



**COLLEGE OF ENGINEERING
VADAKARA
DEPARTMENT OF ELECTRONICS
AND COMMUNICATION
ENGINEERING**

COURSE OUTCOMES (2024 Scheme)

Sem & Subject	CO #	Course Outcome Description
GYMAT101 - Mathematics for Electrical Science-1 (S1)	CO1	Solve systems of linear equations and diagonalize matrices.
	CO2	Solve homogeneous and non-homogeneous linear differential equation with constant coefficients.
	CO3	Compute Laplace transform and apply it to solve ODEs arising in engineering.
	CO4	Determine the Taylor series and evaluate Fourier series expansion for different periodic functions.
GBPHT121 - Physics for Electrical Science (S1/S2)	CO1	Explain the fundamentals of Semiconductor Physics.
	CO2	Describe the behaviour of semiconductor materials in semiconductor devices.
	CO3	Explain Superconductivity and basic theory of dielectrics.
	CO4	Apply the comprehended knowledge about laser and fibre optics in various engineering applications.
	CO5	Apply basic knowledge of principles and theories in physics to conduct experiments.
GXCYT122 - Chemistry for Electrical Science (S1/S2)	CO1	Understand the basic concepts of electrochemistry corrosion and prevention methods of metals.
	CO2	Recognize the use of various engineering materials in different industries.
	CO3	Apply the appropriate techniques for different engineering materials.
	CO4	Understand the various water treatment and waste management methods.
	CO5	Apply basic knowledge of principles and theories in chemistry to conduct experiments.

GMEST103 - Engineering Graphics and Computer Aided Drawing (S1)	CO1	Understand the projection of points and lines located in different quadrants.
	CO2	Prepare Multiview orthographic projections of objects by visualizing them in different positions.
	CO3	Plot sectional views and develop surfaces of a given object.
	CO4	Prepare pictorial drawings using the principles of isometric projection.
	CO5	Sketch simple drawing using CAD tools.
GXEST104 - Introduction to Electrical & Electronics Engineering (S1)	CO1	Apply fundamental concepts and circuit laws to solve simple DC/AC electric circuits.
	CO2	Classify series and parallel magnetic circuits.
	CO3	Understand three phase AC systems.
	CO4	Describe the fundamental concepts of electronic components and devices.
	CO5	Outline the principles of communication systems.
	CO6	Identify various applications of modern electronics in the contemporary world.
UCEST105 - Algorithmic Thinking with Python (S1)	CO1	Utilize computing as a model for solving real-world problems.
	CO2	Articulate a problem before attempting to solve it and prepare a clear and accurate model to represent the problem.
	CO3	Utilize effective algorithms to solve the formulated models and translate algorithms into executable programs.
	CO4	Interpret the problem-solving strategies, a systematic approach to solving computational problems, and essential Python programming skills.

GXESL106 - Basic Electrical and Electronics Engineering Workshop (S1)	CO1	Demonstrate safety measures against electrical shocks.
	CO2	Familiarise with transformers, rheostats, batteries and earthing schemes.
	CO3	Illustrate the connection diagram and identify the suitable accessories necessary for wiring simple electric circuits.
	CO4	Identify various electronic components.
	CO5	Operate various measuring instruments.
	CO6	Apply the design procedure of simple electronic circuits on breadboard and PCB.
	CO7	Build the ability to work in a team with good interpersonal skills.
UCHWT127 - Health and Wellness (S1/S2)	CO1	Explain the structure and functions of major human body systems, describe various types of physical activities, and explain methods used to measure and quantify physical activity.
	CO2	Explain the principles of health and wellness, including psychological practices, dietary habits, sports participation, and the role of yoga and lifestyle choices in maintaining and improving overall health.
	CO3	Discuss common hypokinetic and musculoskeletal disorders, explain the importance of avoiding addictive substances, and describe the basics of first aid along with common sports injuries.
	CO4	Conduct physical fitness assessment activities using the fitness testing protocols prescribed by Fit India, and explain the significance of these tests in evaluating physical fitness levels.
UCHUT128 - Life Skills and Professional Communication (S1/S2)	CO1	Develop the ability to know & understand oneself, show confidence in one's potential & capabilities, set goals and develop plans.

