



Department of Electronics & Communication Engineering

Course Outcomes (COs)

21ELN14 Basics Electronics and Communication		
C114.1	Discuss the concept of power supplies ,amplifiers, oscillators .	K2
C114.2	Describe basics of logic gates , microcontroller system and shift registers	K3
C114.3	Analyze the concepts of embedded systems , sensors, actuators , UART interfacing[K3
C114.4	Discuss the concepts of analog and digital communication	K2
C114.5	Describe the fundamentals of cellular wireless network , wireless network topologies and basics of communication system.	K3

18MAT31 -Transform Calculus, Fourier Series and Numerical Techniques		
C231.1	Solve Laplace transform and inverse Laplace transform in solving differential/ integral equation arising in network analysis, control systems and other fields of engineering.	K2
C231.2	Demonstrate Fourier series to study the behaviour of periodic functions and their applications in system communications, digital signal processing and field theory.	K3
C231.3	Illustrate Fourier transform and Z-transform discrete/continuous function arising in wave and heat propagation, signals and systems.	K4
C231.4	Solve first and second order ordinary differential equations arising in engineering problems using single step and multistep numerical methods.	K3
C231.5	Determine the extremals of functionals using calculus of variations and solve problems arising in dynamics of rigid bodies and vibrational analysis.	K3

18EC32 Network Theory		
C232.1	Determine currents and voltages using source transformation/ source shifting/ mesh/ nodal analysis and reduce given network using star-delta transformation/source transformation/ source shifting.	K3
C232.2	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	K3
C232.3	Calculate current and voltages for the given circuit under initial and transient conditions	K3
C232.4	Apply Laplace transform to solve the Complex networks and find the network parameters.	K3
C232.5	Understand the concept of resonance, solve the given network using specified conditions and find the various network parameters such as Z, Y, T and H parameters for the two port networks.	K3

18EC33 Electronic Devices		
C233.1	Understand the basics of semiconductor physics and electronic devices	K2
C233.2	Understand the principles and characteristics of different types of semiconductor devices	K2
C233.3	Utilize the mathematical models of semiconductor junctions and MOS transistors for circuits and systems	K3
C233.4	Understand and analyse the fabrication process of semiconductor devices and CMOS process integration.	K4

18EC34 Digital System Design		
C234.1	Experiment the concept of combinational and sequential logic circuits; solve switching equations using Karnaugh Maps and Quine-McClusky techniques	K3
C234.2	Demonstrate the combinational logic circuits such as decoders, encoders, multiplexers, demultiplexers, adders, subtractors and comparators, PLDs, CPLDs, FPG	K3
C234.3	Demonstrate the working of Latches and Flip Flops (SR, D, T and JK). construct synchronous/Asynchronous Counters and Shift registers using Flip Flops.	K3
C234.4	Demonstrate and Distinguish the sequential circuits using SR, JK, D, T flip-flops and Mealy & Moore machines	K4

18EC35 Computer Organization & Architecture		
C235.1	Understand and remember the basic sub systems of a computer, their organization, structure and operation	KL2
C235.2	Illustrate the concept of programs as sequences of machine instructions	KL3
C235.3	Discover different ways of communicating with I/O devices	KL3
C235.4	Interpret memory hierarchy and concept of virtual memory	KL3
C235.5	Analyse the organization of simple pipelined processor and other computing systems	KL4

18EC36 Power Electronics & Instrumentation		
C236.1	Build and test circuits using power electronic devices	K2
C236.2	Analyze and design controlled rectifier, DC to DC converters, DC to AC inverters and SMPS	K4
C236.3	Develop circuits for multirange Ammeters, Voltmeters and Bridges to measure passive component values and frequency	K3
C236.4	Describe the principle of operation of Digital instruments and PLCs, design and development of AC & DC bridges	K4
C236.5	Illustrate Instrumentation amplifier for measuring physical parameters	K3

18ECL37 Electronic Devices and Instrumentation Laboratory		
C237.1	Recognize and demonstrate functioning of semiconductor power devices.	KL2
C237.2	Evaluate the characteristics, switching, power conversion and control by semiconductor power devices.	KL3
C237.3	Analyze the response and plot the characteristics of transducers such as LDR, Photodiode etc.	KL4
C237.4	Design and test simple electronic circuits for measurement of temperature and resistance etc.	KL4
C237.5	Use circuit simulation software for the implementation and characterization of electronic devices.	KL3

