management models, Case studies of typical holistic technologies, management models and production systems, Strategy for the transition from the present state to Universal Human Order: a) At the level of individual: as socially and ecologically responsible engineers, technologists and managers, b) At the level of society: as mutually enriching institutions and organizations.		

Total: 45 Hours

Self-Learning: 45 Hours

TEXT BOOKS:

1. R R Gaur, R Sangal, G P Bagaria, Human Values and Professional Ethics Excel Books, New Delhi, 2023

REFERENCE BOOKS:

1. Ivan Illich, 1974, Energy & Equity, The Trinity Press, Worcester, and Harper Collins,USA
2. E.F. Schumacher, 1973, Small is Beautiful: a study of economics as if people mattered, Blond & Briggs,Britain.
3. Sussan George, 1976, How the Other Half Dies, Penguin Press. Reprinted 1986, 1991
4. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, Limits to Growth – Club of Rome's report, Universe Books.

COURSE OUTCOMES

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

COURSE OUTCOMES	DESCRIPTION	KNOWLEDGE LEVEL
CO1	Explain the importance of value education, self-exploration, and human aspirations for achieving happiness and prosperity.	**K2**
CO2	Analyze harmony within the human being by understanding the relationship between self ('I') and body, practice self-discipline and healthy living.	**K4**

CO3	Demonstrate understanding of human relationships, family values, trust, respect, and social harmony for peaceful coexistence.	**K3**
CO4	Interpret the interconnectedness and mutual fulfillment among human beings, nature, and existence from a holistic perspective.	**K2**
CO5	Apply ethical human values and professional ethics in engineering, technology, and management practices.	**K3**

COURSE ARTICULATION MATRIX

	PO1	PO2	PO3	P O4	PO5	PO6	PO7	PO 8	PO9	PO 10	PO 11	PSO1	PSO2
CO1	-	-	-	-	-	2	-	3	-	-	-	–	3
CO2	-	-	-	-	-	2	-	3	-	-	-	–	3
CO3	-	-	-	-	-	3	2	3	-	-	-	–	2
CO4	-	-	-	-	-	3	3	3	-	-	-	–	3
CO5	-	-	-	-	2	2	2	3	-	-	-	–	3
AVG	-	-	-	-	**2**	**2.5**	**2.3**	**3**	-	-	-	-	**2.8**

CODE	ENGINEERING PHYSICS LAB		L	T	P	SL	C
			0	0	3	3	1.5
PRE-REQUISITE	NIL	CO-REQUISITE	NIL				

COURSE OBJECTIVES

- To enable the student to explore the field of Mechanics of Solids and Properties of Matter.
- To gain knowledge in the scientific methods and learn the process of measuring different Physical variables.

LIST OF EXPERIMENTS (Any 8 Experiments)

1. Determination of Rigidity Modulus – Torsional pendulum
2. Determination of wavelength and particle size using laser
3. Ultrasonic Interferometer
4. Determination of band gap of a semiconductor material
5. Hooke's law – Determination of spring constant
6. Determination of Young's Modulus – Uniform Bending
7. Determination of Young's Modulus – Non Uniform Bending
8. Determination of Viscosity of a liquid - Poiseuille's method
9. Spectrometer – Grating
10. Deflection Magnetometer - Tan A position
11. Deflection Magnetometer - Tan B position
12. Potentiometer - Calibration of low range Voltmeter

Total: 45 Hours

Self-Learning: 45 Hours

TEXT BOOKS:

1. C. C. Ouseph, U. J. Rao, V. Vjiayendran, Practical Physics,1st Edition, 2015.
2. Biswajit Saha, Practical Physics Book, LAP LAMBERT Academic Publishing, 1st Edition, 2020

REFERENCE BOOKS:

1. G.L. Squires, Practical Physics, 4th Edition, Cambridge University Press, 2001.
2. RD. Chattopadhyay, P.C. Rakshit, B. Saha, "An Advanced Course in Practical Physics", 2nd ed., Books & Allied Ltd., Calcutta, 1990.

WEB LINKS:

1. http://amrita.olabs.edu.in/?sub=1&brch=5&sim=155&cnt=2
2. https://vlab.amrita.edu/index.php?sub=1&brch=280&sim=1509&cnt=4

COURSE OUTCOMES

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

COURSE OUTCOMES	DESCRIPTION	KNOWLEDGE LEVEL
CO1	Measure the wavelength and particle size of the semiconductor diode laser.	K5
CO2	Analyse the coefficient of viscosity of a liquid.	K4
CO3	Estimate the band gap energy of the given semiconductor material.	K5
CO4	Determine the compressibility of the liquid using an ultrasonic interferometer	K5
CO5	Measure the Young's modulus of the given solid materials.	K5

COURSE ARTICULATION MATRIX

	PO1	PO2	PO3	P O4	PO5	PO6	PO7	PO 8	PO9	PO 10	PO 11	PSO 1	PSO2
CO1	-	-	3	3	3	3	-	-	-	-	-	-	-
CO2	-	-	-	2	2	2	-	-	-	-	-	-	-
CO3	-	-	3	3	3	-	-	-	-	-	3	-	-

CO4	-	-	2	3	-	2	-	-	-	-	-	-	-
CO5	-	-	3	3	2	-	-	-	-	-	2	-	-
AVG	-	-	**2.75**	**2.80**	**2.50**	**2.33**	-	-	-	-	**2.50**	-	-

CODE	COMPUTER PROGRAMMING USING C AND C++ LAB		L	T	P	SL	C
			0	0	3	3	1.5
PRE-REQUISITE	NIL	CO-REQUISITE	NIL				

COURSE OBJECTIVES

- To develop fundamental programming skills using structured programming concepts and problem-solving techniques.
- To apply control structures, arrays, functions, pointers, and user-defined data types for solving computational problems effectively.
- To implement modular programming and file handling concepts for developing efficient software applications.

LIST OF EXPERIMENTS

FUNDAMENTALS OF PROGRAMMING USING C

1. Introduction to programming environment and execution of simple C programs.
2. Solving basic problems using arithmetic expressions and operators.
3. Implementation of decision-making using conditional statements.
4. Development of programs using looping constructs.
5. Operations on one-dimensional arrays.
6. Solving problems using two-dimensional arrays (matrices).

FUNCTIONS, STRINGS, POINTERS, AND FILE PROCESSING IN C

7. Design and implementation of user-defined functions.
8. Implementation of recursive techniques.
9. Basic string handling operations.
10. Applications of pointers and structures.
11. Implementation of file handling operations including sequential and random access.
12. Development of simple searching and sorting algorithms.

FUNDAMENTALS OF OBJECT-ORIENTED PROGRAMMING USING C++

13. Introduction to C++ programming environment and execution of simple programs.
14. Solving basic problems using arithmetic expressions in C++.
15. Implementation of classes and objects.
16. Demonstration of constructors, destructors, and function overloading.
17. Development of programs using inheritance concepts

ADVANCED OBJECT-ORIENTED FEATURES AND FILE HANDLING IN C++

18. Implementation of polymorphism using virtual functions.
19. Exception handling using try, catch, and throw blocks.
20. File handling operations and basic template applications in C++.

Total: 30 Hours

Self-Learning: 30 Hours

TEXT BOOKS:

1. Programming in ANSI C – E. Balagurusamy, 8th Edition, McGraw Hill Education (India) Pvt. Ltd.
2. Object Oriented Programming with C++ – E. Balagurusamy, 8th Edition, McGraw Hill.

