Course Outcomes (COs)

COURSE CODE	:	C231	
COURSE NAME	:	ENGINEERING MATHEMATICS-III	
CO		COURSE OUTCOME	BTL
C231.1		Analyze circuits and system communications using periodic signals and Fourier series.	L4
C231.2		Contrast the general linear system theory for continuous-time signals and digital signal processing using the Fourier Transform and z-transform.	L4
C231.3		Apply the principles of curve fitting and the most common methods for curve fitting such as linear regression. Outline the properties of correlation and compute Karl-Pearson's coefficient of correlation	L3
C231.4		Employ appropriate numerical methods to solve algebraic and transcendental equations. Apply methods of interpolation for prediction and apply numerical integration to calculate definite integrals of analytical functions or experimental data points.	L3
C231.5		Apply Green's Theorem, Divergence Theorem and Stokes' theorem in various applications in the field of electro-magnetic and gravitational fields and fluid flow problems. Determine the extremals of functionals and solve the simple problem on the calculus of variations.	L4

COURSE CODE	:	C232	
COURSE NAME	:	ELECTRONIC INSTRUMENTATION	
CO		COURSE OUTCOME	BTL
C232.1		Analyse the working principles of PMMC Voltmeters, Multimeters, Multi-range Ammeters. True RMS voltmeters and identify errors associated with measuring instruments	L3
C232.2		Illustrate the operation of Digital voltmeters and digital instruments used to measure voltage, frequency, time period, phase difference of signals, rpm of a rotating shaft, capacitance and pH of solutions base instrument.	L3
C232.3		Describe operating principles of oscilloscopes such as simple CRO, DSO's and signal generators with fixed/variable AF oscillator.	L2
C232.4		Analyse AC/DC Bridges in measurement of passive parameters and explain the operational concepts field Strength meter, megger, stroboscope, phase meter and Q meter.	L3
C232.5		Illustrate the functional concepts and operation of passive and active transducers.	L3

COURSE CODE	:	C233	
COURSE NAME	:	ANALOG ELECTRONICS	
CO		COURSE OUTCOME	BTL
C233.1		Acquire the basic knowledge of analog electronic devices such as FET, MOSFET, UJT.	L3
C233.2		Develop the ability to analyze the performance characteristics and parameters of BJT and FET amplifier using small signal model.	L3
C233.3		Analyze the parameters which affect the low frequency and high frequency responses of BJT and FET amplifiers.	L3
C233.4		Analyze the performance of feedback amplifiers and oscillators.	L3
C233.5		Acquire and evaluate the efficiency of power amplifiers classifications and voltage regulators.	L3

COURSE CODE	:	C234	
COURSE NAME	:	DIGITAL ELECTRONICS	
CO		COURSE OUTCOME	BTL
C234.1		Develop simplified switching equation using Karnaugh Maps and Quine-McClusky techniques.	L3
C234.2		Design combinational circuits by understanding the operation of Decoders, Encoders, Multiplexers, Adders, Subtractors and Comparators.	L3
C234.3		Describe the working of Latches and Flip Flops (SR,D,T and JK).	L2
C234.4		Design the application of flip-flops such as Synchronous/Asynchronous Counters and Shift registers.	L3
C234.5		Develop Mealy/Moore Models and state diagrams for the given clocked sequential circuits and apply the knowledge gained in the design of Counters.	L3

COURSE CODE	:	C235	
COURSE NAME	:	NETWORK ANALYSIS	
CO		COURSE OUTCOME	BTL
C235.1		Determine the parameters of electrical network using star-delta transformation/source transformation/source shifting and solve the electrical circuit using mesh/ nodal analysis.	L3
C235.2		Solve electrical circuit by applying Superposition / Thevenin's/ Norton's/ Maximum Power Transfer/ Millman's theorems.	L3
C235.3		Analyze the behavior of R-L, R-C, R-L-C electrical circuits by considering initial/final transient switching conditions for AC and DC excitations	L3
C235.4		Apply Laplace transform to examine step, ramp and impulse response of networks	L3
C235.5		Analyse the given circuit using specified two port network parameter like Impedance (Z), Admittance(Y), Transmission (T) and Hybrid (h)	L3

COURSE CODE	:	C236	
COURSE NAME	:	ENGINEERING ELECTROMAGNETICS	
CO		COURSE OUTCOME	BTL
C236.1		Describe the 3-dimentional co-ordinate systems, application of Coulomb's law and determine the electric field due to 1-Dimensional charges.	L2
C236.2		Apply Gauss law to determine electric flux density and field intensity due to infinite line and sheet charge distribution	L3
C236.3		Apply Laplace equation to find the potential and capacitance for parallel plate capacitor, concentric sphere. Apply Biot-savart's law, Ampere's circuital law to find the current, Stoke's theorem, describe Curl for line, surface and volume distributions.	L3
C236.4		Explain the force experienced by a charge in magnetic field and to infer the effects of magnetic forces in the medium and boundary conditions.	L3
C236.5		Summarize the differential and integral form of Maxwell's equations and power associated with EM waves using Poynting theorem	L3

COURSE CODE	:	C237	
COURSE NAME	:	ANALOG ELECTRONICS LABORATORY	
CO		COURSE OUTCOME	BTL
C237.1		Design the application of diodes such as rectifiers and voltage regulators.	L3
C237.2		Determine the characteristics of BJT amplifiers and plot its frequency response	L3
C237.3		Determine the characteristics of JFET amplifiers and plot its frequency response	L3
C237.4		Determine the transfer and drain characteristics of MOSFET amplifiers and plot its frequency response.	L3
C237.5		Design and test BJT power amplifiers and BJT / FET oscillators	L3