18ECL38 Digital system Design Laboratory		
C237.1	Design , realize and verify De Morgan's theorem , SOP, POS forms	KL4
C237.2	Demonstrate the truth table of various expressions and combinational circuits using logic gates .	KL3
C237.3	Design various combinational circuits such as adders, subtractors comparators , multiplexers and demultiplexers.	KL4
C237.4	Construct flip flops , counters and shift registers	KL3
C237.5	Simulate Serial adder and Binary multiplier	KL4

18MAT41 Complex Analysis, Probability and Statistical Methods		
C241.1	Use the concepts of analytic function and complex potentials to solve the problems arising in electromagnetic field theory	K2
C241.2	Utilize conformal transformation and complex integral arising in aerofoil theory, fluid flow visualization and image processing.	K3
C241.3	Apply discrete and continuous probability distributions in analyzing the probability models arising in engineering field	K3
C241.4	Make use of the correlation and regression analysis to fit a suitable mathematical model for the statistical data.	K2
C241.5	Construct joint probability distributions and demonstrate the validity of testing the hypothesis.	K3

18EC42 Analog Circuits		
C242.1	Understand the characteristics of BJTs and FETs.	K2
C242.2	Articulate the working principle of BJT and FET amplifier circuits.	K3
C242.3	Design sinusoidal and non-sinusoidal oscillators.	K4
C242.4	Understand the functioning of linear ICs.	K2
C242.5	Design and implementation of Linear IC based circuits.	K4

18EC43 Control Systems		
C243.1	Ability to apply Mathematical model for electrical and mechanical systems	K3
C243.2	Ability to examine mathematical techniques to find out Transfer Functions of Complex Block diagrams and Signal Flow Graphs	K4
C243.3	Ability to apply mathematical techniques in determination of system response and analysis of first and second order systems	K3
C243.4	Analyze the stability of a system in the time domain using Routh Harwitz criteria and Root locus Techniques, and to perform frequency domain analysis using Bode plots.	K4
C243.5	Ability to understand the frequency domain analysis using Nyquist plots and a digital control system in continuous and discrete time using state variable techniques.	K2

18EC44 Engineering Statistics & Linear Algebra		
C244.1	Understand the definition of signal and systems and its classifications, various operations on signals	K2
C244.2	Understand the time domain representation of an LTI systems and Define the convolution sum and convolution integral of an LTI system and its properties[K2
C244.3	Understand the impulse response of the systems and its properties interconnections and define the fourier series representation of the periodic signals and apply its properties to analyse the frequency	K3

	domain representation of the periodic signals	
C244.4	Define the fourier representation of the a perodic continues and discrete time signals and its apply its properties to analyse the frequency domain representation of the aperiodic signals	K4
C244.5	Understand the concepts of Z-transforms ROC and apply the Knowledge of Z-transforms in analysis and representation of a LTI systems and design the discrete time systems	K4

	18EC45 Signals & Systems	
C245.1	Understand the definition of signal and systems and its classifications, various operations on signals	K2
C245.2	Understand the time domain representation of an LTI systems and Define the convolution sum and convolution integral of an LTI system and its properties	K2
C245.3	Understand the impulse response of the systems and its properties interconnections and define the fourier series representation of the periodic signals and apply its properties to analyse the frequency domain representation of the periodic signals	K3
C245.4	Define the fourier representation of the aperiodic continues and discrete time signals and its apply its properties to analyse the frequency domain representation of the aperiodic signals [K4
	18EC46 Microcontroller	
C246.1	Explain the difference between Microprocessors & Microcontrollers, Architecture of 8051Microcontroller, Interfacing of 8051 to external memory and Instruction set of 8051	K2
C246.2	Write 8051 Assembly level programs using 8051 instruction set [K3
C246.3	Write 8051 Assembly level programs using 8051 instruction set, stacks, subroutines and interfacing of simple switches, simple LEDs.	K2
C246.4	Explain the operation of Timers/Counters and Serial port of 8051 and Write 8051 Assembly language program to generate timings and waveforms using 8051 timers, to send & receive serial data using 8051 serial port and to generate an external interrupt using a switch	K3
C246.5	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. Interface and write programs to ADC 0804, LCD and Stepper Motor to 8051 using 8051 I/O ports.	K3

