DEPARTMENT OF ELECTRONICS & TELECOMMUNICATION ENGINEERING

Course Outcome AY 2023-2024

MARATHA VIDYA PRASARAK SAMAJ'S

Karmaveer Adv. Baburao Ganpatrao Thakare College of Engineering, Nashik

Permanently Affiliated to Savitribai Phule Pune University Vide Letter No. : CA/1542 & Approved by AICTE New Delhi - Vide Letter No. : 740-89-32 (E) ET/98   AISHE Code - C-41622

Vision- Mission –PEO

Institute Vision

To be internationally accredited, Multidisciplinary, and Multi-collaborative institute working on technology enabled platform fostering innovations and patents through state-of-art academic system designed by highly qualified faculty for the development of common masses at large

Institute Mission

To educate and train common masses through undergraduate, post graduate, research programs by inculcating the values for discipline, quality, transparency and foster career and professional development for employment thereby contributing to the development of society

Department Vision

To recognize as excellent department offering competent technical education to create competent Electronics & Telecommunication Engineers for benefits of common masses.

Department Mission

Committed to serve the needs of society through innovative teaching – learning process, promoting industry-institute interaction to provide competent and cultured Electronics and Telecommunication Engineers.

Program Educational Objectives

1. To impart state of art technical education in Electronics & Telecommunication Engineering.
2. To promote society beneficial projects and activities.
3. To develop soft skill, teamwork, professional ethics, and multidisciplinary approach for the career enhancement.
4. To bridge the gap between Industry-Institute through collaboration with Industries, Institutions and Universities.
5. To provide suitable infrastructure and facilities in tuned with advancing technological evaluation.

Program Outcome

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.
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 modelling 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 reports and design documentation, make effective presentations, and give and receive 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.

Program Specific Outcome

PSOs:

PO1	**Academics**: Apply knowledge of electronics/course in analog and digital domains.
PO2	**Interdisciplinary:** Use of technique, skill & engineering tool necessary for engineering practices.
PO3	**Social Aspect:** Able to demonstrate engineering knowledge, interpersonal skills for societal responsibilities

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DEPARTMENT OF ELECTRONICS AND TELECOMMUNICATION ENGINEERING

COURSE OBJECTIVE FOR SE,TE, BE
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SECOND YEAR

C201	M III
C201.1	Solve higher order linear differential equations.
C201.2	Solve problems related to Fourier transform, Z –Transform to solve difference equation.
C201.3	Use Numerical methods to compute integration and differential equations.
C201.4	Use Vector differentiation to solve vector identities and directional derivatives, check irrotational and solenoidal vector fields.
C201.5	Apply Vector Integration to compute Line, surface and Volume Integrals.
C201.6	Use Complex differentiation to check analytic function and perform contour integration by using complex integration.

C202	Electronics Circuits
C202.1	Assimilate the physics, characteristics and parameters of MOSFET towards its application as an amplifier
C202.2	Design MOSFET amplifiers, with and without feedback, & MOSFET oscillators, for given Specifications
C202.3	Analyze and assess the performance of linear and switching regulators, with their variants, towards applications in regulated power supplies
C202.4	Explain internal schematic of Op-Amp and define its performance parameters
C202.5	Design, Build and test Op-amp based analog signal processing and conditioning circuits towards various real time applications
C202.6	Compare the principles of various data conversion techniques and PLL with their applications

C203	Digital Circuits
C203.1	Identify and prevent various hazards and timing problems in a digital design.
C203.2	Use the basic logic gates and various reduction techniques to design digital logic circuit.
C203.3	Design and implement combinational logic circuits.
C203.4	Analyze, design and implement sequential circuits.
C203.5	Design sequential logic circuit using Finite State Machine and Algorithmic State Machine.
C203.6	Design combinational circuit using PLD's & classify and characterise various semiconductor memories.