REFERENCE BOOKS:

1. The C Programming Language – Brian W. Kernighan and Dennis M. Ritchie, 2nd Edition, Prentice Hall
2. C: The Complete Reference – Herbert Schildt, 4th Edition, McGraw Hill
3. C++ Primer – Stanley B. Lippman, Josée Lajoie, Barbara E. Moo, 5th Edition, Pearson Education

NPTEL Links :

1. "Problem Solving Through Programming In C" by Prof. Anupam Basu, IIT Kharagpur
   https://nptel.ac.in/courses/106105171
2. Programming in Modern C++ By Prof. Partha Pratim Das IIT Kharagpur
   https://nptel.ac.in/courses/106105234

COURSE OUTCOMES

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

COURSE OUTCOMES	DESCRIPTION	KNOWLEDGE LEVEL
CO1	Design structured C programs using operators, control statements, arrays, and functions for problem solving.	K4
CO2	Develop C programs using pointers, structures, recursion, and file handling techniques for efficient data processing.	K5
CO3	Evaluate searching, sorting, and string handling techniques using structured programming concepts.	K5

CO4	Design object-oriented programs using classes, objects, constructors, inheritance, and polymorphism in C++.	K5
CO5	Develop modular C++ applications using exception handling and file processing concepts.	K5

COURSE ARTICULATION MATRIX

	PO1	PO2	PO3	P O4	PO5	PO6	PO7	PO 8	PO9	PO 10	PO 11	PSO1	PSO2
CO1	3	3	2	–	3	–	–	–	–	–	–	3	–
CO2	3	3	3	–	–	–	–	–	–	–	–		–
CO3	3	2	-	2	2	–	–	–	–	–	–	–	–
CO4	3	2	3	-	-	–	–	–	–	–	–	2	–
CO5	3	3	-	3	3	–	–	–	–	–	–	3	–
AVG	**3**	**2.6**	**2.6**	**2.5**	**2.6**				–	–	–	**2.6**	–

CODE	**FABRICATION AND WORKSHOP PRACTICES LAB**	**L**	**T**	**P**	**SL**	**C**
		0	**0**	**3**	**3**	**1.5**
PRE-REQUISITE	**NIL**	**CO-REQUISITE**	**NIL**			

COURSE OBJECTIVES

- To familiarize students with fabrication processes, machine tools and material handling techniques used in manufacturing industries.
- To provide hands-on training in basic manufacturing, fabrication and workshop practices using conventional tools and equipment.
- To develop teamwork, problem-solving ability and professional work ethics through practical workshop exercises and mini fabrication activities.
- To encourage creativity and product realization skills through fabrication and manufacturing-based practical assignments.

LIST OF EXPERIMENTS

GROUP A Fabrication (MECHANICAL ENGINEERING)

1. Machine Shop

   Machining: Basics of Machining Processes Equipment's, Simple turning of cylindrical surface on MS rod using lathe machine tool, To make Facing and plain turning, step turning, drilling in the lathe.

2. Sheet Metal

   To make products as per the given dimensional tolerances, Tools and demonstration of

producing model.

3. Welding Shop

   To make single, butt, lap and T fillet joint by arc welding with the back hand and fore hand welding techniques as per the given dimensions.

   To make simple Dust pan, Rectangular trays in sheet metal with the jigs as per the given Dimensions.

4. Plumbing Works

   Study of pipeline joints, its location and functions: valves, taps, couplings, unions, reducers, elbows in household fittings. Basic pipe connections – Mixed pipe material connection – Pipe connections with different joining components.

GROUP B (ELECTRICAL ENGINEERING)

1. Residential house wiring using switches, fuse, indicator, lamp and energy meter.
2. Fluorescent lamp wiring.
3. Staircase wiring
4. Measurement of electrical quantities -voltage, current, power & power factor in RLC circuit.
5. Measurement of energy using single phase energy meter.
6. Measurement of resistance to earth of electrical equipment.

Total: 45 Hours

Self-Learning: 45 Hours

TEXT BOOKS:

1. B. S. Raghuwanshi, Workshop Technology – Part I & II, Dhanpat Rai& Sons,2024
2. Dr. R. K. Jain, Manufacturing Practices Lab, S. Chand,2023,
3. R. L. Keshavamurthy, Experiments in Manufacturing Processes, Vikas Publishing, 2022.

REFERENCE BOOKS:

1. P. N. Rao, Manufacturing Processes – I & II, Tata McGraw Hill, 2022
2. Roy A. Lindberg, Processes and Materials of Manufacturing, Pearson, 2020
3. Helmi A. Youssef / A. Elbestawi / William W. Worek, Manufacturing Technology – Volume II, Pearson, 2022.

COURSE OUTCOMES

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

COURSE OUTCOMES	DESCRIPTION	KNOWLEDGE LEVEL
CO1	Explain the principles, tools, equipment, and safety procedures involved in manufacturing and electrical workshop practices.	**K2**
CO2	Perform basic machining operations such as facing, turning, step turning, and drilling using lathe machines.	**K3**

CO3	Fabricate sheet metal and welding joints/products according to given dimensions and tolerances.	**K3**
CO4	Apply plumbing techniques and electrical wiring methods for basic engineering and residential applications.	**K3**
CO5	Measure electrical quantities and demonstrate safe workshop practices while working individually and in teams.	**K3**

COURSE ARTICULATION MATRIX

	PO1	PO2	PO3	P O4	PO5	PO6	PO7	PO 8	PO9	PO 10	PO 11	PSO 1	PSO2
CO1	2	-	–	–	-	–	–	–	–	–	-	–	-
CO2	3	2	2	–	3	–	–	–	–	–	2	2	-
CO3	3	2	3	–	2	–	–	–	–	–	2	–	-
CO4	2	2	2	–	2	–	–	–	–	–	2	-	-
CO5	2	2	-	–	3	–	–	–	–	–	3	2	-
AVG	**2.4**	**2**	**2.3**	**–**	**2.5**	**–**	**–**	**–**	**–**	**–**	**2.25**	**2**	**-**

SEMESTER II

COURSECODE	TECHNICAL ENGLISH		L	T	P	SL	C	
			2	0	0	2	2	
PRE-REQUISITE	NIL	CO-REQUISITE	NIL					

COURSE OBJECTIVES

- To develop students' vocabulary and word formation skills for effective written communication.
- To enhance learners' ability to construct grammatically correct and meaningful sentences.
- To enable students to identify and correct common errors in English usage.
- To improve students' skills in precise, coherent, and context-appropriate writing.
- To train learners in various forms of practical writing, including letters, reports, essays, and comprehension-based responses.

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UNIT I	VOCABULARY BUILDING	6 Hours

General Vocabulary, Parts of Speech, Nouns--Compound nouns, Pronouns, Adjectives, Synonyms & Antonyms, Prefixes & Suffixes, Homonyms, Homographs & Homophones, Verb Forms, Blending and Clipping

UNIT II	BASIC WRITING	6 Hours

Sentences structures –Kinds of sentences, Types of sentences, Clauses and Phrases, Numerical Expressions, Summarizing, Paragraph Writing, Checklist, Definitions, Precise Writing

UNIT III	COMMON ERRORS IN ENGLISH	6 Hours

To enable students to identify and correct grammatical and syntactic errors, in English Language use such as Pronouns - Relative pronouns, Demonstrative pronouns, Articles, Prepositions, Tenses, Subject-verb Agreement, Misplaced Modifiers, Redundancies, Infinitives & Gerund.

UNIT IV	NATURE AND STYLE OF WRITING	6 Hours

Definitions, Numerical Expressions, Precise writing, Conversations/ Situational Dialogues, Process description, Recommendation, Information Transfer- Flow chart Bar chart and Pie chart, Letter Writing, Report Writing.

