Course Outcomes

(COs)

2018 Scheme

Course Name	CALCULUS AND LINEAR ALGEBRA
Course Code	18MAT11
CO 1	Apply the C knowledge of calculus to solve problems related to polar curves and its applications in determining the bentness of a curve.
CO 2	Learn the notion of partial differentiation to calculate rates of change of multivariate functions and solve problems related to composite functions and Jacobians.
CO 3	Apply the concept of change of order of integration and variables to evaluate multiple integrals and their usage in computing the area and volumes.
CO 4	Solve first order linear/nonlinear differential equation analytically using standard methods
CO 5	Make use of matrix theory for solving system of linear equations and compute eigenvalues and eigenvectors required for matrix diagonalization process.

Course Name	ENGINEERING PHYSICS
Course Code	18PHY12/21
CO 1	Understand various types of oscillations and their implications, the role of Shock waves in various fields and recognize the elastic properties of materials for engineering applications
CO 2	Realize the interrelation between time varying electric field and magnetic field, the transverse nature of the EM waves and their role in optical fiber communication.
CO 3	Compute Eigen values, Eigen functions, momentum of Atomic and subatomic particles using Time independent 1-D Schrodinger's wave equation.
CO 4	Apprehend theoretical background of laser, construction and working of different types of lasers and its applications in different fields
CO 5	Understand various electrical and thermal properties of materials like conductors, semiconductors and dielectrics using different theoretical models.

Course Name	BASIC ELECTRICAL ENGINEERING
Course Code	18ELE13/23
CO 1	Analyse D.C and A.C circuits.
CO 2	Explain the principle of operation and construction of single-phase transformers.
CO 3	Explain the principle of operation and construction of DC machines and synchronous machines.
CO 4	Explain the principle of operation and construction of three phase induction motors.
CO 5	Discuss concepts of electrical wiring, circuit protecting devices and earthing.

Course Name	ELEMENTS OF CIVIL ENGINEERING AND MECHANICS
Course Code	18CIV 14/24
CO 1	Mention the applications of various fields of Civil Engineering
CO 2	Compute the resultant of a given force system subjected to various loads.
CO 3	Comprehend the action of Forces, Moments and other loads on systems of rigid bodies and compute the reactive forces that develop as a result of the external loads.
CO 4	Locate the Centroid and compute the Moment of Inertia of regular and built-up sections.
CO 5	Express the relationship between the motion of bodies and analyze the bodies in motion

Course Name	ENGINEERING GRAPHICS
Course Code	18EGDL15/25
CO 1	Prepare engineering drawings as per BIS conventions mentioned in the relevant codes.
CO 2	Produce computer generated drawings using CAD software
CO 3	Use the knowledge of orthographic projections to represent engineering information Iconcepts and present the same in the form of drawings.

Course Name	ENGINEERING PHYSICS LABORATORY
Course Code	18PHYL16/26
CO 1	Apprehend the concepts of interference of light, diffraction of light, Fermi energy and magnetic effect of current

CO 2	Understand the principles of operations of optical fibers and semiconductor devices such as Photodiode, and NPN transistor using simple circuits
CO 3	Determine elastic moduli and moment of inertia of given materials with the help of suggested procedures
CO 4	Recognize the resonance concept and its practical applications
CO 5	Understand the importance of measurement procedure, honest recording and representing the data, reproduction of final results

Course Name	BASIC ELECTRICAL ENGINEERING LABORATORY
Course Code	18ELEL17/27
CO 1	Identify the common electrical components and measuring instruments used for conducting experiments in the electrical laboratory.
CO 2	Compare power factor of lamps
CO 3	Determine impedance of an electrical circuit and power consumed in a 3 phase load.
CO 4	Determine earth resistance and understand two way and three way control Of lamps.

