Electronics & Telecommunication Engineering Department: PSO, PO & CO

PROGRAMME SPECIFIC OUTCOMES (PSO):

PSO1: Apply science, engineering, mathematics through differential and integral calculus; to solve complex electronics and communication engineering problems.

PSO2: Demonstrate proficiency in use of software and hardware required to practice electronics and communication profession.

PO1: Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2: Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3: Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PROGRAM OUTCOMES (POs)

PO4: Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5: Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations

PO6: The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7: Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8: Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice

PO9: Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10: Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective report's and design documentation, makes effective presentations, and gives and receives clear instructions.

PO11: Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12: Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

COURSE OUTCOMES (COs)

SE ELECTRONICS & TELECOMMUNICATION	
Subject name (Subject code)	Engineering Mathematics - III (207005)
At the end of this course, the student will be able to:	
Course Outcome	Course Outcome
CO 1	Solve higher order linear differential equation using appropriate techniques for modelling, analyzing of electrical circuits and control systems.
CO 2	Apply concept of Fourier transform & Z-transform and its applications to continuous & discrete systems, signal & image processing and communication systems.
CO 3	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.
CO 4	Perform vector differentiation & integration, analyze the vectorfields and apply to electro- magnetic fields & wave theory.
CO 5	Analyze Complex functions, Conformal mappings, Contour integration applicable to electrostatics, digital filters, signal and image processing.

Subject name (Subject code)	Electronic Circuits(204181)
At the end of this course, the student will be able to:	
Course Outcome	Course Outcome
	Assimilate the physics, characteristics and parameters of MOSFET towards its application as amplifier.
\mathbf{I}	Design MOSFET amplifiers, with and without feedback, & MOSFET oscillators, for given specifications.

603	Analyze and assess the performance of linear and switching regulators with their varients opwards and defines in perulated ce pawer supplies.
CO 5	Design, Build and test Op-amp based analog signal processing and conditioning circuits towards various real time applications.
CO 6	Understand and compare the principles of various data conversion techniques and PLL with their applications.

Subject name (Subject code)	Digital Circuits(204182)	
At the end of thi	At the end of this course, the student will be able to:	
Course Outcome	Course Outcome	
CO 1	Identify and prevent various hazards and timing problems in a digital design.	
CO 2	Use the basic logic gates and various reduction techniques of digital logic circuit.	
CO 3	Analyze, design and implement combinational logic circuits.	
CO 4	Analyze, design and implement sequential circuits.	
CO 5	Differentiate between Mealy and Moore machines.	
CO 6	Analyze digital system design using PLD.	

Subject name (Subject code)	Electrical Circuits (204183)
At the end of this course, the student will be able to:	
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Course Outcome	Course Outcome
CO 1	Analyze the simple DC and AC circuit with circuit simplification techniques.
CO 2	Formulate and analyze driven and source free RL and RC circuits.

CO 3	Formulate & determine network parameters for given network and analyze the given network using Laplace Transform to find the network transfer function.
CO 4	Explain construction, working and applications of DC Machines / Single Phase & Three Phase AC Motors.
CO 5	Explain construction, working and applications of special purpose motors & understand motors used in electrical vehicles.
CO 6	Analyze and select a suitable motor for different applications.

Subject name (Subject code)	Data Structures(204184)
At the end of this course, the student will be able to:	
Course Outcome	Course Outcome
CO 1	Solve mathematical problems using C programming language.
CO 2	Implement sorting and searching algorithms and calculate their complexity.
CO 3	Develop applications of stack and queue using array.
CO 4	Demonstrate applicability of Linked List.
CO 5	Demonstrate applicability of nonlinear data structures - Binary Tree with respect to its time complexity.
CO 6	Apply the knowledge of graph for solving the problems of spanning tree and shortest path algorithm.

Subject name (Subject code)	Signals & Systems(204191)	
At the end of this course, the student will be able to:		
Course Outcome	Course Outcome	
CO 1	Identify, classify basic signals and perform operations on signals.	