COURSE CODE	:	C238	
COURSE NAME	:	DIGITAL ELECTRONICS LAB	
CO		COURSE OUTCOME	BTL
C238.1		Demonstrate the truth table of various expressions and combinational circuits using logic gates	L3
C238.2		Design and test various combinational circuits such as adders, subtractors, comparators, multiplexers.	L3
C238.3		Realize Boolean expression using decoders.	L3
C238.4		construct flip-flops, counters, and shift registers	L3
C238.5		Simulate full adder and up/down counters.	L3

COURSE CODE	:	C239	
COURSE NAME	:	CONSTITUTION OF INDIA, PROFESSIONAL ETHICS AND CYBER LAW	
CO		COURSE OUTCOME	BTL
C239.1		Have general knowledge and legal literacy about Indian Constitution and thereby it helps to take up competitive examinations and to manage / face complex societal issues in society.	L2
C239.2		Understand state and central policies (Union and State Executive) fundamental rights and their duties.	L2
C239.3		Understand electoral process amendments and special provision in constitution	L2
C239.4		Understand powers and functions of municipalities, panchayats and co-operative societies with human rights and NHRC	L2
C239.5		Understand Engineering and professional ethics and responsibilities of Engineers	L2

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COURSE CODE	:	C241	
COURSE NAME	:	ENGINEERING MATHEMATICS-IV	
CO		**COURSE OUTCOME**	**BTL**
C241.1		Apply appropriate single step and multi step numerical methods to solve first and second order ordinary differential equations arising in flow problems	L3
C241.2		Make use of Bessel's function to solve problems of quantum mechanics, hydrodynamics and heat conduction relating to cylindrical polar coordinate systems and Legendre's polynomials relating to spherical polar coordinate systems.	L3
C241.3		Explain the idea of analyticity, analyticity, potential fields, residues and poles of complex potentials in field theory and electromagnetic theory. Describe conformal and bilinear transformation arising in aerofoil theory, fluid flow visualization and image processing.	L3
C241.4		Solve problems on probability distributions relating to digital signal processing, information theory and optimization concepts of stability of design and structural engineering and joint probability distributions connected with the multivariable correlation problems for feasible random events	L3
C241.5		Illustrate the validity of the hypothesis proposed for the given sampling distribution in accepting or rejecting the hypothesis. Define stochastic matrix connected with the multivariable correlation problems for feasible random events and transition probability matrix of a Markov chain and solve problems related to discrete parameter random process	L3

COURSE CODE	:	C242	
COURSE NAME	:	SIGNALS AND SYSTEMS	
CO		**COURSE OUTCOME**	**BTL**
C242.1		Understand the mathematical description and classification of continuous/discrete time signals and systems.	L3
C242.2		Determine and analyze the response of Linear Time Invariant (LTI) systems using convolution sum/convolution integral.	L3
C242.3		Represent the continuous/discrete time periodic signals in frequency domain using Fourier Series analysis.	L3
C242.4		Represent the continuous/discrete time aperiodic signals in frequency domain using Fourier Transform analysis; understand the sampling theorem and reconstruction of signal.	L3
C242.5		Compute Z-transforms, inverse Z- transforms and analyze the transfer functions of LTI systems in Z-domain.	L3

COURSE CODE	:	C243	
COURSE NAME	:	CONTROL SYSTEMS	
CO		**COURSE OUTCOME**	**BTL**
C243.1		Develop the mathematical model of mechanical and electrical systems and Develop transfer function for a given control system using block diagram reduction techniques and signal flow graph method.	L3
C243.2		Determine the time domain specifications for first and second order systems	L3
C243.3		Determine the stability of a system in the time domain using Routh-Hurwitz criterion and Root-locus technique.	L3
C243.4		Determine the stability of a system in the frequency domain using Nyquist and bode plots	L3
C243.5		Develop a control system model in continuous and discrete time using state variable techniques	L3

COURSE CODE	:	C244	
COURSE NAME	:	PRINCIPLES OF COMMUNICATION SYSTEMS	
CO		COURSE OUTCOME	BTL
C244.1		Describe principle generation, detection of AM, SSB, VSB modulation.	L3
C244.2		Describe principle generation, detection and applications of angle modulation.	L3
C244.3		Illustrate random process of analog signal in time domain and types of noise in channel.	L3
C244.4		Analyze the performance of communication system in presence of noise.	L3
C244.5		Represent analog signal in digital format and describe pulse modulation techniques.	L3

COURSE CODE	:	C245	
COURSE NAME	:	LINEAR INTEGRATED CIRCUITS	
CO		COURSE OUTCOME	BTL
C245.1		Understand the terminal characteristics, fundamental parameters of op- Amps and acquire the knowledge of op-amp DC amplifiers.	L3
C245.2		Analyze the performance of op amp and design op-amp applications.	L3
C245.3		Evaluate the performance of Linear and Non-linear applications using op-amps.	L3
C245.4		Analyze Active filters and IC voltage regulators.	L3
C245.5		Analyze voltage-controlled oscillators, ADC, DAC and 555 timer based multi vibrators.	L3

COURSE CODE	:	C246	
COURSE NAME	:	MICROPROCESSORS	
CO		COURSE OUTCOME	BTL
C246.1		Acquire knowledge on the emergence of Microprocessors, perceive architecture, define addressing modes and explain instruction set of 8086	L3
C246.2		Write Assembly language programs using String Instructions, Flag Manipulation Instructions and Assembler Directives.	L3
C246.3		Understand and describe Stack Structure, Interrupts of 8086 and Write Modular programs using Procedures and Macros	L3
C246.4		Analyze timing diagrams of 8086,Interface SRAM/DRAM, Keyboard,7-Segment with 8255 and Describe Bus Configurations	L3
C246.5		Interface 8086 with ADC/DAC, Stepper Motor; Understand the use of INT 21H DOS interrupt in handling keyboard, display unit and RISC, CISC, Von-Neumann, Harvard Architecture	L3

