



# **First Year Curriculum**

**Admission Year 2026-27**

**Bachelor of Technology**  
**CSE(Artificial Intelligence and Machine)**

**Faculty of Engineering & Technology**

**Parul University**

**Vadodara, Gujarat, India**

## Semester 1

- a. **Course Name:** Web Designing
- b. **Course Code:** 03010501PC01
- c. **Prerequisite:** Basic computer skills, problem-solving mindset
- d. **Rationale:** Basic computer skills, HTML, CSS, problem-solving, debugging, interactivity, performance optimization, and user experience are essential for web development.
- e. **Course Learning Objective:**

<b>CLOBJ1</b>	To explain the fundamentals of the Internet, web technologies, website structures, and the web development lifecycle.
<b>CLOBJ2</b>	To design and develop web pages using HTML5 and CSS3 with responsive layouts, multimedia elements, and styling techniques.
<b>CLOBJ3</b>	To apply UI/UX design principles, accessibility concepts, and Bootstrap components for creating user-friendly web interfaces.
<b>CLOBJ4</b>	To demonstrate introductory full stack development concepts, including JavaScript, databases, hosting, and frontend-backend interaction.

- f. **Course Learning Outcomes:**

<b>CLO 1</b>	Create simple web pages using HTML and CSS.
<b>CLO 2</b>	Design web forms with different input fields.
<b>CLO 3</b>	Apply CSS for styling and layout using Flexbox and Grid.
<b>CLO 4</b>	Build responsive web pages with media queries and animations.
<b>CLO 5</b>	Understand web hosting, domain names, and website deployment.

- g. **Teaching & Examination Scheme:**

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
<b>3</b>	<b>0</b>	<b>2</b>	<b>4</b>	<b>20</b>	<b>20</b>	<b>20</b>	<b>60</b>	<b>30</b>	<b>150</b>

L- Lectures; T- Tutorial; P- Practical; C- Credit; MSE- Mid-Semester Evaluation, CE- Continuous Evaluation, ESE- End Semester Examination

## h. Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1	<b>Introduction to HTML &amp; CSS</b> Introduction to HTML (History, evolution, What is HTML? Why it is use? )HTML Page Structure with basic HTML tag (Html, Title, Link, Head, Body) Introduction to CSS (What is CSS, Why it is use? , Syntax)Types of CSS (Inline, Internal, External)	11%	6
2	<b>HTML Elements &amp; Forms</b> Headings, Paragraphs, Lists (ordered , unordered, descriptive), and Tables (table, <tr>, <td>, <th> ,<thead>,<tbody>,<tfoot>) Forms and Input Fields (input, label, button, click events, methods, prompt, alert, confirm, radio button , checkbox, text-area, date, select, option, text, email, password, number) HTML5 Semantic Elements (header, footer, navigation, section, article, container, div, aside) Multimedia Elements (Images, Audio, Video)	26%	12
3	<b>CSS Basics &amp; Styling</b> Selectors and Properties (elements, class, id, hover, active) Box Model & Layout Techniques (content, padding, margin, border, height, width, display, visibility, overflow) Colors, Fonts, and Backgrounds (font-family, font-style, font-size, font-weight) CSS Flexbox and Grid (justify-content, align-items, flex-wrap, flex-direction, grid-template rows, grid-template columns, gap ) CSS positions and indexes (fixed, absolute, relative, static, z-index).	26%	12
4	<b>Responsive Web Design &amp; Advanced CSS</b> Media Queries for Responsive Design, CSS Transitions and Animations (transition property, duration, timing-function, delay, animation-name, iteration-count, direction).CSS Variables & Advanced Styling (shadow, gradient, border-radius).Templates (Pre-defined template, How to use it?)	26%	12
5	<b>Introduction to Web Deployment (Theory Only)</b> What is Web Hosting? Domain Names & Hosting Services .Overview of Deployment Methods. How websites are published online. Students learn about web hosting, domain names, DNS, and different deployment methods using platforms like GitHub Pages or Netlify. Basic version control and SEO considerations are also introduced.	11%	6

## i. Text Book and Reference Book:

1. "HTML and CSS: Design and Build Websites" by Jon Duckett

2. JavaScript and JQuery: Interactive Front-End Web Development – Jon Duckett
3. Learning Web Design: A Beginner's Guide to HTML, CSS, JavaScript, and Web Graphics  
By Jennifer Niederst Robbins
4. Responsive Web Design with HTML5 and CSS – Ben Frain
5. Web Design with HTML, CSS, JavaScript and jQuery Set – Jon Duckett  
HTML5 and CSS3 All-in-One For Dummies – Andy Harris

**j. List of Experiments:**

Sr. No.	Experiment List
1	<ol style="list-style-type: none"> <li>1. Create a simple webpage using headings and paragraphs</li> <li>2. Use to for heading</li> <li>3. Write at least 3 meaningful paragraphs using the tag</li> </ol>
2	<ol style="list-style-type: none"> <li>1. Add links and images to a webpage</li> <li>2. Use the tag to add hyperlinks (external and internal).</li> <li>3. Use the tag to display an image from your computer or a URL.</li> </ol>
3	<ol style="list-style-type: none"> <li>1. Make lists and tables in HTML</li> <li>2. Create an ordered list and an unordered list.</li> <li>3. Design a table with rows and columns using , , , ..</li> </ol>
4	<ol style="list-style-type: none"> <li>1. Create a registration form</li> <li>2. Include fields like Name, Email, Gender, Date of Birth, and Submit button.</li> <li>3. Use appropriate form elements: , , , etc.</li> </ol>
5	<ol style="list-style-type: none"> <li>1. Use semantic HTML elements</li> <li>2. Build a layout using , , , , and .</li> </ol>
6	<ol style="list-style-type: none"> <li>1. Apply CSS styles to HTML elements</li> <li>2. Use tag, class (className), and ID (#idName) selectors.</li> <li>3. Change text color, background color, margins, and padding.</li> </ol>
7	<ol style="list-style-type: none"> <li>1. Understand and use the box model</li> <li>2. Apply padding, borders, and margins to elements.</li> <li>3. Use width and height properties to control size.</li> </ol>
8	<ol style="list-style-type: none"> <li>1. Create a navigation bar using Flexbox</li> </ol>

	<ol style="list-style-type: none"><li>2. Use CSS Flexbox to arrange menu items horizontally.</li><li>3. Add hover effects and spacing between items</li></ol>
9	<ol style="list-style-type: none"><li>1. Make a responsive layout using CSS Grid</li><li>2. Use grid to create a two-column layout.</li><li>3. Adjust grid layout for different screen sizes using media queries.</li></ol>
10	<ol style="list-style-type: none"><li>1. Make your webpage work on all screen sizes</li><li>2. Use responsive units like %, vw, vh, em, and rem.</li><li>3. Use media queries to adapt layout for mobile, tablet, and desktop</li></ol>
11	<ol style="list-style-type: none"><li>1. Add hover effects and simple animations</li><li>2. Use the :hover pseudo-class to style elements on mouse-over.</li><li>3. Create a simple animation using @keyframes and transition.</li></ol>
12.	<ol style="list-style-type: none"><li>1. Create a simple webpage with internal and external CSS</li><li>2. Write internal CSS in</li></ol>
13.	<ol style="list-style-type: none"><li>1. Add audio and video to a webpage</li><li>2. Use and tags with controls, autoplay, and loop.</li></ol>
14.	<ol style="list-style-type: none"><li>1. Build a simple personal portfolio website</li><li>2. Include sections like About Me, Skills, Projects, and Contact.</li><li>3. Add navigation and media (images, links, icons).</li></ol>

- a. **Course Name:** Prompt Engineering
- b. **Course Code:** 03014601ES01
- c. **Prerequisite:** Basic computer literacy; familiarity with any programming language
- d. **Rationale:** This course introduces students to the principles and practices of Prompt Engineering for Large Language Models (LLMs) and Generative AI systems. Students will learn how to design, refine, and evaluate prompts to achieve desired outputs across various domains including code generation, education, data analysis, and content creation. The course combines theoretical understanding with extensive hands-on practice through laboratory sessions.
- e. **Course Learning Objective:**

<b>CLOBJ 1</b>	To explain the fundamentals of artificial intelligence, large language models, generative AI, and the principles of prompt engineering.
<b>CLOBJ 2</b>	To apply core prompting techniques and prompt design strategies for generating accurate, structured, and context-aware AI responses.
<b>CLOBJ 3</b>	To develop advanced prompting workflows using reasoning, chaining, meta-prompting, and retrieval-augmented generation techniques.
<b>CLOBJ 4</b>	To demonstrate domain-specific applications of prompt engineering while evaluating ethical, responsible, and effective use of AI systems.