UNIT V	FUNDAMENTALS OF COMMUNICATION	6 Hours

Listening to general information-specific details- conversation: Introduction to classmates, Telephone conversation, Debates and panel discussions, Self-Introduction, Introducing a friend; Conversation, Reading brochures (technical context), telephone messages / social media messages relevant to technical contexts and emails. Group discussions, and Expressing opinions, Simulations & Role play. Reading editorials; and Opinion Blogs.

Total: 30 Hours

Self-Learning: 30 Hours

TEXT BOOKS

1. Bikramjit Sen, Dr Gurpreet Singh Saund, Communicative English Skills: An Easy Guide. N.p., Notion Press Media Pvt. Limited, 2025.
2. S. Mekala, Geetha R,Contemporary ELT Strategies in Engineering Pedagogy: Theory and Practice. India, Taylor & Francis, 2022
3. Leech, Geoffrey, and Jan Svartvik. *A communicative grammar of English*. Routledge, 2013.
4. MacKenzie, Ian. *Professional English in Use*. Cambridge University Press, 2006.
5. Ibbotson, Mark. *Professional English in Use: Engineering: Technical English for Professionals*. Cambridge University Press, 2009.

REFERENCE BOOKS:

1. M Saranya & Mrs M Linju,Professional English II. N.p., Notion Press Media Pvt. Limited, 2024.
2. Technical English (English, Sambaiah M, Wiley India Pvt, Ltd, Genre Technology & Engineering , ISBN-9788126551354, 2014 Edition.
3. Tebeaux, Elizabeth. *The emergence of a tradition: Technical writing in the English Renaissance, 1475-1640*. Routledge, 2018.
4. Tyagi, Kavita, and Padma Misra. *Basic technical communication*. PHI Learning Pvt. Ltd., 2011.
5. Olohan, Maeve. *Scientific and technical translation*. Routledge, 2015.

WEB LINKS:

1. https://ehlion.com/magazine/technical-english/
2. https://www.kkcl.org.uk/pdf/KKCL_Technical_English_for_Engineers_Brochu re.pdf

NPTEL LINKS

https://onlinecourses.nptel.ac.in/noc26_hs74/preview

COURSE OUTCOMES

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

COURSE OUTCOMES	DESCRIPTION	KNOWLEDGE LEVEL
CO1	Apply English language skills in listening, speaking, reading, and writing for technical communication.	K3

CO2	Utilize listening skills for academic and professional communication.	K3
CO3	Demonstrate effective speaking skills in English for real-life situations.	K4
CO4	Develop effective writing skills for technical, formal, and professional communication.	K3
CO5	Identify self-learning strategies and learner autonomy for continuous language development.	K4

COURSE ARTICULATION MATRIX

	PO 1	PO 2	PO3	P O4	PO5	PO6	PO7	PO 8	PO9	PO 10	PO 11	PSO 1	PSO 2
CO1		-	-	-	-	-	-	**2**	**2**	**3**	**2**	2	-
CO2		-	-	-	-	-	-	-	**2**	**3**	-	3	**3**
CO3		-	-	-	-	-	-	**2**	**3**	**2**	-	-	-
CO4		-	-	-	-	-	-	**2**	-	**3**	**2**		**3**
CO5		-	-	-	-	-	-	-	-	**2**	**2**	-	-
AVG		-	-	-	-	-	-	**2**	**2.3**	**2.6**	**2**	**2.5**	**3**

COURSECODE	MATHEMATICS-II MULTIVARIABLE CALCULUS AND COMPLEX ANALYSIS		L	T	P	SL	C
			3	0	2	4	4
PRE-REQUISITE	NIL	CO-REQUISITE	NIL				

COURSE OBJECTIVES

- To make the student acquire sound knowledge of techniques in solving ordinary differential equations that model engineering problems.
- To acquaint the student with the concepts of vector calculus, needed for problems in all engineering disciplines.
- To develop an understanding of the standard techniques of complex variable

UNIT I	VECTOR CALCULUS	12 Hours

Gradient, divergence and curl – Directional derivative – Irrotational and solenoidal vector fields – Vector integration – Green's theorem in a plane, Gauss divergence theorem and Stoke's theorem (excluding proofs) – Simple applications involving cubes and rectangular parallelopipeds.

UNIT II	ORDINARY DIFFERENTIAL EQUATIONS	12 Hours

Higher order linear differential equations with constant coefficients – Method of variation of parameters – Cauchy's and Legendre's linear equations – Simultaneous first order linear equations with constant coefficients.

UNIT III	LAPLACE TRANSFORM	12 Hours
Laplace transform – Sufficient condition for existence – Transform of elementary functions – Basic properties – Transforms of derivatives and integrals of functions - Derivatives and integrals of transforms – Transforms of unit step function and impulse functions – Transform of periodic functions. Inverse Laplace transform –Statement of Convolution theorem – Initial and final value theorems.		
UNIT IV	**ANALYTIC FUNCTIONS**	**12 Hours**
Functions of a complex variable – Analytic functions: Necessary conditions – Cauchy-Riemann equations and sufficient conditions (excluding proofs) – Harmonic and orthogonal properties of analytic function – Harmonic conjugate – Construction of analytic functions – Conformal mapping: $w = z+k, kz, 1/z, z^2, e^z$ and bilinear transformation.		
UNIT V	**COMPLEX INTEGRATION**	**12 Hours**
Complex integration – Statement and applications of Cauchy's integral theorem and Cauchy's integral formula – Taylor's and Laurent's series expansions – Singular points – Residues – Cauchy's residue theorem – Evaluation of real definite integrals as contour integrals around unit circle and semi-circle (excluding poles on the real axis).		

Total: 60 Hours

Self-Learning: 60 Hours

TEXT BOOKS:

1. Joel R. Hass, Christopher E. Heil, Maurice D. Weir, Przemysław Bogacki, Thomas' Calculus, 15thEdition, Pearson,2022.
2. Ramana B.V., Higher Engineering Mathematics, Tata McGraw Hill New Delhi, First Edition,2025-26.
3. N.P. Bali and Manish Goyal, A text book of Engineering and Mathematics I, Laxmi Publications, 10th Edition, 2023.

REFERENCE BOOKS:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 11th Edition, Wiley India, 2025.
2. B.S. Grewal, Higher Engineering Mathematics, 45th Edition, Khanna Publishers, New Delhi, 2024.
3. Dass, H.K., "Higher Engineering Mathematics", S. Chand Private Ltd., 2020.

NPTEL LINKS:

Engineering Mathematics II-Prof. Jitendra Kumar,IIT Kharagpur
Course link:https://onlinecourses.nptel.ac.in/noc26_ma39/preview

LIST OF EXPERIMENTS:

Sl.No	List of Experiments
1	Check whether the vector field is irrotational or solenoidal.
2	Solve a second-order linear differential equation with constant coefficients.
3	Compute the Laplace transform and inverse Laplace transform of a given function.

4	Apply the Laplace transform technique to solve a linear differential equation
5	Verify the Cauchy-Riemann equations for a complex function
6	Determine the singularities and residues of a complex function.
7	Use the residue theorem to evaluate a contour integral.

TEXT BOOKS:

1. Ronald L. Lipsman , Jonathan M. Rosenberg, Multivariable Calculus with MATLAB with applications to Geometry and Physics, Springe, 2017.
2. Dean G. Duffy, Advanced Engineering Mathematics with MATLAB, CRC Press, 2022.

