

Department of Electronics & Communication Engineering

M. Tech. in Electronics and Communication Engineering

VISION

- Aiming for elite academic programs and substantial research output in cutting-edge fields such networking, digital signal processing, wireless communication, and multimedia.
- Striving to advance knowledge, create innovative algorithms, and create state-of-the-art hardware and software systems.
- Developing solutions that strengthen society and the standard of life in a world driven by technology and produces graduates capable of succeeding in the dynamic, competitive and global setting of academia and the tech industries.

MISSION

- Offering an exigent curriculum that addresses the theoretical and practical facets of contemporary signal processing and communications systems.
- Equipping students specialized expertise and hands-on experience with software and hardware resources that pertain to the design and application of communication and signal processing platforms.
- Setting up a robust research atmosphere, inspiring students to explore pressing research problems, publishing at national/international levels, and build exploratory solutions with high regard for ethical principles and human values and to pursue knowledge as a process of lifelong learning.

PROGRAMME EDUCATIONAL OBJECTIVES:

PEO1: To provide students a solid foundation in electronics and communication engineering so they can pursue higher education, entrepreneurship, and professional careers.

PEO2: To foster ethical leadership, communicative, and professional ethics in order to develop creative solutions that benefit the environment and society.

PROGRAM SPECIFIC OUTCOME (PSOs)

PSO1: Develop expertise in Microelectronics, VLSI Design, and Fabrication to create future integrated circuits to meet the manpower demands for the semiconductor industries.

PSO2: Acquire professional and intellectual integrity and strict adherence to research ethics to ensure competence and sustainability in advanced Academics or Industry environments.

PROGRAMME OUTCOMES:

PO1: **Advanced Disciplinary Knowledge:** Graduates will be able to demonstrate comprehensive and in-depth knowledge and comprehension of the major issues, theories, and recent developments within their specialized field of study.

PO2: Critical Thinking and Problem Solving: Graduates will be able to apply analytical and critical thinking skills to identify, evaluate, and solve complex, real-world problems, utilizing evidence-based reasoning and potentially developing innovative solutions.

PO3: Research and Inquiry Skills: Graduates will be able to design, conduct, and manage independent research or scholarly projects, which includes the ability to identify, source, retrieve, critically appraise, and synthesize information from a variety of scholarly sources

PO4: Technical Communication: An ability to write and present a substantial technical report or document effectively for both the engineering community and society at large.

PO5: Modern Tool Usage and Problem Solving: The ability to apply advanced knowledge, techniques, skills, and modern engineering and advanced IT tools to analyze and solve complex engineering problems in the chosen field.

COURSE CO-PO-PSO MAPPING

SEMESTER-I

COURSE 2 (Introduction to Signal Analysis and Processing)

COURSE OUTCOMES:

CO1: Describe the fundamental principles of sampling, quantization, and analog-to-digital conversion for processing continuous-time signals.

CO2: Apply the Discrete Fourier Transform (DFT) and Fast Fourier Transform (FFT) algorithms for frequency domain analysis of signals, accounting for effects like leakage.

CO3: Design Finite Impulse Response (FIR) and Infinite Impulse Response (IIR) digital filters using various design techniques to meet specified frequency response characteristics.

CO4: Analyze the principles of multirate signal processing, including decimation, interpolation, and polyphase decomposition, to design efficient sampling rate alteration systems.

CO5: Evaluate the performance of different non-parametric and parametric methods for power spectral estimation of random signals.

MAPPING OF COs WITH POs AND PSOs

COURSE OUTCOMES	PROGRAMME OUTCOMES					PROGRAMME SPECIFIC OUTCOMES	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2
CO1	3	1	1	-	1	1	1
CO2	3	2	1	1	2	2	1
CO3	3	3	2	2	3	3	2
CO4	3	3	2	2	3	3	2
CO5	3	3	3	2	3	2	2

1. LOW

2. MODERATE

3. SUBSTANTIAL

Introduction to Signal Analysis and Processing Lab

COURSE OUTCOMES:

CO1: Explain the generation of various elementary signals in MATLAB.

