First Year Curriculum

Admission Year 2026-27

Industry Embedded Bachelor of Technology CSE in Association with Quick Heal

Faculty of Engineering & Technology

Parul University

Vadodara, Gujarat, India

Semester 1

a. **Course Name:** Calculus
b. **Course Code:** 03019101BS01
c. **Prerequisite:** : Basic concepts of Calculus
d. **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.
e. **Course Learning Objective:**

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

f. **Course Learning Outcomes:**

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

g. **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

h. Course Content:

Sr. No.	Content	Weightage	Teaching Hours
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	**SMART CITIES** 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**

i. 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.

(2)

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:**

CLOBJ 1	To introduce students to the fundamentals of web technologies including HTML and CSS for creating web pages.
CLOBJ 2	To develop the ability to design structured and user-friendly web interfaces using various HTML elements and forms.
CLOBJ 3	To enable students to apply CSS styling techniques, layouts, Flexbox, and Grid for effective webpage design.
CLOBJ 4	To familiarize students with responsive web design techniques using media queries, animations, and advanced CSS features.
CLOBJ 5	To provide basic knowledge of website hosting, deployment methods, and publishing websites on the internet.
CLOBJ 6	To enhance creativity and practical skills required for developing modern, responsive, and interactive websites.

f. **Course Learning Outcomes:**

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

g. **Teaching & Examination Scheme:**

Teaching Scheme				**Evaluation Scheme**					
				Internal Evaluation			**ESE**		**Total**
L	**T**	**P**	**C**	**MSE**	**CE**	**P**	**Theory**	**P**	
3	**-**	**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. No.	Topics	Weightage	Teaching Hours
1	**Introduction to HTML & CSS** 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	**HTML Elements & Forms** Headings, Paragraphs, Lists (ordered , unordered, descriptive), and Tables (table, , , ,,,) 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	**CSS Basics & Styling** 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-templaterows, grid-template columns, gap) CSS positions and indexes (fixed, absolute, relative, static, z-index)	**26%**	**12**
4	**Responsive Web Design & Advanced CSS** Media Queries for Responsive Design . CSS Transitions and Animations (transition property, duration, timingfunction, 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	**Introduction to Web Deployment (Theory Only)** 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 6. HTML5 and CSS3 All-in-One For Dummies – Andy Harris

J. **Experiment List**

Sr. NO.	Experiment List
1	1. Create a simple webpage using headings and paragraphs 2. Use to for heading 3. Write at least 3 meaningful paragraphs using the tag
2	1. Add links and images to a webpage 2. Use the tag to add hyperlinks (external and internal). 3. Use the tag to display an image from your computer or a URL.
3	1. Make lists and tables in HTML 2. Create an ordered list and an unordered list. 3. Design a table with rows and columns using , , , .
4	1. Create a registration form 2. Include fields like Name, Email, Gender, Date of Birth, and Submit button. 3. Use appropriate form elements: , , , etc.
5	1. Use semantic HTML elements 2. Build a layout using , , , , and .
6	1. Apply CSS styles to HTML elements 2. Use tag, class (className), and ID (#idName) selectors. 3. Change text color, background color, margins, and padding.
7	1. Understand and use the box model 2. Apply padding, borders, and margins to elements. 3. Use width and height properties to control size.
8	1. Create a navigation bar using Flexbox 2. Use CSS Flexbox to arrange menu items horizontally. 3. Add hover effects and spacing between items.
9	1. Make a responsive layout using CSS Grid 2. Use grid to create a two-column layout. 3. Adjust grid layout for different screen sizes using media queries
10	1. Make your webpage work on all screen sizes 2. Use responsive units like %, vw, vh, em, and rem. 3. Use media queries to adapt layout for mobile, tablet, and desktop.
11	1. Add hover effects and simple animations 2. Use the :hover pseudo-class to style elements on mouse-over. 3. Create a simple animation using @keyframes and transition.
12	1. Create a simple webpage with internal and external CSS 2. Write internal CSS in
13	1. Add audio and video to a webpage 2. Use and tags with controls, autoplay, and loop.
14	1. Build a simple personal portfolio website 2. Include sections like About Me, Skills, Projects, and Contact. 3. Add navigation and media (images, links, icons).

(3)

a. **Course Name:** Cyber Security Fundamentals - 1
b. **Course Code:** 03015501PC01
c. **Prerequisite:** Basic knowledge of computers and digital devices. | 03015501PC01 - Cyber Security Fundamentals – 1
d. **Rationale:** This course aims to provide learners with a comprehensive understanding of computer hardware, operating systems, command-line tools, system security, and troubleshooting techniques. Students will develop the skills necessary to configure, manage, secure, and maintain various IT devices and operating environments, while adhering to professional standards and best practices in system administration and support.
e. **Course Learning Objective:**

CLOBJ 1	To introduce students to fundamental data concepts including structured, semi-structured, and unstructured data.
CLOBJ 2	To develop understanding of relational and non-relational database systems and their applications in cloud environments.
CLOBJ 3	To familiarize students with Microsoft Azure data services such as Azure SQL Database, Azure Blob Storage, Azure Cosmos DB, and Data Lake services.
CLOBJ 4	To enable students to perform basic data storage, processing, querying, and analytics operations using Azure platforms and tools.
CLOBJ 5	To provide knowledge of analytical data processing, data pipelines, and real-time analytics using Azure Synapse Analytics and Microsoft Fabric.
CLOBJ 6	To develop practical skills in managing cloud-based data solutions and understanding pricing, cost estimation, and optimization techniques in Azure.

f. **Course Learning Outcomes:**

CLO 1	Recall the fundamental components of computer hardware, operating systems, and command-line tools including motherboards, memory types, storage devices, Windows utilities, and Linux commands.
CLO 2	Explain the concepts, configuration, and functionalities of various operating systems (Windows, macOS, Linux), along with file management, system tools, user permissions, and basic security settings.
CLO 3	Apply system utilities, command-line tools, and administrative procedures to manage users, files, services, and network configurations in Windows and Linux environments.
CLO 4	Analyze system security settings, SOHO network configurations, and potential system faults to identify, isolate, and interpret hardware, OS, and security-related issues.
CLO 5	Evaluate troubleshooting methodologies, system documentation practices, and professional behaviors to propose effective solutions and maintain system performance and user satisfaction.

