Course Outcomes of Department of Eletronics & Communication Engineering

Course Name	Engineering maths -III
Course Code	15MAT31
CO1	Students are able to solve higher order linear differential equations and apply Knowledge to modeling and analyzing mass spring systems
CO2	Students are Apply Laplace transform and Fourier transform techniques to solve differential equations involved in Vibration theory, Heat transfer and related engineering applications.
CO3	Students are capable to use statistical methods like correlation, regression analysis in analyzing, interpreting experimental data and probability theory in testing and quality control.
CO4	Students solve vector differentiation and integration, analyze the vector fields and apply to fluid flow problems.
CO5	Students Solve various partial differential equations such as wave equation, one and two dimensional heat flow equations.
Course Name	ANALOG ELECTRONICS
Course Code	15EC32
CO1	Explain the working principle and characteristics of BJT, FET, Single stage, cascaded and feedback amplifiers.
CO2	Distinguish the Phase shift, Wien bridge, tuned and crystal Oscillators using BJT/FET/UJT.
CO3	Solve for the AC gain and impedance for BJT using r_e and h Parameters models for CE and CC configuration.
CO4	Identify the performance characteristics and parameters of BJT and FET amplifier using small signal model.
CO5	Determine parameters which affect low frequency and high frequency responses of BJT and FET amplifiers. Compare efficiency of Class A and Class B power amplifiers and voltage regulators.
Course Name	DIGITAL ELECTRONICS
Course Code	15EC33
CO1	Apply Boolean algebra and Karnaugh Map to analyze combinational digital circuits.
CO2	Apply Quine Mc-Cluskey technique for minimization of Boolean expression to get minimal SOP and POS Forms.
CO3	Analyze and design combinational digital electronic circuits to meet the given Specifications/Constraints.
CO4	Understand the working of the basic components used inSequential circuits and hence design Sequential circuit.
CO5	Analyze and develop state diagram, state table, state equation for Mealy and Moore Finite state machine.
Course Name	Network Analysis
Course Code	15EC34
CO1	Make use of source transformation, source shifting, mesh, nodal analysis and reduce given network using star-delta transformation, source transformation and source shifting to find voltage and current of the electrical circuit.
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	Make use of Laplace transform to calculate current and voltages for the given circuit under transient conditions.
CO4	Identify parameters like resonant frequency, quality factor, half power frequencies, voltage across inductor and capacitor, current through the RLC elements, in resonant circuits.
CO5	Solve the given network using specified two port network parameter like Z or Y or T or H.
Course Name	ELECTRONIC INSTRUMENTATION

Course Code	15EC35
CO1	Describe instrument measurement errors and calculate them.
CO2	Describe the operation of Ammeters, Voltmeters, Multimeters and develop circuits for multirange Ammeters and Voltmeters.
CO3	Describe functional concepts and operation of Digital voltmeters and instruments to measure voltage, frequency, time period, phase difference of signals, rotationspeed, capacitance and pH of solutions.
CO4	Describe functional concepts and operation of various Analog measuring instruments to measure output power, field Strength, impedance, stroboscopic speed, in/out of phase, Q of coils, insulation resistance and pH.
CO5	Describe and discuss functioning and types of Oscilloscopes, Signal generators and Transducers.
Course Name	Engineering Electromagnetics
Course Code	15EC36
CO1	Interpret the problems on electric field due to point, linear, volume charges by applying conventional methods or by Gauss law.
CO2	Analyze potential and energy with respect to point charge and capacitance using Laplace equation.
CO3	Calculate magnetic field, force, and potential energy with respect to magnetic materials.
CO4	Apply Maxwell's equation for time varying fields, EM waves in free space and conductors.
CO5	Evaluate power associated with EM waves using Poynting theorem.
Course Name	Analog Electronics Lab
Course Code	15ECL37
CO1	Inspect the circuits of rectifiers, clipping circuits, clamping circuits and voltage regulators.