COURSE CODE	:	C247	
COURSE NAME	:	MICROPROCESSOR LAB	
CO	**COURSE OUTCOME**		**BTL**
C247.1	Write programs for the 8086 Microprocessor to perform arithmetic, logical and data transfer operations.		L3
C247.2	Write programs for the 8086 Microprocessor to perform bit manipulations and branch / loop operations		L3
C247.3	Write programs for the 8086 Microprocessor to perform string manipulations operations		L3
C247.4	Apply Assembler directives, DOS interrupts and the concept of Procedures and Macros for modular programming		L3
C247.5	Interface peripheral devices through PIO 8255 to 8086 Microprocessor for Simple Applications.		L3

COURSE CODE	:	C248	
COURSE NAME	:	LINEAR ICS AND COMMUNICATION LAB	
CO	**COURSE OUTCOME**		**BTL**
C248.1	Illustrate the pulse and flat top sampling techniques using basic circuits.		L3
C248.2	Demonstrate addition and integration using linear ICs, and 555 timer operations to generate signals/pulses		L3
C248.3	Demonstrate AM and FM operations and frequency synthesis.		L3
C248.4	Design and illustrate the operation of instrumentation amplifier, LPF, HPF using linear IC.		L3
C248.5	Design and illustrate the operation of DAC and oscillators using linear IC.		L3

COURSE CODE	:	C351	
COURSE NAME	:	MANAGEMENT AND ENTREPRENEURSHIP DEVELOPMENT	
CO	**COURSE OUTCOME**		**BTL**
C351.1	Understand functions of management involving planning and decision making process.		L2
C351.2	Organize the Staffing and Structure for an Organization, Make use of Communication Methods, Leadership Styles for Building Effective control		L2
C351.3	Describe the importance, characteristics of entrepreneurs and their social responsibilities		L2
C351.4	Identify the institutions supporting the Small Scale Industries and their objectives.		L2
C351.5	Apply the concepts of project Management and project design for managing the enterprise.		L3

COURSE CODE	:	C352	
COURSE NAME	:	DIGITAL SIGNAL PROCESSING	
CO		COURSE OUTCOME	BTL
C352.1		Compute Discrete Fourier Transform (DFT)/Inverse DFT of discrete sequence using the definition and properties of DFT.	L2
C352.2		Evaluate the DFT of real and complex discrete time signals and its response using linear filtering approach.	L3
C352.3		Develop Fast Fourier Transform (FFT) algorithms to reduce the computation time of DFT.	L3
C352.4		Design and analyse analog /digital Infinite Impulse Response (IIR) filters using Butterworth/Chebyshev approximations and to realize IIR filters using Direct form, cascade and parallel structures.	L3
C352.5		Design Finite Impulse Response (FIR) filters using Rectangular, Hamming, Hanning and Bartlett windows and realize FIR filters using Direct form, Linear phase, Frequency sampling and Lattice structures.	L3

COURSE CODE	:	C353	
COURSE NAME	:	VERILOG HDL	
CO		COURSE OUTCOME	BTL
C353.1		Acquire knowledge on evolution of Verilog, hierarchical modeling concepts of Verilog HDL	L2
C353.2		Analyze the structure of a Verilog Module to Demonstrate the use of data types, compiler directives and system tasks to interpret digital circuits in HDL	L2
C353.3		Design and verify the functionality of digital circuits at gate level or data flow modeling and perform timing and delay simulation with suitable test bench.	L3
C353.4		Design and verify the functionality of digital circuits using behavioral modeling more effectively using Verilog tasks, functions, directives and verify with suitable test bench	L3
C353.5		Acquire knowledge to program in VHDL in different modeling styles.	L2

COURSE CODE	:	C354	
COURSE NAME	:	INFORMATION THEORY AND CODING	
CO		COURSE OUTCOME	BTL
C354.1		Calculate entropy, efficiency of dependent and independent sources.	L3
C354.2		Analyze the performance of Shannon encoding algorithm, Shannon fano encoding algorithm, Huffman coding, Arithmetic Coding, Lempel – Ziv Algorithm.	L3
C354.3		Measure mutual information, channel capacity based on channel parameters	L3
C354.4		Design encoding, decoding procedure and detect correct errors of linear block codes, cyclic codes.	L3
C354.5		Design encoding, decoding procedure for convolutional code and analyze error.	L3

COURSE CODE	:	C355	
COURSE NAME	:	OPERATING SYSTEMS	
CO		COURSE OUTCOME	BTL
C355.1		Identify the classes of an Operating System by interpreting Computational structure and Defining the Goals of Operating system.	L2
C355.2		Analyze preemptive, non preemptive Scheduling policies. Illustrate processes & Threads.	L2
C355.3		Describe the techniques of contiguous and non-contiguous memory allocation, segmentation Technique, Virtual Memory and Organize FIFO, LRU page replacement.	L2
C355.4		Illustrate the organization of file system and IOCS, Operation, organizations & interface file system and IOCS.	L3
C355.5		Interpret message passing, mailbox, deadlock detection and prevention methods.	L3

COURSE CODE	:	C356	
COURSE NAME	:	AUTOMOTIVE ELECTRONICS	
CO		COURSE OUTCOME	BTL
C356.1		Discuss automotive components, subsystems, and basics of Electronic Engine Control in today's automotive industry.	L2
C356.2		Use available automotive sensors and actuators while interfacing with microcontrollers / microprocessors during automotive system design.	L3
C356.3		Identify various physical parameters that are to be sensed and monitored for maintaining the stability of the vehicle under dynamic conditions.	L2
C356.4		understand and implement the controls and actuator system pertaining to the comfort and safety of commuters.	L2
C356.5		Design and implement sensor network for mechanical fault diagnostics in an automotive vehicle.	L3

COURSE CODE	:	C357	
COURSE NAME	:	DSP LAB	
CO		COURSE OUTCOME	BTL
C357.1		Understand the concepts of analog to digital conversion of signals and frequency domain sampling of signals.	L2
C357.2		designing of discrete time signals and systems and verify its properties and results.	L3
C357.3		Implementation of discrete computations using DSP processor and verify the results.	L3
C357.4		Apply the DFT properties to obtain the transformed domain representation in an efficient way.	L3
C357.5		Design the digital filters using a simulation tool and analyze the response of the filter for an audio signal.	L3