g. Teaching & Examination Scheme:

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
3	-	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. No.	Content	Weightage	Teaching Hours
1	Hardware Fundamentals and Configuration: Motherboards and system board components, motherboard form factors, processor types, CPU architecture and characteristics. Memory concepts, types, packaging, and cooling systems. Expansion cards (video, multimedia, NICs, I/O cards) and adapter configuration. Storage devices: HDD, SSD, RAID, removable media. Installing, removing, and configuring storage devices. Power supplies: input/output ratings, modular and redundant PSUs, power connectors, AC adapters, replacing PSUs. Laptop and mobile device hardware: disassembling, upgrading, ports, accessories. Printers and multifunction devices: inkjet, laser, thermal, impact, and 3D printers. Printer components, sharing (local/network), upgrades, and maintenance procedures.	25%	10
2	Operating System Concepts, Configuration, and Administration: Basics of operating systems, concepts, types, and minimum system/application requirements. Windows editions and features, the Windows interface, and file management. Task Manager, Microsoft Management Console, additional tools, Control Panel, Windows Settings, Registry, and Disk Management. Installation and upgrade options, upgrade paths, recovery partitions, image deployment. Boot options, CLI tools for OS management. Networking in Windows: models, authentication, network connections, firewall settings, resource access. macOS and Linux: applications, updates, patching, maintenance, tools, basic Linux commands, root access, process control, permissions, and directory/file management.	20%	10

3	Windows Command Line: Introduction to the Windows CLI: syntax structure, command conventions, and administrative privileges, File and Directory Management: Commands for navigating and managing files/folders: cd, dir, mkdir, rmdir, copy, xcopy, robocopy, del, move, type, attrib. Understanding file attributes and batch file scripting basics, System and Disk Utilities: Essential tools for system and disk management: sfc, DISM, msconfig, bcdedit, tasklist, taskkill, shutdown, systeminfo, chkdsk, diskpart, format, defrag. Managing partitions, disk labels, and volumes, Network Configuration and Diagnostics: Networking commands: ipconfig, ping, tracert, netstat, and nslookup, net use, net view, netsh, hostname, getmac, arp, nbtstat. Troubleshooting and configuring network settings via CLI, User and Security Management: User and group management: net user, net localgroup, whoami, runas. File permission tools: cacls, icacls. Registry handling: reg add, reg delete, reg query, Services and Boot Recovery: Process and service control: sc query, sc config, net start, and net stop. Boot and recovery tools: bootrec options for MBR repair and system recovery.	**15%**	**5**
4	Securing Operating Systems, Devices, and SOHO Networks: Windows OS security: users, groups, NTFS/share permissions, system files, firewall settings. Browser security: settings, extensions, download control, credential management. Secure data transfers and web configurations. SOHO network security: default credentials, SSID, encryption, MAC filtering, access point placement, static IPs, DHCP settings. Wired/wireless security best practices. Mobile device security: screen locks, remote wipe, app management, updates, full-device encryption, MFA, authenticator apps, mobile antivirus. Policies and procedures for mobile and IoT environments. Physical security for mobile and network devices. Implementing security features and access control on end-user devices.	**20%**	**10**
5	Troubleshooting, Documentation, and Professional Practices: Troubleshooting methodology: identify problems, establish/test theory, plan and implement solutions, verify, and document. Hardware issues: motherboards, RAM, CPUs, PSUs, BIOS/UEFI, storage (RAID, S.M.A.R.T.), displays, input devices, thermal and battery issues. Troubleshooting OS problems: boot errors,	**20%**	**10**

	update failures, performance, and malware removal. Mobile OS and app troubleshooting. Security troubleshooting: malware symptoms, browser issues, device security. Network troubleshooting: connectivity tools and techniques. Scripting basics and use cases: script types, considerations, automation. Remote access tools: RDP, SSH, Telnet, VPN, VNC. Safety/environmental practices: ESD, safe handling, licensing, prohibited content. Documentation: ticketing systems, asset tracking, knowledge base, and change management. Disaster recovery: backups, UPS, power generators, surge protection. Professionalism: appearance, communication, behavior, and customer interaction.		

i. Text Book and Reference Book:

1. CompTIA A+ complete study guide: Core 1 exam 220-1101 and Core 2 exam 220-1102 (5th ed.). By Quentin Docter, Jon Buhagiar.

j. Experiment List:

Sr. NO.	Experiment List
1	Identify and connect motherboard, CPU, RAM, storage devices, power supply, and I/O ports in a PC. Learn to physically identify and connect essential hardware components such as the motherboard, CPU, RAM, storage devices (HDD/SSD), power supply, and input/output ports. Develop hardware assembly and diagnostic skills through hands-on practice.
2	Install inkjet/laser printers, configure network sharing, and perform maintenance tasks. Install inkjet and laser printers, configure local/network printer sharing, and perform routine maintenance tasks such as cleaning print heads, replacing cartridges, and updating drivers.
3	Connect SATA/SSD drives, configure removable storage, and explore RAID setup (RAID 0/1 in a VM). Connect SATA and SSD drives, configure removable storage devices, and simulate RAID 0 and RAID 1 configurations using a virtual machine to understand redundancy and performance improvement techniques.
4	Use VirtualBox/VMware to perform clean installations of Windows and Ubuntu Linux. Use VirtualBox or VMware to perform clean installations of Windows and Ubuntu Linux. Explore disk partitioning, user account setup, and initial configuration settings in virtualized environments.
5	Use Task Manager, Disk Management, Control Panel, and System Configuration (msconfig) tools. Explore and utilize builtin Windows tools such as Task Manager, Disk Management, Control Panel, and System Configuration (msconfig) for monitoring performance, managing hardware, and system startup settings.
6	Create, modify, and assign permissions to local users and groups via GUI and Linux terminal. Create, delete, and manage local users and groups using Windows graphical interface and Linux terminal. Assign appropriate permissions and explore the impact of group policies.
7	Use commands like dir, cd, mkdir, copy, xcopy, del, robocopy to manage the file system. Use Windows command-line tools (dir, cd, mkdir, copy, xcopy, del,

