



**BVRIT HYDERABAD**  
College of Engineering for Women  
Department of Electronics and Communication Engineering

**AY:2020-21 – I Sem**

<b>II Year I Sem – R18</b>			
<b>Course Code</b>	<b>Course Name</b>	<b>CO. No.</b>	<b>Course Outcomes</b>
C211	EDC	C211.1	Analyze the construction, principle of operation and characteristics of PN junction diode.
		C211.2	Differentiate various types of diodes and their applications.
		C211.3	Design biasing circuits to maintain a stable operating point based on given specifications.
		C211.4	Choose appropriate BJT configuration for a given application.
		C211.5	Evaluate the characteristics of BJT and FET devices.
		C211.6	Analyze the amplifier configurations of BJT and FET devices using h parameters.
C212	NA & TL	C212.1	Analyze the network topologies with electrical components
		C212.2	Analyze the steady state and transient response of RLC circuits
		C212.3	Illustrate the characteristics of two port network parameters
		C212.4	Design attenuators and impedance matching networks
		C212.5	Evaluate various transmission line parameters
		C212.6	Analyze Transmission line using Smith Chart with impedance considerations
C213	DSD	C213.1	Apply the concepts of number systems, codes and Boolean algebra to simplify logic expressions.
		C213.2	Design simple combinational logic circuits.
		C213.3	Apply minimization techniques for optimizing combinational logic.
		C213.4	Design and analyze simple sequential circuits
		C213.5	Apply minimization techniques for sequential circuits
		C213.6	Realize logic gates using diodes and transistors
C214	SS	C214.1	Analyze the orthogonality of signals
		C214.2	Analyze the Spectral characteristics of Periodic and aperiodic continuous signals
		C214.3	Apply sampling theorem in analog to digital signal conversion.

		C214.4	Analyze the signal transmission through linear time invariant systems.
		C214.5	Apply the concepts of convolution and correlation in signal and system analysis
		C214.6	Analyze continuous and discrete-time signals and systems using Laplace and Z Transforms respectively
C215	PTSP	C215.1	Apply the concepts of probability theory to solve probabilistic problems.
		C215.2	Analyze various distribution and density functions of a random variable.
		C215.3	Estimate various parameters of a random variable multiple random variables
		C215.4	Analyze the temporal and spectral characteristics of stochastic processes.
		C215.5	Analyze the characteristics and modelling of various noise sources
		C215.6	Analyze various Source coding techniques and related laws
C216	EDC Lab	C216.1	Analyze the characteristics of different practical diodes.
		C216.2	Construct electronic circuits for various applications using diodes.
		C216.3	Analyze the characteristics of different Transistor configurations.
		C216.4	Design amplifier circuits for a given specification.
C217	DSD Lab	C217.1	Implement Boolean Expressions using universal logic gates
		C217.2	Design and verify Combinational logic circuits using IC's
		C217.3	Design and verify Sequential logic circuits using IC's
		C217.4	Implement Counters & Shift registers using FF's
C218	BS Lab	C218.1	Perform various operations on signals
		C218.2	Verify the properties of LTI system and its response for different inputs.
		C218.3	Analyze the signals using various transforms
		C218.4	Analyze the characteristics of signals in noisy environment.
<b>III Year I Sem – R18</b>			
<b>Course Code</b>	<b>Course Name</b>	<b>CO No.</b>	<b>Course Outcomes</b>
C311	MPMC	C311.1	Differentiate architectural features and modes of operation of 8086 microprocessor and 8051 microcontrollers.
		C311.2	Summarize the addressing modes, instruction set and assembler directives of 8086 Microprocessor and 8051 Microcontroller.
		C311.3	Write assembly language programs for 8086 Microprocessor and 8051 Microcontroller.