COURSE CODE	:	C358	
COURSE NAME	:	HDL LAB	
CO	COURSE OUTCOME		BTL
C358.1	Write the Verilog/VHDL programs to simulate Combinational circuits in Dataflow, Behavioral and Gate level Abstractions.		L3
C358.2	Describe sequential circuits like flip flops and counters in Behavioral description and obtain simulation waveforms.		L3
C358.3	Use FPGA/CPLD kits for downloading Verilog codes and check output		L3
C358.4	Synthesize Combinational and Sequential circuits on programmable ICs and test the hardware.		L3
C358.5	Interface the hardware to the programmable chips and obtain the required output		L3

COURSE CODE	:	C359	
COURSE NAME	:	NANOELECTRONICS	
CO	COURSE OUTCOME		BTL
C358.1	Understand the principles behind Nanoscience engineering, classification of nano structure and fabrication methods.		L2
C358.2	discuss inorganic nano structures and various characterization techniques for nano structures.		L2
C358.3	Discuss the fabrication techniques and physical process in nano structures.		L2
C358.4	Recognize the properties of carbon and carbon nanotubes and its applications.		L2
C358.5	Explain the properties used for sensing and the use of smart dust sensors. Analyse the process flow required to fabricate state-of-the-art transistor Technology.		L2

COURSE CODE	:	C3510	
COURSE NAME	:	SWITCHING & FINITE AUTOMATA THEORY	
CO	COURSE OUTCOME		BTL
C3510.1	Illustrate the concept of threshold logic		L3
C3510.2	analysis the effect of hazards on digital circuits and fault detection.		L3
C3510.3	Use the concepts of finite state model in designing sequential machines.		L3
C3510.4	Analyze the structure of sequential machine		L3
C3510.5	Demonstrate the methods of state identification and fault detection experiments		L3

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COURSE CODE	:	C3511	
COURSE NAME	:	ELECTRICAL ENGINEERING MATERIALS	
CO		COURSE OUTCOME	BTL
C3511.1		Understand the various kinds of materials and their applications in ac and dc fields.	L2
C3511.2		Explain the properties and applications of all kinds of magnetic materials.	L2
C3511.3		Describe the electrical properties of different materials and metallic behavior of materials on the basis of band theory.	L2
C3511.4		Understand the conductivity of superconductivity of materials.	L2
C3511.5		discuss variety of approaches in developing new materials with enhanced performance to replace existing materials	L2

COURSE CODE	:	C3512	
COURSE NAME	:	MSP430 MICROCONTROLLER	
CO		COURSE OUTCOME	BTL
C3512.1		Explain the architecture of MSP430 microcontrollers and its applications in embedded systems and features available.	L2
C3512.2		Use suitable addressing modes and instructions from the instruction set to write programs to solve the problems.	L3
C3512.3		Implement Interrupt Service Routines and Timer functions for time critical solutions. Also use MSP430 in the lower power mode.	L3
C3512.4		Interface ADCs, DACs, LCDs, and other peripherals	L3
C3512.5		Use synchronous and asynchronous serial communication protocols between microcontroller and peripherals	L3

COURSE CODE	:	C3513	
COURSE NAME	:	OBJECT ORIENTED PROGRAMMING USING C++	
CO		COURSE OUTCOME	BTL
C3513.1		Explain the basics of Object Oriented Programming concepts.	L2
C3513.2		Apply the concept of run time polymorphism by using virtual functions, overriding functions and abstract class in programs.	L3
C3513.3		Apply the object initialization and destroy concept using constructors and destructors	L3
C3513.4		Apply the concept of polymorphism to implement compile time polymorphism in programs by using overloading methods and operators also Use the concept of inheritance to reduce the length of code and evaluate the usefulness.	L3
C3513.5		Use I/O operations and file streams in programs.	L3

COURSE CODE	:	C3514	
COURSE NAME	:	8051 MICROCONTROLLERS	
CO		COURSE OUTCOME	BTL
C3514.1		Describe the architectural features of 8051 microcontrollers, Memory organisation and external memory interfacing	L2
C3514.2		Understand the addressing modes of 8051, Instruction set and to write assembly programs	L2
C3514.3		Apply the knowledge of stack and subroutines in writing assembly programs involving loops and to interface LED switch.	L3
C3514.4		Analyze timer and counter operations of 8051 and write assembly and c program for serial communication.	L3
C3514.5		Discuss interrupt operations and write assembly program to interface ADC, LCD, stepper motor to 8051.	L3

COURSE CODE	:	C361	
COURSE NAME	:	DIGITAL COMMUNICATION	
CO		COURSE OUTCOME	BTL
C361.1		Associate and apply the concepts of bandpass sampling to well specified signals and channels	
C361.2		Analyze and compute performance parameters and transfer rates or lowpass and bandpass symbol under ideal and corrupted non band limited channels	
C361.3		Test and validate symbol processing and performance parameters at the receiver under ideal and corrupted band limited channels	
C361.4		Analyse and demonstrate by simulation and emulation the transmission and reconstruction of band pass signals subjected to errors in a band limited channel.	
C361.5		Understand the principle of spread spectrum communication techniques and evaluate the performance parameters.	

