



COURSE OUTCOMES (CO) IN SECOND YEAR

Analog Electronics – I (ETEC203)	
CO.ETEC.203.1	Recall the basics of BJT and compare the different biasing circuits for transistor configurations.
CO.ETEC.203.2	Illustrate the detailed analysis of BJT and MOSFET at low frequency to design the multistage amplifier.
CO.ETEC.203.3	Make use of feedback in different configurations of BJT.
CO.ETEC.203.4	Apply the MOSFET and its application in designing of circuits.
CO.ETEC.203.5	Analyze the performance of classification of power amplifier
CO.ETEC.203.6	Examine the performance of thyristors and different types of tuned amplifiers.

Switching Theory and Logic Design (EETEC205)	
CO.EETEC.205.1	Apply the basic concepts of Boolean Algebra, Switching Theory and Logic Design techniques to solve problems.
CO.EETEC.205.2	Analyse the outputs of all gates using NAND & NOR gates
CO.EETEC.205.3	Design the various combinational circuits such as adders, subtractors, multiplexers, and demultiplexers.
CO.EETEC.205.4	Evaluate the outcomes of ALU.
CO.EETEC.205.5	Construct the various sequential circuits such as Flip-flops, Registers, Counters, PLA, and PAL.
CO.EETEC.205.6	Simulate the Carry look ahead adder, priority encoder and Mealy and Moore systems.

Electronic Instruments and Measurements (EETEC207)	
CO.EETEC.207.1	Compare the different types of measuring instruments, their construction, operation and characteristics.
CO.EETEC.207.2	List the various parameters used for electrical and electronic measuring instruments.
CO.EETEC.207.3	Explain the concept behind the instrumentation which can be applied to perform various electrical parameters
CO.EETEC.207.4	Develop the structure of testing and measuring set up for both electrical and electronic systems.
CO.EETEC.207.5	Apply the knowledge about transducers effectively.
CO.EETEC.207.6	Compare different types of display systems, recordings and distinguish between analog and digital meter.



Data Structures (ETCS209)	
CO ETCS 209.1	Define various problems and apply algorithmic methods for successful solutions.
CO ETCS 209.2	Demonstrate the commonly used applications and representations of arrays, linked lists, stacks, queues and trees.
CO ETCS 209.3	Apply various algorithms to solve the problems of searching and manipulation of data.
CO ETCS 209.4	Examine the use of fundamental data structures and algorithm appropriately to solve a number of computational problems.
CO ETCS 209.5	Choose an appropriate algorithm to solve the problems of Graphs Applications
CO ETCS 209.6	Build appropriate hashing function for an application and apply sorting algorithms on the data.

Signals and Systems (EETEC211)	
CO.EETEC.211.1	Understand and apply the mathematical description and representation of continuous and discrete signals and systems
CO.EETEC.211.2	Develop input output relationship for linear shift invariant system and understand the convolution operation for continuous and discrete time system.
CO.EETEC.211.3	Understand and judge the signals in frequency domain using Fourier series and Fourier Transforms
CO.EETEC.211.4	Analyse the Laplace transformation in S-domain and relationship to frequency response
CO.EETEC.211.5	Apply sampling theorem to convert continuous signal into discrete signal
CO.EETEC.211.6	Express Z transforms with their properties by using the concept of ROC and relate with Laplace transform.

Applied Mathematics (ETMA201)	
CO.ETMA.201.1	Understand and apply the mathematical description and representation of continuous and discrete signals and systems
CO.ETMA.201.2	Develop input output relationship for linear shift invariant system and understand the convolution operation for continuous and discrete time system.
CO.ETMA.201.3	Understand and judge the signals in frequency domain using Fourier series and Fourier Transforms
CO.ETMA.201.4	Analyse the Laplace transformation in S-domain and relationship to frequency response
CO.ETMA.201.5	Apply sampling theorem to convert continuous signal into discrete signal
CO.ETMA.201.6	Express Z transforms with their properties by using the concept of ROC and relate with Laplace transform.



Analog Electronics Lab (ETEC251)	
CO.ETEC.251.1	Find input and output characteristics of a transistor in common emitter configuration
CO.ETEC.251.2	Compare the Measurement of operating point in fixed bias circuit and potential divider biasing circuit
CO.ETEC.251.3	Experiment with FET characteristics & MOSFET characteristics.
CO.ETEC.251.4	Develop the cascading of amplifier to increase the gain with subsequent stages.
CO.ETEC.251.5	Make use of feedback in amplifier for different configurations of BJT.
CO.ETEC.251.6	Analyze the wave shapes and voltages at various points of a UJT relaxation oscillator circuit.