18ECL47 MICROCONTROLLER LABORATORY		
C247.1	Enhance programming skills using assembly language and C	K4
C247.2	Write Assembly language programs in 8051 for solving simple problems that manipulate input data using different instructions of 8051.	K2
C247.3	Interface different input and output devices to 8051 and control them using Assembly language programs.	K3
C247.4	Interface the serial devices to 8051 and do the serial transfer using C programming.	K3
C247.5	Develop applications based on Microcontroller 8051	K4

18ECL48 ANALOG CIRCUITS LABORATORY		
C248.1	Analyze frequency response of JFET/MOSFET amplifier.	K4
C248.2	Design BJT/FETs amplifier with and without feedback and evaluate their performance characteristics.	K4
C248.3	Apply the knowledge gain in the design of BJT/FETs circuits in oscillators.	K3
C248.4	Design analog circuits using OPAMPs for different applications	K4
C248.5	Simulate and analyze analog circuits that uses ICs for different electronic applications.	K4

18ES51 Technological Innovation Management And Entrepreneurship		
C351.1	Understand the roles and characteristics of management & the concept of planning.	K2
C351.2	Understand the importance of organizing, directing, controlling and staffing process of management.	K2
C351.3	Build the leadership, teamwork and communication skills and the profile of entrepreneurs and their role in economic growth.	K3
C351.4	Analyze the Development, Characteristics & Importance of Family business , Idea Generation and Feasibility Analysis to select best from business opportunities.	K4
C351.5	Design & Analyse Business models, Identify financial opportunities & Difficulties.	K4

18EC52 Digital Signal Processing		
C352.1	Understand frequency domain sampling and reconstruction of the original signal, Describe its properties and Express DFT as a linear Transformation.	K1
C352.2	Apply the DFT in the linear filtering techniques and Derive the FFT algorithm for the efficient computation of the DFT.	K3
C352.3	Design and Analyze Digital FIR filters and Develop the Discrete Time structure of an FIR filters.	K4
C352.4	Design and Analyse an Analog and Digital IIR filters and Develop the Discrete Time structure of an IIR filters.	K4
C352.5	Understand the Architecture and working of the DSP processor.	K1

18EC53 Principles of Communication Systems		
C353.1	Remember simple systems for generating and demodulating AM, DSB and SSB signals	K2
C353.2	Understand, design and develop simple systems for generating and demodulating frequency modulated signals	K3
C353.3	Understand the concepts of random process and various types of noise	K2
C353.4	Evaluate the performance of the designed communication system in presence of noise and nonlinear models.	K3
C353.5	Design and Analyze pulse modulation and sampling techniques.	K4

18EC54 Information Theory & Coding		
C354.1	Understand the concepts of measure of information with respect to the source symbols.	K2
C354.2	Solve and formulate the source symbols through various source encoding algorithms	K3
C354.3	Formulate and design the convolution codes in error detection and correction for memory related encoders and decoders	K4
C354.4	Model communication channel with respect to its model, matrix, mutual information, capacity	K3
C354.5	Analyze and solve data communication errors through the use of appropriate error correcting codes	K4

18EC55 Electromagnetic Waves		
C355.1	Acquire knowledge and solve problems related to Basic Concepts of Electric Fields such as Coulombs Law, Electric Field Intensity, Electric Flux density, Gauss's Law and Divergence theorem.	K2
C355.2	Interpretation of Gradient, Divergence, Curl Operators and Maxwell's Equations in differential and integral forms	K3
C355.3	Analyse boundary conditions, Laplace's and Poisson's equations to determine Capacitance of various Configuration	K4
C355.4	Apply Biot-Savart's Law and Ampere's Law to determine Magnetic field for various current distributions	K3
C355.5	Interpret Maxwell's equations for time varying fields and in wave propagation	K3

18EC56 Verilog HDL		
C356.1	To Write Verilog programs in gate, dataflow (RTL), behavioral and switch modeling levels of Abstraction.	K2
C356.2	Design and Verify the functionality of digital circuit/system using test benches	K3
C356.3	Analyse and write the programs more effectively using Verilog tasks, functions and directives	K3
C356.4	Perform timing and delay Simulation	K3
C356.5	Interpret the various constructs in logic synthesis	K3