	CO2	Develop the ability to communicate and connect with others, participate in groups/teams, and empathise.
	CO3	Develop thinking skills, problem-solving and decision-making skills.
	CO4	Develop listening, reading, writing & speaking skills and ability to analyze, interpret & effectively summarize content.
	CO5	Develop the ability to create effective presentations through audio-visual mediums.
	CO6	Initiate profile-building exercises in line with the professional requirements.
GYMAT201 - Mathematics for Electrical Science-2 (S2)	CO1	Compute the partial and total derivatives and maxima and minima of multivariable functions to apply in engineering problems.
	CO2	Understand theoretical idea of multiple integrals and to apply them to find areas and volumes of geometrical shapes.
	CO3	Compute the derivatives and line integrals of vector functions and to learn their applications.
	CO4	Apply the concepts of surface and volume integrals and to learn their inter-relations.
GXEST203 - Foundations of Computing: From Hardware Essentials to Web Design (S2)	CO1	Identify the fundamental components and the working of an IT environment.
	CO2	Explain the data representations, CPU architectures, and the basic functioning of a computer.
	CO3	Explain the operating systems, computer network architecture, and necessary protocols used.
	CO4	Develop simple interactive web pages and validate the inputs.
GBEST213 - Engineering Mechanics (S2)	CO1	Understand the vector representation of forces and moments.
	CO2	Identify and describe the components of system of forces acting on the rigid body.
	CO3	Apply the conditions of equilibrium to different force system.
	CO4	Identify appropriate principles to solve problems of mechanics.

	CO5	Develop the understanding of fundamental principles of rigid body dynamics.
GXEST204 - Programming in C (S2)	CO1	Infer a computational problem and develop C programs using basic constructs including control statements.
	CO2	Develop C programs using arrays, matrices, and strings.
	CO3	Utilize functions to find solution to the computational problems by dividing it into modules.
	CO4	Develop C programs using pointers for dynamic data handling.
	CO5	Use files in C to permanently store and manipulate data.
GXESL208.IT Workshop(S2)	CO1	Experiment with the fundamental hardware components of a computer and how to interface them with software systems.
	CO2	Make use of the command line of Linux operating system and shell programming.
	CO3	Experiment with the data network communication scenarios using Wireshark.
	CO4	Develop basic websites using HTML, CSS & JavaScript and manage the versions.
PCECT205 - Network Theory (S2)	CO1	Analyze electrical networks using mesh and node methods.
	CO2	Apply network theorems to analyze electrical networks.
	CO3	Analyze transient behavior of electrical networks using Laplace transforms.
	CO4	Identify the network functions and parameters of single-port and two-port networks.
UCEST206 - Engineering Entrepreneurship & IPR (S2)	CO1	Gain foundational knowledge of Innovation, Entrepreneurship, and IPR and their importance for startups.
	CO2	Develop a framework for identifying, curating and validating engineering-based business ideas.

	CO3	Learn essential tools for understanding product-market fit and customer needs.
	CO4	Create a comprehensive business plan for a new venture.
	CO5	Develop skills for prototyping, stakeholder engagement, and team collaboration.
GYMAT301 - Mathematics for Electrical Science-3 (S3)	CO1	Determine the Fourier transforms of functions and apply them to solve problems arising in engineering.
	CO2	Understand the analyticity of complex functions and apply it in conformal mapping.
	CO3	Compute complex integrals using Cauchy's integral theorem and Cauchy's integral formula.
	CO4	Understand the series expansion of complex function about a singularity and apply residue theorem.
PCECT302 - Solid State Devices (S3)	CO1	Apply Fermi-Dirac statistics to compare equilibrium carrier concentration.
	CO2	State different carrier transport mechanisms in extrinsic semiconductors and obtain current densities.
	CO3	Apply the concept of semiconductor physics to solve current components in semiconductor devices.
	CO4	Analyze the response of semiconductor devices for different biasing conditions.
	CO5	Outline the effects of scaling in semiconductor devices.
PCECT303 - Analog Circuits (S3)	CO1	Design wave shaping circuits using first order RC network and diodes.
	CO2	Analyze single stage and multi stage BJT amplifier circuits using equivalent models.
	CO3	Apply the principles of feedback in the design of oscillators.
	CO4	Design power amplifiers and voltage regulator circuits.