Switching Theory and Logic Design Lab (ETEC253)	
CO.ETEC.253.1	Apply the basic concepts of Boolean Algebra, Switching Theory and Logic Design techniques to solve problems.
CO.ETEC.253.2	Analyse the outputs of all gates using NAND & NOR gates
CO.ETEC.253.3	Design the various combinational circuits such as adders, subtractors, multiplexers, and demultiplexers.
CO.ETEC.253.4	Evaluate the outcomes of ALU.
CO.ETEC.253.5	Design the various sequential circuits such as Flip-flops, Registers, Counters, PLA, and PAL.
CO.ETEC.253.6	Simulate the Carry look ahead adder, priority encoder and Mealy and Moore systems.

Electronic Instruments and Measurements Lab (ETEC257)	
CO.ETEC.257.1	Measure the electrical parameters using measuring systems.
CO.ETEC.257.2	Calibrate and test measuring instruments.
CO.ETEC.257.3	Understand how physical quantities are converted into electrical.
CO.ETEC.257.4	Demonstrate different types of display devices and printers
CO.ETEC.257.5	Measure Quantities using Analog and Digital Oscilloscopes
CO.ETEC.257.6	Classify and use of Different types of Transducers



Signals and Systems Lab (ETEC259)	
CO.ETEC.259.1	Practice the basics concepts of MATLAB syntax, functions and programming.
CO.ETEC.259.2	Illustrate the various continuous and discrete time signals.
CO.ETEC.259.3	Construct the basic operations of convolution and correlation on the signals.
CO.ETEC.259.4	Judge the spectral characteristics of signals using Fourier analysis.
CO.ETEC.259.5	Justify the spectra of sampled signal
CO.ETEC.259.6	Measure the systems using Z-transform.

Data Structures Lab (ETEC255)	
CO.ETCS.255.1	Define the time and space efficiency of the data structure.
CO.ETCS.255.2	Demonstrate the commonly used applications and representations of arrays, linked lists, stacks and queues.
CO.ETCS.255.3	Apply various algorithms to solve the problems of searching, sorting and manipulation of data.
CO.ETCS.255.4	Simplify design of experiments and synthesis of the information to provide valid conclusions using algorithmic approach.
CO.ETCS.255.5	Choose and implement efficient data structures and apply them to solve problems.
CO.ETCS.255.6	Build appropriate algorithms for trees and graphs.

Applied Mathematics – IV (ETMA 202)	
CO.ETMA.202.1	Examine the equations in several independent variable and to solve them.
CO.ETMA.202.2	Compare and interpret the variation between theoretical and experimental distributions in situations that involve elements of chance.
CO.ETMA.202.3	Develop an understanding of statistics and probability and will use them to describe sets of data, model situations, and support appropriate inferences and arguments.
CO.ETMA.202.4	Calculate and interpret the relationship between bi-variate data
CO.ETMA.202.5	Explain the process of sampling and the effects of under sampling.
CO.ETMA.202.6	Construct a given simplified description of a suitable real-world problem as a mathematical equation and solve by suitable methods.



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Analog Electronics – II (ETEC204)	
CO.ETEC.204.1	Ability to explain the basics of op-amp (IC 741) based amplifier and its linear and non-linear amplification to obtain mathematical operations
CO.ETEC.204.2	Ability to illustrate the differential amplifier circuit to compare the current mirror circuits for improving CMRR (common mode rejection ratio)
CO.ETEC.204.3	Ability to design the different types of oscillator using op-amp (IC 741) with desired frequency of oscillation,
CO.ETEC.204.4	Ability to develop the different types of active filter circuits using op-amp (IC 741) with desired cut off frequency
CO.ETEC.204.5	Ability to compare the waveform generation in astable and monostable mode using op-amp (IC 741) as well as IC 555 timer
CO.ETEC.204.6	Ability to analyse the concept of OTA (operational transconductance amplifier) and its applications

Network Analysis and Synthesis (ETEC206)	
CO.ETEC.206.1	Provide an insight into the concept of realizing electrical circuits in various forms.
CO.ETEC.206.2	Describe and model different types of RL, RC and RLC electrical circuits.
CO.ETEC.206.3	Realize different parameters of Two port networks and operate the networks as functions in different forms.
CO.ETEC.206.4	Compute and examine different types of electrical circuit problems in Foster I and II, Cauer I and II forms. To identify and design different filters according to their characteristics.
CO.ETEC.206.5	Appraise the values of different elements and parameters resulting in diagnosis of error and faulty connections
CO.ETEC.206.6	Design different classical circuits, two port networks and many more complex frameworks on the basis of desired requirement.

Communication Systems (ETEC212)	
CO ECE 212.1	Define and apply various terminologies related to communication system
CO ECE 212.2	Compare various types of radio receivers & its characteristics
CO ECE 212.3	Correlate the concept of random variables to communication system
CO ECE 212.4	Explain the working of modulation and demodulation circuit for analog communication.
CO ECE 212.5	Estimate the effect of noise in communication system
CO ECE 212.6	Formulate the performance of analog communication system Models.



