Gopalan College of Engineering &Management
Dept Of ECE - Regulation 2018

Year:II SEM:III

Course code:18MAT31	Course:TRANSFORM CALCULUS, FOURIER SERIES AND NUMERICAL TECHNIQUES
CO No.	**COURSE OUTCOMES (Cos)**
	At the end the course student will able to
CO1	Use Laplace transform and inverse Laplace transform in solving differential/ integral equation arising in network analysis, control systems and other fields of engineering.
CO2	Demonstrate Fourier series to study the behaviour of periodic functions and their applications in system communications, digital signal processing and field theory.
CO3	Make use of Fourier transform and Z-transform to illustrate discrete/continuous function arising in wave and heat propagation, signals and systems.
CO4	Solve first and second order ordinary differential equations arising in engineering problems using single step and multistep numerical methods.
CO5	Determine the extremals of functionals using calculus of variations and solve problems arising in dynamics of rigid bodies and vibrational analysis.

Course code:18EC32	Course:NETWORK THEORY
CO No.	**COURSE OUTCOMES (Cos)**
	At the end the course student will able to
CO1	Determine currents and voltages using source transformation/ source shifting/ mesh/ nodal analysis and reduce given network using star-delta transformation/source transformation/ source shifting.
CO2	Solve network problems by applying Superposition/ Reciprocity/ Thevenin‘s/ Norton‘s/ Maximum Power Transfer/ Millman‘s Network Theorems and electrical laws to reduce circuit complexities and to arrive at feasible solutions.
CO3	Calculate current and voltages for the given circuit under transient conditions.
CO4	Apply Laplace transform to solve the given network.
CO5	Solve the given network using specified two port network parameter like Z or Y or T or h.
CO6	Understand the concept of resonance.

Course code:18EC33	Course:ELECTRONIC DEVICES
CO No.	**COURSE OUTCOMES (Cos)**
	At the end the course student will able to
CO1	Understand the principles of semiconductor Physics
CO2	Understand the principles and characteristics of different types of semiconductor devices
CO3	Understand the fabrication process of semiconductor devices
CO4	Utilize the mathematical models of semiconductor junctions and MOS transistors for circuits and systems.

Course code:18EC34	Course:DIGITAL SYSTEM DESIGN
CO No.	**COURSE OUTCOMES (Cos)**
	At the end the course student will able to
CO1	Explain the concept of combinational and sequential logic circuits.
CO2	Design the combinational logic circuits.
CO3	Design the sequential circuits using SR, JK, D, T flip-flops and Mealy & Moore machines
CO4	Design applications of Combinational & Sequential Circuits.

Course code:18EC35	Course:COMPUTER ORGANIZATION AND ARCHITECTURE
CO No.	**COURSE OUTCOMES (Cos)**
	At the end the course student will able to
CO1	Explain the basic organization of a computer system.
CO2	Explain different ways of accessing an input / output device including interrupts.
CO3	Illustrate the organization of different types of semiconductor and other secondary storage memories.

CO4	Illustrate simple processor organization based on hardwired control and micro programmed control.

Course code:18EC36	Course:POWER ELECTRONICS AND INSTRUMENTATION
CO No.	**COURSE OUTCOMES (Cos)**
	At the end the course student will able to
CO1	Build and test circuits using power electronic devices.
CO2	Analyze and design controlled rectifier, DC to DC converters, DC to AC inverters and SMPS.
CO3	Define instrument errors.
CO4	Develop circuits for multirange Ammeters, Voltmeters and Bridges to measure passive component values and frequency.
CO5	Describe the principle of operation of Digital instruments and PLCs.
CO6	Use Instrumentation amplifier for measuring physical parameters

Course:ELECTRONIC DEVICES AND INSTRUMENTATION LABORATORY	Course code:18ECL37
CO No.	**COURSE OUTCOMES (Cos)**
	At the end the course student will able to
CO1	Understand the characteristics of various electronic devices and measurement of parameters.
CO2	Design and test simple electronic circuits.
CO3	Use of circuit simulation software for the implementation and characterization of electronic circuits and devices.

