SEMESTER 1

MAT 101	LINEAR ALGEBRA AND CALCULUS
CO	**Statements**
1	Solve systems of linear equations, diagonalize matrices and quadratic forms
2	Apply partial derivatives in extreme value problem and local linear approximations
3	Apply multiple integrals in areas and volumes of geometrical shapes, mass and centre of gravity of plane laminas
4	Explain the convergence of infinite series
5	Determine the power series expansion of a given function.

CYT100	ENGINEERING CHEMISTRY
CO	**Statements**
1	Describe the basic concepts of electrochemistry and corrosion to explore its possible applications in various engineering fields
2	Interpret the spectral data from spectroscopic techniques like UV-Visible, IR, NMR and its applications or predict the Spectral data of a given structure.
3	Outline the principle, classification, instrumentation, procedure and applications of TGA, DTA, Column Chromatography, TLC, Gas Chromatography, HPLC.
4	Explain the basics of stereochemistry, its application and structure properties application of polymers (Kevlar and ABS plastics)
5	Discuss the quality of water (based on hardness, DO) and water treatment methods (sewage and municipal) to develop skills for treating wastewater.

EST100	ENGINEERING MECHANICS
CO	**Statements**
1	Recall principles and theorems related to rigid body mechanics
2	Describe the components of system of forces acting on the rigid body
3	Apply the conditions of equilibrium to various practical problems involving different force system.
4	solve problems of mechanics by choosing appropriate theorems, principles or formulae.
5	Solve problems involving rigid bodies, applying the properties of distributed areas and masses

EST 120	BASICS OF CIVIL & MECHANICAL ENGINEERING
CO	**Statements**
1	Recall the role of civil engineer in society and to relate the various disciplines of civil engineering
2	Explain different types of buildings, building components, building materials and building construction
3	Describe the importance, objectives and principles of surveying
4	Summarise the basic infrastructure services MEP, HVAC, elevators, escalators and ramps
5	Discuss the materials, energy systems, water management and environment for green buildings
6	Illustrate thermodynamic cycles and calculate its efficiency
7	Summarize the working and features of IC Engines
8	Explain the basic principles of Refrigeration and Air Conditioning
9	Summarize the working of Hydraulic turbines and pumps
10	Outline the working of power transmission elements
11	Summarize the basic manufacturing, metal joining and machining processes

HUN101	LIFE SKILLS
CO	**Statements**
1	Outline different life skills required in personal and professional life.
2	Develop an awareness of the self and apply well defined techniques to cope with emotions and stress.
3	Explain the basic mechanics of effective communication and demonstrate these through presentations.
4	Take part in group discussions.
5	Make use of appropriate thinking and problem solving techniques to solve new problems
6	Demonstrate the basics of team work and leadership.

CYL120	ENGINEERING CHEMISTRY LAB
CO	**Statements**
1	Synthesize of UF resin and PF resin
2	Interpret the IR spectra and NMR spectra of simple organic compounds
3	Estimate the Water Quality parameters (Hardness, DO, pH, Conductivity, Fe content)

ESL120	CIVIL & MECHANICAL WORKSHOP
CO	**Statements**
1	Name the different tools and devices used for civil engineering measurements and explain the uses.
2	Demonstrate the steps involved in basic civil engineering activities of setting and operation, plot measurement and levelling
3	Choose the methods and materials required for basic civil engineering activities of masonry work and plumbing
4	Identify Basic mechanical workshop operations in accordance with the material and objects.
5	Apply appropriate tools and instruments with respect to the mechanical workshop trades
6	Apply appropriate safety measures with respect to mechanical workshop trades.

SEMESTER 2

MAT 102	VECTOR CALCULUS, DIFFERENTIAL EQUATIONS AND TRANSFORMS
CO	**Statements**
1	Explain the theory of derivatives and integrals of vector valued functions.
2	Apply calculus of vector valued functions in the evaluation of integrals, surface integrals and volume integrals.
3	Solve the homogeneous and non homogeneous linear ODE with constant coefficient.
4	Explain the concept of Laplace transforms and Fourier transforms.
5	Solve ODE using Laplace transforms.

