Cambridge Institute of Technology

Department of Electronics & Communications Engineering

Course outcomes of 2017 scheme

Course Code	Course Name	Course Outcomes-On completion of this course the students will be able to
3rd SEMESTER		
17MAT31	Engineering Mathematics-III	CO1: Know the use of periodic signals and Fourier series to analyze circuits and system communications. CO2: Explain the general linear system theory for continuous-time signals and digital signal processing using the Fourier Transform and z-transform. CO3: Employ appropriate numerical methods to solve algebraic and transcendental equations. CO4: Apply Green's Theorem, Divergence Theorem and Stokes' theorem in various applications in the field of electro-magnetic and gravitational fields and fluid flow problems. CO5: Determine the extremals of functionals and solve the simple problems of the calculus of variations.
17EC32	Electronic Instrumentation	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, rotation, speed, capacitance and pH of solutions. CO4 : Describe functional concepts and operation of various Analog measuring instruments to measure field Strength, impedance, stroboscopic speed, in/out of phase, Q of coils, insulation resistance. CO5 : Describe and discuss functioning and types of Oscilloscopes, Signal generators and Transducers. CO6 : Utilize AC and DC bridges for passive component and frequency measurements.

17EC33	Analog Electronics	CO1: Describe the working principle and characteristics of BJT, FET, Single stage, cascaded and feedback amplifiers. CO2: Describe the Phase shift, Wien bridge, tuned and crystal oscillators using BJT/FET/UJT. CO3:Calculate the AC gain and impedance for BJT using re and h parameters models for CE and CC configuration. CO4:Determine the performance characteristics and parameters of BJT and FET amplifier using small signal model. CO5:Determine the parameters which affect the low frequency and high frequency responses of BJT and FET amplifiers and draw the characteristics. CO6:Evaluate the efficiency of Class A and Class B power amplifiers and voltage regulators.
17EC34	Digital Electronics	CO1: Develop simplified switching equation using Karnaugh Maps and Quine- McClusky techniques. CO2: Explain the operation of decoders, encoders, multiplexers, demultiplexers, adders, subtractors and comparators. CO3: Explain the working of Latches and Flip Flops (SR,D,T and JK). CO4: Design Synchronous/Asynchronous Counters and Shift registers using FlipFlops. CO5: Develop Mealy/Moore Models and state diagrams for the given clocked sequential circuits. CO6: Apply the knowledge gained in the design of Counters and Registers.
17EC35	Network Analysis	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. CO4: Apply Laplace transform to solve the given network. CO5:Evaluate for RLC elements/ frequency response related parameters like resonant frequency, quality factor, half power frequencies, voltage across inductor and capacitor, current through the RLC elements, in resonant circuits CO6: Solve the given network using specified two port network parameter like Z or Y or T or h.
17EC36	Engineering Electromagnetics	CO1: Evaluate problems on electric field due to point, linear, volume charges by applying conventional methods or by Gauss law. CO2: Determine 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.

17ECL37	Analog Electronics Laboratory	CO1: Test circuits of rectifiers, clipping circuits, clamping circuits and voltage regulators. CO2: Determine the characteristics of BJT and FET amplifiers and plot its frequency response. CO3: Compute the performance parameters of amplifiers and voltage regulators CO4: Design and test the basic BJT/FET amplifiers, BJT Power amplifier and oscillators
17ECL38	Digital Electronics Lab	CO1: Demonstrate 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: Realize Boolean expression using decoders. CO4: Construct and test flips-flops, counters and shift registers. CO5: Simulate full adder and up/down counters.
		4^{th} SEMESTER
17MAT41	Engineering Mathematics - IV	CO1: Solve first and second order ordinary differential equations arising in flow problems using single step and multistep numerical methods. CO2: Understand the analyticity, potential fields, residues and poles of complex potentials in field theory and electromagnetic theory. CO3: Describe conformal and bilinear transformation arising in aerofoil theory, fluid flow visualization and image processing. CO4: Solve problems of quantum mechanics, hydrodynamics and heat conduction by employing Bessel's function relating to cylindrical polar coordinate systems and Legendre's polynomials relating to spherical polar coordinate systems. CO5: Solve problems on probability distributions relating to digital signal processing, information theory and optimization concepts of stability of design and structural engineering. CO6: Draw the validity of the hypothesis proposed for the given sampling distribution in accepting or rejecting the hypothesis. CO7: Determine joint probability distributions and stochastic matrix connected with the multivariable correlation problems for feasible random events. CO8: Define transition probability matrix of a Markov chain and solve problems related to discrete parameter random process.
17EC42	Signals And Systems	CO1: Classify the signals as continuous/discrete, periodic/aperiodic, even/odd, energy/power and deterministic/random signals. CO2: Determine the linearity, causality, time-invariance and stability properties of continuous and discrete time systems. CO3: Compute the response of a Continuous and Discrete LTI system using convolution integral and convolution sum. CO4: Determine the spectral characteristics of continuous and discrete time signal using Fourier analysis. CO5: Compute Z-transforms, inverse Z- transforms and transfer functions of complex LTI systems.

