MVSR ENGINEERING COLLEGE
DEPARTMENT OF E.C.E

Academic Year 2017-18

B.E. I/IV (CBCS) SEM-I

BS101MT-EC101-ENGINEERING MATHEMATICS-1

CODE NO	Statement
BS 101.1 MT	Solve problems based on the concepts of rank of a matrix, Eigen values and Eigen vectors
BS 101.2 MT	Solve some problems based on the concept of convergence and divergence of infinite series and apply the various tests of convergence to determine the nature of an infinite series
BS 101.3 MT	Solve problems based on the fundamental theorems of differential calculus, expanding functions using Taylor's & Mc Laurin's series and solving problems on finding Radius of curvature , evolutes and envelopes
BS 101.4 MT	Evaluate limits, Continuity and derivatives of functions of two variables, Maxima & Minima for functions of two or more variables arising in Engineering Problems.
BS 101.5 MT	Solving problems based on vector differentiation and vector integration.

BS102PH-EC102-ENGINEERING PHYSICS-1

CODE NO	Statement
BS 102.1	To understand the basic concept in physical optiEC like Interference and Diffraction
BS 102.2	To understand the polarization phenomena of light and to utilize Laser technology and Holography technique in various fields of Science and technology
BS 102.3	To gain the knowledge of Optical fibers and UltrasoniEC and their engineering applications
BS 102.4	To understand the basiEC of Statistical mechaniEC and its significance
BS 102.5	To understand the basiEC of Wave mechaniEC and Electromagnetic theory

BS103CH-EC103-ENGINEERING CHEMISTRY-1

CODE NO	Statement
BS 103.1	Apply the knowledge of thermodynamic principles to determine the feasibility of chemical and physical processes.
BS 103.2	Extend the concept of the phase rule in separation of pure metals from alloys and molten solutions and identify alloy as safety fuses and solders.

BS 103.3	Identify the impurities present in water, the problems associated with hard water and utilize the principles and techniques involved in water treatment (analysis) to purify water for domestic and industrial purposes.
BS 103.4	List types of the polymers
BS 103.5	explain the influence of chemical structure on properties of polymers and the need for replacement of conventional materials with Polymers in engineering applications.
BS 103.6	Classify Lubricants; Refractories, clay products and explain their properties, their use in engineering applications.

ES104CE-EC104-ENGINEERING MECHANICS-1

CODE NO	Statement
ES 104.1	Resolve forces acting on a body,obtain resultant force or moment acting due to set of forces and moments acting on a body and determine unknown forces from equations of equilibrium of forces and moments
ES 104.2	Obtain location of centres of mass of regular and composite shapes, use Pappus theorems to calculate surface areas and volumes of composite structures
ES 104.3	Distinguish between static and kinematic friction, determine effect of static or kinematic friction forces acting on a single or a system of connected bodies,effect of friction in screw jack,wedge,brakes and belt transmission
ES 104.4	Compute area moment of inertia and products of inertia for simple and composite elements using integration methods and transform theorem, calculate mass MI and radius of gyration for regular and composite structures
ES 104.5	Obtain displacement, velocity and acceleration relations of particles in rectilinear and curvilinear motion including projectiles,write equations of motion under influence of forces for particles and connected bodies and for plane motion of rigid bodies
ES 104.6	Apply Principles of work and energy to motion of particle or connected bodies to evaluate the velocities and angular velocities of bodies in connected systems and involving plane motion
ES 104.7	Apply Principle of conservation of Momentum and impulse force/moment to evaluate the velocities of a body after application of force/moment, and of bodies in impact/collision considering Coefficient of Restitution

EC105EC-EC105-COMPUTER PROGRAMMING AND PROBLEM SOLVING

CODE NO	Statement
EC 105.1	Understand the architecture of a computer; design strategies for solving basic programming problems; concepts of primitive datatypes, operators.
EC 105.2	Apply concepts of selection statements, loops and functions to write C programs.

EC 105.3	Understand the concepts of arrays and apply them to implement searching and sorting applications.
EC 105.4	Understand the dynamiEC of the memory through pointers and distinguish between call by value and call by reference
EC 105.5	learn concepts of strings.
EC 105.6	Understand the concepts of derived data types and write programs on structures and unions
EC 105.7	Apply the concepts of file handling operations.

MC106EG-EC106-ENGINEERING ENGLISH

CODE NO	Statement
MC 106.1	Learn the importance of communication Skills and its role and Importance and usage in verbal and non-verbal communication appropriately.
MC 106.2	Able to understand the Importance of listening skills in the effective communication and the models of interpersonal development.
MC 106.3	Able to apply writing techniques to develop a passage, draft an essay, make a prÃ©cis and construct general reports, Business communication
MC 106.4	use appropriate idiomatic expressions, one-word substitutes, Development of vocabulary.
MC 106.5	improve reading comprehension skills by reading inspirational texts and infer information.

