ELECTRONICS AND COMMUNICATION ENGINEERING 2018 Scheme	
Course Code	**18ELN14/24 - BASIC ELECTRONICS**
CO1	Describe the operation of diodes, BJT, FET and operational amplifiers
CO2	Design and explain the construction of rectifiers, regulators, amplifiers and oscillators.
CO3	Describe general operating principles of SCRs and its application.
CO4	Explain the working and design of fixed voltage regulator using 7805 and Astable oscillator using timer IC 555.
CO5	Explain the different number system and their conversions and construct simple combinational and sequential logic circuits using Flip-Flops
CO6	Describe the basic principle of operation of communication system and mobile phones.
Course Code	**18EC32 - NETWORK THEORY**
CO1	Determine currents and voltages using source transformation/ source shifting/ mesh/ nodal analysis and reduce given network using star-delta transformation/ source transformation/ source shifting.
CO2	Solve network problems by applying Superposition/ Reciprocity/ Thevenin‘s/ Norton‘s/ Maximum Power Transfer/ Millman‘s Network Theorems and electrical laws to reduce circuit complexities and to arrive at feasible solutions.
CO3	Calculate current and voltages for the given circuit under transient conditions and apply Laplace transform to solve the given network.
CO4	Solve the given network using specified two port network parameter like Z or Y or T or h.
CO5	Understand the concept of resonance and determine the parameters that characterize series/parallel resonant circuits.
Course Code	**18EC33 - ELECTRONIC DEVICES**
CO1	Understand the principles of semiconductor Physics
CO2	Understand the principles and characteristics of different types of semiconductor devices
CO3	Understand the fabrication process of semiconductor devices
CO4	Utilize the mathematical models of semiconductor junctions and MOS transistors for circuits and systems
CO5	Identify the mathematical models of MOS transistors for circuits and systems.
Course Code	**18EC34 - DIGITAL SYSTEM DESIGN**
CO1	Explain the concept of combinational and sequential logic circuits
CO2	Analyze and design the combinational logic circuits.
CO3	Describe and characterize flip-flops and its applications.
CO4	Design the sequential circuits using SR, JK, D, T flip-flops and Mealy & Moore machines
CO5	Design applications of combinational & Sequential circuits
Course Code	**18EC35 - COMPUTER ORGANIZATION AND ARCHITECTURE**
CO1	Explain the basic organization of a computer system
CO2	Describe the addressing modes, instruction formats and program control statement.
CO3	Explain different ways of accessing an input / output device including interrupts

CO4	Illustrate the organization of different types of semiconductor and other secondary storage memories
CO5	Illustrate simple processor organization based on hardwired control and micro programmed control
Course Code	**18EC36 - POWER ELECTRONICS AND INSTRUMENTATION**
CO1	Build and test circuits using power electronic devices
CO2	Analyze and design controlled rectifier, DC to DC converters, DC to AC inverters and SMPS
CO3	Analyze instrument characteristics and errors.
CO4	Describe the principle of operation and develop circuits for multirange ammeters, voltmeters and bridges to measure passive component values and frequency.
CO5	Explain the principle, design and analyze the transducers for measuring physical parameters,
Course Code	**18ECL37 - ELECTRONIC DEVICES AND INSTRUMENTATION LABORATORY**
CO1	Recognize and demonstrate functioning of semiconductor power devices.
CO2	Evaluate the characteristics, switching, power conversion and control by semiconductor power devices.
CO3	Analyze the response and plot the chracteristics of transducers such as LDR, Photo Diode, etc.
CO4	Design and test simple electronic circuits for measurement of temperature and resistance.
CO5	Use of circuit simulation software are for the implementation and characterization of electronic circuits and devices
Course Code	**18ECL38 - DIGITAL SYSTEM DESIGN LABORATORY**
CO1	Design, realize and verify De Morgan's Theorem, SOP, POS forms.
CO2	Demonstrate the truth table of various expressions and combinational circuits using logic gates.
CO3	Design various combinational circuits such as adders, subtractors, comparators, multiplexers and de-multiplexers
CO4	Construct flips-flops, counters and shift registers.
CO5	Simulate serial adder and binary multiplier
Course Code	**18EC42 - ANALOG CIRCUITS**
CO1	Understand the characteristics of BJTs and FETs
CO2	Design and analyze BJT and FET amplifier circuits
CO3	Design sinusoidal and non sinusoidal oscillators
CO4	Understand the functioning of linear Ics
CO5	Design of linear IC based circuits
Course Code	**18EC43- CONTROL SYSTEMS**
CO1	Develop the mathematical model of mechanical and electrical systems
CO2	Develop transfer function for a given control system using block diagram reduction techniques and signal flow graph method
CO3	Determine time domain specifications for first and second order systems
CO4	Determine the stability of a system in the time domain using Route Harvitz criteria and root locus technique
CO5	Determine the stability of a system in the frequency domain using Nyquist and bode plots

