DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING					
LIST OF COURSE OUTCOMES					
SL NO	SEM	SCHEME	COURCE CODE	COURCE NAME	COURCE OUTCOMES
1	3rd	2018	18MAT31	TRANSFORM CALCULUS, FOURIER SERIES AND NUMERICAL TECHNIQUES	CO1: Use Laplace transform and inverse Laplace transform in solving differential/ integral equation CO2: Demonstrate Fourier series to study the behaviour of periodic functions and their applications in system communications, digital signal processing and field theory. CO3: Make use of Fourier transform and Z-transform to illustrate discrete/continuous function arising in wave and heat propagation, signals and systems. CO4: Solve first and second order ordinary differential equations arising in engineering problems using single step and multistep numerical methods. CO5:Determine the extremals of functionals using calculus of variations and solve problems arising in dynamics of rigid bodies and vibrational analysis.
2			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.
3			18EC33	ELECTRONIC DEVICES	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:Solve the given network using specified two port network parameter like Z or Y or Tor h. CO6: Understand the concept of resonance. 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.
4			18EC34	DIGITAL SYSTEM DESIGN	CO1: Explain the concept of combinational and sequential logic circuits. CO2: Design the combinational logic circuits. CO3: Design the sequential circuits using SR, JK, D, T flip-flops and Mealy & Moore machines CO4: Design applications of Combinational & Sequential Circuits.
5			18EC35	COMPUTER ORGANIZATION AND ARCHITECTURE	CO1: Explain the basic organization of a computer system. CO2: Explain different ways of accessing an input / output device including interrupts. C3: Illustrate the organization of different types of semiconductor and other secondary storage memories. CO4: Illustrate simple processor organization based on hardwired control and micro programmed control.
6			18EC356	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: Define instrument errors. CO4: Develop circuits for multirange Ammeters, Voltmeters and Bridges to measure passive component values and frequency. CO5: Describe the principle of operation of Digital instruments and PLCs. CO6: Use Instrumentation amplifier for measuring physical parameters.
7			18ECL37	ELECTRONIC DEVICES AND INSTRUMENTATION LABORATORY	CO1: Understand the characteristics of various electronic devices and measurement of parameters. CO2: Design and test simple electronic circuits CO3: Use of circuit simulation software for the implementation and characterization of electronic circuits and devices.
8			18ECL38	DIGITAL SYSTEM DESIGN LABORATORY	CO1: Demonstrate the truth table of various expressions and combinational circuits using logic gates CO2: Design various combinational circuits such as adders, subtractors,comparators, multiplexers and demultiplexers. CO3: Construct flips-flops, counters and shift registers. CO4:Simulate Serial adder and Binary Multiplier.
9			18CPC39	CONSTITUTION OF INDIA, PROFESSIONAL ETHICS AND CYBER LAW (CPC)	CO 1: Have constitutional knowledge and legal literacy. CO 2: Understand Engineering and Professional ethics and responsibilities of Engineers. CO 3: Understand the the cybercrimes and cyber laws for cyber safety measures.
10			18MAT41	COMPLEX ANALYSIS, PROBABILITY AND STATISTICAL METHODS	CO1: Use the concepts of analytic function and complex potentials to solve the problems arising in electromagnetic field theory. CO2:Utilize conformal transformation and complex integral arising in aerofoil theory, fluid flow visualization and image processing. CO3: Apply discrete and continuous probability distributions in analyzing the probability models arising in engineering field. CO4: Make use of the correlation and regression analysis to fit a suitable mathematical model for the statistical data. CO5: Construct joint probability distributions and demonstrate the validity of testing the hypothesis.
11			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.
12			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 the time domain specification s for first an d second order systems.

					CO4: Deter mine the stability of a system in the time domain using Routh-Hurwitz criterion and Root-locus technique.
					CO5: Determine the s stability of a system in the frequency domain u sing Nyquist and bode plots.
13	4TH	2018	18EC44	ENGINEERING STATISTICS and LINEAR ALGEBRA	CO1: Identify and associate Random Variables and Random Processes in Communication events.
					CO2: Analyze and model the Random events in typical communication events to extract quantitative statistical parameters.
					CO3: Analyze and model typical signal sets in terms of a basis function set of Amplitude, phase and frequency.
					CO4: Demonstrate by way of simulation or emulation the ease of analysis employing basis functions, statistical representation and Eigen values.
14			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: Represent continuous and discrete systems in time and frequency domain using different transforms Test whether the system is stable.
15			18EC46	MICROCONTROLLER	CO1:Explain the difference between Microprocessors & Microcontrollers, Architecture of 8051 Microcontroller, Interfacing of 8051 to external memory and Instruction set of 8051.
					CO2: Write 8051 Assembly level programs using 8051 instruction set.
					CO3:Explain the Interrupt system, operation of Timers/Counters and Serial port of 8051.
					CO4: 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.
					CO5: 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.
					CO6: Interface simple switches, simple LEDs, ADC 0804, LCD and Stepper Motor to 8051 using 8051 I/O ports.
16			18ECL47	MICROCONTROLLER LABORATORY	CO1: Write Assembly language programs in 8051 for solving simple problems that manipulate input data using different instructions of 8051.
					CO2: Interface different input and output devices to 8051 and control them using Assembly language programs.
					CO3: Interface different input and output devices to 8051 and control them using Assembly language programs.
17			18ECL48	ANALOG CIRCUITS LABORATORY	CO1: Design analog circuits using BJT/FETs and evaluate their performance characteristics.
					CO2: Design analog circuits using OPAMPs for different applications
					CO3: Simulate and analyze analog circuits that usesICs for different electronic applications.
18			18KVK49	Vyavaharika Kannada	At the end of the course, the student will be able to understand Kannada and communicate in Kannada language.
19	5TH	2018	18ES51	TECHNOLOGICAL INNOVATION MANAGEMENT AND ENTREPRENEURSHIP	CO1: Understand the fundamental concepts of Management and Entrepreneurship and opportunities in order to setup a business
					CO2: Describe the functions of Managers, Entrepreneurs and their social responsibilities
					CO3: Understand the components in developing a business plan
					CO4: Understand the components in developing a business plan
20			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: Compute DFT of real and complex discrete time signals.
					CO4: Compute DFT of real and complex discrete time signals.
					CO5: Compute DFT of real and complex discrete time signals.
21			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 and demultiplex the signals and reconstruct digitally formatted signals at the receiver.
					CO4: Design/Demonstrate the use of digital formatting in Multiplexers, Vocoders and Video transmission.
22			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.
23			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 Gauss 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-Savart's and Ampere's 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 Maxwell's equations for time varying fields, EM waves in free space and conductors and Evaluate power associated with EM waves using Poynting theorem
24			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, functions and directives.
					CO5: Perform timing and delay Simulation
					CO6: Interpret the various constructs in logic synthesis.
25			18EC57	DIGITAL SIGNAL PROCESSING LABORATORY	CO1: Understand the concepts of analog to digital conversion of signals and frequency domain sampling of signals.
					CO2: Modeling 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.

