Department of Electronics and Communication Engineering		
BTech in Electronics and Communication Engineering **Course Outcomes 2019 - Scheme**		
Semester I		
Course Code & Course Name	**CO No**	**CO Description**
HUN 101 LIFE SKILL	CO1	Define and Identify different life skills required in personal and professional life
	CO2	Develop an awareness of the self and apply well-defined techniques to cope with emotions and stress.
	CO3	Explain the basic mechanics of effective communication and demonstrate these through presentations.
	CO4	Take part in group discussions
	CO5	Use appropriate thinking and problem solving techniques to solve new problems
	CO6	Understand the basics of teamwork and leadership
	CO7	Apply appropriate Tools and Instruments with respect to the mechanical workshop trades
	CO8	Apply appropriate safety measures with respect to the mechanical workshop trades
Semester II		
Course Code & Course Name	**CO No**	**CO Description**
EST 130 BASICS OF ELECTRICAL AND ELECTRONICS ENGINEERING	CO1	Apply fundamental concepts and circuit laws to solve simple DC electric and magnetic circuits
	CO2	Develop and solve models of magnetic circuits
	CO3	Apply the fundamental laws of electrical engineering to solve simple ac circuits in steady state.
	CO4	Describe working of a voltage amplifier
	CO5	Outline the principle of an electronic instrumentation system
	CO6	Explain the principle of radio and cellular communication

HUN 102 PROFESSIONAL COMMUNICATION	CO1	Develop vocabulary and language skills relevant to engineering as a profession
	CO2	Analyze, interpret and effectively summarize a variety of textual content
	CO3	Create effective technical presentations
	CO4	Discuss a given technical/non-technical topic in a group setting and arrive at generalizations/consensus.
	CO5	Identify drawbacks in listening patterns and apply listening techniques for specific needs.
	CO6	Create professional and technical documents that are clear and adhering to all the necessary conventions.
ESL 130 ELECTRICAL AND ELECTRONICS WORKSHOP	CO1	Demonstrate safety measures against electric shocks.
	CO2	Identify the tools used for electrical wiring, electrical accessories, wires, cables, batteries and standard symbols.
	CO3	Develop the connection diagram, identify the suitable accessories and materials necessary for wiring simple lighting circuits for domestic buildings.
	CO4	Identify and test various electronic components
	CO5	Draw circuit schematics with EDA tools
	CO6	Assemble and test electronic circuits on boards
	CO7	Work in a team with good interpersonal skills

Semester III

Course Code & Course Name	CO No	CO Description
ECT201 SOLID STATE DEVICES	CO1	Residue theorem to compute several kinds of real integrals.
	CO2	Explain drift and diffusion currents in extrinsic semiconductors and Compute current density due to these effects.
	CO3	Define the current components and derive the current equation in a pn junction diode and bipolar junction transistor.
	CO4	Explain the basic MOS physics and derive the expressions for drain current in linear and saturation regions.
	CO5	Discuss scaling of MOSFETs and short channel effects.
ECT 203 LOGIC CIRCUIT DESIGN	CO1	Explain the elements of digital system abstractions such as digital representations of information, digital logic and Boolean algebra

	CO2	Create an implementation of a combinational logic function described by a truth table using and/or/inv gates/ muxes
	CO3	Compare different types of logic families with respect to performance and efficiency
	CO4	Design a sequential logic circuit using the basic building blocks like flip-flops
	CO5	Design and analyze combinational and sequential logic circuits through gate level Verilog models.
ECT205 NETWORK THEORY	CO1	Apply Mesh / Node analysis or Network Theorems to obtain steady state response of the linear time invariant networks.
	CO2	Apply Laplace Transforms to determine the transient behaviour of RLC networks.
	CO3	Apply Network functions and Network Parameters to analyse the single port and two port networks.
MCN201 SUSTAINABLE ENGINEERING	CO1	Understand the relevance and the concept of sustainability and the global initiatives in this direction
	CO2	Explain the different types of environmental pollution problems and their sustainable solutions
	CO3	Discuss the environmental regulations and standards
	CO4	Outline the concepts related to conventional and non-conventional energy
	CO5	Demonstrate the broad perspective of sustainable practices by utilizing engineering knowledge and principles
ECL 201 SCIENTIFIC COMPUTING LAB	CO1	Describe the needs and requirements of scientific computing and to familiarize one programming language for scientific computing and data visualization.
	CO2	Approximate an array/matrix with matrix decomposition.
	CO3	Implement numerical integration and differentiation.
	CO4	Solve ordinary differential equations for engineering applications
	CO5	Compute with exported data from instruments
	CO6	Realize how periodic functions are constituted by sinusoids
	CO7	Simulate random processes and understand their statistics.