	robocopy) to navigate and manipulate the file system. Understand folder structures, file operations, and recursive commands
8	Use commands such as ipconfig, ping, tracert, netstat, nslookup, and net use to diagnose network issues. Use networking commands like ipconfig, ping, tracert, netstat, nslookup, and net use to diagnose and troubleshoot basic connectivity and name resolution issues in local and remote networks.
9	Write .bat scripts for cleaning temp files, creating backups, or launching apps. Write and execute .bat scripts to automate tasks such as deleting temporary files, backing up directories, or launching frequently used applications. Understand script structure, comments, and execution flow.
10	Perform system health checks using sfc, chkdsk, DISM, and tasklist. Perform health checks and repair procedures using tools like sfc, chkdsk, DISM, and tasklist. Understand how to identify system file corruption, disk errors, and process performance issues.
11	Simulate router configuration (SSID, WPA2, MAC filtering, DHCP scope, static IPs) using web emulator or real router. Using a web emulator or real router interface, configure SSID names, enable WPA2 encryption, apply MAC filtering, define DHCP scopes, and assign static IPs. Understand security and networking practices for home/small offices.
12	Apply NTFS permissions, configure file/folder sharing, and test restricted access. Apply and test NTFS permissions for users and groups, configure folder/file sharing, and verify access control. Learn the difference between share and NTFS permissions and how they interact.
13	Configure secure browser settings (pop-up blocker, password manager) and install endpoint antivirus for scanning. Configure secure browser settings such as disabling pop-ups, managing saved passwords, and limiting downloads. Install and update endpoint antivirus software and perform a complete system scan for threats.
14	Diagnose and resolve hardware/software issues (boot failure, overheating, no display, corrupted OS) using structured steps. Diagnose and resolve common hardware and OS issues including no display, boot failures, overheating, and corrupted system files. Follow a structured troubleshooting methodology to identify and fix problems.
15	Simulate an IT support environment where students document symptoms, propose solutions, and close tickets using a helpdesk tool or template. Simulate an IT helpdesk scenario where students identify issues, gather user input, apply solutions, and close support tickets using templates or helpdesk software. Emphasize documentation and professional communication.

(4)

a. **Course Name:** Electrical and Electronics Engineering
b. **Course Code:** 03010601ES02
c. **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
d. **Course Learning Objective:**

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

e. **Course Learning Outcomes:**

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

f. **Teaching & Examination Scheme:**

Teaching Scheme				**Evaluation Scheme**					
L	**T**	**P**	**C**	**Internal Evaluation**			**ESE**		**Total**
				MSE	**CE**	**P**	**Theory**	**P**	
3	**-**	**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

g. **Course Content:**

Sr. No.	**Content**	**Weightage**	**Teaching Hours**

1	**DC Circuits** 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.	**20%**	**10**
2	**AC Circuits** 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.	**30%**	**13**
3	**Diode and Transistors** 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 & specifications of BJT (PNP & NPN transistors), Biased and unbiased BJT, Configuration of the transistor, the concept of gain & BW, Operation of BJT in the cut-off, saturation & active regions (DC analysis), BJT as a switch, Transistor as an amplifier, Voltage divider bias and analysis, VDB load line and Q point.	**30%**	**12**

4	**Voltage Regulators and Transducers** 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	**20%**	**10**

h. Text Book and Reference Book:

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

i. Experiment List:

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 experimentally investigate the behaviour of a series RLC circuit under AC excitation
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 half wave rectifier with and without filter.
8	To perform full wave rectifier with and without filter
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

(5)

a. **Course Name:** Programming for Problem Solving
b. **Course Code:** 03010501ES01
c. **Prerequisite:** Requires Basic Knowledge of Computer
d. **Rationale:** This course is design to provide basic ideas of computer programming. This course also makes help to understand programming language. It will help to develop their logical abilities
e. **Course Learning Objective:**

CLOBJ 1	To introduce students to the fundamentals of computer programming and problem-solving techniques using the C programming language.
CLOBJ 2	To develop logical thinking and analytical skills required for solving engineering and computational problems.
CLOBJ 3	To familiarize students with basic programming concepts such as data types, operators, control structures, arrays, strings, functions, pointers, and file handling.
CLOBJ 4	To enable students to design algorithms and implement efficient C programs for various applications.
CLOBJ 5	To develop debugging, testing, and program execution skills for writing error-free programs.
CLOBJ 6	To provide practical knowledge of structured programming and modular programming concepts using user-defined functions and data structures.

f. **Course Learning Outcomes:**

CLO 1	Recognize the computer's basic principles and organizations
CLO 2	Understand Concepts of Computer Programming Language.
CLO 3	Develop the algorithm for solving basic Engineering Problems.
CLO 4	Write, Compile and debug program with C Programming.

CLO 5	Write, Compile and debug program with C Programming.
CLO 6	Develop simple projects using C Language.

g. Teaching & Examination Scheme:

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
3	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. 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. 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	**20%**	**10**
6	**Pointers, Dynamic memory allocation and File Management in C Pointers:** Basics of pointers, pointer to pointer, pointer and array, Pointer to array, array of pointers , functions returning pointers Dynamic memory allocation: Introduction to Dynamic memory allocation, malloc(), calloc(), free(), realloc(). File Management in C: Introduction and standard file handling functions.	**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
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	Practical Set 1 (Basics) 1. Write a program to print HELLO FRIENDS! 2. Write a program that reads two nos. from key board and gives their addition, subtraction, multiplication, division and modulo. 3. Write a program to calculate area of circle,use Ω as symbolic constants. 4. Write a program to convert days into months and days. 5. Write a program which calculates the summation of three digits from the given 3 digit number. 6. Write a program to demonstrate enumerates data type. 7. Write a program to compute Fahrenheit from centigrade. 8. Write a program to calculate simple interest. 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