		C311.4	Interface various peripheral devices and memory with 8051 microcontrollers.
		C311.5	Analyze the architectural features and instruction set of ARM processor
		C311.6	Explain the architectural feature of CORTEX and OMAP processors
C312	Data Communication and Networks	C312.1	Analyze the Categories and functions of various Data communication Networks
		C312.2	Design and analyze various error detection techniques.
		C312.3	Demonstrate the mechanism of routing the data in network layer
		C312.4	Analyze the significance of various Flow control and Congestion control Mechanisms
		C312.5	Analyze the Functioning of various Application layer Protocols.
		C312.6	Analyze the features and operations of various user interface protocols.
C313	CS	C313.1	Evaluate the types of control systems for real time applications.
		C313.2	Compute transfer function of a system by different techniques.
		C313.3	Evaluate the time response of systems for standard input signals.
		C313.4	Probe the stability of a system using time and frequency domain approach
		C313.5	Examine the performance of systems with compensators and controllers
		C313.6	Construct state models for continuous & discrete time systems and Comment on controllability and observability of the system
C314	BEFA	C314.1	Understand the Economic Concepts in business decision making process.
		C314.2	Familiarize with the cost concepts, market structures.
		C314.3	Make use of breakeven analysis, CVP Analysis, pricing strategies.
		C314.4	Examine financial accounting and analyze various financial statements.
		C314.5	Interpret various financial statements by applying different types of ratios.
		C314.6	Examine the usefulness of funds flow statement and cash flow statement for better managerial decisions.
C315	Professional Elective-I CO&OS	C315.1	Examine the Basic structure of a digital computer and the organization of different blocks in a computer using Micro Operations
		C315.2	Use of micro-level operations to control different Units in a computer and analyze the concept of Memory system.

		C315.3	Examine the organization of the I/O peripheral devices.
		C315.4	Analyze the Operating system functions, types, system calls.
		C315.5	Demonstrate the memory management techniques impact on architecture of computer design and Principals of Deadlock.
		C315.6	Examine file system implementation and its interface.
C316	Professional Elective-I ECC	C316.1	Calculate various information parameters and explain the types of errors and control strategies
		C316.2	Explain error detection and correction mechanism of linear block codes and its applications
		C316.3	Design cyclic codes for error detection
		C316.4	Implement encoding and decoding techniques of Convolution codes
		C316.5	Elucidate encoding and decoding process of Turbo codes and its applications
		C316.6	Describe the concepts of space time codes
C317	Professional Elective-I EMI	C317.1	Illustrate the characteristics and operating principles of measuring systems.
		C317.2	Summarize the construction and operation of various Wave Analyzers and Signal generators.
		C317.3	Analyze the working principles and applications of different types of Oscilloscopes
		C317.4	Measure R, L and C values using different bridge circuits.
		C317.5	Utilise transducers to compute various electrical parameters.
		C317.6	Make use of measuring devices to measure different physical parameters
C318	MPMC Lab	C318.1	Debug 8086 assembly language programs using macro assembler.
		C318.2	Write 8051 assembly language programs for simple arithmetic and logical operations and verify using Keil IDE.
		C318.3	Write 8051 assembly language programs to configure various peripheral devices and verify using Keil IDE.
		C318.4	Interface various input/output devices to 8051 microcontroller using development kit.
C319	Data Communications & Networks lab	C319.1	Create and evaluate the performance of various LAN topologies
		C319.2	Evaluate the performance of queue management, scheduling mechanisms and protocols
		C319.3	Evaluate the performance of routing protocols and IEEE 802.x standards.
		C319.4	Analyze various protocols using packet capture monitoring tools.

C31A	ACS Lab	C31A.1	Build sound vocabulary and use functional English effectively
		C31A.2	Analyze the given text and respond appropriately and develop efficacious writing skills
		C31A.3	Develop effective speaking skills and maximize job prospects
		C31A.4	Plan and make different forms of presentation using various techniques
C32A	Intellectual Property Rights	C32A.1	Discuss the fundamental aspects of Intellectual property Rights which play a major role in development and management of innovative projects in industries.
		C32A.2	Examine Trademarks, Acquisition of Trade Mark Rights and its registration processes.
		C32A.3	Evaluate various aspects relating to copyrights and its procedure for registration processes.
		C32A.4	Evaluate with the Trade Secret Law, protection for submission, Unfair Competition
		C32A.5	Evaluate on the International Developments in Intellectual Property Rights
		C32A.6	Interpret about current trends in IPR and the steps taken by the Government of India in fostering IPR
<b>IV Year I Sem – R16</b>			
<b>Course Code</b>	<b>Course Name</b>	<b>CO No.</b>	<b>Course Outcomes</b>
C411	MWE	C411.1	Analyze various modes of microwave transmission lines.
		C411.2	Examine various waveguide components and their applications.
		C411.3	Analyze the characteristics of O-type and M-type microwave tubes
		C411.4	Illustrate the operation of various solid-state devices
		C411.5	Estimate S-parameters of multiport junction devices
		C411.6	Measure various parameters using microwave bench
C412	Professional Elective – II CN	C412.1	Compare OSI, TCP/IP Reference Model
		C412.2	Determine the Transmission media in wired and wireless Technology
		C412.3	Examine different Error control & Flow control mechanisms
		C412.4	Analyze various access control mechanisms and different internetworking device and protocols
		C412.5	Assess the connection management and congestion control of TCP protocol.

