JAIPUR ENGINEERING COLLEGE AND RESEARCH CENTRE	Jaipur Engineering college and research centre, Shri Ram ki Nangal, via Sitapura RIICO Jaipur- 302022.	**Academic year-2024-25**

Department of Electronics & Communication Engineering

Course Outcomes (CO's) -2024-25

III Semester Subjects
Subject: Advanced Engineering Mathematics-I (3EC2-01)
CO-1: Apply numerical methods for interpolation, numerical differentiation, integration, and solution of ordinary differential equations and polynomials.
CO-2: Solve ordinary differential equations using Laplace transforms.
CO-3: Analyze one-dimensional heat and wave equations using Fourier transforms.
CO-4: Implement Z-transform techniques for solving difference equations.
Subject: Technical Communication (3EC2-02)
CO-1: Demonstrate effective technical writing by applying appropriate concepts, styles, and methodologies.
CO-2: Develop proficiency in English language for higher studies and technical documentation.
CO-3: Evaluate various forms and aspects of technical communication used in professional settings.
Subject: Digital System Design (3EC4-04)
CO-1: Explain number systems and demonstrate their applications in digital electronics.
CO-2: Simplify Boolean functions using Karnaugh Maps for optimized circuit design.
CO-3: Design combinational and sequential circuits considering performance metrics.
CO-4: Analyze the interfacing of digital and analog components using ADCs and DACs.
CO-5: Design semiconductor memories and implement digital systems using PLDs and FPGAs.
Subject: Signals & Systems (3EC4-05)
CO-1: Classify signals and examine their properties and system behaviors.
CO-2: Interpret the behavior of linear shift-invariant systems.
CO-3: Analyze continuous and discrete-time systems using various transform techniques.
CO-4: Construct state-space models and apply sampling theorems for signal reconstruction.
Subject: Network Theory (3EC4-06)
CO-1: Apply basic circuit laws and theorems for network simplification.
CO-2: Utilize frequency-domain techniques in network analysis.
CO-3: Perform steady-state and transient analysis using Laplace transforms.
CO-4: Analyze transient responses and compute two-port network parameters.
CO-5: Examine resonance conditions and design passive filters.
Subject: Electronics Devices (3EC4-07)
CO-1: Explain semiconductor physics of intrinsic and extrinsic materials.
CO-2: Describe the current-voltage characteristics of BJT and MOSFET.
CO-3: Apply mathematical models of semiconductor devices in circuit analysis.

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CO-4: Analyze the characteristics and applications of electronic devices like amplifiers, LEDs, solar cells.
CO-5: Demonstrate understanding of IC fabrication through theoretical and experimental approaches.
Subject: Electronics Devices Lab (3EC4-21)
CO-1: Interpret the I-V characteristics of various electronic devices.
CO-2: Verify rectifier circuit behavior using hardware implementation.
CO-3: Design and construct CE, CC, and CS amplifiers; observe frequency response.
CO-4: Evaluate the characteristics of JFET and MOSFET for amplifier design.
CO-5: Examine the transistor frequency response for RF and high-frequency amplifier design.
Subject: Digital System Design Lab (3EC4-22)
CO-1: Verify logic gate truth tables through practical implementation.
CO-2: Minimize digital logic circuits using appropriate techniques.
CO-3: Design and evaluate combinational logic circuits.
CO-4: Construct and analyze sequential logic circuits.
CO-5: Implement applications using both combinational and sequential logic.
Subject: Signal Processing Lab (3EC4-23)
CO-1: Generate various continuous and discrete-time signals.
CO-2: Demonstrate operations on signals using MATLAB.
CO-3: Design and test basic signal processing algorithms.
CO-4: Generate and analyze random signals with specified distributions.
CO-5: Conduct experiments, interpret outcomes, and present findings effectively.
Subject: Computer Programming Lab-I (3EC3-24)
CO-1: Implement searching and sorting algorithms for structured data.
CO-2: Develop operations on nonlinear data structures using linked lists.
CO-3: Construct recursive and non-recursive algorithms for data manipulation.
Subject: Industrial Training (3EC7-30)
CO-1: Apply theoretical concepts of ECE in real-world industrial settings.
CO-2: Evaluate engineering technologies and practices in the industry.
CO-3: Enhance interpersonal skills through direct communication with industry professionals.
CO-4: Analyze professional roles and ethics in engineering contexts.
CO-5: Assess industrial processes with respect to safety, health, and societal impacts.

