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ENGINEERS WITH
SOCIAL RESPONSIBILITY

NAAC Accredited
Recipient of Centre of Excellence Award by the Government of Gujarat
Recipient of '5 Star' in GSIRF Ranking by Government of Gujarat

PROGRAM: BACHELOR OF TECHNOLOGY IN INFORMATION AND COMMUNICATION TECHNOLOGY, BTECH (ICT)

PO No.	Programme Outcomes
PO1	**Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	**Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences
PO3	**Design/development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	**Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	**Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6	**The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and

	cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	**Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	**Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	**Individual and team work:** Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	**Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	**Project management and finance:** Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	**Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PSO No.	Program Specific Outcomes (PSOs)
PSO1	To apply the theoretical concepts of computer engineering and practical knowledge in analysis, design and development of computing systems and interdisciplinary applications.
PSO2	Develop system solutions involving both hardware and software modules
PSO3	To work as a socially responsible professional by applying ICT principles in real-world problems.

Course Outcomes (COs) – Program Outcomes (POs) – Program Specific Outcomes (PSOs)

Basic Electronic Circuits (3-0-2-4)

Course Objective: The objective of this course is to provide students the fundamental idea of electronic circuits and components. The course will enable students with the skills of working with different circuit elements like resistor, capacitor, inductor, diode, transistor, operational amplifier. The content is designed to help students not only to analyze a circuit but also to design an electronic circuit with necessary components.

Course Outcomes: After completion of this course, students should be able to:

- Understand the working principles of electronic circuits [PO1, PO12].
- Analyze a given circuit using mathematical knowledge [PO1, PO2, PO4].
- Identify any issues in a circuit, and propose a solution [PO2, PO3, PO4].
- Work in a group for a laboratory experiment, and present their results [PO9, PO10].

POs-COs Matrix:

PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
X	X	X	X					X	X		X

Course Outcomes and Competencies

Sr. No.	Course Outcome	PO/PSO	CPD	KD
1	CO1: Understand the working principles of electronic circuits	PO1, PO12 / PSO1	U	F, C
2	CO2: Analyze a given circuit using	PO1, PO2, PO4 / PSO1, PSO2	U, Ap	F, C, P

	mathematical knowledge			
3	CO3: Identify any issues in a circuit, and propose a solution	PO2, PO3, PO4 / PSO1, PSO2	U, An	F, C, P
4	CO4: Work in a group for a laboratory experiment, and present their results	PO9, PO10 / PSO2, PSO3	Ap, An, E	F, C, P

CL: Cognitive Process Domain [R: Remember; U: Understand; Ap: Apply; An: Analyze; E: Evaluate; C: Crete]

KC: Knowledge Domain [F: Factual; C: Conceptual; P: Procedural; M: Metacognitive]

Focus Area	Yes/No	Details
Focus on Employability	Yes	The students taking the Basic Electronics course can be employed in industries focusing on chip manufacturing, hardware.
Focus on Skill development	Yes	The students develop necessary skills to develop foundational knowledge in basic electronics that become prerequisite for other subsequent courses..
Focus on entrepreneurship	No	-

Introduction to Programming (3-0-0-3)

Course objective: This course aims to introduce problem solving techniques using C programming to help the students to develop analytical and logical skills. The course starts with basic concepts of computer programming and follows in building up knowledge in program development, deployment and testing to solve computational problems. The course also provides visualization of memory and time requirements

for solving problems using C programming language. The coverage of this course includes problem solving techniques, flow charts, algorithms development, pseudo codes, and implementation of algorithms using C programming.

Course Outcomes: After completion of this course, students should be able to:

- Understand the basic programming skills in C. [PO1, PO12]
- Understand the syntax and semantics of flow-chart, data types and structured programming. [PO1, PO4]
- Apply skills in problem solving techniques. [PO2, PO3, PO4]

POs-COs Matrix:

PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
X	X		X								X

Course Outcomes and Competencies

Sr. No.	Course Outcome	PO/PSO	CPD	KD
1	CO1: Understand the basic programming skills in C	PO1, PO12 / PSO1	U	F, C
2	CO2: Understand the syntax and semantics of flow-chart, data types and structured programming	PO1, PO4 / PSO1, PSO2	U, Ap	F, C, P
3	CO3: Apply skills in problem solving techniques.	PO1, PO3, PO4 / PSO1, PSO2	U, Ap	F, C, P

CL: Cognitive Process Domain [R: Remember; U: Understand; Ap: Apply; An: Analyze; E: Evaluate; C: Crete]

KC: Knowledge Domain [F: Factual; C: Conceptual; P: Procedural; M: Metacognitive]

Focus Area	Yes/No	Details
Focus on Employability	Yes	The students taking the Programming course can be employed in industries focusing on coding, web development.
Focus on Skill development	Yes	The students develop necessary skills to develop foundational knowledge in basic programming skills that become prerequisite for other subsequent courses..
Focus on entrepreneurship	Yes	The students apply their coding skills in entrepreneurship, start-up.

Introduction to Programming Lab (0-0-4-2)

Course objective: This course aims to provide hands-on practical knowledge on C programming on topics, exercises and use cases discussed in the course, Introduction to Programming.

Course Outcomes: After completion of this course, students should be able to:

- Understand the basic programming skills in C. [PO1, PO12]
- Understand the syntax and semantics of flow-chart, data types and structured programming. [PO1, PO4]
- Apply skills in problem solving techniques. [PO2, PO3, PO4]
- Work in a group for a laboratory experiment, and present their results [PO9, PO10]

POs-COs Matrix:

PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
X	X		X					X	X		X

Course Outcomes and Competencies

Sr. No.	Course Outcome	PO/PSO	CPD	KD
1	CO1 Understand the basic programming skills in C	PO1, PO12 / PSO1	U	F, C
2	CO2: Understand the syntax and semantics of flow-chart, data types and structured programming	PO1 PO4/ PSO1, PSO2	U, Ap	F, C P
3	CO3: Apply skills in problem solving techniques	PO2, PO3, PO4 / PSO1, PSO2	U, An	F, C, P
4	CO4: Work in a group for a laboratory experiment, and present their results	PO9, PO10 / PSO2, PSO3	Ap, An, E	F, C, P

CL: Cognitive Process Domain [R: Remember; U: Understand; Ap: Apply; An: Analyze; E: Evaluate; C: Crete]

KC: Knowledge Domain [F: Factual; C: Conceptual; P: Procedural; M: Metacognitive]

Focus Area	Yes/No	Details
Focus on Employability	Yes	The students taking the Basic Electronics course can be employed in industries focusing on chip manufacturing, hardware.
Focus on Skill development	Yes	The students develop necessary skills to develop foundational knowledge in basic electronics that become prerequisite for other subsequent courses..