PBECT304 - Logic Circuit Design (S3)	CO1	Apply knowledge of digital representation and Boolean algebra to deduce optimal digital circuits.
	CO2	Design and implement combinational logic circuits, sequential logic circuits and finite state machines.
	CO3	Design and implement digital circuits on FPGA using hardware description language (HDL).
	CO4	Outline the performance of logic families with Respect to different parameters.
GNEST305 - Introduction to Artificial Intelligence and Data Science (S3)	CO1	Apply the concept of machine learning algorithms including neural networks and supervised/unsupervised techniques.
	CO2	Apply advanced mathematical concepts like matrix operations and PCA to solve engineering problems.
	CO3	Analyze and interpret data using statistical methods including correlation and regression analysis.
	CO4	Integrate statistical approaches and machine learning techniques for practical solutions.
UCHUT346 - Economics for Engineers (S3/S4)	CO1	Understand the fundamentals of various economic issues using laws of demand, supply, and production.
	CO2	Develop decision making capability by applying concepts relating to costs and revenue.
	CO3	Outline macroeconomic principles of monetary systems, national income and stock market.
	CO4	Solve simple business problems using break even analysis, cost benefit analysis and capital budgeting.
UCHUT347 - Engineering Ethics and Sustainable Development (S3/S4)	CO1	Develop the ability to apply the principles of engineering ethics in professional life.

	CO2	Develop the ability to exercise gender-sensitive practices in professional lives.
	CO3	Develop the ability to explore contemporary environmental issues and sustainable practices.
	CO4	Analyse the role of engineers in promoting sustainability and climate resilience.
	CO5	Develop interest and skills in addressing environmental and climate-related challenges.
PCECL307 - Analog Circuits Lab (S3)	CO1	Design and demonstrate the functioning of basic analog circuits using discrete components.
	CO2	Design and simulate the functioning of basic analog circuits using simulation tools.
	CO3	Conduct troubleshooting of a given circuit and to analyze it.
PCECL308 - Logic Circuit Design Lab (S3)	CO1	Design and demonstrate the functioning of various combinational and sequential circuits using ICs.
	CO2	Apply an industry compatible hardware description language to implement digital circuits.
	CO3	Implement digital circuits on FPGA boards and connect external hardware.
	CO4	Function effectively as an individual and in a team to accomplish the given task.
GBMAT401 - Mathematics for Electrical Science-4 (S4)	CO1	Illustrate the concept and important models of discrete random variables for random phenomena.
	CO2	Describe the concept and important models of continuous random variables for random phenomena.
	CO3	Estimate population parameters and test hypotheses using z-tests and the one-sample t-test.
	CO4	Analyze random processes using autocorrelation functions in signal processing and communication.

PCECT402 - Signals and Systems (S4)	CO1	Classify and explain continuous-time and discrete-time signals and systems based on their properties and basic signal operations.
	CO2	Apply Fourier series, Fourier transform, and Laplace transform to analyze continuous-time signals in the frequency domain.
	CO3	Sampling theorem. Discrete-time transforms (DTFS, DTFT, and Z-transform) to analyze discrete-time signals.
	CO4	Analyze continuous-time and discrete-time LTI systems using transform techniques to determine stability, causality, and frequency response.
PCECT403 - Linear Integrated Circuits (S4)	CO1	Summarize the concepts of operational amplifiers and differential amplifier configurations.
	CO2	Design operational amplifier circuits for various applications.
	CO3	Choose integrated circuit chips for various linear circuit applications.
	CO4	Implement various applications using specific integrated circuit chips.
PBECT404 – Microcontrollers (S4)	CO1	Outline Architecture of Microcontroller.
	CO2	Develop Microcontroller programs.
	CO3	Design various interfaces to Microcontroller.
	CO4	Design and implement an Embedded System.
PEECT411 - Instrumentation (S4)	CO1	Design and demonstrate the functioning of various combinational and sequential circuits using ICs.
	CO2	Apply an industry compatible hardware description language to implement digital circuits.
	CO3	Implement digital circuits on FPGA boards and connect external hardware.
	CO4	Function effectively as an individual and in a team.