C204	Electrical Circuits
C204.1	Analyze the simple DC and AC circuit with circuit simplification techniques.
C204.2	Formulate and analyze driven and source free RL and RC circuits.
C204.3	Formulate & determine network parameters for given network and analyze the given network using Laplace Transform to find the network transfer function.
C204.4	Explain construction, working and applications of DC Generator, DC Motor and Permanent Magnet DC Motor.
C204.5	Explain construction, working and applications of Single phase & Three phase AC Motors.
C204.6	Explain construction, working and applications of special purpose motors & understand motors used in electrical vehicles.

C205	Data Structure
C205.1	Apply fundamentals of C for array, pointers, file handling
C205.2	Implement sorting and searching algorithms and calculate their complexity
C205.3	Develop applications of stack and applicability of queue using array
C205.4	Demonstrate applicability of Linked List to develop stack and queue using link list
C205.5	Demonstrate applicability of nonlinear data structures and evaluate string using Tree
C205.6	Apply the knowledge of graph for solving the problems of spanning tree and shortest path algorithm

C206	Electronics Circuits Lab
C206.1	To design, implement and test MOSFET Amplifier, Oscillator.
C206.2	To measure and verify OPAMP parameters
C206.3	To design, implement and test OPAMP as an integrator
C206.4	To design, implement and test OPAMP based R-2R ladder DAC
C206.5	To design, implement and test OPAMP based Square and triangular waveform generator
C206.6	To design, implement and test OPAMP based Schmitt trigger and Instrumentation amplifier circuits

C207	Digital Circuit Lab
C207.1	Verify truth table of IC-74LS153, IC-74LS138 and implement for 3 and 4 bit variable functions.
C207.2	Design and implement 1 Digit BCD adder , 4-bit binary subtractor using 74LS83 , implement 4 & 8 bit comparator using 74LS 85 .
C207.3	Verify voltage and current parameter for TTL and CMOS ICs.
C207.4	Design and implement Synchronous and asynchronous counter using JK flipflop , 74LS90, IC74HC191
C207.5	Design and implement Shift register using D Flip flop ,develop application like Pulse train generator ,ring and twisted ring counter using shift register IC 74HC194.
C207.6	Implement digital logic gate using Python Programs or virtual lab.

C208	Electrical Circuits Lab
C208.1	Analyze the simple DC circuits using Network Theorems.
C208.2	Carry out the transient analysis and determine the voltage, current expressions for RL, RC and RLC Network.
C208.3	Determine "Network Parameters" for given network and analyze using Laplace Transform to find the network transfer function.
C208.4	Analyzing characteristics of DC Shunt motor.
C208.5	Analyzing parameters and characteristics of three phase AC Motors.
C208.6	Make a report on construction, working and applications of special purpose motors.

C209	DATA STRUCTURE LAB
C209.1	Conceptual Implementation of String, files, structure using array and pointers
C209.2	Implement sorting algorithm and analyses time complexity
C209.3	To implement stack and queue using array and link list
C209.4	Create Link list and perform operation like insert, delete, search, sort, traversing.
C209.5	Implement Binary search tree with operations
C209.6	Implement graph with different traversal techniques

C210	Employability Skill Development
C210.1	Identify and analyze the appropriate electronic principle for the task.
C210.2	Build an electronic circuit as per required specifications.
C210.3	Design a Printed Circuit Board layout using PROTEOUS programme.
C210.4	Assemble components and Printed Circuit Board
C210.5	Measure the parameters of electronic circuit and test it.
C210.6	Conduct circuit simulation using suitable software

C211	Signals & Systems
C211.1	Classify different signals and systems and perform operations on signals.
C211.2	Analyze the LTI systems in time domain and determine the convolution between two signals.
C211.3	Analyze and resolve the signals in frequency domain using Fourier series.
C211.4	Analyze and resolve the signals in frequency domain using Fourier Transform.
C211.5	Apply and Analyze LTI systems using Laplace transform.
C211.6	Apply the concept of probability to compute statistical parameters, CDF and PDF.