Course Code	18EC44 - ENGINEERING STATISTICS and LINEAR ALGEBRA
CO1	Analyze the evaluate single and multiple random variables.
CO2	Identify and associate random variables and random processes in communication events
CO3	Analyze and model the random events in typical communication events to extract quantitative statistical parameters
CO4	Analyze and model typical signal sets in terms of a basis function set of amplitude, phase and frequency
CO5	Demonstrate by way of simulation or emulation the ease of analysis employing basis functions, statistical representation and eigen values
Course Code	**18EC45 - SIGNALS AND SYSTEMS**
CO1	Analyze the different types of signals and systems
CO2	Determine the linearity, causality, time-invariance and stability properties of continuous and discrete time systems.
CO3	Evaluate the convolution sum and integral.
CO4	Represent continuous and discrete signals & systems in frequency domain using fourier representation.
CO5	Analyze discrete time signals and systems using Z-transforms.
Course Code	**18EC46- MICROCONTROLLER**
CO1	Explain the difference between Microprocessor & Microcontrollers, architectures of 8051 microcontroller, interfacing of 8051 to external memory and instruction set of 8051
CO2	Write 8051 assembly level programs using 8051instruction set
CO3	Explain the interrupt system, operation of timers/counters and serial port of 8051
CO4	Write 8051 assembly languate programs to generate square wave on 8051 i/o port pin using interrupt and c programme to send and receive serial data using 8051 serial port
CO5	Interface simple switches, simple LEDs, ADC 0804, LCD and stepper motor to 8051 using 8051 i/o ports
Course Code	**18ECL47 - MICROCONTROLLER LABORATORY**
CO1	Enhance programming skills using Assembly language and C.
CO2	Write assembly language programs in 8051 for solving simple problems that manipulate input data using different instructions of 8051
CO3	Interface different input and output devices to 8051 and control them using assembly language programs
CO4	Interface the serial devices to 8051 and to the serial transfer using C Programming
CO5	Develop applications based on Microcontroller 8051.
Course Code	**18ECL48 - ANALOG CIRCUITS LABORATORY**
CO1	Analyze frequency response of JFET/MOSFET amplifier.
CO2	Design BJT/FETs amplifier with and without feedback and evaluate their performance characteristics
CO3	Apply the knowledge gained in the design of BJT/FET circuits in oscillators.
CO4	Design analog circuits using OPAMPs for different applications
CO5	Simulate and analyze analog circuits that uses IC s for different electronic applications

Course Code	18ES51 - TECHNOLOGICAL INNOVATION MANAGEMENT AND ENTREPRENEURSHIP
CO1	Understand the fundamental concepts of Management and Entrepreneurship and opportunities in order to setup a business
CO2	Identify the various organizations architecture
CO3	Describe the functions of Managers, Entrepreneurs and their social responsibilities
CO4	Understand the components in developing a business plan
CO5	Recognize the various sources of funding and institutions supporting entrepreneurs
Course Code	**18EC52 - DIGITAL SIGNAL PROCESSING**
CO1	Determine response of LTI systems using time domain and DFT techniques.
CO2	Compute DFT of real and complex discrete time signals.
CO3	Computation DFT using FFT algorithms and linear filtering approach.
CO4	Design and realize FIR and IIR digital filters
CO5	Understand the DSP processor architecture
Course Code	**18EC53 - PRINCIPLES OF COMMUNICATION SYSTEMS**
CO1	Analyze and compute performance of AM and FM modulation in the presence of noise at the receiver
CO2	Analyze and compute performance of digital formatting processes with quantization noise.
CO3	Multiplex digitally formatted signals at transmitter
CO4	De-multiplex the signals and reconstruct digitally formatted signals at the receiver
CO5	Design / Demonstrate the use of digital formatting in Multiplexers, vocoders and video transmission
Course Code	**18EC54 - INFORMATION THEORY AND CODING**
CO1	Explain concept of Dependent & Independent Source, measure of information, Entropy, Rate of Information and Order of a source
CO2	Represent the information using Shannon Encoding, Shannon Fano, Prefix and Huffman Encoding Algorithms
CO3	Model the continuous and discrete communication channels using input, output and joint probabilities
CO4	Determine a codeword comprising of the check bits computed using Linear Block codes, cyclic codes & convolutional codes
CO5	Design the encoding and decoding circuits for Linear Block codes, cyclic codes, convolutional codes, BCH and Golay codes.
Course Code	**18EC55 - ELECTROMAGNETIC WAVES**
CO1	Evaluate problems on electrostatic force, electric field due to point, linear, volume
	charges by applying conventional methods and charge in a volume
CO2	Apply Guass law to evaluate electric fields due to different charge distributions and volume charge distribution by using divergence theorem
CO3	Determine potential and energy with respect to point charge and capacitance using Laplace equation and apply biot savarts and amperes laws for evaluating magnetic field for different current configurations
CO4	Calculate magnetic force, potential energy and magnetization with respect to magnetic materials and voltage induced in electric circuits
CO5	Apply maxwells equation for time varying fields, EM waves in free space and conductors and evaluate power associated with EM waves using poynting theorem