CO 2	Identify, Classify the systems based on their properties in terms of input output relation and in terms of impulse response and will be able to determine the convolution between to signals.
CO 3	Analyze and resolve the signals in frequency domain using Fourier series and Fourier Transform.
CO 4	Resolve the signals in complex frequency domain using Laplace Transform, and will be able to apply and analyze the LTI systems using Laplace Transforms.
CO 5	Define and Describe the probability, random variables and random signals. Compute the probability of a given event, model, compute the CDF and PDF.
CO 6	Compute the mean, mean square, variance and standard deviation for given random variables using PDF.

Subject name (Subject code)	Control Systems(204192)
At the end of this course, the student will be able to:	
Course Outcome	Course Outcome
CO 1	Determine and use models of physical systems in forms suitable for use in the analysis and design of control systems.
CO 2	Determine the (absolute) stability of a closed-loop control system.
CO 3	Perform time domain analysis of control systems required for stability analysis.
CO 4	Perform frequency domain analysis of control systems required for stability analysis.
CO 5	Apply root-locus, Frequency Plots technique to analyze control systems.
CO 6	Express and solve system equations in state variable form.
CO 7	Differentiate between various digital controllers and understand the role of the controllers in Industrial automation.

Subject name	Principles of Communication Systems(204193)
(Subject code)	r inciples of Communication Systems(204193)

Course Outcome	Course Outcome
CO 1	To compute & compare the bandwidth and transmission power requirements by analyzing time and frequency domain spectra of signal required for modulation schemes under study.
CO 2	Describe and analyze the techniques of generation, transmission and reception of Amplitude Modulation Systems.
CO 3	Explain generation and detection of FM systems and compare with AM systems.
CO 4	Exhibit the importance of Sampling Theorem and correlate with Pulse Modulation technique (PAM, PWM, and PPM).
CO 5	Characterize the quantization process and elaborate digital representation techniques (PCM, DPCM, DM and ADM).
CO 6	Illustrate waveform coding, multiplexing and synchronization techniques and articulate their importance in baseband digital transmission.

Subject name (Subject code)	Object Oriented Programming(204194)
At the end of this	course, the student will be able to:

Course Outcome	Course Outcome
CO 1	Describe the principles of object oriented programming.
CO 2	Apply the concepts of data encapsulation, inheritance in C++.
CO 3	Understand Operator overloading and friend functions in C++.
CO 4	Apply the concepts of classes, methods inheritance and polymorphism to write programs C++.

	Apply Templates, Namespaces and Exception Handling concepts owrite programs in C++.
CO 6	Describe and use of File handling in C++.

Subject name (Subject code)	Employbility Skills Development(2041990	
At the end of this	At the end of this course, the student will be able to:	
Course Outcome	Course Outcome	
CO 1	Define personal and career goals using introspective skills and SWOC assessment. Outline and evaluate short-term and long-term goals.	
CO 2	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.	
CO 3	Be a part of a multi-cultural professional environment and work effectively by enhancing inter-personal relationships, conflict management and leadership skills.	
CO 4	Comprehend the importance of professional ethics, etiquettes & morals and demonstrate sensitivity towards it throughout certified career.	
CO 5	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.	

Subject name (Subject code)	Project Based Learning(204200)
At the end of this course, the student will be able to:	
Course Outcome	Course Outcome

CO 1	Identify the real-world problem (possibly of interdisciplinary nature) through a rigorous literature survey and formulate / set relevant aim and objectives.
CO 2	Contribute to society through proposed solution by strictly following professional ethics and safety measures.
CO 3	Propose a suitable solution based on the fundamentals of electronics and communication engineering by possibly the integration of previously acquired knowledge.
CO 4	Analyze the results and arrive at valid conclusion.
CO 5	Use of technology in proposed work and demonstrate learning inoral and written form.
CO 6	Develop ability to work as an individual and as a team member.

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Subject name	Digital Communication(304181)
(Subject code)	Digital Communication(504161)

Course Outcome	Course Outcome
CO 1	Apply the statistical theory for describing various signals in a communication system.
CO 2	Understand and explain various digital modulation techniques used in digital communication systems and analyze their performance in presence of AWGN noise.
CO 3	Describe and analyze the digital communication system with spread spectrum modulation.
CO 4	Analyze a communication system using information theoretic approach.
CO 5	Use error control coding techniques to improve performance of a digital communication system.