REFERENCE BOOKS:

1. Dean G. Duffy, Advanced Engineering Mathematics with MATLAB, CRC Press, 2022.

COURSE OUTCOMES

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

COURSE OUTCOMES	DESCRIPTION	KNOWLEDGE LEVEL
CO1	Apply concepts of vector calculus and ordinary differential equations for solving engineering problems involving physical systems.	K3
CO2	Solve linear time-dependent engineering systems using Laplace transform techniques along with differential equation methods	K3
CO3	Analyze complex functions using Cauchy-Riemann technique.	K4
CO4	Use Cauchy's theorem and integral formula for solving real and complex integral problems	K3
CO5	Apply knowledge of vector calculus, Laplace transforms, and complex variables to formulate complex engineering problems	K3

COURSE ARTICULATION MATRIX

	PO1	PO2	PO3	P O4	PO5	PO6	PO7	PO 8	PO9	PO 10	PO 11	PSO 1	PSO2
CO1	3	2	-	2	2	-	-	-	-	-	-	2	-
CO2	3	2	-	2	3	-	-	-	-	-	-	3	-
CO3	3	2	-	-	3	-	-	-	-	-	-	-	-
CO4	3	2	-	-	-	-	-	-	-	-	-		-
CO5	3	3	2	2	3	-	-	-	-	-	-	-	-
AVG	3	2.2	2	2	2.75	-	-	-	-	-	-	2.5	-

COURSECODE	ENGINEERING CHEMISTRY		L	T	P	SL	C
			3	0	0	3	3
PRE-REQUISITE	NIL	CO-REQUISITE	ENGINEERING CHEMISTRY LAB				

COURSE OBJECTIVES

- To gain knowledge of molecular orbitals, ionic interactions, and periodic trends.
- To analyze periodic properties, including ionization energy, electronegativity, and oxidation states.
- To outline the key chemical reactions involved in molecular synthesis.

UNIT I	PERIODIC PROPERTIES OF ELEMENTS	9 Hours

Introduction to Periodic Properties- Modern periodic law, Classification of elements, variation of s, p, d and f-block elements - orbital energies of atoms in the periodic table, Effective nuclear charge, penetration of orbitals. Atomic and Ionic Radii, Ionization Energy, Electron Affinity, Electronegativity - Definition - Scales of electronegativity (Pauling scale – qualitative) - Valency and Oxidation States, Periodic variation of properties.

UNIT II	SPECTROSCOPIC TECHNIQUES AND APPLICATIONS	9 Hours

Interaction of electromagnetic radiation with matter - Types of spectra: absorption and emission - Regions of electromagnetic spectrum. Principles of spectroscopy and selection rules. Electronic transitions - Beer–Lambert law - Principle of UV–Visible spectroscopy - Instrumentation and working of UV spectrophotometer and its applications. Fluorescence and phosphorescence - Importance and applications. Rotational spectroscopy of diatomic molecules and Vibrational Spectroscopy, Instrumentation and working of IR spectrophotometer. Applications.

UNIT III	THERMODYNAMICS, ELECTROCHEMISTRY AND CORROSION	9 Hours

Thermodynamic functions: energy, entropy, free energy. Free energy and emf.Cell potentials, the Nernst equation and its applications. Electrochemical and electrolytic cells – primary and secondary batteries. Fuel cells: H_2-O_2fuel cell- photovoltaic cell - Solar cells. Water Quality parameters, Water Treatment – Demineralization Process– Reverse osmosis process. Corrosion – Wet and Dry Corrosion, Methods of Corrosion Control – Sacrificial anodic protection and impressed current cathodic Protection methods.

UNIT IV	ATOMIC AND MOLECULAR STRUCTURE, COORDINATION CHEMISTRY	9 Hours

Molecular orbital diagrams of diatomic molecules. Equations for atomic and molecular orbitals. Energy level diagrams of diatomic molecules. Pi-molecular orbitals of butadiene and benzene. Crystal field theory and the energy level diagrams for transition metal ions and their magnetic properties. Ionic, dipolar and van Der Waals interactions, Band structure of solids and the role of doping on band structures. Coordination numbers and geometries, hard soft acids and bases, molecular geometries.		
UNIT V	**ORGANIC REACTIONS AND SYNTHESIS OF A DRUG MOLECULE**	**9 Hours**
Introduction to Organic Reactions - Classification of organic reactions - Introduction to reactions involving substitution, addition, elimination, oxidation, reduction, cyclization, Coupling reaction and ring openings. . Synthesis of a commonly used drug molecule - Stepwise synthesis of **Aspirin / Paracetamol / Ibuprofen**		

Total: 45 Hours

Self-Learning: 45 Hours

TEXT BOOKS:

1. Engineering Chemistry, by Prasanta Rath, B, Rama Devi, C H Venkata Ramana Reddy, Subendu Chakraborthy, Cengage Learning Publication India Private Limited, and Edition 2018.
2. Engineering Chemistry, Jain & Jain, 16th Edition, 2018.
3. Engineering Chemistry (NPTEL Web-book), by B. L. Tembe, Kamaluddin and M. S. Krishnan.

REFERENCE BOOKS:

1. B R Puri, L R Sharma and M S Pathania, Principles of Physical Chemistry, S. Nagin Chand & Company Ltd, 49th edition 2025
2. Atkins' Physical Chemistry: International, 2018, Eleventh edition, Oxford University Press; UK
3. Colin Banwell, Elaine McCash, Fundamentals for Molecular Spectroscopy, 4th Edition, McGraw Hill, 2016 US
4. Solid State Chemistry and its Applications, Anthony R. West. 2022, 2nd edition, Wiley, UK.

WEB LINKS:

1. https://opentextbc.ca/chemistry/chapter/10-1-intermolecular-forces/
2. https://nptel.ac.in/content/storage2/courses/102103044/pdf/mod2.pdf
3. https://chem.libretexts.org/Bookshelves/Physical_and_Theoretical_Chemistry_Textbook_Maps/Supplemental_Modules_(Physical_and_Theoretical_Chemistry)/Thermodynamics/Chemical_Energetics/FreeEnergyandEquilibrium
4. https://chem.libretexts.org/Bookshelves/Inorganic_Chemistry/Supplemental_Modules_and_Websites_(Inorganic_Chemistry)/Descriptive_Chemistry/Periodic_Trends_of_Elemental_Properties/Periodic_Properties_of_the_Elements
5. https://www.bcebhagalpur.ac.in/wp-content/uploads/2020/03/Organic-Reactions-Synthesis-of-Drug- Molecule.pdf

NPTEL COURSES:

Concepts of Chemistry in Engineering
https://onlinecourses.nptel.ac.in/e-learning/preview/noc26_cy55

COURSE OUTCOMES

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

COURSE OUTCOMES	DESCRIPTION	KNOWLEDGE LEVEL
CO1	Explain the periodic trends in atomic and molecular properties, including chemical properties and oxidation states of elements.	K2
CO2	Apply the fundamental principles of spectroscopic techniques to determine molecular structure, bonding, and material characteristics.	K3
CO3	Illustrate the concepts of chemical equilibrium using thermodynamic functions, electrochemical cells, and corrosion processes.	K3
CO4	Explain the principles of atomic and molecular structure, including molecular orbital theory, crystal field theory, band structure, and the electronic structure of solids.	K2
CO5	Demonstrate the fundamental organic reaction mechanisms and synthetic strategies for the preparation of a commonly used drug molecule.	K2

OURSE ARTICULATION MATRIX

	PO1	PO2	PO3	P O4	PO5	PO6	PO7	PO 8	PO9	PO 10	PO 11	PSO1	PSO2
CO1	2	2	-	-	-	-	-	-	-	-	-	2	-
CO2	3	2	-	2	-	-	2	-	-	-	-	-	-
CO3	3	3	-	2	-	2	2	-	-	-	-	-	-
CO4	2	2	-	2	-	-	-	-	-	-	-	-	-
CO5	3	2	2	-	-	2	2	-	-	-	-	3	-
AVG	2.6	2.2	2.0	2.0	-	2.0	2.0	-	-	-	-	2.5	-

COURSECODE	DIGITAL SYSTEM DESIGN		L	T	P	SL	C
			3	0	2	3	4
PRE-REQUISITE	NIL	CO-REQUISITE	NIL				

COURSE OBJECTIVES

- To understand the fundamental principles of Boolean algebra and techniques for simplifying logical expressions.
- To analyze and design combinational and sequential digital circuits using systematic design procedures.
- To acquire knowledge of memory devices and programmable logic devices for digital system implementation.