ECL 203 LOGIC DESIGN LAB	CO1	Design and demonstrate the functioning of various combinational and sequential circuits using ICs
	CO2	Apply an industry compatible hardware description language to implement digital circuits
	CO3	Implement digital circuits on FPGA boards and connect external hardware to the boards
	CO4	Function effectively as an individual and in a team to accomplish the given task
ECT281 ELECTRONIC CIRCUITS	CO1	Realize simple circuits using diodes, resistors and capacitors
	CO2	Design amplifier and oscillator circuits
	CO3	Design Power supplies, D/A and A/D convertors for various applications
	CO4	Design Power supplies, D/A and A/D convertors for various applications

Semester IV

Course Code & Course Name	CO No	CO Description
ECT202 ANALOG CIRCUITS	CO1	Design analog signal processing circuits using diodes and first order RC circuit
	CO2	Analyse basic amplifiers using BJT and MOSFET
	CO3	Apply the principle of oscillator and regulated power supply circuits.
ECT204 SIGNALS AND SYSTEMS	CO1	Apply properties of signals and systems to classify them
	CO2	Represent signals with the help of series and transforms
	CO3	Describe orthogonality of signals and convolution integral.
	CO4	Apply transfer function to compute the LTI response to input signals.
	CO5	Apply sampling theorem to discretize continuous time signals
ECT 206 COMPUTER ARCHITECTURE AND MICROCONTROLLERS	CO1	Explain the functional units, I/O and memory management w.r.t a typical computer architecture.
	CO2	Distinguish between microprocessor and microcontroller
	CO3	Develop simple programs using assembly language programming.
	CO4	Interface 8051 microcontroller with peripheral devices using ALP/Embedded C
	CO5	Familiarize system software and Advanced RISC Machine Architecture.

Course Code & Course Name	CO No	CO Description
ECL202 ANALOG CIRCUITS AND SIMULATION LAB	CO1	Design and demonstrate the functioning of basic analog circuits using discrete components.
	CO2	Design and simulate the functioning of basic analog circuits using simulation tools.
	CO3	Function effectively as an individual and in a team to accomplish the given task.
ECL204 MICROCONTROLLER LAB	CO1	Write an Assembly language program/Embedded C program for performing data manipulation.
	CO2	Develop ALP/Embedded C Programs to interface microcontroller with peripherals
	CO3	Perform programming/interfacing experiments with IDE for modern microcontrollers.
EST200 DESIGN AND ENGINEERING	CO1	Explain the different concepts and principles involved in design engineering.
	CO2	Apply design thinking while learning and practicing engineering.
	CO3	Develop innovative, reliable, sustainable and economically viable designs incorporating knowledge in engineering

Semester V

Course Code & Course Name	CO No	CO Description
ECT301 LINEAR INTEGRATED CIRCUITS	CO1	Design operational amplifier circuits for various applications
	CO2	Design Oscillators and active filters using op amps
	CO3	Explain the working and applications of timer, VCO and PLL ICs
	CO4	Outline the working of Voltage regulator IC's and Data converters
	CO5	Mapping of course outcomes with program outcomes
ECT 303 DIGITAL SIGNAL PROCESSING	CO1	solve basic problems involving DFT based filtering methods
	CO2	Compute DFT and IDFT using DIT and DIF radix-2 FFT algorithms
	CO3	Design linear phase FlR filters and IIR filters for a given specification
	CO4	Illustrate the various FIR and IIR filter structures for the realization of the given system function