C213	Control System
C213.1	Apply the Knowledge of model of physical system to analyze and check the stability of the control system
C213.2	Apply the knowledge of time domain analysis to check the stability of a closed-loop control system
C213.3	Apply and analyze the time domain technique to check the stability of system.
C213.4	To Analyze the performance characteristics of system using frequency response method
C213.5	Apply knowledge of state variable form for system equation.
C213.6	Compare various digital controllers and understand the role of the controllers in Industrial automation.

C214	Principles of Communication Systems
C214.1	To compute & compare the bandwidth and transmission power requirements by analyzing time and frequency domain spectra of signal required for modulation schemes.
C214.2	Apply amplitude modulation concepts for measurement of modulation index & compare different generation techniques.
C214.3	Analyze the mathematical techniques of generation, transmission of FM & PM signals
C2014.4	Compare various pulse modulation techniques& analyze sampling effects.
C214.5	Compare various modulation techniques in a digital communication system.
C214.6	Illustrate waveform coding, digital multiplexing and synchronization techniques and their importance in baseband digital transmission.

C215	Object Oriented Programming
C215.1	Apply the principles of object-oriented programming and basic of C++ to write simple programming.
C215.2	Apply the concepts of OOP such as classes & objects, data encapsulation in C++ to create application
C215.3	Create application by using the concept of polymorphism (operator overloading) and friend function in C++
C215.4	Create application by using the concepts of classes, methods inheritance and polymorphism to write programs C++.
C215.5	Apply Templates, Namespaces and Exception Handling concepts to write programs in C++.
C215.6	Create application by using concept of file in Cpp programming

C217	Principle of Communication Systems Lab
C217.1	Evaluate analog modulated waveform in time /frequency domain and also find modulation index
C217.2	Analyse transmission & reception of Phase modulation
C217.3	To illustrate the effect of sampling theorem.
C217.4	Analyse the pulse modulation nature in communication
C217.5	Able to use sampling techniques in MATLAB simulink
C217.6	Able to use the pulse modulation techniques in MATLAB simulink

C218	Object Oriented Programming Lab
C218.1	Apply the basic of C++ to write simple programming
C218.2	Create an application by using concept of classes, objects, Constructor and Destructor in C++ programming.
C218.3	Develop an application by using concept of operator overloading.
C218.4	By using principle of OOP – inheritance, polymorphism; develop an application in C++.
C218.5	Create application in C++by using Concept of namespaces , template ,exception handling.
C218.6	Create an application in C++, to retrieve , write data in file.

C220	Emplyolabity Skill Development
C220.1	Apply SWOC assessment to develop personal and career goals using introspective skills. Outline and evaluate short-term and long-term goals.
C220.2	Develop effective communication skills listening, reading, writing, and speaking
C220.3	Develop self- management attributes, problem solving abilities and team working & building capabilities
C220.4	Work in multi-cultural professional environment, leadership qualities and work effectively by enhancing inter-personal relationships, conflict management and leadership skills.
C220.5	Apply professional ethics, etiquettes & morals to enhance the opportunities of employability and excel in the professional environment.
C220.6	Develop practically deployable skill set like critical thinking, Quantitative Ability & Logical Reasoning to enhance the opportunities of employability and excel in the professional environment.

C221	Project Based Learning
C221.1	Identify the real-world problem through a literature survey and/or field visits.
C221.2	Identity project & learning objectives as a part of a team.
C221.3	Design system by selecting appropriate technology, components & cost effective measures.
C221.4	Contribute to society through proposed solution by following professional ethics and safety measures.
C221.5	To derive inferences, communicate effectively & identify the extension of the project.
C221.6	Lead individuals and teams using effective communication skills.

C219	Data Analytics Lab
C219.1	Install Python Jupyter and write programs using NumPy, Pandas, Matplotlib and Scikit-learn.
C219.2	Write programs related to 1D and 2D arrays also use data series ,dataframe
C219.3	Write programs to visualize output using various graphs and plots
C219.4	Write programs for Data Wrangling Operation.
C219.5	Write programs for Exploratory Data Analysis.
C219.6	Complete an end to end project related to data analytics.