UNIT I	LOGIC GATES, BOOLEAN ALGEBRA AND MINIMIZATION TECHNIQUES	12 Hours
Logic Simplification and Combinational Logic Design: Review of Boolean Algebra and De-Morgan's Theorem, Minimum of Boolean Expressions, Minterm, Maxterm, Sum Of Products (SOP) & Product Of Sums (POS) forms, Canonical forms, Karnaugh maps, Quin McCluskey method of minimization.		
UNIT II	COMBINATIONAL LOGIC DESIGN	12 Hours
Half Adder, Full Adder, Half Subtractor, Full Subtractor, Parallel Adder, Parallel Subtractor, Look Ahead Carry Generator, BCD Adder, Code Converters, Magnitude Comparator, Multiplexer, Demultiplexer, Encoder, Decoder.		
UNIT III	SEQUENTIAL LOGIC DESIGN	12 Hours
Flip Flop design: S-R, JK, D and T Flip Flop, Realization of Flip flops, Counters: Modulo N Counter, UP/DOWN Counter, Ripple Counter, Ring Counter, Shift registers- SISO, SIPO, PIPO, PISO and Universal Shift Register, Algorithmic State Machines Charts, Cycles, Races, Hazards.		
UNIT IV	MEMORIES, PROGRAMMABLE LOGIC DEVICES AND LOGIC FAMILIES	12 Hours
Memories: ROM, PROM, EPROM, EEPROM, RAM, Static RAM cell, Bipolar RAM cell, MOSFET RAM cell, Dynamic RAM CELL. Programmable logic devices: Programmable Logic Array (PLA), Programmable Array Logic (PAL), Field Programmable Gate Array (FPGA). Logic Families: TTL, ECL, CMOS.		
UNIT V	VHDL CONCEPTS IN DIGITAL DESIGN	12 Hours
Design entry: Different modelling styles in VHDL, Data types and objects, Dataflow, Behavioral and Structural Modelling, VHDL constructs and codes for combinational and Sequential circuits.		

Total: 60 Hours

Self-Learning: 60 Hours

TEXT BOOKS:

1. R.P. Jain, "Modern digital Electronics", Tata McGraw Hill, 5th edition, 2022.
2. M. Morris Mano, M. Morris Mano, "Digital Design: With an Introduction to the Verilog HDL, VHDL, and System Verilog, 6e", Pearson Education, 2018.
3. S. Salivahanan and S. Arivazhagan, Digital Circuits and Design, 4th Edition., Vikas Publishing House Pvt. Ltd, New Delhi, 2018.
4. Stephen D. Brown, "Fundamentals Of Digital Logic With Vhdl Design", Tata McGraw Hill, 2025

REFERENCE BOOKS:

1. Donald D. Givone, Digital Principles and Design, Tata McGraw–Hill Education, 2017.
2. W.H. Gothmann, "Digital Electronics- An introduction to theory and practice", PHI, 2nd edition, 2006.
3. Douglas Perry, "VHDL", Tata McGraw Hill, 5th edition, 2012.
4. Charles Roth, "Digital System Design using VHDL", Tata McGraw Hill 2nd edition 2012.

WEB LINKS:

1. www.tutorialspoint.com/digital_electronics/index.asp
2. www.coertvonk.com/hw/logic/synchronous-sequential-logic-30712

NPTEL LINKS:

1. https://onlinecourses.nptel.ac.in/e-learning/preview/noc21_ee39

COURSE OUTCOMES

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

COURSE OUTCOMES	DESCRIPTION	KNOWLEDGE LEVEL
CO1	Apply laws of Boolean algebra and reduction techniques for digital circuit design	**K3**
CO2	Develop digital system using combinational and sequential design techniques	**K3**
CO3	Analyze digital circuit using Programmable Logic devices	**K4**
CO4	Choose appropriate digital circuits to realize digital system applications.	**K1**
CO5	Implement digital circuits using simulation tools for problem-solving.	**K5**

COURSE ARTICULATION MATRIX

	PO1	PO2	PO3	P O4	PO5	PO6	PO7	PO 8	PO9	PO 10	PO 11	PSO1	PSO2
CO1	3	-	-	3	-	-	-	-	-	-	-	-	-
CO2	3	3	3	3	-	-	-	-	-	-	-	-	-
CO3	3	3	3	2	3	-	-	-	-	-	-	3	-
CO4	-		2	2	-	-	-	-	-	-	-	2	-
CO5	-	3	2	2	3	-	-	-	-	-	-	3	-
AVG	**3**	**3**	**2.5**	**2.4**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**2.7**	**-**

COURSECODE	INTRODUCTION TO IOT		L	T	P	SL	C
			3	0	0	3	3
PRE-REQUISITE	NIL	CO-REQUISITE	NIL				

COURSE OBJECTIVES

- To understand the basics of IoT architectures and its application sectors
- To understand and become proficient in IoT platforms
- To explore knowledge to apply IoT protocols appropriately
- To develop IoT based applications

UNIT I	INTRODUCTION AND CONCEPTS OF IOT	9 Hours

Introduction to IOT, definition and characteristics of IOT - Architecture of Internet of Things, Physical and logical design of IOT, IOT enabling technologies, IOT levels - Domain specific IOTs, Use cases of IoT

UNIT II	IOT AND M2M COMMUNICATION	9 Hours

M2M, M2M to IoT-An Architectural Overview– Difference between IOT and M2M, ETSI M2M Architecture, Security in ETSI M2M framework, SDN and NFV for IOT, IOT system management, Need for IOT system management -SNMP, Network operator requirements, M2M Value Chains, IoT Value Chains

UNIT III	IOT PLATFORMS	9 Hours

Introduction to Hardware used for IoT: Microcontrollers, Microprocessors, SoC, Sensors - Introduction to Arduino, Pi, Spark, Intel Galileo

UNIT IV	IOT TECHNICAL STANDARDS AND PROTOCOLS	9 Hours

RF Protocols: RFID, NFC;IEEE 802.15.4: ZigBee, Z-WAVE, THREAD; Bluetooth Low Energy (BLE), IPv6 for Low Power and Lossy Networks (6LoWPAN) and Routing Protocol for Low power and lossy networks (RPL) -CoAP, XMPP, Web Socket, AMQP, MQTT, WebRTC, PuSH - Architectural Considerations in Smart Object Networking

UNIT V	DEVELOPING INTERNET OF THINGS	9 Hours

IoT platforms design methodology, IoT Physical devices and endpoints -IoT Systems: Platforms for Smart Cities, First Steps Towards a Secure Platform, Data Aggregation for the IoT in Smart Cities, Security and Privacy in IoT.