CO2	Conclude the characteristics of BJT and FET amplifiers and plot its frequency response.
CO3	Estimate the performance parameters of amplifiers and voltage regulators.
CO4	Model the BJT/FET amplifiers, BJT Power amplifier.
CO5	Examine the performance characteristics of oscillators.
Course Name	Digital Electronics Lab
Course Code	15ECL38
CO1	Determine the truth table of various expressions and combinational circuits using logic gates.
CO2	Design and test various combinational circuits such as adders, subtractors, comparators, multiplexers.
CO3	Simplify Boolean expression using decoders.
CO4	Assess and test flips-flops, counters and shift registers
CO5	Build full adder and up/down counters
Course Name	ENGG. MATHEMATICS – IV
Course Code	15MAT41
CO1	Apply Numerical methods to obtain the solution of fist order and first degree differential equations.
CO2	Make use of probability theory on discrete and continuous random variables to obtain the solution of problems on different distributions and joint probability distribution.
CO3	Identify the problems on sampling distribution and on markov chains in attempting the engineering problems for feasible random events.
CO4	Utilize the Bessel's and Legendre functions for the problems arising in engineering fields.

CO5	Construct the analytic functions. Calculate residues and poles of complex potentials in flow problems.
Course Name	MICROPROCESSORS
Course Code	15EC42
CO1	Identifythe different CPU architectures,8086 Microprocessor architecture and addressing modes of 8086.
CO2	Make use of the instruction set, addressing modes and directives of 8086 to develop assembly language programs.
CO3	Make use of the interrupts and subprogramsdevelop modular programs.
CO4	Model the static RAM, 7segment display and keyboard using PIO 8255 with 8086.
CO5	Model the ADC-0808, DAC-0800 and stepper motor using PIO 8255 with 8086. Identify the architecture of 8088 and 8087, modes of 8254 Timer.
Course Name	CONTROL SYSTEMS
Course Code	15EC43
CO1	Develop the mathematical model of mechanical and electrical systems.
CO2	Explain time domain specifications for first and second order sytems
CO3	Identify the stability of the systems in the time domain using Routh Hurwitz criteria and Root locus technique.
CO4	Apply the concept of stability of a system in the frequency domain using Nyquist and Bode plots
CO5	Model a control system in continous and discrete time using state variable technique.
Course Name	SIGNALS AND SYSTEMS
Course Code	15EC44
CO1	Classify the signals as continuous/discrete, periodic/aperiodic, even /odd, energy/power and deterministic/random signals.
CO2	Identify the linearity, causality, time-invariance and stability properties of continuous and discrete time systems.
CO3	Solve the response of a Continuous and Discrete LTI system using convolution integral and convolution sum.
CO4	Solve the spectral characteristics of continuous and discrete time signal using Fourier analysis.
CO5	Solve Z-transforms, inverse Z-transforms and transfer functions of complex LTI systems.
Course Name	PRINCIPLES OF COMMUNICATION SYSTEMS
Course Code	15EC45
At the end of this course, the student will be able to:	
CO1	Apply the time and frequency domain knowledge for the generation and demodulation of amplitude modulated signals.
CO2	Identify the performance of different generation and detection methodologies of AM, FM and multiplexing.
CO3	Utilize analog signals in time domain as random processes and identify the types of basic Noise
CO4	Identify the influence of noise in receivers of analog modulated signals
CO5	Compare the characteristics of pulse modulation techniques
Course Name	LINEAR INTEGRATED CIRCUITS
Course Code	15EC46
CO1	Identify Op-amp circuit and parameters including CMRR, PSRR, Input & Output Impedances and Slew Rate.
CO2	Construct Op-amp based AC Amplifiers including Voltage Follower, Inverting / Non-inverting & Difference Amplifier and Develop circuits for Op-amp based Voltage / Current Sources & Sinks, Current, Instrumentation and Precision Amplifiers.

