

Course Objectives (Cos):

Course Name	Class	COs	Statement
Engineering Mathematics III	SE	CO1	Solve higher order linear differential equation using appropriate techniques for modelling, analyzing of electrical circuits and control systems.
		CO2	Apply concept of Fourier transform & Z-transform and its applications to continuous & discrete systems, signal & image processing and communication systems
		CO3	Obtain Interpolating polynomials, numerically differentiate and integrate functions, numerical solutions of differential equations using single step and multi-step iterative methods used in modern scientific computing.
		CO4	Perform vector differentiation & integration, analyze the vector fields and apply to electro- magnetic fields & wave theory.
		CO5	Analyze Complex functions, conformal mappings, and Contour integration applicable to electrostatics, digital filters, signal and image processing.
Electronic Circuits		CO1	Assimilate the physics, characteristics and parameters of MOSFET towards its application as amplifier
		CO2	Design MOSFET amplifiers, with and without feedback, & MOSFET oscillators, for given specifications.
		CO3	Analyze and assess the performance of linear and switching regulators, with their variants, towards applications in regulated power supplies.
		O4	Explain internal schematic of Op-Amp and define its performance parameters
		CO5	Design, Build and test Op-amp based analog signal processing and conditioning circuits towards various real time applications
		CO6	Understand and compare the principles of various data conversion techniques and PLL with their applications.
Digital Circuits		CO1	Classify and characterize the digital Logic families
		CO2	Apply basic logic gates and various reduction techniques for building digital logic circuit.
		CO3	Analyze, design and implement combinational logic circuits
		CO4	Analyze, design and implement sequential circuits
		CO5	Implement and differentiate between different finite state machines

		CO6	Design combinational digital systems using PLD
Electrical Circuits		CO1	Analyze the simple DC and AC circuit with circuit simplification techniques.
		CO2	Formulate and analyze driven and source free RL and RC circuits.
		CO3	Formulate & determine network parameters for given network and analyze the given network using Laplace Transform to find the network transfer function.
		CO4	Explain construction, working and applications of DC Machines / Single Phase & Three Phase AC Motors.
		CO5	Explain construction, working and applications of special purpose motors & understand motors used in electrical vehicles.
		CO6	Analyze and select a suitable motor for different applications.
Data structures		CO1	Solve mathematical problems using C programming language.
		CO2	Implement sorting and searching algorithms and calculate their complexity.
		CO3	Develop applications of stack and queue using array.
		CO4	Demonstrate applicability of Linked List.
		CO5	Demonstrate applicability of nonlinear data structures - Binary Tree with respect to its time complexity.
		CO6	Apply the knowledge of graph for solving the problems of spanning tree and shortest path algorithm.
Signals & Systems		CO1	To understand the mathematical representation of continuous and discrete time signals and systems.
		CO2	To classify signals and systems into different categories.
		CO3	To analyze Linear Time Invariant (LTI) systems in time and transform domains.
		CO4	To build basics for understanding of courses such as signal processing, control system and communication.
		CO5	To develop basis of probability and random variables.
		CO6	Understand the basic concept of probability, random variables & random signals and develop the ability to find correlation, CDF, PDF and probability of a given event.

Control Systems	CO1	To determine and use models of physical systems in forms suitable for use in the analysis and design of control system
	CO2	To determine stability of closed loop control system
	CO3	To perform time domain analysis of control systems required for stability analysis.
	CO4	To perform Frequency domain analysis of control systems required for stability analysis.
	CO5	To apply root-locus, Frequency Plots technique to analyze control systems.
	CO6	To Express and solve system equations in state variable form.
	CO7	Differentiate between various Digital Controllers and understand the role of the controllers in industrial automation
Principles of Communication Systems	CO1	To compute & compare the bandwidth and transmission power requirements by analyzing time and frequency domain spectra of signal required for modulation schemes under study.
	CO2	Describe and analyze the techniques of generation, transmission and reception of Amplitude Modulation Systems.
	CO3	Explain generation and detection of FM systems and compare with AM systems.
	CO4	Exhibit the importance of Sampling Theorem and correlate with Pulse Modulation technique (PAM, PWM, and PPM).
	CO5	Characterize the quantization process and elaborate digital representation techniques (PCM, DPCM, DM and ADM).
	CO6	Illustrate waveform coding, multiplexing and synchronization techniques and articulate their importance in baseband digital transmission.
Object Oriented Programming	CO1	Describe the principles of object-oriented programming
	CO2	Apply the concepts of data encapsulation, inheritance in C++
	CO3	Understand Operator overloading and friend functions in C++
	CO4	Apply the concepts of classes, methods inheritance and polymorphism to write programs C++
	CO5	Apply Templates, Namespaces and Exception Handling concepts to write programs in C++.
	CO6	Describe and use of File handling in C++