Electromagnetic Field Theory (ETEE 210)	
COECE210.1	Apply the various terminologies to elucidate the phenomenon of electromagnetics.
COECE210.2	Analyse the behaviour of static and time varying fields at the boundary of two different mediums.
COECE210.3	Apply the mathematical tools such as coordinate geometry and vector calculus in the problems of electromagnetics.
COECE210.4	Solve the problems related to field intensity, flux density and potential using the fundamental laws of electromagnetics.
COECE210.5	Analyse the propagation of EM wave in different mediums using Maxwell's equations.
COECE210.6	Analyse the behaviour of transmission line through mathematical modelling.
Computer Organization and Architecture (ETCS 204)	
CO.ETCS 204.1	Define the fundamental components for computer design and organisation.
CO.ETCS 204.2	Illustrate architecture along with instruction set of 8085 microprocessor.
CO.ETCS 204.3	Apply arithmetic microoperations in computer system.
CO.ETCS 204.4	Analyze cache mapping and the various parts of memory hierarchy.
CO.ETCS 204.5	Explain the control unit design with parallel computing
CO.ETCS 204.6	Discuss the concepts of input-output organisation.

Applied Mathematics Lab (ETMA 252)	
CO.ETMA 252.1	Develop programming techniques to solve algebraic and transcendental equation by numerical methods.
CO.ETMA 252.2	Design programs for mathematical methods to solve differential equations.
CO.ETMA 252.3	Make use of programs of numerical analysis in the field of engineering.
CO.ETMA 252.4	Compose reports and presentations by construting different plots.
CO.ETMA 252.5	Utilize features of MATLAB \ C/C ++ /MS EXCEL as a programming tool.
CO.ETMA 252.6	Solve simple graphic objects in MATLAB / C/C ++ / MS EXCEL .



Network Analysis and Synthesis Lab (ETEC258)

CO.ETEC.258.1	Build an electrical circuit/ or network on a bread board.
CO.ETEC.258.2	Measure nodal voltages, branch currents, impedance and admittance of any electrical network topology.
CO.ETEC.258.3	Determine various two port network parameters for a linear, bilateral and time invariant network.
CO.ETEC.258.4	Evaluate two port network parameters of an inter-connected networks.
CO.ETEC.258.5	Compare the practically obtained parameters with the theoretical data.
CO.ETEC.258.6	Analyse the transient response of an LTI electrical network using Computer Software.

Communication System Lab (ETEC256)

CO 256.1	Define and Apply the concept of modulation and demodulation of communication signals.
CO 256.2	Analyze amplitude modulation and demodulation techniques.
CO 256.3	Evaluate modulation index from amplitude modulated waveform .
CO 256.4	Illustrate FM using different modulation techniques.
CO 256.5	Justify demodulation of FM using different methods.
CO 256.6	Deduce the function of Superheterodyne Receiver

Analog Electronics – II Lab (ETEC254)

CO.ETEC.254.1	Illustrate the op-amp (IC 741) to obtain the gain as inverting and non inverting amplifier.
CO.ETEC.254.2	Compare the output of differentiator and integrator circuit for square wave input.
CO.ETEC.254.3	Experiment with the use of op-amp as adder, subtractor, clipper and precision rectifier.
CO.ETEC.254.4	Measure the frequency of oscillation and amplitude for RC phase shift and Wein bridge oscillator.
CO.ETEC.254.5	Design of Monostable and Astable multivibrator using op-amp (IC 741) and IC 555 timer.
CO.ETEC.254.6	Design of the active filter circuit using op-amp (IC 741).



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COA Lab (ETEC 260)	
CO.ETCS 254.1	Define the basics of logic gates and levels of programming language.
CO.ETCS 254.2	Illustrate internal architecture and pin diagram of 8085 microprocessor.
CO.ETCS 254.3	Choose the appropriate instruction from available instruction set.
CO.ETCS 254.4	Analyze the results produced by the 8085 microprocessor simulator.
CO.ETCS 254.5	Evaluate the computer design and organization of 8085 microprocessor.
CO.ETCS 254.6	Formulate efficient assembly language programs for different micro operations.



COURSE OUTCOMES (CO) IN THIRD YEAR

Communication Skills for Professionals (ETHS301)	
CO.ETHS.301.1	Define and understand social skills to function effectively as a professional.
CO.ETHS.301.2	Explain how to overcome problems and limitations in work environment.
CO.ETHS.301.3	Make use of vocabulary and advanced writing skills to communicate and function effectively as an individual and as a leader
CO.ETHS.301.4	Function in diverse teams and multidisciplinary environment with emotional awareness.
CO.ETHS.301.5	Assess the fundamentals of ethics and values to function effectively in a multidisciplinary and cross-cultural environment.
CO.ETHS.301.6	Develop lifelong learning through work in order to perform efficiently.