2	Practical Set 2 (Control Structures) 1. Write a program to find the largest of the three nos. using Nested-If-Else statement. 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. 3. Write a program to read marks from keyboard and your program should display equivalent grade according to following table. Marks Grade 100-80 Dist 60-79 First Class 35-59 Second Class 0-34 Fail 1. Write a program to read marks of a student from keyboard whether the student id pass (if). 2. Write a program to find the sum of first N odd numbers. 3. Write a program using while loop construct which finds the factorial of a given integer number. 4. Write a C program using do…while and for loop constructs to reverse the digits of the number. 5. Write a program to demonstrate use of Switch-Break Statement. 6. Write a program to find out all the numbers divisible by 5 and 7 between 1 to 100. Check for Armstrong number. A number is Armstrong if sum of cube of every digit is same as the original number. E.g. 153=13+53+33=153 1. Write a program to print the output of bellow series. 1!+2!+3!+4!+. ..... n! 2. Write a program to print the following outputs using for Loop. (a) 1 (b) * 12 ** 123 *** 1. Write a program to print the following outputs using for Loop. (a) 1 (b) 321 21 21 321 1
3	Practical Set 3 (Array & Strings) 1. Write a program which sorts 10 numbers into ascending order. 2. Write a program to find maximum element from 1-D array. 3. Write a program to find number of odd and even elements from the 1-D array. 4. Write a program add two 2x2 matrices. 5. Write a program to count number of positive, negative and zero elements from 3x3 matrix. 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. 1. Write a program to count vowels from a entered String. 2. Write a program which finds whether a string is a palindrome or not
4	Practical Set 4 (Functions) 1. Write a program to find factorial of a number using recursion. 2. Write a program that used user defined function Swap ( ) and interchange the value of two variable. 3. Write a function to return 1 if the number is prime otherwise return 0.
5	Practical Set 5 (Structures) 1. Define a structure type, personal that would contain person name, date of joining and salary. 2. Define a structure called cricket that will describe the following information: Player name Team name Batting average
6	Practical Set 6 (Pointers) 1. Write a program to add two numbers using pointers. 2. Write a program to swap two numbers using pointer
7	Practical Set 7 (File Management) 1. Write a program to illustrate reading files contents. 2. Write a program to illustrate the use of fgets( ).

(6)

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:**

CLOBJ 1	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.
CLOBJ 2	Develop basic reading and listening comprehension skills by using appropriate strategies to understand simple texts and spoken content with improved pronunciation awareness.
CLOBJ 3	Organize and express ideas clearly in written form through picture-based perception activities.
CLOBJ 4	Build confidence and fluency in spoken communication through correct pronunciation practice, meeting and greeting activities, extempore speech, and everyday conversational exercises.
CLOBJ 5	Apply goal-setting and self-reflection techniques to monitor personal language learning progress, pronunciation improvement, and overall communication skills development.

f. Course Learning Outcomes:

CLO 1	Enable students to apply essential grammar rules for accurate and effective communication.
CLO 2	Develop ability to construct clear and coherent sentences and paragraphs using varied sentence structures.
CLO 3	Enhance reading and listening comprehension through identification of main ideas, details, and contextual meanings.
CLO 4	Build s confidence in everyday communication using appropriate greetings, expressions, and speaking skills.
CLO 5	Encourage creative and logical thinking through picture perception and extempore activities.
CLO 6	Help students set and track realistic personal and academic goals for continuous self-improvement.

g. Teaching & Examination Scheme:

Teaching Scheme				**Evaluation Scheme**					
				Internal Evaluation			**ESE**		**Total**
L	**T**	**P**	**C**	**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. Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1	**Parts of Speech, Punctuation** Overview of 8 parts of speech Basic punctuation marks and their usage Importance of grammar in writing	**10%**	**4**
2	**Tenses Types**: ● Present, Past, Future Forms and correct usage Common tense errors	**8%**	**2**
3	**Phrase and Clauses; Types of Sentences (Structure Wise)** Difference between phrases and clauses Classification of Simple, Compound & Complex Interchange of Simple to Compound, Simple to Complex, Compound to Complex	**10%**	**4**
4	**Picture Perception** Observing and interpreting images Building a short story or description Improving vocabulary and creativity	**15%**	**4**
5	● **Paragraph Development Structure:** topic sentence, development, conclusion	**8%**	**2**
6	● **Meeting and Greeting (Initiating a conversation)** Basic conversation skills Formal and informal greetings Common phrases for starting interactions	**7%**	**2**
7	● **Reading Comprehension (Basic Level)** Types – Skimming & Scanning Reading short passages Identifying main ideas and details Answering basic questions	**12%**	**4**
8	● **Listening Comprehension (Basic Level)** Listening to short audios/Conversation Understanding and responding to key information	**8%**	**2**
9	● **Extempore Speech** Speaking on random topics Organizing thoughts quickly Improving fluency and confidence	**15%**	**4**

10	● **Goal Setting and Tracking** Setting SMART goals Planning and tracking progress Self-assessment and reflection	**7%**	**2**

i. Text Book and Reference Book:

1. English Grammar in Use (TextBook) By Murphy, Raymond | Cambridge University Press, Pub. Year 2019
2. A Practical English Grammar (TextBook) By Thomson & Martinet | Oxford University Press, Pub. Year 1986
3. The St. Martin's Guide to Writing By Rise B. Axelrod & Charles R. | Cooper, Bedford/St. Martin's, Pub. Year 2021
4. Tactics for Listening (Basic) By Jack C. Richards | Oxford University Press, Pub. Year 2011
5. Active Skills for Reading: Book 1 By Neil J. Anderson | Cengage Learning, Pub. Year 2013
6. Speak with Impact By Allison Shapira | HarperCollins Leadership, Pub. Year 2018

Semester 2

(1)

a. **Course Name:** Cyber security fundamental – 2
b. **Course Code:** 03015502PC01
c. **Prerequisite:** Basic knowledge of Operating Systems, Cyber Security Fundamentals, and basic programming logic or scripting experience.
d. **Rationale:** This course focuses on developing programming and scripting skills using Bash, PowerShell, and Python to support cybersecurity operations. It emphasizes automation of tasks, system analysis, and creation of tools for penetration testing, system monitoring, malware analysis, and threat detection. Learners will gain practical experience in building and executing offensive and defensive cyber tools, enabling them to understand, simulate, and respond to real-world cyber threats effectively
e. **Course Learning Objective:**