				LABORATORY	CO4: Realize the digital filters using a simulation tool and analyze the response of the filter for an audio signal.
26			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. 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.
27			18CIV59	ENVIRONMENTAL STUDIES	CO1: Understand the principles of ecology and environmental issues that apply to air, land, and water issues on a global 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: Demonstrate ecology knowledge of a complex relationship between biotic and a biotic components.
28	6TH	2018	18EC61	DIGITAL COMMUNICATION	CO1: Associate and apply the concepts of Bandpass sampling to well specified signals and channels. CO1: Analyze and compute performance parameters and transfer rates for low pas 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.
29			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.
30			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 a RF system CO5: Recommend various antenna configurations according to the applications.
31			18EC644	DIGITAL SYSTEM DESIGN USING VERILOG	CO1: Construct the combinational circuits, using discrete gates and programmable logic devices. CO2: Describe how arithmetic operations can be performed for each kind of code, and also combinational circuits that implement arithmetic operations. CO3: Design a semiconductor memory for specific chip design. CO4: Design embedded systems using small microcontrollers, larger CPUs/DSPs, or hard or soft processor cores. CO5: Synthesize different types of I/O controllers that are used in embedded system.
32			18ME651	NON CONVENTIONAL ENERGY SOURCE	CO1: Describe the environmental aspects of non-conventional energy resources. In Comparison with various conventional energy systems, their prospects and limitations. CO2: Know the need of renewable energy resources, historical and latest developments. CO3: Describe the use of solar energy and the various components used in the energy production with respect to applications like-heating, cooling, desalination, power generation, drying, cooking etc. CO4: Appreciate the need of Wind Energy and the various components used in energy generation and know the classifications. CO5: Understand the concept of Biomass energy resources and their classification, types of biogas Plants-applications CO6: Compare Solar, Wind and bio energy systems, their prospects, Advantages and limitations. CO7: Acquire the knowledge of fuel cells, wave power, tidal power and geothermal principles and applications.
32			18ECL66	EMBEDDED SYSTEMS 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.
33			18ECL67	COMMUNICATION LAB	CO1: Determine the characteristics and response of microwave waveguide. CO2: Determine the characteristics of microstrip antennas and devices and compute the parameters associated with it. CO3: Design and test the digital and analog modulation circuits and display the waveforms. CO4: Simulate the digital modulation systems and compare the error performance of basic digital modulation schemes.
34			18EC71	COMPUTER NETWORKS	CO1: Understand the concepts of networking thoroughly CO2: Identify the protocols and services of different layers. CO3: Distinguish the basic network configurations and standards associated with each network. CO4: Analyze a simple network and measurement of its parameters.
35			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
36			18EC733	DIGITAL IMAGEPROCESSING	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 and evaluate image analysis techniques CO4: Conduct independent study and analysis of Image Enhancement and restoration techniques.
37	7TH	2018	18EC741	IoT & WIRELESS	CO1: Understand choice and application of IoT & M2M communication protocols. CO2: Describe Cloud computing and design principles of IoT

37	7TH	2018	18EC741	SENSOR NETWORKS	CO3: Awareness of MQTT clients, MQTT server and its programming.
					CO4: Develop an architecture and its communication protocols of of WSNs.
38			18ME751		CO1: Understand energy scenario, energy sources and their utilization.
					CO2: Understand various methods of energy storage, energy management and economic analysis
					CO3: Analyse the awareness about environment and eco system.
					CO4: Understand the environment pollution along with social issues and acts.
39			18ECL76	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
40			18ECL77	VLSI LAB	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.
41	8TH	2018	18EC81	WIRELESS AND CELLULAR COMMUNICATION	CO1: Explain concepts of propagation mechanisms like Reflection, Diffraction, Scattering in wireless channels.
					CO2: Develop a scheme for idle mode, call set up, call progress handling and call tear down in a GSM cellular network.
					CO3: Develop a scheme for idle mode, call set up, call progress handling and call tear down in a CDMA cellular network.
					CO4: Understand the Basic operations of Air interface in a LTE 4G system.
42			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