PEECT412 - Power Electronics (S4)	CO1	Outline the operation of power semiconductor devices and its characteristics.
	CO2	Design and analyze various rectifier circuits for power devices.
	CO3	Analyze different power converter circuits.
	CO4	Illustrate different types of inverter circuits.
PEECT413 - Machine Learning (S4)	CO1	Analyze and apply supervised and unsupervised ML techniques for data-driven problems.
	CO2	Develop, train, and optimize regression and classification models.
	CO3	Design and execute clustering techniques and assess their effectiveness.
	CO4	Apply unsupervised learning techniques and understand reinforcement learning.
PEECT414 - Object Oriented Programming (S4)	CO1	Summarize object-oriented concepts - classes, objects, and inheritance using UML diagrams.
	CO2	Utilize datatypes, operators, and object concepts in Java to develop programs.
	CO3	Illustrate robust program writing in Java using packages and exception handling.
	CO4	Identify and utilize various Swing controls, components, and containers.
PEECT415 - Digital Systems and VLSI Design (S4)	CO1	Design, analyze, and model clocked synchronous sequential networks (CSSNs).
	CO2	Design and analyze asynchronous sequential circuits (ASCs) and ALUs.
	CO3	Identify and mitigate static and dynamic hazards in combinational networks.
	CO4	Explain the VLSI design flow and develop VHDL constructs for circuits.

PEECT416 - Digital System Design (S4)	CO1	Analyze asynchronous and clocked synchronous sequential circuits.
	CO2	Design hazard-free digital circuits.
	CO3	Identify faults in digital circuits.
	CO4	Apply VHDL programming in digital system design.
PCECL407 - Linear Integrated Circuits Lab (S4)	CO1	Design and implement basic linear integrated circuits using Op Amps.
	CO2	Design and implement basic linear integrated circuits using linear ICs.
	CO3	Design and simulate the functioning of linear ICs using simulation tools.
	CO4	Effectively troubleshoot a given circuit and analyze it.
PCECL408 - Microcontroller Lab (S4)	CO1	Develop 8051 Microcontroller programs.
	CO2	Design and implement various interfaces to the 8051 Microcontroller.
	CO3	Design and implement an Embedded System using a 8051 microcontroller.
	CO4	Design and implement an Embedded System using an ARM processor.
PCECT501 - Electromagnetics (S5)	CO1	Summarize basic mathematical concepts related to electromagnetic vector fields.
	CO2	Apply Maxwell's equations in different forms to diverse electromagnetic problems.
	CO3	Analyze reflection, refraction and power density of electromagnetic waves.
	CO4	Analyse the propagation of EM waves in transmission lines and wave guides.

PCECT502 - Analog & Digital Communication (S5)	CO1	Illustrate the principles of analog communication systems.
	CO2	Explain the basic concepts of digital communication.
	CO3	Analyse the baseband transmission of digital data through AWGN channel.
	CO4	Apply various digital modulation techniques in the design of digital communication systems.
PCECT503 - Control Systems (S5)	CO1	Analyze the systems using transfer function approach.
	CO2	Perform time domain analysis and steady state analysis of systems.
	CO3	Determine absolute and relative stability using Routh Hurwitz Criterion and root locus.
	CO4	Apply frequency domain techniques to assess system stability and design compensation.
	CO5	Analyse system Controllability and Observability using state space representation.
PBECT504 - Digital Signal Processing (S5)	CO1	Illustrate fundamental properties relevant to DFT and solve DFT-based filtering problems.
	CO2	Design linear phase FIR filters and IIR filters of different specifications.
	CO3	Realise the various FIR and IIR filter structures for a given system function.
	CO4	Compute DFT efficiently using FFT and explain DSP processor architecture.
PEECT521 - Biomedical Engineering (S5)	CO1	Outline basic bioelectric potentials and their implications in diagnostics.
	CO2	Summarize principles used for diagnosis of abnormalities in the cardiovascular system.