EST102	PROGRAMMING IN C
CO	**Statements**
1	Analyze a computational problem and develop an algorithm/flowchart to find its solution
2	Develop readable* C programs with branching and looping statements, which uses Arithmetic, Logical, Relational or Bitwise operators.
3	Write readable C programs with arrays, structure or union for storing the the data to be processed
4	Divide a given computational problem into a number of modules and develop a readable multi-function C program by using recursion if required, to find the solution to the computational problem
5	Write readable C programs which use pointers for array processing and parameter passing
6	Develop readable C programs with files for reading input and storing output

PHT100	ENGINEERING PHYSICS
CO	**Statements**
1	Describe the characteristics of different types of oscillations and waves in engineering systems.
2	Apply the cosine law of thin film interfernce to wedge shaped films and diffraction phenomena in gratings
3	Explain the behavior of matter in atomic level through the principle of quantum mechanics and the basic concept of nanoscience and technology.
4	Derive Maxwell's equation using vector calculus for ststic, magnetic field
5	Describe the phenomenon of superconductivity, the basics of solidstate lighting devices and fibre optic communication systems.

EST110	ENGINEERING GRAPHICS
CO	**Statements**
1	Solve projection of lines inclined to one of the reference planes, true length and traces
2	Construct Orthographic Projections of Solids with axis inlcined to both the reference planes and orthographic view of combination of solids
3	Develop sections of solids with inclined plane and development of solids
4	Construct isometric views of solids and persepective projection of solids
5	Construct orthographc view of objectes from given 3D view
6	Model 2D and 3D objects using software

EST 130	BASICS OF ELECTRICAL & ELECTRONICS ENGINEERING
CO	**Statements**
1	Solve resistive networks by Mesh current and node voltage method
2	Solve magnetic circuits using Faradays law and Ampere circuital law
3	Solve simple AC circuits in steady state condition
4	Describe the working of a voltage amplifier
5	Outline the principle of an electronic instrumentation system
6	Explain the principle of radio and cellular communication

HUN102	PROFESSIONAL COMMUNICATION
CO	**Statements**
1	Develop vocabulary and language skills relevant to engineering as a profession
2	Analyze, interpret and effectively summarize a variety of textual content
3	Create effective technical presentations
4	Discuss a given technical/non-technical topic in a group setting and arrive at generalizations/consensus
5	Identify drawbacks in listening patterns and apply listening techniques for specific needs
6	Create professional and technical documents that are clear and adhering to all the necessary conventions

PHL120	ENGINEERING PHYSICS LAB
CO	**Statements**
1	Apply cosine law in understanding the interference from thin films with Airwedge and Newton's ring setup.
2	Interpret theV-I relation in solar cell, the strain-voltage relation in strain gauge, (m/l2)relation in melde’s arrangement for trans &longi. waves,analysing signal voltage and frequency using CRO.
3	Illustrate the phenomenon of diffraction through transmission grating-using spectrometer and find the dispersive power and resolving power of grating

ESL130	ELECTRICAL & ELECTRONICS WORKSHOP
CO	**Statements**
1	Demonstrate safety measures against electric shocks
2	Identify the tools used for electrical wiring, accessories,wires,cables,batteries and standard symbols
3	Develop the connection diagram,identify the suitable accessories and materials necessary for wiring simple lighting circuits for domestic buildings
4	Identify and test various electronic components
5	Assemble and test electronic circuits on boards
6	Familiarize various equipment in electronic laboratories

SEMESTER 3

MAT 201	Partial Differential Equation and Complex Analysis
CO	**Statements**
1	Solve PDE by different methods
2	Solve one dimensional wave equation and heat equation.
3	Explain the concept of analytic function and its properties.
4	Explain the concept of power series and singularities of analytic function.
5	Evaluation of line integrals of complex functions by different methods.

ECT201	Solid State Devices
CO	**Statements**
1	Calculate carrier concentration in semiconductors
2	Identify the excess carriers in semiconductors and carrier transport in semiconductors
3	Calculate terminal currents in PN junctions and bipolar junction transistors
4	Explain MOSFET characteristics
5	Describe MOSFET scaling techniques and identify the short channel effects

ECT203	Logic Circuit Design
CO	**Statements**
1	Explain the elements of digital system abstractions such as digital representations of information, number systems digital logic and Boolean algebra.
2	Implementation of logic function described by a truth table/ logic functions using basic/universal logic gates and fundamentals of VERILOG modelling.
3	Implementation of combinational logic circuits, arithmetic circuits and their modelling in VERILOG with different levels of abstractions
4	Implementation of sequential logic circuit using the basic building blocks like flip-flops and their modelling in VERILOG with different levels of abstractions.