CO2: Analyse basic signal processing operations like convolution, correlation etc.

CO3: Analyse the spectrum of discrete time signals using DFT.

CO4: Implement various efficient computation technique using DITFFT and DIFFFT algorithm.

CO5: Design FIR and IIR filters using various techniques.

MAPPING OF COs WITH POs AND PSOs

COURSE OUTCOMES	PROGRAMME OUTCOMES					PROGRAMME SPECIFIC OUTCOMES	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2
CO1	3	2	2	1	3	3	3
CO2	3	3	2	2	3	3	3
CO3	3	3	3	2	3	3	3
CO4	3	3	3	2	3	3	3
CO5	3	3	3	3	3	3	3

1. LOW

2. MODERATE

3. SUBSTANTIAL

COURSE 3 (Advanced VLSI Design)

COURSE OUTCOMES:

CO1: Remember the syntax and basic constructs of Hardware Description Languages (HDLs) like VHDL and Verilog.

CO2: Understand the functional behaviour of basic and sequential digital CMOS circuits (e.g., Inverter, NAND, NOR, Latches).

CO3: Apply HDL programming skills to model, simulate, and verify the functionality of various combinational and sequential logic circuits.

CO4: Analyse the simulation results to debug and validate the design against expected logical outcomes.

CO5: Create and synthesize digital designs for fundamental building blocks using industry-standard EDA tools.

MAPPING OF COs WITH POs AND PSOs

COURSE OUTCOMES	PROGRAMME OUTCOMES					PROGRAMME SPECIFIC OUTCOMES	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2
CO1	2	-	-	-	2	2	1
CO2	2	1	-	-	1	2	2
CO3	3	2	3	2	3	3	2
CO4	2	3	2	3	3	2	3
CO5	3	2	3	2	3	3	3

1. LOW

2. MODERATE

3. SUBSTANTIAL

Advanced VLSI Design Lab

COURSE OUTCOMES:

CO1: Learn the basic principles of CMOS logic gates (AND, OR, NOT, NAND, NOR, XOR, XNOR). Develop the ability to design and implement basic CMOS logic gates using VHDL.

CO2: Develop skills in organizing and connecting logic gates to create a working full adder and half subtractor circuit.

CO3: Learn debugging techniques for verifying the functionality of the multiplexer by testing all possible select line combinations and ensuring correct output selection.

CO4: Simulate the decoder circuit using design and simulation software tools (e.g., Xilinx) to verify its functionality.

CO5: Gain a solid understanding of sequential circuits, Flip Flop designs, and logic optimization.

MAPPING OF COs WITH POs AND PSOs

COURSE OUTCOMES	PROGRAMME OUTCOMES					PROGRAMME SPECIFIC OUTCOMES	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2
CO1	3	2	1	3	3	2	3
CO2	3	3	2	3	2	1	3
CO3	3	2	1	3	3	2	1
CO4	3	3	3	2	3	2	1
CO5	1	1	1	1	1	2	1

1. LOW

2. MODERATE

3. SUBSTANTIAL

COURSE 4A (Quantum Theory of Solids)

COURSE OUTCOMES:

- CO1:** Basic postulates of quantum mechanics.
CO2: Approximation techniques and variational techniques.
CO3: Density operator formalism for mixed states.
CO4: Basic ideas of open quantum systems.
CO5: Basic ideas of quantum foundations like entanglement.

MAPPING OF COs WITH POs AND PSOs

COURSE OUTCOMES	PROGRAMME OUTCOMES					PROGRAMME SPECIFIC OUTCOMES	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2
CO1	3	2	1	1	1	2	1
CO2	2	3	2	-	-	2	2
CO3	2	2	2	2	-	3	2
CO4	3	2	2	-	2	2	2
CO5	2	3	2	3	3	2	3

1. LOW

2. MODERATE

3. SUBSTANTIAL

COURSE 4B (Advanced Communication)

COURSE OUTCOMES:

- CO1:** To study the concepts fundamentals of optical communications and evolution of mobile communication generations.
CO2: To implement the applications of photodetectors.
CO3: To explain the concept of wireless networks, and different types of modelling approach.
CO4: To study the designing concept of Universal Mobile Telecommunication System and the related architecture.
CO5: To study the concept of satellite communication, software defined radio.