	CO3	Identify techniques used for diagnosis in neuromuscular and myoelectric systems.
	CO4	Illustrate principle and working of biomedical equipment/devices.
	CO5	State various diagnostic medical imaging techniques.
PEECT522 - Data Structures (S5)	CO1	Compare performance of algorithms using asymptotic notations.
	CO2	Solve real world problems using data structures like linked list, stacks and queues.
	CO3	Make use of nonlinear data structures like trees and graphs for various applications.
	CO4	Apply and compare various techniques for searching and sorting.
	CO5	Apply appropriate hash function to store and access a given dataset.
PEECT523 - Sensors and Actuators (S5)	CO1	Describe Sensor Fundamentals.
	CO2	Explain principles of commonly used sensors, their purpose, and how they work.
	CO3	Illustrate the working principles of smart sensors.
	CO4	Explain the working principle of different types of actuators.
PEECT524 - ARM architecture and programming (S5)	CO1	Use the features of C that are frequently used in embedded systems.
	CO2	Explain a programmer's view of processor architecture.
	CO3	Choose between programming at the level of assembly or C as appropriate.

PEECT525 - ARM architecture, programming and Interfacing (S5)	CO1	Use the features of C that are frequently used in embedded systems.
	CO2	Explain a programmer's view of processor architecture.
	CO3	Choose between programming at the level of assembly or C as appropriate.
	CO4	Analyze the interfacing of peripherals.
PEECT526 - High Speed Digital Design (S5)	CO1	Illustrate fundamentals of passive circuit element effects on high-speed signal propagation.
	CO2	Describe high speed properties of logic gates and measurement techniques.
	CO3	Analyze the effects of wiring, source, and load on signal propagation.
	CO4	Design power supply and clock distribution circuits for high speed devices.
PEECT527 - Estimation and Detection (S5)	CO1	Summarize fundamentals of statistical estimation principles in engineering.
	CO2	Apply different types of estimation algorithms in engineering applications.
	CO3	Illustrate fundamentals of statistical detection principles in engineering.
	CO4	Apply various types of statistical decision rules in engineering applications.
PBECL507 - DSP Lab (S5)	CO1	Generate basic signal waveforms.
	CO2	Verify the properties of DFT.
	CO3	Familiarize with DSP hardware and interface with Computer.
	CO4	Implement LTI systems.
	CO5	Design and Implement FIR low-pass filters.

PCECL508 - Communication Lab I (S5)	CO1	Setup simple prototype circuits for waveform coding and digital modulation in a team.
	CO2	Simulate error performance of a digital communication system using modulation schemes.
	CO3	Develop hands-on skills to emulate a communication system with software-defined-radio.
PCECT601 - Advanced Communication Theory (S6)	CO1	Explain information theory measures such as entropy and mutual information.
	CO2	Apply source coding theorem for data compression.
	CO3	Apply channel coding for error detection and correction.
	CO4	Explain the basic Principle of wireless communication techniques.
	CO5	Describe wireless channel models and analyze modulation performance.
	CO6	Identify advantages of various diversity and equalization techniques.
PCECT602 - Microwaves and Antennas (S6)	CO1	Explain the basic mechanism of operation of cavity resonator and microwave sources.
	CO2	Apply S parameter theory to obtain S matrices of microwave hybrid circuits.
	CO3	Illustrate antenna radiation parameters and measurement techniques.
	CO4	Design important broadband antennas and arrays.
PEECT631 - Computer Networks (S6)	CO1	Summarize principles of computer networks, switching, and layered architecture.
	CO2	Demonstrate protocols and the functions of different layers.
	CO3	Analyse the concept of routing and addressing protocols.
	CO4	Make use of different physical communication standards in computer networks.