ECT205	Network Theory
CO	**Statements**
1	Apply Mesh / Node analysis or Network Theorems to obtain steady state response of the linear time invariant networks.
2	Apply Laplace Transforms to determine the transient behaviour of RLC networks.
3	Apply Network functions and Network Parameters to analyse the single port and two port networks.

HUT200	Professional Ethics
CO	**Statements**
1	Understand the core values that shape the ethical behaviour of a professional
2	Adopt a good character and follow an ethical life.
3	Explain the role and responsibility in technological development by keeping personal ethics and legal ethics.
4	Solve moral and ethical problems through exploration and assessment by established experiments.
5	Apply the knowledge of human values and social values to contemporary ethical values and global issues

MCN201	Sustainable Engineering
CO	**Statements**
1	Understand the relevance and the concept of sustainability and the global initiatives in this direction
2	Explain the different types of environmental pollution problems and their sustainable solution
3	Discuss the environmental regulations and standards
4	Outline the concepts related to conventional and non-conventional energy
5	Demonstrate the broad perspective of sustainable practices by utilizing engineering knowledge and principles

ECL201	Scientific Computing Lab
CO	**Statements**
1	Describe the needs and requirements of scientific computing and to familiarize one programming language for scientific computing and data visualization.
2	Approximate an array/matrix with matrix decomposition.
3	Implement numerical integration and differentiation.
4	Solve ordinary differential equations for engineering applications
5	Compute with exported data from instruments
6	Realize how periodic functions are constituted by sinusoids
7	Simulate random processes and understand their statistics.

ECL203	Logic Design Lab
CO	**Statements**
1	Design and demonstrate the functioning of combinational/ arithmetic circuits using ICs
2	Design and demonstrate the functioning of sequential circuits using ICs.
3	Apply an industry compatible hardware description language to simulate and implement digital circuits on FPGA

SEMESTER 4

MAT204	Probability, Random Process and Numerical Methods
CO	**Statements**
1	Explain discrete and continuous RV and different distributions
2	Apply the density function of the distribution to find the probability of the R.V.
3	Understand random processes using autocorrelation ,power sspectrum and poisson process.
4	Evaluate definite integrals and perform interpolation on given numerical data by standard numerical techniques.
5	Solve the algebraic equations ,system of linear equations and ODE using numerical methods.

ECT202	Analog Circuits
CO	**Statements**
1	Determine the component values of analog signal processing circuits using diodes and first order RC circuits
2	Apply small signal models to basic amplifier using BJT and MOSFET
3	Apply the principle of oscillator and regulated power supply circuits

ECT204	Signals and Systems
CO	**Statements**
1	Apply properties of signals and systems to classify them.
2	Represent signals with the help of series and transforms
3	Describe orthogonality of signals and convolution integral
4	Apply transfer function to compute LTI response to input signals
5	Apply sampling theorem to discretize continuous time signals

ECT206	Computer Architecture and Microcontrollers
CO	**Statements**
1	Explain the functional units, I/O and memory management w.r.t a typical computer architecture
2	Distinguish between microprocessor and microcontroller
3	Develop simple programs using assembly language programming
4	Interface 8051 microcontroller with peripheral devices using ALP/Embedded C
5	Familiarize system software and Advanced RISC Machine Architecture

EST200	Design and Engineering
CO	**Statements**
1	Explain the different concepts and principles involved in design engineering
2	Apply design thinking while learning and practicing engineering
3	Develop innovative, reliable, sustainable and economically viable designs incorporating knowledge in engineering

MCN202	Constitution of India
CO	**Statements**
1	Explain the background of the present constitution of India and features.
2	Utilize the fundamental rights and duties
3	Understand the working of the union executive, parliament and judiciary.
4	Understand the working of the state executive, legislature and judiciary.
5	Utilize the special provisions and statutory institutions.

ECL202	Analog Circuits and Simulation Lab
CO	**Statements**
1	Design and demonstrate the functioning of basic analog circuits using discrete components.
2	Design and simulate the functioning of basic analog circuits using simulation tools.
3	Function effectively as an individual and in a team to accomplish the given task.