THIRD YEAR

C301	Digital Communication
C301.1	Apply the knowledge of probability and statistical calculations on random signal analysis.
C301.2	Measure the performance of digital communication receiver systems in terms of probability of error in presence of noise
C301.3	Find the probability of error of different pass band transmission techniques.
C301.4	Analyze Performance of spread spectrum communication system and classify it to improve the performance under fading channels for various applications.
C301.5	Apply the concept of average information content, entropy and mutual information to design efficient encoding schemes for communication system
C301.6	Design a data compression scheme using suitable sourse coding technique to maximize the data rate

C302	Electromagnetic and Field Theory
C302.1	Apply the basic electromagnetic principles to E & H field for different source.
C302.2	Apply boundary conditions to the boundaries between various media to interpret behavior of the fields on either sides.
C302.3	Apply Maxwell's equations in both the forms for various sources and Calculate the time average power density using Power Poynting Theorem, retarded vector magnetic potential.
C302.4	Analyze the incident/reflected/transmitted waves at normal incidence.
C302.5	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
C302.6	Carry out a detailed study, interpret the relevance and applications of Electromagnetics

C303	DATABASE MANAGMENT SYSTEM
C303.1	Implement the underlying concepts of a database system.
C303.2	Design and implement a database schema for a given problem-domain using data model.
C303.3	Formulate, using SQL/DML/DDL commands, solutions to a wide range of query and update problems
C303.4	Implement transactions, concurrency control, and be able to do Database recovery.
C303.5	Able to Compare various Parallel Database Architectures and Identify for various applications
C303.6	Able to understand various Distributed Databases Evaluate it for various applications

C304	Microcontrollers
C304.1	Understand the fundamentals of microcontroller and write a Sample programs in C language.
C304.2	Interface various electronic components with microcontrollers.
C304.3	Analyze the features of PIC 18F XXXX.
C304.4	Describe the programming details in peripheral support.
C304.5	Develop interfacing models according to applications
C304.6	Evaluate the serial communication details and interfaces.

C305	Computer Networks
C305D.1	Apply fundamental underlying principles of computer networking , Analyze different topologies, transmission media, its architecture by Drawing ISO OSI Reference Model, TCP/IP Model & its Addressing,
C305D.2	Apply fundamental of controlling techniques for flawless data communication using data link layer protocols, Analyze & Classify Media Access Control.
C305D.3	Learn the functions of network layer protocol, Apply IP addressing technique, Compare & Classify various switching Techniques.
C305D.4	Analyze various interior and exterior, unicasting and multicasting protocols.
C305D.5	Analyze data flow using various protocols used at Transport layer, congestion control techniques for QoS.
C305D.6	Analyze & Compare use of various Protocols at applications Layer.

C306	Digital Communictaion Lab
C306.1	Able to analyze digital modulation techniques using hardware setup kit.
C306.2	Describe and analyze the digital communication system with spread spectrum modulation
C306.3	Able to analyze digital modulation techniques by using MATLAB tools (M-ary PSK & QAM)
C306.4	Able to analyze digital modulation techniques by using MATLAB tools (BPSK Receiver)
C306.5	Able to identify and describe different techniques in modern digital communications, in particular in source coding using MAT Lab tools.
C306.6	Apply the knowledge of digital electronics and describe the error control codes like block code, cyclic code

C307	DBMS Lab
C307.1	Develop open source relational database using MySql.
C307.2	Design and Develop appropriate DDL query of relational database.
C307.3	Design and Develop appropriate DML query of relational database.
C307.4	Write a PL/ SQL block for control structure & Cursor.
C307.5	Write a PL/ SQL block for stored Procedure, Function & Trigger.
C307.6	Develop interfacing of Database with Java/ Python & with Database Relational Design.