f. **Course Learning Outcomes:**

<b>CLO 1</b>	Demonstrate proficiency in designing effective prompts for various LLM applications
<b>CLO 2</b>	Apply appropriate prompting techniques based on task requirements
<b>CLO 3</b>	Evaluate and iterate on prompt designs to improve output quality
<b>CLO 4</b>	Understand the ethical implications and limitations of generative AI
<b>CLO 5</b>	Build practical applications leveraging prompt engineering principles

g. **Teaching & Examination Scheme:**

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
2	-	2	3	20	20	20	60	30	150

L- Lectures; T- Tutorial; P- Practical; C- Credit; MSE- Mid-Semester Evaluation, CE- Continuous Evaluation, ESE- End Semester Examination

**h. Course Content:**

Sr. No.	Content	Weightage	Teaching Hours
1	<p><b>Foundations of AI &amp; Prompt Engineering</b></p> <p>Introduction to AI, LLMs, and Generative AI - Overview of artificial intelligence, introduction to large language models, and understanding generative AI systems at a high level.</p> <p>Evolution of Language Models - Historical progression from rule-based systems to modern transformer-based models like GPT.</p> <p>What is Prompt Engineering - Definition, importance, and real-world applications of prompt engineering across industries.</p> <p>Anatomy of a Prompt - Understanding prompt components: instruction, context, input data, and output format specifications.</p> <p>Types of Prompts - Classification of prompts: open-ended, instructional, conversational, and role-based prompts.</p> <p>How LLMs Generate Responses - Technical overview of tokens, temperature, top-p sampling, and other generation parameters.</p>	20	6
2	<p><b>Core Prompting Techniques</b></p> <p>Zero-Shot Prompting - Techniques for asking questions without providing examples.</p> <p>One-Shot and Few-Shot Prompting - Guiding model behavior through strategic use of examples. Chain-of-Thought (CoT) Prompting - Eliciting step-by-step reasoning from language models.</p> <p>Instruction-Based Prompting - Imperative framing techniques and achieving clarity in instructions. Role Prompting - Assigning personas and roles to models for context-appropriate responses.</p> <p>Contextual Prompting - Providing background information for enhanced output quality. Negative Prompting - Specifying what the model should avoid in its responses.</p> <p>Iterative Prompting - Refining outputs through systematic follow-up instructions.</p>	27	8
3	<p><b>Prompt Design Principles</b></p> <p>Clarity and Specificity - Understanding why vague prompts fail and techniques for precise prompt construction.</p> <p>Constraints and Format Control - Requesting specific output formats: JSON, bullet points, tables, word limits.</p> <p>Decomposing Complex Tasks - Breaking large requests into manageable sub-prompts for better results. Prompt Chaining - Sequential prompting where output from one prompt feeds into the next.</p> <p>Managing Hallucinations - Detection strategies and mitigation techniques for factual inaccuracies. Bias in LLM Outputs - Recognizing and reducing unintended bias in model responses.</p>	20	6

4	<p><b>Advanced Prompting Strategies</b></p> <p>Tree of Thoughts (ToT) Prompting - Exploring multiple reasoning paths for complex problem-solving. ReAct Prompting - Combining reasoning and action steps in prompt design.</p> <p>Self-Consistency Prompting - Sampling multiple outputs and selecting optimal responses. System Prompts and Meta-Prompting - Configuring model behavior at a higher architectural level.</p> <p>Retrieval-Augmented Generation (RAG) Concepts - Introduction to combining prompts with external knowledge sources.</p>	17	5
5	<p><b>Domain-Specific Applications</b></p> <p>Prompt Engineering for Code Generation - GitHub Copilot-style prompting techniques and AI-assisted debugging.</p> <p>Prompt Engineering for Education - Quiz generation, lesson planning, and educational explanation prompts.</p> <p>Prompt Engineering for Data Analysis - Using LLMs for data interpretation, SQL generation, and chart creation.</p> <p>Prompt Engineering for Content Creation - Professional writing: blogs, emails, summarization, and translation tasks.</p>	13	4
6	<p><b>Evaluation, Ethics &amp; Capstone</b></p> <ul style="list-style-type: none"> <li>Evaluation, Ethics, and Responsible AI - Metrics for prompt quality assessment (accuracy, relevance, coherence); prompt versioning and documentation; ethical considerations including prompt injection risks.</li> </ul>	3	1

**i. Text Book and Reference Book:**

- Alto, V. (2024). *Building LLM Apps*. Packt Publishing.  
Useful for advanced modules on RAG and chaining techniques.
- Foster, D. (2023). *Generative Deep Learning* (2nd ed.). O'Reilly Media. Provides strong theoretical background on how LLMs work.
- Taulli, T. (2024). *AI-Assisted Programming*. O'Reilly Media. Excellent companion for code generation practical labs.
- Hunter, N. (2023). *The Art of Prompt Engineering with ChatGPT*.  
Clear, accessible introduction suitable for both technical and non-technical learners.
- Phoenix, J., & Taylor, M. (2024). *Prompt Engineering for Generative AI*. O'Reilly Media.  
Best beginner-friendly textbook covering all core techniques with practical examples.

j. Experiment List:

Sr. NO.	Experiment List
1	<b>Interface Exploration Lab</b> Hands-on exploration of ChatGPT/Gemini interfaces; experimentation with different prompt types and observation of output variations by changing temperature and phrasing.
2	<b>Zero-Shot vs Few-Shot Comparison Lab</b> Comparative analysis of same tasks using different prompting strategies; evaluation of output quality across approaches.
3	<b>Chain-of-Thought Lab</b> Application of CoT prompting to mathematical problems, logical puzzles, and step-by-step reasoning tasks.
4	<b>Role Prompting Lab</b> Development of specialized agents: customer support bot, educational tutor, and code reviewer using role-based prompts.
5	<b>Format Control Lab</b> Generation of outputs in multiple structured formats: JSON, Markdown, HTML, and tabular representations.
6	<b>Prompt Chaining Lab</b> Building a 3-step pipeline: outline generation → draft creation → summarization for a research topic.
7	<b>Hallucination Detection Lab</b> Identification of factual errors in LLM responses and crafting prompts that minimize hallucinations.
8	<b>ToT and Self-Consistency Lab</b> Complex decision-making scenarios with multiple solution paths and consistency verification
9	<b>System Prompt Design Lab</b> Building a domain-specific assistant (e.g., coding tutor) using system-level instructions.
10	<b>Code Generation Lab</b> Writing Python functions, debugging code, and generating unit tests using prompt engineering.
11	<b>Education Content Lab</b> Generation of multiple-choice questions, lesson plans, and concept explanations for computer science topics.
12	<b>Data Analysis Lab</b> Using LLMs to write SQL queries and interpret dataset descriptions.
13	<b>Content Creation Lab</b> Drafting professional emails, blog posts, and summaries using prompt templates.
14	<b>Prompt Evaluation Lab</b> Creation of scoring rubrics and comparison of five different prompting strategies on identical tasks.
15	<b>Capstone Project</b> End-to-end project where students design a prompt-based application (e.g., interview prep bot, course assistant, code reviewer), document design decisions, and present results.

a. **Course Name:** Calculus

a. **Course Code:** 03019101BS01

b. **Prerequisite:** Basic concepts of Calculus

c. **Rationale:** Calculus is the branch of mathematics that deals with continuous change. Calculus is also called infinitesimal calculus or “the calculus of infinitesimals”. The meaning of classical calculus is the study of continuous change of functions. Most of these quantities are the functions of time such as velocity is equal to change in distance with respect to time.

d. **Course Learning Objective:**

<b>CLOBJ 1</b>	Understand the consequences of various mean value theorems and fundamental theorems of calculus.
<b>CLOBJ 2</b>	Apply multivariable calculus techniques for optimization and partial differentiation problems.
<b>CLOBJ 3</b>	Solve problems involving double and triple integration for area and volume calculations.
<b>CLOBJ 4</b>	Analyze line, surface, and volume integrals using vector calculus.
<b>CLOBJ 5</b>	Apply Green’s, Gauss’s, and Stokes’ theorems in engineering and mathematical applications.

e. **Course Learning Outcomes:**

<b>CLO 1</b>	Understand the consequences of various mean value theorems for differentiable functions.
<b>CLO 2</b>	Apply the concept of Multivariate calculus in optimization problems.
<b>CLO 3</b>	Apply the concept of multiple integration in problems.
<b>CLO 4</b>	Analyze Inter-relationship amongst the line integral, double and triple integral formulations.
<b>CLO 5</b>	Realize importance of Green, Gauss and Stokes’ theorems in other branches of mathematics.

f. **Teaching & Examination Scheme:**

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
4	-	-	4	20	20	-	60	-	100

L- Lectures; T- Tutorial; P- Practical; C- Credit; MSE- Mid-Semester Evaluation, CE- Continuous Evaluation, ESE- End Semester Examination