CODE NO	BS151PH-EC107-ENGINEERING PHYSICS LAB-1
	Statement
BS 151.1 PH	To demonstrate the phenomena of interference and determine wavelength of a given light source.
BS 151.2 PH	To demonstrate the phenomena of diffraction and determine wavelength of a given light source .
BS 151.3PH	To understand the principle of lasers and determine wavelength of a given laser source.
BS 151.4PH	2. learn basic grammar and structure of the English language such as Tense and Aspect
BS 151.5PH	Transformation of sentences
BS 151.6PH	To verify Malus law of polarization of light.
BS 151.7PH	To determine the specific rotatory power of an optically active substance using polarimeter.
	BS151CH-EC108-ENGINEERING CHEMISTRY LAB-1
CODE NO	Statement

BS 151.1CH	Utilize analytical laboratory skills for performing chemical analysis and its data compilation individually or in teams for resolving related problems in day to day life.
BS 151.2CH	Make use of titrimetric principles in preparation, standardisation and estimation of unknown chemical samples.
BS 151.3CH	Identify and determine hardness causing impurities present in hard water by complexometric method.
BS 151.4CH	Explain causes for carbonate and bicarbonate alkalinity of water and estimate their concentration in alkaline water.
BS 151.5CH	Estimate quantitatively species like Fe+2, Fe+3, Cr+3, Mn, present in unknown complex mixtures like ores, alloys by titrimetric methods.

ES153CH-EC109-ENGINEERING GRAPHICS-1

CODE NO	Statement
ES153CH.1	The student would be able to recall the mathematical concepts related to scales, conic sections, involutes, etc and demonstrate proficiency in construction of these using the various methods described in literature.
ES153CH.2	The student would be able to analyse the various tools in AUTOCAD and utilize them for drawing of problems related to scales, conic sections, cycloids, etc..
ES153CH.3	The student would be able to analyse the position of points and lines when placed in different orientations with respect to reference planes and reproduce them using AUTOCAD.
ES153CH.4	The student would be able to draw the various views of planes when in simple position and in oblique positions using AUTOCAD.
ES153CH.5	The student would be able to assess the shapes of objects such as prisms, pyramids and solids of revolution and analyse their projections when they are placed in different orientations with reference planes. Subsequently the students would be able to draw these projections using AUTOCAD.

ES154CH-EC110-COMPUTER PROGRAMMING LAB-1

CODE NO	Statement
ES154CH.1	Understand the procedure to create, compile and execute C program for different inputs.
ES154CH.2	Apply concepts of selection and looping statements
ES154CH.3	and apply concepts of functions to increase the modularity of the program and re usability.
ES154CH.4	Apply array concepts to implement different concepts like searching, sorting, matrix multiplication and many more.
ES154CH.5	Apply pointers concepts to access variables through address and understand the dynamic memory allocation.
ES154CH.6	Apply derived data types using structures and unions.

	ES155ME-EC111-ENGINEERING WORKSHOP-1
CODE NO	Statement
ES155ME.1	The student would be able to utilize the various tools of smithy namely forge, tongs, fullers, flatters, swage block, chisels, anvil, hammers, etc to perform various forging operations on the work piece (job) like flattering, bending, upsetting, fullering, etc.
ES155ME.2	The student would be able to understand the different types of welding techniques like arc welding, gas welding, brazing, soldering, etc and prepare various weld joints like lap joint, butt joint, T joint, etc.
ES155ME.3	The student would be able to utilize the various tools of machining namely lathe machine, cutting tools (single point cutting tool, knurling tool, parting tool, etc) to perform various machining operations like turning, facing, drilling, boring, threading, knurling, etc.
ES155ME.4	The student would be able to utilize the various tools of plumbing namely pipe vice, hack saw, pipe cutter, wrench, dies, pipe fittings, etc to prepare various pipe joints. Subsequently the student would be able to estimate how to prepare pipe connections for domestic and industrial applications.
	MC156-EG-EC112-ENGINEERING ENGLISH LAB
CODE NO	Statement
MC156EG.1	learn the sound system of English Language with the knowledge of IPA-classification & description
MC156EG.2	learn the word stress & aspects of connected speech
MC156EG.3	learn the Rhythm & Intonation of English language
MC156EG.4	Improve the fluency in the spoken form of the language by partaking in Presentation skills, Public speaking, Group Discussion and Debate.
MC156EG.5	learn to dictionary and thesaurus effectively in an appropriate way.
	Academic Year 2017-18
	B.E I (CBCS) II-SEM
	BS201MY-EC101-ENGINEERING MATHEMATICS-2
CODE NO	
BS201MY.1	Solve various types of First ordered ordinary differential equations and apply these techniques for solving some problems in Geometry, Electricity, Heat transfer and Radio activity.
BS201MY.2	Solve higher ordered linear O.D.E's with constant Coefficients using various techniques.
BS201MY.3	Solve linear O.D.E's using power series and Frobenius methods and apply these methods for solving Legendres D.E.
BS201MY.4	Evaluate improper integrals using Beta, Gamma and error functions and solve Bessel's differential equations.
BS201MY.5	Solve some problems using the properties of Legendre polynomial and Bessel's functions.