MAPPING OF COs WITH POs AND PSOs

COURSE OUTCOMES	PROGRAMME OUTCOMES					PROGRAMME SPECIFIC OUTCOMES	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2
CO1	3	2	1	1	1	2	1
CO2	2	3	2	-	-	2	2
CO3	3	2	2	2	-	3	2
CO4	2	2	2	2	2	2	3
CO5	3	2	3	3	2	3	2

1. LOW

2. MODERATE

3. SUBSTANTIAL

MAPPING OF COs WITH POs AND PSOs

COURSE OUTCOMES	PROGRAMME OUTCOMES					PROGRAMME SPECIFIC OUTCOMES	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2
CO1	1	2	1	1	-	-	1
CO2	2	1	2	-	-	2	-
CO3	-	2	2	-	-	2	-
CO4	-	-	-	2	-	-	-
CO5	-	1	1	2	-	-	-

1. LOW

2. MODERATE

3. SUBSTANTIAL

COURSE 5B (Advanced Programming Language)

COURSE OUTCOMES:

CO1: Recall Python syntax, keywords, and control structures used in basic programming.

CO2: Explain the use of decision-making constructs, loops, and data structures like lists, tuples, and dictionaries in solving problems.

CO3: Develop modular Python programs using user-defined and recursive functions for real-world tasks.

CO4: Analyze the structure and behavior of programs involving file handling and data visualization using Matplotlib.

CO5: Design and implement Python-based applications that integrate multiple concepts from the course.

MAPPING OF COs WITH POs AND PSOs

COURSE OUTCOMES	PROGRAMME OUTCOMES					PROGRAMME SPECIFIC OUTCOMES	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2
CO1	3	1	1	-	-	-	-
CO2	3	-	1	-	-	-	-
CO3	3	-	1	-	-	-	-
CO4	2	3	3	-	-	-	-
CO5	3	2	2	-	-	-	-

1. LOW

2. MODERATE

3. SUBSTANTIAL

Advanced Programming Language Lab

COURSE OUTCOMES:

CO1: Recall Python syntax, keywords, and control structures used in basic programming.

CO2: Explain the use of decision-making constructs, loops, and data structures like lists, tuples, and dictionaries in solving problems.

SEMESTER-II

COURSE 1 (Microcontrollers and Embedded Systems)

COURSE OUTCOMES:

CO1: Understand Assembly Language/embedded C programming of Microcontroller.

CO2: Understand interfacing simple peripheral devices to Microcontroller.

CO3: Engage student groups to design and implement simple embedded systems.

CO4: Apply appropriate techniques, resources for modeling embedded systems with understanding of limitations.

CO5: Work individually and in a group to develop embedded systems.

MAPPING OF COs WITH POs AND PSOs

COURSE OUTCOMES	PROGRAMME OUTCOMES					PROGRAMME SPECIFIC OUTCOMES	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2
CO1	3	1	1	1	1		1
CO2	3	2	1	1	1		1
CO3	2	2	1	2	1	1	1
CO4	3	2	2	1	1		1
CO5	3	3	1	1	2		2

1. LOW

2. MODERATE

3. SUBSTANTIAL

Microcontrollers and Embedded Systems Lab

COURSE OUTCOMES:

CO1: Demonstrate the skills in Assembly Language Programming of microprocessors and microcontroller.

CO2: Apply the basic knowledge of microprocessor to delay generation, and waveform generation.

CO3: Apply the concepts of Interfacing to connect external peripheral with the microprocessor 8085.

CO4: Apply the concepts of Interfacing to connect external peripheral with the microcontroller 8051.