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IV Semester Subjects
Subject: Advanced Engineering Mathematics-II (4EC2-01)
CO-1: Apply differentiation and integration techniques to complex functions.
CO-2: Use residue theorem to evaluate complex integrals.
CO-3: Solve problems involving recurrence relations and special functions like Bessel and Legendre.
CO-4: Demonstrate concepts of linear systems and matrix theory in linear algebra.
Subject: Managerial Economics and Financial Accounting (4EC1-03)
CO-1: Explain fundamental concepts of economics.
CO-2: Interpret the relationship between demand and supply.
CO-3: Analyze production and cost behaviors in managerial contexts.
CO-4: Evaluate financial statements for decision-making.
Subject: Analog Circuit (4EC4-04)
CO-1: Analyze the operation of diodes and transistors.
CO-2: Design and analyze rectifiers and amplifiers.
CO-3: Design sinusoidal and non-sinusoidal oscillators.
CO-4: Evaluate OP-AMP operations and design applications.
CO-5: Design analog-to-digital and digital-to-analog conversion circuits.
Subject: Microcontroller (4EC4-05)
CO-1: Develop and execute assembly language programs.
CO-2: Interface peripherals such as I/O, A/D, D/A, and timers.
CO-3: Build systems using microcontrollers.
CO-4: Illustrate memory architecture of microcontrollers.
CO-5: Design embedded systems using RISC processors and ARM architecture.
Subject: Electronics Measurement and Instrumentation (4EC3-06)
CO-1: Describe working principles and applications of various measuring instruments.
CO-2: Develop measurement circuits using basic instrumentation tools.
CO-3: Analyze electronic parameters using modern instrumentation techniques.
CO-4: Identify suitable instruments for specific measurements.
CO-5: Apply transducers in diverse field applications.
Subject: Analog and Digital Communication (4EC4-07)
CO-1: Evaluate analog modulation techniques based on bandwidth and efficiency.
CO-2: Analyze system performance under noise conditions.
CO-3: Investigate pulse modulation techniques and assess performance.
CO-4: Analyze digital modulation schemes and determine BER performance.
CO-5: Design communication systems using both analog and digital modulation techniques.
Subject: Analog and Digital Communication Lab (4EC4-21)
CO-1: Demonstrate analog modulation and measure modulation index.
CO-2: Illustrate the working of a superheterodyne receiver.
CO-3: Implement time-division multiplexing in real-time systems.

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CO-4: Design and evaluate data formatting schemes.
CO-5: Analyze digital modulation schemes used in communication systems.
Subject: Analog Circuit Lab (4EC4-22)
CO-1: Examine BJT and FET operations in different regions.
CO-2: Design and test amplifiers and oscillators with feedback.
CO-3: Analyze analog circuits' linear and non-linear behavior through frequency response.
CO-4: Design OP-AMP-based circuits with specified characteristics and ensure stability.
CO-5: Perform experimental analysis and present results.
Subject: Microcontroller Lab (4EC4-23)
CO-1: Implement assembly language programs for microcontrollers.
CO-2: Demonstrate interfacing and control techniques including delays and interrupts.
CO-3: Develop microcontroller-based solutions for real-time applications.
CO-4: Explain interfacing functions of general-purpose devices.
CO-5: Design and prototype simple embedded systems.
Subject: Electronics Measurement and Instrumentation Lab (4EC4-24)
CO-1: Identify and explain measuring instruments used in electronic instrumentation.
CO-2: Measure passive components using various methods.
CO-3: Design instrumentation systems meeting specific criteria.
CO-4: Perform and interpret experimental results accurately.
CO-5: Apply transducer principles in industrial contexts.

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V Semester
Computer Architecture (5EC3-01)
CO-1: Explain the theory and structure of computers.
CO-2: Describe the architecture and functionality of the central processing unit.
CO-3: Design a simple CPU by applying theoretical concepts.
CO-4: Illustrate the I/O and memory organization.
Electromagnetic Waves (5EC4-02)
CO-1: Explain the fundamentals of electromagnetic waves and apply vector operations.
CO-2: Apply boundary conditions to Maxwell's equations for EM wave analysis.
CO-3: Analyze wave propagation on high-frequency transmission lines and use line sections to construct circuit elements.
CO-4: Characterize uniform plane waves and evaluate modal propagation in metallic waveguides.
CO-5: Explain the principles of radiation and evaluate the radiation characteristics of antennas.
Control System (5EC4-03)
CO-1: Model a system mathematically and determine its steady-state behavior.
CO-2: Assess the stability of a system using different techniques.
CO-3: Design various types of controllers.
CO-4: Solve linear, non-linear, and optimal control problems.
CO-5: Construct a state model for a given system of equations.
Digital Signal Processing (5EC4-04)
CO-1: Represent signals in continuous and discrete time, and in frequency domain.
CO-2: Evaluate the response of an LSI system to various input signals.
CO-3: Design digital filters for specific applications.
CO-4: Estimate spectral parameters of signals.
CO-5: Apply digital signal processing techniques in real-world scenarios.
Microwave Theory & Techniques (5EC4-05)
CO-1: Describe various microwave system components and their properties.
CO-2: Identify and apply mathematical techniques to analyze microwave systems.
CO-3: Solve complex problems involving microwave signals.
CO-4: Characterize different microwave components.
CO-5: Design microwave systems for practical applications.
Satellite Communication (5EC5-14)
CO-1: Explain the dynamics and architecture of satellite systems.
CO-2: Solve problems related to satellite orbital motion.
CO-3: Examine the design aspects of Earth stations and satellite tracking systems.
CO-4: Design and evaluate link power budgets.