BS201MY.6	Evaluate Laplace Transforms and inverse Laplace transforms of various functions and solve linear ordinary differential equations using Laplace transforms.

BS202PH-EC102-ENGINEERING PHYSICS-2

CODE NO	Statement
BS202PH.1	To acquire the knowledge on basic concepts of solid state physiEC.
BS202PH.2	To know and understand the properties and applications of magnetic and super conducting materials.
BS202PH.3	To know about the properties and applications of semiconducting and dielectric materials.
BS202PH.4	To acquire the knowledge on latest material characterization techniques along with their applications.
BS202PH.5	To know about nano technology and nano science.

BS203CH-EC103-ENGINEERING CHEMISTRY-2

CODE NO	Statement
BS203CH.1	Recall, relate and apply various parameters of electrodes and electrolytes such as conductance, conductivity, molar, equivalent conductance, electrode potentials, emf, pH and their measurements by constructing electrochemical cells using suitable electrodes with the knowledge of standard reduction potential data.
BS203CH.2	Explain the basic operating principles of primary, secondary batteries, fuel cells, solar cells â€" their design, similarities, differences and applications.
BS203CH.3	List types of corrosion; explain their mechanism, factors affecting the rate of corrosion and apply the knowledge of various corrosion control methods for protection of metals.
BS203CH.4	Classify chemical fuels, calculate calorific value, air quantities required for combustion of fuels, explain analysis of coal, refining of petroleum, cracking of petroleum, engine knocking , fuel rating , identify uses of solid , liquid , gaseous fuels and the importance of renewable energy sources such as bio-diesel.
BS203CH.5	List types of composites; liquid crystals, identify their advantages, engineering applications in day to day life and relate concept and principles of green chemistry for design and manufacturing of engineering materials.

HS204EG-EC104-BUSINESS COMMUNICATION AND PRESENTATION SKILLS

CODE NO	Statement
HS204EG.1	know the importance of Business Communication, ABC of Technical Communication, and Channels of Communication appropriately
HS204EG.2	learn models of Interpersonal Communication, Styles of Communication, Teamwork, Persuasion Techniques, Mobile phone and E-mail Etiquette and Time management

HS204EG.3	learn the differences between Technical and General writing, Report-writing, and drafting Scientific Papers
HS204EG.4	learn how to draft an SoP, Job application, Cover letter, Business letters, Agenda, and Minutes of Meeting
HS204EG.5	plan and prepare to face Interviews and participate in Group Discussions
	PC205EC-EC105-BASIC CIRCUIT ANALYSIS
CODE NO	**Statement**
PC205EC.1	Appreciate the concept of Mesh, Super Mesh, Node, Super Node and Evaluate DC analysis of Network theorems, Topologies and terminal Characteristics of Passive components.
PC205EC.2	Compute Transient and steady state responses of RL, RC and RLC series and Parallel networks
PC205EC.3	Analyze AC circuits and magnetically coupled circuits.
PC205EC.4	Differentiate between different sets of 2- Port network parameters along with interconnection of networks.
PC205EC.5	Evaluate Complex Frequencies, Pole-Zeros of an Admittance or Impedance function and sketch Pole-Zero Plots and to find Resonance Q-Factor and Bandwidth.
	ES949EE-EC106-ELECTRICAL TECHNOLOGY
CODE NO	**Statement**
ES949EE.1	Appreciate the importance of ac & dc circuits.
ES949EE.2	The ability to select a suitable measuring instrument for measuring of electrical power .
ES949EE.3	Recall operation of transformers and applications.
ES949EE.4	Identify the suitable DC motor and generator for application.
ES949EE.5	The ability to formulate and then analyze the working of AC electrical machine.
	BS251PH-EC107-ENGINEERING PHYSICS LAB-2
CODE NO	**Statement**
BS251PH.1	To examine the nature of ferromagnetic materials.
BS251PH.2	To characterize semiconducting device and calculate temperature co-efficient of resistance.
BS251PH.3	To study the characteristiEC of photo voltaic cell and evaluate the efficiency.
BS251PH.4	To characterize a semiconducting device and calculate the energy gap.
BS251PH.5	To characterize a semiconducting device using junction diode and calculate the resistance for forward and reverse bias.
BS251PH.6	To examine the nature of dielectric materials and evaluate their related parameter.
	BS251CH-EC108-ENGINEERING CHEMISTRY LAB-2

CODE NO	Statement
BS251CH.1	Extend the knowledge of electroanalytical techniques like Conductometry, Potentiometry, pHmetry and Colorimetry for performing chemical analysis and its data compilation individually or in teams for analyzing physical properties of engineering materials used in in daily life.
BS251CH.2	Estimate strength of weak acids, strong acids or acids present in mixtures by Conductometric, Potentiometric titrations.
BS251CH.3	Determine the strength of reducing agents like Fe^{+2} present in un known sample solutions by Potentiometry.
BS251CH.4	Analyze acids quickly and accurately using pH metry.
BS251CH.5	Test and determine chemical species like Iron and Manganese present in unknown complex mixtures or ores by Colorimetric method.