Subject name	Electromagnetic Field Theory(304182)
(Subject code)	Electromagnetic Field Theory(504162)

Course Outcome	Course Outcome
CO 1	Apply the basic electromagnetic principles and determine the fields (E & H) due to the given source.
CO 2	Apply boundary conditions to the boundaries between various media to interpret behavior of the fields on either sides.
CO 3	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.
CO 4	Formulate, Interpret and solve simple uniform plane wave (Helmholtz Equations) equations, and analyze the incident/reflected/transmitted waves at normal incidence.
CO 5	Interpret and Apply the transmission line equation to transmission line problems with load impedance to determine input and output voltage/current at any point on the Transmission line, Find input/load impedance, input/load admittance, reflection coefficient, SWR, Vmax/Vmin, length of transmission line using Smith Chart.
CO 6	Carry out a detailed study, interpret the relevance and applications of Electromagnetics.

Subject name (Subject code)	Database Management(304183)
At the end of this course, the student will be able to:	
Course Outcome	Course Outcome
L CO I	Ability to implement the underlying concepts of a database system.
	Design and implement a database schema for a given problem- domain using data model.

CO 3	Formulate, using SQL/DML/DDL commands, solutions to a wide range of query and update problems.
CO 4	Implement transactions, concurrency control, and be able to do Database recovery.
CO 5	Able to understand various Parallel Database Architectures and its applications.
CO 6	Able to understand various Distributed Databases and its applications.

Subject name (Subject code)	Microcontroller(304184)
At the end of this course, the student will be able to:	
Course Outcome	Course Outcome
CO 1	Understand the fundamentals of microcontroller and programming.
CO 2	Interface various electronic components with microcontrollers.
CO 3	Analyze the features of PIC 18F XXXX.
CO 4	Describe the programming details in peripheral support.
CO 5	Develop interfacing models according to applications.
CO 6	Evaluate the serial communication details and interfaces.

Subject name (Subject code)	I AMMITAR NATWARKS I RIAPTIVA - II SIVIIXS I III
At the end of this course, the student will be able to:	
Course Outcome	Course Outcome
CO 1	Design LAN using appropriate networking architecture, topologies, transmission media, and networking devices.

CO 2	Understand the working of controlling techniques for flawless data communication using data link layer protocols.
CO 3	Learn the functions of network layer, various switching techniques and internet protocol addressing.
CO 4	Explore various interior and exterior, unicasting and multicasting protocols.
CO 5	Analyze data flow using TCP/UDP Protocols, congestion control techniques for QoS.
CO 6	Illustrate the use of protocols at application layer.

Subject name (Subject code)	Skill Development(304190)
At the end of this course, the student will be able to:	
Course Outcome	Course Outcome
CO 1	Student should recognize the need to engage in independent and life-long learning in required skill sets
CO 2	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.
CO 3	Student has to make use of the modern electronic and IT Engineering Tools and Technologies for solving electronic engineering problems.
CO 4	Student would be able to communicate effectively at different technical and administrative levels.
CO 5	Student will exhibit leadership skills both as an individual and as a member in a team in multidisciplinary environment.

Subject name (Subject code)	Cellular Networks(304192)
At the end of this course, the student will be able to:	
Course	Course Outcome
Outcome	

CO 1	Understand fundamentals of wireless communications.
CO 2	Discuss and study OFDM and MIMO concepts.
CO 3	Elaborate fundamentals mobile communication.
CO 4	Describes aspects of wireless system planning.
CO 5	Understand of modern and futuristic wireless networks architecture.
CO 6	Summarize different issues in performance analysis.

Subject name (Subject code)	Project Management(304193)
At the end of this course, the student will be able to:	

Course Outcome	Course Outcome
CO 1	Apply the fundamental knowledge of project management for effectively handling the projects.
CO 2	Identify and select the appropriate project based on feasibility study and undertake its effective planning.
CO 3	Assimilate effectively within the organizational structure of project and handle project management related issues in an efficient manner.
CO 4	Apply the project scheduling techniques to create a Project Schedule Plan and accordingly utilize the resources to meet the project deadline.
CO 5	Identify and assess the project risks and manage finances in line with Project Financial Management Process.
CO 6	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.