		C412.6	Analyze the features and operations of various user interface protocols.
C413	Professional Elective – II FPGA Programming	C413.1	Choose appropriate PLD for a specific digital circuit.
		C413.2	Model digital circuits using Hardware Description Language.
		C413.3	Identify suitable modelling style based on design specifications.
		C413.4	Understand the concepts of UDM & UDM-PD.
		C413.5	Optimize logic for timing performance.
		C413.6	Implement digital logic circuits using switch logic.
C414	Professional Elective – II CT& T	C414.1	Analyze information and errors in digital data for reliable transmission and storage
		C414.2	Design linear block codes for error detection and correction
		C414.3	Construct cyclic codes for efficient digital transmission
		C414.4	Design convolution codes
		C414.5	Design turbo codes for reliable digital transmission and storage
		C414.6	Design space time codes for reliable data transmission
C415	Professional Elective – II Soft Computing Techniques	C415.1	Apply Back propagation Networks in Pattern Recognition & Image Processing
		C415.2	Apply HPF in Optimization problems
		C415.3	Examine different ART Architectures
		C415.4	Build Fuzzy rule-based system for various Controllers
		C415.5	Interpret various parameters of Genetic Algorithms.
		C415.6	Design hybrid systems to suit a given real – life problem
C416	Professional Elective – III WCN	C416.1	Describe the basic concept of wireless communication like handoff, frequency reuse, interference issues and cell coverage.
		C416.2	Evaluate various mobile radio wave propagation models for large scale path loss.
		C416.3	Analyze the performance of the communication systems using the factors responsible for small scale fading and multi-path propagation.
		C416.4	Evaluate the receiver efficiency of various equalization and diversity techniques.
		C416.5	Discuss about the significance of various wireless networks.
		C416.6	Summarize different propagation, interference and diversity models and can develop a new

			model based on requirements.
C417	Professional Elective – III IoT	C417.1	Inference the impact and challenges posed by IoT networks leading to new architectural models.
		C417.2	Compare and contrast the deployment of smart objects and the technologies to connect them to network.
		C417.3	Appraise the role of IoT protocols for efficient network communication.
		C417.4	Elaborate python programming with various interfacing devices using with Raspberry PI.
		C417.5	Illustrate different sensor technologies for sensing real world entities and identify the applications of IoT in Industry
		C417.6	Construct a restful web API.
C418	Professional Elective – III RS	C418.1	Analyze the performance of Radar System and its parameters.
		C418.2	Analyze the functionality of CW and FMCW radar.
		C418.3	Classify the mechanism of detecting stationary and moving targets
		C418.4	Compare the working mechanism of various tracking radars.
		C418.5	Analyze the radar signal in noisy environment.
		C418.6	Assess various components and parameters of Radar receivers
C419	Professional Elective – III ESD	C419.1	Distinguish the embedded systems from general purpose processing systems.
		C419.2	Recommend suitable hardware for different applications of embedded systems.
		C419.3	Select different types and amount of memory based on embedded system specifications.
		C419.4	Discuss the Embedded firmware design approaches, development languages and device drivers
		C419.5	Analyze the issues and techniques of Task synchronization and communication in embedded firmware.
		C419.6	Differentiate between general purpose operating systems and RTOS.
C41A	Professional Elective – IV Optimization Techniques	C41A.1	Optimize given engineering problem by using suitable techniques
		C41A.2	Formulate and solve linear programming problem
		C41A.3	Obtain optimal solutions of transportation Problem
		C41A.4	Optimize Un Constrained non - linear programming problems
		C41A.5	Optimize Constrained non - linear programming problems
		C41A.6	Solve the dynamic Programming problems