ES930EC-EC109-COMPUTER SKILLS LAB

CODE NO	Statement
ES930EC.1	Identify assemble and disassemble the components of Personal Computer (PC) System.
ES930EC.2	Install the operating system.
ES930EC.3	Create Documents using MS WORD and spread sheets using MS EXCEL
ES930EC.4	Design presentations using MS POWER POINT
ES930EC.5	Develop a website using HTML
ES930EC.6	Use Documentation Tool LATEX to create reports, books, articles in standard formats.

HS253EG-EC110-COMMUNICATION SKILLS LAB

CODE NO	Statement
HS253EG.1	use dialogues in a variety of situations and settings such as Role Play
HS253EG.2	make effective Presentations using multi-media and overcome stage fright
HS253EG.3	learn the art of planning and making a Public Speech
HS253EG.4	participate in Group Discussions and Debates
HS253EG.5	face Interviews effectively

PC945EC-EC111-ELECTRONIC WORKSHOP LAB

CODE NO	Statement
PC945EC.1	Appreciate the difference between different Passive, Active and Electro mechanical components and their lead identification procedures.
PC945EC.2	Use different Electronic test and measuring instruments
PC945EC.3	Analyze and understand network theorems using MULTI-SIM.
PC945EC.4	Appreciate how to design PCB, soldering and De-soldering techniques
PC945EC.5	Assess the importance of Transformer design, and its construction.

Academic Year 2017-18

COURSE NAME : Engineering Mathematics – III	COURSE CODE: BS 301 MT

Code No.	Statement
BS 301.1 MT	Solve problems based on differentiation and line integration of complex functions.
BS 301.2 MT	Develop Taylor's and Laurent's series for a given complex function and explain some standard conformal transformations and application of the theory of residues.
BS 301.3 MT	Develop a Fourier series for a given function in various Intervals.
BS 301.4 MT	Solve problems on formation of partial differential equations and on some standard first ordered and higher ordered linear partial differential equations.
BS 301.5 MT	Apply the theory of Fourier series to some boundary value problems associated with one - dimensional wave, heat and Laplace's Equation.

COURSE NAME : Elements of Mechanical Engineering	COURSE CODE: BS 301 MT

Code No.	Statement
M 221.1	The student would be able to correlate the laws of thermodynamics with the fundamental conceptual terminologies like properties, systems, processes, cycles, states, different types of equilibrium, energy, etc and solve related problems.
M 221.2	The student would be able to understand the different classifications of IC engines and reciprocating air compressors with specific focus on similarities and differences between (i) 2 stroke and 4 stroke engines and (ii) CI and SI engines. Subsequently, the student would be able to compute the performance parameters of the engines and reciprocating air compressors.
M 221.3	The student would be able to classify the different modes of heat transfer, analyze the governing equations, understand the applications of heat exchangers and solve related problems.
M 221.4	The student would be able to assess the relevance of different refrigeration systems with respect to their eco friendliness, suitability, performance etc., and also learn about different parameters of Psychrometry.
M 221.5	The student would be able to classify different manufacturing processes like forging, welding, forming, machining, etc and recognize their suitability for manufacturing of different industrial products.
M 221.6	The student would be able to understand the different types of power transmission systems like gears, gear trains, belts, ropes etc with emphasis on their kinematic mechanisms and solve related problems.

COURSE NAME : ELECTRONIC DEVICES	COURSE CODE:

PC301EC	
Code No.	**Statement**
PC301EC.1	Interpret the characteristics and apply diode models to analyze various applications of diodes.
PC301EC.2	Identify the merits and demerits of various filters, formulate and design rectifier circuits with filters.
PC301EC.3	Discriminate the BJT configurations to recognize appropriate transistor configuration for any given application and design the biasing circuits with good stability.
PC301EC.4	Analyze, compare and design of BJT amplifiers with biasing circuits.
PC301EC.5	Distinguish the working principles and characteristics of BJT and FET also between FET & MOSFET.

COURSE NAME: SWITCHING THEORY AND LOGIC DESIGN COURSE CODE: PC302EC	
Code No.	**Statement**
PC302EC.1	Translate one number system to another number system and define the Boolean laws and theorems.
PC302EC.2	Deduce the simplified Boolean function using K-Map and Quine-Mc Clusky method and construct the logic circuits.
PC302EC.3	Design Combinational logic circuits and implement Boolean functions using IC's.
PC302EC.4	Apply the concept of sequential logic design, analyze the operation of flip-flop and design various types of sequential circuits.
PC302EC.5	Distinguish synchronous and asynchronous sequential circuits, Design sequential circuits and draw counters using various IC's.