C309 D	Computer Network Lab
C309D.1	Implement & Test LAN
C309D.2	Simulate various Networks using relevant network devices commands on Simulator
C309D.3	Observe Analyze and note the details of the live type of traffic using packet capture and analysis tool
C309D.4	Configure servers and analyse packet sequence and data flow between client-server using packet analysis tools.
C309D.5	Observe, Analyse and note the working of protocols and capture packets in LAN using packet capture and analysis tool.
C309D.6	Installation and configuration of Server for different role.

C312	Cellular Network
C312.1	Apply the fundamental knowledge of wireless communication
C312.2	Analyse the performance of OFDM & MIMO system
C312.3	Design cellular radio system & compare handover mechanism.
C312.4	Analysis of link budget & tele traffic system models.
C312.5	Compare wireless mobile technologies, wireless network using simulation.
C312.6	Summarise different issues in performance analysis.

C313	Project Management
C313.1	Apply the fundamental knowledge of project management for effectively handling the projects.
C313.2	Identify and select the appropriate project based on feasibility study and undertake its effective planning.
C313.3	Assimilate effectively within the organizational structure of project and handle project management related issues in an efficient manner.
C313.4	Apply the project scheduling techniques to create a Project Schedule Plan and accordingly utilize the resources to meet the project deadline.
C313.5	Identify and assess the project risks and manage finances in line with Project Financial Management Process.
C313.6	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.

C314	POWER DEVICES AND CIRCUITS
C314.1	Based on the characteristic parameters among SCR, GTO, MOSFET & IGBT, analyze and identify suitability of the power device for certain applications and understand the significance of device ratings
C314.2	To design triggering / driver circuits for various power devices
C314.3	To evaluate and analyze various performance parameters of the different converters and its topologies
C314.4	To understand significance and design of various protections circuits for power devices
C314.5	To evaluate the performance of uninterruptible power supplies, switch mode power supplies and battery
C314.6	Analyze case studies of electric vehicles & solar systems by using power electronics

C315	Advance Java Programming
C315.1	Design and Investigate GUI applications using Applets and JApplet - swing component
C315.2	Design and Investigate GUI application using relevant AWT/ swing components to handle the event like key event, window event, mouse event.
C315.3	Design and Investigate GUI applications using Abstract Windowing Toolkit (AWT), Swing and collection frameworks.
C315.4	Design application to access database through java program
C315.5	Design & investigate an application using remote method & invocations(RMI)
C315.6	Develop program for client /server communication using Java Networking classes.

C315E	Network Security
C315.1	Analyze attacks on computers and computer security
C315.2	Analyze knowledge of cryptography techniques
C315.3	Apply and Analyze various symmetric asymmetric keys for ciphers
C315.4	Evaluate different message authentication algorithms and hash functions
C315.5	Analyze various aspects of E-Mail Security
C315.6	Analyze various aspects of Web Security

C316	Cellular Networks Lab (304196)
C316.1	Compute and compare the median loss by employing Hata model for various distance for carrier frequencies of 2.1GHz and 6GHz
C316.2	Simulate BER Performance oover a Wireline AWGN channel with BPSK transmission for SNR:0 to 50 dB& Simulate BER performance of multi-antenna Rayleigh channel for SNR varying from 0 to 60 dB.
C316.3	Compute the RMS delay spread & Estimate channel coefficient vector Multi-Antenna Systems
C316.4	Perform a Link-Budget analysis for a wireless communication system & Compute doppler shift of the received signal for different carrier frequency of mobile generations.
C316.5	Program to implement OFDM and Evaluate frame error rate against SNR
C316.6	Simulate mobile environment to evaluate performance parameters &Simulate a cellular system with 48 channels per cell and blocking probability of 2%

C317	Power Devices & Circuits Lab
C317.1	Analyze V-I Characteristics of SCR, MOSFET & IGBT.
C317.2	Analyze single phase semi and full converters with R & R-L loads
C317.3	Analyze single phase PWM Power MOSFET based bridge inverter as well as DC chopper for R & R-L loads
C317.4	Analyze Switched Mode Power Supply
C317.5	Analyze single phase AC voltage controller using SCRs
C317.6	Design and implement a solar cell operated emergency lighting system

C318	Advance java Programming lab
C318.1	Developing GUI application using applet and handling key event.
C318.2	Developing GUI application by using relevant AWT/Swing components to handle the mouse event
C318.3	Develop application to insert and retrieve data from database through Java programs, using Java Database Connectivity
C318.4	Develop application to Invoke the remote methods using Remote Method Invocation (RMI) to accept simple datatypes.
C318.5	Develop application for client /server communication using Java Networking classes
C318.6	Develop application to create simple JSP pages using concept of servlets.