Course Code	18EC56- VERILOG HDL
CO1	Write Verilog programs in gate, dataflow (RTL), behavioral and switch modeling levels of Abstraction.
CO2	Design and verify the functionality of digital circuit/system using test benches.
CO3	Identify the suitable Abstraction level for a particular digital design.
CO4	Write the programs more effectively using Verilog tasks and directives.
CO5	Perform timing and delay Simulation and interpret the various constructs in logic synthesis
Course Code	**18ECL57 - DIGITAL SIGNAL PROCESSING LABORATORY**
CO1	Understand the concepts of analog to digital conversion of signals and frequency domain sampling of signals.
CO2	Modelling of discrete time signals and systems and verification of its properties and results.
CO3	Implementation of discrete computations using DSP processor and verify the results.
CO4	Realize the digital filters using a simulation tool and analyze the response of the filter for an audio signal.
CO5	Write programs using Matlab / Scilab/Octaye to illustrate DSP concepts.
Course Code	**18ECL58 - HDL LABORATORY**
CO1	Write the Verilog/VHDL programs to simulate Combinational circuits in Dataflow, Behavioral and Gate level Abstractions.
CO2	Describe sequential circuits like flip flops and counters in Behavioral description and obtain simulation waveforms. description and obtain simulation waveforms.
CO3	Use FPGA/CPLD kits for down loading verilog codes and check output.
CO4	Synthesize Combinational and Sequential circuits on programmable ICs and test the hardware.
CO5	Interface the hardware to the programmable chips and obtain the required output.
Course Code	**18CIV59 - ENVIRONMENTAL STUDIES**
CO1	Understand the principles of ecology and environmental issues that apply to air, land, and water issues on a globe scale.
CO2	Develop critical thinking and/or observation skills, and apply them to the analysis of a problem or question related to the environment.
CO3	Demonstrate ecology knowledge of a complex relationship between biotic and a biotic components.
CO4	Apply their ecological knowledge to illustrate and graph a problem and describe the realities that managers face when dealing with complex issues.
CO5	Relate to the lates developments in environmental pollution mitigation tools.
Course Code	**18EC61 - DIGITAL COMMUNICATION**
CO1	Associate and apply the concepts of Band pass sampling to well specified signals and channels.
CO2	Analyze and compute performance parameters and transfer rates for low pas and Band pass symbol under ideal and corrupted non band limited channels.
CO3	Test and validate symbol processing and performance parameters at the receiver under ideal and corrupted band limited channels.

CO4	Demonstrate that band pass signals subjected to corruption and distortion in a Band limited channel can be processed at the receiver to meet specified performance criteria
CO5	Understand the principles of spread spectrum communications.
Course Code	**18EC62 -EMBEDDED SYSTEMS**
CO1	Describe the architectural features and instructions of 32 bit microcontroller ARM Cortex M3
CO2	Apply the knowledge gained for Programming ARM Cortex M3 for different applications
CO3	Understand the basic hardware components and their selection method based on the characteristics and attributes of an embedded system
CO4	Develop the hardware /software co-design and firmware design approaches
CO5	Explain the need of real time operating system for embedded system applications
Course Code	**18EC63 – MICROWAVE AND ANTENNAS**
CO1	Describe the use and advantages of microwave transmission
CO2	Analyze various parameters related to microwave transmission lines and waveguides
CO3	Identify microwave devices for several applications
CO4	Analyze various antenna parameters necessary for building an RF system
CO5	Recommend various antenna configurations according to the applications
Course Code	**18EC641 – OPERATING SYSTEM**
CO1	Explain the goals, structure, operation and types of operating systems.
CO2	Apply scheduling techniques to find performance factors.
CO3	Explain organization of file systems and IOCS.
CO4	Apply suitable techniques for contiguous and non-contiguous memory allocation.
CO5	Describe message passing, deadlock detection and prevention methods.
Course Code	**18ECL66 - EMBEDDED SYSTEMS LABORATORY**
CO1	Understand the instruction set of 32 bit microcontroller ARM Cortex M3, and the software tool required for programming in Assembly and C language
CO2	Develop assembly language programs using ARM Cortex M3 for different applications
CO3	Interface external devices and I/O with ARM Cortex M3
CO4	Develop C language programs and library functions for embedded system applications
CO5	Analyze the functions of varous peripherals, peripheral registers and power saving modes of ARM Cortex M3
Course Code	**18ECL67 – COMMUNICATION LABORATORY**
CO1	Design and test circuits for analog modulation and demodulation schemes viz., AM, FM, etc.
CO2	Determine the characteristics and response of microwave waveguide.
CO3	Determine the characteristics of microstrip antennas and devices and compute the parameters associated with it.
CO4	Design and test the digital and analog modulation circuits and display the waveforms.
CO5	Simulate the digital modulation systems and compare the error performance of basic digital modulation schemes
Course Code	**18EC71 – COMPUTER NETWORKS**
CO1	Understand the concepts of networking.