CLOBJ 1	To introduce students to fundamental data concepts including structured, semi-structured, and unstructured data.
CLOBJ 2	To develop understanding of relational and non-relational database systems and their applications in cloud environments.
CLOBJ 3	To familiarize students with Microsoft Azure data services such as Azure SQL Database, Azure Blob Storage, Azure Cosmos DB, and Data Lake services.
CLOBJ 4	To enable students to perform basic data storage, processing, querying, and analytics operations using Azure platforms and tools.
CLOBJ 5	To provide knowledge of analytical data processing, data pipelines, and real-time analytics using Azure Synapse Analytics and Microsoft Fabric.
CLOBJ 6	To develop practical skills in managing cloud-based data solutions and understanding pricing, cost estimation, and optimization techniques in Azure.

f. **Course Learning Outcomes:**

CLO 1	Recall the syntax, structure, and fundamental concepts of Bash, PowerShell, and Python scripting used in system and cybersecurity environments.
CLO 2	Explain core scripting logic, flow control mechanisms, and data structures across Bash, PowerShell, and Python for solving administrative tasks.
CLO 3	Apply scripting techniques to automate security tasks such as password generation, log analysis, and vulnerability scanning using open-source tools.
CLO 4	Analyze cybersecurity scenarios to develop offensive and defensive scripts for threat detection, privilege escalation simulation, and log monitoring
CLO 5	Design integrated scripting solutions involving APIs, remote execution, and cloud-based automation for real-world security operations and response.

g. Teaching & Examination Scheme:

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

g. Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1	Bash Scripting FundamentalsIntroduction to Bash scripting, structure, Hello World, variables, user input, comments, arguments, arrays, string slicing. Conditional expressions (file, string, arithmetic), exit status, if-else, switch-case, loops (for, while, until), break, continue, functions, debugging, shortcuts, custom commands, persistent changes, aliases, and basic script creation. Advanced Bash Scripting & Automation: Multi-function scripting, interactive menu with colors, remote script execution, working with JSON via jq, Cloudflare API integration, access log summarizer, sending emails with SSMTP, password generator, pipes vs redirection, and automated WordPress setup on LAMP stack.	25%	10
2	PowerShell Basics and Core ConceptsIntroduction to PowerShell, console and ISE usage, writing scripts, variables, user input, comments, cmdlets, pipelines, operators, conditional statements (if, else, switch), loops (for, foreach, while, do), arrays, hashtables, functions, scoping, basic error handling, working with help, profiles, and script files. Advanced PowerShell and Automation: Modules, file handling (CSV, JSON, XML), menus, prompts, system tasks (services, processes, registry, tasks), Active Directory, PowerShell Remoting, jobs, scheduled tasks, advanced functions with validation, GUI scripting, automation scripts for user management, logs, system monitoring, and deployment tasks.	25%	10
3	Python Basics and Cybersecurity EssentialsIntroduction to Python, data types, variables, input/output operations, conditional statements, loops, functions, string handling, lists, tuples, dictionaries, and file handling. Python modules and libraries for cybersecurity, regular expressions for pattern matching, exception handling, and	20%	8

	working with datetime. Introduction to socket programming, basic networking in Python, and writing simple port scanners.		
4	Cybersecurity Applications using PythonAutomating cybersecurity tasks using Python, email scraping, password strength checker, hashing algorithms (MD5, SHA), encoding/decoding, web scraping using BeautifulSoup, using Python for penetration testing and vulnerability scanning, packet sniffing with Scapy, brute-force script development, building keyloggers, working with APIs, and developing basic malware analysis tools.	**15%**	**10**
5	Offensive and Defensive Cyber Operations using PythonMITRE ATT&CK framework simulation, automated threat emulation, building offensive tools (port scanners, reverse shells, phishing kits), developing defensive tools (log analyzers, detection scripts), obfuscation and evasion techniques, privilege escalation simulation, credential harvesting, data exfiltration, OSINT automation, SMB/SSH scripting, C2 communications, and network monitoring with packet analysis.	**15%**	**7**
5	**Backup, Restore & High Availability** Backup and restore strategies including automated backups, long-term retention, and point-in-time recovery; Configuring high availability using active geo-replication and auto-failover groups; Automating tasks using elastic jobs and runbooks; Managing maintenance with scheduled updates; Migration options using Data Migration Assistant and Azure Database Migration Service; Hybrid cloud database architecture	**20%**	**10**

h. Experiment List:

Exp. No.	Name of the Experiment
1	Basic Bash scripting and input handling: Create a simple Bash script that prints "Hello, World!" and accepts user input to understand script structure and I/O operations.
2	File existence and permission checking: Develop a Bash script using conditional logic to check if a file exists, and whether it's readable or writable.
3	Interactive menu creation using Bash: Build a menu-driven script using case and while loops to navigate user-selected tasks interactively.
4	Array management and string manipulation: Write a script to manage arrays and perform string slicing, demonstrating handling of complex data structures in Bash.
5	Automated backup scripting: Create a Bash script that automates folder backups and compresses them using tar to demonstrate automation of routine administrative

	tasks.
6	JSON parsing with jq: Develop a Bash script to extract and process data from a JSON configuration file using jq for configuration automation and system reporting.
7	Automated deployment of LAMP and WordPress: Write a complete Bash script to install a LAMP stack and deploy WordPress automatically, simulating DevSecOps practices.
8	System information retrieval using PowerShell: Write a PowerShell script to fetch and display operating system, CPU, and RAM details to practice hardware and system queries.
9	File size filtering: Create a PowerShell script that identifies and lists files exceeding a user-defined size for disk usage monitoring.
10	Process monitoring and control: Use PowerShell loops to monitor system processes and automatically terminate those consuming excessive memory.
11	Graphical file backup using PowerShell GUI: Design a GUI-based PowerShell script that allows users to select files and copy them to a secure backup location.
12	Remote script execution via PowerShell Remoting: Implement a script to execute system updates across multiple machines remotely using PowerShell remoting.
13	Service monitoring with automated recovery: Schedule a PowerShell script that monitors critical services and restarts them if they are found to be stopped.
14	Login simulation using conditional logic: Develop a Python script to simulate a secure login process with basic user authentication checks.
15	Network port scanning with socket programming: Write a Python port scanner using the socket library to detect open ports on a target system.
16	Email validation using regex: Create a Python script that uses regular expressions to validate the format of email addresses.
17	File parsing and word frequency analysis: Write a Python program that reads a file, calculates word frequency, and stores results in a dictionary for text analysis.
18	Secure password storage and verification: Develop a script to hash passwords using SHA-256 and verify them against stored hashes to simulate authentication systems.
19	Email scraping from web pages: Use BeautifulSoup in Python to scrape and extract email addresses from HTML pages for OSINT purposes.
20	Password strength checker: Write a script that analyzes password strength based on defined rules such as length, special characters, and entropy.
21	HTTP traffic sniffing with Scapy: Capture and log HTTP traffic on a network interface using Scapy for network forensics.
22	Brute-force attack simulation: Develop a script to perform brute-force attempts on a dummy login page to understand password attack techniques.
23	Keylogger development using pynput: Build a basic keylogger in Python to understand keylogging techniques used in offensive operations.
24	Reverse shell implementation: Create a Python reverse shell script to simulate remote access tools used by attackers.
25	Automated OSINT data collection: Write a Python script that leverages public APIs to gather OSINT data about individuals or organizations.
26	Credential harvesting and log analysis simulation: Create detection scripts that simulate credential theft and analyze logs for indicators of compromise.