Focus on entrepreneurship	Yes	The students apply their coding skills in entrepreneurship, start-up.

Calculus (3-1-0-4)

Course objective: The students after completing the course will get a basic overview of Calculus and its applications. They will get an insight into how it is used in various applications (both old and new). Through this course student can develop the ability to apply the knowledge of mathematics, science, engineering fundamentals, and engineering specialization to the solution of complex engineering problems, understand and create mathematical arguments for solving problems, understand mathematical structures such as functions, variables, integrations and learn their uses, develop skills towards mathematical modeling and analysis of engineering problems.

Course Outcomes: After completion of this course, students should be able to:

- Model some physical situations with functions, differential equations or integrals. [PO2, PO5, PO12]
- Solve the models created and also determine the reasonableness of solutions, including sign, size, units of measurement and accuracy. [PO1, PO2, PO3, PO4]
- Communicate mathematics and explain solutions to problems both verbally and in written sentences. [PO12]
- Acquire manipulation and computation competence. [PO4, PO12].
- Develop an appreciation of calculus as a coherent body of knowledge and as a human accomplishment. [PO12]

POs-COs Matrix:

PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
X	X	X		X							X

Course Outcomes and Competencies

Sr. No.	Course Outcome	PO/PSO	CPD	KD
1	CO1: Model some physical situations with functions, differential equations or integrals	PO2, PO5, PO12 / PSO1	U, An	F, C
2	CO2: Solve the models created and also determine the reasonableness of solutions, including sign, size, units of measurement and accuracy	PO1, PO2, PO3, PO4 / PSO1, PSO2	U, Ap	F, C, P
3	CO3: Communicate mathematics and explain solutions to problems both verbally and in written sentences	PO12 / PSO1, PSO2	U, An	F, C, P
4	CO4: Acquire manipulation and computation competence	PO4, PO12 / PSO2, PSO3	Ap, An	F, C, P
5	CO5: Develop an appreciation of calculus as a coherent body of knowledge and as a human accomplishment	PO12/PSO1	U	F, C

CL: Cognitive Process Domain [R: Remember; U: Understand; Ap: Apply; An: Analyze; E: Evaluate; C: Crete]

KC: Knowledge Domain [F: Factual; C: Conceptual; P: Procedural; M: Metacognitive]

Focus Area	Yes/No	Details
Focus on Employability	No	-
Focus on Skill development	Yes	The students develop necessary skills to develop foundational knowledge in calculus that become prerequisite for other subsequent courses.
Focus on entrepreneurship	No	

Introduction to ICT (1-0-2-2)

Course Objective: This course is designed to provide students a contextual understanding of different facets of ICT along with the practical exposure to basic engineering tools.

Course Outcomes: After completion of this course, students should be able to:

- Understanding different pillars of ICT [PO1, PO12].
- Draw and visualize engineering tools using Autocad [PO1, PO2, PO5].
- Understand Computer Numerical Control (CNC) machines and use them for engineering design [PO2, PO3, PO5].

POs-COs Matrix:

PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
X	X	X		X							X

Course Outcomes and Competencies

Sr. No.	Course Outcome	PO/PSO	CPD	KD
1	CO1: Understanding different pillars of ICT	PO1, PO12 / PSO1	U	F, C
2	CO2: Draw and visualize engineering tools using Autocad	PO1, PO2, PO5 / PSO1, PSO2	U, Ap	F, C, P
3	CO3: Understand CNC machines and use them for engineering design	PO2, PO3, PO5 / PSO1, PSO2	U	F, C, P

CL: Cognitive Process Domain [R: Remember; U: Understand; Ap: Apply; An: Analyze; E: Evaluate; C: Crete]

KC: Knowledge Domain [F: Factual; C: Conceptual; P: Procedural; M': Metacognitive]

Focus Area	Yes/No	Details
Focus on Employability	Yes	The students taking the course can be employed in industries focusing on service on chip, prototype design.
Focus on Skill development	Yes	The students develop necessary skills to develop foundational knowledge in ICT that become prerequisite for other subsequent courses.
Focus on entrepreneurship	No	-

PC110 Language and Literature (3-0-0-3)

Course Objective: This course is designed to introduce students to the study of the English language and literature at the undergraduate level. It follows a two-pronged approach, first, teaching the English language through literature; secondly, introducing the students to the world of literature and teaching them strategies of reading and comprehending.

Course Outcomes: After completion of this course, students should be able to:

- Upskills their language proficiency [PO4, PO6, PO8, PO12].
- Understand post-colonial literature [PO7, PO8, PO12].

POs-COs Matrix:

PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
			X		X	X	X				X

Course Outcomes and Competencies

Sr. No.	Course Outcome	PO/PSO	CPD	KD
1	CO1: Upskills their language proficiency	PO4, PO6, PO8, PO12 / PSO1	U	F, C
2	CO2: Understand post-colonial literature	PO7, PO8, PO12 / PSO1, PSO2	U	F, C

CL: Cognitive Process Domain [R: Remember; U: Understand; Ap: Apply; An: Analyze; E: Evaluate; C: Crete]

KC: Knowledge Domain [F: Factual; C: Conceptual; P: Procedural; M: Metacognitive]

Focus Area	Yes/No	Details
Focus on Employability	Yes	Communication skills and language proficiency helps students in employment.
Focus on Skill development	Yes	The students develop necessary skills for communicative english, writing and presentation skills
Focus on entrepreneurship	No	-

Digital Logic and Computer Organization (3-0-2-4)

Course objective: This course provides an introduction to the design and implementation of digital circuits and microprocessors. Topics include transistor network design, Boolean algebra, combinational circuits, sequential circuits, finite state machine design, processor pipelines, and memory hierarchy. Design methodology using both discrete components and hardware description languages is covered in the course.