Course code:18ECL38	Course:DIGITAL SYSTEM DESIGN LABORATORY
CO No.	**COURSE OUTCOMES (Cos)**
	At the end the course student will able to
CO1	Demonstrate the truth table of various expressions and combinational circuits using logicgates.
CO2	Design various combinational circuits such as adders, subtractors, comparators, multiplexers and demultiplexers.
CO3	Construct flips-flops, counters and shift registers
CO4	Simulate Serial adder and Binary Multiplier.

Course code:18CPC39/49	Course:CONSTITUTION OF INDIA, PROFESSIONAL ETHICS AND CYBER LAW (CPC)
CO No.	**COURSE OUTCOMES (Cos)**
	At the end the course student will able to
CO1	Have constitutional knowledge and legal literacy.
CO2	Understand Engineering and Professional ethics and responsibilities of Engineers.
CO3	Understand the the cybercrimes and cyber laws for cyber safety measures.

Course code:18MATDIP31	Course:ADDITIONAL MATHEMATICS – I
CO No.	**COURSE OUTCOMES (Cos)**
	At the end the course student will able to
CO1	Apply concepts of complex numbers and vector algebra to analyze the problems arising in related area
CO2	Use derivatives and partial derivatives to calculate rate of change of multivariate functions.
CO3	Analyze position, velocity and acceleration in two and three dimensions of vector valued functions.
CO4	Learn techniques of integration including the evaluation of double and triple integrals.
CO5	Identify and solve first order ordinary differential equations

Year:II	SEM:IV
Course code:18MAT41	Course:COMPLEX ANALYSIS, PROBABILITY AND STATISTICAL METHODS
CO No.	**COURSE OUTCOMES (Cos)**
	At the end the course student will able to
CO1	Use the concepts of analytic function and complex potentials to solve the problems arising in electromagnetic field theory.

CO2	Utilize conformal transformation and complex integral arising in aerofoil theory, fluid flow visualization and image processing.
CO3	Apply discrete and continuous probability distributions in analyzing the probability models arising in engineering field.
CO4	Make use of the correlation and regression analysis to fit a suitable mathematical model for the statistical data.
CO5	Construct joint probability distributions and demonstrate the validity of testing the hypothesis.

Course code:18EC42	Course:ANALOG CIRCUITS
CO No.	**COURSE OUTCOMES (Cos)**
	At the end the course student will able to
CO1	Understand the characteristics of BJTs and FETs.
CO2	Design and analyze BJT and FET amplifier circuits.
CO3	Design sinusoidal and non-sinusoidal oscillators.
CO4	Understand the functioning of linear ICs.
CO5	Design of Linear IC based circuits.

Course code:18EC43	Course:CONTROL SYSTEMS
CO No.	**COURSE OUTCOMES (Cos)**
	At the end the course student will able to
CO1	Develop the mathematical model of mechanical and electrical systems.
CO2	Develop transfer function for a given control system using block diagram reduction techniques and signal flow graph method.
CO3	Determine the time domain specification s for first an d second order systems.
CO4	Deter mine the stability of a system in the time domain using Routh-Hurwitz criterion and Root-locus technique
CO5	Determine the s stability of a system in the frequency domain u sing Nyquist and bode plots

Course code:18EC44	Course:ENGINEERING STATISTICS and LINEAR ALGEBRA
CO No.	**COURSE OUTCOMES (Cos)**
	At the end the course student will able to
CO1	Identify and associate Random Variables and Random Processes in Communication events.
CO2	Analyze and model the Random events in typical communication events to extract quantitative statistical parameters.
CO3	Analyze and model typical signal sets in terms of a basis function set of Amplitude, phase and frequency
CO4	Demonstrate by way of simulation or emulation the ease of analysis employing basis functions, statistical representation and Eigen values.

Course code:18EC4	Course:SIGNALS AND SYSTEMS 5
CO No.	**COURSE OUTCOMES (Cos)**
	At the end the course student will able to
CO1	Analyze the different types of signals and systems.
CO2	Determine the linearity, causality, time-invariance and stability properties of continuous and discrete time systems.
CO3	Represent continuous and discrete systems in time and frequency domain using different transforms Test whether the system is stable.