CO2	Describe the various networking architectures.
CO3	Identify the protocols and services of different layers.
CO4	Distinguish the basic network configurations and standards associated with each network
C05	Analyze a simple network and measure its parameters
Course Code	**18EC72 – VLSI DESIGN**
CO1	Demonstrate understanding of MOS transistor theory, CMOS fabrication flow and technology scaling.
CO2	Draw the basic gates using the stick and layout diagrams with the knowledge of physical design aspects.
CO3	Demonstrate ability to design Combinational, sequential and dynamic logic circuits as per the requirements
CO4	Interpret Memory elements along with timing considerations
CO5	Interpret testing and testability issues in VLSI Design
Course Code	**18EC733 – DIGITAL IMAGE PROCESSING**
CO1	Describe the fundamentals of digital image processing.
CO2	Understand image formation and the role human visual system plays in perception of gray and color image data.
CO3	Apply image processing techniques in both the spatial and frequency (Fourier) domains.
CO4	Design and evaluate image analysis techniques
CO5	Conduct independent study and analysis of Image Enhancement and restoration techniques
Course Code	**18EC743 – MULTIMEDIA COMMUNICATION**
CO1	Understand basics of different multimedia networks and applications. Analyse different media types to represent them in digital form.
CO2	Understand different compression techniques to compress audio and video.
CO3	Describe multimedia Communication across Networks.
CO4	Analyze different media types to represent them in digital form.
CO5	Compress different types of text and images using different compression techniques
Course Code	**18ECL76 – COMPUTER NETWORKS LABORATORY**
CO1	Choose suitable tools to model a network.
CO2	Use the network simulator for learning and practice of networking algorithms.
CO3	Illustrate the operations of network protocols and algorithms using C programming.
CO4	Simulate the network with different configurations to measure the performance parameters.
CO5	Implement the data link and routing protocols using C programming.
Course Code	**18ECL77 - VLSI LABORATORY**
CO1	Design and simulate combinational and sequential digital circuits using Verilog HDL.
CO2	Understand the Synthesis process of digital circuits using EDA tool.
CO3	Perform ASIC design flow and understand the process of synthesis, synthesis constraints and evaluating the synthesis reports to obtain optimum gate level net list
CO4	Design and simulate basic CMOS circuits like inverter, common source amplifier and differential amplifiers.
CO5	Perform RTL-GDSII flow and understand the stages in ASIC design

Course Code	18EC81 – WIRELESS AND CELLULAR COMMUNICATION
CO1	Understand the communication theory both physical and networking associated with GSM, CDMA & LTE 4G systems.
CO2	Explain concepts of propagation mechanisms like Reflection, Diffraction, Scattering in wireless channels.
CO3	Develop a scheme for idle mode, call set up, call progress handling and call tear down in a GSM cellular network.
CO4	Develop a scheme for idle mode, call set up, call progress handling and call tear down in a CDMA cellular network.
CO5	Understand the Basic operations of Air interface in a LTE 4G system.
Course Code	**18EC821 – NETWORK SECURITY**
CO1	Explain network security services and mechanisms and explain security concepts
CO2	Understand the concept of Transport Level Security and Secure Socket Layer.
CO3	Explain Security concerns in Internet Protocol security
CO4	Explain Intruders, Intrusion detection and Malicious Software
CO5	Describe Firewalls, Firewall Characteristics, Biasing and Configuration