COURSE NAME: SIGNAL ANALYSIS AND TRANSFORM TECHNIQUES COURSE CODE: PC303EC	
Code No.	**Statement**
PC303EC.1	Define and differentiate types of signals and systems in continuous and discrete time.
PC303EC.2	Apply the properties of the Fourier Series and Fourier Transform for Continuous and Discrete time signals.
PC303EC.3	List the properties of Fourier Transform and apply them to determine the Fourier spectrum
PC303EC.4	Relate Laplace transforms to solve differential equations and to determine the response of the Continuous Time Linear Time Invariant Systems to known inputs
PC303EC.5	Apply Z-Transforms for discrete time signals to solve Difference equations

Code No.	Statement
PC303EC.6	Compute frequency domain representation of discrete time signals and systems. Obtain Linear Convolution and Correlation of discrete time signals with graphical representation.

COURSE NAME: NETWORKS ANALYSIS AND SYNTHESIS COURSE CODE: PC304EC	
Code No.	Statement
PC304EC.1	Characterize the various forms of Symmetrical & Asymmetrical Networks
PC304EC.2	Design & Analyze the T, Pi, Lattice, Bridged T and L Section Networks
PC304EC.3	Distinguish between the characteristics of different of Filters
PC304EC.4	Realize LPF,BPF, HPF, BRF filters using constant K and m- derived methods
PC304EC.5	Infer various types of attenuator networks and construct them

COURSE NAME: ELECTRICAL ENGINEERING LAB COURSE CODE: ES352EE	
Code No.	Statement
ES352EE.1	The ability to formulate and then analyze the working of any electrical machines under loaded and unloaded conditions.
ES352EE.2	Design the rectifiers with filters using SPICE
ES352EE.3	Recognize the various parts of electrical machines
ES352EE.4	Recall the methods to find efficiency and regulation of 1-phase transformers
ES352EE.5	Collect the data from experiments on AC machines to find characteristiEC
ES352EE.6	Able to calculate the torque and speed control of a given machines

COURSE NAME: ELECTRONIC DEVICES AND LOGIC DESIGN LAB COURSE CODE: PC351EC COURSE CODE: PC351EC	
Code No.	Statement
PC351EC.1	Characterize the behavior of p-n junction diode, determine the diode parameters and design Zener voltage regulator using SPICE
PC351EC.2	Evaluate the performance of rectifiers with & without filters. Analyze and design the rectifiers with filters using SPICE.
PC351EC.3	Distinguish between the characteristics of different BJT and FET transistor configurations
PC351EC.4	Design and Evaluate the functionality of various biasing circuits for BJT and FET amplifiers
PC351EC.5	Analyze the functionality of Binary-to-gray and Gray-to-Binary code converter using logic gates

PC351EC.6	Derive the Boolean functions of adders and subtractors using K-maps and realize with minimum number of universal gates and also design using IC 74283

Academic Year 2017-18
B.E II (CBCS)   IV-SEM

Course Name: Applied Mathematics	Course number: MT 202
CO	**Student should be able to**
MAT202.1	Solve problems on formation of partial differential equations and some standard first order partial differential equations.
MAT 202.2	Solve problems based on differentiation and line integration of complex functions
MAT 202.3	Solve problems based on expansion of a given complex function in Taylor's series, Laurent's series ,some problems on contour integration and explain some standard conformal transformations.
MAT 202.4	Apply numerical methods for solving algebraic, transcendental , system of linear equations, initial value problems for first order ordinary differential equations and interpolation methods for estimation.
MAT 202.5	Apply method of least squares for curve fitting , computing
	correlation Coefficient and obtaining lines of regression for given data

Course Name: Analog Electronic Circuits	Course number: PC301EC
CO	**Student should be able to**
PC301EC.1	Design and Analyze low frequency, mid frequency and high frequency response of small signal single stage and Multistage RC coupled and Transformer Amplifiers using BJT and FET.
PC301EC.2	Identify the type of negative feedback, Analyze and design of various negative feedback amplifiers.
PC301EC.3	Design various Audio Frequency and Radio Frequency oscillators and various regulators
PC301EC.4	Distinguish various classes of Power Amplifiers.
PC301EC.5	Differentiate the performance and analyze various Tuned Amplifiers.