Subject name	Power Devices & Circuits (304194)
(Subject code)	rower Devices & Circuits (304194)

Course Outcome	Course Outcome
CO 1	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.
CO 2	To design triggering / driver circuits for various power devices.
CO 3	To evaluate and analyze various performance parameters of the different converters and its topologies.
CO 4	To understand significance and design of various protections circuits for power devices.
CO 5	To evaluate the performance of uninterruptible power supplies, switch mode power supplies and battery.
CO 6	To understand case studies of power electronics in applications like electric vehicles, solar systems etc.

Subject name	Sensors in Automation (Elective -II) 304195 (B)
(Subject code)	Sensors in Automation (Elective -11) 304195 (B)

Course Outcome	Course Outcome
CO 1	Understand the Concepts of Sensors/Transducers, classify and evaluate static and Dynamic Characteristics of Measurement Systems.
CO 2	Choose the proper sensor comparing different standards and guidelines for measurements of Temperature and Humidity.
CO 3	Choose the proper sensor comparing different standards and guidelines for measurements of Force, Pressure, Stress and Flow

CO 4	Choose the proper sensor comparing different standards and guidelines for measurements of Displacement, Vibration, Acceleration and Level
	Explore sensors to profound areas like environmental, Agricultural and bio-medical equipment and sustainability.
CO 6	Explore IoT based applications of Sensors and Transducers.

Subject name (Subject code)	Internship(304199)
At the end of this course, the student will be able to:	
Course Outcome	Course Outcome
CO 1	To develop professional competence through internship.
CO 2	To apply academic knowledge in a personal and professional environment.
CO 3	To build the professional network and expose students to future employees.
CO 4	Apply professional and societal ethics in their day to day life.
CO 5	To become a responsible professional having social, economic and administrative considerations.
CO 6	To make own career goals and personal aspirations.

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Subject name	Mini Project(304200)
(Subject code)	111111 1 1 0 Jeet (50 + 200)

Course Outcome	Course Outcome
CO 1	Understand, plan and execute a Mini Project with team.
CO 2	Implement electronic hardware by learning PCB artwork design, soldering techniques, testing and troubleshooting etc.

CO 3	Prepare a technical report based on the Mini project.
CO 4	Deliver technical seminar based on the Mini Project work carriedout.

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Subject name (Subject code)	Radiation and Microwave Theory(404181)
At the end of this	s course, the student will be able to:
Course Outcome	Course Outcome
CO 1	Apply the fundamentals of electromagnetic to derive free space propagation equation and distinguish various performance parameters of antenna.
CO 2	Identify various modes in the waveguide. Compare: coaxial line, rectangular waveguides & striplines and identify applications of the same.
CO 3	Explore construction and working of principles passive microwave devices/components.
CO 4	Explore construction and working of principles active microwave devices/components.
CO 5	Analyze the structure, characteristics, operation, equivalent circuits and applications of various microwave solid state active devices.
CO 6	Know the various microwave systems, device set ups of microwave measurement devices and Identify the effect of radiations on environmental sustainability.
Subject name (Subject code)	VLSI Design and Technology(404182)
At the end of this course, the student will be able to:	
Course Outcome	Course Outcome

CO 1	Develop effective HDL codes for digital design.
CO 2	Apply knowledge of real time issues in digital design.
CO 3	Model digital circuit with HDL, simulate, synthesis and prototype in PLDs.
CO 4	Design CMOS circuits for specified applications.
CO 5	Analyze various issues and constraints in design of an ASIC.
CO 6	Apply knowledge of testability in design and Build In Self Test (BIST) circuit.

	Subject name (Subject code)	Cloud Computing(404183)
At the end of this course, the student will be able to:		

Course Outcome	Course Outcome
CO 1	Understand the basic concepts of Cloud Computing.
CO 2	Describe the underlying principles of different Cloud Service Models.
CO 3	Classify the types of Virtualization.
CO 4	Examine the Cloud Architecture and understand the importance of Cloud Security.
CO 5	Develop applications on Cloud Platforms.
CO 6	Evaluate distributed computing and the Internet of Things.