CO5: Implement microcontroller based simple real time applications.

MAPPING OF COs WITH POs AND PSOs

COURSE OUTCOMES	PROGRAMME OUTCOMES					PROGRAMME SPECIFIC OUTCOMES	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2
CO1	3	2	2	1	1	2	1
CO2	2	2	1	1	1	2	1
CO3	2	2	2	2	1	1	1
CO4	2	2	2	1	2	2	1
CO5	1	2	1	1	2	1	2

1. LOW

2. MODERATE

3. SUBSTANTIAL

COURSE 2 (Image Processing)

COURSE OUTCOMES:

CO1: Implement and apply basic image manipulation operations, including file I/O, intensity transformations, and spatial filtering using a programming environment.

CO2: Analyze image characteristics in the frequency domain by applying the 2D Discrete Fourier Transform (DFT) and designing frequency domain filters for smoothing and sharpening.

CO3: Evaluate the efficacy of various edge detection operators (e.g., Sobel, Canny, Laplacian) by testing them on different image types and measuring their performance.

CO4: Develop programs to perform morphological operations, image restoration, and basic object segmentation tasks using algorithms like thresholding and region growing.

CO5: Determine the optimal parameters for image compression algorithms (e.g., run-length encoding, Huffman coding, or JPEG) to achieve a desired balance between compression ratio and fidelity.

MAPPING OF COs WITH POs AND PSOs

COURSE OUTCOMES	PROGRAMME OUTCOMES					PROGRAMME SPECIFIC OUTCOMES	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2
CO1	3	1	1	1	1		1
CO2	3	1	1	2	1		1
CO3	2	3	2	2	1		1
CO4	3	2	2	1	1		1
CO5	3	3	1	1	2		1

1. LOW

2. MODERATE

3. SUBSTANTIAL

Image Processing Lab

COURSE OUTCOMES:

CO1: Describe digital image representation, manipulation and illustrate the use of histograms.

CO2: Applying various Geometric transformations on image and Illustrate Two- dimensional Fourier transform.

CO3: Use and compare, various linear filtering methods.

CO4: Applying various Ideal filters in the frequency domain and understand the concept of edge detection.

CO5: Compose various morphological operations on binary images and generate their transformed images.

MAPPING OF COs WITH POs AND PSOs

COURSE OUTCOMES	PROGRAMME OUTCOMES					PROGRAMME SPECIFIC OUTCOMES	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2
CO1	3	2	-	2	3	-	-
CO2	3	1	-	-	3	2	-
CO3	3	1	-	2	3	-	3
CO4	3	2	-	2	3	2	3
CO5	3	2	-	2	3	2	3

1. LOW

2. MODERATE

3. SUBSTANTIAL

COURSE 3(1A) (Quantum Computing)

COURSE OUTCOMES:

CO1: Explain the foundational principles of quantum computation including qubits, Bloch sphere representation, multiple-qubit systems, Hilbert spaces, measurements, and entanglement.

CO2: Design and analyze quantum circuits using single-qubit and multi-qubit gates, and demonstrate logical operations through circuit diagrams and simulations.

CO3: Compare and evaluate concepts in quantum information and cryptography, including Bell states, quantum teleportation, quantum cryptography protocols, and the no-cloning theorem.

CO4: Apply major quantum algorithms such as Deutsch's, Deutsch-Jozsa, Shor's factorization, and Grover's search to appropriate computational problems and assess their advantage over classical algorithms.

CO5: Interpret and implement techniques for noise resilience and fault tolerance in quantum systems, including graph states, quantum error correction codes, and fault-tolerant quantum computation.

MAPPING OF COs WITH POs AND PSOs

COURSE OUTCOMES	PROGRAMME OUTCOMES					PROGRAMME SPECIFIC OUTCOMES	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2
CO1	3	2	1				1
CO2	3	3	1		1	1	1
CO3	3	3	1			1	1
CO4	3	3	1		1	2	2
CO5	2	3	2		1	1	2

1. LOW

2. MODERATE

3. SUBSTANTIAL

COURSE 3(1B) (Semiconductor Optoelectronic Devices)

COURSE OUTCOMES:

CO1: Explain semiconductor physics concepts relevant to optoelectronic devices, including energy band diagrams, density of states, carrier statistics, heterostructures, and quantum wells.