Course Outcomes: After completion of this course, students should be able to

- Understand and verify digital logic gates using IC chips, and realize the combinational digital circuit for a given logical function [PO1, PO3, PO12].
- Understand Instruction cycle, I/O fundamentals and interrupts [PO1, PO2, PO5].
- Design a data and control path for the MIPS instruction set architecture [PO2, PO3, PO5]

POs-COs Matrix:

PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
X	X	X		X							X

Course Outcomes and Competencies

Sr. No.	Course Outcome	PO/PSO	CPD	KD
1	CO1: Understand and verify digital logic gates using IC chips, and realize the combinational digital circuit for a given logical function	PO1, PO3, PO12 / PSO1	U	F, C
2	CO2: Understand Instruction cycle, I/O fundamentals and interrupts	PO1, PO2, PO5 / PSO1, PSO2	U	F, C
3	CO3: Design a data and control path for	PO2, PO3, PO5 / PSO1, PSO2	U, Ap	F, C, P

	the MIPS instruction set architecture			

CL: Cognitive Process Domain [R: Remember; U: Understand; Ap: Apply; An: Analyze; E: Evaluate; C: Crete]

KC: Knowledge Domain [F: Factual; C: Conceptual; P: Procedural; M: Metacognitive]

Focus Area	Yes/No	Details
Focus on Employability	Yes	The students taking the course can be employed in industries focusing on systems design and VLSI.
Focus on Skill development	Yes	The students develop necessary skills to develop foundational knowledge in computer organization that become prerequisite for other subsequent courses.
Focus on entrepreneurship	No	-

Data Structures (3-0-0-3)

Course objective: The course aims to introduce the concept of data structures, and their indispensability in implementing algorithms and also how they aid in improving performance. An extensive coverage of the well-known and important data structures and routines/algorithms associated with them will be covered.

Course Outcomes: After completion of this course, students should be able to:

- Understand basic and abstract data types [PO1, PO12].
- Analyze complexity of various data structures [PO2, PO3, PO4].
- Apply skills for solving problems [PO2, PO3, PO4]

POs-COs Matrix:

PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
X	X	X	X	X							X

Course Outcomes and Competencies

Sr. No.	Course Outcome	PO/PSO	CPD	KD
1	CO1: Understand basic and abstract data types	PO1, PO12 / PSO1	U	F, C
2	CO2: Analyze complexity of various data structures	PO2, PO3, PO4 / PSO1, PSO2	U, An	F, C, P
3	CO3: Apply skills for solving problems	PO2, PO3, PO4 / PSO1, PSO2	U, Ap	F, C, P

CL: Cognitive Process Domain [R: Remember; U: Understand; Ap: Apply; An: Analyze; E: Evaluate; C: Crete]

KC: Knowledge Domain [F: Factual; C: Conceptual; P: Procedural; M: Metacognitive]

Focus Area	Yes/No	Details
Focus on Employability	Yes	The students taking the course can be employed in industries focusing on software development, coding and computing.
Focus on Skill development	Yes	The students develop necessary skills to develop foundational knowledge in data structures that become prerequisite for other subsequent courses.

Focus on entrepreneurship	Yes	Data structure is a foundational course that helps in exploring startups, entrepreneurship.

Data Structures Lab using OOP (1-0-2-2)

Course objective: Aim of this course is to provide practical exposure to different data structures and algorithms concepts that are taught in the course "IT205: Data Structures". Preferred programming language is C++.

Course Outcomes: After completion of this course, students should be able to:

- Implement basic and abstract data types [PO1, PO12].
- Analyze complexity of various data structures [PO2, PO3, PO4].
- Apply skills for solving problems [PO2, PO3, PO4]

POs-COs Matrix:

PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
X	X	X	X	X							X

Course Outcomes and Competencies

Sr. No.	Course Outcome	PO/PSO	CPD	KD
1	CO1: Implement basic and abstract data types	PO1, PO12 / PSO1	U	F, C
2	CO2: Analyze complexity of various data structures	PO2, PO3, PO4 / PSO1, PSO2	U, An	F, C, P

3	CO3: Apply skills for solving problems	PO2, PO3, PO4 / PSO1, PSO2	U, Ap	F, C, P

CL: Cognitive Process Domain [R: Remember; U: Understand; Ap: Apply; An: Analyze; E: Evaluate; C: Crete]

KC: Knowledge Domain [F: Factual; C: Conceptual; P: Procedural; M: Metacognitive]

Focus Area	Yes/No	Details
Focus on Employability	Yes	The students taking the course can be employed in industries focusing on software development, coding and computing.
Focus on Skill development	Yes	The students develop necessary skills to develop foundational knowledge in data structures that become prerequisite for other subsequent courses.
Focus on entrepreneurship	Yes	Data structure is a foundational course that helps in exploring startups, entrepreneurship.

Discrete Mathematics (3-1-0-4)

Course objective: Students are expected to learn logical reasoning to solve a variety of problems to learn different proof methods, algorithms to solve problems, and to learn discrete probability and number theory to solve problems.

Course Outcomes: After completion of the course, the students should acquire:

- A basic overview of discrete mathematics [PO1, PO12]
- Understand how the concepts are used in various applications [PO3, PO4, PO5].
- Apply skills learned in the course for problem solving [PO2, PO3, PO5]

POs-COs Matrix:

PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
X	X	X	X	X							X

Course Outcomes and Competencies

Sr. No.	Course Outcome	PO/PSO	CPD	KD
1	CO1: A basic overview of discrete mathematics	PO1, PO12 / PSO1	U	F, C
2	CO2: Understand how the concepts are used in various applications	PO3, PO4, PO5 / PSO1, PSO2	U	F, C, P
3	CO3: Apply skills learned in the course for problem solving	PO2, PO3, PO5 / PSO1, PSO2	U, Ap	F, C, P

CL: Cognitive Process Domain [R: Remember; U: Understand; Ap: Apply; An: Analyze; E: Evaluate; C: Crete]

KC: Knowledge Domain [F: Factual; C: Conceptual; P: Procedural; M: Metacognitive]

Focus Area	Yes/No	Details
Focus on Employability	Yes	The students taking the course can be employed in industries focusing on software development.
Focus on Skill development	Yes	The students develop necessary skills to develop foundational knowledge in discrete mathematics that become prerequisite for other subsequent courses.