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CO-5: Analyze analog and digital techniques used in satellite communication.
RF Simulation Lab (5EC4-21)
CO-1: Design and fabricate planar transmission lines.
CO-2: Design and fabricate microwave couplers and filters.
CO-3: Analyze techniques to determine circuit properties of microwave devices.
CO-4: Model and evaluate the performance of microwave circuits.
Digital Signal Processing Lab (5EC4-22)
CO-1: Generate and analyze elementary signals such as unit step and ramp.
CO-2: Simulate Fourier and Laplace transforms and analyze their outcomes.
CO-3: Generate random sequences with specified distributions.
CO-4: Implement DSP algorithms using MATLAB.
CO-5: Analyze the frequency response of digital FIR and IIR filters.
Microwave Lab (5EC4-23)
CO-1: Demonstrate the working of microwave components and instruments.
CO-2: Design and test transmission lines and microwave guides.
CO-3: Analyze measurement techniques for microwave parameters.
CO-4: Examine the characteristics of microstrip lines and their applications.
CO-5: Develop an understanding of planar transmission lines and microwave integrated circuits.
Industrial Training (5EC7-30)
CO-1: Apply ECE concepts and principles in industrial environments.
CO-2: Analyze technological aspects of electronics and communication industries.
CO-3: Enhance interpersonal skills through communication with industry professionals.
CO-4: Examine ethical responsibilities of engineers in industries.
CO-5: Evaluate the impact of industrial processes on health, safety, and society.

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VI Semester
Subject: Power Electronics (Code: 6EC3-01)
CO-1: Identify and apply the operation of semiconductor power devices such as SCR, Power Diode, DIAC, TRIAC, IGBT, GTO.
CO-2: Design rectifiers and inverters for R, RL, and RLE load conditions.
CO-3: Explain the fundamentals of power supplies, including step-up/step-down choppers, Buck and Boost converters, and UPS systems.
CO-4: Demonstrate control of speed in DC and induction motors.
Subject: Computer Network (Code: 6EC4-02)
CO-1: Explain and interpret queuing theory principles.
CO-2: Illustrate and evaluate layered protocol models and various network layer protocols.
CO-3: Analyze and assess standard computer network protocols using reference materials.
CO-4: Design network solutions for homes, data centers, IoT/IoE systems, LANs, and WANs.
Subject: Fiber Optics Communication (Code: 6EC4-03)
CO-1: Describe the principles of optical fiber communication including modes, configuration, materials, and losses.
CO-2: Explain the functioning of optical sources like LEDs, laser diodes, and OTDR.
CO-3: Analyze the working of photo receivers and evaluate materials, operations, and connectors used.
CO-4: Explain WDM techniques, optical amplifier operations, and optical fiber systems.
Subject: Antenna and Propagation (Code: 6EC4-04)
CO-1: Describe various types of antennas and their properties.
CO-2: Analyze the characteristics and design principles of antennas.
CO-3: Solve problems related to antenna performance.
CO-4: Conduct experiments involving antenna arrays and configurations.
CO-5: Design antennas to meet specific performance criteria.
Subject: 5G Communication (Code: 6EC4-05)
CO-1: Summarize the evolution of wireless communication and introduce the concept of 5G.
CO-2: Analyze the architecture and physical layout of 5G networks.
CO-3: Apply knowledge of modulation and access techniques used in 5G.
CO-4: Describe 5G communication methods and technologies.
CO-5: Design and propose smart technologies and slicing in 5G communication.
Subject: Introduction to MEMS (Code: 6EC5-11)
CO-1: Explain the functioning and applications of microsystems and micro devices.
CO-2: Describe MEMS fabrication processes.