COURSE CODE	:	C362	
COURSE NAME	:	ARM CONTROLLER AND EMBEDDED SYSTEMS	
CO		COURSE OUTCOME	BTL
C362.1		Describe the architectural features of ARM Cortex M3, a 32-bit microcontroller including memory map, interrupts, and exceptions.	L2
C362.2		Write C and assembly language program for ARM cortex M3 using Bit-band operations, memory mapping.	L3
C362.3		Understand the basic hardware components in an embedded system and their application areas.	L3
C362.4		Describe the hardware software co-design and firmware design approaches.	L3
C362.5		Explain the need of real time operating system for embedded system applications.	L3

COURSE CODE	:	C363	
COURSE NAME	:	VLSI DESIGN	
CO	COURSE OUTCOME		BTL
C363.1	Demonstrate understanding of MOS transistor theory, CMOS fabrication flow.		L2
C363.2	Draw the basic gates using the stick and layout diagrams with the knowledge of physical design aspects.		L3
C363.3	Illustration technology scaling and demonstrate the subsystem Design Processes		L3
C363.4	Analyse CMOS subsystems and architectural issues with the design constraints and Demonstrate knowledge of FPGA based system design		L3
C363.5	Interpret Memory elements along with timing considerations and interpret testing and testability issues in VLSI Design		L3

COURSE CODE	:	C364	
COURSE NAME	:	COMPUTER COMMUNICATION NETWORKS	
CO	COURSE OUTCOME		BTL
C364.1	Understand the issues and challenges in Network Models & Data link layers.		L2
C364.2	Identify the Media Access Control and Evolution of Ethernet.		L2
C364.3	Describe Architecture of Wireless LAN- IEEE 802.11, connecting devices, Virtual LAN and Analyse IPV4 addressing.		L2
C364.4	Comprehend the Network Layer Protocols and Apply the Unicast Routing Protocols.		L3
C364.5	Recognize transport layer services in a computer communication network.		L2

COURSE CODE	:	C365	
COURSE NAME	:	DATA STRUCTURES USING C++	
CO	COURSE OUTCOME		BTL
C365.1	Understand the functions, dynamic memory allocation and linear list representation of data.		L2
C365.2	Apply one dimensional and multidimensional arrays and stacks for problem solving.		L3
C365.3	Apply queues for problem solving and understand dictionaries and Hash table representation.		L3
C365.4	Understand the binary tree and its representation methods.		L3
C365.5	Understand the priority queue and apply heaps and binary search trees for problem solving.		L3

COURSE CODE	:	C366	
COURSE NAME	:	DIGITAL SWITCHING SYSTEMS	
CO	COURSE OUTCOME		BTL
C366.1	Describe the basic types of switching systems in telecommunication, Network Structure, services, and telecommunication transmission methods.		L2
C366.2	Illustrate the concepts of DSS building blocks, Basics of Call processing, software architectures and maintenance of DSS.		L2
C366.3	Compute the telecommunication traffic and its measurements.		L2
C366.4	Analyse the Switching System Software associated with the data switching operations.		L2
C366.5	Analyse the Telecommunications Traffic using simulation tool and its maintenance.		L2

COURSE CODE	:	C367	
COURSE NAME	:	DIGITAL SYSTEM DESIGN USING VERILOG	
CO	COURSE OUTCOME		BTL
C367.1	Design the combinational circuits/ sequential circuits and construct Verilog model for the design and test bench for verification.		L3
C367.2	Design a semiconductor memory for specific chip design.		L3
C367.3	Illustrate the implementation fabrics for PLD.		L3
C367.4	Design embedded systems using small microcontrollers, larger CPUs/DSPs, or hard or soft processor cores		L3
C367.5	Analyse and synthesize different types of processor and I/O controllers that are used in embedded system design		L4

COURSE CODE	:	C368	
COURSE NAME	:	EMBEDDED CONTROLLER LAB	
CO	COURSE OUTCOME		BTL
C368.1	Understand the instruction set of 32-bit ARM Cortex M3 and the Keil IDE for programming in Assembly and Embedded C language.		L2
C368.2	Develop Embedded C program to display message on LCD using UART & generate PWM, interface DAC.		L3
C368.3	Develop Embedded C program to interface Cortex M3 to LED's, 7 segment display & to control DC, Stepper Motor.		L3
C368.4	Develop Embedded C program to interface Cortex M3 to control DC, Stepper Motor.		L3
C368.5	Develop Embedded C programs to interface temperature sensors (LM35) using SPI ADC, Hex keypad.		L3

COURSE CODE	:	C369	
COURSE NAME	:	COMPUTER NETWORKS LAB	
CO	COURSE OUTCOME		BTL
C369.1	Use the network simulator for learning and practice of networking algorithms		L2
C369.2	Illustrate the operations of network protocols and algorithms using C/C++ programming		L3
C369.3	Simulate the network with different configurations to measure the performance parameters		L3
C369.4	Implement the data link protocols using C programming		L3
C369.5	Implement the routing protocols using C programming		L3

COURSE CODE	:	C3610	
COURSE NAME	:	CELLULAR MOBILE COMMUNICATION	
CO	COURSE OUTCOME		BTL
C3610.1	Understand the concept of cellular communication, frequency reuse, capacity, Interference and to improve coverage and capacity.		L2
C3610.2	Describe factors affecting propagation in wireless channels to explain the need for developing models and explain the distinction between large-scale models and small-scale model.		L3
C3610.3	Describe GSM system architecture and protocols. GSM Signalling and call control: Mobility.		L3
C3610.4	Describe GSM system services.		L3
C3610.5	Understand the basic CDMA system architecture and explain the advanced CDMA technology services.		L2

COURSE CODE	:	C3611	
COURSE NAME	:	ADAPTIVE SIGNAL PROCESSING	
CO	COURSE OUTCOME		BTL
C3611.1	Discuss filtering solutions for optimising the cost function indicating error in estimation of parameters and appreciate the need for adaptation in design.		L2
C3611.2	Discuss the performance of various methods for designing adaptive filters through estimation of different parameters of stationary random process clearly considering practical application specifications		L2
C3611.3	Analyse convergence and stability issues associated with adaptive filter design.		L3
C3611.4	Interpret optimum solutions for real life applications taking care of requirements in terms of complexity and accuracy		L3
C3611.5	Design and implement filtering solutions for applications such as channel equalisation, interference cancelling and prediction considering present day challenges		L3

DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING

COURSE CODE	:	C3612	
COURSE NAME	:	ARTIFICIAL NEURAL NETWORKS	
CO		COURSE OUTCOME	BTL
C3612.1		Understand the role of neural networks in engineering, artificial intelligence, and cognitive modelling.	L2
C3612.2		illustrate the concepts and techniques of neural networks through the study of important neural network models.	L3
C3612.3		Evaluate whether neural networks are appropriate to a particular application.	L3
C3612.4		Apply neural networks to particular application	L3
C3612.5		Analyze the steps needed to improve performance of the selected neural network.	L3

COURSE CODE	:	C3613	
COURSE NAME	:	MICROELECTRONICS	
CO		COURSE OUTCOME	BTL
C3613.1		Explain the underlying physics and principles of operation of Metal oxide semiconductor (MOS) capacitors and MOS field effect transistors (MOSFETs)	L2
C3613.2		Describe and apply simple small signal circuit models for MOSFETs amplifiers.	L2
C3613.3		design microelectronic circuits for linear amplifier and Analyze frequency response.	L3
C3613.4		Use of discrete MOS circuits to design Single stage amplifiers to meet stated operating specifications.	L3
C3613.5		Use of discrete MOS circuits to design Multistage amplifiers to meet stated operating specifications.	L3

COURSE CODE	:	C471	
COURSE NAME	:	MICROWAVE AND ANTENNAS	
CO		COURSE OUTCOME	BTL
C471.1		Describe the use and advantages of microwave generation and transmission using reflex klystron oscillator and two cavity klystron amplifiers	L2
C471.2		Analyze and speculate the parameters related to microwave transmission lines and waveguides.	L3
C471.3		Identify microwave devices for several applications. Understand and apply the parameters of antenna to determine directivity of radiation patterns in terms of beam width.	L3
C471.4		Analyze isotropic point sources in an array system and design an array antenna for N isotropic sources. Derive the expression for radiation patterns of various antennae	L3
C471.5		Distinguish the antennas (Wire, Aperture and Array Antennas) according to the applications.	L3

COURSE CODE	:	C472	
COURSE NAME	:	DIGITAL IMAGE PROCESSING	
CO		COURSE OUTCOME	BTL
C472.1		Comprehend DIP, fundamental steps, components, Image sensing, some basic	L2
C472.2		Apply image enhancement techniques in Spatial and Frequency domains. Along with the need for image transforms	L3
C472.3		Illustrate the image restoration techniques and methods used in digital image processing.	L3
C472.4		Use the fundamentals of Color Image processing, Wavelets and Morphological Operations used in digital image processing.	L3
C472.5		demonstrate feature extraction techniques for image analysis using Segmentation, Representation, and description.	L3

COURSE CODE	:	C473	
COURSE NAME	:	POWER ELECTRONICS	
CO		COURSE OUTCOME	BTL
C473.1		Illustrate the basic operation and characteristics of power semiconductor devices.	L2
C473.2		Understand the working principle of Thyristor to realize its turn-on and turn-off mechanism.	L2
C473.3		Analyze single-phase controlled rectifiers and AC voltage converters for R and RL load.	L3
C473.4		Apply the knowledge of thyristor characteristics in analysis of DC- DC converter circuit for R and RL load.	L3
C473.5		Analyze the characteristics of inverter circuits and static switches for domestic and industrial applications.	L3

COURSE CODE	:	C474	
COURSE NAME	:	MULTIMEDIA COMMUNICATION	
CO		COURSE OUTCOME	BTL
C474.1		Understand the basics of various multimedia networks and applications	L2
C474.2		Describe the digitization principle and analyze the multimedia types.	L2
C474.3		Interpret the concepts of Distributed multimedia systems and compression techniques.	L3
C474.4		Analyze the compression techniques and standards used in text, image, audio and video.	L3
C474.5		Apply the knowledge of multimedia communication across different networks.	L3

COURSE CODE	:	C475	
COURSE NAME	:	IOT AND WIRELESS SENSOR NETWORKS	
CO	COURSE OUTCOME		BTL
C475.1	Identify areas where Pattern Recognition and Machine Learning can offer a solution.		L2
C475.2	Describe the strength and limitations of some techniques used in computational Machine Learning for classification, regression and density estimation problems		L2
C475.3	Describe genetic algorithms, validation methods and sampling techniques		L2
C475.4	Describe and model data to solve problems in regression and classification		L2
C475.5	Implement learning algorithms for supervised tasks		L3

COURSE CODE	:	C476	
COURSE NAME	:	ADVANCED COMMUNICATION LAB	
CO	COURSE OUTCOME		BTL
C476.1	Illustrate the characteristics and response of microwave devices.		L3
C476.2	Illustrate the characteristics and response of optical waveguide.		L3
C476.3	Illustrate the characteristics of microstrip antennas and devices and compute the parameters associated with it.		L3
C476.4	Illustrate an optical communication system and study its characteristics.		L3
C476.5	Simulate the digital communication concepts and compute and display various parameters along with plots/figures.		L3

COURSE CODE	:	C477	
COURSE NAME	:	VLSI LAB	
CO	COURSE OUTCOME		BTL
C477.1	Design Combinational Circuits and sequential circuits using Verilog module.		L3
C477.2	Develop test bench to Simulate Combinational Circuits and sequential circuits.		L3
C477.3	Use transistors to design gates and further using gates realize shift registers and adders to meet desired parameters.		L3
C477.4	Design CMOS inverter, Common Source, Common Drain and Differential Amplifiers and Analyse the DC, ac and Transient Characteristics. Create Layout for designed amplifiers to verify DRC, LVS.		L3
C477.5	Design Operational Amplifier and R2R based Digital to Analog Converter using Library Components to Analyse DC, AC and Transient Characteristics.		L3