Focus on entrepreneurship	No	-

HM106 Approaches to Indian Society (3-0-0-3):

Course Objective: This course aims to construct a comparative framework for the understanding of different cultures with particular reference to social organization, politics, religion and symbolism illustrated with various ethnographic examples. The course is designed to provide with the means to apply basic anthropological understandings of society and culture in the analysis of meanings, actions and explanations that is the basis for communication in the society. Students will be expected to reflect upon the Indian society utilizing the readings and lectures.

Course Outcomes: Upon passing the courses, students should have a:

- Basic critical and analytical understanding of how social and cultural diversity is approached in anthropology [PO1, PO7, PO12]
- How the diversity of culture, implicit in anthropological explanations, is to be understood [PO6, PO7, PO8].

POs-COs Matrix:

PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
X					X	X	X				X

Course Outcomes and Competencies

Sr. No.	Course Outcome	PO/PSO	CPD	KD
1	CO1: Basic critical and analytical understanding of how social and cultural	PO1, PO7, PO12 / PSO1	U	F, C

	diversity is approached in anthropology			
2	CO2: How the diversity of culture, implicit in anthropological explanations, is to be understood	PO6, PO7, PO8 / PSO1, PSO2	U, Ap	F, C, P

CL: Cognitive Process Domain [R: Remember; U: Understand; Ap: Apply; An: Analyze; E: Evaluate; C: Crete]

KC: Knowledge Domain [F: Factual; C: Conceptual; P: Procedural; M: Metacognitive]

Focus Area	Yes/No	Details
Focus on Employability	No	-
Focus on Skill development	Yes	The students develop necessary skills to develop knowledge in culture, society and identity.
Focus on entrepreneurship	No	-

Electromagnetic Theory (3-1-0-4)

Course objective: The course is targeted at students of engineering who want to understand medium and its response to a signal. Electromagnetic waves are the simplest signal, its propagation, energy associated with such waves and the techniques to understand its behavior in different media, are what are under the scope of this course.

Course Outcomes: After successful completion of the course, the student will have the ability to

- Understand and analyze complicated engineering and real-world situations by physical reasoning in terms of simple fundamental physical laws. [PO1, PO2 PO12].
- Formulate mathematical models by applying abstract concepts to complex problems and solving the model using approximations if necessary [PO3, PO4].

POs-COs Matrix:

PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
X	X	X	X								X

Course Outcomes and Competencies

Sr. No.	Course Outcome	PO/PSO	CPD	KD
1	CO1: Understand and analyze complicated engineering and real-world situations by physical reasoning in terms of simple fundamental physical laws	PO1, PO2, PO12 / PSO1	U	F, C
2	CO2: Formulate mathematical models by applying abstract concepts to complex problems and solving the model using approximations if necessary	PO3, PO4 / PSO1, PSO2	U, Ap	F, C, P

CL: Cognitive Process Domain [R: Remember; U: Understand; Ap: Apply; An: Analyze; E: Evaluate; C: Crete]

KC: Knowledge Domain [F: Factual; C: Conceptual; P: Procedural; M: Metacognitive]

Focus Area	Yes/No	Details
Focus on Employability	No	-
Focus on Skill development	Yes	The students develop necessary skills to develop foundational knowledge in the course that becomes a prerequisite for other subsequent courses.
Focus on entrepreneurship	No	-

Exploratory Project 1 (0-1-0-1) and Exploratory Project 2 (0-0-2-1)

Objective: This course allows students to explore their surroundings to identify interesting problems that admit a hardware based solution and design and make such a product by leveraging the engineering workshop skills learnt in the first semester. Students are expected to work in groups of 8 to 10 under a faculty mentor and conceive and implement a project over two semesters. The course will conclude with a class demonstration and exhibition.

Course Outcomes: After completion of the course, students should be able to:

- Explore different opportunities for doing projects in ICT [PO1, PO8, PO9, PO12].
- Perform hands-on activities using ICT tools and technologies [PO8, PO12].

POs-COs Matrix:

PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
X							X	X			X

Course Outcomes and Competencies

Sr. No.	Course Outcome	PO/PSO	CPD	KD
1	CO1: Explore different opportunities for doing projects in ICT	PO1, PO8, PO9, PO12 / PSO1	U	F, C
2	CO2: Perform hands-on activities using ICT tools and technologies	PO8, PO12 / PSO1	U, Ap	F, C, P

CL: Cognitive Process Domain [R: Remember; U: Understand; Ap: Apply; An: Analyze; E: Evaluate; C Crete]

KC: Knowledge Domain [F: Factual; C: Conceptual; P: Procedural; M: Metacognitive]

Focus Area	Yes/No	Details
Focus on Employability	No	-
Focus on Skill development	Yes	The students develop necessary skills to develop hands-on knowledge in the course that becomes a prerequisite for other subsequent courses.
Focus on entrepreneurship	No	-

Signals and Systems (3-1-0-4)

Course Objective: This course concentrates on classification and description of signals and systems. The emphasis is primarily on linear time invariant systems using both the time domain and frequency domain representations.

Course Outcomes: After completion of the course, students should be able to:

- Understand characteristics of signals [PO1, PO3]
- Understand various transforms [PO1, PO5].
- Compute and determine various transformation [PO1, PO12]

POs-COs Matrix:

PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
X		X		X							X

Course Outcomes and Competencies

Sr. No.	Course Outcome	PO/PSO	CPD	KD
1	CO1: Understand characteristics of signals	PO1, PO3 / PSO1	U	F, C
2	CO2: Understand various transforms	PO1, PO5 / PSO1	U	F, C, P
3	CO3: Compute and determine various transformation	PO1, PO12 / PSO1	U, An	F, C, P

CL: Cognitive Process Domain [R: Remember; U: Understand; Ap: Apply; An: Analyze; E: Evaluate; C: Crete]

KC: Knowledge Domain [F: Factual; C: Conceptual; P: Procedural; M: Metacognitive]

Focus Area	Yes/No	Details
Focus on Employability	Yes	The students taking the course can be employed in industries focusing on communication engineering.
Focus on Skill development	Yes	The students develop necessary skills to develop foundational knowledge in signals and systems that become prerequisite for other subsequent courses.