Course code:18EC46	Course:MICROCONTROLLER
CO No.	**COURSE OUTCOMES (Cos)**
	At the end the course student will able to
CO1	Explain the difference between Microprocessors & Microcontrollers, Architecture of 8051 Microcontroller, Interfacing of 8051 to external memory and Instruction set of 8051.
CO2	Write 8051 Assembly level programs using 8051 instruction set.
CO3	Explain the Interrupt system, operation of Timers/Counters and Serial port of 8051.
CO4	Write 8051 Assembly language program to generate timings and waveforms using 8051 timers, to send & receive serial data using 8051 serial port and to generate an external interrupt using a switch.
CO5	Write 8051 Assembly language programs to generate square wave on 8051 I/O port pin using interrupt and C Programme to send & receive serial data using 8051 serial port.
CO6	Interface simple switches, simple LEDs, ADC 0804, LCD and Stepper Motor to 8051 using 8051 I/O ports.

Course code:18ECL47	Course:MICROCONTROLLER LABORATORY
CO No.	**COURSE OUTCOMES (Cos)**
	At the end the course student will able to
CO1	Write Assembly language programs in 8051 for solving simple problems that manipulate input data using different instructions of 8051.
CO2	Interface different input and output devices to 8051 and control them using Assembly language programs.

CO3	Interface the serial devices to 8051 and do the serial transfer using C programming.

Course code:18ECL48	Course:ANALOG CIRCUITS LABORATORY
CO No.	**COURSE OUTCOMES (Cos)**
	At the end the course student will able to
CO1	Design analog circuits using BJT/FETs and evaluate their performance characteristics.
CO2	Design analog circuits using OPAMPs for different applications
CO3	Simulate and analyze analog circuits that usesICs for different electronic applications.

Year:III	SEM:V
Course code:18ES51	Course:TECHNOLOGICAL INNOVATION MANAGEMENT AND ENTREPRENEURSHIP
CO No.	**COURSE OUTCOMES (Cos)**
	At the end the course student will able to
CO1	Understand the fundamental concepts of Management and Entrepreneurship and opportunities in order to setup a business
CO2	Describe the functions of Managers, Entrepreneurs and their social responsibilities
CO3	Understand the components in developing a business plan
CO4	Awareness about various sources of funding and institutions supporting entrepreneurs

Course code:18EC52	Course:DIGITAL SIGNAL PROCESSING
CO No.	**COURSE OUTCOMES (Cos)**
	At the end the course student will able to
CO1	Determine response of LTI systems using time domain and DFT techniques.
CO2	Compute DFT of real and complex discrete time signals.
CO3	Computation of DFT using FFT algorithms and linear filtering approach.
CO4	Design and realize FIR and IIR digital filters
CO5	Understand the DSP processor architecture.

Course code:18EC53	Course:PRINCIPLES OF COMMUNICATION SYSTEMS
CO No.	**COURSE OUTCOMES (Cos)**
	At the end the course student will able to
CO1	Analyze and compute performance of AM and FM modulation in the presence of noise at the receiver.
CO2	Analyze and compute performance of digital formatting processes with quantization noise.
CO3	Multiplex digitally formatted signals at Transmitter and demultiplex the signals and reconstruct digitally formatted signals at the receiver.
CO4	Design/Demonstrate the use of digital formatting in Multiplexers, Vocoders and Video transmission.

Course code:18EC54	Course:INFORMATION THEORY and CODING
CO No.	**COURSE OUTCOMES (Cos)**
	At the end the course student will able to
CO1	Explain concept of Dependent & Independent Source, measure of information, Entropy, Rate of Information and Order of a source
CO2	Represent the information using Shannon Encoding, Shannon Fano, Prefix and Huffman Encoding Algorithms
CO3	Model the continuous and discrete communication channels using input, output and joint probabilities
CO4	Determine a codeword comprising of the check bits computed using Linear Block codes, cyclic codes & convolutional codes
CO5	Design the encoding and decoding circuits for Linear Block codes, cyclic codes, convolutional codes, BCH and Golay codes.