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CO-3: Analyze micromachining techniques for developing MEMS structures.
Subject: Computer Network Lab (Code: 6EC4-21)
CO-1: Identify and utilize network components and design cables for various transmission media.
CO-2: Implement different network topologies using networking devices.
CO-3: Configure TCP/IP on both Windows and Linux platforms.
CO-4: Demonstrate device sharing across a network.
CO-5: Identify key software and hardware technologies in networks.
Subject: Antenna and Wave Propagation Lab (Code: 6EC4-22)
CO-1: Interpret basic characteristics and parameters of antennas and arrays.
CO-2: Analyze and compare performance of various practical antennas.
CO-3: Design antenna systems for reduced interference from the ground.
CO-4: Utilize CST Microwave Studio for antenna design simulations.
CO-5: Develop and implement antenna systems for real-time applications.
Subject: Electronics Design Lab (Code: 6EC4-23)
CO-1: Design various electronic circuits.
CO-2: Analyze the operation of Op-amps and amplifier circuits.
CO-3: Design and explain the operation of oscillators.
CO-4: Explain the functionality of filters and multivibrators.
CO-5: Design circuits based on operational amplifiers.
Subject: Power Electronics Lab (Code: 6EC4-24)
CO-1: Evaluate the characteristics of SCR, DIAC, TRIAC, and other power devices.
CO-2: Analyze power electronic converters, choppers, and inverters.
CO-3: Implement motor control for DC and induction motors using power electronics.

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VII Semester
Subject: VLSI Design (Code: 7EC5-11)
CO-1: Describe parameters of MOSFET and CMOS technologies.
CO-2: Apply and analyze properties and design of MOSFET and CMOS.
CO-3: Evaluate various dynamic CMOS circuit configurations.
CO-4: Design custom and ASIC components using FPGA and VHDL.
Subject: Environmental Engineering and Disaster Management (Code: 7AG6-60.2)
CO-1: Explain the significance and standards of safe water systems.
CO-2: Describe wastewater treatment processes and their supply systems.
CO-3: Identify sources, effects, and monitoring techniques of air pollutants.
CO-4: Discuss the role and importance of disaster management strategies.
Subject: VLSI Design Lab (Code: 7EC4-21)
CO-1: Implement interconversion of canonical forms through programming.
CO-2: Apply sequencing and graph coloring algorithms using programming.
CO-3: Implement decision trees using logical programming constructs.
CO-4: Model logic gates and combinational circuits in VHDL.
Subject: Advance Communication Lab (MATLAB Simulation) (Code: 7EC4-22)
CO-1: Explain analog-to-digital conversion and sampling concepts.
CO-2: Design digital modulation schemes including transmitter and receiver.
CO-3: Conduct experiments and develop codes for digital communication.
CO-4: Explain MIMO, fuzzy logic, and neural networks in communication systems.
Subject: Optical Communication Lab (Code: 7EC4-23)
CO-1: Demonstrate an optical fiber communication link and measure losses.
CO-2: Design and simulate optical waveguides and compensators.
CO-3: Evaluate parameters such as dispersion and power in optical systems.
Subject: Industrial Training (Code: 7EC7-30)
CO-1: Apply theoretical concepts in practical electronics and communication systems.
CO-2: Analyze the technological and engineering practices in industries.
CO-3: Enhance interpersonal skills through industry interaction.
CO-4: Evaluate the roles and responsibilities of engineers in industries.
CO-5: Assess industrial impacts on health, safety, and the environment.
Subject: Seminar (Code: 7EC7-40)
CO-1: Develop presentation and collaborative idea-sharing skills.

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CO-2: Share knowledge across diverse technical domains.
CO-3: Recognize industry trends and technological advancements.
CO-4: Build confidence and refine communication and personality skills.
CO-5: Conduct literature reviews and present innovative ideas.

VIII Semester
Subject: Digital Image and Video Processing (Code: 8EC5-12)
CO-1: Explain various image transformations and processing operations.
CO-2: Apply spatial and frequency domain techniques for enhancement and restoration.
CO-3: Illustrate compression and segmentation methods.
CO-4: Explain techniques for video processing and compression.
Subject: Disaster Management (Code: 8TT6-60.2)
CO-1: Describe the basic structure and components of disaster management.
CO-2: Discuss the social aspects of natural hazards and disaster responses.
CO-3: Identify technological hazards in textile industries and recommend mitigation.
CO-4: Acquire and apply mitigation strategies to minimize disaster impacts.
Subject: Internet of Things (IoT) Lab (Code: 8EC4-21)
CO-1: Explain IoT concepts and implement sensor interfacing with Arduino/Raspberry Pi.
CO-2: Develop data transmission protocols for wireless communication.
CO-3: Analyze and execute SQL queries for IoT-based database operations.
Subject: Skill Development Lab (Code: 8EC4-22)
CO-1: Demonstrate knowledge in technical domains through hands-on practice.
CO-2: Develop confidence and communication skills for presenting in industrial contexts.
Subject: Project (Code: 8EC7-50)
CO-1: Review and synthesize existing literature related to the chosen problem domain.
CO-2: Apply appropriate methodologies to develop solutions for the identified problem.
CO-3: Analyze the problem using suitable tools, techniques, and engineering principles.
CO-4: Create and implement a working solution or prototype addressing the problem.
CO-5: Prepare, document, and present a comprehensive project report with outcomes and conclusions.

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