**g. Course Content:**

<b>Sr. No.</b>	<b>Topics</b>	<b>Weightage</b>	<b>Teaching Hours</b>
1	Application of Functions of One Variable Review of the function of one variable, limit, continuity, and Differentiability, mean value theorems and applications, Riemann integration, fundamental theorem of calculus, application to length, area, volume, and surface area of revolution.	25%	15
2	Multivariate Calculus Functions of several variables, limit and continuity, partial derivatives and differentiability, composite functions, chain rule, implicit functions, Euler's theorem, Taylor's expansion, Jacobian, maxima and minima, method of Lagrange multipliers..	25%	15
3	Multiple Integration Double integration, change of order, change into polar form, application to area and volume..	20%	12
4	Vector Calculus Vector-valued function, velocity and acceleration, the gradient of a scalar function, directional derivatives, divergence and curl of a vector-valued function. Parameterization of curves and surfaces, vector fields, line integrals, Green's theorem, surface integrals, Gauss divergence theorem and Stokes' theorems with applications.	30%	18

**h. Text Book and Reference Book:**

1. Calculus and Analytic Geometry, (TextBook) By G. B. Thomas, Jr. and R. L. Finney, | Pearson India.
2. Calculus, By Ron Larson, Bruce Edwards, | Cengage Learning
3. Calculus: Early Transcendentals, By James Stewart, | Brooks/Cole.
4. Calculus, By Tom M Apostol, | Wiley Publication

a. **Course Name:** Object Oriented Programming with Java

b. **Course Code:** 03010802ES03

c. **Prerequisite:** The practical component reinforces Core Java concepts through hands-on programming. It helps students apply OOP, collections, exception handling, file I/O, multithreading, and Java 8 features to solve real-world problems, preparing them for advanced development and industry roles.

d. **Course Learning Outcomes:**

<b>CLO 1</b>	Explain Java architecture, JVM working, and program execution process.
<b>CLO 2</b>	Apply core programming constructs including data types, control statements, and operators.
<b>CLO 3</b>	Implement object-oriented programming concepts to design modular applications
<b>CLO 4</b>	Utilize collections, exception handling, file I/O, and multithreading in application development

e. **Teaching & Examination Scheme:**

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
3	0	2	4	20	20	20	60	30	150

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f. **Course Content:**

Sr. No.	Content	Weightage	Teaching Hours
1	<b>Java Basics, JVM &amp; Syntax</b> History and features of Java, JDK vs JRE vs JVM, compilation and execution flow. JVM basics (class loading, memory areas). Basic syntax: data types, variables, operators, input (Scanner), control flow (if/switch, loops). Simple console programs.	12	5
2	<b>Core OOP Concepts in Java</b> Defining classes and objects, constructors, this and super, encapsulation with getters/setters. Inheritance (single, multilevel), method overloading and overriding, runtime		

Sr. No.	Content	Weightage	Teaching Hours
	polymorphism, abstract classes and interfaces. Access modifiers and packages basics. UML-style thinking for class design.	20	5
3	<b>Arrays, Strings &amp; Basic I/O</b> Working with 1D and 2D arrays for data storage and algorithms. Strings in Java (String, StringBuilder), immutability, common string methods. Basic file and console I/O use-cases (reading input, printing formatted output). Simple problems using arrays and strings.	16	5
4	<b>Exception Handling &amp; Debugging</b> Types of errors, exceptions vs errors. try-catch-finally, multiple catch blocks. Checked vs unchecked exceptions, throws, creating simple custom exceptions. Exception propagation and basic debugging using stack traces and IDE tools.	16	5
5	<b>Introduction to Collections</b> Need for collections vs arrays. Introduction to List and Set with ArrayList and HashSet. Iteration using for-each and Iterator. Basics of Map with HashMap (key-value access). Generics at a basic level (List<String>, List<Integer>). When to choose which collection.	20	5
6	<b>Java Multithreading</b> Introduction to concurrency and multithreading, Thread creation (Thread class, Runnable interface), Thread lifecycle and states, Thread methods (start, run, sleep, join, interrupt), Thread priorities and daemon threads, Synchronization (synchronized keyword)	16	5

**g. Text Book and Reference Book:**

1.	Herbert Schildt, Java: The Complete Reference, McGraw-Hill.
2.	<b>Cay S. Horstmann, Core Java – Volume I &amp; II, Pearson.</b>
3.	<b>Joshua Bloch, Effective Java, Addison-Wesley.</b>
4.	<b>Kathy Sierra &amp; Bert Bates, Head First Java, O'Reilly.</b>

## h. Experiment List:

List of Practicals	W - Weightage (%) , T - Teaching hours
1	<b>JVM &amp; Basic Program Structure</b> Write a simple Java program to display student details and explain the compilation and execution process of a Java program through comments.
2	<b>Control Statements &amp; Number Logic</b> Develop a Java program that uses conditional and looping statements to implement a menu-driven calculator and generate number-based patterns such as prime numbers and Fibonacci series.
3	<b>Class, Object &amp; Constructors</b> Design a BankAccount class with appropriate data members and methods to perform deposit and withdrawal operations using constructors and access modifiers.
4	<b>Inheritance &amp; Polymorphism</b> Create a base class Employee and derive Manager and Developer classes to demonstrate method overriding and runtime polymorphism for salary calculation.
5	<b>Interfaces &amp; Abstraction Using Packages</b> Implement an interface Payment and create multiple payment mode classes to demonstrate abstraction, interface implementation, and package usage.
6	<b>Arrays &amp; String Manipulation</b> Write a Java program to perform operations on arrays and strings, including sorting an array, reversing a string, and demonstrating string immutability.
7	<b>Exception Handling &amp; Custom Exception</b> Develop a banking application that throws a custom InsufficientBalanceException when withdrawal amount exceeds available balance, using proper exception handling mechanisms.
8	<b>Java Collections Framework</b> Create a Student class and use ArrayList, HashSet, and HashMap to store, sort, and manage student records using Comparable and Comparator interfaces.
9	<b>File Handling &amp; Serialization</b> Write a Java program to store student details in a file, read the data back, and demonstrate object serialization and deserialization.
10	<b>Multithreading &amp; Java 8 Features</b> Develop a multithreaded Java application using Thread and Runnable, synchronize shared resources, and use Lambda expressions and Stream API to process collections.



3	0	2	4	20	20	20	60	30	150
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L- Lectures; T- Tutorial; P- Practical; C- Credit; MSE- Mid-Semester Evaluation, CE- Continuous Evaluation, ESE- End Semester Examination

#### h. Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1	INTRODUCTION TO 'C' PROGRAMMING What is C language, History of C language, Application areas of C, Features of C language, structure of C Program, execution flow of program, reading a character, writing a character, formatted input, formatted output functions.	10%	8
2	CONSTANTS, VARIABLES, DATA TYPES, OPERATORS AND EXPRESSIONS Constants, Variables, Data Types: Character Set, C tokens, Keywords and Identifiers, Constants, Variables, Data types, Declaration of Variables, Assigning values to variables, typedef, and Defining symbolic constants. Operators and Expression: Introduction to Operators and its types, Evaluation of expressions, Precedence of arithmetic operators, Type conversions in expressions, Operator precedence and associativity	15%	5
3	CONTROL STRUCTURES IN C Decision Making & branching: Decision making with If & If .. Else statements, If .. Else statements (Nested .... Ladder), The Switch, The break statement & goto statements, The ternary (?:) Operator Looping: The while statement, & The Do.. While loop, The FOR loop, Jump within loops – Programs	15%	4
4	ARRAYS AND STRINGS Arrays: Introduction, One-dimensional array, Two-dimensional array, Concept of Multidimensional arrays. Strings: String declaration, storage, Built-in-string functions.	20%	7
5	USER-DEFINED FUNCTIONS, STRUCTURE AND UNIONS User-Defined Functions: Concepts of user defined functions, prototypes, definition of function, parameters, parameter passing, calling a function, recursive function, Macros, Pre-processing.	20%	10

Sr. No.	Content	Weightage	Teaching Hours
	Structure and Unions: Introduction, Structure definition, declaring and initializing Structure variables, Accessing Structure members, Copying & Comparison of structures, Arrays of structures, Arrays within structures, Structures within Structures, Structures and functions, Unions		
6	<p>POINTERS, DYNAMIC MEMORY ALLOCATION AND FILE MANAGEMENT IN C</p> <p>Pointers: Basics of pointers, pointer to pointer, pointer and array, Pointer to array, array of pointers , functions returning pointers</p> <p>Dynamic memory allocation: Introduction to Dynamic memory allocation, malloc(), calloc(), free(), realloc().</p> <p>File Management in C: Introduction and standard file handling functions.</p>	20%	8