Focus on entrepreneurship	No	-

Design and Analysis of Algorithms (3-1-0-4)

Course Objective: This course intends to provide a rigorous introduction to fundamental techniques in the design and analysis of algorithms.

Course Outcomes: Students who complete the course should have the ability to do the following:

- Understand the correctness of algorithms using inductive proofs and invariants [PO1, PO12].
- Analyze worst-case running times of algorithms using asymptotic analysis. Describe the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it. Synthesize divide-and-conquer algorithms and analyze them [PO2].
- Describe the dynamic-programming paradigm and explain when an algorithmic design situation calls for it. Synthesize dynamic programming algorithms, and analyze them [PO2, PO3].
- Describe the greedy paradigm and explain when an algorithmic design situation calls for it. Synthesize greedy algorithms, and analyze them [PO2,PO3, PO4, PO12].

POs-COs Matrix:

PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
X	X	X	X								X

Course Outcomes and Competencies

Sr. No.	Course Outcome	PO/PSO	CPD	KD
1	CO1: Understand the correctness of algorithms using inductive proofs and invariants	PO1 / PSO1	U	F, C

2	CO2: Analyze worst-case running times of algorithms using asymptotic analysis. Describe the divide-and-conquer paradigm and explain when an algorithmic design situation calls for it. Synthesize divide-and-conquer algorithms and analyze them	PO2 / PSO1, PSO2	U, An	F, C, P
3	CO3: Describe the dynamic-programming paradigm and explain when an algorithmic design situation calls for it. Synthesize dynamic programming algorithms, and analyze them	PO2, PO3 / PSO1, PSO2	U, An	F, C, P
4	CO4: Describe the greedy paradigm and explain when an algorithmic design situation calls for it. Synthesize greedy algorithms, and analyze them	PO2, PO3, PO4, PO11 / PSO2, PSO3	Ap, An, E	F, C, P

CL: Cognitive Process Domain [R: Remember; U: Understand; Ap: Apply; An: Analyze; E: Evaluate; C: Crete]

KC: Knowledge Domain [F: Factual; C: Conceptual; P: Procedural; M: Metacognitive]

Focus Area	Yes/No	Details
Focus on Employability	Yes	The students taking the course can be employed in industries focusing on software development, coding and computing.
Focus on Skill development	Yes	The students develop necessary skills to develop foundational knowledge in Algorithms that become prerequisite for other subsequent courses.

Focus on entrepreneurship	Yes	Algorithms is a foundational course that helps in exploring startups, entrepreneurship.

Linear Algebra (3-1-0-4)

Course Objective: Vectors are an essential idea to understand numerous natural phenomena. Its applications start right from mechanics and electrostatics and magnetostatics. These applications use equations involving vectors. Such ideas are abstracted to study solutions of a system of linear equations in several variables.

Course Outcomes: After completion of the course, students should be able to:

- Solve systems of linear equations and understand the nature of the solutions [PO1, PO2, PO12].
- Demonstrate matrix representation of linear operators and understand the concepts through linear operators and matrices [PO1, PO2].
- Perform calculations with vectors, eigenvalues and eigenvectors in "n" dimensions [PO2, PO12].

POs-COs Matrix:

PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
X	X										X

Course Outcomes and Competencies

Sr. No.	Course Outcome	PO/PSO	CPD	KD
1	CO1: Solve systems of linear equations and understand the nature of the solutions	PO1, PO2, PO12 / PSO1	U, Ap	F, C

2	CO2: Demonstrate matrix representation of linear operators and understand the concepts through linear operators and matrices	PO1, PO2 / PSO1, PSO2	U, Ap	F, C, P
3	CO3: Perform calculations with vectors, eigenvalues and eigenvectors in "n" dimensions	PO2, PO12 / PSO1, PSO2	U, An	F, C, P

CL: Cognitive Process Domain [R: Remember; U: Understand; Ap: Apply; An: Analyze; E: Evaluate; C: Crete]

KC: Knowledge Domain [F: Factual; C: Conceptual; P: Procedural; M: Metacognitive]

Focus Area	Yes/No	Details
Focus on Employability	Yes	The students taking the course can be employed in industries focusing on Machine Learning, Data Science.
Focus on Skill development	Yes	The students develop necessary skills to develop foundational knowledge in Linear Algebra that become prerequisite for other subsequent courses.
Focus on entrepreneurship	No	-

HM216 Science, Technology, Society (3-0-0-3)

Course objective: This course is designed to encourage students to understand, explore and critically analyze ways in which science and technology work in diverse

social contexts. It draws its basic approaches from Science and Technology studies (STS) which is a growing field of interdisciplinary studies that seeks to understand how science and technology shape human lives and livelihoods and how society and culture, in turn, shape the development of science and technology.

Course Outcomes: After completion of the course students should be able to understand:

- What are the debates STS studies raise about science and technology and society that compel us to question our received ideas and assumptions about science, technology and human progress? [PO1, PO12]
- How have the questions and problems raised by historical and sociological studies of science and technology informed our understanding of the career of modern science and technology in India? [PO4, PO6, PO7]
- What are the techno-social imaginaries that influence our attitude toward science and technology in contemporary times? [PO7, PO8]
- How do we deploy the benefits of science and technology to build more inclusive societies and economies? [PO6, PO10, PO12]

POs-COs Matrix:

PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
X			X		X	X	X		X		X

Course Outcomes and Competencies

Sr. No.	Course Outcome	PO/PSO	CPD	KD
1	CO1: What are the debates STS studies raise about science and technology and society that compel us to question our received ideas and	PO1, PO12 / PSO1	U	F, C

	assumptions about science, technology and human progress?			
2	CO2: How have the questions and problems raised by historical and sociological studies of science and technology informed our understanding of the career of modern science and technology in India?	PO4, PO6, PO7 / PSO1, PSO2	U, Ap	F, C, P
3	CO3: What are the techno-social imaginaries that influence our attitude toward science and technology in contemporary times?	PO7, PO8 / PSO1, PSO2	U, Ap	F, C, P
4	CO4: How do we deploy the benefits of science and technology to build more inclusive societies and economies?	PO6, PO10, PO12 / PSO2, PSO3	Ap, An, E	F, C, P

