



JAYAWANT SHIKSHAN PRASARAK MANDAL'S
Bhivarabai Sawant Institute of Technology & Research

(Approved by AICTE New Delhi, DTE Mumbai & Affiliated to Savitribai Phule Pune University)

Accredited with B++ Grade by NAAC

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Accredited by NAAC with a B++ grade

and

NBA accredited programs: Electronics and Telecommunication Engineering, Information Technology and Electrical Engineering

Department of Electronics and Telecommunication Engineering

List of Course Outcomes(Current Year)

SE 2019 Course: Academic year: 2022-23, SE Semester I

Course Code	Name of the Course	Course Outcome Statements
207005	Engineering Mathematics - III	<ul style="list-style-type: none"> Solve higher order linear differential equation using appropriate techniques for modelling, analyzing of electrical circuits and control system Apply concept of Fourier transform & Z-transform and its applications to continuous & discrete systems, signal & image processing and communication systems 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. Perform vector differentiation & integration, analyze the vector fields and apply to electro- magnetic fields & wave theory. Analyze Complex functions, Conformal mappings, Contour integration applicable to electrostatics ,digital filters, signal and image processing
204181	Electronic Circuits	<ul style="list-style-type: none"> Assimilate the physics, characteristics and parameters of MOSFET towards its application as amplifier. Design MOSFET amplifiers, with and without feedback, & MOSFET oscillators, for given specifications Analyze and assess the performance of linear and switching regulators, with their variants, towards applications in regulated power supplies Explain internal schematic of Op-Amp and define its performance parameters Design, Build and test Op-amp based analog signal processing and conditioning circuits towards various real time applications. Understand and compare the principles of various data conversion techniques and PLL with their applications
204182	Digital Circuits	

		<ul style="list-style-type: none"> • Identify and prevent various hazards and timing problems in a digital design. • Use the basic logic gates and various reduction techniques of digital logic circuit. • Analyze, design and implement combinational logic circuits. • Analyze, design and implement sequential circuits. • Differentiate between Mealy and Moore machines. • Analyze digital system design using PLD
204183	Electrical Circuits	<ul style="list-style-type: none"> • Analyze the simple DC and AC circuit with circuit simplification techniques. • Formulate and analyze driven and source free RL and RC circuits. • Formulate & determine network parameters for given network and analyze the given network using Laplace Transform to find the network transfer function. • Explain construction, working and applications of DC Machines / Single Phase & Three Phase AC Motors. • Explain construction, working and applications of special purpose motors & understand motors used in electrical vehicles. • Analyze and select a suitable motor for different applications.
204184	Data Structures	<ul style="list-style-type: none"> • Solve mathematical problems using C programming language • Implement sorting and searching algorithms complexity. • Develop applications of stack and queue using array. • Demonstrate applicability of Linked List. • Demonstrate applicability of nonlinear Binary Tree with respect to its time complexity. • Apply the knowledge of graph for solving spanning tree and shortest path algorithm

SE 2019 Course: Academic year: 2022-23, SE Semester II

Course Code	Name of the Course	Course Outcome Statements
204191	Signals & Systems	<ul style="list-style-type: none"> • Identify, classify basic signals and perform operations on signals. • 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. • Analyze and resolve the signals in frequency domain using Fourier series and Fourier Transform. • Resolve the signals in complex frequency domain using Laplace Transform, and will be able to