Course Name	TECHNICAL ENGLISH - I
Course Code	18EGH18
CO 1	Use grammatical English and essentials of language skills and identify the nuances of phonetics, intonation and flawless pronunciation
CO 2	Implement English vocabulary at command and language proficiency
CO 3	Identify common errors in spoken and written communication
CO 4	Understand and improve the nonverbal communication and kinesics
CO 5	Perform well in campus recruitment, engineering and all other general competitive examinations

Course Name	ADVANCED CALCULUS AND NUMERICAL METHODS
Course Code	18MAT21
CO 1	Illustrate the applications of multivariate calculus to understand the solenoidal and irrotational vectors and also exhibit the interdependence of line, surface and volume integrals.
CO 2	Demonstrate various physical models through higher order differential equations and solve such linear ordinary differential equations.
CO 3	Construct a variety of partial differential equations and solution by exact methods/method of separation of variables
CO 4	Explain the applications of infinite series and obtain series solutions of ordinary differential equations.
CO 5	Apply the knowledge of numerical methods in the modeling of various physical and engineering phenomena.

Course Name	ENGINEERING CHEMISTRY
Course Code	18CHE12/22
CO 1	Use of free energy in equilibria, rationalize bulk properties and processes using thermodynamic considerations, electrochemical energy systems.
CO 2	Causes & effects of corrosion of metals and control of corrosion. Modification of surface properties of metals to develop resistance to corrosion, wear, tear, impact etc.by electroplating and electroless plating.
CO 3	Production & consumption of energy for industrialization of country and living standards of people. Electrochemical and concentration cells. Classical, modern batteries and fuel cells. Utilization of solar energy for different useful forms of energy.
CO 4	Environmental pollution, waste management and water chemistry.
CO 5	Different techniques of instrumental methods of analysis. Fundamental principles of nano materials.

Course Name	C PROGRAMMING FOR PROBLEM SOLVING
Course Code	18CPS13/23
CO 1	Illustrate simple algorithms from different domains such as mathematics, physics, etc.
CO 2	Construct a programming solution to the given problem using C.
CO 3	Identify and correct the syntax and logical errors in C programs.
CO 4	Modularize the given problem using functions and structures.

Course Name	BASIC ELECTRONICS
Course Code	18ELN14/24
CO 1	Describe the operation of diodes, BIT, PET and Operational Amplifiers
CO 2	Design and explain the construction of rectifiers, regulators, amplifiers and oscillators.
CO 3	Describe general operating principles of SCRs and its application.
CO 4	Explain the working and design of Fixed voltage IC regulator using 7805 and A stable oscillator using timer IC 555.
CO 5	Explain the different number systems and their conversions and construct simple combinational and sequential logic circuits using Flip-Flops.

Course Name	ELEMENTS OF MECHANICAL ENGINEERING
Course Code	18ME15/25
CO 1	Identify different sources of energy and their conversion process.
CO 2	Explain the working principle of hydraulic turbines, pumps, IC engines and refrigeration.
CO 3	Recognize various metal joining processes and power transmission elements.
CO 4	Understand the properties of common engineering materials and their applications in the engineering industry.
CO 5	Discuss the working of conventional machine tools, machining processes, tools and accessories.

Course Name	ENGINEERING CHEMISTRY LABORATORY
Course Code	18CHEL16/26
CO 1	Handling different types of instruments for analysis of materials using small quantities of materials involved for quick and accurate results.
CO 2	Carrying out different types of titrations for estimation of concerns in materials using comparatively more quantities of materials involved for good results.

Course Name	C PROGRAMMING LABORATORY
Course Code	18CPL17/27
CO 1	Write algorithms, flowcharts and programs for simple problems. Correct syntax and logical errors to execute a program.
CO 2	Write iterative and wherever possible recursive programs
CO 3	Demonstrate use of functions, arrays, strings, structures and pointers in problem solving.

Course Name	TECHNICAL ENGLISH - II
Course Code	18EGH28
CO 1	Identify common errors in spoken and written communication
CO 2	Get familiarized with English vocabulary and language proficiency
CO 3	Improve nature and style of sensible writing and acquire employment and workplace communication skills
CO 4	Improve their Technical Communication Skills through Technical Reading and Writing practices
CO 5	Perform well in campus recruitment, engineering and all other general competitive examinations.