Course code:18EC55	Course:ELECTROMAGNETIC WAVES
CO No.	**COURSE OUTCOMES (Cos)**
	At the end the course student will able to
CO1	Evaluate problems on electrostatic force, electric field due to point, linear, volume charges by applying conventional methods and charge in a volume.
CO2	Apply Gauss law to evaluate Electric fields due to different charge distributions and Volume Charge distribution by using Divergence Theorem.
CO3	Determine potential and energy with respect to point charge and capacitance using Laplace equation and Apply Biot-Savart's and Ampere's laws for evaluating Magnetic field for different current configurations
CO4	Calculate magnetic force, potential energy and Magnetization with respect to magnetic materials and voltage induced in electric circuits.
CO5	Apply Maxwell's equations for time varying fields, EM waves in free space and conductors and Evaluate power associated with EM waves using Poynting theorem

Course code:18EC56	Course:Verilog HDL
CO No.	**COURSE OUTCOMES (Cos)**
	At the end the course student will able to
CO1	Write Verilog programs in gate, dataflow (RTL), behavioral and switch modeling levels of Abstraction.
CO2	Design and verify the functionality of digital circuit/system using test benches.
CO3	Identify the suitable Abstraction level for a particular digital design.

CO4	Identify the suitable Abstraction level for a particular digital design.
CO5	Write the programs more effectively using Verilog tasks, functions and directives.
CO6	Perform timing and delay Simulation
CO7	Interpret the various constructs in logic synthesis.

Course code:18ECL57	Course:DIGITAL SIGNAL PROCESSING LABORATORY
CO No.	**COURSE OUTCOMES (Cos)**
	At the end the course student will able to
CO1	Understand the concepts of analog to digital conversion of signals and frequency domain sampling of signals.
CO2	Modeling of discrete time signals and systems and verification of its properties and results.
CO3	Implementation of discrete computations using DSP processor and verify the results.
CO4	Realize the digital filters using a simulation tool and analyze the response of the filter for an audio signal.

Course code:18ECL58	Course:HDL LABORATORY
CO No.	**COURSE OUTCOMES (Cos)**
	At the end the course student will able to
CO1	Write the Verilog/VHDL programs to simulate Combinational circuits in Dataflow, Behavioral and Gate level Abstractions.
CO2	Describe sequential circuits like flip flops and counters in Behavioral description and obtain simulation waveforms.
CO3	Synthesize Combinational and Sequential circuits on programmable ICs and test the hardware.
CO4	Interface the hardware to the programmable chips and obtain the required output

Course code:18CIV59	Course:ENVIRONMENTAL STUDIES
CO No.	**COURSE OUTCOMES (Cos)**
	At the end the course student will able to
CO1	Understand the principles of ecology and environmental issues that apply to air, land, and water issues on a global scale
CO2	Develop critical thinking and/or observation skills, and apply them to the analysis of a problem or question related to the environment.
CO3	Demonstrate ecology knowledge of a complex relationship between biotic and a biotic components.
CO4	Apply their ecological knowledge to illustrate and graph a problem and describe the realities that managers face when dealing with complex issues.

Year:III	SEM:VI
Course code:18EC61	Course:DIGITAL COMMUNICATION
CO No.	**COURSE OUTCOMES (Cos)**
	At the end the course student will able to
CO1	Associate and apply the concepts of Bandpass sampling to well specified signals and channels.
CO2	Analyze and compute performance parameters and transfer rates for low pass and bandpass symbol under ideal and corrupted non band limited channels.
CO3	Test and validate symbol processing and performance parameters at the receiver under ideal and corrupted bandlimited channels.
CO4	Demonstrate that bandpass signals subjected to corruption and distortion in a bandlimited channel can be processed at the receiver to meet specified performance criteria.

Course code:18EC62	Course: EMBEDDED SYSTEMS
CO No.	**COURSE OUTCOMES (Cos)**
	At the end the course student will able to
CO1	Describe the architectural features and instructions of 32 bit microcontroller ARM Cortex M3.
CO2	Apply the knowledge gained for Programming ARM Cortex M3 for different applications.
CO3	Understand the basic hardware components and their selection method based on the characteristics and attributes of an embedded system.
CO4	Develop the hardware software co-design and firmware design approaches.
CO5	Explain the need of real time operating system for embedded system applications.