CO2: Analyze the interaction of light with semiconductor materials—such as absorption, spontaneous emission, stimulated emission, and amplification—and determine the conditions necessary for optical gain.

CO3: Evaluate the structure, principles of operation, and performance characteristics of key semiconductor photon sources including LEDs, laser diodes, quantum-well lasers, DFB/DBR lasers, and VCSELs.

CO4: Examine and compare semiconductor optical amplifiers and optical modulators, focusing on SOA operation, device characteristics, and modulation mechanisms including the quantum-confined Stark effect and electro-absorption.

CO5: Assess and select appropriate photodetector architectures—including photoconductors, PIN diodes, APDs, phototransistors, solar cells, CCDs, and OEICs—by analyzing responsivity, noise behavior, material choice, and performance parameters.

MAPPING OF COs WITH POs AND PSOs

COURSE OUTCOMES	PROGRAMME OUTCOMES					PROGRAMME SPECIFIC OUTCOMES	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2
CO1	3	2	1			1	1
CO2	3	3	1		1	1	1
CO3	3	3	1		1	2	1
CO4	3	3	1		1	2	2
CO5	3	3	2		2	2	2

1. LOW

2. MODERATE

3. SUBSTANTIAL

COURSE 3(1C) (Advanced MEMS Devices)

COURSE OUTCOMES:

- CO1:** Apply the principles behind the operations of MEMS devices.
CO2: Describe a Micromachine technique for a specific MEMS fabrication process.
CO3: Explain various techniques of surface Micromachining for MEMS devices.
CO4: Apply recent advancements in the field of RF MEMS devices.
CO5: Classify and use of Physical micro sensors.

MAPPING OF COs WITH POs AND PSOs

COURSE OUTCOMES	PROGRAMME OUTCOMES					PROGRAMME SPECIFIC OUTCOMES	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2
CO1	3	3	3	3	-	2	2
CO2	2	2	2	2	-	3	2
CO3	3	3	2	3	-	3	2
CO4	3	2	2	2	-	2	2
CO5	2	3	2	2	-	3	2

1. LOW

2. MODERATE

3. SUBSTANTIAL

COURSE 3(1D) (Advanced Power Electronics)

COURSE OUTCOMES:

- CO1:** Define and recognize power semiconductor devices (Diodes, SCRs, BJTs, MOSFETs, IGBTs), their switching characteristics, ratings, and the design of associated gate driver and snubber circuits for reliable converter operation.
CO2: Identify and explain various non-isolated converter topologies such as Buck, Boost, Buck-Boost, Cuk, and SEPIC converters, accounting for both continuous and discontinuous conduction modes and the impact of non-idealities.
CO3: Infer and classify isolated converter configurations including Flyback, Forward, and Push-Pull converters, emphasizing their operation principles, component selection, and performance under different load conditions.
CO4: Formulate mathematical models for DC-DC converters and execute suitable control strategies (including frequency-domain techniques and voltage feedback control) to ensure dynamic stability and regulated output performance.
CO5: Design and construct input filters for power electronic converters, assessing their impact on electromagnetic interference (EMI), converter dynamics, and overall system efficiency and stability.

MAPPING OF COs WITH POs AND PSOs

COURSE OUTCOMES	PROGRAMME OUTCOMES					PROGRAMME SPECIFIC OUTCOMES	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2
CO1	3	2	1	1	1		1
CO2	3	2	1	1	2		1
CO3	3	2	1	2	1	1	1
CO4	3	3	2	1	1	1	1
CO5	3	3	1	1	2	1	2

1. LOW

2. MODERATE

3. SUBSTANTIAL

COURSE 3(2A) (Advanced Networking Technologies)

COURSE OUTCOMES:

CO1: Explain troubleshooting strategies, host configuration, and network management techniques using routers, switches, and bridges in different network operating systems.