COURSE CODE	:	C478	
COURSE NAME	:	PROJECT WORK PHASE–I	
CO		COURSE OUTCOME	BTL
C478.1		Demonstrate an ability to apply engineering specialization to identify a problem.	L2
C478.2		Formulate a hypothesis for a given problem using research literature, then identify applicable tools and components to solve the identified technical problems.	L2
C478.3		Design, Analyse and evaluate the subblocks of the identified project to obtain experimental results and propose suitable modifications to improve performance.	L3
C478.4		Effectively present the work with professional ethics as an individual or working as a team.	L2
C478.5		Communicate technical content effectively through written reports and oral presentations.	L2

COURSE CODE	:	C479	
COURSE NAME	:	BIOMEDICAL SIGNAL PROCESSING	
CO		COURSE OUTCOME	BTL
C479.1		Discuss basic electrocardiography signals and signal conversion circuits.	L2
C479.2		Apply classical and modern filtering and adaptive noise cancelling techniques for ECG and EEG signals.	L3
C479.3		Apply classical and modern compression techniques for ECG and EEG signals.	L3
C479.4		Develop a thorough understanding on basics of ECG data acquisition, filtering, amplification, detection, and matching techniques.	L3
C479.5		Analyse the characteristics of EEG signal and detection of EEG rhythms	L3

COURSE CODE	:	C4710	
COURSE NAME	:	REAL TIME SYSTEMS	
CO		COURSE OUTCOME	BTL
C4710.1		Understand the fundamentals of Real time systems, its classifications and control concepts for computers.	L2
C4710.2		Discuss the hardware requirements for computer in real-time applications.	L2
C4710.3		Develop the software languages to meet Real time applications.	L3
C4710.4		Understand the concepts of tasking, scheduling strategies, resource control in operating system.	L2
C4710.5		Apply suitable methodologies to design and develop Real-Time Systems.	L3

COURSE CODE	:	C4711	
COURSE NAME	:	CRYPTOGRAPHY	
CO		COURSE OUTCOME	BTL
C4711.1		Understand the basic concepts of number theory, finite fields, polynomial arithmetic, prime numbers, Fermat's, Euler's and Chinese remainder theorem.	L2
C4711.2		Apply the techniques of encrypting and decrypting for producing cipher by DES and AES private key encryption techniques.	L3
C4711.3		Illustrate the generation of Pseudorandom numbers using LCG and LFSR techniques for cryptographic applications.	L3
C4711.4		Analyze the RSA, ECC public key cryptosystems and Diffie-hellman key management systems.	L3
C4711.5		Discuss the need of authentication, protection of encrypted data, one way hash functions, MAC, Digital signature algorithms.	L2

COURSE CODE	:	C4712	
COURSE NAME	:	CAD FOR VLSI	
CO		COURSE OUTCOME	BTL
C4712.1		Describe basic terminology, graph algorithms and computational geometry algorithms.	L2
C4712.2		Describe basic data structure and generalized graph theoretic approach to VLSI problems	L2
C4712.3		Illustrate group migration algorithms and constraint-based floor planning	L3
C4712.4		Illustrate pin assignment problems, simulation-based placement and partitioning based algorithms.	L3
C4712.5		Illustrate detailed routing consideration and classification of global routing.	L3

COURSE CODE	:	C4713	
COURSE NAME	:	DSP ALGORITHMS AND ARCHITECTURE	
CO		COURSE OUTCOME	BTL
C4713.1		Comprehend the knowledge and concepts of digital signal processing techniques.	L2
C4713.2		Apply the knowledge of DSP computational building blocks to achieve speed in DSP architecture or processor.	L3
C4713.3		Apply knowledge of various types of addressing modes, interrupts, peripherals and pipelining structure of TMS320C54xx processor.	L3
C4713.4		Develop basic DSP algorithms for FIR / IIR filter also implement FFT algorithm using DSP processors.	L3
C4713.5		Demonstrate synchronous serial interface and multichannel buffered serial port (McBSP) of DSP device.	L3

COURSE CODE	:	C4714	
COURSE NAME	:	PATTERN RECOGNITION	
CO	COURSE OUTCOME		BTL
C4714.1	Identify areas where Pattern Recognition and Machine Learning can offer a solution.		L2
C4714.2	Describe the strength and limitations of some techniques used in computational Machine Learning for classification, regression, and density estimation problems		L2
C4714.3	Describe genetic algorithms, validation methods and sampling techniques		L2
C4714.4	Demonstrate and model data to solve problems in regression and classification		L3
C4714.5	Implement learning algorithms for supervised tasks		L3

COURSE CODE	:	C4715	
COURSE NAME	:	ADVANCED COMPUTER ARCHITECTURE	
CO	COURSE OUTCOME		BTL
C4715.1	Explain parallel computer models and conditions of parallelism		L2
C4715.2	Discuss control flow, dataflow, demand driven mechanisms also Explain the principle of scalable performance		L3
C4715.3	Discuss advanced processors architectures like CISC, RISC, superscalar and VLIW		L3
C4715.4	Understand the basics of instruction pipelining and memory technologies		L3
C4715.5	Explain the issues in multiprocessor architectures		L3

COURSE CODE	:	C4716	
COURSE NAME	:	SATELLITE COMMUNICATION	
CO	COURSE OUTCOME		BTL
C4716.1	Understand the satellite orbits and its trajectories with the satellite parameters associated with it.		L2
C4716.2	Describe the electronic hardware systems associated with the satellite subsystem and earth station.		L2
C4716.3	Compute the satellite link parameters under various propagation conditions with the illustration of multiple access techniques.		L3
C4716.4	Illustrate the applications of satellite with the focus on national satellite system.		L3
C4716.5	Describe the non-communication applications of Remote Sensing, Weather Forecasting and Navigation Satellites		L2