CL: Cognitive Process Domain [R: Remember; U: Understand; Ap: Apply; An: Analyze; E: Evaluate; C: Crete]

KC: Knowledge Domain [F: Factual; C: Conceptual; P: Procedural; M: Metacognitive]

Focus Area	Yes/No	Details
Focus on Employability	No	-
Focus on Skill development	Yes	The students develop necessary skills to develop knowledge in science, technology and society.
Focus on entrepreneurship	No	-

Computer Systems Programming (3-0-2-4)

Course objective: The course takes an introductory look at the core abstractions in operating systems: processes, virtual memory and files. It takes an in-depth look at the OS services provided by system calls, how system calls work, and how they can be used. Students will become familiar with writing application programs using system calls.

Course Outcomes: After completion of the course, students should be able to:

- Understand the importance of system programming, kernel subsystems, types of kernel, embedded and real time systems [PO1, PO2, PO12].
- Implement process scheduling policy and signaling mechanisms for real time and non-real time processes [PO2, PO5].
- Understand and implement features as per POSIX standards [PO1, PO12].

POs-COs Matrix:

PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
X	X			X							X

Course Outcomes and Competencies

Sr. No.	Course Outcome	PO/PSO	CPD	KD
1	CO1: Understand the importance of system programming, kernel subsystems, types of kernel, embedded and real time systems	PO1, PO2, PO12 / PSO1	U	F, C
2	CO2: Implement process scheduling policy and signaling mechanisms for real time and non-real time processes	PO2, PO5 / PSO1, PSO2	U, Ap	F, C, P
3	CO3: Understand and implement features as per POSIX standards	PO1, PO12 / PSO1, PSO2	U, Ap, An	F, C, P

CL: Cognitive Process Domain [R: Remember; U: Understand; Ap: Apply; An: Analyze; E: Evaluate; C: Crete]

KC: Knowledge Domain [F: Factual; C: Conceptual; P: Procedural; M: Metacognitive]

Focus Area	Yes/No	Details
Focus on Employability	Yes	The students taking the course can be employed in industries focusing on software engineering, developer.
Focus on Skill development	Yes	The students develop necessary skills to develop foundational knowledge in systems software that become prerequisite for other subsequent courses.

Focus on entrepreneurship	No	-

Probability and Statistics (3-0-1-4)

Course objective: The course introduces students to the basics of probability and statistics. Probability theory has wide scale applications in mathematics, engineering and finance. The student is introduced to the axiomatic way of looking at probability invented by Kolmogorov. The different types of random variables (both discrete and continuous) are introduced with context and examples. The student learns the limit theorems such as the central limit theorem with their applications. The course ends with some introductory statistics in the form of estimation and regression. The course has mathematical rigor but at the same time practical examples as well as an experimental approach where the students can simulate probabilistic situations on a computer is encouraged.

Course Outcomes: After completion of the course, students should be able to:

- Apply key concepts of probability, including discrete and continuous random variables, probability distributions, conditioning, independence, expectations, variances [PO1, PO2, PO4, PO12].
- Define and explain the different statistical distributions (e.g., Normal, Binomial, Poisson) and the typical phenomena that each distribution often describes [PO2, PO5].
- Apply the concepts of interval estimation, confidence intervals and hypothesis testing [PO2, PO4, PO5].

POs-COs Matrix:

PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
X	X		X	X							X

Course Outcomes and Competencies

Sr. No.	Course Outcome	PO/PSO	CPD	KD
1	CO1: Apply key concepts of probability, including discrete and continuous random variables, probability distributions, conditioning, independence, expectations, variances	PO1, PO2, PO4, PO12 / PSO1	U	F, C
2	CO2: Define and explain the different statistical distributions (e.g., Normal, Binomial, Poisson) and the typical phenomena that each distribution often describes	PO2, PO4 / PSO1, PSO2	U, An	F, C, P
3	CO3: Apply the concepts of interval estimation, confidence intervals and hypothesis testing	PO2, PO4, PO5 / PSO1, PSO2	U, Ap	F, C, P

CL: Cognitive Process Domain [R: Remember; U: Understand; Ap: Apply; An: Analyze; E: Evaluate; C: Crete]

KC: Knowledge Domain [F: Factual; C: Conceptual; P: Procedural; M: Metacognitive]

Focus Area	Yes/No	Details
Focus on Employability	No	-

Focus on Skill development	Yes	The students develop necessary skills to develop foundational knowledge in probability and statistics that become prerequisite for other subsequent courses.
Focus on entrepreneurship	No	

HM116 Principles of Economics (3-0-0-3)

Course Objective: This course provides students an understanding of what is Economics, the problems of Economic Organization, what, how and for whom to produce.

Course Outcomes: After completion of the course, students should be able to:

- Understand the functioning of different types of markets including Monopoly, Monopolistic competition, Oligopoly, and Perfect Competition and the corresponding equilibrium conditions in each market [PO1, PO6, PO12].
- Analyze market efficiencies, consumer surplus, producer surplus and social welfare in economic markets [PO6, PO7].
- Understand theory of labour markets and associated equilibrium wages, employment and unemployment rates with applications in the ICT industry [PO6, PO7].
- Apply macroeconomics principles to estimate the welfare of countries including the determination of GDP, standard of living and unemployment rates [PO6, PO7, PO12].