CO2: Analyze IPv6 addressing, configuration, and security aspects along with Quality of Service (QoS) and VoIP implementation challenges.

CO3: Describe the architecture and implementation strategies of storage area networks (SAN) and virtual private networks (VPN).

CO4: Evaluate optical networking technologies such as Wavelength Division Multiplexing (WDM), photonic packet switching, and IP-over-WDM design approaches.

CO5: Apply knowledge of network monitoring and management using SNMP (v1/v2/v3), RMON, and RMON2 protocols for performance and fault analysis.

MAPPING OF COs WITH POs AND PSOs

COURSE OUTCOMES	PROGRAMME OUTCOMES					PROGRAMME SPECIFIC OUTCOMES	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2
CO1	3	2	1	1	2		1
CO2	3	3	2	1	2		1
CO3	3	2	1	2	1		1
CO4	3	3	2	1	1		1
CO5	3	3	1	1	3		2

1. LOW

2. MODERATE

3. SUBSTANTIAL

COURSE 3(2B) (Wireless and Mobile Communication)

COURSE OUTCOMES:

CO1: Explain the fundamental principles of cellular communication, including frequency reuse, handoff, interference management, and GSM system architecture and operations.

CO2: Analyze and compare multiple access techniques (FDMA, TDMA, CDMA) in terms of spectral efficiency, advantages, disadvantages, and application areas.

CO3: Evaluate radio propagation characteristics and develop link budgets using large-scale and small-scale fading models for different wireless environments.

CO4: Apply techniques such as equalization and diversity to mitigate multipath fading and improve wireless communication performance.

CO5: Examine the architectures, protocols, and evolution of modern cellular standards including IS-95, CDMA2000, UMTS, LTE, and 5G technologies.

MAPPING OF COs WITH POs AND PSOs

COURSE OUTCOMES	PROGRAMME OUTCOMES					PROGRAMME SPECIFIC OUTCOMES	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2
CO1	3	1					
CO2	3	3	1				
CO3	3	3	2		2		
CO4	3	3	1		2		
CO5	3	2	2	1	1		1

1. LOW

2. MODERATE

3. SUBSTANTIAL

COURSE 3(2C) (Satellite Communication)

COURSE OUTCOMES:

CO1: Explain the fundamental architecture of satellite communication systems, including their advantages, applications, and the characteristics of different frequency bands.

CO2: Apply Kepler's laws and orbital equations to determine key orbital parameters such as velocity, period, and the location of apogee and perigee for a satellite.

CO3: Analyze the impact of phenomena like solar eclipse, sun transit outage, and Doppler shift on satellite operations and evaluate the appropriate remedies.

CO4: Design a satellite link budget by calculating signal power, system noise temperature, and C/N ratio to ensure reliable link performance under various atmospheric conditions.

CO5: Evaluate the suitability of different modulation and multiple access schemes for specific satellite applications like VSAT, DBS-TV, and GPS.

COURSE 4A (Internet of Things)

COURSE OUTCOMES:

CO1: Explain the evolution of IoT and networking fundamentals—including smart cities, M2M communication, IPv4/IPv6 addressing, and peer-to-peer connectivity—that enable pervasive smart environments.

CO2: Analyze IoT communication architectures and protocols—including SDN, fog, mist, and edge networking—with emphasis on modular design, security, and privacy in distributed IoT systems.

CO3: Examine wireless sensor network architectures (PAN, LAN, WAN) and edge resource management strategies such as resource pooling, caching, and client-side configuration.

CO4: Design and implement IoT systems using smart objects, open-source hardware platforms, embedded system interfaces, and multithreaded programming for edge/gateway applications.

CO5: Evaluate IoT operating systems (e.g., mbed, RIOT, Contiki) and major IoT applications—including transportation, smart grid, and healthcare—considering security, legal frameworks, and regulatory compliance.