**i. Text Book and Reference Book:**

1. Programming in ANSI C (TextBook) By E. Balaguruswamy | Tata McGraw-Hill
2. C Programming: Test Your Skills By Ashok Kamthane Graphic Science and Design French, T.E. Vierck, C.J & Foster; Tata McGraw Hill Publications.
3. Computer Fundamentals By P.K.Sinha and Priti Sinha | BPB Publications | 4th Edition
4. Star C Programming STAR Certification | C Certification Exam
5. Programming with C By Byron Gottfried | Tata McGraw Hill Education
6. C The Complete Reference By Herbert Schildt
7. Let Us C By Yeshavant Kanetkar | BPB Publications

**j. Experiment List:**

Sr. No.	Experiment List
1	<p>Practical Set 1 (Basics)</p> <ol style="list-style-type: none"> <li>1. Write a program to print HELLO FRIENDS!</li> <li>2. Write a program that reads two nos. from key board and gives their addition, subtraction, multiplication, division and modulo.</li> <li>3. Write a program to calculate area of circle, use <math>\Omega</math> as symbolic constants.</li> <li>4. Write a program to convert days into months and days.</li> </ol>

	<p>5. Write a program which calculates the summation of three digits from the given 3 digit number.</p> <p>6. Write a program to demonstrate enumerates data type.</p> <p>7. Write a program to compute Fahrenheit from centigrade.</p> <p>8. Write a program to calculate simple interest.</p> <p>9. Read the price of item in decimal form e.g. 12.50 and separate Rs and Paise from the given value e.g. 12 rupees and 50 paise</p>
2	<p>Practical Set 2 (Control Structures)</p> <p>1. Write a program to find the largest of the three nos. using Nested-If-Else statement.</p> <p>2. Write a C program to enter a character and to check whether it is a small letter or it is a capital letter or it is a digit or it is a special symbol.</p> <p>3. Write a program to read marks from keyboard and your program should display equivalent grade according to following table.</p> <p>Marks Grade</p> <p>100-80 Dist</p> <p>60-79 First Class</p> <p>35-59 Second Class</p> <p>0-34 Fail</p> <p>1. Write a program to read marks of a student from keyboard whether the student id pass (if).</p> <p>2. Write a program to find the sum of first N odd numbers.</p> <p>3. Write a program using while loop construct which finds the factorial of a given integer number.</p> <p>4. Write a C program using do...while and for loop constructs to reverse the digits of the number.</p> <p>5. Write a program to demonstrate use of Switch- Break Statement.</p> <p>6. Write a program to find out all the numbers divisible by 5 and 7 between 1 to 100.</p> <p>Check for Armstrong number. A number is Armstrong if sum of cube of every digit is same as the original number. E.g. <math>153=1^3+5^3+3^3=153</math></p> <p>1. Write a program to print the output of bellow series. <math>1!+2!+3!+4!+. \dots n!</math></p> <p>2. Write a program to print the following outputs using for Loop.</p> <p>(a) 1 (b) *12 **</p> <p>123 ***</p> <p>3. Write a program to print the following outputs using for Loop.</p> <p>(a) 1 (b) 321</p>

	21 21 321 1
3	<p>Practical Set 3 (Array &amp; Strings)</p> <ol style="list-style-type: none"> <li>1. Write a program which sorts 10 numbers into ascending order.</li> <li>2. Write a program to find maximum element from 1-D array.</li> <li>3. Write a program to find number of odd and even elements from the 1-D array.</li> <li>4. Write a program add two 2x2 matrices.</li> <li>5. Write a program to count number of positive, negative and zero elements from 3x3 matrix.</li> <li>6. Write a function for the following operations on string: Copy one string to another Comparing two strings Adding a string to the end of another.</li> </ol> <ol style="list-style-type: none"> <li>1. Write a program to count vowels from a entered String.</li> <li>2. Write a program which finds whether a string is a palindrome or not.</li> </ol>
4	<p>Practical Set 4 (Functions)</p> <ol style="list-style-type: none"> <li>1. Write a program to find factorial of a number using recursion.</li> <li>2. Write a program that used user defined function Swap ( ) and interchange the value of two variable.</li> <li>3. Write a function to return 1 if the number is prime otherwise return 0.</li> </ol>
5	<p>Practical Set 5 (Structures)</p> <ol style="list-style-type: none"> <li>1. Define a structure type, personal that would contain person name, date of joining and salary.</li> <li>2. Define a structure called cricket that will describe the following information: Player name Team name Batting average</li> </ol>
6	<p>Practical Set 6 (Pointers)</p> <ol style="list-style-type: none"> <li>1. Write a program to add two numbers using pointers.</li> <li>2. Write a program to swap two numbers using pointer</li> </ol>
7	<p>Practical Set 7 (File Management)</p> <ol style="list-style-type: none"> <li>1. Write a program to illustrate reading files contents.</li> <li>2. Write a program to illustrate the use of fgets( )</li> </ol>

- a. **Course Name:** Physics of Semiconductors
- b. **Course Code:** 03019201BS01
- c. **Prerequisite:** Knowledge of Physics and some basic concepts in Mathematics like differentiation, integration, limit, differential equation, vector calculus up to 12th science level.
- d. **Rationale:** Knowledge of physics is essential for all Engineering branch because physics is the foundation subject of all the branches of engineering and it develops scientific temperament and analytical capability of engineering students. Comprehension of basic physics concepts enables the students to solve engineering problem logically and develop scientific approach.
- e. **Course Learning Objective:**

<b>CLOBJ 1</b>	Understand semiconductor materials using band theory concepts.
<b>CLOBJ 2</b>	Explain principles of optoelectronic devices and optical fibers.
<b>CLOBJ 3</b>	Understand the fundamentals of quantum mechanics and quantum computing.
<b>CLOBJ 4</b>	Analyze low-dimensional and nanomaterials with their applications.
<b>CLOBJ 5</b>	Develop knowledge of semiconductor-based modern technologies.

f. **Course Learning Outcomes:**

<b>CLO 1</b>	To conceptualize semiconducting materials on the basis of band theory..
<b>CLO 2</b>	To get familiar with optical fibres and semiconductor based optoelectronic devices useful in fibre optic system.
<b>CLO 3</b>	To conceptualize the foundational principles of quantum Physics and their role in quantum computing.
<b>CLO 4</b>	Formulate and conceptualize various theoretical aspects and the physical phenomena at Low dimensional level (nano)

g. **Teaching Scheme:**

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
3	0	2	4	20	20	20	60	30	150

L- Lectures; T- Tutorial; P- Practical; C- Credit; MSE- Mid-Semester Evaluation, CE- Continuous Evaluation, ESE- End Semester Examination

#### **h. Course Content:**

<b>Sr. No.</b>	<b>Content</b>	<b>Weightage</b>	<b>Teaching Hours</b>
1	<b>BAND THEORY &amp; SEMICONDUCTORS</b> Band structure of solid materials, E-k diagram, Direct and Indirect band gap, Effective mass, Concept of Fermi Energy, Density of state, Fermi Level in Intrinsic and Extrinsic Semiconductors, Ohmic and Schottky Junction	25%	11
2	<b>OPTOELECTRONICS</b> Interaction of radiation with Matter, Absorption, Spontaneous and Stimulated emission, Characteristics of Lasers, Diode Laser, LED, Photodiode and their applications. Principle and Structure of Optical Fiber, Numerical Aperture of fiber, Types of Optical Fibers, Attenuation in Optical Fibers, Applications of Optical Fibers	25%	11
3	<b>QUANTUM MECHANICS &amp; QUANTUM COMPUTING</b> Quantum postulates, wave function, Schrodinger's equation time dependent, independent (No derivation), One dimensional potential well, quantum tunneling and its application in soft computing Key Principles of Quantum Computing, Difference between classical and quantum computing, Quantum Computing advantages Challenges and Application.	30%	13
4	<b>LOW DIMENSIONAL MATERIALS</b> Basic characteristic including synthesis, properties, quantum confinement, classification: Quantum Dot, Quantum well, Quantum Wire and their applications, Novel Materials and their applications.	20%	10

#### **i. Text books:**

1. Physics of Semiconductor Devices (TextBook) By S. M. Sze and K. N. Kwok | John Wiley & Sons
2. J emiconductor Optoelectronic Devices By P. Bhattacharya | Prentice Hall of India, Pub. Year 1997.
3. Engineering Physics (TextBook) By B.K.Pandey S Chaturvedi and M. Venkanna | - Cengage Publication
4. Semiconductor Optoelectronics (TextBook) By J. Singh | McGraw-Hill Inc, Pub. Year 1995

**j. Experiment List**

<b>Sr. No</b>	<b>Experiment List</b>
1	I -V characteristics of light emitting diode in forward bias.
2	I-V characteristics of Zener diode in reverse bias.
3	Determination of Velocity of ultrasonic waves in water.
4	Determination of Dielectric constants of Dielectric samp
5	Measurement of Band gap of semiconductor material
6	Measurement of Hall coefficient and carrier concentration in semiconductor material
7	Measurement of Planck's constant using LED
8.	Measurement of wavelength of laser light using diffraction grating.
9.	Measurement of Numerical aperture of an optical Fiber.
10.	Determination of the size of lycopodium powder particles.
11.	Measurement of power loss in an optical fibre.
12.	Moment of Inertia of a flywheel.
13.	Young's Modulus by bending of beam.