Digital Communication (ETEC303)	
CO.ETEC.303.1	Define the basic knowledge of Digital Communication including Line coding, Modulation techniques.
CO.ETEC.303.2	Illustrate the concept of Signal processing involved in Digital Communication with time and frequency domain fundamental.
CO.ETEC.303.3	Apply theory of probability in identifying, solving relevant problems and compute density and distribution functions.
CO.ETEC.303.4	Design an optimum parameter selection criterion satisfying digital communication requirement.
CO.ETEC.303.5	Determine the SNR of various filters and sketch the impulse response of Matched filter.
CO.ETEC.303.6	Examine the Bandwidth and error probability of the different digital modulation techniques.

Microprocessors and Microcontrollers (ETEC305)	
CO.ETEC.305.1	Solve basic binary math operations using the microprocessor
CO.ETEC.305.2	Illustrate programming proficiency using the various addressing modes and data transfer instructions of the target microprocessor and microcontroller
CO.ETEC.305.3	Compare accepted standards and guidelines to select appropriate Microprocessor (8085 & 8086) and Microcontroller to meet specified performance requirements.
CO.ETEC.305.4	Construct assembly language programs and select appropriate assembler for conversion into machine language for processor.
CO.ETEC.305.5	Design electrical circuitry to the Microprocessor I/O ports in order to interface the processor to external devices.
CO.ETEC.305.6	Evaluate assembly language programs and machine code that will provide solutions to real- world control problems using microcontroller.



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Control Systems (ETEL307)	
CO.ETEL.307.1	Define the classification of control system that lead to relate the practical complexities of applications in control systems
CO.ETEL.307.2	Find the performance parameters of a system by steady state error calculation in time domain specifications with variations of inputs and modify the values of the parameter of the system by proportional, integral and/or derivative controllers.
CO.ETEL.307.3	Illustrate the fundamental concepts of control systems and mathematical modeling of Systems and time response and frequency response of systems in LTI system.
CO.ETEL.307.4	Solve the relationship between hardware results in practical experimental observations in comparison to theory for stability analysis.
CO.ETEL.307.5	Inspect for stability analysis of nth order system by different techniques i.e. root locus, nyquist criteria, compensation techniques etc.
CO.ETEL.307.6	Test for graphical presentations of laboratory data and computational results and compare it with numerical calculation.

Digital System Design (ETEC309)	
CO.ETEC.309.1	Illustrate the Digital system design flow.
CO.ETEC.309.2	Classify the concepts of VHDL constructs.
CO.ETEC.309.3	Articulate combinational logic circuits using various VHDL design topologies.
CO.ETEC.309.4	Illustrate sequential logic circuits using various VHDL design topologies.
CO.ETEC.309.5	Evaluate synchronous sequential circuits using FSM VHDL modeling.
CO.ETEC.309.6	Design asynchronous sequential circuits and infer place and route, CPLDs architecture.

Industrial Management (ETMS311)	
CO.ETMS.311.1	To Describe the Concepts of Industrial Relation for cooperation in the organization
CO.ETMS.311.2	To Examine the means and methods of trade unions for conflict ,Management
CO.ETMS.311.3	To Compare the various quality Management technique for increasing efficiency in the organization
CO.ETMS.311.4	To Facilitate the methods and techniques to increae the profitability of the organization
CO.ETMS.311.5	To illustrate the various intergrated system which include people, material , information , equipment and environment
CO.ETMS.311.6	To Hypothesize various Time Management technique for increasing the work producctivity and profit of thr organization



Communication Skills for Professionals Lab (ETHS351)	
CO.ETHS.351.1	To help students understand how to plan and prepare for Interviews and learn to communicate effectively in multi-disciplinary settings and exhibit responsible engineering practices.
CO.ETHS.351.2	To explain the students the various aspects of phonetics while applying appropriate tools and techniques in order to engage in public speaking and communicate effectively
CO.ETHS.351.3	Helping students to apply verbal and nonverbal communication to make effective presentations in order to manage projects and function effectively
CO.ETHS.351.4	Helping students analyze the nuances of group discussion and apply fundamental knowledge and understanding and function effectively as a member or a leader in diverse teams
CO.ETEC.351.5	Assess conversational skills through role plays and learn to communicate effectively as an individual and apply these to one's own work.
CO.ETHS.351.6	Plan, deliver and formulate the essentials of public speaking and learn to work as a leader in diverse teams and multi-disciplinary environments in order to recognize the need for professionalism

Digital System Design Lab (ETEC351)	
CO.ETEC.351.1	Determine VHDL programming for sequential circuits.
CO.ETEC.351.2	Illustrate VHDL programming for combinational circuits.
CO.ETEC.351.3	Explain outputs and waveform of Adder, Subtractor, MUX, Demux etc.
CO.ETEC.351.4	Conclude and simulate outputs and waveform of ALU, Clock divider, Multiplier etc.
CO.ETEC.351.5	Conduct experiments as individuals by using Modern tools like XILINX.
CO.ETEC.351.6	Make effective report based on experiments and observations.