Employability Skill Development		CO1	Define personal and career goals using introspective skills and SWOC assessment. Outline and evaluate short-term and long-term goals.
		CO2	Develop effective communication skills (listening, reading, writing, and speaking), self- management attributes, problem solving abilities and team working & building capabilities in order to fetch employment opportunities and further succeed in the workplace.
		CO3	Be a part of a multi-cultural professional environment and work effectively by enhancing inter-personal relationships, conflict management and leadership skills.
		CO4	Comprehend the importance of professional ethics, etiquettes & morals and demonstrate sensitivity towards it throughout certified career.
		CO5	Develop practically deployable skill set involving critical thinking, effective presentations and leadership qualities to hone the opportunities of employability and excel in the professional environment.
Project Based Learning		CO1	Identify the real-world problem (possibly of interdisciplinary nature) through a rigorous literature survey and formulate / set relevant aim and objectives.
		CO2	Contribute to society through proposed solution by strictly following professional ethics and safety measures.
		CO3	Propose a suitable solution based on the fundamentals of electronics and communication engineering by possibly the integration of previously acquired knowledge.
		CO4	Analyze the results and arrive at valid conclusion.
		CO5	Use of technology in proposed work and demonstrate learning in oral and written form.
		CO6	Develop ability to work as an individual and as a team member.
Digital Communication	TE	CO1:	Apply the statistical theory for describing various signals in a communication system.
		CO2:	Understand and explain various digital modulation techniques used in digital communication systems and analyze their performance in presence of AWGN noise.
		CO3:	Describe and analyze the digital communication system with spread spectrum modulation
		CO4:	Analyze a communication system using information theoretic approach.
		CO5:	Use error control coding techniques to improve performance of a digital communication system

Electromagnetic Field Theory	CO1:	Apply the basic electromagnetic principles and determine the fields (E & H) due to the given source.
	CO2	Apply boundary conditions to the boundaries between various media to interpret behavior of the fields on either side.
	CO3	State, Identify and Apply Maxwell's equations (integral and differential forms) in both the forms (Static, time-varying or Time-harmonic field) for various sources, Calculate the time average power density using Poynting Theorem, Retarded magnetic vector potential.
	CO4	Formulate, Interpret and solve simple uniform plane wave (Helmholtz Equations) equations, and analyze the incident/reflected/transmitted waves at normal incidence.
	CO5	Interpret and Apply the transmission line equation
	CO6	Carry out a detailed study, interpret the relevance and applications of Electromagnetics
	Database Management	CO1
CO2		Design and implement a database schema for a given problem-domain using data model.
CO3		Formulate, using SQL/DML/DDDL commands, solutions to a wide range of query and update problems.
CO4		Implement transactions, concurrency control, and be able to do Database recovery.
CO5		Able to understand various Parallel Database Architectures and its applications.
CO6:		Able to understand various Distributed Databases and its applications.
Microcontroller	CO1	Understand the fundamentals of microcontroller and programming.
	CO2	Interface various electronic components with microcontrollers.
	CO3	Analyze the features of PIC 18F XXXX.
	CO4	Describe the programming details in peripheral support.
	CO5	Develop interfacing models according to applications.
	CO6	Evaluate the serial communication details and interfaces.
Elective - I : Fundamentals of	CO1	Understand the basic principles of Java programming language
	CO2	Apply the concepts of classes and objects to write programs in Java