Course Name	TRANSFORM CALCULUS, FOURIER SERIES AND NUMERICAL TECHNIQUES
Course Code	18MAT31

CO 1	Use Laplace transform and inverse Laplace transform in solving differential/ integral equations arising in network analysis, control systems and other fields of engineering.
CO 2	Demonstrate Fourier series to study the behavior of periodic functions and their applications in system communications, digital signal processing and field theory.
CO 3	Make use of Fourier transform and Z-transform to illustrate discrete/ continuous function arising in wave and heat propagation, signals and systems.
CO 4	Solve first and second order ordinary differential equations arising in engineering problems using single step and multistep numerical methods.
CO 5	Determine the extremals of functionals using calculus of variations and solve problems arising in dynamics of rigid bodies and vibrational analysis

Course Name	NETWORK THEORY
Course Code	18EC32
CO 1	Determine currents and voltages using source transformation/ source shifting/ mesh/ nodal analysis and reduce given network using star delta transformation/source transformation/ source shifting.
CO 2	Solve network problems by applying Superposition/ Thevenin's/Norton's/ Maximum Power Transfer/ Millman's Network Theorems and electrical laws to reduce circuit complexities and to arrive at feasible solutions
CO 3	Calculate current and voltages for the given circuit under transient conditions and Apply Laplace transform to solve the given network.
CO 4	Solve the given network using specified two port network parameters - Z, Y, T & h.
CO 5	Understand the concept of resonance and determine the parameters that characterize series/parallel Resonant Circuits.

Course Name	ELECTRONIC DEVICES
Course Code	18EC33
CO 1	Understand the principles of semiconductor Physics
CO 2	Understand the principles and characteristics of different types of semiconductor devices
CO 3	Understand the fabrication process of semiconductor devices
CO 4	Utilize the mathematical models of semiconductor junctions for circuits and systems
CO 5	Identify the mathematical models of MOS transistors for circuits and systems.

Course Name	DIGITAL SYSTEM DESIGN
Course Code	18EC34
CO 1	Explain the concept of combinational and sequential logic circuits.
CO 2	Analyse and Design the combinational logic circuits.
CO 3	Describe and characterize flip-flops and its applications.
CO 4	Design the sequential circuits using SR, JK, D, T flip-flops and Mealy & Moore machines.
CO 5	Design applications of Combinational & Sequential Circuits

Course Name	COMPUTER ORGANIZATION AND ARCHITECTURE
Course Code	18EC35
CO 1	Explain the basic organization of a computer system.
CO 2	Describe the addressing modes, instruction formats and program control statement.
CO 3	Explain different ways of accessing an input I output device including interrupts.
CO 4	Illustrate the organization of different types of semiconductor and other secondary storage memories.
CO 5	Illustrate simple processor organization based on hardwired control and micro programmed control.

Course Name	POWER ELECTRONICS AND INSTRUMENTATION
Course Code	18EC36
CO 1	Build and test circuits using power electronic devices.

CO 2	Analyse and design-controlled rectifier, DC to DC converters, DC to AC inverters and SMPS
CO 3	Analyse instrument characteristics and errors.
CO 4	Describe the principle of operation and develop circuits for multi range Ammeters, Voltmeters and Bridges to measure passive component values and frequency.
CO 5	Explain the principle, design and analyse the transducers for measuring physical parameters

Course Name	ELECTRONIC DEVICES AND INSTRUMENTATION LABORATORY
Course Code	18ECL37
CO 1	Recognize and demonstrate functioning of semiconductor power devices.
CO 2	Evaluate the characteristics, switching, power conversion and control by semiconductor power devices.
CO 3	Analyse the response and plot the characteristics of transducers such as LDR, Photo diode, etc.
CO 4	Design and test simple electronic circuits for measurement of temperature and resistance
CO 5	Use circuit simulation software for the implementation and characterization of electronic circuits and devices.

Course Name	DIGITAL SYSTEM DESIGN LABORATORY
Course Code	18ECL38
CO 1	Design, realize and verify De Morgan's Theorem, SOP, POS forms
CO 2	Demonstrate the truth table of various expressions and combinational circuits using logic gates
CO 3	Design various combinational circuits such as adders, subtractors, comparators, multiplexers and demultiplexers
CO 4	Construct flips-flops, counters and shift registers.
CO 5	Simulate Serial adder and Binary Multiplier.