17EC43	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 the time domain specifications for first and second order systems CO4: Determine the stability of a system in the time domain using Routh-Hurwitz criterion and Root-locus technique. CO5: Determine the stability of a system in the frequency domain using Nyquist and bode plots CO6: Develop a control system model in continuous and discrete time using state variable techniques.
17EC44	Principles Of Communication Systems	CO1:Determine the performance of analog modulation schemes in time and frequency domains. CO2:Determine the performance of systems for generation and detection of modulated analog signals. CO3: Characterize analog signals in time domain as random processes and in frequency domain using Fourier transforms. CO4: Characterize the influence of channel on analog modulated signals CO5: Determine the performance of analog communication systems. CO6:Understand the characteristics of pulse amplitude modulation, pulse position modulation and pulse code modulation systems.
17EC45	Linear Integrated Circuits	CO1: Explain Op-Amp circuit and parameters including CMRR, PSRR, Input & Output Impedances and Slew Rate. CO2:Design Op-Amp based Inverting, Non-inverting, Summing & Difference Amplifier, and AC Amplifiers including Voltage Follower. CO3:Test circuits of Op-Amp based Voltage/ Current Sources & Sinks, Current, Instrumentation and Precision Amplifiers. CO4:Test circuits of Op-Amp based linear and non-linear circuits comprising of limiting, clamping, Sample & Hold, Differentiator/ Integrator Circuits, Peak Detectors, Oscillators and Multiplier & Divider. CO5: Design first & second order Low Pass, High Pass, Band Pass, Band Stop Filters and Voltage Regulators using Op-Amps CO6: Explain applications of linear ICs in phase detector, VCO, DAC, ADC and Timer.
17EC46	Microprocessors	CO1: Explain the History of evaluation of Microprocessors, Architecture and instruction set of 8086, CISC & RISC, Von-Neumann & Harvard CPU Architecture, Configuration & Timing diagrams of 8086 and Instruction set of 8086. CO2: Write 8086 Assembly level programs using the 8086 instruction set. CO3 : Write modular programs using procedures. CO4: Write 8086 Stack and Interrupts programming. CO5: Interface 8086 to Static memory chips and 8255, 8254, 0808 ADC, 0800 DAC, Keyboard, Display and Steppemotors. CO6: Use INT 21 DOS interrupt function calls to handle Keyboard and Display.

17ECL47	Microprocessor Lab	CO1:Write and execute 8086 assembly level programs to perform data transfer, arithmetic and logical operations. CO2: Understand assembler directives, branch, loop operations and DOS 21H Interrupts CO3 :Write and execute 8086 assembly level programs to sort and search elements in a given array. CO4: Perform string transfer, string reversing, searching a character in a string with string manipulation instructions of 8086. CO5:Utilize procedures and macros in programming 8086. CO6: Demonstrate the interfacing of 8086 with 7 segment display, matrix keyboard, logical controller, stepper motor, ADC,DAC, and LDR for simple applications.
17ECL48	Linear ICS And Communication Lab	CO1: Illustrate the pulse and flat top sampling techniques using basic circuits. CO2: Demonstrate addition and integration using linear ICs, and 555 timer operations to generate signals/pulses. CO3 : Demonstrate AM and FM operations and frequency synthesis. CO4: Design and illustrate the operation of instrumentation amplifier, LPF, HPF, DAC and oscillators using linear IC.
5^{th} Semester		
17EC51	Management And Entrepreneurship Development	CO1:Understand the fundamental concepts of Management and Entrepreneurship. CO2: Select a best Entrepreneurship model for the required domain of establishment CO3 :Describe the functions of Managers, Entrepreneurs and their social responsibilities CO4:Compare various types of Entrepreneurs. CO5:Analyze the Institutional support by various state and central government agencies.
17EC52	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 of DFT using FFT algorithms and linear filtering approach. CO4 : Solve problems on digital filter design and realize using digital computations.
17EC53	Verilog HDL	CO1:Write Verilog programs in gate, dataflow (RTL), behavioral and switch modeling levels of Abstraction. CO2:Write simple programs in VHDL in different styles. CO3: Design and verify the functionality of digital circuit/system using test benches. CO4: Identify the suitable Abstraction level for a particular digital design. CO5:Write the programs more effectively using Verilog tasks and directives and perform timing and delay Simulation.