Course code:18EC63	Course:MICROWAVE and ANTENNAS
CO No.	**COURSE OUTCOMES (Cos)**
	At the end the course student will able to
CO1	
CO2	Analyze various parameters related to microwave transmission lines and waveguides
CO3	Identify microwave devices for several applications
CO4	Analyze various antenna parameters necessary for building a RF system
CO5	Recommend various antenna configurations according to the applications

Course code:18EC641	Course:OPERATING SYSTEM
CO No.	**COURSE OUTCOMES (Cos)**
	At the end the course student will able to
CO1	Explain the goals, structure, operation and types of operating systems.
CO2	Apply scheduling techniques to find performance factors.

CO3	Explain organization of file systems and IOCS.
CO4	Apply suitable techniques for contiguous and non-contiguous memory allocation.
CO5	Describe message passing, deadlock detection and prevention methods.

Course code:18EC642	Course: ARITIFICAL NEURAL NETWORKS
CO No.	**COURSE OUTCOMES (Cos)**
	At the end the course student will able to
CO1	Understand the role of neural networks in engineering, artificial intelligence, and cognitive modelling.
CO2	Understand the concepts and techniques of neural networks through the study of the most important neural network models.
CO3	Evaluate whether neural networks are appropriate to a particular application.
CO4	Apply neural networks to particular application, and to know what steps to take to improve performance.

Course code:18EC643	Course: DATA STRUCTURE USING C++
CO No.	**COURSE OUTCOMES (Cos)**
	At the end the course student will able to
CO1	Acquire knowledge of Dynamic memory allocation, Various types of data structures, operations and algorithms and Sparse matrices and Hashing
CO2	Understand non Linear data structures trees and their applications
CO3	Design appropriate data structures for solving computing problems
CO4	Analyze the operations of Linear Data structures: Stack, Queue and Linked List and their applications

Course code:18EC644	Course:DIGITAL SYSTEM DESIGN USING VERILOG
CO No.	**COURSE OUTCOMES (Cos)**
	At the end the course student will able to
CO1	Construct the combinational circuits, using discrete gates and programmable logic devices.
CO2	Describe how arithmetic operations can be performed for each kind of code, and also combinational circuits that implement arithmetic operations.
CO3	Design a semiconductor memory for specific chip design.
CO4	Design embedded systems using small microcontrollers, larger CPUs/DSPs, or hard or soft processor cores.
CO5	Synthesize different types of I/O controllers that are used in embedded system.

Course code:18EC645	Course:NANOELECTRONICS
CO No.	**COURSE OUTCOMES (Cos)**
	At the end the course student will able to
CO1	Understand the principles behind Nanoscience engineering and Nanoelectronics.
CO2	Know the effect of particles size on mechanical, thermal, optical and electrical properties of nanomaterials.
CO3	Know the properties of carbon and carbon nanotubes and its applications.
CO4	Know the properties used for sensing and the use of smart dust sensors.
CO5	Apply the knowledge to prepare and characterize nanomaterials.
CO6	Analyse the process flow required to fabricate state-of-the-art transistor technology.

Course code:18EC646	Course: PYTHON APPLICATION PROGRAMMING
CO No.	**COURSE OUTCOMES (Cos)**
	At the end the course student will able to
CO1	Examine Python syntax and semantics and be fluent in the use of Python flow control and functions.
CO2	Demonstrate proficiency in handling Strings and File Systems.
CO3	Create, run and manipulate Python Programs using core data structures like Lists, Dictionaries and use Regular Expressions.
CO4	Interpret the concepts of Object-Oriented Programming as used in Python.
CO5	Implement exemplary applications related to Network Programming, Web Services and Databases in Python.