Course Name	Adlitha Kannada

Course Name	Vyavaharika Kannada
Course Code	18KVK28/39/49

Course Name	CONSTITUTION OF INDIA, PROFESSIONAL ETHICS AND CYBER LAW (CPC)
Course Code	18CPC39/49
CO 1	Describe and analyze the role and salient features of the Indian Constitution
CO 2	Understand the structure and powers of the Union and State Executives.
CO 3	Relate to the procedures and provisions in the electoral process
CO 4	Develop Engineering and Professional ethics and adopt the responsibilities expected of an Engineer
CO 5	Identify the cybercrimes and describe the cyber laws for cyber safety measures

Course Name	ADDITIONAL MATHEMATICS-I
Course Code	18MATDIP31

CO 1	Apply concepts of complex numbers and vector algebra to analyze the problems arising in related area.
CO 2	Use derivatives and partial derivatives to calculate rate of change of multivariate functions
CO 3	Analyze position, velocity and acceleration in two and three dimensions of vector valued functions.
CO 4	Learn techniques of integration including the evaluation of double and triple integrals.
CO 5	Identify and solve first order ordinary differential equations.

Course Name	COMPLEX ANALYSIS, PROBABILITY AND STATISTICAL METHODS
Course Code	18MAT41
CO 1	Use the concepts of analytic function and complex potentials to solve the problems arising in electromagnetic field theory.
CO 2	Utilize conformal transformation and complex integral arising in Aerofoil theory, fluid flow visualization and image processing.
CO 3	Apply discrete and continuous probability distributions in analyzing the probability models arising in engineering field
CO 4	Make use of the correlation and regression analysis to fit a suitable mathematical model for the statistical data.
CO 5	Construct joint probability distributions and demonstrate the validity of testing the hypothesis.

Course Name	ANALOG CIRCUITS
Course Code	18EC42
CO 1	Understand the characteristics of BJTs and FETs.
CO 2	Design and analyze BIT and FET amplifier circuits.
CO 3	Design sinusoidal and non-sinusoidal oscillators
CO 4	Understand the functioning of linear Cs.
CO 5	Design of Linear IC based circuits.

Course Name	CONTROL SYSTEMS
Course Code	18EC43
CO 1	Develop the mathematical model of mechanical and electrical systems.
CO 2	Develop transfer function for a given control system using block diagram reduction techniques and signal flow graph method.
CO 3	Determine the time domain specifications for first and second order systems.
CO 4	Determine the stability of a system in the time domain using Routh Hurwitz criterion and Root-locus technique.
CO 5	Determine the stability of a system in the frequency domain using Nyquist and bode plots.

Course Name	ENGINEERING STATISTICS and LINEAR ALGEBRA
Course Code	18EC44
CO 1	Analyse and evaluate single and multiple random variables.
CO 2	Identify and associate Random Variables and Random Processes in Communication events
CO 3	Analyze and model the Random events in typical communication events to extract quantitative statistical parameters.
CO 4	Analyze and model typical signal sets in terms of a basis function set of Amplitude, phase and frequency
CO 5	Demonstrate by way of simulation or emulation the ease of analysis employing basis functions, statistical representation and Eigenvalues.

Course Name	SIGNALS AND SYSTEMS
Course Code	18EC45
CO 1	Analyse the different types of signals and systems.

CO 2	Determine the linearity, causality, time-invariance and stability properties of continuous and discrete time systems.
CO 3	Evaluate the convolution sum and integral.
CO 4	Represent continuous and discrete signals & systems in frequency domain using Fourier representations.
CO 5	Analyse discrete time signals and systems using Z-transforms.

Course Name	MICROCONTROLLER
Course Code	18EC46
CO 1	Explain the difference between Microprocessors & Microcontrollers, Architecture of 805l Microcontroller, Interfacing of 8051 to external memory and Instruction set of 8051
CO 2	Write 8051 Assembly level programs using the 8051instruction set.
CO 3	Explain the Interrupt system, operation of Timers/Counters and Serial port of 8051.
CO 4	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.
CO 5	Interface simple switches, simple LEDs, ADC 0804, LCD and Stepper Motor to 8051 using 8051 I/O ports

Course Name	MICROCONTROLLER LABORATORY
Course Code	18ECL47
CO 1	Enhance programming skills using Assembly language and C.
CO 2	Write Assembly language programs in 8051 for solving simple problems that manipulate input data using different instructions of 8051.
CO 3	Interface different input and output devices to 8051 and control them using Assembly language programs.
CO 4	Interface the serial devices to 8051 and do the serial transfer using C programming.
CO 5	Develop applications based on Microcontroller 8051.