C41B	Professional Elective – IV Object Oriented Programming	C41B.1	Develop problem-solving and programming skills using OOP concepts.
		C41B.2	Make use of Interfaces, Abstract classes and packages for Java applications.
		C41B.3	Make Use of I/O functionality to read from and write to text files.
		C41B.4	Analyze multithreading and exception handling mechanism for java applications.
		C41B.5	Develop Applets for Web Application
		C41B.6	Build GUI using AWT and Swings
C41C	Professional Elective – IV EMI	C41C.1	Illustrate the characteristics and operating principles of measuring systems.
		C41C.2	Summarize the construction and working of various instruments like wave analyzers and Signal generators.
		C41C.3	Analyze the working principles and applications of various oscilloscopes to measure time period and frequency.
		C41C.4	Apply the knowledge of bridges to measure R, L and C of different components.
		C41C.5	Select different transducers to compute quantities like pressure, temperature, displacement, etc.
		C41C.6	Measure various physical parameters like flow rate, vacuum level, humidity etc by using different measurement devices.
C41D	Professional Elective – IV AI	C41D.1	Possess the ability to formulate an efficient problem space for a problem expressed in English
		C41D.2	Possess the ability to select a search algorithm for a problem and characterize its time and space complexities
		C41D.3	Possess the skill for representing knowledge using the appropriate technique
		C41D.4	Apply AI techniques to solve problems of Machine learning and Natural Language Processing
		C41D.5	Create gaming application
		C41D.6	Create Expert system
C41E	VLSI Design	C41E.1	Summarize the various steps in VLSI fabrication process of different MOS Technologies
		C41E.2	Analyze the electrical properties and models of CMOS circuits.
		C41E.3	Construct layouts using stick diagrams in accordance with the design rules.
		C41E.4	Implement complex digital logic circuits using switch logic and PLDs.
		C41E.5	Build different VLSI subsystems using CMOS logic.
		C41E.6	Analyze the concepts of testing and fault tolerant systems.



C41F	VLSI and E-CAD Lab	C41F.1	Design and Implement Combinational Logic Circuits on FPGAs
		C41F.2	Design and Implement Sequential Logic Circuits on FPGAs.
		C41F.3	Analyze static timing, IR drop and Cross talk in digital circuit Layouts
		C41F.4	Analyze the AC Characteristics of Amplifiers using VLSI backend tools
C41G	Microwave Engineering Lab	C41G.1	Analyze the characteristics of microwave sources and devices.
		C41G.2	Measure different parameters of various microwave devices.
		C41G.3	Measure the Scattering Parameters of various Tee Junctions
		C41G.4	Measure the Antenna Patterns
C41I	Seminar	C41I.1	Identify emerging topic specific to the programme.
		C41I.2	Extract the information relevant to the chosen topic.
		C41I.3	Deliver the knowledge using multimedia.
		C41I.4	Answer the queries with appropriate explanation and elaboration.
		C41I.5	Compile an effective technical report, providing conclusions and proposing an appropriate future scope.