Control Systems Lab (ETEL355)	
CO.ETEL.355.1	Relate the basics of control systems with MATLAB/SIMULINK from practical and application point of view.
CO.ETEL.355.2	Describe a physical control system and its components like servo, synchro, etc.
CO.ETEL.355.3	Construct or model a transfer functions from the mathematical model of the physical system and experiment with analytical testing tools.
CO.ETEL.355.4	Interpret and describe the control system from its responses in MATLAB/SIMULINK for test inputs such as unit step, unit ramp, unit impulse etc.
CO.ETEL.355.5	Select and examine the parameters of a controller (say PID) initially in MATLAB/SIMULINK and finally on the physical control system.
CO.ETEL.355.6	Experiment and examine a control system, and infer or verify the results.



Microprocessors and Microcontrollers Lab (ETEC355)	
CO.ETEE.355.1	Develop basic assembly language programs for microprocessor 8086 using instruction set.
CO.ETEE.355.2	Analyse the mathematical applications using 8086 and 8051 assembly language .
CO.ETEE.355.3	Evaluate basic assembly language programs using software such as 8086 simulator.
CO.ETEE.355.4	Design interfacing circuits using various peripheral devices with 8086 microprocessor
CO.ETEE.355.5	Integrate external memory with 8051 microcontroller.
CO.ETEE.355.6	Validate basic assembly language programs for 8086 and 8051 for practical applications.

Digital Communication Lab (ETEC357)	
CO.ETEC.357.1	Explain the concept of Sampling theorem and its reconstruction.
CO.ETEC.357.2	Identify different digital modulation techniques like PCM,DM ADM & DPCM with S/N ratio & Prob. Of Error.
CO.ETEC.357.3	Observe the various line coding techniques .
CO.ETEC.357.4	Compare the outputs of ASK,PSK & FSK with the help of their S/N ratio & Prob. Of Error.
CO.ETEC.357.5	Design the pass band digital modulation systems to calculate the probability of error.
CO.ETEC.357.6	Analyze different modulation techniques by using MATLAB tool.

Microwave Engineering (ETEC302)	
CO.ETEC.302.1	Able to describe the microwave frequency band, the applications of microwave , microstrip line and also able to use of maxwell's equations and observe the different mode's pattern.
CO.ETEC.302.2	Able to explain the properties of Rectangular waveguide, circular wave guide and Cavity resonator. Also formulate the field expresion as well as resonance frequency for both type of wave guide.
CO.ETEC.302.3	Able to Analyze the properties of S-Matrix and various microwave components and calculate the S- Matix of Various microwave componets.
CO.ETEC.302.4	Able to classify the linear beam tubes and cross field tube as Oscillator or Amplifier and describe the working of these device.
CO.ETEC.302.5	Able to explain and illustrate the Solid state devices, Avalanche transit time device, parametric devices
CO.ETEC.302.6	Able to observe and calculate the parameters of microwave signals as well as components using Frequency meter, Power meter and VSWR meter(Impedance).



Information Theory and Coding (ETEC304)	
CO.ETEC.304.1	Explain uncertainty, information and entropy, and source coding theorem for data compaction.
CO.ETEC.304.2	Outline the channel coding theorem, information capacity and its implications.
CO.ETEC.304.3	Model the encoding and decoding of linear block codes and cyclic codes with generator matrices and polynomials.
CO.ETEC.304.4	Summarize the concept of Turbo Codes and Cryptography.
CO.ETEC.304.5	Apply the information theory and probability theory in source coding, mutual information and channel coding.
CO.ETEC.304.6	Design the encoder, decoder and transfer function of Convolutional Codes.