Course Name	ANALOG CIRCUITS LABORATORY
Course Code	18ECL48
CO 1	Analyze Frequency response of JFET/MOSFET amplifier.
CO 2	Design BJT/FETs amplifier with and without feedback and evaluate their performance characteristics
CO 3	Apply the knowledge gained in the design of BJT/FET circuits in Oscillators
CO 4	Design analog circuits using OPAMPs for different applications.
CO 5	Simulate and analyze analog circuits that use ICs for different electronic applications.

Course Name	ADDIDONALMATHEMATICS-11
Course Code	18MATDIP41
CO 1	Solve systems of linear equations using matrix algebra.
CO 2	Apply the knowledge of numerical methods in modelling and solving engineering problems.
CO 3	Make use of analytical methods to solve higher order differential equations
CO 4	Classify partial differential equations and solve them by exact methods
CO 5	Apply elementary probability theory and solve related problems.

Course Name	TECHNOLOGICAL INNOVATION MANAGEMENT AND ENTREPRENEURSHIP
Course Code	18ES51
CO 1	Understand the fundamental concepts of Management and Entrepreneurship and opportunities in order to set up a business
CO 2	Identify the various organizations' architecture
CO 3	Describe the functions of Managers, Entrepreneurs and their social responsibilities

CO 4	Understand the components in developing a business plan
CO 5	Recognize the various sources of funding and institutions supporting entrepreneurs

Course Name	DIGITAL SIGNAL PROCESSING
Course Code	18EC52
CO 1	Determine response of LTI systems using time domain and DFT techniques.
CO 2	Compute DFT of real and complex discrete time signals.
CO 3	Compute DFT using FFT algorithms and linear filtering approach.
CO 4	Design and realize FIR and IIR digital filters.
CO 5	Understand the DSP processor architecture.

Course Name	PRINCIPLES OF COMMUNICATION SYSTEMS
Course Code	18EC53
CO 1	Analyze and compute performance of AM and FM modulation in the presence of noise at the receiver.
CO 2	Analyze and compute performance of digital formatting processes with quantization noise
CO 3	Multiplex digitally formatted signals at Transmitter.
CO 4	Demultiplex the signals and reconstruct digitally formatted signals at the receiver.
CO 5	Design /Demonstrate the use of digital formatting in Multiplexers, Vocoders and Video transmission.

Course Name	INFORMATION THEORY and CODING
Course Code	18EC54
CO 1	Explain concept of Dependent & Independent Source, measure of information, Entropy, Rate of information and Order of source
CO 2	Represent the information using Shannon Encoding, Shannon Fano, Prefix and Huffman Encoding Algorithms
CO 3	Model the continuous and discrete communication channels using input, output and joint probabilities
CO 4	Determine a codeword comprising of the check bits computed using Linear Block codes, cyclic codes & convolutional codes
CO 5	Design the encoding and decoding circuits for Linear Block codes, cyclic codes, convolutional codes, BCH and Golay codes.

Course Name	ELECTROMAGNETIC WAVES
Course Code	18EC55
CO 1	Evaluate problems on electrostatic force, electric field due to point, linear, volume charges by applying conventional methods and charge in a volume.
CO 2	Apply Gauss law to evaluate Electric fields due to different charge distributions and Volume Charge distribution by using Divergence Theorem.
CO 3	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

| CO 4 | Calculate magnetic force, potential energy and Magnetization with respect to magnetic materials and voltage induced in electric circuits. |
| CO 5 | 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 Name	Verilog HDL
Course Code	18EC56
CO 1	Write Verilog programs in gate, dataflow (RTL), behavioural and switch modelling levels of Abstraction.
CO 2	Design and verify the functionality of digital circuit/system using test benches.
CO 3	Identify the suitable Abstraction level for a particular digital design.
CO 4	Write the programs more effectively using Verilog tasks, functions and directives.
CO 5	Perform timing and delay Simulation and Interpret the various constructs in logic synthesis.

Course Name	DIGITAL SIGNAL PROCESSING LABORATORY
Course Code	18ECL57
CO 1	Understand the concepts of analog to digital conversion of signals and frequency domain sampling of signals.
CO 2	Model the discrete time signals and systems and verify its properties and results.
CO 3	Implement discrete computations using a DSP processor and verify the results.
CO 4	Realize the digital filters using a simulation tool and analyze the response of the filter for an audio signal.
CO 5	Write programs using Matlab *I* Scilab/Octave to illustrate DSP concepts.