	CO5	Explain the basic multi-rate DSP operations decimation and interpolation in both time and frequency domains using supported mathematical equations
	CO6	Explain the architecture of DSP processor (TMS320C67xx) and the finite word length effects
ECT305 ANALOG AND DIGITAL COMMUNICATIONS	CO1	Explain the existent analog communication systems
	CO2	Apply the concepts of random processes to LTI systems.
	CO3	Apply waveform coding techniques in digital transmission.
	CO4	Apply GS procedure to develop digital receivers.
	CO5	Apply equalizer design to counteract ISI.
	CO6	Apply digital modulation techniques in signal transmission.
ECT 307 CONTROL SYSTEMS	CO1	Analyse electromechanical systems by mathematical modelling and derive their transfer function
	CO2	Determine Transient and Steady State behaviour of systems using standard test signal
	CO3	Determine absolute stability and relative stability of a system
	CO4	Apply frequency domain techniques to assess the system performance and to design a control system with suitable compensation techniques
	CO5	Analyse system Controllability and Observability using state space representation
ECL331 ANALOG INTEGRATED CIRCUITS AND SIMULATION LAB	CO1	Use data sheets of basic Analog Integrated Circuits and design and implement application circuits using Analog ICs.
	CO2	Design and simulate the application circuits with Analog Integrated Circuits using simulation tools.
	CO3	Function effectively as an individual and in a team to accomplish the given task.
ECL333 DSP LAB	CO1	Simulate digital signals
	CO2	verify the properties of DFT computationally
	CO3	Familiarize the DSP hardware and interface with the computer.
	CO4	Implement LTI systems with linear convolution
	CO5	Implement FFT and IFFT and use it on real time signals.

	CO6	Implement FIR low pass filter
	CO7	Implement real time LTI systems with block convolution and FFT.
ECT381 EMBEDDED SYSTEM	CO1	Understand and gain the basic idea about the embedded system
	CO2	Able to gain architectural level knowledge about the system and hence to program an embedded system.
	CO3	Apply the knowledge for solving the real life problems with the help of an embedded system
ECT393 FPGA BASED SYSTEM DESIGN	CO1	Design simple digital systems with programmable logic devices
	CO2	Analyze the architecture of FPGA
	CO3	Analyze the design considerations of FPGA
	CO4	Design simple combinational and sequential circuits using FPGA

Semester VI

Course Code & Course Name	CO No	CO Description
ECT302 ELECTROMAGNETICS	CO1	To summarize the basic mathematical concepts related to electromagnetic vector fields.
	CO2	Analyse Maxwell's equation in different forms and apply them to diverse engineering problems
	CO3	To analyse electromagnetic wave propagation and wave polarization
	CO4	To analyse the characteristics of transmission lines and solve the transmission line problems using Smith chart.
	CO5	To analyse and evaluate the propagation of EM waves in Waveguides.
ECT304 VLSI CIRCUIT DESIGN	CO1	Explain the various methodologies in ASIC and FPGA design.
	CO2	Design VLSI Logic circuits with various MOSFET logic families.
	CO3	Compare different types of memory elements.
	CO4	Design and analyse data path elements such as Adders and multipliers.
	CO5	Explain MOSFET fabrication techniques and layout design rules.
ECT306 INFORMATION THEORY AND CATEGORY	CO1	Explain measures of information-entropy, conditional entropy, mutual information
	CO2	Apply Shannon's source coding theorem for data compression.
	CO3	Apply the concept of channel capacity for characterize limits of error-

		free transmission
	CO4	Apply linear block codes for error detection and correction
	CO5	Apply algebraic codes with reduced structural complexity for error correction
	CO6	Understand encoding and decoding of convolutional and LDPC codes
ECT 308 COMPREHENSIVE COURSE WORK	CO1	Apply the knowledge of circuit theorems and solid state physics to solve the problems in electronic Circuits
	CO2	Design a logic circuit for a specific application
	CO3	Design linear IC circuits for linear and non-linear circuit applications.
	CO4	Explain basic signal processing operations and Filter designs
	CO5	Explain existent analog and digital communication systems
ECL332 COMMUNICATION LAB	CO1	Setup simple prototype circuits for waveform coding and digial modulation techniques working in a team.
	CO2	Simulate the error performance of a digital communication system using standard binary and M-ary modulation schemes.
	CO3	Develop hands-on skills to emulate a communication system with software-designed-radio working in a team.
ECD334 MINI PROJECT	CO1	Be able to practice acquired knowledge within the selected area of technology for project development.
	CO2	Identify, discuss and justify the technical aspects and design aspects of the project with a systematic approach
	CO3	Reproduce, improve and refine technical aspects for engineering projects
	CO4	Work as a team in development of technical projects.
	CO5	Communicate and report effectively project related activities and findings necessary for image processing
ECT352 DIGITAL IMAGE PROCESSING	CO1	Distinguish/ Analyse the various concepts and mathematical transforms
	CO2	Differentiate and interpret the various image enhancement techniques
	CO3	Illustrate image segmentation algorithm
	CO4	Understand the basic image compression techniques
ECT382 VLSI CIRCUITS	CO1	Explain the working of various functional building blocks used in digital