Course Name: Pulse And Digital Circuits	Course number: EC 302
CO	**Student should be able to**
EC 302.1	Construct different linear networks and analyze their response to different input signals
EC 302.2	Understand switching characteristics of diodes and transistors and Construct various Non-linear circuits
EC 302.3	Understand ,Analyze and design multivibrators and sweep circuits using

	transistors.
EC 302.4	Investigate the internal operation of a basic gate of various logic families and Compare basic operating characteristics of CMOS and TTL logic families
EC 302.5	B Build basic gates with MOS and CMOS logic family and design their interfacing circuits

Course Name: Probability Theory and Stochastic Processes Course number: EC253	
CO	Student should be able to
PC404EC	Define the axiomatic formulation of modern Probability Theory and think of random variables as an intrinsic need for the analysis of random phenomena
PC404EC	Characterize probability models and function of random variables based on single & multiples random variables
PC404EC	Evaluate and apply moments & characteristic functions and understand the concept of inequalities and probabilistic limits.
PC404EC	Define random processes and determine covariance and spectral density of stationary random processes
PC404EC	Demonstrate the specific applications to Markov processes and Evaluate the response of LTI systems to stochastic processes in time and frequency domain

Course Name: Electromagnetic Theory AND Transmission Lines Course number: PC404EC	
Code No.	Statement
PC404EC.1	Interpret the behavior of static electric fields & Evaluate the equation for potentials and capacitances
PC404EC.2	Verify the basic principles of static magnetic fields with Biot – Savart & Ampere's Laws.
PC404EC.3	Analyze Electromagnetic wave propagation in free space and conducting media and illustrate the Reflection of plane waves by different media both in normal and oblique incidence
PC404EC.4	Interpret the characteristic behavior of Transmission Line under various load conditions & Deduce the expressions for Characteristic Impedance , Reflection Coefficient & Propagation Constant in all these cases.
PC404EC.5	Draw Smith Chart and Calculate VSWR, Reflection Coefficient for Transmission Lines at High Frequencies

Course Name: Analog Electronic Circuits Lab Course number: PC451EC	
CO	Student should be able to
PC451EC.1	Design and develop the amplifier circuits using PSPICE.

PC451EC.2	Analyze the effect of negative feedback on frequency response, design and construct the feedback amplifiers using PSPICE.
PC451EC.3	Design and implement oscillator circuits and compare experimental results with theoretical analysis.
PC451EC.4	Investigate the performance of various power amplifiers.
PC451EC.5	Evaluate the characteristics of low pass and high pass filters, design and implement using SPICE.

Course Name: Pulse, Digital and Integrated Circuits Lab Course number: PC452EC	
CO	Student should be able to
PC452.1	Design and analyze various linear and nonlinear wave shaping circuits
PC452.2	Design and analyze the switching characteristics of Transistor.
PC452.3	Design and analyze the characteristics of Bistable, Astable and Monostable Multivibrators.
PC452.4	Design and Generate non-sinusoidal signals using Miller and UJT sweep circuits.
PC452.5	Analyze the characteristics of Blocking oscillator.

Academic Year 2017-18	
B.E. III/IV SEM-I	
COURSE NAME: Linear ICs and Applications COURSE CODE: EC301 COURSE CODE: PC351EC	
CO	**Student should be able to**
EC301.1	Analyze DC and AC characteristics for Single/Dual input Balanced/Unbalanced output configurations using BJTs.
EC301.2	Distinguish various linear and non-linear applications of Op-Amp.
EC301.3	Construct various linear and nonlinear circuits using Op-Amp.
EC301.4	Design and Formulate Op-Amp oscillators, single chip oscillators, frequency generators and active filters and IC regulators.
EC301.5	Analyze the operation of the most commonly used D/A and A/D converter types.

Course Name: Pulse Digital & Switching Circuits Course number: EC302	
CO	**Student should be able to**
EC302.1	Design Linear & Nonlinear Wave shaping Circuits such as Differentiators, Integrators, Clippers and Clampers.
EC302.2	Design various Multivibrators employing BJTs and Sweep circuits employing

	UJT & SCR.
EC302.3	Implement the Switching Circuits with minimum of Hardware.
EC302.4	Design Combinational Logic Circuits such as Adders, Subtractors, Code Converters, and Encoders & Decoders. To comprehend the need of Flip-flops in building Digital Systems.
EC302.5	Design Finite State Machines such as Counters & Sequence Detector.

COURSE NAME: Analog Communication COURSE CODE: EC303 COURSE CODE: PC351EC	
CO	Student should be able to
EC303.1	Understand analog communication systems using amplitude modulation and demodulation.
EC303.2	Understand analog communication systems using angle modulation and demodulation.
EC303.3	Be familiar with analog radio transmitters and receivers.
EC303.4	Understand the performance of analog communications in the presence of noise.
EC303.5	Be familiar with analog pulse communication systems..

COURSE NAME: Automatic Control Systems COURSE CODE: EC304 COURSE CODE: PC351EC	
CO	Student should be able to
EC304.1	Classify the different types of the control systems and apply mathematical modeling to convert mechanical systems into electrical systems and Block diagram into Signal Flow Graph.
EC304.2	Examine the stability of the system using R-H and Root locus techniques and calculate the Steady state error, order, type of the system.
EC304.3	Illustrate the compensation techniques and frequency domain specifications and be able to fins the stability of the system using Bode plot and Nyquist plot.
EC304.4	Characterize the digital control systems and Transfer function of sampled data system.
EC304.5	Detect the Observability/Controllability of control systems and design their state models.