Course code:18EC651	Course:SIGNAL PROCESSING
CO No.	**COURSE OUTCOMES (Cos)**
	At the end the course student will able to
CO1	Understand and explain continuous time and discrete time signals and systems, in time and frequency domain
CO2	Apply the concepts of signals and systems to obtain the desired parameter/ representation
CO3	Analyse the given system and classify the system/arrive at a suitable conclusion
CO4	Design analog/digital filters to meet given specifications.
CO5	Design and implement the analog filter using components/ suitable simulation tools (assignment component)
CO6	Design and implement the digital filter (FIR/IIR) using suitable simulation tools, and record the input and output of the filter for the given audio signal (assignment component)

Course code:18EC652	Course:SENSORS and SIGNAL CONDITIONING
CO No.	**COURSE OUTCOMES (Cos)**

	At the end the course student will able to
CO1	Appreciate various types of sensors and their construction
CO2	Use sensors specific to the end use application
CO3	Design systems integrated with sensors

Course code:18ECL66	Course: EMBEDDED SYSTEMS LAB
CO No.	**COURSE OUTCOMES (Cos)**
	At the end the course student will able to
CO1	Understand the instruction set of 32 bit microcontroller ARM Cortex M3, and the software tool required for programming in Assembly and C language.
CO2	Develop assembly language programs using ARM Cortex M3 for different applications.
CO3	Interface external devices and I/O with ARM Cortex M3.
CO4	Develop C language programs and library functions for embedded system applications.

Course code:18ECL67	Course:COMMUNICATION LAB
CO No.	**COURSE OUTCOMES (Cos)**
	At the end the course student will able to
CO1	Determine the characteristics and response of microwave waveguide.
CO2	Determine the characteristics of microstrip antennas and devices and compute the parameters associated with it.
CO3	Design and test the digital and analog modulation circuits and display the waveforms.
CO4	Simulate the digital modulation systems and compare the error performance of basic digital modulation schemes.

Year:IV	SEM:VII
Course code:18EC71	Course:DIGITAL COMMUNICATION
CO No.	**COURSE OUTCOMES (Cos)**
	At the end the course student will able to
CO1	Understand the concepts of networking thoroughly
CO2	Identify the protocols and services of different layers.
CO3	Distinguish the basic network configurations and standards associated with each network.
CO4	Analyze a simple network and measurement of its parameters.

Course code:18EC71	Course:VLSI DESIGN
CO No.	**COURSE OUTCOMES (Cos)**
	At the end the course student will able to
CO1	Demonstrate understanding of MOS transistor theory, CMOS fabrication flow and technology scaling.
CO2	Draw the basic gates using the stick and layout diagrams with the knowledge of physical design aspects.
CO3	Demonstrate ability to design Combinational, sequential and dynamic logic circuits as per the requirements
CO4	Interpret Memory elements along with timing considerations
CO5	Interpret testing and testability issues in VLSI Design

Course code:18EC731	Course: REAL TIME SYSTEM
CO No.	**COURSE OUTCOMES (Cos)**
	At the end the course student will able to
CO1	Explain the fundamentals of Real time systems and its classifications.
CO2	Understand the concepts of computer control and the suitable computer hardware requirements for realtime applications.
CO3	Describe the operating system concepts and techniques required for real time systems.
CO4	Develop the software algorithms using suitable languages to meet Real time applications.
CO5	Apply suitable methodologies to design and develop Real-Time Systems.

Course code:18EC732	Course:SATELLITE COMMUNICATION
CO No.	**COURSE OUTCOMES (Cos)**
	At the end the course student will able to
CO1	Describe the satellite orbits and its trajectories with the definitions of parameters associated with it.
CO2	Describe the electronic hardware systems associated with the satellite subsystem and earth station.
CO3	Describe the various applications of satellite with the focus on national satellite system.
CO4	Compute the satellite link parameters under various propagation conditions with the illustration of multiple access techniques
CO5	

Course code:18EC733	Course: DIGITAL IMAGEPROCESSING
CO No.	**COURSE OUTCOMES (Cos)**
	At the end the course student will able to
CO1	Understand image formation and the role human visual system plays in perception of gray and color image data.
CO2	Apply image processing techniques in both the spatial and frequency (Fourier) domains.
CO3	Design and evaluate image analysis techniques
CO4	Conduct independent study and analysis of Image Enhancement and restoration techniques.