Course Code & Course Name	CO No	CO Description
		system design
	CO2	Explain Structure and working of MOSFETS and basic VLSI circuits using MOSFET
	CO3	Explain the circuit technique used to implement dynamic logic and storage cells
	CO4	Explain the application specific integrated circuit design flow and design approached
	CO5	Explain the programmable logic cells, programming technologies, different type of io cells and different timing constraints in ASIC design_
ECT 394 ELECTRONIC DESIGN	CO1	Apply Search Algorithms and Shortest Path Algorithms to find various graph solutions.
	CO2	Outline VLSI Design Flow and Design Styles and apply partitioning algorithms on graphs representing netlist.
	CO3	IIlustrate Design Layout Rules and apply different algorithms for layout compaction.
	CO4	Make use of various algorithms to solve placement and floorplan problems.
	CO5	Utilise different algorithms to solve routing problems

Semester VII		
Course Code & Course Name	**CO No**	**CO Description**
ECT 401 MICROWAVES AND ANTENNAS	CO1	Understand the basic concept of antennas and its parameters
	CO2	Analyze the far field pattern of Short dipole and Half wave dipole antenna
	CO3	Design of various broadband antennas, arrays and its radiation patterns.
	CO4	Illustrate The principle of operation of cavity resonators and various microwave sources
	CO5	Explain various microwave hybrid circuits and microwave semiconductor devices.
ECT 423 COMPUTER NETWORKS (Program ElectiveII)	CO1	Describe the protocols used in web and email applications.
	CO2	Analyse problems pertaining to reliable data transfer, flow control and

		congestion over a TCP network.
	CO3	Apply Dijkstra's algorithm and distance-vector algorithm in the context of routing over computer networks.
	CO4	Analyze the performance of collision avoidance algorithms in random access protocols such as ALOHA.
	CO5	Analyze the delay performance of an ARQ system using standard queueing models.
MCN401 INDUSTRIAL SAFETY ENGINEERING	CO1	Describe the theories of accident causation and preventive measures of industrial accidents. (Cognitive Knowledge level: Understand)
	CO2	Explain about personal protective equipment, its selection, safety performance & indicators and importance of housekeeping. (Cognitive Knowledge level: Understand)
	CO3	Explain different issues in construction industries. (Cognitive Knowledge level: Understand)
	CO4	Describe various hazards associated with different machines and mechanical material handling. (Cognitive Knowledge level: Understand)
	CO5	Utilise different hazard identification tools in different industries with the knowledge of different types of chemical hazards. (Cognitive Knowledge level: Apply)
ECL 411 ELECTROMAGNETICS LAB	CO1	Familiarize the basic Microwave components and to analyse few microwave measurements and its parameters
	CO2	Understand the principles of fiber-optic communications and the different kind of losses, signal distortion and other signal degradation factors.
	CO3	Design and simulate basic antenna experiments with simulation tools.
ECQ 413 SEMINAR	CO1	Identify academic documents from the literature which are related to her/his areas of interest (Cognitive knowledge level: Apply)
	CO2	Read and apprehend an academic document from the literature which is related to her/ his areas of interest (Cognitive knowledge level: Analyze).
	CO3	Prepare a presentation about an academic document (Cognitive knowledge level: Create).
	CO4	Give a presentation about an academic document (Cognitive knowledge level: Apply).

	CO5	Prepare a technical report (Cognitive knowledge level:Create)
ECD 415 PROJECT PHASE I	CO1	Model and solve real world problems by applying knowledge across domains (Cognitive knowledge level: Apply).
	CO2	Develop products, processes or technologies for sustainable and socially relevant applications (Cognitive knowledge level: Apply)
	CO3	Function effectively as an individual and as a leader in diverse teams and to comprehend and execute designated tasks (Cognitive knowledge level: Apply).
	CO4	Plan and execute tasks utilizing available resources within timelines, following ethical and professional norms (Cognitive knowledge level: Apply).
	CO5	Identify technology/research gaps and propose innovative/creative solutions (Cognitive knowledge level: Analyze).
	CO6	Organize and communicate technical and scientific findings effectively in written and oral forms (Cognitive knowledge level: Apply).
ECD481 MINI PROJECT (MINOR)	CO1	Be able to practice acquired knowledge within the selected area of technology for project development.
	CO2	Identify, discuss and justify the technical aspects and design aspects of the project with a systematic approach.
	CO3	Reproduce, improve and refine technical aspects for engineering projects
	CO4	Work as a team in development of technical projects.
	CO5	Communicate and report effectively project related activities and findings.
ECT495 RF MEMS (HONOURS)	CO1	Understand the various fabrication techniques and actuation mechanisms used in RF -MEMS design and apply them in practical situations
	CO2	Explain the principle of operation of MEMS switches
	CO3	Understand the construction and principle of operation of micromachined inductors and capacitors
	CO4	Understand the construction and principle of operation of micromachined RF filters and phase shifters
	CO5	Analyse the performance improvement of antenna due to micromachining techniques.