		<p>apply and analyze the LTI systems using Laplace Transforms.</p> <ul style="list-style-type: none"> • Define and Describe the probability, random variables and random signals. Compute the probability of a given event, model, compute the CDF and PDF. • Compute the mean, mean square, variance and standard deviation for given random variables using PDF •
204192	Control Systems	<ul style="list-style-type: none"> • • Determine and use models of physical systems in forms suitable for use in the analysis and design of control systems. • • Determine the (absolute) stability of a closed-loop control system. • Perform time domain analysis of control systems required for stability analysis. • Perform frequency domain analysis of control systems required for stability analysis. • Apply root-locus, Frequency Plots technique to analyze control systems • Express and solve system equations in state variable form. • Differentiate between various digital controllers and understand the role of the controllers in Industrial automation. •
204193	Principles of Communication Systems	<ul style="list-style-type: none"> • To compute & compare the bandwidth and transmission power requirements by analyzing time and frequency domain spectra of signal required for modulation schemes under study. • Describe and analyze the techniques of generation, transmission and reception of Amplitude Modulation Systems. • Explain generation and detection of FM systems and compare with AM systems. • Exhibit the importance of Sampling Theorem and correlate with Pulse Modulation technique (PAM, PWM, and PPM). • Characterize the quantization process and elaborate digital representation techniques (PCM, DPCM, DM and ADM). • Illustrate waveform coding, multiplexing and synchronization techniques and articulate their importance in baseband digital transmission
204194	Object Oriented Programming	<ul style="list-style-type: none"> • • Describe the principles of object oriented

		<p>programming.</p> <ul style="list-style-type: none"> • Apply the concepts of data encapsulation, inheritance in C++ • Understand Operator overloading and friend functions in C++. • Apply the concepts of classes, methods inheritance and polymorphism to write programs C++. • Apply Templates, Namespaces and Exception Handling concepts to write programs in C++. • Describe and use of File handling in C++
204199	Employability Skills Development	<ul style="list-style-type: none"> • Define personal and career goals using introspective skills and SWOC assessment. Outline and evaluate short-term and long-term goals. • 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. • Be a part of a multi-cultural professional environment and work effectively by enhancing inter-personal relationships, conflict management and leadership skills. • Comprehend the importance of professional ethics, etiquettes & morals and demonstrate sensitivity towards it throughout certified career. • 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.
204200	Project Based Learning	<ul style="list-style-type: none"> • identify the real-world problem (possibly of interdisciplinary nature) through a rigorous literature survey and formulate / set relevant aim and objectives. • Contribute to society through proposed solution by strictly following professional ethics and safety measures. • Propose a suitable solution based on the fundamentals of electronics and communication engineering by possibly the integration of previously acquired knowledge. • Analyze the results and arrive at valid conclusion. • Use of technology in proposed work and demonstrate learning in oral and written form. • Develop ability to work as an individual and as a team member.

TE 2019 Course: Academic year: 2022-23, TE Semester I

Course Code	Name of the Course	Course Outcome Statements
304181	Digital Communication	<ul style="list-style-type: none">• 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
304182	Electromagnetic Field Theory	<ul style="list-style-type: none">• 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 sides.• 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 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, V_{max}/V_{min}, length of transmission line using Smith Chart.• CO6: Carry out a detailed study, interpret the relevance and applications of Electromagnetics
304183	Database Management	<ul style="list-style-type: none">• CO1: Ability to implement the underlying concepts of a database system.• CO2: Design and implement a database schema for a given problem-domain using data model.

		<ul style="list-style-type: none"> • 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.
304184	Microcontroller	<ul style="list-style-type: none"> • 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.
304185 (A):	Digital Signal Processing (Elective - I)	<ul style="list-style-type: none"> • CO1: Interpret and process discrete/ digital signals and represent DSP system. • CO2: Analyze the digital systems using the Z-transform techniques. • CO3: Implement efficient transform and its application to analyze DT signals. • CO4: Design and implement IIR filters. • CO5: Design and implement FIR filters. • CO6: Apply DSP techniques for speech/ biomedical/ image signal processing
304185 (B):	Electronic Measurements (Elective - I)	<ul style="list-style-type: none"> • CO1: Understand the metrics for the measurement system • CO2: Select and use the instruments for measurement & analysis of basic electronic parameters • CO3: Identify and use the different signal generators for specific applications • CO4: Understand the principles of different Oscilloscopes for specific applications • CO5: Identify the use of other display devices, recorders and timer/counter in measurement systems • CO6: Use the advanced measurement systems for electronics parameter measurement
304185 (C):	Fundamentals of JAVA Programming (Elective - I)	<ul style="list-style-type: none"> • CO1: Understand the basic principles of Java programming language • CO2: Apply the concepts of classes and objects to write programs in Java • 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