Digital Signal Processing (ETEC306)	
CO.ETEC.306.1	Ability to apply the knowledge of mathematical description of Discrete Fourier Transform, linear filtering, FFT, Lattice- Ladder structures, Lavinson and schur algorithms
CO.ETEC.306.2	Ability to identify Properties of DFT, FFT and analyze to solve numerical based on DFT, FFT and various Structures
CO.ETEC.306.3	Ability to Design solution using different FFT algorithms, Linear phase filters and the structures of IIR and FIR filters and transformation for digital domain
CO.ETEC.306.4	Ability to estimate analog to digital transformation techniques for various filters, Discrete Hilbert Transform and Round off effects in digital filters
CO.ETEC.306.5	Ability to apply appropriate technique for solution of IIR and FIR filters, decimators and interpolator structures
CO.ETEC.306.6	Ability to identify Symmetric and antisymmetric nature of Filters and schur - cohn stability criterion for Lattice Ladder Structures

VLSI Design (ETEC308)	
CO.ETEC.308.1	To understand the evolution of VLSI ,MOSFET's operation and its characteristics , IC Fabrication and layout process steps for various MOS circuits
CO.ETEC.308.2	To study CMOS inverter circuit on basis of its operation and working and apply lambda based design rules.
CO.ETEC.308.3	To implement various logic gates and design combinational circuits using MOS transistors family.
CO.ETEC.308.4	To design and analyze sequential and dynamic logic circuits
CO.ETEC.308.5	To compute various timing issues, clocking strategies of VLSI designs and study of various digital vlsi design Methodology.
CO.ETEC.308.6	To investigate computer aided design technology and low power design concepts using CMOS Technology



Data Communication and Networks (ETEC310)	
CO.ETEC.310.1	Explain the concept of Data communication and networks, layered architecture and its applications.
CO.ETEC.310.2	Illustrate and set up protocol designing issues for communication networks.
CO.ETEC.310.3	Demonstrate various data link layer protocols for error detection and correction.
CO.ETEC.310.4	Design subnets and supernets and define packet flow on basis of routing protocols.
CO.ETEC.310.5	Estimate congestion control to improve quality of service of networking application.
CO.ETEC.310.6	Identify basic security threats and internet applications.

Antenna and Wave Propagation (ETEC314)	
CO.ETEC.314.1	Understand and Apply the mathematical description of fundamental parameters of an antenna.
CO.ETEC.314.2	Illustrate various types of dipoles like small dipole, short dipole, folded dipole.
CO.ETEC.314.3	Evaluate various theorems like reciprocity and duality used in antenna theory.
CO.ETEC.314.4	Classify various types of antennas like travelling wave, broadband, frequency independent, microstrip and smart antennas.
CO.ETEC.314.5	Access various type of propagations like ground wave, sky wave and space wave propagation.
CO.ETEC.314.6	Measure of antenna properties like reflection coefficient, radiation pattern by using an eochic chamber and vector network analyzer.

Microwave Engineering Lab (ETEC352)	
CO.ETEC.352.1	Demonstrate microwave test bench to measure frequency and wavelength and analyse various modes of propagation exist inside the rectangular and cylindrical waveguide
CO.ETEC.352.2	Identify the working of microwave passive components such as isolator and circulator based on Faraday's rotation
CO.ETEC.352.3	Analyse the properties of E Plane Tee, H Plane Tee and Magic Tee
CO.ETEC.352.4	Study of different properties of Directional Coupler (Two hole coupler).
CO.ETEC.352.5	Explain and understand the characteristics, working of Gunn Diode and Reflex Klystron using Microwave test bench setup.
CO.ETEC.352.6	Perform the working of Micro strip power divider line and LPF using MIC trainer kits



VLSI Design Lab (EETEC354)	
CO.EETEC.354.1	Examine the basics concepts of MOSFET circuits using Tanner EDA tools
CO.EETEC.354.2	Analyse the Characteristics of resistive and CMOS inverter using S-Edit
CO.EETEC.354.3	Design and study the characteristics of Logic gates using S-Edit
CO.EETEC.354.4	Evaluate characteristics of MOS based Combinational circuits using S-Edit
CO.EETEC.354.5	Design sequential circuits using CMOS in S –Edit
CO.EETEC.354.6	Design boolean function and MUX using transmission gates

Digital Signal Processing Lab (EETEC356)	
CO.EETEC.356.1	Ability to apply digital signal processing techniques/ procedures like DFT, FFT and Filter Designing to solve problems.
CO.EETEC.356.2	Ability to analyse outputs of DFT, FFT, Digital filters
CO.EETEC.356.3	Ability to conduct experiments as individuals by using Modern tools like MATLAB / Octave-Online
CO.EETEC.356.4	Ability to design IIR and FIR Filters for the given specifications and analyse its frequency response.
CO.EETEC.356.5	Ability to understand and develop programs on Code Composer Studio DSK 6713 hardware kit
CO.EETEC.356.6	Ability to make effective report based on experiments and observations.