Course Name	HDL Laboratory
Course Code	18ECL58
CO 1	Write the Verilog/VHDL programs to simulate Combinational circuits in Dataflow, Behavioural and Gate level Abstractions.
CO 2	Describe sequential circuits like flip flops and counters in Behavioural description and obtain simulation waveforms.
CO 3	Use FPGA/CPLD kits for downloading Verilog codes and check output.
CO 4	Synthesize Combinational and Sequential circuits on programmable ICs and test the hardware.
CO 5	Interface the hardware to the programmable chips and obtain the required output

Course Name	ENVIRONMENTAL STUDIES
Course Code	18CIV59
CO 1	Understand the principles of ecology and environmental issues that apply to air, land, and water issues on a global scale.
CO 2	Develop critical thinking and/or observation skills, and apply them to the analysis of a problem or question related to the environment
CO 3	Demonstrate ecology knowledge of a complex relationship between biotic and biotic components.

CO 4	Apply their ecological knowledge to illustrate and graph a problem and describe the realities that managers face when dealing with complex issues.
CO 5	Relate to the latest Developments in Environmental Pollution Mitigation Tools.

Course Name	DIGITAL COMMUNICATION
Course Code	18EC61
CO 1	Associate and apply the concepts of Bandpass sampling towel specified signals and channels.
CO 2	Analyze and compute performance parameters and transfer rates for low pass and bandpass symbol under ideal and corrupted non band limited channels
CO 3	Test and validate symbol processing and performance parameters at the receiver under ideal and corrupted bandlimited channels.
CO 4	Demonstrate that bandpass signals subjected to corruption and distortion in a bandlimited channel can be processed at the receiver to meet specified performance criteria.
CO 5	Understand the principles of spread spectrum communications

Course Name	EMBEDDED SYSTEMS
Course Code	18EC62
CO 1	Describe the architectural features and instructions of 32bit microcontroller ARM CortexM3.
CO 2	Apply the knowledge gained for Programming ARM Cortex M3 for different applications.
CO 3	Understand the basic hardware components and their selection method based on the characteristics and attributes of an embedded system.
CO 4	Develop the hardware software co-design and firmware design approaches.
CO 5	Explain the need of real time operating system for embedded system applications

Course Name	MICROWAVE and ANTENNAS
Course Code	18EC63
CO 1	Describe the use and advantages of microwave transmission
CO 2	Analyze various parameters related to microwave transmission lines and waveguides
CO 3	Identify microwave devices for several applications
CO 4	Analyze various antenna parameters necessary for building a RF system
CO 5	Recommend various antenna configurations according to the applications

Course Name	OPERATING SYSTEM
Course Code	18EC641
CO 1	Explain the goals, structure, operation and types of operating systems.
CO 2	Apply scheduling techniques to find performance factors.
CO 3	Explain organization of file systems and roles.
CO 4	Apply suitable techniques for contiguous and non-contiguous memory allocation
CO 5	Describe message passing, deadlock detection and prevention methods.

Course Name	PROGRAMMING IN JAVA
Course Code	18CS653
CO 1	Explain the object-oriented concepts and JAV
CO 2	Develop computer programs to solve real world problems in Java
CO 3	Develop simple GUI interfaces for a computer program to interact with users

Course Name	EMBEDDED SYSTEMS LABORATORY
Course Code	18ECL66
CO 1	Understand the instruction set of 32 bit microcontroller ARM Cortex M3, and the software tool required for programming in Assembly and C language.
CO 2	Develop assembly language programs using ARM Cortex M3 for different applications.
CO 3	Interface external devices and *VO* with ARM Cortex M3.
CO 4	Develop C language programs and library functions for embedded system applications.

CO 5	Analyze the functions of various peripherals, peripheral registers and power saving modes of ARM Cortex M3

Course Name	**COMMUNICATION LABORATORY**
Course Code	**18ECL67**
CO 1	Design and test circuits for analog modulation and demodulation schemes viz., AM, FM, etc
CO 2	Determine the characteristics and response of microwave waveguide.
CO 3	Determine characteristics of microstrip antennas and devices & compute the parameters associated with it.
CO 4	Design and test the digital and analog modulation circuits and display the waveforms.
CO 5	Simulate the digital modulation systems and compare the error performance of basic digital modulation schemes.