C318E	Network Security Lab
C318.1	Apply the cryptographic algorithms for data communication
C318.2	Apply the Digital signature for secure data transmission
C318.3	Implementation of DES & AES Algorithm
C318.4	Implementation of Hash functions
C318.5	Implementation of windows security using firewall
C318.6	Apply steps to ensure Security of google chrome web browser

C319	**Advance java Programming lab**
C319.1	Developing GUI application using applet and handling key event.
C319.2	Developing GUI application by using relevant AWT/Swing components to handle the mouse event
C319.3	Develop application to insert and retrieve data from database through Java programs, using Java Database Connectivity
C319.4	Develop application to Invoke the remote methods using Remote Method Invocation (RMI) to accept simple datatypes.
C319.5	Develop application for client /server communication using Java Networking classes
C319.6	Develop application to create simple JSP pages using concept of servlets.

C320	**Advance java Programming lab**
C320.1	Developing GUI application using applet and handling key event.
C320.2	Developing GUI application by using relevant AWT/Swing components to handle the mouse event
C320.3	Develop application to insert and retrieve data from database through Java programs, using Java Database Connectivity
C320.4	Develop application to Invoke the remote methods using Remote Method Invocation (RMI) to accept simple datatypes.
C320.5	Develop application for client /server communication using Java Networking classes
C320.6	Develop application to create simple JSP pages using concept of servlets.

FINAL YEAR

C401	**Radiation & Microwave Theory**
C401.1	Apply the fundamentals of electromagnetic to derive free space propagation equation and distinguish various performance parameters of antenna.
C401.2	Formulate the wave equation for analysis of waveguide
C401.3	Analyze the passive microwave devices/components
C401.4	Explore construction and working of principles active microwave devices/components.
C401.5	Analyze the structure, characteristics, operation, equivalent circuits and applications of various microwave solid state active devices
C401.6	To perform the various microwave measurement techniques

C402	**VLSI Design & Technology**
C402.1	Develop effective HDL codes for digital design.
C402.2	Apply knowledge of real time issues in digital design.
C402.3	Model digital circuit with HDL, simulate, synthesis and prototype in PLDs.
C402.4	Design CMOS circuits for specified applications.
C402.5	Analyze various issues and constraints in design of an ASIC.
C402.6	Apply knowledge of testability in design and Build In Self Test (BIST) circuit.

C403	CLOUD COMPUTING
C403.1	Implement the underlying concepts of a database system.
C403.2	Design and implement a database schema for a given problem-domain using data model.
C403.3	Formulate, using SQL/DML/DDL commands, solutions to a wide range of query and update problems
C403.4	Implement transactions, concurrency control, and be able to do Database recovery.
C403.5	Able to Compare various Parallel Database Architectures and Identify for various applications
C403.6	Able to understand various Distributed Databases Evaluate it for various applications

C404D	Embedded & RTOS
C404.1	Apply design metrics of Embedded systems to design real time applications to match recent trends in technology.
C404.2	Apply Real time systems concepts.
C404.3	Evaluate µCOS operating system and its services.
C404.4	Apply Embedded Linux Development Environment and testing tools.
C404.5	Analyze Linux operating system and device drivers.
C404.6	Analyze the hardware – software co design issues for testing of real time Embedded system

C405	Deep learning
C405.1	Classify machine learning algorithms and its types.
C405.2	Discuss the concepts of deep learning and its Frameworks
C405.3	Identify the deep learning architectures with respect to the applications.
C405.4	Demonstrate different architectures of Convolutional neural networks.
C405.5	Discuss natural language processing architectures.
C405.6	Make use of various case studies and deep learning applications.