CO5	

Course code:18EC734	Course:DSP ALGORITHMS and ARCHITECTURE
CO No.	**COURSE OUTCOMES (Cos)**
	At the end the course student will able to
CO1	Comprehend the knowledge and concepts of digital signal processing techniques.
CO2	Apply the knowledge of DSP computational building blocks to achieve speed in DSP architecture or processor.
CO3	Apply knowledge of various types of addressing modes, interrupts, peripherals and pipelining structure of TMS320C54xx processor.
CO4	Develop basic DSP algorithms using DSP processors.
CO5	Discuss about synchronous serial interface and multichannel buffered serial port (McBSP) of DSP device.
CO6	Demonstrate the programming of CODEC interfacing

Course code:18EC741	Course: IoT & WIRELESS SENSOR NETWORKS
CO No.	**COURSE OUTCOMES (Cos)**
	At the end the course student will able to
CO1	Understand choice and application of IoT & M2M communication protocols.
CO2	Describe Cloud computing and design principles of IoT.
CO3	Awareness of MQTT clients, MQTT server and its programming.
CO4	Develop an architecture and its communication protocols of of WSNs.
CO5	

Course code:18EC742	Course:AUTOMOTIVE ELECTRONICS
CO No.	**COURSE OUTCOMES (Cos)**
	At the end the course student will able to
CO1	Acquire an overview of automotive components, subsystems, and basics of Electronic Engine Control in today's automotive industry.
CO2	Use available automotive sensors and actuators while interfacing with microcontrollers / microprocessors during automotive system design.
CO3	Understand the networking of various modules in automotive systems, communication protocols and diagnostics of the sub systems.
CO4	Design and implement the electronics that attribute the reliability, safety, and smartness to the automobiles, providing add-on comforts and get fair idea on future Automotive Electronic Systems.

Course code:18EC743	Course:MULTIMEDIA COMMUNICATION
CO No.	**COURSE OUTCOMES (Cos)**
	At the end the course student will able to
CO1	Understand basics of different multimedia networks and applications.
CO2	Understand different compression techniques to compress audio and video.
CO3	Describe multimedia Communication across Networks.
CO4	Analyse different media types to represent them in digital form.
CO5	Compress different types of text and images using different compression techniques

Course code:18EC744	Course:CRYPTOGRAPHY
CO No.	**COURSE OUTCOMES (Cos)**
	At the end the course student will able to
CO1	Explain basic cryptographic algorithms to encrypt and decrypt the data.
CO2	Use symmetric and asymmetric cryptography algorithms to encrypt and decrypt the information.
CO3	Apply concepts of modern algebra in cryptography algorithms.
CO4	Apply pseudo random sequence in stream cipher algorithms

Course:MACHINE LEARNING WITH PYTHON	Course code:18EC745
CO No.	**COURSE OUTCOMES (Cos)**
	At the end the course student will able to
CO1	Identify the problems in machine learning.
CO2	Select supervised, unsupervised or reinforcement learning for problem solving.
CO3	Apply theory of probability and statistics in machine learning
CO4	Apply concept learning, ANN, Bayes classifier, k nearest neighbor
CO5	Perform statistical analysis of machine learning techniques.

Course:COMPUTER NETWORKS LAB	Course code:18ECL76
CO No.	**COURSE OUTCOMES (Cos)**
	At the end the course student will able to
CO1	Use the network simulator for learning and practice of networking algorithms.
CO2	Illustrate the operations of network protocols and algorithms using C programming.
CO3	Simulate the network with different configurations to measure the performance parameters.
CO4	Implement the data link and routing protocols using C programming.
CO5	

Course code:18ECL77	Course: VLSI LAB
CO No.	**COURSE OUTCOMES (Cos)**

	At the end the course student will able to
CO1	Design and simulate combinational and sequential digital circuits using Verilog HDL
CO2	Understand the Synthesis process of digital circuits using EDA tool.
CO3	Perform ASIC design flow and understand the process of synthesis, synthesis constraints and evaluating the synthesis reports to obtain optimum gate level net list
CO4	Design and simulate basic CMOS circuits like inverter, common source amplifier and differential amplifiers.
CO5	Perform RTL-GDSII flow and understand the stages in ASIC design.