Data Communication Network Lab (EETEC358)	
CO.EETEC.358.1	Demonstrate the fundamental underlying principles of data communication and networks
CO.EETEC.358.2	Identify the functionality and details of layered network architecture
CO.EETEC.358.3	Design network model using IP addressing and subnetting.
CO.EETEC.358.4	Compare the performance of various communication protocols
CO.EETEC.358.5	Choose the best routing algorithm to find shortest path
CO.EETEC.358.6	Test for packet/file transmission between nodes and networks



COURSE OUTCOMES (CO) IN FOURTH YEAR

Embedded Systems (ETEC401)	
CO.ETEC.401.1	Explain the concept of embedded systems, including their architecture, and review concepts associated with 8051 microcontroller.
CO.ETEC.401.2	Describe basic knowledge about fundamentals of PIC and ARM microcontrollers.
CO.ETEC.401.3	Compare ARM and PIC microcontrollers including their architecture and buses.
CO.ETEC.401.4	Illustrate programming proficiency using the various addressing modes and data transfer instructions of the target ARM and PIC microcontrollers.
CO.ETEC.401.5	Define the concept of real-time programming and Embedded System for its quality check
CO.ETEC.401.6	Evaluate task control and real-time scheduling algorithms required to perform multitasking and multischeduling.

Optoelectronics and Optical Communication (ETEC403)	
CO.ETEC.403.1	Demonstrate an understanding of optical fiber communication link, structure, propagation and transmission properties of an optical fiber.
CO.ETEC.403.2	Estimate the losses and analyse the propagation characteristics of an optical signal in different types of fibers
CO.ETEC.403.3	Describe the principles of optical sources and power launching-coupling methods.
CO.ETEC.403.4	Compare the characteristics of fiber optic receivers
CO.ETEC.403.5	Analyse the optical source materials
CO.ETEC.403.6	Classified the different types of network topology and explain the application of optical fiber.

Wireless Communication (ETEC405)	
CO ETEC 405.1	Discover the Evolution and Architecture of Wireless system
CO ETEC 405.2	Analyse multiple access technologies and different fading channel and diversity modeling.
CO ETEC 405.3	Explain the architecture and operation of 2G system.
CO ETEC 405.4	Describe 2.5G system and the concept of wireless LANs and mobile IP.
CO ETEC 405.5	Compare the features of 3G/4G standards
CO ETEC 405.6	Illustrate basic technical standards(WLL/WPAN/Wi-Max)



Database Management System (ETCS425)	
CO.ETEC.425.1	Recall the basic concepts and applications of database management system.
CO.ETEC.425.2	Develop the Entity Relationship (E-R) diagram for the specified problem statement.
CO.ETEC.425.3	Construct the relational model by implementing the SQL queries.
CO.ETEC.425.4	Examine the anomalies present in the database by using normalization forms.
CO.ETEC.425.5	Explain the protocols associated with concurrent transaction processing and recovery techniques.
CO.ETEC.425.6	Compare the database storage structures and access techniques.

Radar and Navigation (ETEC419)	
CO ECE 419.1	Compare the principles of operation of various blocks of Radar systems.
CO ECE 419.2	Define working of different types of radars.
CO ECE 419.3	Correlate the fixed and moving targets using different types of radar systems with different types of display devices and duplexers.
CO ECE 419.4	Explain various techniques employed in radar receivers for detection of signals in noise communication.
CO ECE 419.5	Estimate the principles and working of phased array antennas and their application to radar systems.
CO ECE 419.6	Formulate the various types of navigation mechanism in radar systems

Optical and Wireless Communication Lab (ETEC451)	
CO.ETEC.451.1	Explain the propagation of light through optical fiber.
CO.ETEC.451.2	Design an optical communication link for different type of fibers.
CO.ETEC.451.3	Compute and simulate the modes in step index fiber and graded index fiber.
CO.ETEC.451.4	Identify and simulate different modulation techniques for analog and digital signals.
CO.ETEC.451.5	Calculate the DC characteristics of different types of detectors.
CO.ETEC.451.6	Calculate different types of losses and numerical aperture in optical fiber.



Embedded System Lab (ETEC453)	
CO ETEC 453.1	Discuss the architecture of 8051 and PIC microcontroller with instructions set
CO ETEC 453.2	Comparison of ARM architecture with PIC microcontroller
CO ETEC 453.3	Experiment with peripheral devices such as 7 segment display and stepper motor with microcontroller 8051
CO ETEC 453.4	Demonstrate a series of moving lights using PIC on LEDs
CO ETEC 453.5	Implement assembly language programs on software and hardware kits
CO ETEC 453.6	Design project based on Arm Processor

Minor Project (ETEC459)	
CO ETEC 459.1	Understand acquired knowledge and information to solve the problem in the field of Engg.
CO ETEC 459.2	Discuss the basic requirements for designing of the project with cost effective solution.
CO ETEC 459.3	Explain the suitable techniques & efficient tools for implementation of project.
CO ETEC 459.4	Demonstrate the project skills in the industrial environment.
CO ETEC 459.5	Apply the principle and commit to professional ethics and responsibilities.
CO ETEC 459.6	Illustrate collaborative skills through working in a team to achieve common goals.