Course Name	**COMPUTER NETWORKS**
Course Code	**18EC71**
CO 1	Understand the concepts of networking.
CO 2	Describe the various networking architectures.
CO 3	Identify the protocols and services of different layers.
CO 4	Distinguish the basic network configurations and standards associated with each network.
CO 5	Analyze a simple network and measure its parameters

Course Name	**VLSI DESIGN**
Course Code	**18EC72**
CO 1	Demonstrate understanding of MOS transistor theory, CMOS fabrication flow and technology scaling.
CO 2	Draw the basic gates using the stick and layout diagrams with the knowledge of physical design aspects.
CO 3	Demonstrate ability to design Combinational, sequential and dynamic logic circuits as per the requirements
CO 4	Interpret Memory elements along with timing considerations
CO 5	Interpret testing and testability issues in VLSI Design

Course Name	**REAL TIME SYSTEM**
Course Code	**18EC731**
CO 1	Explain the fundamentals of Real time systems and its classifications
CO 2	Understand the concepts of computer control and the suitable computer hardware requirements for real-time applications.
CO 3	Describe the operating system concepts and techniques required for real time systems
CO 4	Develop the software algorithms using suitable languages to meet Real time applications.
CO 5	Apply suitable methodologies to design and develop Real-Time Systems.

Course Name	**CRYPTOGRAPHY**
Course Code	**18EC744**
CO 1	Explain basic cryptographic algorithms to encrypt and decrypt the data.
CO 2	Use symmetric and asymmetric cryptography algorithms to encrypt and decrypt the information.
CO 3	Describe the mathematics associated with cryptography.
CO 4	Apply concepts of modern algebra in cryptography algorithms.
CO 5	Apply pseudo random sequence in stream cipher algorithms.

Course Name	ENVIRONMENTAL PROTECTION AND MANAGEMENT
Course Code	18CV753
CO 1	Appreciate the elements of Corporate Environmental Management systems complying to international environmental management system standards.
CO 2	Lead pollution prevention assessment team and implement waste minimization options
CO 3	Develop, Implement, maintain and Audit Environmental Management systems for Organizations.

Course Name	COMPUTER NETWORKS LAB
Course Code	18ECL76
CO 1	Choose suitable tools to model a network
CO 2	Use the network simulator for learning and practice of networking algorithms
CO 3	Illustrate the operations of network protocols and algorithms using C programming.
CO 4	Simulate the network with different configurations to measure the performance parameters.
CO 5	Implement the data link and routing protocols using C programming

Course Name	VLSI LABORATORY
Course Code	18ECL77
CO 1	Design and simulate combinational and sequential digital circuits using VerilogHDL
CO 2	Understand the Synthesis process of digital circuits using the EDA tool.
CO 3	Perform ASIC design flow and understand the process of synthesis, synthesis constraints and evaluating the synthesis reports to obtain optimum gate level netlist
CO 4	Design and simulate basic CMOS circuits like inverter, common source amplifier and differential amplifiers.
CO 5	Perform RTL-GDSII flow and understand the stages in ASIC design.

Course Name	WIRELESS and CELLULAR COMMUNICATION
Course Code	18EC81
CO 1	Understand the Communication theory both Physical and networking associated with GSM, CDMA& LTE 4G systems.
CO 2	Explain concepts of propagation mechanisms like Reflection, Diffraction, Scattering in wireless channels.
CO 3	Develop a scheme for idle mode, call set up, call progress handling and call tear down in a GSM cellular network.
CO 4	Develop a scheme for idle mode, call set up, call progress handling and call tear down in a CDMA cellular network.
CO 5	Understand the Basic operations of Air interface in a LTE 4G system

Course Name	RADAR ENGINEERING
Course Code	18EC823
CO 1	Describe the radar fundamentals.
CO 2	Analyze the radar signals.
CO 3	Explain the working principle of pulse Doppler radars, their applications and limitations.
CO 4	Describe the working of various radar transmitters and receivers
CO 5	Analyze the range parameters of pulse radar system which affect the sys tem performance