17EC54	Information Theory & Coding	CO 1: Explain the concept of Dependent & Independent Source, measure of information, Entropy, Rate of information and order of a 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 the 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.
17EC553	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.
17EC562	Object Oriented Programming Using C++	CO1: Explain the basics of Object Oriented Programming concepts.(M1,M2) CO2: Apply the object initialization and destroy concept using constructors and destructors. (M3) CO3: Apply the concept of polymorphism to implement compile time polymorphism in programs by using overloading methods and operators.(M3) CO4: Use the concept of inheritance to reduce the length of code and evaluate the usefulness and apply the concept of run time polymorphism by using virtual functions, overriding functions and abstract class in programs. (M4) CO5: Use I/O operations and file streams in programs. (M5)
17ECL57	DSP Lab	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 a DSP processor and verify the frequency and phase response.
17ECL58	HDL Lab	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. CO3:Synthesize Combinational and Sequential circuits on programmable ICs and test the hardware. CO4:Interface the hardware to the programmable chips and obtain the required output.
6^{th} SEMESTER		

17EC61	Digital Communication	CO1:Associate and apply the concepts of Bandpass sampling to well specified signals and channels. CO2:Analyze and compute performance parameters and transfer rates for low pasS and bandpass 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 bandlimited channels. CO4:Demonstrate by simulation and emulation that bandpass signals subjected to corrupted and distorted symbols in a bandlimited channel, can be demodulated and estimated at receiver to meet specified performance criteria.
17EC62	Arm Microcontroller And 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.
17EC63	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:Interpret Memory elements along with timing considerations Demonstrate knowledge of FPGA based system design Interpret testing and testability issues in VLSI Design. CO4: Analyze CMOS subsystems and architectural issues with the design constraints.
17EC64	Computer Communication Network	CO1:Identify the protocols and services of Data link layer. CO2:Identify the protocols and functions associated with the transport layer services. CO3:Describe the layering architecture of computer networks and distinguish between the OSI reference model and TCP/IP protocol suite. CO4:Distinguish the basic network configurations and standards associated with each network. CO 5:Construct a network model and determine the routing of packets using different routing algorithms.
17EC651	Cellular Mobile Communications	CO1: Apply the understanding of statistical characterization of urban mobile channels to compute the performance for simple modulation schemes. CO 2: Demonstrate the limitations of GSM, GPRS and CDMA to meet high data rate requirements and limited improvements that are needed. CO3: Analyze the call process procedure between a calling number and called number for all scenarios in GSM or CDMA based systems. CO4: Test and validate voice and data call handling for various scenarios in GSM and CDMA systems for national and international interworking situations.

17EC655	Micro Electronics	CO1: Explain the underlying physics and principles of operation of Metaloxidesemiconductor (MOS) capacitors and MOS field effect transistors (MOSFETs). CO2: Describe and apply simple large signal circuit models for MOSFETs. CO3: Analyze and design microelectronic circuits for linear amplifier for digital applications. CO4: Use of discrete MOS circuits to design Single stage and Multistage amplifiers to meet stated operating specifications.
17EC661	Data Structures Using C++	CO1: To understand the basic concepts of C++, Data objects, Linear Lists and singly Linked List CO2: To understand the concepts of Arrays and Matrics, Stack, Queue and Hashing. CO3: To understand the concepts of Binary Trees, Priority Queues and Search Trees.
17ECL67	Embedded Controller Lab	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:Analyzing the functions of various peripherals, peripheral registers and power saving modes of ARM Cortex M3
17ECL68	Computer Networks Lab	CO1 : Use the network simulator for learning and practice of networking algorithms.. CO2 : Illustrate the operations of network protocols and algorithms using C programming. CO3 : Simulate the network with different configurations to measure the performance parameters. CO4 : Implement the data link and routing protocols using C programming.
7^{TH} SEMESTER		
17EC71	Microwaves 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 : Analyze various antenna parameters necessary for building an RF system.
17EC72	Digital Image Processing	CO1 :Understand image formation and the role human visual system plays in perception of gray and color image data. CO2 : Apply image processing techniques in both the spatial and frequency (Fourier) domains. CO3 :Design image analysis techniques in the form of image segmentation and to evaluate the Methodologies for segmentation. CO4 : Conduct independent study and analysis of Image Enhancement techniques.