POs-COs Matrix:

PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
					X	X					X

Course Outcomes and Competencies

Sr. No.	Course Outcome	PO/PSO	CPD	KD
1	CO1: Understand the functioning of different types of markets including Monopoly, Monopolistic competition, Oligopoly, and Perfect Competition and the corresponding equilibrium conditions in each market	PO1, PO6, PO12 / PSO1	U	F, C
2	CO2: Analyze market efficiencies, consumer surplus, producer surplus and social welfare in economic markets	PO6, PO7 / PSO1, PSO2	U, An	F, C, P
3	CO3: Understand theory of labour markets and associated equilibrium wages, employment and unemployment rates with applications in the ICT industry	PO6, PO7 / PSO1	U	F, C

4	CO4: Apply macroeconomics principles to estimate the welfare of countries including the determination of GDP, standard of living and unemployment rates	PO6, PO7, PO12 / PSO1, PSO2	U, Ap	F, C, P

CL: Cognitive Process Domain [R: Remember; U: Understand; Ap: Apply; An: Analyze; E: Evaluate; C: Crete]

KC: Knowledge Domain [F: Factual; C: Conceptual; P: Procedural; M: Metacognitive]

Focus Area	Yes/No	Details
Focus on Employability	No	-
Focus on Skill development	Yes	The students develop necessary skills to develop foundational knowledge in economics that helps students taking related elective courses.
Focus on entrepreneurship	No	-

Introduction to Communication Systems (3-0-2-4)

Course objective: This is a foundation course for analog and digital communication and other advanced communication courses. The objective of this course is to make the students appreciate what a telecommunication system is, why it is required and its fundamental concepts.

Course Outcomes: After completion of the course, students should be able to:

- Understand the principles of basic communication systems including time, frequency, and antenna diversity [PO1, PO12].

- Understand the impact of channel encoding/decoding schemes including linear block codes, cyclic, and convolutional codes on output bit error probability [PO4, PO5].

POs-COs Matrix:

PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
X			X	X							X

Course Outcomes and Competencies

Sr. No.	Course Outcome	PO/PSO	CPD	KD
1	CO1: Understand the principles of basic communication systems including time, frequency, and antenna diversity	PO1, PO12 / PSO1	U	F, C
2	CO2: Understand and apply the impact of channel encoding /decoding schemes including linear block codes, cyclic, and convolutional codes on output bit error probability	PO4, PO5 / PSO1, PSO2	U, Ap	F, C, P

CL: Cognitive Process Domain [R: Remember; U: Understand; Ap: Apply; An: Analyze; E: Evaluate; C: Crete]

KC: Knowledge Domain [F: Factual; C: Conceptual; P: Procedural; M: Metacognitive]

Focus Area	Yes/No	Details
Focus on Employability	No	-
Focus on Skill development	Yes	The students develop necessary skills to develop foundational knowledge in communication systems that become prerequisite for other subsequent courses.
Focus on entrepreneurship	No	-

Database Management Systems (3-0-2-4)

Course objective: This course covers all essential topics in database management, in particular, relational databases. The exposure obtained by the students in this course serve as a required prerequisite to several elective courses in the areas of Software Engineering.

Course Outcomes: After completion of the course, students should be able to:

- Understand the principles of relational algebra and entity-relationship diagrams [PO1, PO2, PO4].
- Understand and apply the concepts of database design and implementation [PO2, PO4, PO5, PO12]

POs-COs Matrix:

PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
X	X		X	X							X

Course Outcomes and Competencies

Sr. No.	Course Outcome	PO/PSO	CPD	KD
1	CO1: Understand the principles of relational	PO1, PO2, PO4 / PSO1	U	F, C

	algebra and entity-relationship diagrams			
2	CO2: Understand and apply the concepts of database design and implementation	PO2, PO4, PO5, PO12 / PSO1, PSO2	U, Ap	F, C, P

CL: Cognitive Process Domain [R: Remember; U: Understand; Ap: Apply; An: Analyze; E: Evaluate; C: Crete]

KC: Knowledge Domain [F: Factual; C: Conceptual; P: Procedural; M: Metacognitive]

Focus Area	Details
Focus on Employability	The students taking DBMS course can be employed to industries focusing on database and software development.
Focus on Skill development	The students develop necessary skills to work with real use cases using databases.
Focus on entrepreneurship	The students can work on real time projects focusing on development of small, medium and large enterprises through entrepreneurship/self-employability and start-ups.

Embedded Hardware Design (3-0-2-4)

Course Objective: This course aims to cover computing devices, associated peripherals and networks along with high level software(C) and hardware language (Verilog HDL) which are used in the design of a modern day embedded system.

Course Outcomes: After completion of the course, students should be able to:

- Understand essential hardware components, SOC, and their usage in embedded systems [PO1, PO4, PO5, PO12].

- Acquire skills in hardware language and visualize it through embedded systems [PO4, PO5, PO6].

POs-COs Matrix:

PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
X			X	X	X						X

Course Outcomes and Competencies

Sr. No.	Course Outcome	PO/PSO	CPD	KD
1	CO1: Understand essential hardware components, SOC, and their usage in embedded systems	PO1, PO4, PO5, PO12 / PSO1	U	F, C
2	CO2: Acquire skills in hardware language and visualize it through embedded systems	PO4, PO6, PO6 / PSO1, PSO2	U, Ap	F, C, P

CL: Cognitive Process Domain [R: Remember; U: Understand; Ap: Apply; An: Analyze; E: Evaluate; C: Crete]

KC: Knowledge Domain [F: Factual; C: Conceptual; P: Procedural; M: Metacognitive]

Focus Area	Yes/No	Details
Focus on Employability	Yes	The students taking the course can be employed in industries focusing on chip manufacturing, hardware.
Focus on Skill development	Yes	The students develop necessary skills to

		develop foundational knowledge in embedded systems.
Focus on entrepreneurship	Yes	Embedded Hardware Design offers a lot of opportunities for start-ups, entrepreneurship

Digital Communications (3-0-2-4)

Course objective: The course aims to cover introduction to digital communication systems and digitization of analog signals-analog versus digital communications.

Course Outcomes: After completion of the course, students should be able to:

- Understand the necessary concepts in digital communication [PO1, PO4, PO12].
- Visualize various aspects of signals through analog-digital-analog [PO3].
- Analyze communication complexity with respect to different channels [PO2, PO4].