COURSE CODE	:	C481	
COURSE NAME	:	WIRELESS & CELLULAR COMMUNICATION	
CO	COURSE OUTCOME		BTL
C481.1	Understand system architecture and wireless fundamentals of LTE 4G		L2
C481.2	Identify the multicarrier modulation multiple access schemes and diversity techniques required to improve performance of mobile radio channel.		L3
C481.3	Describe the LTE channel structure and processing of downlink physical channel.		L2
C481.4	Describe the uplink physical layer procedure.		L2
C481.5	Analyse the performance of resource management and mobility management.		L3

COURSE CODE	:	C482	
COURSE NAME	:	FIBER OPTICS & NETWORKS	
CO	COURSE OUTCOME		BTL
C482.1	Describe building blocks of optical Fiber communication system, optical networks & amplifiers, their merits and demerits along with light propagation properties		L2
C482.2	Distinguish between Fiber losses (attenuation) such as absorption, scattering losses, radiative losses as well as Fiber alignment and joint loss.		L2
C482.3	Illustrate and analyse the behaviour of optical transmitters & receivers for analog & digital mode of operation.		L3
C482.4	Investigate and Integrate the Active and Passive components in a WDM system.		L4
C482.5	Illustrate the networking aspects of optical Fiber and describe the optical network standards.		L3

COURSE CODE	:	C483	
COURSE NAME	:	NETWORK AND CYBER SECURITY	
CO	COURSE OUTCOME		BTL
C483.1	Identify the threats in web and apply the counter measures available to enhance the security of web applications.		L2
C483.2	Develop the skills for email security by PGP, S/MIME, Domain keys identified mail.		L3
C483.3	Illustrate the IP security policy, ESP, Combining security Associations Internet key exchange, Cryptographic suits.		L3
C483.4	Illustrate the security architecture and understand the security concepts and problems related to cyber security.		L3
C483.5	Apply concept of cyber security and Enterprise security framework in computer system administration.		L3

COURSE CODE	:	C484	
COURSE NAME	:	INTERNSHIP/PROFESSIONAL PRACTICE	
CO	COURSE OUTCOME		BTL
C484.1	Enhance the existing engineering knowledge and gain practical experience.		L2
C484.2	Understand through an intensive experience, the nature of workplaces and their associated values, routines, and cultures.		L2
C484.3	Integrate and demonstrate existing and new technical knowledge for industrial application		L3
C484.4	Effectively present and write technical reports with professional ethics as an individual /Team on contemporary areas/trends/developments in Engineering fields.		L2
C484.5	Recognize the need for lifelong learning processes with Management skills through critical reflection of internship experiences.		L2

COURSE CODE	:	C485	
COURSE NAME	:	PROJECT WORK	
CO	COURSE OUTCOME		BTL
C485.1	Ability to Interconnect different design block.		L3
C485.2	Apply relevant modern tools to solve the identified technical problem.		L3
C485.3	Analyze and evaluate the experimental results and propose suitable modifications to improve performance.		L4
C485.4	Effectively present the work with professional ethics as an individual or working as a team.		L2
C485.5	Communicate technical content effectively through written reports and oral presentations.		L2

COURSE CODE	:	C486	
COURSE NAME	:	SEMINAR	
CO	COURSE OUTCOME		BTL
C486.1	Identify and review research literature and comprehend solutions that exist to ECE problems.		L2
C486.2	Understand the techniques, skills and use applicable tools necessary for presenting the authorized work.		L2
C486.3	Communicate effectively on contemporary areas/trends/developments in Engineering fields and develop technical reports.		L2
C486.4	Effectively present the work with professional ethics as an individual.		L2
C486.5	Understand the impact of authorized work in societal and environmental context.		L2

COURSE CODE	:	C487	
COURSE NAME	:	MICRO ELECTROMECHANICAL SYSTEMS	
CO		**COURSE OUTCOME**	**BTL**
C487.1		Appreciate the technologies related to Micro Electro Mechanical Systems.	L2
C487.2		Understand working principles of microsystems design and fabrication processes involved with MEMS devices.	L2
C487.3		Analyse the MEMS devices and develop suitable mathematical models.	L3
C487.4		Illustrate scaling laws in miniaturization.	L3
C487.5		Understand the micromanufacturing process	L2

COURSE CODE	:	C488	
COURSE NAME	:	SPEECH PROCESSING	
CO		**COURSE OUTCOME**	**BTL**
C488.1		Describe the fundamentals of speech and Model speech production system.	L2
C488.2		Explain time domain to perform short time speech processing and modification function using short time auto correlation.	L2
C488.3		Explain frequency domain representation for speech processing, different synthesis method, filter method and modification method of STFT	L2
C488.4		Use homomorphic analysis of the speech model and cepstrum analysis of all-pole models.	L3
C488.5		Analyse speech signals using linear predictive analysis and understand some properties of LPC polynomial.	L3

COURSE CODE	:	C489	
COURSE NAME	:	RADAR ENGINEERING	
CO		**COURSE OUTCOME**	**BTL**
C489.1		Understand the radar fundamentals, operation of radar and solve simple problems using radar equations.	L2
C489.2		Illustrate the range performance, detection, and probability of detection, also illustrate simple target, losses by solving problems using radar equations.	L3
C489.3		Illustrate the working principle of pulse Doppler radars, their applications and limitations also Describe digital MTI doppler signal processor and detector.	L3
C489.4		Analyze the range parameters of pulse radar system which affect the system performance also describe tracking and its types.	L3
C489.5		Analyse antenna parameters, types of antennas used in radar also radar receiver.	L3

COURSE CODE	:	C4810	
COURSE NAME	:	MACHINE LEARNING	
CO	COURSE OUTCOME		BTL
C4810.1	Understand the core concepts of Machine learning.		L2
C4810.2	Explain paradigms of supervised and un-supervised learning.		L2
C4810.3	Understand neural networks and Bayesian techniques for problems appearing in machine learning.		L2
C4810.4	Understand instant based learning, sequential covering algorithms and learning rule sets.		L2
C4810.5	Recognize a real-world problem and apply the learned techniques of Machine Learning to solve the problem.		L2