Subject name (Subject code)	Embedded System & RTOS (Elective - III) 404184 (D)
At the end of this	course, the student will be able to:

Course Outcome	Course Outcome
CO 1	Apply design metrics of Embedded systems to design real time applications to match recent trends in technology.
CO 2	Apply Real time systems concepts.
CO 3	Evaluate μCOS operating system and its services.
CO 4	Apply Embedded Linux Development Environment and testingtools.
CO 5	Analyze Linux operating system and device drivers.
CO 6	Analyze the hardware – software co design issues for testing of real time Embedded system.

Subject name (Subject code)	Electronics Product Design (Elective - IV) 404185 (B)
At the end of this course, the student will be able to:	
Course Outcome	Course Outcome
CO 1	Understand and explain design flow of design of electronics product.
CO 2	Associate with various circuit design issues and testing.
CO 3	Inferring different software designing aspects and the Importance of product test & test specifications.
CO 4	Summarizing printed circuit boards and different parameters.
CO 5	Estimating assorted product design aspects.
CO 6	Exemplifying special design considerations and importance of documentation.

Subject name (Subject code)	Project Phase – I(404188)
At the end of this course, the student will be able to:	
Course Outcome	Course Outcome
	Demonstrate a sound technical knowledge in field of E&TC in the form of project.
CO 2	Undertake real life problem identification, formulation and solution.
CO 3	Design engineering solutions to complex problems utilizing a systematic approach.
$(1)\Delta$	Demonstrate the knowledge, effective communication skills and attitudes as professional engineer.

Subject name (Subject code)	Fiber Optic Communication(404190)
At the end of this course, the student will be able to:	
Course Outcome	Course Outcome
CO 1	Explain the working of components and measurement equipments in optical fiber networks.
CO 2	Calculate the important parameters associated with optical components used in fiber optic telecommunication systems.
CO 3	Compare and contrast the performance of major components in optical links.
CO 4	Evaluate the performance viability of optical links using the power and rise time budget analysis.
CO 5	Design digital optical link by proper selection of components and check its viability using simulation tools.

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.

Subject name (Subject code)	Innovation and Entrepreneurship(404193)
At the end of this course, the student will be able to:	
Course Outcome	Course Outcome
CO 1	Understand Innovation, Entrepreneurship and characteristics of an entrepreneur.
CO 2	Develop a strong understanding of the Design Process and its application in variety of business settings.
CO 3	Generate sustainable ideas.
CO 4	Explore various processes required to be an entrepreneur.
CO 5	Understand patents and its process of filing.
CO 6	Choose and use appropriate social media for marketing.

Subject name (Subject code)	Digital Business Management(404194)
At the end of this course, the student will be able to:	
Course Outcome	Course Outcome
CO 1	Identify drivers of digital business.
CO 2	Illustrate various approaches and techniques for E-business and management.
CO 3	Prepare E-business plan.

Subject name (Subject code)	Embedded System Design (Elective - V)404191 (D)
At the end of this course, the student will be able to:	
Course Outcome	Course Outcome
CO 1	Apply the design aspects of Embedded system.

Outcome	Course outcome
CO 1	Apply the design aspects of Embedded system.
CO 2	Create and debug a firmware for the Embedded System using ARM Cortex M4.
CO 3	Develop a specific software code for the functionality of the Embedded System.
CO 4	Utilize an open source RTOS for embedded system design.
CO 5	Design an advanced embedded system.
CO 6	Explore Embedded Android system.

Subject name (Subject code)	Digital Marketing (Elective - VI) 404192 (D)
At the end of this course, the student will be able to:	
Course Outcome	Course Outcome
Outcome	
	Design websites using free tools like Wordpress and explore it for digital marketing.
CO 2	Apply various keywords for a website & to perform SEO.

CO 3

Understand the various SEM Tools and implement the Digital Marketing Tools.

	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.