JAVA Programming	CO3	Demonstrate the concepts of methods & Inheritance
	CO4	Use the concepts of interfaces & packages for program implementation
	CO5	Understand multithreading and Exception handling in Java to develop robust programs
	CO6	Use Graphics class, AWT packages and manage input and output files in Java
Elective - I :Computer Networks	CO1	Design LAN using appropriate networking architecture, topologies, transmission media, and networking devices.
	CO2	Describe the working of controlling techniques for flawless data communication using data link layer protocols.
	CO3	Compare the functions of network layer, various switching techniques and internet protocol addressing.
	CO4	Distinguish different interior and exterior, unicasting and multicasting protocols.
	CO5	Analyze data flow using TCP/UDP Protocols, congestion control techniques for QoS.
	CO6	Select and use the protocols at application layer.
Skill Development	CO1	Student should recognize the need to engage in independent and life-long learning in required skill sets.
	CO2	Student needs to experience the impact of industries on society by visiting different industries and understand the importance of industrial products for analog and digital circuits and systems.
	CO3	Student has to make use of the modern electronic and IT Engineering Tools and Technologies for solving electronic engineering problems.
	CO4	Student would be able to communicate effectively at different technical and administrative levels.
	CO5	Student will exhibit leadership skills both as an individual and as a member in a team in multidisciplinary environment.
Cellular Networks	CO1:	Understand fundamentals of wireless communications.
	CO2:	Discuss and study OFDM and MIMO concepts.
	CO3:	Elaborate fundamentals mobile communication.
	CO4:	Describes aspects of wireless system planning.
	CO5:	Understand of modern and futuristic wireless networks architecture.

		CO6: Summarize different issues in performance analysis.
Project Management	CO1:	Apply the fundamental knowledge of project management for effectively handling the projects.
	CO2:	Identify and select the appropriate project based on feasibility study and undertake its effective planning.
	CO3:	Assimilate effectively within the organizational structure of project and handle project management related issues in an efficient manner.
	CO4:	Apply the project scheduling techniques to create a Project Schedule Plan and accordingly utilize the resources to meet the project deadline.
	CO5:	Identify and assess the project risks and manage finances in line with Project Financial Management Process.
	CO6:	Develop new products assessing their commercial viability and develop skillsets for becoming successful entrepreneurs while being fully aware of the legal issues related to Product development and Entrepreneurship.
Power Devices & Circuits	CO1:	To differentiate based on the characteristic parameters among SCR, GTO, MOSFET & IGBT and identify suitability of the power device for certain applications and understand the significance of device ratings.
	CO2:	To design triggering / driver circuits for various power devices.
	CO3:	To evaluate and analyze various performance parameters of the different converters and its topologies
	CO4:	To understand significance and design of various protection circuits for power devices.
	CO5:	To evaluate the performance of uninterruptible power supplies, switch mode power supplies and battery
	CO6:	To understand case studies of power electronics in applications like electric vehicles, solar systems etc
Elective-II : Advanced JAVA Programming	CO1:	Design and develop GUI applications using Applets.
	CO2:	Apply relevant AWT/ swing components to handle the given event.
	CO3:	Design and develop GUI applications using Abstract Windowing Toolkit (AWT), Swing and Event Handling.
	CO4:	Learn to access database through Java programs, using Java Database Connectivity (JDBC)