Total: 45 Hours

Self-Learning: 45 Hours

TEXT BOOKS:

1. ArshdeepBahga, Vijay Madisetti, "Internet of Things, A Hands -on Approach", Edition 2021, University Press, ISBN: 978-81-7371- 954-7
2. Introduction to IoT Paperback by SudipMisra (Author), Anandarup Mukherjee (Author), Arijit Roy , 31 January 2022,
3. Oliver Hersent, David Boswarthick, Omar Elloumy, "The Internet of Things", 1st Edition 2015, ISBN: 978-81-265-5686-1.

REFERENCE BOOKS:

1. SudipMisra, Anandarup Mukherjee, Arijit Roy -Introduction to IOT, Cambridge University Press.
2. David Hanes, Gonzalo salgueiro, Patrick Grossetete, Rob barton, Jerome henry-IoT Fundamentals Networking Technologies, Protocols and Usecases for IoT", Cisco Press.
3. Michael Miller, "The Internet of Things, How Smart TVs, Smart Cars, Smart Homes, and Smart Cities are changing the World", First edition ,2015, Pearson, ISBN:978-93-325-5245-6

WEB LINKS:

1. https://archive.nptel.ac.in/courses/106/105/106105166/
2. https://nptel.ac.in/courses/108108098
3. https://tools.ietf.org/html/rfc7452
4. http://dret.net/lectures/iot-spring15/protocols
5. http://iot.intersog.com/blog/overview-of-iot-development-standards-and-frameworks

NPTEL LINKS:

1. **https://archive.nptel.ac.in/courses/106/105/106105166/**

COURSE OUTCOMES

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

COURSE OUTCOMES	DESCRIPTION	KNOWLEDGE LEVEL
CO1	Explain the fundamental concepts, architecture and application of the Internet of Things.	**K2**
CO2	Describe IoT hardware platforms, sensors, and communication technologies.	**K2**
CO3	Develop prototype model using IoT hardware platforms, sensors, and microcontrollers.	**K5**
CO4	Implement appropriate IoT communication protocols and standards for engineering applications.	**K4**
CO5	Design secure IoT-based applications and smart system solutions addressing real-world challenges.	**K6**

COURSE ARTICULATION MATRIX

	PO1	PO2	PO3	P O4	PO5	PO6	PO7	PO 8	PO9	PO 10	PO 11	PSO 1	PSO 2
CO1	3	2	–	–	–	–	–	–	–	–	–	2	–
CO2	3	–	–	–	-	–	–	–	–	–	–	2	–
CO3	2	2	3		3	–	–	–	–	–	–	3	–
CO4	2	3	2	2	-	–	–	–	–	–	–	2	–
CO5	2	3	3	2	3	–	–	–	–	–	-	3	–
AVG	**2.4**	**2.5**	**2.7**	**2**	**3**	–	–	–	–	–	-	**2.4**	–

COURSECODE	ELECTRONIC DEVICES		L	T	P	SL	C
			3	0	0	3	3
PRE-REQUISITE	NIL	CO-REQUISITE	NIL				

COURSE OBJECTIVES

- To provide fundamental knowledge of the construction, characteristics, and working principles of semiconductor devices such as diodes and transistors.
- To study the operation and applications of power electronic and optoelectronic devices.
- To develop simulation skills for circuit analysis and design.

UNIT I	INTRODUCTION TO SEMICONDUCTOR PHYSICS	9 Hours

Quantum Mechanics: Wave-Particle Duality of Nature in Quantum mechanics, Photo electric effect, Atomic spectra, Schrodinger's Wave Equation. Classification of semiconductors, conductivity of semiconductor, Charge carrier transport: Drift and Diffusion currents, mobility and resistivity of semiconductors, Carrier life time, and Continuity equation.

UNIT II	SEMICONDUCTOR DIODES	9 Hours

Carrier generation and recombination mechanisms. PN junction diode: operation, and I–V characteristics, diode current equation. Special diodes: Zener diode, Schottky dode, LASER Diode, Applications of semiconductor diodes - Full wave rectifiers, voltage regulators, clippers, clampers.

UNIT III	BIPOLAR JUNCTION AND FIELD EFFECT TRANSITORS	9 Hours

Bipolar Junction Transistor (BJT): structure, operation and transistor action. Transistor configurations – common emitter (CE), common base (CB), and common collector (CC) – characteristics and comparison. Metal Oxide Semiconductor Field Effect Transistor (MOSFET): structure and operation. Enhancement and depletion type MOSFET. I–V characteristics and

comparison between BJT and MOSFET. Small signal models of MOS transistor and basic amplifier applications		
UNIT IV	**POWER AND OPTOELECTRONIC DEVICES**	**9 Hours**
Operation and characteristics of power electronic devices: UJT, SCR, DIAC and TRIAC. Optoelectronic and display devices: LED, LCD, photoconductive sensors: photodiode, phototransistor, photovoltaic sensor: photovoltaic cell and solar cell, optocoupler. Applications in switching and display systems.		
UNIT V	**ELECTRONIC DEVICES AND SIMULATION**	**9 Hours**
Introduction to PSpice: Overview of circuit simulation, Importance in electronic design, Features of PSpice:Schematic capture, Simulation tools, Waveform viewer, Basic Circuit Simulation : Creating circuits in PSpice, Using components: Resistors, capacitors, inductors, Diodes, transistors, Setting values and parameters, DC analysis: Diode characteristics, AC analysis: Amplifiers.		

Total: 45 Hours

Self-Learning: 45 Hours

TEXT BOOKS:

1. David A bell, Electronic Devices and Circuits, 5th Edition, McGraw Hill Education, 2022
2. Ben G. Streetman, Sanjay Kumar Banerjee, Solid State Electronic Devices, Global eText Edition, Pearson, 2024.
3. Chandan Giri, Takahiro Iizuka, Hafizur Rahaman, Bhargab B. Bhattacharya, Emerging Electronic Devices, Circuits and Systems, 1st Edition, Springer Nature, 2023.
4. Paul Tobin, PSpice for Circuit Theory and Electronic Devices, Morgan & Claypool Publishers, 1st Edition, 2022.

REFERENCE BOOKS:

1. Donald. A Neamen, Semiconductor Physics and Devices: Basic Principles, 4th Edition, McGraw-Hill Education, 2022.
2. S.Salivahanan, N.Suresh Kumar, "Electronic Devices and Circuits, 5th Edition, New Delhi: McGraw Hill Education, 2022.
3. Simon M. Sze, Kwok K. Ng, Physics of Semiconductor Devices, 4th Edition, John Wiley & Sons, 2022.
4. Circuit Analysis with PSpice: A Simplified Approach, Nassir H. Sabah, And Publisher: CRC Press, 1st Edition, 2022.