ECL204	Microcontroller Lab
CO	**Statements**
1	Develop Assembly Language Program for data manipulations
2	Develop Assembly Language Program for Arithmetic/Logic Operations
3	Develop Assembly Language Program for I/O Interface

SEMESTER 5

ECT301	Linear Integrated Circuits
CO	**Statements**
1	Understand Op Amp fundamentals and differential amplifier configurations
2	Design operational amplifier circuits for various applications
3	Design Oscillators and active filters using opamps
4	Explain the working and applications of timer, VCO and PLL ICs
5	Outline the working of Voltage regulator IC's and Data converters

ECT303	Digital Signal Processing
CO	**Statements**
1	Analyze signal in transform domain and develop a concept of linear filtering
2	Evaluate DFT and IDFT using FFT algorithms
3	Design digital FIR and IIR filters and draw the different filter structures
4	Understand the concept of multirate signal processing and finite word length effects
5	Understand the concept of digital signal processors

ECT305	Analog and Digital Communication
CO	**Statements**
1	Explain the existent analog communication systems.
2	Apply the concepts of random processes to LTI systems.
3	Apply waveform coding techniques in digital transmission.
4	Design baseband pulse for ISI free transmission over finite bandwidth channel.
5	Apply digital modulation techniques in signal transmission.

ECT307	Control Systems
CO	**Statements**
1	Analyze electromechanical system by mathematical modeling and derive their transfer function
2	Determine Transient and steady state behaviour of systems using standard test signals
3	Determine absolute stability and relative stability of a system
4	Apply frequency domain techniques to assess the system performance and to design a control system with suitable compensation techniques
5	Analyze system controllability and observability using state space representation

HUT310	Management For Engineers
CO	**Statements**
1	Explain the characteristics of management in the contemporary context
2	Describe the functions of management
3	Demonstrate ability in decision making process and productivity analysis
4	Illustrate project management technique and develop a project schedule
5	Summarize the functional areas of management
6	Comprehend the concept of entrepreneurship and create business plans

MCN301	Disaster Management
CO	**Statements**
1	Define and use various terminologies in use in disaster management , parlance and organise each of these terms in relation to DM cycle
2	Distinguish between hazard types and vulnerability types and do vulnerability assessments
3	Identify the components and describe the process of risk assessment and apply appropriate methodologies assess methodologies to assess risk
4	Explain the core elements and phases of Disaster risk management and develop possible measures to reduce disaster risks across sector and community
5	Identify the factors that determine the nature of disaster response and discuss the varioys disaster response actions
6	Explain the various legislations and best practices for disaster management and risk reduction at national and international level.

ECL331	Analog Integrated Circuits and Simulation Lab
CO	**Statements**
1	Use data sheets of basic Analog Integrated Circuits and design and implement application circuits using Analog ICs
2	Design and simulate the application circuits with Analog Integrated Circuits using simulation tools
3	Function effectively as an individual and in a team to accomplish the given task

ECL333	DigitalSignalProcessingLab
CO	**Statements**
1	Develop and validate different signal processing systems using Matlab/Scilab
2	Develop and validate different signal processing systems using Python
3	Devise various signal processing applications using DSP kit

SEMESTER 6

ECT302	Electromagnetics
CO	**Statements**
1	To summarize the basic mathematical concepts related to electromagnetic vector fields
2	To analyse Maxwell's equation in different forms and apply them to diverse engineering problems
3	To analyse electromagnetic wave propagation
4	To analyse wave polarization and characteristics of transmission lines
5	To solve the transmission line problems using Smith chart and evaluate the propagation of EM waves in Wave guides

ECT304	VLSI Circuit Design
CO	**Statements**
1	Understand various methodologies in ASIC and FPGA design.
2	Understand static and dynamic behavior of MOSFET based inverters
3	Design / Implement static and dynamic logic circuits with various MOSFET logic families
4	Design and analyze different types of memory and data path elements
5	Explain logical and physical design processes of integrated circuits.