18ECL57 DIGITAL SIGNAL PROCESSING LABORATORY		
C357.1	Understand the concepts of analog to digital conversion of signals and frequency domain sampling of signals.	K2
C357.2	Model the discrete time signals and systems and verify its properties and results.	K3
C357.3	Implement discrete computations using DSP processor and verify the results.	K4
C357.4	Realize the digital filters using a simulation tool and analyse the response of the filter for an audio signal.	K3
C357.5	Write programs using Matlab/Scilab/Octave to illustrate DSP concepts.	K2

18ECL58 HDL		
C358.1	Write the Verilog/VHDL programs to simulate Combinational circuits in Dataflow, Behavioral and Gate level Abstractions.	K2
C358.2	Describe sequential circuits like flip flops and counters in Behavioral description and obtain simulation waveforms.	K3
C358.3	Use FPGA/CPLD kits for downloading Verilog codes and check output.	K2
C358.4	Synthesize Combinational and Sequential circuits on programmable ICs and test the hardware.	K4
C358.5	Interface the hardware to the programmable chips and obtain the required output	K4

18EC61 Digital Communication		
C361.1	Understand the concepts of Hilbert Transform, various Line codes and Derive its Power Spectral Density.[K3
C361.2	Understand the concepts of Detection and Estimation theory in the transmission/reception of the signals over the noisy channel and Design the Optimum receivers.	K4
C361.3	Describe and implement the various Digital Modulation and Detection Techniques for the Transmission and reception in digital communication.	K3
C361.4	Design the communication system which overcomes the effect of Inter Symbol Interference in the communication channel.	K4
C361.5	Design and formulate the communication system for the secured transmission of the data using Spread Spectrum Modulation Techniques	K5

18EC62 Embedded Systems		
C362.1	To Discuss in-depth knowledge about 32-bit ARM Microcontroller Architecture and its instruction set.	K2
C362.2	Apply knowledge on ARM CORTEX M3 internal registers and operations by using Assembly and C Programming and Evaluateits Interfacing Modules.	K3
C362.3	To Identify Embedded System Components and its applications along with the purpose of an Embedded System including all types of processor/controller	K2
C362.4	To Apply the Knowledge in Embedded System Design Conceptsand Program Modeling and introduce to the modern embedded systems.	K3
C362.5	To Analyze Real Time Operating Systems (RTOS), inter task communication and an embedded software simulator, emulator and debugging techniques.	K4

18EC63 Microwave & Antennas		
C363.1	Understand the concepts of Microwave Transmission.	K2
C363.2	Solve various parameters related to microwave transmission lines and Waveguides	K2
C363.3	Explain and solve basic equations for Microstrip lines and antennas.	K3
C363.4	Analyze the expressions for different antenna array configurations	K4
C363.5	Identify the functions of different types of antenna and its application	K4

18EC641 Operating System		
C364.1	Understand the services provided by an Operating system.	K2
C364.2	Summarize how process are synchronized and scheduled	K2
C364.3	Understand and solve different approaches of memory management and virtual memory management	K3
C364.4	Illustrate the structure and organization of file system	K3
C364.5	Analyze the inter-process communication and deadlock situations	K3

18EC652 Sensors and Signal processing		
C364.1	Appreciate various types of Sensors	K2
C364.2	Describe the manufacturing process of sensors	K3
C364.3	Understand about the material properties required to make the sensors.	K2
C364.4	Use sensors specific to the end user applications.	K2
C364.5	Design system integrated with sensors.	K4

18ECL66		
C366.1	Understand the instruction set of 32 bit microcontroller ARM Cortex M3, and the software tool required for programming in Assembly and C language.	K2
C366.2	Develop assembly language programs using ARM Cortex M3 for different applications.	K4
C366.3	Interface external devices and I/O with ARM Cortex M3.	K3
C366.4	Develop C language programs and library functions for embedded system applications.	K4
C366.5	Analyze the functions of various peripherals, peripheral registers and power saving modes of ARM Cortex M3	K4

18ECL67		
C367.1	Design and test circuits for analog modulation and demodulation schemes via, AM, FM, etc.	K4
C367.2	Determine the characteristics and response of microwave waveguide	K3
C367.3	Determine characteristics of microstrip antennas and devices & compute the parameters associated with it.	K3
C367.4	Design and test the digital and analog modulation circuits and display the waveforms.	K4
C367.5	Simulate the digital modulation systems and compare the error performance of basic digital modulation schemes.	K4