CO3	Develop circuits for OpAmp based linearand non-linear circuits comprising of limiting, clamping, Sample & Hold, Differentiator / Integrator Circuits, Peak Detectors ,Oscillators and Multiplier & Divider.
CO4	Make use of first & Second Order Low Pass, High Pass, Band Pass, Band Stop Filters andVoltage Regulators.
CO5	Illustrate applications of linear ICs in phase detector, VCO, DAC, ADC and Timer.
Course Name	MICROPROCESSOR LAB
Course Code	15ECL47
CO1	Develop an Assembly Language Program (ALP)to perform data transfer arithmetic and logical applicationsusing 8086 Microprocessor
CO2	Develop Assembly Language Program to perform bit manipulation operation.
CO3	Utilize procedures and macros for modular programming and develop ALPusing assembler directives, DOS Interrupts, branch and loop operations.
CO4	Develop Assembly Language Program to perform string operation.
CO5	Develop ALPs to interface 8086 microprocessor to various peripherals for simple applications.
Course Name	Linear ICs& Communication Lab
Course Code	15ECL48
CO1	Inspect the basic analog systems for a given specification using the basic building blocks and ICs.
CO2	Examine the performance of instrumentation amplifier, LPF, HPF, DAC and oscillators using linear IC.
CO3	Analyze with Linear ICs for applications like addition, integration, differentiation and 555 timer operations to generate pulses.
CO4	Test for pulse and flat top sampling techniques.
CO5	Determine the percentage of modulation for AM and FM Techniques, and use PLL to synthesize the Frequency.
Course Name	MANAGEMENT AND ENTREPRENEURSHIP DEVELOPMENT
Course Code	15ES51
CO1	Understand the fundamental concepts of Management and Entrepreneurship.
CO2	Select a best Entrepreneurship model for the required domain of establishment.
CO3	Explain the functions of Managers, Entrepreneurs and their social responsibilities.
CO4	Compare various types of Entrepreneurs
CO5	Survey the Institutional support by various state and central government agencies
Course Name	Digital signal processing
Course Code	15EC52
CO1	Understand the frequency domain sampling and reconstruction of discrete time signals.
CO2	Make use of the properties and develop efficient algorithms for the computation of DFT.
CO3	Construct FIR and IIR filters in different structural forms.
CO4	Utilize the procedures to design IIR filters from the analog filters using impulse invariance and bilinear transformation.
CO5	Identify the different windows used in the design of FIR filters and design appropriate filters based on the specifications.
Course Name	VERILOG HDL
Course Code	15EC53

CO1	Write Verilog programs in gate, dataflow (RTL), behavioral and switch modeling levels of Abstraction& simple programs in VHDL in different styles.
CO2	Identify the suitable Abstraction level for a particular digital design. ·
CO3	Build the programs more effectively using Verilog tasks and directives.
CO4	Take part in timing and delay Simulation
CO5	Design and verify the functionality of digital circuit/system using test benches.
Course Name	Information Theory & Coding
Course Code	15EC54
CO1	Explain concept of dependent & independent source, measure of information, entropy, rate of information and order of a source.
CO2	Construct 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	Develop a codeword comprising of the check bits computed using Linear Block codes, cyclic codes & convolution codes
CO5	Examine the encoding and decoding circuits for Linear Block codes, cyclic codes, convolution codes, BCH and Golay codes.
Course Name	OPERATING SYSTEMS
Course Code	15EC553
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 Name	Object Oriented Programming Using C++
Course Code	15EC562
CO1	Understand Encapsulation, Inheritance and Polymorphism.
CO2	Utilize Object Oriented approach to solve problems
CO3	Examine problem statements and build object oriented models to solve the problems after analysing the objects that constitute the system.
CO4	Demonstrate function overloading, operator overloading and virtual functions.
CO5	Identify advantages of object oriented programming over procedure oriented programming.
Course Name	DSP Lab
Course Code	15ECL57
CO1	Experiment with concepts of analog to digital conversion of signals and frequency domain sampling of signals.