17EC73	Power Electronics	CO1 :Describe the characteristics of different power devices and identify the various applications associated with it. CO2 : Illustrate the working of a power circuit as a DC-DC converter. CO3 : Illustrate the operation of inverter circuit and static switches. CO4 : Determine the output response of a thyristor circuit with various triggering options. CO5 : Determine the response of a controlled rectifier with resistive and inductive loads.
17EC741	Multimedia Communications	CO1:Understand basics of different multimedia networks and applications. CO2:Understand different compression techniques to compress audio and video. CO3:Describe multimedia Communication across Networks. CO4:Analyse different media types to represent them in digital form. CO5:Compress different types of text and images using different compression techniques and analyse DMS.
17EC755	Satellite Communication	CO1 :Describe the satellite orbits and its trajectories with the definitions of parameters associated with it. CO2 :Describe the electronic hardware systems associated with the satellite subsystem and earth station. CO3 : Describe the various applications of satellite with the focus on national satellite system. CO4 : Compute the satellite link parameters under various propagation conditions with the illustration of multiple access techniques.
17ECL76	Advanced Communication Lab	CO1 :Determine the characteristics and response of microwave devices and optical waveguide. CO2 :Determine the characteristics of microstrip antennas and devices and compute the parameters associated with it. CO3 :Simulate the digital modulation schemes with the display of waveforms and computation of performance parameters. CO4 : Design and test the digital modulation circuits/systems and display the waveforms.
17ECL77	VLSI LAB	CO1 :Write test bench to simulate various digital circuits. CO2 :Interpret concepts of DC Analysis, AC Analysis and Transient Analysis in analog circuits. CO3 :Design and simulate basic CMOS circuits like inverter, common source amplifier and differential amplifiers. CO4 :Use basic amplifiers and further design higher level circuits like operational amplified and analog/digital converters to meet desired parameters. CO5 :Use transistors to design gates and further using gates realize shift registers and adders to meet desired parameters.
8^{TH} SEMESTER		

17EC81	Wireless Cellular And Lte 4g Broadband	CO1 :Understand the system architecture and the functional standard specified in LTE 4G. CO2 :Analyze the role of LTE radio interface protocols and EPS Data convergence protocols to set up, reconfigure and release data and voice from users. CO3 :Demonstrate the UTRAN and EPS handling processes from set up to release including mobility management for a variety of data call scenarios. CO4:Test and Evaluate the Performance of resource management and packet data processing and transport algorithms.
17EC82	Fiber Optics And Networks	CO1: Classification and working of optical fiber with different modes of signal propagation. CO2: Describe the transmission characteristics and losses in optical fiber communication. CO3: Describe the construction and working principle of optical connectors, multiplexers and amplifiers. CO4 : Describe the constructional features and the characteristics of optical sources and detectors. CO5 :Illustrate the networking aspects of optical fiber and describe various standards associated with it.
17EC831	Micro Electro Mechanical Systems	CO1 :Appreciate the technologies related to Micro Electro Mechanical Systems. CO2 :Understand design and fabrication processes involved with MEMS devices. CO3 :Analyse the MEMS devices and develop suitable mathematical models CO4:Know various application areas for MEMS device
17EC833	Radar Engineering	CO1:Understand the radar fundamentals and radar signals. CO2 :Explain the working principle of pulse Doppler radars, their applications and limitations CO3 :Describe the working of various radar transmitters and receivers. CO4:Analyze the range parameters of pulse radar system which affect the system performance

PRINCIPAL
CAMBRIDGE INSTITUTE OF TECHNOLOGY
K.R. PURAM, BANGALORE-560 036.