PEECT632 - Digital Image Processing (S6)	CO1	Explain different components of image processing system.
	CO2	Analyse mathematical transforms necessary for image processing.
	CO3	Illustrate the various schemes of image compression.
	CO4	Analyze the filtering and restoration of images.
	CO5	Describe the basic image segmentation techniques.
PEECT633 - Secure Communication (S6)	CO1	Explain security services, mechanisms, and modular arithmetic concepts.
	CO2	Illustrate principles of symmetric ciphers like DES and AES.
	CO3	Outline concepts of public key cryptography, RSA, and key management.
	CO4	Explain requirements for authentication and authenticator functions.
PEECT634 - Nano-Electronics (S6)	CO1	Describe challenges of scaling electron devices to Nano meter scales.
	CO2	Design novel transistor devices to reduce short channel effects.
	CO3	Outline the Nano scale quantum transport in Nano electronic devices.
	CO4	Apply quantum mechanics in materials and quantum devices.
PEECT635 - Image Processing Applications (S6)	CO1	Compare different colour model representations of image processing system.
	CO2	Analyse mathematical transforms and compression schemes for image processing.
	CO3	Illustrate the various schemes of image filtering.
	CO4	Determine the techniques for restoration of images.

PEECT636 - Optical Communication (S6)	CO1	Explain the structure, fabrication, and principle of operation of optical fibers.
	CO2	Describe transmission characteristics and evaluate losses in optical fiber.
	CO3	Illustrate working of sources, detectors and optical amplifiers.
	CO4	Explain the concepts of Multiplexing and Optical Networks.
PBECT604 - VLSI Circuit Design (S6)	CO1	Explain VLSI design methodologies including ASIC, SoC and FPGA devices.
	CO2	Describe VLSI fabrication techniques.
	CO3	Design and create the layout of static CMOS logic circuits adhering to rules.
	CO4	Design and analysis of dynamic logic circuits and basic storage cells.
PCECL607 - Communication Lab II (S6)	CO1	Familiarise with basic Microwave components and analyze measurements.
	CO2	Describe principles of fiber-optic communications and signal degradation factors.
	CO3	Design and simulate basic antenna experiments with simulation tools.
OEECT611 - Entertainment Electronics (S6)	CO1	Explain packetized streaming of digital media in the infotainment industry.
	CO2	Realise critical aspects of DVB and DAB standards for media broadcasting.
	CO3	Apply video coding/compression algorithms for high-definition video.
	CO4	Describe modern display technologies for video reproduction.

OEECT612 - Computer Networks (S6)	CO1	Summarize principles of computer networks, switching, and layered architecture.
	CO2	Demonstrate protocols and the functions of different layers.
	CO3	Analyse routing and addressing protocols in computer networking.
	CO4	Make use of physical communication standards in computer networks.
OEECT613 - Biomedical Engineering (S6)	CO1	Outline basic bioelectric potentials and their implications in diagnostics.
	CO2	Summarize principles used for diagnosis of cardiovascular abnormalities.
	CO3	Identify techniques used for therapy in neuromuscular and myoelectric systems.
	CO4	Illustrate principle and working of biomedical equipment/devices.
	CO5	State various diagnostic medical imaging techniques.
PEECT743 - Robotics and Automation (S7)	CO1	Describe components, structural configurations, and degrees of freedom (DOF) of robots.
	CO2	Apply forward and inverse kinematics for different robotic manipulators.
	CO3	Implement various types of controllers for robot motion control.
	CO4	Identify and compare sensors and actuators used in robotic systems.
	CO5	Describe basics of robot cell layouts considering machine interfaces.
PEECT752 - Internet of Things (S7)	CO1	Explain in a concise manner the architecture of IoT.
	CO2	Identify various hardware and software components used in IoT.
	CO3	Describe the various communication technologies and interfaces in IoT.
	CO4	Describe usage of cloud computing for data