COURSE NAME: Computer Organization & Architecture COURSE CODE: EC305 COURSE CODE: PC351EC	
CO	Student should be able to
EC305.1	Classify the different types of the control systems and apply mathematical modeling to convert mechanical systems into electrical systems and Block

	diagram into Signal Flow Graph.
EC305.2	Examine the stability of the system using R-H and Root locus techniques and calculate the Steady state error, order, type of the system.
EC305.3	Illustrate the compensation techniques and frequency domain specifications and be able to fins the stability of the system using Bode plot and Nyquist plot.
EC305.4	Characterize the digital control systems and Transfer function of sampled data system.
EC305.5	Detect the Observability/Controllability of control systems and design their state models.

Course Name: DSD Through Verilog HDL	Course Code: EC 306
CO	Student should be able to
EC306.1	Appreciate the constructs and conventions of the Verilog HDL programming
EC306.2	Generalize the Structural, Register-Transfer level (RTL) and Algorithmic levels of abstraction for modeling Digital hardware system and apply the concept of test-benches for simulation based verification
EC306.3	Design and analyze modeling of Combinational, Sequential digital systems and Finite state machines
EC306.4	Comprehend advanced features of Verilog HDL and apply them to design Complex Real Time digital systems
EC306.5	Create various circuits for memory devices and annotate the ASIC/FPGA design flow

COURSE NAME: Pulse& Digital IC Applications Lab COURSE CODE: EC331 COURSE CODE: PC351EC	
CO	Student should be able to
EC331.1	Identify different types of Integrated circuits, IC packages its pin description and Interpret the data sheet and can explain the importance of electrical parameters for considering an IC for different applications.
EC331.2	Design and analyse the linear and non linear applications of op amps.
EC331.3	Design Astable and Monostable Multivibrator circuits using NE555 IC Timer and design different applications based on it.
EC331.4	Design Combinational circuits by using digital ICs.
EC331.5	Design Sequential circuits by using digital ICs.

Course Name: Verilog HDL lab   Course number: EC-332

CO	Student should be able to
EC 332.1	Design building block of digital IC using Verilog HDL in all Dataflow, structural and behavioral modeling styles.
EC 332.2	Analyze various modeling styles by understanding their impact on final gate level circuit.(Gate–level Net list file)
EC 332.3	Generate stimulus blocks to effectively test the functionality of the designs.
EC 332.4	Develop and Analyze 4 bit sequence detector using Mealy and Moore type Finite state machine.
EC 332.5	Synthesize and implement the digital circuit on FPGA boards.

Academic Year 2017-18	
B.E. III/IV SEM-II	
Course Name: Digital Communications Course number: EC351	
CO	Student should be able to
EC351.1	Classify the different types of digital modulation techniques PCM, DPCM, DM and ADM and compare their performance by SNR.
EC351.2	Illustrate the classification of channels and Entropy coding methods.
EC351.3	Distinguish different types of Error control codes along with their encoding/decoding algorithms.
EC351.4	Examine the Performance of different Digital Carrier Modulation schemes of Coherent and Non-coherent type based on Probability of error.
EC351.5	Generation of PN sequence usingSpread Spectrum and characterize the Acquisition Schemes for Receivers to track the signals.

Course Name: Digital Signal Processing Course number: EC 352	
CO	Student should be able to
EC 352.1	Evaluate DFT using direct and FFT methods. Analyze Circular and Linear convolution, and apply for linear filtering
EC 352.2	Design & compare Digital FIR filters using window method, Analyze the characteristics of various windows
EC 352.3	Formulate & apply Digital IIR filter design using Butterworth &Chebyshev approximations to Verify the characteristics of LPF, HPF, BPF& BEF.
EC 352.4	Comprehend & deduce Interpolator, Decimator & Multi-stage sampling rate conversion and appreciate its applications
EC 352.5	Visualize & Appreciate the Architecture of TMS320C54xx Processor and the Various Addressing modes.

Course Name: Antenna& Wave Propagation   Course number:EC353

CO	Student should be able to
EC353.1	Analyze different antenna parameters by applying the concept of Radiation and isotropic radiator.
EC353.2	Derive the far field pattern of loop and helical antennas by applying the concept of half wave dipole and quarter wave monopole.
EC353.3	Evaluate the features and analyze the radiation pattern of different VHF & UHF antennas by using different measurement techniques.
EC353.4	Analyze the characteristics of broad side and end fire arrays and calculate various parameters.
EC353.5	Compare and Contrast different wave propagation techniques and illustrate the radio wave behaviour in different modes of communications.