**AY:2020-21 - II Sem****II Year II Sem – R18**

<b>Course Name</b>	<b>CO No.</b>	<b>Course Outcomes</b>
LTNM&CV	C221.1	Apply Laplace Transforms to solve ordinary differential equations
	C221.2	Estimate unknown values for a given data using Interpolation and method of least squares.
	C221.3	Apply numerical methods to solve algebraic and transcendental equations.
	C221.4	Apply numerical methods to evaluate definite integrals and solve initial value problems.
	C221.5	Analyze the complex functions with reference to their analyticity
	C221.6	Apply the knowledge of complex functions to evaluate various integrals.
EMFW	C222.1	Apply the laws of electrostatics for different types of charge distributions
	C222.2	Apply the laws of magneto-statics for different types of current distributions
	C222.3	Analyze boundary conditions using Maxwell's equations at different media interfaces
	C222.4	Examine the propagation of EM waves in different media
	C222.5	Analyze the reflection and refraction of plane waves in dielectrics.
	C222.6	Compare various modes of microwave transmission lines.
ADC	C223.1	Analyze various modulation/demodulation techniques of amplitude modulation.
	C223.2	Explain various modulation / demodulation techniques of angle modulation.
	C223.3	Classify various types of transmitters and receivers used in AM and FM
	C223.4	Analyze different types of pulse modulation techniques and multiplexing schemes.
	C223.5	Demonstrate the error representation mechanism in various PCM techniques
	C223.6	Analyze different types of digital modulation techniques and optimal reception of signal
LICA	C224.1	Describe the fundamentals of integrated circuits and Op-Amp
	C224.2	Design Op-Amp circuits for basic applications.
	C224.3	Choose appropriate regulator based on the type of application
	C224.4	Design filters and oscillators using Op-Amp
	C224.5	Use IC 555 and IC 565 for different analog applications.

	C224.6	Differentiate between various types of data converters.
ECA	C225.1	Build different types of multistage amplifiers.
	C225.2	Analyze high frequency response of BJT amplifiers
	C225.3	Categorize different feedback amplifier circuits
	C225.4	Design various types of power and tuned amplifiers for specific applications
	C225.5	Design multivibrators for various applications
	C225.6	Design time-based generators using various techniques
ADC Lab	C226.1	Analyze the spectrum of various analog modulation techniques
	C226.2	Design a multiplexing system using FDM
	C226.3	Examine various pulse modulation techniques
	C226.4	Analyze different digital modulation and demodulation schemes
ICA Lab	C227.1	Design analog circuits for practical applications using Op Amp IC-741
	C227.2	Design waveform generators and PLL circuits using ICs
	C227.3	Design multi vibrators using IC555 and Schmitt trigger using IC741
	C227.4	Analyze the practical applications of Voltage Regulator using various ICs.
ECA Lab	C228.1	Design, simulate and verify basic amplifier circuits.
	C228.2	Design, simulate and verify feedback amplifiers and oscillators.
	C228.3	Design, simulate and verify power amplifier circuits.
	C228.4	Design, simulate and verify Multivibrators and Sweep Circuits.
GS Lab	C229.1	Develop a better understanding of important issues related to gender in contemporary India.
	C229.2	Analyze basic dimensions of the biological, sociological, psychological and legal aspects of gender.
	C229.3	Develop a sense of appreciation of women in all walks of life and will be equipped to work and live together as equals.
	C229.4	Examine the new laws for women protection & relief, and empower students to understand and respond to gender violence.

**III Year II Sem – R18**

Course Code	Course Name	CO No.	Course Outcomes
C321	Antennas and Propagation	C321.1	Apply the basic concepts of various antenna parameters like antenna pattern, radiation intensity, directivity, etc in antenna design.
		C321.2	Analyze radiation pattern of linear wire antennas
		C321.3	Examine the geometry of various types of antennas.
		C321.4	Design different antenna arrays for improving the gain in desired direction.
		C321.5	Measure antenna parameters to assess antenna's performance.
		C321.6	Analyze the characteristics of wave propagation in different layers of atmosphere.
C322	DSP	C322.1	Determine the behavior of LTI systems by solving difference equation
		C322.2	Understand the concepts of multi rate digital signal processing
		C322.3	Analyze digital signals in frequency domain using DFS and DFT
		C322.4	Compute DFT using FFT algorithms
		C322.5	Design and implement IIR and FIR digital filters
		C322.6	Analyze the effects of finite word length representation
C323	VLSI Design	C323.1	Summarize the steps in VLSI fabrication process of different MOS Technologies
		C323.2	Examine the electrical properties and models of CMOS circuits.
		C323.3	Construct layouts using stick diagrams in accordance with the design rules.
		C323.4	Implement complex digital logic circuits using switch logic and PLDs.
		C323.5	Build different VLSI subsystems using CMOS logic.
		C323.6	Explore the concept of testing and fault tolerant systems.
C324	Professional Elective-II OOP Through Java	C324.1	Develop programs using OOP concepts in Java
		C324.2	Choose use of Interfaces, Abstract classes and packages for Java applications
		C324.3	Choose I/O functionality to read from and write to text files
		C324.4	Analyze multithreading and exception handling mechanism for java applications
		C324.5	Employ Collections in Java Application to store and Manipulate the data
		C324.6	Construct GUI applications using Applet, AWT and Swings