- a. **Course Name:** Principles of Communication Skills
- b. **Course Code:** 03010001HM01
- c. **Prerequisite:** Knowledge of English Language studied till 12th standard
- d. **Rationale:** : Basic Communication Skills are essential for all Engineers.
- e. **Course Learning Objective:**

<b>CLOBJ 1</b>	Understand the fundamental grammatical structures including parts of speech, punctuation, tenses, phrases, clauses, determiners, Quantifiers, sentence types, and basic concepts of phonetics (IPA symbols, speech sounds, stress, and intonation) for accurate and effective language use.
<b>CLOBJ 2</b>	Develop basic reading and listening comprehension skills by using appropriate strategies to understand simple texts and spoken content with improved pronunciation awareness.
<b>CLOBJ 3</b>	Organize and express ideas clearly in written form through picture-based perception activities.
<b>CLOBJ 4</b>	Build confidence and fluency in spoken communication through correct pronunciation practice, meeting and greeting activities, extempore speech, and everyday conversational exercises.
<b>CLOBJ 5</b>	Apply goal-setting and self-reflection techniques to monitor personal language learning progress, pronunciation improvement, and overall communication skills development.

**f. Course Learning Outcomes:**

<b>CLO 1</b>	Identify and explain parts of speech, punctuation marks, tenses, phrases, clauses, determiners, Quantifiers, sentence structures, and basic IPA phonetic symbols for accurate language use.
<b>CLO 2</b>	Demonstrate effective basic conversational exchanges and short extempore speeches using correct pronunciation, appropriate greetings, logical organization of ideas, and improved fluency.
<b>CLO 3</b>	Apply basic reading and listening strategies to comprehend short passages and spoken texts, recognizing appropriate pronunciation, stress, and intonation patterns.
<b>CLO 4</b>	Analyse personal communication performance and evaluate SMARTER goals through self-assessment and reflective practices to monitor language and pronunciation improvement.
<b>CLO 5</b>	Compose structured short picture-based perceptions by developing clear topic sentences, supporting details, and coherent conclusions with grammatical accuracy.

**g. Teaching & Examination Scheme:**

Teaching Scheme Hrs/Week			Credit	Examination Scheme					Total
Lec.	Tut.	Lab		Internal			External		
				T	CE	P	T	P	
0	0	2	1	-	-	20	-	30	50

**Lec.-** Lecture; **Tut.-** Tutorial; **T-** Theory; **P-** Practical; **CE-** Continuous Evaluation.

### h. Course Content

#### Lab (Practical)

Sr.	Content	Weightage	Teaching Hrs.	CO	BT
1	Parts of Speech, Punctuation and Tenses using time line <ul style="list-style-type: none"> <li>Overview of 8 parts of speech</li> <li>Basic punctuation marks and their usage</li> <li>Types: Present, Past, Future</li> <li>Forms and correct usage</li> <li>Common tense errors</li> </ul>	10%	4	1	1
2	Introduction to Phonetics-Symbols and Pronunciation <ul style="list-style-type: none"> <li>Introduction to Phonetics and IPA</li> <li>English Speech Sounds</li> <li>Stress and Intonation</li> </ul>	10%	4	1	1
3	Phrase and Clauses; Types of Sentence (Structure Wise) <ul style="list-style-type: none"> <li>Difference between phrases and clauses</li> <li>Classification of Simple, Compound &amp; Complex</li> <li>Interchange of Simple to Compound, Simple to Complex, Compound to Complex</li> </ul>	8%	2	1	1

4	<p>Picture Perception</p> <ul style="list-style-type: none"> <li>• Observing and interpreting images</li> <li>• Building a short story or description</li> <li>• Improving vocabulary and creativity</li> </ul>	14%	4	3,4	3,6
5	<p>Determiners and Quantifiers</p> <ul style="list-style-type: none"> <li>• Types of determiners</li> <li>• Order of determiners in a sentence</li> <li>• Quantifiers with countable and uncountable nouns</li> <li>• Common errors in the use of determiners and Quantifiers</li> </ul>	8%	2	3	6
6	<p>Meeting and Greeting (Initiating a conversation)</p> <ul style="list-style-type: none"> <li>• Basic conversation skill</li> <li>• Formal and informal greetings</li> <li>• Common phrases for starting interactions</li> </ul>	10%	4	4	2,3
7	<p>Reading Comprehension (Level of difficulty-Basic)</p> <ul style="list-style-type: none"> <li>• Types – Skimming &amp; Scanning</li> <li>• Reading short passages</li> <li>• Identifying main ideas and details</li> <li>• Answering basic questions</li> </ul>	10%	2	2	2
8	<p>Listening Comprehension</p> <ul style="list-style-type: none"> <li>• Listening to short audios/Conversation</li> <li>• Understanding and responding to key information</li> </ul>	8%	2	2	2
9	<p>Extempore Speech</p> <ul style="list-style-type: none"> <li>• Speaking on random topics</li> <li>• Organizing thoughts quickly</li> <li>• Improving fluency and confidence</li> </ul>	12%	4	4	3
10	<p>Goal Setting and Tracking</p> <ul style="list-style-type: none"> <li>• Setting SMARTER goals</li> <li>• Planning and tracking progress</li> <li>• Self-assessment and reflection</li> </ul>	10%	2	5	5
		<b>100%</b>	<b>30</b>		

**i. Reference Books:**

- Murphy, Raymond. *English Grammar in Use*. Cambridge University Press, 2019.
  - Swan, Michael. *Practical English Usage*. Oxford University Press, 2016.
  - Lewis, Norman. *Word Power Made Easy*. Goyal Publishers, 2014.
  - Raman, Meenakshi, and Sangeeta Sharma. *Communication Skills*. Oxford University Press, 2017.
  - Kaul, Asha. *Business Communication*. PHI Learning, 2014.
  - Lucas, Stephen E. *The Art of Public Speaking*. McGraw-Hill Education, 2015.
  - Bailey, Stephen. *Academic Writing: A Handbook for International Students*. Routledge, 2018.
1. Balasubramaniam, T. *A Textbook of English Phonetics for Indian Students*. Macmillan Publishers, 2012

## Semester-2

- a. Course Name:** Privacy and Security in Online Social Media
- b. Course Code:** 03M10002UE01
- c. Prerequisite:** Basic knowledge of social media, privacy and security.
- d. Rationale:** The course explores the fundamentals of Online Social Networks (OSNs), focusing on data collection, analysis, trust, security, and privacy.
- e. Teaching & Examination Scheme:**

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
3	0	0	3	20	20	-	60	-	100

L- Lectures; T- Tutorial; P- Practical; C- Credit; MSE- Mid-Semester Evaluation, CE- Continuous Evaluation, ESE- End Semester Examination

**f. Course Content:**

Sr. No.	Content	Weightage	Teaching Hours
1	<b>INTRODUCTION TO ONLINE SOCIAL NETWORKS</b> Definition and Evolution of Online Social Networks (OSNs), Data Collection from Social Networks, Challenges, Opportunities, and Pitfalls in OSNs, Social Media APIs for Data Extraction.	20%	8
2	<b>DATA COLLECTION AND ANALYSIS IN OSNS</b> Techniques for Collecting Data from Online Social Media, Ethical Considerations in Social Media Data Collection, Data Processing and Cleaning for Analysis, Case Studies on Social Media Data Collection.	20%	8
3	<b>TRUST, CREDIBILITY, AND REPUTATION IN SOCIAL SYSTEMS</b> Understanding Trust and Credibility in Online Communities, Reputation Systems and Their Impact on User	20%	8

Sr. No.	Content	Weightage	Teaching Hours
	Behavior, Detecting Misinformation and Fake News in OSNs, Methods for Enhancing Trustworthiness in Social Media.		
4	<p><b>SECURITY, PRIVACY, AND FRAUD DETECTION IN OSNS</b></p> <p>Online Social Media and Its Role in Law Enforcement &amp; Policing, Information Privacy: Disclosure, Revelation, and Its Effects, Phishing Attacks in OSNs and Their Countermeasures, Identifying Fraudulent Entities and Fake Profiles in OSNs.</p>	20%	8
5	<p><b>RESEARCH AND PRACTICAL APPLICATIONS</b></p> <p>Review and Discussion of Key Topics (Refresher), Analyzing Real-World OSN. Case Studies, Research Paper Discussions on Online Social Networks and Security, Future Trends in OSN Security and privacy</p>	20%	8

**g. Text Book and Reference Book:**

1. "Social Media Mining: An Introduction" – Reza Zafarani, Mohammad Ali Abbasi, Huan Liu: Provides a comprehensive
2. Mining the Social Web" – Matthew A. Russell: Covers data collection, analysis, and visualization techniques using Python and APIs from platforms like Twitter, Facebook, and LinkedIn..
3. Security and Privacy-Preserving Techniques in Social Networks" – Barbara Carminati & Elena Ferrari Explores security challenges, privacy risks, and trust management in online social networks..