POs-COs Matrix:

PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
X	X	X	X								X

Course Outcomes and Competencies

Sr. No.	Course Outcome	PO/PSO	CPD	KD
1	CO1: Understand the necessary concepts in digital communication	PO1, PO4, PO12 / PSO1	U	F, C
2	CO2: Visualize various aspects of	PO3 / PSO1, PSO2	U, Ap	F, C, P

	signals through analog-digital-analog			
3	CO3: Analyze communication complexity with respect to different channels	PO2, PO4 / PSO1, PSO2	U, An	F, C, P

CL: Cognitive Process Domain [R: Remember; U: Understand; Ap: Apply; An: Analyze; E: Evaluate; C: Crete]

KC: Knowledge Domain [F: Factual; C: Conceptual; P: Procedural; M: Metacognitive]

Focus Area	Yes/No	Details
Focus on Employability	Yes	The students taking the course can be employed in industries focusing on communication engineering.
Focus on Skill development	Yes	The students develop necessary skills to develop knowledge in digital communication..
Focus on entrepreneurship	No	-

Computer Networks (3-0-2-4)

Course objective: The course explains the evolution of computer and communication networks and the design principles of modern network architectures. Primary focus is on system level concepts and engineering design and implementation issues. Some of the recent advancements including multimedia networking, and Software Defined Networking (SDN) will also be studied. In addition, we will study the design and implementation of modern network applications using sockets libraries. The associated laboratory component is designed to expose students to the network simulation tools for the analysis of traffic and network protocols.

Course Outcomes: After completion of the course, students should be able to:

- Understand digital information flow from source to destination over OSI and TCP stack [PO1, PO12].
- Understand the network protocol stacks in the Internet [PO1, PO3].
- Determine and implement appropriate medium access control protocol to avoid collision of packets during transmission in a given medium [PO3, PO4].

POs-COs Matrix:

PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
X		X	X								X

Course Outcomes and Competencies

Sr. No.	Course Outcome	PO/PSO	CPD	KD
1	CO1: Understand digital information flow from source to destination over OSI and TCP stack	PO1, PO12 / PSO1	U	F, C
2	CO2: Understand the network protocol stacks in the Internet	PO1, PO3 / PSO1, PSO2	U	F, C, P
3	CO3: Determine and implement appropriate medium access control protocol to avoid collision of packets during transmission in a given medium	PO3, PO4 / PSO1, PSO2	U, Ap	F, C, P

CL: Cognitive Process Domain [R: Remember; U: Understand; Ap: Apply; An: Analyze; E: Evaluate; C: Crete]

KC: Knowledge Domain [F: Factual; C: Conceptual; P: Procedural; M: Metacognitive]

Focus Area	Yes/No	Details
Focus on Employability	Yes	The students taking the course can be employed in industries focusing on Software Engineering, Network Administrator.
Focus on Skill development	Yes	The students develop necessary skills to develop foundational knowledge in computer networks.
Focus on entrepreneurship	No	-

Software Engineering (3-0-2-4)

Course objective: The Software Engineering course introduces the basic principles, practices, tools and techniques required to engineer large complex software systems. The course is project intensive, where students learn by example and practice. The main objective is to understand and learn how complexity and change are engineered during large software development. Here, we would focus on the methodologies (processes), techniques (methods), and tools that can be used to successfully design and validate large software. Wherever relevant, we will make use of various technologies (e.g., DevOps, CASE) to represent various aspects of software development.

Course Outcomes: After completion of the course, students should be able to:

- Understand software engineering principles and existing software process models [PO1, PO12].
- Develop software requirement specification documents for a given project using software requirement engineering principles [PO5, PO6].
- Implement software project management including project scheduling, software size metrics and cost estimation methods [PO11].

POs-COs Matrix:

PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
X				X	X					X	X

Course Outcomes and Competencies

Sr. No.	Course Outcome	PO/PSO	CPD	KD
1	CO1: Understand software engineering principles and existing software process models	PO1, PO12 / PSO1	U	F, C
2	CO2: Develop software requirement specification documents for a given project using software requirement engineering principles	PO5, PO6 / PSO1, PSO2	U, Ap	F, C, P
3	CO3: Implement software project management including project scheduling, software size metrics and cost estimation methods	PO11 / PSO1, PSO2	U, Ap	F, C, P

CL: Cognitive Process Domain [R: Remember; U: Understand; Ap: Apply; An: Analyze; E: Evaluate; C: Crete]

KC: Knowledge Domain [F: Factual; C: Conceptual; P: Procedural; M: Metacognitive]

Focus Area	Yes/No	Details
Focus on Employability	Yes	The students taking the course can be employed in industries focusing on Software Engineering.
Focus on Skill development	Yes	The students develop necessary skills to develop foundational knowledge in software engineering.
Focus on entrepreneurship	Yes	Software Engineering is an essential course for start-ups and entrepreneurship.

Environmental Science (3-0-0-3)

Course objective: Sensitize students on various issues and problems of the environment affecting our society. Allow students to do hands-on exercise on a few specific problems related to the environment. Enable the student to conceive ICT based solutions to environmental problems. With the broad understanding of the environment and underlying principles, the students should be able to relate the changes and challenges of environment related issues.

Course Outcomes: After completion of the course, students should be able to:

- Understand the importance of the environment for our society [PO1, PO7, PO12].
- Visualize ICT based solutions to environmental problems [PO7, PO8].
- Relate the changes and challenges of environment related issues [PO7, PO8]

POs-COs Matrix:

PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
X						X	X				X

Course Outcomes and Competencies

Sr. No.	Course Outcome	PO/PSO	CPD	KD
1	CO1: Understand the importance of the environment for our society	PO1, PO7, PO12 / PSO1	U	F, C
2	CO2: Visualize ICT based solutions to environmental problems	PO7, PO8 / PSO1, PSO2	U, Ap	F, C, P
3	CO3: Relate the changes and challenges of environment related issues	PO7, PO8 / PSO1	U, Ap	F, C, P

CL: Cognitive Process Domain [R: Remember; U: Understand; Ap: Apply; An: Analyze; E: Evaluate; C: Crete]

KC: Knowledge Domain [F: Factual; C: Conceptual; P: Procedural; M: Metacognitive]

Focus Area	Yes/No	Details
Focus on Employability	No	-
Focus on Skill development	Yes	The students develop necessary skills to develop foundational knowledge in environmental science.
Focus on entrepreneurship	No	-

DA-IICT GANDHINAGAR

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