		<ul style="list-style-type: none"> • CO6: Use Graphics class, AWT packages and manage input and output files in Java
304185 (D):	Computer Networks (Elective - I)	<ul style="list-style-type: none"> • CO1: Design LAN using appropriate networking architecture, topologies, transmission media, and networking devices. • CO2: Understand the working of controlling techniques for flawless data communication using data link layer protocols. • CO3: Learn the functions of network layer, various switching techniques and internet protocol addressing. • CO4: Explore various interior and exterior, unicasting and multicasting protocols. • CO5: Analyze data flow using TCP/UDP Protocols, congestion control techniques for QoS. • CO6: Illustrate the use of protocols at application layer.
304190	Skill Development	<ul style="list-style-type: none"> • 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.

TE 2019 Course: Academic year: 2022-23, TE Semester II

Course Code	Name of the Course	Course Outcome Statements
304192	Cellular Networks	<ul style="list-style-type: none"> • 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.
304193	Project Management	<ul style="list-style-type: none"> • CO1: Apply the fundamental knowledge of project management for effectively handling the projects. • CO2: Identify and select the appropriate project based on

		<p>feasibility study and undertake its effective planning.</p> <ul style="list-style-type: none"> • 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.
304194	Power Devices & Circuits	<ul style="list-style-type: none"> • 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.
304195 (A):	Digital Image Processing (Elective - II)	<ul style="list-style-type: none"> • CO1: Apply knowledge of mathematics for image understanding and analysis. • CO2: Implement spatial domain image operations. • CO3: Design and realize various algorithms for image segmentation. • CO4: Design and realize various algorithms for image Compression. • CO5: Apply restoration to remove noise in the image. • CO6: Describe the object recognition system.
304195 (B):	Sensors in Automation (Elective - II)	<ul style="list-style-type: none"> • 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

		<p>environmental, Agricultural and bio-medical equipment and sustainability.</p> <ul style="list-style-type: none"> • CO6: Explore IoT based applications of Sensors and Transducers.
304195 (C)	Advanced JAVA Programming (Elective - II)	<ul style="list-style-type: none"> • 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.
304195 (D)	Embedded Processors (Elective - II)	<ul style="list-style-type: none"> • CO1: Understand basics of Embedded C Programming and usage of Embedded C and study different software tools for programming microcontrollers. • CO2: Get acquainted with various Embedded Processor architectures related to industrial application. • CO3: Know about the programming of ARM 7 based microcontroller with on chip peripherals and external peripherals. • CO4: Understand the architectures of ARM Cortex M4 Microcontrollers and its advantages over ARM 7 Microcontrollers. • CO5: Implement the real world programming of ARM 7 based microcontroller with on chip peripherals and external peripherals. • CO6: Recognize the interfacing of real world sensors and standard buses. Will also able to design different case studies.
304195 (E)	Network Security (Elective-II)	<ul style="list-style-type: none"> • 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
304199	Internship	<ul style="list-style-type: none"> • 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,

		<p>economic and administrative considerations.</p> <ul style="list-style-type: none"> • CO6: To make own career goals and personal aspirations
304200	Mini Project	<ul style="list-style-type: none"> • 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. • CO 4: Deliver technical seminar based on the Mini Project work carried out

BE 2019 Course: Academic year: 2022-23, BE Semester I

Course Code	Name of the Course	Course Outcome Statements
404181	Radiation and Microwave Theory	<ul style="list-style-type: none"> • 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, device set ups of microwave measurement devices and Identify the effect of radiations on environmental sustainability
404182	VLSI Design and Technology	<ul style="list-style-type: none"> • 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.
404183	Cloud Computing	<ul style="list-style-type: none"> • 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
404184 (A)	Speech Processing (Elective -	<ul style="list-style-type: none"> • CO1: Understand basics of Human speech production mechanism. • CO2: Classify speech sounds based on acoustic and