(2)

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 Objective:**

CLOBJ 1	Understand the fundamental concepts of matrices, systems of linear equations, and matrix decomposition techniques.
CLOBJ 2	Analyze eigenvalues, eigenvectors, diagonalization, and Cayley-Hamilton theorem for solving mathematical problems.
CLOBJ 3	Develop understanding of vector spaces, subspaces, basis, dimension, and linear dependence concepts.
CLOBJ 4	Apply linear transformations, rank-nullity theorem, and matrix representations in mathematical and engineering applications.
CLOBJ 5	Construct orthogonal and orthonormal bases using inner product spaces and Gram–Schmidt orthogonalization process.
CLOBJ 6	Apply linear algebra concepts in coding-decoding, data analysis, and computational applications such as Principal Component Analysis (PCA).

f. **Course Learning Outcomes:**

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

g. **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

h. Course Content:

Sr. No.	Content	Weightage	Teaching Hours
1	**Matrices** 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**
2	**Vector Space** Vector spaces over the field of real numbers, Elementary Properties of Vector Spaces, Subspaces, Spanning set, Linear independence and dependence, Basis and Dimension.	**20%**	**12**
3	**Linear Transformation:** 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.	**25%**	**15**
4	**Inner Product Spaces** Inner-product spaces, norm and its properties, angle between two vectors, orthogonal vectors, orthonormal vector, Gram-Schmidt process, orthonormal basis.	**20%**	**12**

i. 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

(3)

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 12thscience 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:**

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

f. **Course Learning Outcomes:**

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

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	60	20	30	20	20	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	Band theory& Semiconductors 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	Optoelectronics 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	Quantum Mechanics & Quantum ComputingQuantum 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	Low Dimensional Materials 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 Book and Reference Book:

1. Physics of Semiconductor Devices (TextBook) By S. M. Sze and K. N. Kwok | John Wiley & Sons
2. Semiconductor 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:

Sr. NO.	Experiment List
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 samples.
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.

(4)

a. Course Name: Objected Oriented Programming

b. Course Code: 03010502ES01

c. Prerequisite: strong foundation in programming and object oriented concepts.

d. Rationale: OOP in C++ provides a structured approach to programming by enabling encapsulation, inheritance, polymorphism, and abstraction. It enhances code reusability, maintainability, security, and scalability, making it a preferred choice for building largescale software applications

e. Course Learning Objective:

CLOBJ 1	Understand the fundamental principles of Object-Oriented Programming and differentiate it from procedural programming.
CLOBJ 2	Apply core C++ concepts including classes, objects, functions, constructors, and destructors.
CLOBJ 3	Implement various types of inheritance and use function overriding and virtual functions for achieving polymorphism.
CLOBJ 4	Use pointers, virtual functions, and the 'this' pointer effectively in object-oriented design.
CLOBJ 5	Develop modular and reusable code using features like function overloading, friend functions, inline functions, and access specifiers.
CLOBJ 6	Design and implement real-world applications using object-oriented programming concepts in C++.

f. Course Learning Outcomes:

CLO 1	Perform various Program of functions in C++.
CLO 2	Perform class and object concept of program
CLO 3	Apply constructors and destructors for object initialization and cleanup.
CLO 4	Demonstrate various inheritance types and function overriding.
CLO 5	Utilize pointers and virtual functions for dynamic behaviors.

g. Teaching & Examination Scheme:

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
2	-	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. No.	Content	Weightage	Teaching Hours
1	**Principles of Object Oriented Programming** Object Oriented Languages, Applications of Object Oriented Programming, C++ Concepts,Structure of C++ program,Basic Data types in C++, User defined Data types, Derived Data types,Declaration of variables and Dynamic initialization of variables, Reference variables,Operators	25%	5

	in C++, Scope Resolution Operators,Differentiate OOP and POP, Access Specifiers: Public, Private, Protected		
2	**Functions, Class and Objects** Concept of Functions in C++, Function prototyping, Function Defining, Function Calling, Inline Function, Default Arguments, Constant Arguments, Function Overloading,Defining Class and Creating Objects,Defining Member function , Nesting of Member functions, Private Member functions, Friend function	**25%**	**6**
3	**Constructor and Destructor** Constructor, Types of Constructor: Default Constructor, Parameterized Constructor, Copy Constructor, Destructor	**20%**	**6**
4	**Inheritance** Inheritance , Defining Derived Classes, Types of Inheritance : Single Inheritance, Multiple Inheritance, Multilevel Inheritance, Hybrid Inheritance, Function Overriding,Function Overloading vs. Function Overriding,Virtual Base Class , Abstract Classes.	**20%**	**6**
5	**Pointer & Virtual Functions** Pointers to objects,Pointer to Derived Classes , Virtual Functions, Pointer to Virtual Functions, 'this' Pointer.	**10%**	**6**

i. Text Book and Reference Book:

1. Object Oriented programming with C++ (TextBook) By E. Balagurusamy | TMH

2. The Complete Reference C++, (TextBook) By by Herbert Schildt | TMH

3. Object Oriented Programming with ANSI and Turbo C++ By Ashok Kamthane | Pearson

j. **Experiment List:**

Sr. NO.	**Experiment List**
1	Write a program to Display Hello World on your Output Screen in C++.
2	Write a C++ program to generate all the prime numbers between 1 and n, where n is a value supplied by the user.
3	Write a C++ Program to generate first n terms of Fibonacci sequence.
4	Write a program for recursive function.
5	Write a C++ program to find both the largest and smallest number in a list of integers.
6	Write a C++ Program to take two values from the user side and perform all kinds of Arithmetic Operation.
7	Write a C++ program to sort a list of numbers in ascending order.
8	Write a program to check Given Number is Even or Odd Using if-else in C++.