		CO5: Invoke the remote methods in an application using Remote Method Invocation (RMI)
		CO6: Develop program for client /server communication using Java Networking classes.
Sensors in Automation (Elective -II)		CO1: Understand the Concepts of Sensors/Transducers, classify and evaluate static and Dynamic Characteristics of Measurement Systems.
		CO2: Choose the proper sensor comparing different standards and guidelines for measurements of Temperature and Humidity.
		CO3: Choose the proper sensor comparing different standards and guidelines for measurements of Force, Pressure, Stress and Flow
		CO4: Choose the proper sensor comparing different standards and guidelines for measurements of Displacement, Vibration, Acceleration and Level
		CO5: Explore sensors to profound areas like environmental, Agricultural and bio-medical equipment and sustainability.
		CO6: Explore IoT based applications of Sensors and Transducers.
Network Security (Elective-II)		CO1: Analyze attacks on computers and computer security.
		CO2: Demonstrate knowledge of cryptography techniques.
		CO3: Illustrate various Symmetric and Asymmetric keys for Ciphers
		CO4: Evaluate different Message Authentication Algorithms and Hash Functions
		CO5: Get acquainted with various aspects of E-Mail Security
		CO6: Assimilate various aspects of Web Security
Internship**		CO1: To develop professional competence through internship.
		CO2: To apply academic knowledge in a personal and professional environment.
		CO3: To build the professional network and expose students to future employees.
		CO4: Apply professional and societal ethics in their day to day life.
		CO5: To become a responsible professional having social, economic and administrative considerations.
		CO6: To make own career goals and personal aspirations.

Mini Project		CO1:	Understand, plan and execute a Mini Project with team.
		CO2:	Implement electronic hardware by learning PCB artwork design, soldering techniques, testing and troubleshooting etc.
		CO3:	Prepare a technical report based on the Mini project
		CO4:	Deliver technical seminar based on the Mini Project work carried out.
Radiation and Microwave Theory	BE	CO1	Apply the fundamentals of electromagnetic to derive free space propagation equation and distinguish various performance parameters of antenna.
		CO2	Identify various modes in the waveguide. Compare: coaxial line, rectangular waveguides & striplines and identify applications of the same.
		CO3	Explore construction and working of principles passive microwave devices/components.
		CO4	Explore construction and working of principles active microwave devices/components.
		CO5	Analyze the structure, characteristics, operation, equivalent circuits and applications of various microwave solid state active devices
		CO6	Know the various microwave systems, devise set ups of microwave measurement devices and identify the effect of radiations on environmental sustainability.
VLSI Design and Technology		CO1	Develop effective HDL codes for digital design.
		CO2	Apply knowledge of real time issues in digital design.
		CO3	Model digital circuit with HDL, simulate, synthesis and prototype in PLDs.
		CO4	Design CMOS circuits for specified applications.
		CO5	Analyze various issues and constraints in design of an ASIC.
		CO6	Apply knowledge of testability in design and Build In Self Test (BIST) circuit.
Cloud Computing		CO1	Understand the basic concepts of Cloud Computing.
		CO2	Describe the underlying principles of different Cloud Service Models.
		CO3	Classify the types of Virtualization.
		CO4	Examine the Cloud Architecture and understand the importance of Cloud Security.

	CO5	Develop applications on Cloud Platforms.
	CO6	Evaluate distributed computing and the Internet of Things.
PLC SCADA and Automation (Elective - III)	CO1	Understand and Recognize Industrial Control Problems.
	CO2	Analyze & explain different hardware functions of PLC.
	CO3	Develop Ladder Programming in PLC and PLC Interface in real time applications.
	CO4	Explore and interpret functionality of SCADA.
	CO5	Identify and interpret the functionality of DCS.
	CO6	Define and explain CNC machines and Applications of Industrial Protocols.
Java Script (Elective - III)	CO1	Use basic features of java script.
	CO2	Use relevant data types for developing application in java script.
	CO3	Apply the regular expression for Text matching and manipulation.
	CO4	Explore use of the various aspects of JavaScript object models that are fundamental to the proper use of the language.
	CO5	Develop the application using windows controlling and form handling.
Embedded System & RTOS (Elective - III)	CO1	Apply design metrics of Embedded systems to design real time applications to match recent trends in technology.
	CO2	Apply Real time systems concepts.
	CO3	Evaluate μ COS operating system and its services.
	CO4	Apply Embedded Linux Development Environment and testing tools.
	CO5	Analyze Linux operating system and device drivers.
	CO6	Analyze the hardware – software co design issues for testing of real time Embedded system.
Modernized IoT (Elective - III)	CO1	Comprehend and analyze concepts of sensors, actuators, IoT and IoE.
	CO2	Interpret IoT Architecture Design Aspects.
	CO3	Comprehend the operation of IoT protocols.
	CO4	Describe various IoT boards, interfacing, and programming for IoT.
	CO5	Illustrate the technologies, Catalysts, and precursors of IIoT using suitable use cases.