	III)	<p>articulatory phonetics.</p> <ul style="list-style-type: none"> • CO3: Analyse speech signal to extract the characteristic of vocal tract (formants) and vocal cords (pitch). • CO4: Evaluate speech signal for extracting LPC and MFCC Parameters of speech signal. • CO5: Implement algorithms for processing of speech and audio signals considering the properties of acoustic signals. • CO6: Design speech recognition application for speech signal analysis.
404184 (B)	PLC SCADA and Automation (Elective - III)	<ul style="list-style-type: none"> • 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
404184 (C)	Java Script (Elective - III)	<ul style="list-style-type: none"> • CO1: Use basic features of java script. • CO2: Use relevant data types for developing application in java script. CO3: Use the function and objects as self-contained, with data passing in and out through well-defined interfaces in development of small systems. • CO4: Apply the regular expression for Text matching and manipulation. CO5: Explore use of the various aspects of JavaScript object models that are fundamental to the proper use of the language. • CO6: Develop the application using windows controlling and form handling
404184 (D)	Embedded System & RTOS (Elective - III)	<ul style="list-style-type: none"> • 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 μCOS 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
404184 (E)	Modernized IoT (Elective - III)	<ul style="list-style-type: none"> • 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.
404185	Data	<ul style="list-style-type: none"> • CO1: Understand the process of data mining and

(A)	Mining (Elective - IV)	<p>performance issues in data mining</p> <ul style="list-style-type: none"> • • 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
404185 (B)	Electronics Product Design (Elective - IV)	<ul style="list-style-type: none"> • CO1: Understand and explain design flow of design of electronics product. • 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.
404185 (B)	Deep Learning (Elective - IV)	<ul style="list-style-type: none"> • CO1: Classify machine learning algorithms and its types. • 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
404185 (D)	Low Power CMOS (Elective - IV)	<ul style="list-style-type: none"> • CO1: Explain the sources of power dissipation in CMOS. • CO2: Classify the special techniques to mitigate the power consumption in CMOS circuits. • CO3: Summarize the power optimization and trade off techniques in digital circuits. • CO4: Illustrate the power estimation at logic and circuit level. • CO5: Explain the software design for low power in various level. • CO6: Use the CAD tools for low power synthesis.
404185 (E)	Smart Antennas (Elective - IV)	<ul style="list-style-type: none"> • CO1: Compare various linear wire antenna and uniform array in terms of antenna parameters and analyze them based on the current distribution and identify an appropriate wire antenna for given application. • CO2: Classify Microstrip & re-configurable antenna and techniques. CO3: Describe smart antenna systems and discuss the beam steering and mutual coupling effects. • CO4: Explain DOA estimation methods and classify. • CO5: Classify the beam forming methods.

		<ul style="list-style-type: none"> • CO6: Describe and Compare MIMO systems.
404188	Project Phase – I	<ul style="list-style-type: none"> • CO1: Demonstrate a sound technical knowledge in field of E&TC in the form of project. • 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

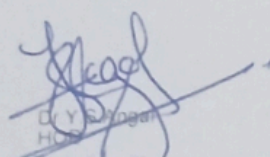
BE 2019 Course: Academic year: 2022-23, SE Semester II

Course Code	Name of the Course	Course Outcome Statements
404190	Fiber Optic Communication	<ul style="list-style-type: none"> • 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.
404191 (A)	Biomedical Signal Processing (Elective - V)	<ul style="list-style-type: none"> • 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
404191 (B)	Industrial Drives & Control (Elective - V)	<ul style="list-style-type: none"> • CO1: Understand significance and design of various components of electrical drives. • CO2: Develop, evaluate and analyze the performance of DC motor drives. • CO3: Design, estimate and examine the performance of chopper controlled DC drives. • CO4: Adapt, choose and categorize performance of PWM inverter drives for Induction motors.