9	Write a Program that shows the use of call by reference and Call by Value in C++.
10	Write a Program to Demonstrate Friend Function and Friend Class.
11	Write a Program to show the use of Inline Function.
12	Create a Class named as “STUDENT”, Create two data members of that class:sid, smarks and Take two member Function of that class i.e.:GetData() to get the value of data member and ShowData() to Display the value of data members and call that function from the main function.
13	Create a Class named as “EMPLOYEE”, Declare Three Data Members i.e.: eid,ename and e-salary and create two member functions of that class i.e.: GetDetails() to get the input of all the datamembers and PrintDetails() to Display all the details of the Employee. (note: create eid of int datatype, e-name is of char array data type and e-salary is of float data type. 14. Write a Program to show the use of Function Overloading.
14	Write a Program to show the use of Single level inheritance.
15	Write a Program to show the use of multilevel inheritance.
16	Write a Program to show the use of multiple inheritance.
17	Write a Program to show the use of Hybrid inheritance.
18	Write a Program to show the use of Virtual Base Class.
19	Write a Program to show the use of a Default Constructor.
20	Write a Program to show the use of a Parameterized Constructor.
21	Write a Program to show the use of a Copy Constructor.
22	Write a Program to show the use of ‘this’ pointer.
23	Develop a program using pointers to derived classes.

(5)

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

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

f. **Teaching & Examination Scheme:**

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

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

g. **Experiment List:**

Sr. NO.	Experiment List
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-DHT
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

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a. **Course Name:** Environmental Science
b. **Course Code:** 03010002MC01
c. **Prerequisite:** Knowledge of Physics, Chemistry and Mathematics up to 12th science level and Biology up to 10th science level
d. **Rationale:** The proposed syllabus of Environmental Science is comprehensive and multidisciplinary, reflecting the interconnectedness of ecological systems, technological development, human behavior, and urban planning. This rationale explains the relevance and importance of each thematic area covered: Environmental Health, Ecology, and Quality of Life; Pollution Prevention; Population Growth and Global Environmental Challenges; Environmental Information Systems and Technological Tools; Smart Cities
e. **Course Learning Objective:**

CLOBJ 1	Understand the fundamentals of Environmental Science and the interaction between humans and the environment.
CLOBJ 2	Explain various types of environmental pollution, their impacts, and pollution control techniques.

CLOBJ 3	Explain various types of environmental pollution, their impacts, and pollution control techniques.
CLOBJ 4	Analyze contemporary environmental issues and sustainable development practices.
CLOBJ 5	Understand the concept of climate resilient cities and sustainable urban planning

f. Course Learning Outcomes:

CLO 1	Analyze the impact of human activities on environmental sustainability and ecosystems.
CLO 2	Promote awareness about biodiversity conservation and its importance for ecological balance.
CLO 3	Assess the effects of pollution and propose strategies for pollution control and waste management.
CLO 4	Describe the significance of climate change and its global implications on ecosystems and human life.
CLO 5	Develop skills to evaluate and mitigate environmental risks in industrial and urban development.

g. Teaching & Examination Scheme:

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

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	FUNDAMENTALS OF ENVIRONMENTAL SCIENCE Definition, Principles and Scope of Environmental Science. Structure and composition of atmosphere, hydrosphere, lithosphere and biosphere. Laws of thermodynamics, heat transfer processes, mass and energy transfer across various interfaces, material balance. Meteorological parameters - pressure, temperature, precipitation, humidity, radiation and wind velocity. Interaction between Earth, Man and Environment. Biogeographic provinces of the world and agro-climatic zones of India. Concept of sustainable development goals. Environmental education and awareness. Environmental ethics.	15%	3
2	ENVIRONMENTAL POLLUTION AND CONTROL Air, Noise, Water, Soil, Thermal, Marine, and Radioactive pollution, focusing on sources, types of pollutants, and their impacts on human health, plants, and materials. It includes the measurement techniques and standards for air and water	25%	4

	quality, along with pollution control devices and methods. Key topics include criteria air pollutants, noise indices, wastewater treatment, and soil pollution management.		
3	ENVIRONMENT MANAGEMENT AND LEGISLATION Overview of Environmental Laws in India: Constitutional provisions in India (Article 48A and 51A), Forest Conservation Act, 1980, Water (Prevention and Control of Pollution) Act, 1974 amended 1988 and Rules 1975, Air (Prevention and Control of Pollution) Act, 1981 amended 1987 and Rules 1982, Environmental (Protection) Act, 1986 and Rules 1986, The Hazardous and Other Waste (Management and Transboundary Movement) Rules, 2016, The Solid Waste Management Rules, 2016, , Noise Pollution (Regulation 8 and Control) Rules, 2000, Environmental Conventions and Agreements: Stockholm Conference on Human Environment 1972, Montreal Protocol, 1987, Basel Convention (1989, 1992), Earth Summit at Rio de Janeiro, 1992, Agenda-21, Global Environmental Facility (GEF), Convention on Biodiversity (1992), UNFCCC, Kyoto Protocol, 1997, Clean Development Mechanism (CDM), Copenhagen Summit, 2009.	25%	3
4	CONTEMPORARY ENVIRONMENTAL ISSUES Current Environmental Issues in India: Environmental issues related to water resource projects - Narmada dam, Tehri dam etc., Hydro-power projects in Jammu & Kashmir etc.. Water conservation-development of watersheds, Rain water harvesting and ground water recharge. National river conservation plan – Namami Gange and Yamuna Action Plan. Eutrophication and restoration of lakes. Conservation of wetlands, Ramsar sites in India. Climate change - adaptability, energy security, food security and sustainability. Wild life conservation projects: Project tiger, Project Elephant etc., Carbon sequestration and carbon credits. Waste Management – Swachha Bharat Abhiyan. Sustainable Habitat: Green Building, GRIHA Rating Norms. Vehicular emission norms in India. Epidemiological Issues: Fluorosis, Arsenocosis, Goitre, Dengue. Environmental Disasters: Minnamata Disaster, Love Canal Disaster, Bhopal Gas Disaster, 1984	15%	3
5	CLIMATE RESILIENT CITY Introduction to Climate Resilience – Understanding the need for cities to adapt to climate change. Impact of Climate Change on Cities – Urban heat islands, flooding, pollution, and infrastructure challenges. Sustainable Urban Planning – Role of green spaces, energy-efficient buildings, and smart city concepts. Green Infrastructure – Importance of urban forests, permeable surfaces, and nature-based solutions. Case Studies and Future Trends – Learning from cities like Singapore, Rotterdam, and Copenhagen.	20%	2