- a. Course Name:** Indian Economy: Some Contemporary Perspectives
- b. Course Code:** 06M10102UE02 -
- c. Prerequisite:** Basic understanding of economic principles and macroeconomic concepts is recommended. Familiarity with the
- d. Rationale :** This course is designed to provide students with a comprehensive understanding of the Indian economy's evolution, key reforms, and current challenges.
- e. Course Learning Outcomes**

<b>CLO 1</b>	To critically assess the trajectory of India's economic development since independence and explain the impact of major sectoral reforms in agriculture and industry.
<b>CLO 2</b>	To evaluate the effectiveness of financial sector reforms, tax policies, and India's engagement with WTO regulations in promoting inclusive and sustainable economic growth.
<b>CLO 3</b>	3. To analyze the impact of recent policy shocks and government initiatives on the Indian economy and identify key challenges to future economic stability and growth.

**f. Teaching & Examination Scheme:**

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
3	0	0	3	20	20	-	60	-	100

L- Lectures; T- Tutorial; P- Practical; C- Credit; MSE- Mid-Semester Evaluation, CE- Continuous Evaluation, ESE- End Semester Examination

**g. Course Content:**

Sr. No.	Content	Weightage	Teaching Hours
1	Module I Indian economy since independence; analysis of the pre- and post-reform periods of India's economic growth and development; Assessment of agriculture sector	40%	18

	reforms; industrial reforms in a mixed economic set up and tracing the contours of liberalization and self-reliance.		
2	Module 2 Socio-economic development and tax reforms; Financial sector reforms and financial inclusion; Indian banking sector crisis and recent developments.	40%	18
3	Module 3 India and WTO regulations: Inward and outward analysis; Structural shocks and analysis of recent policy initiatives; Indian economy: Recent outlook and challenges.	20%	9

- a. Course Name:** Design, Technology and Innovation
- b. Course Code:** 03M10002UE02
- c. Prerequisite:** Zeal to learn the subject.
- d. Rationale:** Design, Technology, and Innovation (DT&I) subject's lies in equipping students with the skills to be creative problemsolvers and innovators in a rapidly evolving world. These subjects foster critical thinking, creative exploration, and the ability to translate ideas into tangible solutions, preparing students for future careers and societal challenges.
- e. Course Learning Outcomes:**

<b>CLO 1</b>	Apply design thinking methodologies to identify and solve user-centered problems.
<b>CLO 2</b>	Demonstrate creative thinking and effective ideation strategies.
<b>CLO 3</b>	Develop low-fidelity and high-fidelity prototypes and understand fabrication challenges.
<b>CLO 4</b>	Incorporate engineering principles into design and innovation.
<b>CLO 5</b>	Communicate ideas visually through sketching and graphical tools.
<b>CLO 6</b>	Understand the fundamentals of entrepreneurship and the startup process.

**f. Teaching & Examination Scheme:**

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
3	-	-	4	20	20	-	60	-	100

L- Lectures; T- Tutorial; P- Practical; C- Credit; MSE- Mid-Semester Evaluation, CE- Continuous Evaluation, ESE- End Semester Examination

**g. Course Content:**

Sr. No.	Content	Weightage	Teaching Hours
1	<b>Design Thinking and Methodologies</b> Introduction to Design Thinking: Understanding the design process, user needs, and problem definition. <b>Design Process:</b> Exploring different design methodologies, including brainstorming, sketching, and prototyping.	30 %	12

Sr. No.	Content	Weightage	Teaching Hours
	<p><b>Human and Culture Centered Design:</b> Focusing on user needs, ergonomics, and user experience. Design for Social and Life style change. Concept Generation and Evaluation: Developing and evaluating design concepts through various techniques.</p>		
2	<p><b>Technology and its Role in Design</b>  <b>Technology for Design:</b> Exploring how technology enables and enhances the design process.  <b>Specific Technologies:</b> Relevant areas like CAD and Graphics software, 3D printing, Machining technologies, digital fabrication, and other relevant technology. Innovation in Emerging Technologies and methods like AR/VR, IOT, AI and ML, Supply Chain Management and Project Management.  <b>Technology to Solution:</b> Understanding how technology can be leveraged to solve real-world problems.  <b>Engineering Aspect of design</b> Electrical, Mechanical, Design, Material, Aspect, Safety and Reliability aspect, Sustainable and Eco friendly materials.</p>	35 %	16
3	<p><b>Innovation and Entrepreneurship:</b>  <b>Introduction to Innovation:</b> Understanding the principles of innovation and its role in product development. Role of Innovation in Life and Society  <b>Grassroots Innovation:</b> Learning from innovative solutions developed at the community level.  <b>Collaborative Innovation:</b> Exploring how different individuals and teams can collaborate to drive innovation.  <b>Intellectual Property:</b> Learning about patents, copyrights, and other forms of intellectual property. Business Model Development: Exploring how to develop a business model for a new product or service.  <b>Entrepreneurship:</b> Fundamentals of starting a business and the challenges and opportunities of entrepreneurship.</p>	35%	16

- a. Course Name:** Intellectual Property
- b. Course Code:** 06M10502UE03
- c. Prerequisite:** A basic understanding of business, innovation, or creativity-related fields will be helpful.
- d. Rationale:** The course aims to empower future managers, entrepreneurs, and innovators to make informed IP-related decisions
- e. Course Learning Outcomes:**

<b>CLO 1</b>	To identify different forms of IP, understand their role in value creation, and analyze real-world examples of patents, trademarks, and copyrights.
<b>CLO 2</b>	To evaluate unconventional IPs, assess enforcement mechanisms, and apply business strategies to monetize intellectual assets.
<b>CLO 3</b>	To analyze the role of IP in research institutions and creative industries and assess the importance of policy and education in strengthening the IP framework.

**f. Teaching & Examination Scheme:**

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
3	-	-	3	20	20	-	60	-	100

L- Lectures; T- Tutorial; P- Practical; C- Credit; MSE- Mid-Semester Evaluation, CE- Continuous Evaluation, ESE- End Semester Examination

**g. Course Content:**

Sr. No.	Content	Weightage	Teaching Hours
1	<b>Module 1 Basics of Intellectual Property;</b> The Intangible Economy; Patents—From ball pens to biologics; Trade Marks—What does red soles and barbie girl mean?; Copyright—Is it right to copy?	40%	18
2	<b>Module 2 Unconventional IP</b> —The expanding scope; Enforcement of IP—Protecting your rights; IP for Business—A profit making asset class .	40%	18
3	<b>Module 3 IP, Research, and Universities:</b> IP for the Creative and Entertainment Industries; Governments Role in Fostering IP; Teaching IP—Let everyone learn IP.	20%	9

**a. Course Name:** Electrical and Electronics Engineering

**b. Course Code:** 03010601ES02

**c. Prerequisite:** Knowledge of Physics and Mathematics up to 12th science level

**d. Rationale:** The main objective of this subject is introductory treatment of the field of Electrical and Electronics Engineering to the students of various branches of engineering.

**e. Course Learning Objective:**

<b>CLOBJ 1</b>	To master the application of circuit laws and network theorems for solving DC electrical circuits.
<b>CLOBJ 2</b>	To develop the ability to analyze and calculate parameters for single-phase and three-phase AC systems.
<b>CLOBJ 3</b>	To understand BJT operation and determine stability through DC load line and Q-point analysis.
<b>CLOBJ 4</b>	To design regulated power supplies and understand the functional principles of various transducers.

**f. Course Learning Outcomes:**

<b>CLO 1</b>	Apply fundamental electrical laws and circuit theorems to electrical circuits.
<b>CLO 2</b>	Analyse single-phase and three phase AC circuits
<b>CLO 3</b>	Evaluate the operating regions of BJTs through DC analysis and Q-points using load line analysis
<b>CLO 4</b>	Design DC-regulated power supplies using voltage regulators and introduce various transducers with operation.