		CO6	Provide suitable solution for domain specific applications of IoT.
Data Mining (Elective - IV)		CO1	Understand the process of data mining and performance issues in data mining
		CO2	Apply data preprocessing techniques to the historical data collected in data warehouse
		CO3	Analyze various types of Frequent pattern analysis methods and advanced Pattern mining techniques
		CO4	Evaluate various data mining algorithms for developing effective data mining models
		CO5	Analyze different clustering and outlier detection methods
		CO6	Design data mining models in different mining application areas
	Electronics Product Design (Elective - IV)		CO1
		CO2	Associate with various circuit design issues and testing
		CO3	Inferring different software designing aspects and the Importance of product test & test specifications.
		CO4	Summarizing printed circuit boards and different parameters.
		CO5	Estimating assorted product design aspects.
		CO6	Exemplifying special design considerations and importance of documentation.
Deep Learning (Elective - IV)			CO1
		CO2	Discuss the concepts of deep learning and its Frameworks.
		CO3	Identify the deep learning architectures with respect to the applications.
		CO4	Demonstrate different architectures of Convolutional neural networks.
		CO5	Discuss natural language processing architectures.
		CO6	Make use of various case studies and deep learning applications.
	Project Phase – I		CO1
		CO2	Undertake real life problem identification, formulation and solution.
		CO3	Design engineering solutions to complex problems utilizing a systematic approach

		CO4	Demonstrate the knowledge, effective communication skills and attitudes as professional engineer.
Fiber Optic Communication		CO1	Explain the working of components and measurement equipments in optical fiber networks.
		CO2	Calculate the important parameters associated with optical components used in fiber optic telecommunication systems.
		CO3	Compare and contrast the performance of major components in optical links.
		CO4	Evaluate the performance viability of optical links using the power and rise time budget analysis.
		CO5	Design digital optical link by proper selection of components and check its viability using simulation tools.
		CO6	Compile technical information related to state of art components, standards, simulation tools and current technological trends by accessing the online resources to update their domain knowledge.
Biomedical Signal Processing (Elective - V)		CO1	Describe the origin of various biomedical signals and Interpret the meaning of various parameters associated with biomedical signals
		CO2	Analyze ECG Signals with extraction of meaningful information
		CO3	Explain Processing of EEG signals for Diseases of Central Nervous System
		CO4	Analyze EMG signals for understanding Neuromuscular Diseases
		CO5	Analyze various Biomedical Signals
		CO6	Process the biomedical signals to remove adaptive interference and noise
Mobile Computing (Elective - V)		CO1	Understand concepts of Mobile Communication
		CO2	Analyse next generation Mobile Communication System
		CO3	Understand network layers of Mobile Communication.
		CO4	Understand IP and Transport layers of Mobile Communication.
		CO5	Study of different mathematical models.
		CO6	Understand different mobile applications.
Digital Marketing (Elective - VI)		CO1	Design websites using free tools like Wordpress and explore it for digital marketing.
		CO2	Apply various keywords for a website & to perform SEO.

		CO3	Understand the various SEM Tools and implement the Digital Marketing Tools.
		CO4	Illustrate the use of Facebook, Instagram and Youtube for Digital Marketing in real life.
		CO5	Use Linked in platform for various campaigning.
		CO6	Understand the importance of recent trends in digital marketing.
Innovation and Entrepreneurship		CO1	Understand Innovation, Entrepreneurship and characteristics of an entrepreneur.
		CO2	Develop a strong understanding of the Design Process and its application in variety of business settings.
		CO3	Generate sustainable ideas.
		CO4	Explore various processes required to be an entrepreneur.
		CO5	Understand patents and its process of filing.
		CO6	Choose and use appropriate social media for marketing.
Digital Business Management		CO1	Identify drivers of digital business.
		CO2	Illustrate various approaches and techniques for E-business and management.
		CO3	Prepare E-business plan.