i. Text Book and Reference Book:

1. Textbook of Environmental Studies for Undergraduate Courses' (TextBook) By Erach Bharucha | Universities press
2. Basics of Environmental Studies By U K Khare | Tata McGraw Hi

3. Environmental Studies (TextBook) By Anindita Basak | Drling Kindersley(India)Pvt. Ltd Pearson
4. Environmental Sciences By Daniel B Botkin & Edward A Keller | John Wiley & Sons
5. Air Pollution By M. N. Rao and H. V. N. Rao; | Tata McGraw-Hill Publishing Company
6. Environmental Engineering By Howard S. Peavy, Donald R. Rowe, George Tchobanoglous | McGraw-Hill

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a. **Course Name:** Advanced Communication and Interpersonal Skills
b. **Course Code:** 03010002HM01
c. **Prerequisite:** Basic Communication Skills are essential for all Engineers
d. **Rationale:** Strengthen core language and soft skills through applied grammar, communication tasks, and vocabulary building.
e. **Course Learning Objective:**

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

CLO 1	Remember the essential rules of English grammar and core vocabulary required for accurate communication.
CLO 2	Understand spoken and written texts at an intermediate level to grasp meaning, ideas, and context.
CLO 3	Apply grammatical structures, vocabulary, and writing skills in essays, self-introductions, and everyday communication.
CLO 4	Analyze personal strengths and weaknesses through SWOT analysis to enhance grooming and personality development.
CLO 5	Analyze communication habits and daily routines to improve time management and professional effectiveness.

g. **Teaching & Examination Scheme:**

Teaching Scheme				Evaluation Scheme					
L	T	P	C	Internal Evaluation			ESE		Total
				MSE	CE	P	Theory	P	
1	-	2	2	40		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	Subject Verb Agreement Rules of subject-verb matching Singular vs plural forms Common agreement errors	10%	1
2	Reported Speech Direct and indirect speech Changing tenses, pronouns, and time expressions Reporting statements, questions, and commands	10%	1
3	Active and Passive Voice Difference between Active and Passive Rules for converting sentences Usage in real-life contexts	10%	1
4	Building Vocabulary Word meanings and usage Synonyms and antonyms Homonyms, Homophones, Homographs, Idioms	10%	2
5	Grooming and Personality Development Importance of dressing and professional etiquette Building confidence and positive body language	10%	2
6	SWOT Analysis with Self Introduction Identifying strengths, weaknesses, opportunities, threats Preparing and delivering a confident self-introduction Developing self-awareness and a growth mindset	10%	2
7	Reading Comprehension (Intermediate Level) Understanding written texts Finding main ideas and supporting details Answering questions accurately	10%	2
8	Listening Comprehension (Intermediate Level) Listening for specific information Identifying tone and purpose Responding appropriately	10%	1
9	Essay Writing Structure of an essay: introduction, body, conclusion Organizing ideas logically Using appropriate language and tone	10%	2
10	Time Management Importance of managing time Prioritization Creating schedules	10%	1

i. Text Book and Reference Book:

1. Technical Communication: Principles And Practice By Sangeetha Sharma, Meenakshi Raman | Oxford University Press | 2nd Edition
2. Personality Development and Soft Skills By Barun K Mitra | Oxford, 2011
3. High School English Grammar and Composition By Wren & Martin | S. Chand Publishing, Pub. Year 2017
4. English Grammar in Use By Raymond Murphy | Cambridge University Press, Pub. Year 2019
5. Communication Skills and Soft Skills By Suresh Kumar | Pearson Publication, 2010

Experiment List:

Sr. NO.	Experiment List
1	Subject Verb Agreement a. Fill-in-the-blank exercises b. Sentence correction tasks c. Group quiz competition d. Role-play using correct subject-verb forms
2	Reported Speech a. Dialogue conversion practice b. Pair work: narrate a conversation c. Reporting classroom news d. Role-play followed by reporting
3	Active and Passive Voice a. Transform active sentences to passive and vice versa b. Rewrite instructions in passive voice c. Classroom narration using passive structures d. Group activity: change story voice
4	Building Vocabulary a. Daily word journal b. Vocabulary flashcards and games c. Synonym-antonym match-up d. Word building through storytelling
5	Grooming and Personality Development a. Personal grooming checklist task b. Group discussion on personality traits c. Mock social interaction d. Confidence-building exercises
6	SWOT Analysis with Self Introduction a. SWOT worksheet filling b. Self-introduction in pairs or groups c. Strength-sharing circle d. Feedback on introductions
7	Reading Comprehension (Intermediate Level) a. Reading passage followed by Q&A b. Find-the-theme activity c. Vocabulary hunt from the passage d. Summarizing a short text
8	Listening Comprehension (Intermediate Level) a. Listen and answer exercises b. Listening and completing notes c. Audio- based MCQs d. Paraphrasing what was heard
9	Essay Writing a. Brainstorming and outline creation b. Writing on guided topics c. Peer feedback session d. Editing and final draft submission
10	Time Management and Team Building a. Create a weekly schedule b. Prioritization task (urgent vs important) c. Reflection on time use habits