**g. Teaching & Examination Scheme:**

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
3	0	2	4	20	20	20	60	30	150

**L-** Lectures; **T-** Tutorial; **P-** Practical; **C-** Credit; **MSE-** Mid-Semester Evaluation, **CE-** Continuous Evaluation, **ESE-** End Semester Examination

**h. Course Content:**

Sr.	Topic	Weightage	Teaching Hrs.
1	<p><b>DC Circuits</b>            Concepts of Electrical Current, Voltage, Power and Energy. Electrical circuit elements (R, L and C), voltage and current sources, - Ohm's Law and Kirchhoff's Laws, simplifications of networks using series and parallel resistance circuits and its examples, star-delta conversions. Superposition, Thevenin's and Norton Theorems.</p>	20 %	10
2	<p><b>AC Circuits</b>            Sinusoidal voltages and currents, their mathematical and graphical representation, Concept of instantaneous, peak (maximum), average and R.M.S. values, frequency, cycle, period, peak factor and form factor, phase difference, lagging, leading and in phase quantities and phasor representation. Rectangular and polar representation of phasors, examples based on theory. Analysis with phasor diagrams of R, L, C, R-L, R-C and R-L-C series circuits and it's example. study of parallel R-L, R-C and R-L-C circuit, concept of impedance , admittance, conductance and susceptance in case of above combinations and relevant voltage-current phasor diagrams, Resonance in series and parallel circuits. Q-factor. concept of active, reactive and apparent power and power factor. Concept of three-phase supply and phase sequence. Voltages, currents and power relations in three-phase balanced star-connected loads and delta-connected loads along with phasor diagrams with examples.</p>	30 %	13
3	<p><b>Diode and Transistors</b>            Introduction to Ideal Diode, Effect of temperature Ideal diodes, unbiased diode and Forward and reverse bias of Diode. PIV, surge current, Diode as Uncontrolled switch. Rectifiers: Half wave, Full wave, and bridge wave. Ripple factor, PIV rating. Choke and Capacitor input filter rectifiers, Clipper and Clamper circuits, Construction and working of BJT, Characteristics &amp; specifications of BJT (PNP &amp; NPN transistors), Biased and unbiased BJT, Configuration of the transistor, the concept of gain &amp; BW, Operation of BJT in the cut-off, saturation &amp; active regions (DC analysis), BJT as a switch, Transistor as an amplifier, Voltage divider bias and analysis, VDB load line and Q point.</p>	30 %	12
4	<p><b>Voltage Regulators and Transducers</b>            Basic series and shunt regulator, Types of voltage regulator IC: Fixed and adjustable positive and negative linear voltage regulator, IC linear fixed voltage regulator (78XX, 79XX,) Linear Adjustable Regulator, DC Regulated Power supply. Introduction of Transducers. Types of Transducers and its applications</p>	20 %	10

**\*Continuous Evaluation:**

It consists of Assignments/Seminars/Presentations/Quizzes/Surprise Tests (Summative/MCQ) etc.

**Reference Books:**

1. A textbook of Electrical technology Vol2 by B.L.Theraja | S. Chand Publication
2. Electrical Engineering Fundamentals (Text Book) By V. D. Toro | Prentice Hall India | 2, Pub. Year 198
3. Electrical and Electronics Technology by E. Hughes | Pearson | 10, Pub. Year 2010
4. Basic Electrical Engineering by D. P. Kothari and I. J. Nagrath, | Tata McGraw Hill | 3, Pub. Year 2010
5. Basic Electrical Engineering by D. C. Kulshreshtha | McGraw Hill | 1, Pub. Year 2009
6. Introduction to Electrical Engineering by M.S Sarma, Oxford university press 2001

**i. List of Experiments:**

Sr. No.	Experiment List
1	To study about various electrical and electronics symbols and demonstrate various measuring instruments used in electrical & electronics laboratories.
2	Verification of superposition theorem with DC source.
3	Verification of Thevenin's theorem with DC source.
4	To obtain the Inductance, Capacitance, Power, and Power Factor of the series R-L-C circuit with AC supply using a phasor diagram.
5	Verification of current and voltage relations in three-phase balanced star and delta-connected loads.
6	To plot V-I characteristics of the P-N junction diode.
7	To perform and observe the response of a half-wave rectifier without filter & with (L, C) filter and measure DC voltage regulation and ripple factor for various load currents in the case of filtered output.
8	To perform and observe the response of full wave rectifiers without filter and with (L,C) filter and measure DC voltage regulation and ripple factor for various load currents in the case of filtered output.
9	To plot and study input-output characteristics of the Common Emitter (CE) configuration of the transistor.
10	To perform and observe the response of voltage regulator IC 7805.

- a. **Course Name:** Linear Algebra
- b. **Course Code:** 03019102BS01
- c. **Prerequisite:** Basic Knowledge of Matrix and Determinants
- d. **Rationale:** To attain the knowledge of Matrices and apply to the engineering field to check the consistency of the system. The concept of vector space helps to understand programming in field of computer engg.
- e. **Course Learning Outcomes:**

<b>CLO 1</b>	Understand system of linear algebraic equation and solution techniques using matrix.
<b>CLO 2</b>	Exhibit the understanding of vector space and subspace and solve related problems.
<b>CLO 3</b>	Compute eigenvalues and eigenvectors and diagonalize the matrix
<b>CLO 4</b>	Create orthogonal and orthonormal bases: Gram-Schmidt process and use bases and orthonormal bases to solve application

f. **Teaching & Examination Scheme:**

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
4	0	0	4	20	20	-	60	-	100

L- Lectures; T- Tutorial; P- Practical; C- Credit; MSE- Mid-Semester Evaluation, CE- Continuous Evaluation, ESE- End Semester Examination

g. **Course Content:**

Sr. No.	Content	Weightage	Teaching Hours
1	<b>Matrices</b> Introduction, System of linear equations (Homogeneous and Nonhomogeneous systems) by Gauss Elimination, and LU Decomposition Method, Rank, Eigenvalues and Eigenvectors, Algebraic and Geometric Multiplicity, Diagonalization, Cayley-Hamilton theorem and Applications-coding-decoding, Principal Component Analysis (PCA).	35%	21

<b>2</b>	<b>Vector Space</b> Vector spaces over the field of real numbers, Elementary Properties of Vector Spaces, Subspaces, Spanning set, Linear independence and dependence, Basis and Dimension.	<b>20%</b>	<b>12</b>
<b>3</b>	<b>Linear Transformation</b> Definition of Linear Transformation from $R^n$ to $R^m$ Some Standard Linear Transformation, The Null Space & Column Space, The Rank-Nullity Theorem, Matrix of Linear Transformation.	<b>25%</b>	<b>15</b>
<b>4</b>	<b>Inner Product Spaces</b> Inner-product spaces, norm and its properties, angle between two vectors, orthogonal vectors, orthonormal vector, Gram-Schmidt process, orthonormal basis.	<b>20%</b>	<b>12</b>

**h. Text Book and Reference Book:**

1. Elementary Linear Algebra with Applications, (TextBook) By H. Anton | John Wiley
2. Linear Algebra and Its Applications By G. Strang | Brooks/Cole India
3. Advanced Engineering Mathematics By Erwin Kreyszig | Willey India Education
4. Linear Algebra, By K. Hoffman and R. Kunze, | Prentice Hall
5. Calculus By T.M. Apostol | John Wiley Publication | Vol. II
6. Linear Algebra: A Modern Introduction, By D. Poole, | 2nd Edition, Brooks/Cole

- a. **Course Name:** ICT Workshop
- b. **Course Code:** 03010702ES01
- c. **Prerequisite:** Basic Computer Knowledge and Physics
- d. **Rationale:** This course is design to provide basic knowledge of Electronics components and computer components. This course helps in learning problem solving process of Electronics circuits and Computer
- e. **Course Learning Objective:**

<b>CLOBJ 1</b>	Understand the fundamental concepts and operating principles of basic electronic components such as resistors, capacitors, inductors, and diodes.
<b>CLOBJ 2</b>	Demonstrate the ability to use testing instruments for measuring electrical parameters such as voltage, current, frequency, and resistance.
<b>CLOBJ 3</b>	Understand the basic concepts and types of power supplies, including DC regulated and unregulated power supplies.
<b>CLOBJ 4</b>	Demonstrate the interfacing of various IoT sensors with microcontrollers such as Arduino or similar platforms.

f. **Course Learning Outcomes:**

<b>CLO 1</b>	Gain ability to understand the working of Electronics Components
<b>CLO 2</b>	Ability to understand the operating of various testing and measurement instrumentation.
<b>CLO 3</b>	Ability to use Power Supply
<b>CLO 4</b>	Ability to learn working and use of different IoT sensors

g. **Teaching & Examination Scheme:**

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
0	0	2	1	-	-	20	-	30	50

L- Lectures; T- Tutorial; P- Practical; C- Credit; MSE- Mid-Semester Evaluation, CE- Continuous Evaluation, ESE- End Semester Examination

**h. List of Experiment:**

<b>Sr. No.</b>	<b>Experiment List</b>
1.	Introduction to Breadboard and Digital Multi Meter, Verify the circuit analysis (voltage and current)
2.	Identification, symbolic representation and testing of various electronics components.
3.	To study CRO and Function generator with specifications.
4.	To verify Ideal Value and practical value of voltage regulator ICs.
5.	Introduction to Arduino IDE with LED Blinking
6.	Interfacing Button-Controlled LED with Arduino board.
7.	Buzzer Alarm System Using Arduino.
8.	Demonstrate the function of LCD Display Interfacing with Arduino.
9.	Relay-Based ON/OFF Control System with Arduino
10.	Demonstrate the working of Temperature Sensor-DHT11
11.	Demonstrate the working of Ultrasonic Distance Measurement sensor.
12.	Verify the functionality of water flow sensor
13.	Demonstrate the working of PIR Sensor using Arduino.
14.	Project based on electronics components and sensors