CO2	Experiment with Linear and circular convolution of two given sequences, Commutative, distributive and associative property of convolution.
CO3	Modelling of discrete time signals and systems and verification of its properties and results.
CO4	Experiment with FIR,IIR filters to meet the given specification.
CO5	Evaluatefor discrete computations using DSP processor and verify the results.

Course Name	HDL Lab
Course Code	15ECL58
CO1	Develop and Write the Verilog/VHDL programs to simulate Combinational circuits in Dataflow, Behavioral and Gate level Abstractions
CO2	Develop and Describe sequential circuits like flip flops and counters in Behavioral description and obtain simulation waveforms
CO3	Develop andSynthesize Combinational and Sequential circuits on programmable ICs and test the hardware
CO4	Develop and Interface the hardware to the programmable chips and obtain the required output
CO5	Develop HARDWARE DESCREPTIVE PROGRAMMES USING Verilog or VHDL for a given Abstraction level
Course Name	Digital Communication
Course Code	15EC61
CO1	Apply the concepts of Bandpass sampling to well specified signals and channels.
CO2	Identify the performance parameters and transfer rates for low pass and bandpass symbol under ideal and corrupted non band limited channels.
CO3	Utilize the valid symbol processing and performance parameters at the Receiver under ideal and corrupted bandlimited channels.
CO4	Apply the band pass signals subjected to corrupted and distorted symbols in a band limited channel, can be demodulated and estimated at receiver to meet specified performance criteria.
CO5	Identify the need for data security using spread spectrum technique.
Course Name	ARM Microcontroller & Embedded systems
Course Code	15EC62
CO1	Explain the architectural features and instructions of 32 bit microcontroller ARM Cortex M3.
CO2	CMake use of the knowledge gained for Programming ARM Cortex M3 for different applications.
CO3	summarize 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 Name	VLSI Design
Course Code	15EC63
CO1	interpret and understand of MOS transistor theory, CMOS fabrication flow and technology scaling.
CO2	Make use of the basic gates using the stick and layout diagrams with the knowledge of physical design aspects.
CO3	identify and understanding the concept of Memory elements along with timing considerations with scaling fundamentals
CO4	experiment with the basic knowledge of FPGA based system design Interpret testing and testability issues in VLSI Design
CO5	Analyze the CMOS subsystems and architectural issues with the design constraints
Course Name	Computer communication Networks
Course Code	15EC64
CO1	Identify the layering architecture of computer networks and distinguish between the OSI reference model and TCP/IP protocol suite.
CO2	Identify the protocols and services of Data link layer

CO3	Identify the basic network configurations and standards associated with each network.
CO4	Model a network scenario and determine the routing of packets using different routing algorithms.
CO5	Identify the protocols and functions associated with the transport layer services.
Course Name	Cellular Mobile Communication
Course Code	15EC651
CO1	Illustrate the statistical characterization of urban mobile channels to compute the performance for simple modulation schemes.
CO2	Compare the limitations of GSM, GPRS and CDMA to meet high data rate requirements and limited improvements that are needed
CO3	Explain the call process procedure between a calling number and called number for all scenarios in GSM or CDMA based systems
CO4	Outline and validate voice and data call handling for various scenarios in GSM and CDMA systems for national and international interworking situations
CO5	Explain voice and data call handling for various scenarios CDMA systems for national and international interworking situations
Course Name	DIGITAL SWITCHING SYSTEMS(Professional Elective)
Course Code	15EC654
CO1	Identify the basic concepts and parameters of telecommunication networks and services.
CO2	Identify the evolution of switching system, its architecture and operation.
CO3	Model the traffic flow in lost call systems and queuing systems.
CO4	Organize the digital switching software architecture for various levels of control.
CO5	Outline the software aspects of switching systems and its maintenance.
Course Name	POWER ELECTRONICS(Open Elevtive-2)
Course Code	15EC662
CO1	Identify the characteristics of different power semiconductor devices and their applications.