MAPPING OF COs WITH POs AND PSOs

COURSE OUTCOMES	PROGRAMME OUTCOMES					PROGRAMME SPECIFIC OUTCOMES	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2
CO1	3	2	1			1	
CO2	3	3	1		1	1	1
CO3	3	3	1		1	1	1
CO4	3	3	1		2	2	1
CO5	3	2	2		1	1	2

1. LOW

2. MODERATE

3. SUBSTANTIAL

COURSE 4B (Artificial Intelligence)

COURSE OUTCOMES:

CO1: Explain the fundamental concepts of intelligent systems and their architecture.

CO2: Illustrate uninformed and informed search techniques for problem solving in intelligent systems.

CO3: Solve Constraint Satisfaction Problems using search techniques.

CO4: Represent AI domain knowledge using logic systems and use inference techniques for reasoning in intelligent systems.

CO5: Illustrate different types of learning techniques used in intelligent systems.

MAPPING OF COs WITH POs AND PSOs

COURSE OUTCOMES	PROGRAMME OUTCOMES					PROGRAMME SPECIFIC OUTCOMES	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2
CO1	3	1	-	-	-	3	1
CO2	3	2	1	-	2	3	2
CO3	3	2	2	1	2	3	2
CO4	3	3	3	2	3	3	3
CO5	3	3	3	2	2	3	3

1. LOW

2. MODERATE

3. SUBSTANTIAL

COURSE 2A (Wireless Sensor Networks)

COURSE OUTCOMES:

CO1: Explain the fundamental principles, architectures, and design challenges of wireless sensor networks.

CO2: Implement suitable communication, MAC, and routing mechanisms for typical Wireless Sensor Network scenarios.

CO3: Analyze sensor-network protocols, energy constraints, and data dissemination strategies to determine their suitability for diverse applications.

CO4: Evaluate the performance, scalability, and security aspects of wireless sensor network deployments under varying operational conditions.

CO5: Design optimized sensor-network solutions integrating routing, energy management, and application-specific requirements.

MAPPING OF COs WITH POs AND PSOs

COURSE OUTCOMES	PROGRAMME OUTCOMES					PROGRAMME SPECIFIC OUTCOMES	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2
CO1	3	1					
CO2	3	2	1		2		
CO3	3	3	2		2		
CO4	3	3	2	1	1		2
CO5	3	3	2	1	3		2

1. LOW

2. MODERATE

3. SUBSTANTIAL

COURSE 2B (Remote Sensing)

COURSE OUTCOMES:

CO1: Explain services and mechanisms for effective counter measures.

CO2: Describe different concepts and terms used in Remote Sensing and its data.

CO3: Understand the Data conversion and Process in different coordinate systems of GIS interface.

CO4: Evaluate the accuracy of Data and implementing a GIS.

CO5: Understand the applicability of RS and GIS for various applications.

MAPPING OF COs WITH POs AND PSOs

COURSE OUTCOMES	PROGRAMME OUTCOMES					PROGRAMME SPECIFIC OUTCOMES	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2
CO1	3	1	2	2	3	2	1
CO2	3	1	2	2	3	3	2
CO3	1	2	3	1	3	2	3
CO4	2	2	2	2	3	3	2
CO5	3	3	1	3	3	3	3

1. LOW

2. MODERATE

3. SUBSTANTIAL

COURSE 2C (High speed Communication Network)

COURSE OUTCOMES:

CO1: Explain the principles and architecture of high-speed networks, including broadband technologies like ATM, Frame Relay, and High-Speed Ethernet.

CO2: Apply fundamental Queuing Theory models to calculate and predict network performance metrics such as throughput, delay, and utilization.

CO3: Analyze the mechanisms and algorithms for Congestion and Traffic Management in TCP and ATM networks, including algorithms like GCRA and RED.

CO4: Evaluate the protocols and architectures used for providing Quality of Service (QoS), such as Integrated Services (IntServ), Differentiated Services (DiffServ), and RSVP.