Satellite Communication (ETEC404)	
CO.ETEC.404.1	Ability to apply the knowledge of communication system for satellite, satellite orbits, Geo-synchronous satellite, satellite launch, satellite subsystems, ISDN networks
CO.ETEC.404.2	Ability to identify the various types of orbits, different techniques for satellite link design, uplink and downlink transponder for signal transmission.
CO.ETEC.404.3	Ability to design satellite links for uplink and downlink transmission, satellite network.
CO.ETEC.404.4	Ability to evaluate different parameters for orbital mechanism and satellite link design.
CO.ETEC.404.5	Ability to apply appropriate modulation techniques for satellite systems.
CO.ETEC.404.6	Ability to analyze sub satellite points, telemetry, tracking, command and monitoring subsystem.



Ad Hoc and Sensor Networks (ETEC406)	
CO.ETEC.406.1	Develop the basic concept of ad hoc wireless networks, their applications, network architectures and design issues in MAC protocols.
CO.ETEC.406.2	Explain the architecture of MAC layer, their classification and scheduling mechanisms.
CO.ETEC.406.3	Examine the various types of routing protocols used for unicast and multicast routing.
CO.ETEC.406.4	Determine the transport layer and security issues possible in Adhoc sensor Network
CO.ETEC.406.5	Describe wireless sensor network and architectural issues of hybrid wireless network by considering QoS measurements
CO.ETEC.406.6	Compare the performance of wireless geolocation system and recent advances in wireless network

Mobile Computing (ETIT402)	
CO.ETIT.402.1	Define the basics of mobile Computing services and its architecture.
CO.ETIT.402.2	Classify different types of Wireless Application Protocol (WAP) and its application.
CO.ETIT.402.3	Explain the function and applications of Mobile Data Link Layer.
CO.ETIT.402.4	Develop the functionality of Mobile IP and Transport Layer.
CO.ETIT.402.5	Demonstrate the Adhoc networks concepts and its routing protocols.
CO.ETIT.402.6	Make use of mobile operating systems in developing mobile applications.

GPS and GIS (ETIT422)	
CO.ETIT.422.1	Understand and Apply basic graphic and data visualization concepts such as color theory, symbolization, and use of white space.
CO.ETIT.422.2	Ability to Demonstrate proficiency in the use of GIS tools to create Digital maps that are fit-for-purpose and effectively convey the information they are intended to.
CO.ETIT.422.3	Ability to explain and apply different Geographic co-ordinate system.
CO.ETIT.422.4	Ability to understand the different accuracies of consumer, mapping and survey grade GPS units and their component and applications.
CO.ETIT.422.5	Ability to provide exposure to students in gaining knowledge on concepts and applications leading to modeling of earth resources management using Remote Sensing.
CO.ETIT.422.6	Ability to Apply mathematical concepts, including statistical methods, spatial and non-spatial data to be used in geospatial analysis and Interpolation.



Satellite and Antenna Lab (ETEC452)

CO.ETEC.452.1	Apply the knowledge of signal parameters in satellite link design and analysis of link performance.
CO.ETEC.452.2	Identify the various procedures to achieve higher SNR at receiver and improvements in overall system gain.
CO.ETEC.452.3	Design satellite antennas for uplink and downlink transmission in 6/4GHz and 14/11GHz range.
CO.ETEC.452.4	Evaluate different parameters by analyzing radiation pattern of received signal such as signal power, HPBW etc.
CO.ETEC.452.5	Apply appropriate antenna type and its polarization to achieve maximum SNR.
CO.ETEC.452.6	Investigate overall satellite link to improve G/T ratio and enhanced channel capacity.

Mobile Computing Lab (ETEC454)

CO.ETEC.454.1	Ability to apply mobile computing fundamentals to verify the working of SIM card in a GSM handset
CO.ETEC.454.2	Ability to analyse the details of a GSM handset
CO.ETEC.454.3	Ability to conduct experiperimets as individuals to verify AT commands and network registration commands
CO.ETEC.454.4	Ability to make effective report based on experiments and observations.
CO.ETEC.454.5	Ability to demonstrate the function of vibrator in GSM.
CO.ETEC.454.6	Ability to identify and verify network registration command.

Major Project (ETEC456)

CO ETEC 456.1	Apply acquired knowledge and information to solve the problem in the field of Engg.
CO ETEC 456.2	Understanding the basic requirements for designing of the project with cost effective solution.
CO ETEC 456.3	Explain the suitable techniques & efficient tools for implementation of project.
CO ETEC 456.4	Demonstrate the project skills in the industrial environment.
CO ETEC 456.5	Apply the principle and commit to professional ethics and responsibilities.
CO ETEC 456.6	Illustrate collaborative skills through working in a team to achieve common goals.