WEB LINKS:

1. https://elearn.nptel.ac.in/shop/nptel/fundamentals-of-semiconductor-devices/?v=13b5bfe96f3e
2. https://onlinecourses.nptel.ac.in/noc25_ee140/preview

NPTEL LINKS:

1. https://onlinecourses.nptel.ac.in/e-learning/preview/noc24_mm10

COURSE OUTCOMES

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

COURSE OUTCOMES	DESCRIPTION	KNOWLEDGE LEVEL
CO1	Explain the fundamental concepts of semiconductor physics in Electronic devices.	**K2**
CO2	Interpret the operation principles and characteristics of semiconductor devices.	**K2**
CO3	Apply the characteristics of semiconductor devices in the analysis of electronic circuits.	**K3**
CO4	Summarize the operation and applications of power electronic and optoelectronic devices.	**K2**
CO5	Apply circuit simulation tools to model electronic circuits and perform DC/AC analysis.	**K3**

COURSE ARTICULATION MATRIX

	PO1	PO2	PO3	P O4	PO5	PO6	PO7	PO 8	PO9	PO 10	PO 11	PSO1	PSO2
CO1	3	2	–	–	3	–	–	–	–	–	–	2	-
CO2	3	2	–	–	–	–	–	–	–	–	–	2	-
CO3	2	3	2	–	2	–	–	–	–	–	–	3	-
CO4	2	–	–	–	-	-	-	–	–	–	–	2	-
CO5	2	2	2	2	3	–	–	–	–	–	–	3	-
AVG	2.4	2.25	2	2	2.7	-	-	-	-	-	-	2.4	-

COURSECODE	CONSTITUTION OF INDIA		L	T	P	SL	C
			1	0	0	1	0
PRE-REQUISITE	NIL	CO-REQUISITE	NIL				

COURSE OBJECTIVES

- To introduce the basic concepts, features, and structure of the Constitution of India.
- To understand the Fundamental Rights, Directive Principles of State Policy, and Fundamental Duties.
- To understand the constitutional provisions related to amendments, emergencies, and local self-government.
  To develop awareness of constitutional values, rights, duties, and democratic governance

UNIT I	NATURE, OBJECT AND SCOPE OF THE CONSTITUTION	6 Hours

Nature, object and scope of Constitutional Law and Constitutionalism – Historical Perspective of the Constitution of India – Salient Features and Characteristics of Constitution of India.

UNIT II	FUNDAMENTAL RIGHTS	6 Hours

Nature and scope of Fundamental Rights – Scheme of Fundamental Rights – Right to Equality – Right to Freedom of Speech and Expression – Right to Life – Right against Exploitation – Right to Religious Freedom – Minority Rights.

UNIT III	DIRECTIVE PRINCIPLES OF STATE POLICY AND FUNDAMENTAL DUTIE	6 Hours

Directive Principles of State Policy – Importance and Implementation – Scheme of Fundamental Duties and its Legal Status.

UNIT IV	FEDERAL STRUCTURE	6 Hours

Federal Structure – Distribution of Legislative and Financial Powers between the Union and the States – Parliamentary Form of Government in India – Constituent Powers and Status of the President of India.

UNIT V	AMENDMENT AND EMERGENCY PROVISIONS	6 Hours

Amendment of the Constitution – Procedure – Historical Perspective of the Constitutional Amendments in India – Emergency Provisions – National Emergency – President Rule – Financial Emergency – Local Self Government – Constitutional Scheme in India.

Total: 30 Hours

Self-Learning: 30 Hours

TEXT BOOKS:

1. Basu, Durga Das, *Introduction to the Constitution of India*, 26th Edition, LexisNexis, New Delhi, 2023.
2. Agarwal, R. C., *Indian Political System*, Revised Edition, S. Chand and Company, New Delhi, 2022.
3. MacIver and Page, *Society: An Introductory Analysis*, Reprint Edition, Macmillan India Ltd., New Delhi, 2023.
   Sharma, K. L., *Social Stratification in India: Issues and Themes*, Reprint Edition, Rawat Publications, New Delhi, 2023

REFERENCE BOOKS:

1. Mahajan, V. D., *Constitutional Law of India*, Revised Edition, Eastern Book Company, 2022.
2. Seervai, H. M., *Constitutional Law of India*, 4th Edition, Universal Law Publishing, 2015.
3. Sharma, Brij Kishore, *Introduction to the Constitution of India*, 13th Edition, Prentice Hall of India, New Delhi, 2022.
4. Gahai, U. R., *Indian Political System*, Revised Edition, New Academic Publishing House, Jalandhar, 2021.
5. Sharma, R. N., *Indian Social Problems*, Latest Revised Edition, Media Promoters and Publishers Pvt. Ltd., 2022.

WEB LINKS:

1. https://www.writinglaw.com/constitution-pdf-download/
2. https://www.academia.edu/33739388/The_Constitution_of_India_Bare_Acts_
3. https://en.wikipedia.org/wiki/Constitution_of_India

COURSE OUTCOMES

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

COURSE OUTCOMES	DESCRIPTION	KNOWLEDGE LEVEL
CO1	Explain the basic principles, features, and structure of the Constitution of India.	**K2**
CO2	Describe the rights, duties, and responsibilities of Indian citizens under the Constitution.	**K2**
CO3	Explain the role of constitutional provisions in governance and administration.	**K2**
CO4	Describe the functioning of the provisions related to constitutional amendments and emergencies.	**K3**
CO5	Apply constitutional knowledge to understand democratic governance and responsible citizenship.	**K3**

COURSE ARTICULATION MATRIX

	PO1	PO2	PO3	P O4	PO5	PO6	PO7	PO 8	PO9	PO 10	PO 11	PSO1	PSO2
CO1	-	-	-	-	-	2	3	2	-	-	2	-	3
CO2	-	-	-	-	-	3	3	2	-	-	2	-	2
CO3	-	-	-	-	-	3	3	2	-	-	2	-	-
CO4	-	-	-	-	-	3	3	2	-	-	2	-	2
CO5	-	-	-	-	-	3	3	2	-	-	3	-	-
AVG	-	-	-	-	-	2.8	3	2	-	-	2.2	-	2.33

CODE	TECHNICAL ENGLISH LAB		L	T	P	SL	C
			0	0	2	2	1
PRE-REQUISITE	NIL	CO-REQUISITE	NIL				

COURSE OBJECTIVES

- To enable the student to explore the knowledge in communication skills.
- To gain knowledge in the process of Placement Interviews, Group Discussions and other recruitment procedures.

  To teach appropriate pronunciation, word accent, intonation

LIST OF EXPERIMENTS

1. Introduction to English sounds
2. Consonants and vowels
3. Syllable and Stress
4. Intonation
5. Communication Skills
6. Summarizing
7. Report Writing
8. Information Transfer
9. Presentation Skills
10. Group Discussion
11. Letter Writing
12. Cover letter and Resume

Total: 30 Hours

Self-Learning: 30 Hours

TEXT BOOKS:

1. M.AshrafRizvi, "Effective Technical Communication", Tata McGraw-Hill Publishing Company Limited, New Delhi.2005.
2. Communication Skills. Sanjay Kumar and PushpLata. Oxford University Press. 2011.

3. Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. Oxford University Press.
4. Practical English Usage 4th International Edition 2016 by Michael Swan, Oxford Publisher.

WEB LINKS:

1. https://onlinemasters.ohio.edu/blog/engineering-communication/
2. https://online.rice.edu/courses/communication-skills-for-engineers-specialization

COURSE OUTCOMES

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

COURSE OUTCOMES	DESCRIPTION	KNOWLEDGE LEVEL
CO1	Analyze listening and written contexts to understand implied meanings and respond appropriately.	K4
CO2	Apply appropriate pronunciation, stress, and rhythm in oral communication.	K3
CO3	Interpret written communication in official contexts such as narrative, descriptive, analytical, and report writing.	K2
CO4	Analyze different genres of texts and evaluate their ideas and methods of oral presentation.	K4
CO5	Apply suitable communicative strategies to express ideas effectively in discussions, negotiations, and conversations.	K3

COURSE ARTICULATION MATRIX

	PO1	PO2	PO3	P O4	PO5	PO6	PO7	PO 8	PO9	PO 10	PO 11	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	2	-	2	-	3
CO2	-	-	-	-	-	-	-	-	3	2	-	-	2
CO3	-	-	-	-	-	-	-	-	2	-	-	-	2
CO4	-	-	-	-	-	-	-	3	-	2	-	-	-
CO5	-	-	-	-	-	-	-	3	-	2	-	-	2
AVG	-	-	-	-	-	-	-	**3**	**2.3**	**2**	**2**	-	**2.25**

CODE	ENGINEERING CHEMISTRY LAB		L	T	P	SL	C
			0	0	3	3	1.5
PRE-REQUISITE	NIL	CO-REQUISITE	NIL				

COURSE OBJECTIVES

- To analyze water and solution quality using chemical methods such as alkalinity, hardness, and chloride determination.
- To apply electrochemical techniques including conductometry, potentiometry and pH-metry for precise measurements.
- To investigate kinetics and adsorption through experiments on reaction rate constants and adsorption studies.