CO5: Design and propose solutions for next-generation network challenges using advanced technologies like MPLS, WDM, or emerging 5G/6G concepts.

MAPPING OF COs WITH POs AND PSOs

COURSE OUTCOMES	PROGRAMME OUTCOMES					PROGRAMME SPECIFIC OUTCOMES	
	PO1	PO2	PO3	PO4	PO5	PSO1	PSO2
CO1	3	1	1	1	1		1
CO2	3	2	1	1	1		1
CO3	2	2	1	2	1	1	1
CO4	3	2	2	1	1		1
CO5	3	3	1	1	2		2

1. LOW

2. MODERATE

3. SUBSTANTIAL

SEMESTER-IV



Bloom's Taxonomy Verbs:

Remember (BT1)	Understand (BT2)	Apply (BT3)	Analyze (BT4)	Evaluate (BT5)	Create (BT6)
Cite	Add	Acquire	Analyze	Appraise	Abstract
Define	Approximate	Adapt	Audit	Assess	Animate
Describe	Articulate	Allocate	Blueprint	Compare	Arrange
Draw	Associate	Alphabetize	Breadboard	Conclude	Assemble
Enumerate	Characterize	Apply	Break down	Contrast	Budget
Identify	Clarify	Ascertain	Characterize	Counsel	Categorize
Index	Classify	Assign	Classify	Criticize	Code
Indicate	Compare	Attain	Compare	Critique	Combine
Label	Compute	Avoid	Confirm	Defend	Compile
List	Contrast	Back up	Contrast	Determine	Compose
Match	Convert	Calculate	Correlate	Discriminate	Construct
Meet	Defend	Capture	Detect	Estimate	Cope
Name	Describe	Change	Diagnose	Evaluate	Correspond
Outline	Detail	Classify	Diagram	Explain	Create
Point	Differentiate	Complete	Differentiate	Grade	Cultivate
Quote	Discuss	Compute	Discriminate	Hire	Debug
Read	Distinguish	Construct	Dissect	Interpret	Depict
Recall	Elaborate	Customize	Distinguish	Judge	Design
Recite	Estimate	Demonstrate	Document	Justify	Develop
Recognize	Example	Depreciate	Ensure	Measure	Devise
Record	Explain	Derive	Examine	Predict	Dictate
Repeat	Express	Determine	Explain	Prescribe	Enhance
Reproduce	Extend	Diminish	Explore	Rank	Explain
Review	Extrapolate	Discover	Figure out	Rate	Facilitate
Select	Factor	Draw	File	Recommend	Format
State	Generalize	Employ	Group	Release	Formulate
Study	Give	Examine	Identify	Select	Generalize
Tabulate	Infer	Exercise	Illustrate	Summarize	Generate
Trace	Interact	Explore	Infer	Support	Handle
Write	Interpolate	Expose	Interrupt	Test	Import
	Interpret	Express	Inventory	Validate	Improve
	Observe	Factor	Investigate	Verify	Incorporate
	Paraphrase	Figure	Layout		Integrate
	Picture graphically	Graph	Manage		Interface
	Predict	Handle	Maximize		Join
	Review	Illustrate	Minimize		Lecture
	Rewrite	Interconvert	Optimize		Model
	Subtract	Investigate	Order		Modify
	Summarize	Manipulate	Outline		Network
	Translate	Modify	Point out		Organize
	Visualize	Operate	Prioritize		Outline
		Personalize	Proofread		Overhaul
		Plot	Query		Plan
		Practice	Relate		Portray
		Predict	Select		Prepare
		Prepare	Separate		Prescribe
		Price	Subdivide		Produce
		Process	Train		Program



		Produce	Transform		Rearrange
		Project			Reconstruct
		Provide			Relate
		Relate			Reorganize
		Round off			Revise
		Sequence			Rewrite
		Show			Specify
		Simulate			Summarize
		Sketch			
		Solve			
		Subscribe			
		Tabulate			
		Transcribe			
		Translate			
		Use			