Course Outcomes (COs)

	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**
C234.5	Analyse and Design applications of Combinational & Sequential Circuits includes sequence detector, state graphs, ROMs, PLAs, serial adder, multiplier, divider	**K5**

	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**

4th SEM

	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	K3

	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	
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 applay 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 aperodic continues and discrete time signals and its apply its properties to analyse the frequency domain representation of the aperiodic signals [	**K4**
C245.5	Understand the concepts of Z-transforms ROC and applay the Knowledge of Z-transforms in analysis and representation of a LTI systems and design the discrete time systems[	**K3**

	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**

	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, Charecteristics & 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	K3

	algorithms	
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 Can frame a small statement as To Understand concept of Electrostatics in Electromagnetic waves	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

	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	Analyzethe inter-process communication and deadlock situations	K3

7TH SEM

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	18EC71 Computer networks	
C481.1	Understand the Concept of Networking	K2
C481.2	Describe the various networking architectures.	K2
C481.3	Identify the protocols and services of different layers.	K2
C481.4	Distinguish the basic network configuration and standards associated	K3

	with each network.	
C481.5	Analyze simple networks and measure its parameters.	**K4**

	18EC72 VLSI DESIGN	
C482.1	Demonstrate understanding of MOS transistor theory, CMOS fabrication flow and technology scaling.	K2
C482.2	Draw the basic gates using the stick and layout diagrams with the knowledge of physical design aspects.	K2
C482.3	Demonstrate ability to design Combinational, sequential and dynamic logic circuits as per the requirements.	K3
C482.4	Interpret Memory elements along with timing considerations	K3
C482.5	Interpret testing and testability issues in VLSI Design.	K2

	18EC732 Satellite Communication	
C483.1	Describe the satellite orbits and its trajectories with the definitions of parameters associated with it.	**K2**
C483.2	Describe the electronic hardware systems associated with the satellite subsystem and earth station.	**K3**
C483.3	Describe the electronic hardware systems associated with the satellite subsystem and earth station.	**K3**
C483.4	Compute the satellite link parameters under various propagation conditions with the illustration of multiple access techniques.	**K4**
C485.5	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**

8th SEM

	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**