**Miscellaneous- Open Ended Problems**

Mini Projects based on students' choice

- . **Course Name:** Advanced Communication and Interpersonal Skills
- a. **Course Code:** 03010002HM01
- b. **Prerequisite:** Knowledge of Principles of Communication Skills.
- c. **Rationale:** Equips students with professional communication and collaborative teamwork skills essential for effective performance and industry readiness in the workplace.
- d. **Course Learning Objectives:**

<b>CLOBJ 1</b>	Apply core grammatical principles including subject–verb agreement, reported speech, and active–passive voice to improve accuracy in spoken and written communication.
<b>CLOBJ 2</b>	Expand functional vocabulary and language usage by applying synonyms, antonyms, homonyms, idioms, and contextual word meanings effectively.
<b>CLOBJ 3</b>	Develop effective reading comprehension skills to understand, interpret, and respond to intermediate-level texts and spoken content.
<b>CLOBJ 4</b>	Enhance written and spoken expression through structured essay writing, Paragraph development, confident self-introduction, and professional grooming practices.
<b>CLOBJ 5</b>	Develop self-management and personal development skills by applying SWOT analysis, practicing effective time management strategies, and engaging in reflective learning processes.

**f. Course Learning Outcomes:**

<b>CLO 1</b>	Remember rules of subject–verb agreement, reported speech, and active–passive voice to produce grammatically correct sentences in real-life contexts.
<b>CLO 2</b>	Understand the usage of appropriate vocabulary including synonyms, antonyms, homonyms, homophones, homographs, and idioms in spoken and written communication.
<b>CLO 3</b>	Apply structured essays, Paragraph, and confident self-introductions using appropriate language, logical organization, professional etiquette, and positive body language.
<b>CLO 4</b>	Analyse intermediate-level reading passages by identifying main ideas, supporting details, tone, and purpose.
<b>CLO 5</b>	Evaluate SWOT analysis and time-management techniques to plan personal goals, prioritize tasks, and improve academic and professional effectiveness.

**g. Teaching & Examination Scheme:**

Teaching Scheme Hrs/Week				Examination Scheme					Total
Lec.	Tut.	Lab	Credit	Internal			External		
				T	CE	P	T	P	
1	0	2	2	40	-	20	60	30	150

**Lec.-** Lecture; **Tut.-** Tutorial; **T-** Theory; **P-** Practical; **CE-** Continuous Evaluation.

**h. Course Content:**

**Lecture**

<b>Sr.</b>	<b>Content</b>	<b>Weightage</b>	<b>Teaching Hrs.</b>	<b>CO</b>	<b>BT</b>
1	Subject Verb Agreement <ul style="list-style-type: none"> <li>• Rules of subject-verb matching</li> <li>• Singular vs plural forms</li> <li>• Common agreement errors</li> </ul>	10%	1	1	1
2	Reported Speech <ul style="list-style-type: none"> <li>• Direct and indirect speech</li> <li>• Changing tenses, pronouns, and time expressions</li> <li>• Reporting statements, questions, and commands</li> </ul>	10%	1	1	1
3	Active and Passive Voice <ul style="list-style-type: none"> <li>• Difference between Active and Passive</li> <li>• Rules for converting sentences</li> <li>• Usage in real-life contexts</li> </ul>	10%	1	1	1
4	Building Vocabulary <ul style="list-style-type: none"> <li>• Word meanings and usage</li> <li>• Synonyms and antonyms</li> <li>• Homonyms, Homophones, Homographs, Idioms</li> </ul>	10%	2	2	2
5	Grooming and Personality Development <ul style="list-style-type: none"> <li>• Importance of dressing and professional etiquette</li> <li>• Building confidence and positive body language</li> </ul>	10%	2	4	3
6	SWOT Analysis and Self Introduction <ul style="list-style-type: none"> <li>• Identifying strengths, weaknesses, opportunities, threats</li> <li>• Preparing and delivering a confident self-introduction</li> </ul>	10%	2	4,5	3,5

	<ul style="list-style-type: none"> <li>Developing self-awareness and growth mind set</li> </ul>				
7	<b>Reading Comprehension (Level of difficulty-Intermediate)</b> <ul style="list-style-type: none"> <li>Understanding written texts</li> <li>Finding main ideas and supporting details</li> <li>Answering questions accurately</li> </ul>	10%	2	3	4
8	<b>Paragraph Development</b> <ul style="list-style-type: none"> <li>Elements of a paragraph</li> <li>Unity and coherence</li> <li>Types of paragraphs</li> </ul>	10%	1	3	4
9	<b>Essay Writing</b> <ul style="list-style-type: none"> <li>Structure of an essay: introduction, body, conclusion</li> <li>Organizing ideas logically</li> <li>Using appropriate language and tone</li> </ul>	10%	2	4	3
10	<b>Time Management</b> <ul style="list-style-type: none"> <li>Importance of managing time</li> <li>Pomodoro and Eisenhower matrix</li> <li>Prioritization</li> <li>Creating schedules</li> <li>Time Wasters and Time Distractors</li> </ul>	10%	1	5	5
		<b>100%</b>	<b>15</b>		

### Lab (Practical)

Sr.	Content	Weightage	Teaching Hrs.	CO	BT
1	<b>Subject Verb Agreement</b> <ul style="list-style-type: none"> <li>Fill-in-the-blank exercises</li> <li>Sentence correction tasks</li> <li>Group quiz competition</li> <li>Role-play using correct subject-verb forms</li> </ul>	10%	2	1	1

2	<b>Reported Speech</b> <ul style="list-style-type: none"> <li>• Dialogue conversion practice</li> <li>• Pair work: narrate a conversation</li> <li>• Reporting classroom news</li> <li>• Role-play followed by reporting</li> </ul>	10%	2	1	1
3	<b>Active and Passive Voice</b> <ul style="list-style-type: none"> <li>• Transform active sentences to passive and vice versa</li> <li>• Rewrite instructions in passive voice</li> <li>• Classroom narration using passive structures</li> <li>• Group activity: change story voice</li> </ul>	10%	2	1	1
4	<b>Building Vocabulary</b> <ul style="list-style-type: none"> <li>• Daily word journal</li> <li>• Vocabulary flashcards and games</li> <li>• Synonym-antonym match-up</li> <li>• Word building through storytelling</li> </ul>	10%	4	2	2
5	<b>Grooming and Personality Development</b> <ul style="list-style-type: none"> <li>• Personal grooming checklist task</li> <li>• Group discussion on personality traits</li> <li>• Mock social interaction</li> <li>• Confidence-building exercises</li> </ul>	10%	4	4	3
6	<b>SWOT Analysis with Self Introduction</b> <ul style="list-style-type: none"> <li>• SWOT worksheet filling</li> <li>• Self-introduction in pairs or groups</li> <li>• Strength-sharing circle</li> <li>• Feedback on introductions</li> </ul>	10%	4	4,5	3,5
7	<b>Reading Comprehension (Level of Difficulty – Intermediate)</b> <ul style="list-style-type: none"> <li>• Reading passage followed by Q&amp;A</li> <li>• Find-the-theme activity</li> <li>• Vocabulary hunt from the passage</li> <li>• Summarizing a short text</li> </ul>	10%	4	3	4
8	<b>Paragraph Development</b> <ul style="list-style-type: none"> <li>• Paragraph writing using prompts</li> <li>• Sentence reordering activity</li> <li>• Peer editing for coherence</li> </ul>	10%	2	3	4

9	<b>Essay Writing</b> <ul style="list-style-type: none"> <li>• Brainstorming and outline creation</li> <li>• Writing on guided topics</li> <li>• Peer feedback session</li> <li>• Editing and final draft submission</li> </ul>	10%	4	4	3
10	<b>Time Management and Team Building</b> <ul style="list-style-type: none"> <li>• Create a weekly schedule</li> <li>• Prioritization task (urgent vs important)</li> <li>• Reflection on time use habits</li> </ul>	10%	2	5	5
		<b>100%</b>	<b>30</b>		

**i. Reference Books:**

- Dhanavel, S. P. *English and Soft Skills*. Orient Blackswan, 2010.
- Mitra, Barun K. *Personality Development and Soft Skills*. Oxford University Press, 2011.
- Murphy, Raymond. *English Grammar in Use*. 5th ed., Cambridge University Press, 2019.
- Raman, Meenakshi, and Sangeeta Sharma. *Technical Communication: Principles and Practice*. Oxford University Press, 2004.
- Wren, P. C., and H. Martin. *High School English Grammar and Composition*. S. Chand & Company, 1995.