18EC71 Computer networks		
C471.1	Understand the Concept of Networking	K2
C471.2	Describe the various networking architectures.	K2
C471.3	Identify the protocols and services of different layers.	K2
C471.4	Distinguish the basic network configuration and standards associated with each network.	K3
C471.5	Analyze simple networks and measure its parameters.	K4

18EC72 VLSI DESIGN		
C472.1	Demonstrate understanding of MOS transistor theory, CMOS fabrication flow and technology scaling.	K2
C472.2	Draw the basic gates using the stick and layout diagrams with the knowledge of physical design aspects.	K2

C472.3	Demonstrate ability to design Combinational, sequential and dynamic logic circuits as per the requirements.	K3
C472.4	Interpret Memory elements along with timing considerations	K3
C472.5	Interpret testing and testability issues in VLSI Design.	K2

18EC731 Real time systems		
C4731.1	Explain the Fundamentals of Real time system and its applications.	K2
C4731.2	Understand the concepts of computer control and suitable computer hardware requirements for real time applications.	K2
C4731.3	Describe the operating system concepts and techniques required for real time systems.	K3
C4731.4	Develop the software algorithms using suitable languages to meet real time applications.	K4
C4731.5	Apply suitable methodologies to design and develop real time systems.	K4

18EC732 Satellite Communication		
C4732.1	Describe the satellite orbits and its trajectories with the definitions of parameters associated with it.	K2
C4732.2	Describe the electronic hardware systems associated with the satellite subsystem and earth station.	K3
C4732.3	Describe the electronic hardware systems associated with the satellite subsystem and earth station.	K3
C4732.4	Compute the satellite link parameters under various propagation conditions with the illustration of multiple access techniques.	K4
C4732.5	Describe the satellite used for various applications.	K2

18EC741 IOT		
C4741.1	Describe the OSI Model for the IoT/M2M Systems	K2
C4741.2	Understand the architecture and design principles for IoT.	K2
C4741.3	Learn the programming for IoT Applications.	K3
C4741.4	Identify the communication protocols which best suits the WSN	K3

18EC751 Communication Theory		
C4751.1	Describe operation of communication system.	K3
C4751.2	Understand the techniques of Amplitude and Angle modulation.	K2
C4751.3	Understand the concept of sampling and Quantization.	K2
C4751.4	Understand the concepts of different digital modulation techniques.	K2
C4751.5	Describe the principles of wireless communication system.	K3

18ECL76 Computer Networks Lab		
C476.1	Choose suitable tools to model a network	K3
C476.2	Use the network simulator for learning and practice of networking algorithms.	K2
C476.3	Illustrate the operations of network protocols and algorithms using C programming.	K2
C476.4	Simulate the network with different configurations to measure the performance parameters.	K2
C476.5	Implement the data link and routing protocols using C programming.	K3

18ECL77 VLSI Laboratory		
C477.1	Design and simulate combinational and sequential digital circuits using Verilog HDL	K3
C477.2	Understand the Synthesis process of digital circuits using EDA tool.	K2
C477.3	Perform ASIC design flow and understand the process of synthesis, synthesis constraints and evaluating the synthesis reports to obtain optimum gate level net list	K2
C477.4	Design and simulate basic CMOS circuits like inverter, common source amplifier and differential amplifiers.	K2
C477.5	Perform RTL-GDSII flow and understand the stages in ASIC design.	K3

18EC81 Wireless Cellular and Cellular communication		
C481.1	Understand the concepts of propagation over wireless channels from a physics standpoint.	K2
C481.2	Ability to use communication theory for both physical and networking to understand GSM system to handle mobile telephony.	K3
C481.3	Use of Communication theory for both physical and networking to understand CDMA system to handle mobile telephony.	K2
C481.4	Explain the basic fundamentals of wireless cellular concept, and to know the LTE 4G standardization phases and features along with its system architecture	K2

18EC821 Network Security		
C482.1	Explain network security services and mechanisms and explain security concepts.	K2
C482.2	Understand the concept of transport level security and secure socket layer	K2
C482.3	Explain security concerns in Internet security protocol.	K2
C482.4	Explain Intruders, Intrusion detection and malicious software	K2
C482.5	Describe Firewalls, Firewall Biasing and configuration	K3

Programme coordinator