CO2	Utilize the characteristics of SCR for the construction of commutation and gate triggering circuits.
CO3	Make use of the knowledge of power devices to construct different AC voltage controller and converter circuits.
CO4	Identify the classification, operation of converters and its applications.
CO5	Utilize the principle of operation and performance parameters for construction of various inverters.
Course Name	DIGITAL SYSTEM DESIGN USING VERILOG (Open Elevtive-2)
Course Code	15EC663
CO1	Construct the combinational circuits, using discrete gates and programmable logic devices.
CO2	Design a semiconductor memory for specific chip design.
CO3	Design embedded systems using small microcontrollers, larger CPUs/DSPs, or hard or soft processor cores.
CO4	Construct different types of processor and I/O controllers that are used in embedded system.
CO5	Develop Verilog model for sequential circuits and test pattern generation.
Course Name	Embedded controller Lab
Course Code	15ECL67
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	CDevelop assembly language programs using ARM Cortex M3 for different applications
CO3	Develop C language programs to interface external devices and I/O with ARM Cortex M3.
CO4	Develop C language programs for embedded system applications.
CO5	Develop C language programs which makes use of library functions for embedded system applications.
Course Name	Computer Networks Lab
Course Code	15ECL68
CO1	Illustrate the operations of network protocols and algorithms using C programming.
CO2	Utilize the network simulator for learning and practice of networking algorithms.
CO3	Built the network with different configurations to measure the performance parameters.
CO4	Develop the data link and routing protocols using C programming.
CO5	Develop wired and wireless LAN protocol using network simulator
Course Name	Computer communication Networks
Course Code	10EC71
CO1	Illustrate the basic terminology of network and data communication system.
CO2	Experiment with different topologies and protocols of a computer network and assist in networking design and implementation.
CO3	Analyze the features of various application layer protocols by understanding the IP addressing to fulfill network requirements.
CO4	Construct a network model and determine the routing of packets using different routing algorithms.
CO5	Identify the functions of each layers of the OSI model and TCP/IP Model
Course Name	Optical Fiber Communication
Course Code	10EC72
CO1	Apply the propagation of light in waveguide, recognize and categorize Optical fiber structures.
CO2	Build knowledge on the channel impairments like losses, dispersion along with various coupling losses and noise performance of the system.
CO3	Choose Optical sources, detectors, other components in optical fiber link and their different construction methods.
CO4	Make use of calculations of fiber optic systems, wave division multiplexing (WDM) concepts and gain the importance of the same.
CO5	Identify the different applications of optical amplifiers and learn the variety of networking aspects, FDDI, SONET/SDH.
Course Name	Power Electronics
Course Code	10EC73
CO1	Interpret the basic operation of various power semiconductor devices used in modern industries as switching devices.
CO2	Develop the various Power converter circuits.
CO3	Build different firing circuitsused for different types of power converters.
CO4	Make use of commutation circuits used for different power electronic circuit applications.
CO5	Construct and implement inverter circuits used for different applications.
Course Name	Embedded System Design
Course Code	10EC74

CO1	Interpret the meaning of Embedded system and also to understand how the hardware is built.
CO2	Utilization of memory in building the embedded system.
CO3	Development of embedded system.
CO4	Utililse the operating system in building the embedded system .
CO5	Apply the knowledge acquired to measure the performance of Embedded system build and also its optimization.
Course Name	DSP Algorithms & Architecture(Elective 2- Group B)
Course Code	10EC751
CO1	Apply the fundamental principles of digital signal processing techniques, sampling theorem, architectural features of DSP devices and identifying various building blocks of programmable digital signal processor to achieve speed.
CO2	Identify architecture, software, and hardware features of TMS320C54xx processor. Acquire knowledge about various addressing modes of DSP TMS320C54XX and are able to program DSP processor.
CO3	Build the Q-notation to develop assembly level programming with an example. FIR and IIR filters on TMS320C54xx.