		management in IoT.
PEECT741 - Advanced Mobile Communication (S7)	CO1	Illustrate the evolution from 1G to 5G.
	CO2	Explain the basics of 5G.
	CO3	Illustrate 5G network.
	CO4	Describe the current state and challenges ahead in 5G.
PEECT742 - Deep Learning (S7)	CO1	Explain the basic concepts of neural networks.
	CO2	Solve real world problems using CNN.
	CO3	Solve real world problems using RNN.
	CO4	Describe the concepts of GAN.
PEECT744 - Coding Theory (S7)	CO1	Explain various algebraic structures used in coding theory.
	CO2	Explain error detection and correction capabilities of linear codes.
	CO3	Apply linear block codes to detect and correct errors.
	CO4	Use algebraic techniques to construct efficient codes.
	CO5	Apply convolutional code for error detection correction.
	CO6	Illustrate modern correcting codes like Turbo codes and LDOC.
PEECT745 - Deep Learning Techniques (S7)	CO1	Analyze and differentiate between various neural network components.
	CO2	Develop and implement strategies for training neural networks.
	CO3	Apply and Integrate Sequence and Generative Models.
	CO4	Evaluate the effectiveness of transformer models

		including BERT and GPT.
PEECT746 - Advanced DSP (S7)	CO1	Classify continuous and discrete time signals based on properties.
	CO2	Determine stability and causality of LTI systems using convolution.
	CO3	Analyze signals in frequency domain using various transforms.
	CO4	Interpret transforms to analyze continuous and discrete time LTI systems.
PEECT747 - Cryptography (S7)	CO1	Apply principles of number theory and abstract algebra in cryptology.
	CO2	Design and analyze various symmetric ciphers.
	CO3	Design and analyze various asymmetric ciphers.
	CO4	Apply mathematical techniques for cryptanalysis of ciphers.
PCECT751 - Satellite and Radar Communication (S7)	CO1	Illustrate the principles of satellite communication.
	CO2	Design and analysis of satellite link.
	CO3	Illustrate Radar Fundamentals like Radar Equation and Applications.
	CO4	Compare various types of Radars and tracking techniques.
PEECT753 - Real Time Operating System (S7)	CO1	Explain fundamental concepts and characteristics of real-time systems.
	CO2	Analyze and implement real-time scheduling algorithms and techniques.
	CO3	Conduct worst-case execution time (WCET) analysis for tasks.
	CO4	Utilize RTOS services and middleware for developing applications.
	CO5	Develop practical real-time applications in various domains.

PEECT754 - Mixed Signal Circuits (S7)	CO1	Explain various Single stage Amplifiers with different types of loads.
	CO2	Explain Differential Amplifiers & Current Mirrors.
	CO3	Apply amplifier knowledge in the design of two stage OPAMP.
	CO4	Illustrate the concept of frequency compensation in OPAMP.
	CO5	Describe specifications and architectures of data converter circuits.
PEECT755 - Mixed Signal Circuit Design (S7)	CO1	Analyze effect of different types of loads on MOS Amplifiers.
	CO2	Apply amplifier knowledge in the design of two stage OPAMP.
	CO3	Demonstrate the concept of frequency compensation in OPAMP.
	CO4	Implement various types of data converter circuits.
	CO5	Design and Implement amplifiers, OPAMPs, ADCs, and DACs.
PEECT756 - Speech and Audio Processing (S7)	CO1	Describe fundamental concepts, principles, and theories of speech production.
	CO2	Analyse the speech signal in the time and frequency domain.
	CO3	Apply speech processing concepts in real-world applications.
	CO4	Describe fundamental concepts and theories of hearing mechanism.
	CO5	Develop applications combining speech production and hearing mechanism.