C325	Professional Elective-II MCN	C325.1	Understand various techniques that improves the efficiency of cellular communication system
		C325.2	Design an effective cellular system considering the effects of co-channel and non co-channel interferences
		C325.3	Explore the factors that affect signal coverage in various contours
		C325.4	Understand the concepts of frequency management and effective channel assignment
		C325.5	Assimilate the concept of handoff mechanism and dropped call
		C325.6	Elucidate the concept of Adhoc networks and design goals of MAC layer
C326	Professional Elective-II ESD	C326.1	Distinguish the embedded systems from general purpose processing systems.
		C326.2	Recommend suitable hardware for different applications of embedded systems.
		C326.3	Select different types and amount of memory based on embedded system specifications.
		C326.4	Explain the Embedded firmware design approaches, development languages and device drivers
		C326.5	Analyze the issues and techniques of Task synchronization and communication in embedded firmware.
		C326.6	Differentiate between general purpose operating systems and RTOS.
C327	Open Elective-1 Fundamentals of Management for Managers	C327.1	Understand the concept of Management and its significance.
		C327.2	Analyse different Organizational Structures to meet contemporary challenges in Human Resource Management.
		C327.3	Analyse and Study different principles in Operations Management.
		C327.4	Evaluate and Understand Marketing Management and Supply Chain Strategies.
		C327.5	Develop Project Management Techniques to estimate the optimal cost of the project.
		C327.6	Understand and explore Contemporary Management Practices in their domain area of Engineering.
C327	Open Elective-1 Entrepreneurship	C327.1	Understand the ability to discern distinct entrepreneurial traits for entrepreneurial development.
		C327.2	Familiarize the concept of Establishing New Ventures.
		C327.3	Analyse the challenges of MSMEs and Rehabilitation of sick units.
		C327.4	Develop essential Marketing Strategies for Pricing, Service and Branding.
		C327.5	Evaluate the Strategic perspectives in Entrepreneurship.
		C327.6	Apply the Entrepreneurial mindset to become a successful Entrepreneur.

C328	DSP Lab	C328.1	Generate sinusoidal and noise waveforms using different approaches.
		C328.2	Analyze Impulse and frequency response of various digital filters.
		C328.3	Verify different algorithms of DSP through simulation.
		C328.4	Implement various DSP algorithms in hardware.
C329	e-CAD Lab	C329.1	Verify the functionality of digital circuits using Xilinx ISIM simulator
		C329.2	Implement digital circuits on various FPGA boards using Xilinx tools
		C329.3	Design layout for digital circuits and perform physical verification
		C329.4	Analyze static timing, IR drop and crosstalk in digital circuit layouts
C32A	Scripting Languages Lab	C32A.1	Design and test programs to solve mathematical problems
		C32A.2	Develop programs Using Ruby Script
		C32A.3	Develop Programs Using TCL Script
		C32A.4	Develop Programs Using Perl Script
C32B	Environmental Science	C32B.1	Discover knowledge regarding environment and its components.
		C32B.2	Understand the classification, importance and conservation of natural resources.
		C32B.3	Perceive the knowledge regarding different Bio -Geo classification of India.
		C32B.4	Examine impacts of pollution on the environment and their control measures.
		C32B.5	Analyze Environmental laws and Environmental Impact Assessments.
		C32B.6	Determine sustainable development that aims to meet raising human needs.
<b>IV Year II Sem – R16</b>			
<b>Course Code</b>	<b>Course Name</b>	<b>CO No.</b>	<b>Course Outcomes</b>
C421	Open Elective-III R-Programming	C421.1	Explore the Basic Knowledge of R and able to do in the programming language R
		C421.2	Develop Programs using Control Structures and vectors
		C421.3	Make Use of the concepts of Lists and Data Frames for programming
		C421.4	Experiment with factors and tables
		C421.5	Make use of R to solve statistical problems
		C421.6	Interpret different Object-Oriented Programming Concepts