Course Code & Course Name	CO No	CO Description
	CO6	Identify the constraints in integration and packaging of RF MEMS devices
Semester VIII		
Course Code & Course Name	**CO No**	**CO Description**
ECT 402 WIRELESS COMMUNICATION	CO1	Summarize the basics of cellular system and cellular design fundamentals.
	CO2	Describe the wireless channel models and discuss capacity of wireless channels.
	CO3	Analyze the performance of the modulation techniques for flat-fading channels and multicarrier modulation.
	CO4	Illustrate how receiver performance can be enhanced by various diversity techniques.
	CO5	Identify advantages of various equalization techniques and multiple-access techniques in wireless communication.
	CO6	Calculate system parameters such antenna height, range, maximum usable frequency in different modes of radio wave propagation.
ECT 434 SECURE COMMUNICATION (PROGRAM ELECTIVE III)	CO1	Explain network security services and mechanisms and the types of attacks they are designed for
	CO2	Model the symmetric encryption process and different encryption techniques
	CO3	Apply the concepts of group, ring, field,modular arithmetic, Euclidean algorithm,Finite fields and polynomial arithmetic
	CO4	Illustrate the principles of modern symmetric ciphers like the Data Encryption Standard and Advanced Encryption Standard
	CO5	Outline the concepts of public key cryptography, RSA algorithm, key distribution and management for public key systems
	CO6	Explain the requirements for authentication and the types of functions used to produce an authenticator
ECT 426 REAL TIME OPERATING SYSTEM (Program Elective IV)	CO1	Summarize the functions and structure of general-purpose operating systems.
	CO2	Use different scheduling algorithms on processes and threads
	CO3	Interpret a real time operating system along with its synchronization, communication and interrupt handling tools.

	CO4	Illustrate task constraints and analyze the different scheduling algorithms on tasks
	CO5	Illustrate the applications of real time operating systems.
ECT 418 MECHATRONICS (PROGRAM ELECTIVE V)	CO1	Understand the working principles of various sensors and actuators in Mechatronics systems and be able to choose the suitable one for the real world application
	CO2	Formulate and simulate models of mechatronics systems
	CO3	Explain the implementation of PLC in mechatronics applications
	CO4	Explain the standard fabrication techniques and principle of operation of MEMS devices
	CO5	Design and Analysis of commonly encountered mechatronics systems for real time applications
ECD416 PROJECT PHASE II	CO1	Model and solve real world problems by applying knowledge across domains (Cognitive knowledge level: Apply)
	CO2	Develop products, processes or technologies for sustainable and socially relevant applications (Cognitive knowledge level: Apply).
	CO3	Function effectively as an individual and as a leader in diverse teams and to comprehend and execute designated tasks (Cognitive knowledge level: Apply).
	CO4	Plan and execute tasks utilizing available resources within timelines, following ethical and professional norms (Cognitive knowledge level: Apply)
	CO5	Identify technology/research gaps and propose innovative/creative solutions (Cognitive knowledge level: Analyze).
	CO6	Organize and communicate technical and scientific findings effectively in written and oral forms (Cognitive knowledge level: Apply).
ECD482 MINI PROJECT(MINOR)	CO1	Be able to practice acquired knowledge within the selected area of technology for project development.
	CO2	Identify, discuss and justify the technical aspects and design aspects of the project with a systematic approach.
	CO3	Reproduce, improve and refine technical aspects for engineering projects
	CO4	Work as a team in development of technical projects.

	CO5	Communicate and report effectively project related activities and findings
ECD496 MINI PROJECT (HONOUR)	CO1	Be able to practice acquired knowledge within the selected area of technology for project development.
	CO2	Identify, discuss and justify the technical aspects and design aspects of the project with a systematic approach.
	CO3	Reproduce, improve and refine technical aspects for engineering projects.
	CO4	Work as a team in development of technical projects.
	CO5	Communicate and report effectively project related activities and findings.