PEECT757 - Microwave Devices and Circuits (S7)	CO1	Describe basic principles of Microwave solid state diodes and generators.
	CO2	Analyse Microwave Networks using signal flow graphs.
	CO3	Design microwave filters by different methods.
	CO4	Illustrate the basic concepts of Monolithic Integrated Circuits.
OEECT721 - Optical Communication (S7)	CO1	Explain structure, fabrication, and principle of operation of optical fibers.
	CO2	Describe transmission characteristics and evaluate losses.
	CO3	Explain working of sources, detectors and optical amplifiers.
	CO4	Describe concepts of Multiplexing, Optical Networks and Free Space.
OEECT722 - Digital Image Processing (S7)	CO1	Explain different components of image processing system.
	CO2	Analyse mathematical transforms necessary for image processing.
	CO3	Illustrate various schemes of image compression.
	CO4	Analyze filtering and restoration of images.
	CO5	Describe basic image segmentation techniques.
OEECT723 - Optimization Techniques (S7)	CO1	Formulate an optimization problem for an engineering application.
	CO2	Apply the Simplex method to solve a linear programming problem.
	CO3	Solve unconstrained optimization problems using gradient based method.

	CO4	Apply various optimization techniques to solve constrained problems.
	CO5	Use metaheuristic algorithms to solve constrained and unconstrained problems.
PEECT861 - Wireless Sensor Networks (S8)	CO1	Explain principles of wireless networks concepts and their standards.
	CO2	Illustrate various concepts on basics of wireless sensor and adhoc networks.
	CO3	Develop single node wireless sensor architecture.
	CO4	Analyse network architecture and communication protocols of WSNs.
PEECT862 - RF Engineering (S8)	CO1	Explain basic idea about RF networks and working of RF filter circuits.
	CO2	Describe behaviour of RF components and network analyzer application.
	CO3	Apply principle of RF networks in designing RF amplifiers.
	CO4	Apply principle of RF networks in designing RF Oscillators and Mixers.
PEECT863 - Renewable Energy Systems (S8)	CO1	Explain need, importance and scope of various Non-Conventional sources.
	CO2	Outline concepts and technologies related to wind and Solar-PV systems.
	CO3	Illustrate integration of smart grid with renewable energy systems.
	CO4	Explain the concept of distribution management system.
PEECT864 - Cyber- Security (S8)	CO1	Explain basics of network security, attacks, intrusion techniques, and threats.
	CO2	Identify security services including OS security, firewalls and IDS.
	CO3	Describe cryptography principles including RSA and hash functions.
	CO4	Illustrate cybercrime and related laws including the

		Indian IT Act 2000.
PEECT865 - Antenna Theory & Design (S8)	CO1	Analyse the radiation mechanism of antennas.
	CO2	Design and measure parameters of a microstrip antenna.
	CO3	Analyse and design advanced antennas.
	CO4	Explain different modes and parameters of radio wave propagation.
PEECT866 - Low Power VLSI (S8)	CO1	Describe impact of technology scaling on power dissipation in digital ICs.
	CO2	Discuss the different sources of power dissipation in digital ICs.
	CO3	Describe various approaches for power management in digital ICs.
	CO4	Apply various clocked and non-clocked design styles for logic.
	CO5	Describe the use of Adiabatic switching for power management.
PEECT867 - Blockchain (S8)	CO1	Explain the fundamental concepts of blockchain technology.
	CO2	Summarise the classification of consensus algorithms.
	CO3	Explain concepts of first decentralized cryptocurrency bitcoin.
	CO4	Explain the use of smart contracts and its use cases.
	CO5	Develop simple applications using Solidity on Ethereum platform.
OEECT831 - Internet of Things (S8)	CO1	Explain in a concise manner the architecture of IoT.
	CO2	Identify various hardware and software components used in IoT.
	CO3	Discuss the various communication technologies and interfaces in IoT.

	CO4	Describe usage of cloud computing for data management in IoT.
OEECT832 - Satellite and Radar Communication (S8)	CO1	Illustrate the principles of satellite communication.
	CO2	Design and analysis of satellite link.
	CO3	Illustrate Radar Fundamentals like Radar Equation and Applications.
	CO4	Compare various types of Radars and tracking techniques.