		<ul style="list-style-type: none"> • CO5: Elaborate, interpret and analyze the performance of Synchronous motor drive. • CO6: Develop, explain and examine performance of stepper motor control.
404191 (C)	Android Development (Elective - V)	<ul style="list-style-type: none"> • CO1: Describe the process of developing mobile applications. • CO2: Create mobile applications on the different android platform. CO3: Design and implement mobile applications involving data storage in databases.
404191 (D)	Embedded System Design (Elective - V)	<ul style="list-style-type: none"> • CO1: Apply the design aspects of Embedded system. • CO2: Create and debug a firmware for the Embedded System using ARM Cortex M4. • CO3: Develop a specific software code for the functionality of the Embedded System. • CO4: Utilize an open source RTOS for embedded system design. • CO5: Design an advanced embedded system. • CO6: Explore Embedded Android system.
404191 (E)	Mobile Computing (Elective - V)	<ul style="list-style-type: none"> • 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.
404192 (A)	System on Chip (Elective - VI)	<ul style="list-style-type: none"> • CO1: Understand the basic concepts and architecture of SOC. • CO2: Understand the basic terminology of Verilog HDL programming. CO3: Apply the various Verilog modeling styles in writing the design and testbench codes. • CO4: Understand the basic steps used in the VLSI Physical Design. • CO5: Understand the basic architecture of various processors used in SOC. • CO6: Understand the working principle of various Buses and memory used in SOC.
404192 (B)	Nanoelectronics (Elective - VI)	<ul style="list-style-type: none"> • CO1: Understand the fundamental knowledge behind nanotechnology. CO2: Understand to Nano-CMOS technology. • CO3: Explore various Nanoelectronics material. • CO4: Understand the importance of carbon nanotubes. • CO5: Understand Nanomaterial and Nanodevice fabrication. • CO6: Understand various applications of Nanotechnology in Electronics.
404192 (C)	Remote Sensing (Elective - VI)	<ul style="list-style-type: none"> • CO1: Describe the concepts of remote sensing and electromagnetic radiation interaction. • CO2: Explain the sensors characteristics and analyze its resolution.

		<ul style="list-style-type: none"> • CO3: Classify different types of satellite data products and design various color composites. • CO4: Describe the fundamentals of microwave remote sensing. • CO5: Analyze GNSS signal structure and augmentation systems. • CO6: Demonstrate and describe real life applications of remote sensing
404192 (D)	Digital Marketing (Elective - VI)	<ul style="list-style-type: none"> • 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
404193	Innovation and Entrepreneurship	<ul style="list-style-type: none"> • 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
404194	Digital Business Management	<ul style="list-style-type: none"> • CO1: Identify drivers of digital business. • CO2: Illustrate various approaches and techniques for E-business and management. • CO3: Prepare E-business plan.

404192 (B)	Nanoelectronics (Elective - VI)	CO1: Understand the fundamental knowledge behind nanotechnology. CO2: Understand to Nano-CMOS technology. CO3: Explore various Nanoelectronics material. CO4: Understand the importance of carbon nanotubes. CO5: Understand Nanomaterial and Nanodevice fabrication. CO6: Understand various applications of Nanotechnology in Electronics.
404192 (C)	Remote Sensing (Elective - VI)	CO1: Describe the concepts of remote sensing and electromagnetic radiation interaction. CO2: Explain the sensors characteristics and analyze its resolution. CO3: Classify different types of satellite data products and design various color composites. CO4: Describe the fundamentals of microwave remote sensing. CO5: Analyze GNSS signal structure and augmentation systems. CO6: Demonstrate and describe real life applications of remote sensing
404192 (D)	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
404193	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
404194	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.


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