LIST OF EXPERIMENTS

1. Determination of type and amount of alkalinity present in the given water sample.
2. Determination of strength of the given acid by pH metry.
3. Determination of the amount of strong acid present in the given solution by conductometric titration.
4. Determination of mixture of acids by conductometric method.
5. Determination of cell constant and conductance of solution.
6. Estimation of amount of ferrous ion present in the whole of the given solution by Potentiometric method.
7. Estimation of amount of chloride present in the water sample by Argentometric analysis.
8. Determination of total, temporary and permanent hardness of the given water sample by EDTA method.
9. Determination of the rate constant of a reaction.
10. Estimation of adsorption of acetic acid by charcoal

Total: 30 Hours

Self-Learning: 30 Hours

TEXT BOOKS:

1. Dr. Sunita Rattan Engineering Chemistry (With Experiments), published by S.K. Kataria & Sons 2024.
2. Dr. N. Rama Jyothi, Engineering Chemistry Lab Manual, Shine Book Publishing, 2023
3. Sundaramand K.Raghavan “PracticalChemistry”, S.Viswanathan. Co.
3rd edition 2011.
4. Gnanaprakasam, Ramamurthy, “Organic Chemistry Lab Manual”S. Viswanathan
Pvt. Ltd 3rd edition 2011

REFERENCE BOOKS:

1. Vogel’s– “Textbook of qualitative organic Analysis”, Longmann, 12th edition, 2011
2. J.N.Gurtuand R.Kapoor “Advanced experimental Chemistry”, S.Chand and Co. 6th edition, 2010.

WEB LINKS:

1. https://www.khanacademy.org/science/ap-chemistry-beta/x2eef969c74e0d802:kinetics/x2eef969c74e0d802:introduction-to-rate- law/v/experimental-determination-of-rate-laws
2. https://www.youtube.com/watch?v=qdmKGskCyh8
3. https://www.youtube.com/watch?v=7_6_dKlo67k

COURSE OUTCOMES

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

COURSE OUTCOMES	DESCRIPTION	KNOWLEDGE LEVEL
CO1	Explain the principles of volumetric and instrumental analytical methods used in chemical analysis.	K2
CO2	Interpret the experimental data obtained from pH-metric, conductometric, and potentiometric techniques.	K3
CO3	Apply analytical methods to determine water quality parameters such as alkalinity, hardness, and chloride content.	K3
CO4	Analyze the reaction kinetics of a reaction using the experimentally generated kinetic data.	K3
CO5	Determine the adsorption parameters of acetic acid on charcoal through adsorption studies.	K3

COURSE ARTICULATION MATRIX

	PO1	PO2	PO3	P O4	PO5	PO6	PO7	PO 8	PO9	PO 10	PO 11	PSO1	PSO2
CO1	2	2	-	-	-	-	-	-	-	-	-	2	-
CO2	3	3	-	-	-	-	2	-	-	-	-	-	-
CO3	3	3	2	3	-	-	3	-	-	-	-	-	-
CO4	3	2	2	2	-	-	-	-	-	-	-	-	-
CO5	2	2	2	-	-	-	-	-	-	-	-	3	-
AVG	2.6	2.4	2.0	2.5	-	-	2.5	-	-	-	-	2.5	-

CODE	ELECTRONIC DEVICES LAB	L	T	P	SL	C
		-	-	3	3	1.5
PRE-REQUISITE	NIL	CO-REQUISITE	NIL			

COURSE OBJECTIVES

- To measure the resistivity of semiconductor samples and characterize PN junction and Zener diodes, evaluate half-wave and bridge rectifiers with filtering, and design a Zener-based voltage regulator to assess line and load regulation.
- To analyze the characteristics of BJT and FET. Plot the input and output characteristics and drain and transfer characteristics
- To characterize optoelectronic devices and to simulate the voltage transfer characteristic of a CMOS inverter using SPICE to extract noise margins, with an optional virtual lab exercise on IC fabrication steps.

LIST OF EXPERIMENTS

1. Study and measure the parameters of Semiconductor devices
2. V-I Characteristics of a PN Junction Diode and Zener Diode
3. Half-Wave and Full-Wave Rectifier Circuits
4. Zener Diode as Voltage Regulator
5. Input and Output Characteristics of a BJT
6. Transfer and Drain Characteristics of a MOSFET
7. Characteristics of UJT and SCR
8. Optoelectronic Devices: LED, Photodiode, and Solar Cell
9. Simulation Experiments
10. Simulation of IV Characteristics of PN Junction & Zener Diode
11. Simulation of BJT Input/Output Characteristics
12. Simulation of MOSFET Transfer and Drain Characteristics
13. Simulation of CMOS Inverter Characteristics

Total: 45 Hours

Self-Learning: 45 Hours

TEXT BOOKS:

1. G. S. Tomar, and A. Bagwari, “Fundamentals of Electronic Devices and Circuits,” Springer, 2020
2. T. L. Floyd, “Electronic Devices: Conventional Current Version,” 10th ed., Pearson, 2017.
3. R. L. Boylestad, and L. Nashelsky, “Electronic Devices and Circuit Theory,” 11th ed., Pearson, 2013

REFERENCE BOOKS:

1. J. M. Hughes, “Semiconductor Devices: Theory & Application,” Open Textbook, Milne Open Textbooks, 2021.

2. B. L. Anderson, and R. L. Anderson, “Fundamentals of Semiconductor Devices,” 2nd ed., McGraw-Hill Education, 2017.
3. R. J. Baker, “CMOS Circuit Design, Layout, and Simulation,” 4th ed., Wiley, 2019

WEB LINKS:

1. https://github.com/utkarsh-kumar4/LTspice-Simulation-Circuit-Models
2. https://wiki.dcae.pub.ro/index.php/Pagina_principal%C4%83

COURSE OUTCOMES

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

COURSE OUTCOMES	DESCRIPTION	KNOWLEDGE LEVEL
CO1	Measure the parameters of semiconductor devices.	**K5**
CO2	Experiment with various diodes, transistors and determine the characteristics.	**K3**
CO3	Analyze the characteristics of power electronic devices.	**K4**
CO4	Analyse the VI Characteristics of optoelectronic devices.	**K4**
CO5	Apply bending methods to evaluate the Young’s modulus of solid materials.	**K3**

COURSE ARTICULATION MATRIX

	PO1	PO2	PO3	P O4	PO5	PO6	PO7	PO 8	PO9	PO 10	PO 11	PSO1	PSO2
CO1	3	2	-	2	-	-	-	3	-	-	-	2	-
CO2	3	-	-	2	-	-	-	3	-	-	-	2	-
CO3	3	-	-	3	-	-	-	3	-	-	-	3	-
CO4	3	2	-	3	-	-	-	3	-	-	-	2	-
CO5	-	2	-	2	-	-	-	3	-	-	-	3	-
AVG	**3**	**2**	**-**	**2.4**	**-**	**-**	**-**	**3**	**-**	**-**	**-**	**2.4**	**-**