C406	Lab Practice - 1 (RMT & Cloud Computing)
C406.1	Develop a simple web application to launch using Google App Engine.
C406.2	Demonstrate Virtualization by launching virtual machine and share file between them
C406.3	Design and develop custom (API) Application using Cloud.
C406.4	Analyze the antenna by measuring the different antenna parameters.
C406.5	Demonstrate various perceive operating principles of passive and active microwave devices.
C406.6	Perform measurements on microwave devices and networks using VNA

C407	Lab Practice - 2 (VLSI Design & Elective -3)
C407.1	Design and Implement CMOS circuits Using Microwind.
C407.2	To simulate, synthesis circuit with PLD devices.
C407.3	To Design VLSI application using VHDL or CMOS.
C407.4	
C407.5	
C407.6	

C408	Project Stage I
C408.1	Ability to identify community and its need, engage in study to research literature & consolidate to formulate the problem statement.
C408.2	Ability to engage in study to identify the mathematical, science and engineering concepts necessary to solve the identified engineering problem.
C408.3	Ability to select the engineering tools/components for solving the identified engineering problem.
C408.4	-
C408.5	-
C408.6	-

C410	Fiber Optic Communication (404190)
C410.1	plot electrical and optical characteristics of LED & LSAER optical source
C410.2	to estimate the numerical aperture MMSI optical fiber
C410.3	establish a digital optical link
C410.4	handle optical power meter for optical power measurement
C410.5	compute OSNR by Simulating WDM system
C410.6	to identify the current trends in optical communication

C411	Mobile Computing
C411.1	**Apply &Analyse concepts of Mobile Computing.**
C411.2	Analyse next generation Mobile Communication System.
C411.3	Analyse& Evaluate network layers of Mobile Communication.
C411.4	Analyse& Evaluate IP and TCP layers of Mobile Communication.
C411.5	Analyse& Evaluate of different mathematical models.
C411.6	Analyse different mobile applications

C412D	Digital Marketing
C412.1	Design websites using free tools like Wordpress and explore it for digital marketing.
C412.2	Apply various keywords for a website & to perform SEO.
C412.3	Understand the various SEM Tools and implement the Digital Marketing Tools.
C412.4	Illustrate the use of Facebook, Instagram and Youtube for Digital Marketing in real life.
C412.5	Use Linked in platform for various campaigning.
C412.6	Interpret the online reviews to understand the importance of recent trends in digital marketing.

C414	Digital Business Management
C414.1	Identify drives of digital Business
C414.2	Analyse the impact of E-commerce on business model and its strategy
C414.3	Carryout detail study, interpret the building digital business its application and infrastructure.
C414.4	Illustrate various approaches and techniques for e-business and management
C414.5	Illustrate various E-business strategies and analyze the e-business action, challenges and transition
C414.6	Prepare E-business plan

C415	Project Stage II
C415.1	Ability to identify community and its need, engage in study to research literature & consolidate to formulate the problem statement.
C415.2	Ability to engage in study to identify the mathematical, science and engineering concepts necessary to solve the identified engineering problem.
C415.3	Ability to select the engineering tools/components for solving the identified engineering problem.
C415.4	Ability to demonstrate compliance to the prescribed standards/safety norms through implementation of the identified engineering problem.
C415.5	Ability to perform the budget analysis of the project through the utilization of resources (finance, power, area, bandwidth, weight, size, any other).
C415.6	Ability to analyze and interpret results of experiments conducted on the designed solution(s) to arrive at valid conclusions.

C416	FOC LAB (404195)
C416.1	plot electrical and optical characteristics of LED & LASER optical source
C416.2	to estimate the numerical aperture MMSI optical fiber
C416.3	establish a digital optical link
C416.4	handle optical power meter for optical power measurement
C416.5	compute OSNR by Simulating WDM system
C416.6	to identify the current trends in optical communication