Course code:18EC75	Course: COMMUNICATION THEORY
CO No.	**COURSE OUTCOMES (Cos)**
	At the end the course student will able to
CO1	Describe operation of communication systems.
CO2	Understand the techniques of Amplitude and Angle modulation.
CO3	Understand the concept of sampling and quantization
CO4	Understand the concepts of different digital modulation techniques.
CO5	Describe the principles of wireless communications system.

Course code:18EC752	Course:NEURAL NETWORKS
CO No.	**COURSE OUTCOMES (Cos)**
	At the end the course student will able to
CO1	Understand the role of neural networks in engineering, artificial intelligence, and cognitive modelling.
CO2	Understand the concepts and techniques of neural networks through the study of the most important neural network models.
CO3	Evaluate whether neural networks are appropriate to a particular application.
CO4	Apply neural networks to particular application, and to know what steps to take to improve performance.

Year:IV	SEM:VIII
Course code:18EC81	Course: WIRELESS AND CELLULAR COMMUNICATION
CO No.	**COURSE OUTCOMES (Cos)**
	At the end the course student will able to
CO1	Explain concepts of propagation mechanisms like Reflection, Diffraction, Scattering in wireless channels.
CO2	Develop a scheme for idle mode, call set up, call progress handling and call tear down in a GSM cellular network.
CO3	Develop a scheme for idle mode, call set up, call progress handling and call tear down in a CDMA cellular network.
CO4	Understand the Basic operations of Air interface in a LTE 4G system.

Course code:18EC821	Course: NETWORK SECURITY
CO No.	**COURSE OUTCOMES (Cos)**
	At the end the course student will able to
CO1	Explain network security services and mechanisms and explain security concepts
CO2	Understand the concept of Transport Level Security and Secure Socket Layer.
CO3	Explain Security concerns in Internet Protocol security
CO4	Explain Intruders, Intrusion detection and Malicious Software
CO5	Describe Firewalls, Firewall Characteristics, Biasing and Configuration

Course code:18EC822	Course:MICRO ELECTROMECHANICAL SYSTEMS
CO No.	**COURSE OUTCOMES (Cos)**
	At the end the course student will able to
CO1	Appreciate the technologies related to Micro Electro Mechanical Systems.
CO2	Understand design and fabrication processes involved with MEMS Devices.
CO3	Analyze the MEMS devices and develop suitable mathematical models. Know various application areas for MEMS device.
CO4	
CO5	

Course code:18EC823	Course:RADAR ENGINEERING
CO No.	**COURSE OUTCOMES (Cos)**
	At the end the course student will able to
CO1	Understand the radar fundamentals and radar signals.
CO2	Explain the working principle of pulse Doppler radars, their applications and limitations.
CO3	Describe the working of various radar transmitters and receivers.
CO4	Analyze the range parameters of pulse radar system which affect the system performance.
CO5	

Course: OPTICAL COMMUNICATION NETWORKS	Course code:18EC824

CO No.	COURSE OUTCOMES (Cos)
	At the end the course student will able to
CO1	Classification and working of optical fiber with different modes of signal propagation.
CO2	Describe the transmission characteristics and losses in optical fiber communication.
CO3	Describe the construction and working principle of optical connectors, multiplexers and amplifiers.
CO4	Describe the constructional features and the characteristics of optical Sources and detectors.
CO5	Illustrate the networking aspects of optical fiber and describe various standards associated with it.

Course code:18EC825	Course: BIOMEDICAL SIGNAL PROCESSING
CO No.	**COURSE OUTCOMES (Cos)**
	At the end the course student will able to
CO1	Possess the basic mathematical, scientific and computational skills necessary to analyse ECG and EEG signals.
CO2	Apply classical and modern filtering and compression techniques for ECG and EEG signals
CO3	Develop a thorough understanding on basics of ECG and EEG feature extraction.