C422	Professional Elective –V NS & C	C422.1	Illustrate the concepts and principles of security Attacks, Services and Mechanisms.
		C422.2	Evaluate the applications of classical and modern Encryption Techniques.
		C422.3	Examine the Principles and Techniques of Symmetric and Asymmetric key cryptography.
		C422.4	Analyze the usage of various mathematical models to ensure security.
		C422.5	Demonstrate the techniques like Message authentication, Hash function and their Applications.
		C422.6	Discuss the importance of IP Security, Web Security, trusted systems and impact of Threats.
C423	Professional Elective –V System Design Using FPGAs	C423.1	Translate a software application into hardware logic for FPGA architectures.
		C423.2	Apply basic constructs of Verilog HDL for modelling digital circuits.
		C423.3	Identify suitable modelling style based on design specifications.
		C423.4	Construct test benches for functional verification of digital circuits.
		C423.5	Optimize logic for various performance goals (timing, frequency, area & power)
		C423.6	Solve the issues related to clock & reset signals synchronization.
C424	Professional Elective –V OC	C424.1	Analyze the Parameters of Optical communication System and types of fiber
		C424.2	Analyze various types of distortions / losses occur in optical communication
		C424.3	Analyze the working mechanism of Optical sources and detectors
		C424.4	Illustrate types of Fiber splicing and power launching methods
		C424.5	Design an Optical system and measurement of attenuation, dispersion
		C424.6	Explain principle of WDM and Line coding
C425	Professional Elective –V ML	C425.1	Formulate machine learning problems corresponding to different applications
		C425.2	Analyze Decision Tree Algorithm and Back propagation algorithms
		C425.3	Evaluate the various error estimation and weight tuning rules.
		C425.4	Examine Expectation Minimization and Hidden Markov Models
		C425.5	Survey the instance-based learning mechanisms.
		C425.6	Apply genetic Learning algorithmic approach for search and optimization problem.
C426	Professional Elective –VI	C426.1	Summarize the types, control programs and industry applications of robot systems.
		C426.2	Analyze the coordinate systems, positioning and arm of a robot system.
		C426.3	Develop skills in performing motion analysis of a robot.

	Actuators and Robot Systems	C426.4	Identify the functionality, limitations and applications of robot actuators and sensors.
		C426.5	Classify the hydraulic and electrical systems of a robot.
		C426.6	Develop skills in programming of robot in a programming environment.
C427	Professional Elective –VI Analog CMOS IC Design	C427.1	Design basic building blocks of CMOS analog ICs
		C427.2	Determine device dimensions of MOSFETs involved in analog IC design.
		C427.3	Analyze the design issues related to single & multistage amplifiers.
		C427.4	Develop various amplifiers like differential, current & operational amplifiers.
		C427.5	Optimize the amplifier designs for good performance (impedance, gain, bandwidth & stability).
		C427.6	Design & analyze the performance of open loop comparators.
C428	Professional Elective –VI GPS	C428.1	Explain the basic concepts and architecture of GPS
		C428.2	Analyze GPS signal characteristics and parameters
		C428.3	Discuss GPS receiver architecture and design options
		C428.4	Illustrate various atmospheric errors in GPS Communication
		C428.5	Analyze differential GPS and wide area augmentation systems
		C428.6	Discuss various applications and orbital parameters of GPS system with data analysis
C429	Professional Elective –VI Computer Vision	C429.1	Apply image processing techniques for edge detection
		C429.2	Distinguish between various functions for shape and region detection
		C429.3	Make use of Hough Transform for line and shape detection
		C429.4	Make use of techniques for Object Detection, Localization and 3D object Recognition
		C429.5	Detect 3D features from objects and motion
		C429.6	Apply the computer vision techniques for various real time applications
C42A	Major Project	C42A.1	Identify problem, conduct relevant literature survey and formalize it.
		C42A.2	Analyze & design efficient, cost-effective and eco-friendly solutions using relevant tools (if necessary) and processes
		C42A.3	Implement the design and demonstrate the functionality of developed model
		C42A.4	Evaluate the results to derive the conclusion and provide scope for future enhancement.



		C42A.5	Exhibit good interpersonal and leadership skills in meeting project deadlines with individual contribution towards progress of the project.
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