CO4	Model the implementation of interpolation and decimation on TMS320C54xx.
CO5	Examine the FFT and DFT computation in developing a TMS320C54xx assembly code to find DFT of a sequence
Course Name	Applied Embeded Systems Design(Elective -II (Group B)
Course Code	10EC755
CO1	Understand the techniques that are required to design an embedded system and have proficiency in both hardware and software.
CO2	Construct an embedded system around a microprocessor or DSP or microcontroller.
CO3	Understand networking of embedded systems , concepts of devices and communication buses for device network.
CO4	Understand the device drivers and interrupt servicing mechanism.
CO5	Identify architectural and implementation decisions that influence performance and power dissipation and produce efficient code for embedded systems.
Course Name	Image processing (Elective-III Group C)
Course Code	10EC763
CO1	understand the fundamentals of Digital Image processing.
CO2	make use of the concepts of Image sensing & acquisition using various sensors and its applications.
CO3	make use of different mathematical for Image Transformations.
CO4	Applying various techniques for image enhancement, restoration/degradation, compression and segmentation in different domains for greyscale images.
CO5	Applying various techniques for image enhancement, restoration/degradation, compression and segmentation in different domains for color Images.
Course Name	VLSI Lab
Course Code	15ECL77
CO1	Experiment with various digital circuits by simulating using Verilog Test bench
CO2	Built and simulate basic CMOS circuits like inverter, common source amplifier and differential amplifiers.

CO3	Make use of transistors to design gates and further using gates realize shift registers and adders to meet desired parameters.
CO4	Make use of basic amplifiers and further design higher level circuits like operational amplifier and analog/digital converters to meet desired parameters.
CO5	Interpret concepts of DC Analysis, AC Analysis and Transient Analysis in analog circuits.
Course Name	Power Electronics Lab
Course Code	10ECL78
CO1	Make use of high Power to understand various type of power semiconductor devices.
CO2	Model the firing circuits using power semiconductor devices
CO3	Make use of firing circuits model to analyze different types of power converters.
CO4	Make use of power converter to realize the working of DC and AC motors drives
CO5	Select the suitable Power Converter and Firing Ciricuits using Pspice software.
Course Name	wireless communication
Course Code	10EC81
CO1	To understand the concept of wireless communication system through different generations
CO2	Able to select and study cellular system components , its identification and fundamentals
CO3	Identifying various accessing schemes and gain knowledge on GSM architecture and operations
CO4	Make use of CDMA , TDMA technology in utilizing the various accessing schemes
CO5	Apply the basic knowledge in solving the path loss model and coding techniques
Course Name	DIGITAL SWITCHING SYSTEMS
Course Code	10EC82
CO1	Identify the basic concepts and parameters of telecommunication networks and services.
CO2	Identify the evolution of switching system, its architecture and operation.
CO3	Model the traffic flow in lost call systems and queuing systems.
CO4	Organize the digital switching software architecture for various levels of control.
CO5	Identify the software aspects of switching systems and its maintenance.
Course Name	GSM
Course Code	10EC843
CO1	Identify the need for network security and understand the conventional encryption
CO2	Plan to learn Public-key encryption and Hash Functions used in cryptography
CO3	Make use of Digital signature for providing the authentication in network security
CO4	Apply the different methods for intrusion detection and relate the techniques for data protection
CO5	Choose the OSI model used in network security and identify the effect of virus and show the use of firewalls in networks
Course Name	Network Security
Course Code	10EC832

CO1	Explain the need of mobile communication,architectural features, radio link capability and use of smart antennas in cellular communication of GSM.
CO2	Relate the need of speech coding and different services available in GSM.
CO3	Identify the data services, Handover in GSM, process of authorization and authentication in cellular communication.
CO4	Identify process of authorization and authentication in cellular Communication.
CO5	Apply need for planning in mobile technology and the drawbacks of GSM yielding to future scope.