ECT306	Information Theory and Coding
CO	**Statements**
1	Explain measures of information entropy, conditional entropy, mutual information
2	Apply Shannon's source coding theorem for data compression.
3	Apply the concept of channel capacity to characterize limits of error-free transmission.
4	Apply linear block codes for error detection and correction
5	Apply algebraic codes with reduced structural complexity for error correction

HUT300	Industrial Economics and Foreign Trade
CO	**Statements**
1	Determine the impact of changes in global economic policies on the business opportunities of a firm

2	Take appropriate decisions regarding volume of output and to evaluate the social cost of production
3	Determine the functional requirement of a firm under various competitive conditions
4	Examine the overall performance of the economy, and the regulation of economic fluctuations and its impact on various sections in the society
5	Determine the impact of changes in global economic policies on the business opportunities of a firm

ECT308	**ComprehensiveCourseWork**
CO	**Statements**
1	Apply the knowledge of circuit theorems and solid state physics to solve the problems in electronic Circuits
2	Design a logic circuit for a specific application
3	Design linear IC circuits for linear and non-linear circuit applications.
4	Explain basic signal processing operations and Filter designs
5	Explain existent analog and digital communication systems

EC332	**Communication Lab**
CO	**Statements**
1	Setup simple prototype circuits for waveform coding and digital modulation techniques working in a team.
2	Simulate the error performance of a digital communication system.
3	Develop hands-on skills to emulate a communication system with software-designed-radio working in a team.

ECD334	**Mini Project**
CO	**Statements**
1	Apply the knowledge within the selected area of technology for project development
2	Discuss and justify the technical aspects and design aspects of the project with a systematic approach.
3	Design and Reproduce engineering projects.
4	Development of working technical projects.
5	Communicate and report effectively project related activities

SEMESTER 7

ECT 401	Microwaves and Antennas
CO	**Statements**
1	Understand the basic concept of antennas and its parameters.
2	Analyze the far field pattern of short dipole and Half wave dipole antenna
3	Design of various broad band antennas, arrays and its radiation patterns
4	Illustrate the principle of operation of cavity resonators and various microwave sources
5	Explain various microwave hybrid circuits and microwave semiconductor devices

MCN401	Industrial Safety Engineering
CO	**Statements**
1	Describe the theories of accident causation and preventive measures of industrial accidents.
2	Explain about personal protective equipment, its selection, safety performance & indicators and importance of housekeeping.
3	Explain different issues in construction industries.
4	Describe various hazards associated with different machines and mechanical material handling.
5	Utilise different hazard identification tools in different industries with the knowledge of different types of chemical hazards.

ECL 411	Electromagnetics Lab
CO	**Statements**
1	Familiarize the basic Microwave components and to analyse few microwave measurements and its parameters.
2	Understand the principles of fiber-optic communications and the different kind of losses, signal distortion and other signal degradation factors.
3	Design and simulate basic antenna experiments with simulation tools.

ECQ 413	Seminar
CO	**Statements**
1	Identify academic documents from the literature which are related to her/his areas of interest
2	Read and apprehend an academic document from the literature which is related to her/ his areas of interest
3	Prepare a presentation about an academic document

4	Give a presentation about an academic document
5	Prepare a technical report
6	Identify academic documents from the literature which are related to her/his areas of interest

ECD 415	**Project Phase I**
CO	**Statements**
1	Model and solve real world problems by applying knowledge across domains
2	Develop products, processes or technologies for sustainable and socially relevant applications
3	Function effectively as an individual and as a leader in diverse teams and to comprehend and execute designated tasks
4	Plan and execute tasks utilizing available resources within timelines, following ethical and professional norms
5	Identify technology/research gaps and propose innovative/creative solutions
6	Organize and communicate technical and scientific findings effectively in written and oral forms

SEMESTER 8

ECT 402	Wireless Communication
CO	**Statements**
1	Summarize the basics of cellular system and cellular design fundamentals
2	Describe the wireless channel models and discuss capacity of wireless channels
3	Analyze the performance of the modulation techniques for flat-fading channels and multicarrier modulation
4	Illustrate how receiver performance can be enhanced by various diversity and equalization techniques
5	Analyze the system parameters such as antenna height, range, maximum usable frequency in different modes of radio wave propagation

ECT 404	Comprehensive Viva Voce
CO	**Statements**
1	Explain the basic concepts in fundamental core courses in the curriculum.

ECD 416	Project Phase II
CO	**Statements**
1	Model and solve real world problems by applying knowledge across domains
2	Develop products, processes or technologies for sustainable and socially relevant applications
3	Function effectively as an individual and as a leader in diverse teams and to comprehend and execute designated tasks
4	Plan and execute task utilizing available resources within timelines, following ethical and professional norms
5	Identify technology/research gaps and propose innovative/creative solutions
6	Organize and communicate technical and scientific findings effectively in written and oral forms.