Course Name: Micro Processors and Micro Controllers Course Code: EC354	
CO	STATEMENT
EC354.1	Identify the architectural features of 8086,Comprehend the instruction set and Develop the assembly language programming
EC354.2	Conceptualize the interrupt structure of 8086, operation and interfacing of various peripheral devices like memory, 8254, 8257 and 8251.
EC354.3	Differentiate between microprocessor and microcontroller in their architectural features and develop the assembly language programming using 8051.
EC354.4	Develop programs using the timers/counters and UART with interrupts.
EC354.5	Extend the memory and I/O ports of 8051 and Program 8051 for real time applications.

Course Name: MANAGERIAL ECONOMICS & ACCOUNTANCY Course number: CM371	
CO	COURSE OUTCOME Student should be able to
CM371.1	Find out the general exposure about the business, economic environment and the structural aspects of Managerial Economics
CM371.2	Analyze different principles and laws of managerial economics & examine the consumer behaviour for taking various managerial decisions, such as forecasting demand for new and existing goods and services to the business units and also suggest the best profit maximizing production function to the producers/entrepreneurs.
CM371.3	Identify the impact of changes in internal factors, such as cost, price & volume on profitability and appraise of the firms behaviour in different markets structures with respective to competitive prices fixation of products and optimum input-output decisions.

CM371.4	Evaluate with the knowledge of capital budgeting methods and techniques for different business proposals and identify the best among them for prudent investment and also explore different sources of capital needed to the business
CM371.5	Construct and analyse the financial statements of the business and interpret them for taking ideal managerial decisions.

Course Name: Communication Lab	Course number: EC381
CO	Student should be able to
EC381.1	Generate and detect the signal using analog modulation schemes AM, FM, PAM, PWM and PPM and digiatal modulation techniques ASK, FSK, BPSK, DPSK and M-ary QPSK
EC381.2	Generate the multiplexed signal using TDM and FDM and Demultiplex it
EC381.3	Demonstrate the mixer characteristics, Pre-emphasis and De-emphasis Circuits.
EC381.4	Generate and demodulate the signal using PCM, DPCM, DM and ADM.
EC381.5	Transmit the message via serial communication using modem and represent the data using various signalling/data formats.

Course Name: Systems & Signal Processing Lab	Course number: EC 382
CO	**\<statement\>** Student should be able to
EC 382.1	Evaluate frequency response, output response, Linear & circular convolution using DFT. Appreciate efficient implementation of DFT using FFT.
EC 382.2	Design & Interpret FIR filters (LPF,HPF,BPF & BEF) using various window techniques
EC 382.3	Develop & contrast IIR filters (LPF, HPF, BPF & BEF) using Butterworth and Chebyshev approximations
EC 382.4	Implement Interpolation and Decimation.
EC 382.5	Devise the above concepts using MATLAB & CCS tools. Acquire knowledge to work on real time processing using DSK.

Course Name: Microprocessor And Microcontrollers Lab	Course Code: EC383
CO	Student should be able to
EC383.1	Identify various ICs used in the development of 8086 trainer kit.
EC383.2	Develop the logic using instruction set of 8086 in different addressing modes to carry out arithmetic, logical and string operations.

EC383.3	Interface devices like ADC, DAC, LCD, and Stepper Motor to 8086
EC383.4	Use the IDE tool effectively for developing and executing the programs using 8051.
EC383.5	Comprehend the usage of on-chip timers and serial communication of 8051 and their interrupts using programs
EC383.6	Interface devices like ADC, DAC, LCD, and Stepper Motor to 8051 and develop real time projects.

Course Name: Industrial Visit	Course Code: EC384
CO	**Statement**
EC 384.1	Forecast about the technical approach in different industries.
EC 384.2	Integrate their knowledge about different technologies and to apply them in problem solving techniques.
EC 384.3	Predict different problems that disturbs the environment and solve them.
EC 384.4	Construct different Projects with the knowledge acquired.
EC 384.5	Work in multidisciplinary teams.

Academic Year 2017-18
B.E. IV/IV SEM-I

Course Name: Microwave Engineering	Course number: EC 401
CO	**Student should be able to**
EC 401.1	Analyse the Propagation of Guided waves in different modes between parallel planes.
EC 401.2	Evaluate different parameters (like impedance ,attenuation and quality factor.) for Rectangular and Circular Wave guides & Cavity Resonators
EC 401.3	Determining Scatt5erring parameters of different microwave components and analyse their properties.
EC 401.4	Integrate the concept of bunching and velocity modulation to summarize the operation of micro wave tubes and the high frequency limitations of conventional tubes.
EC 401.5	Analyse the principle, operation and characteristics of different micro wave solid state devices.

Course Name: VLSI Design	Course number: EC 402
CO	**Student should be able to**
EC402.1	Design building blocks of digital IC using Gate level and Dataflow Modelling.
EC402.2	Design blocks of digital IC using Behavioural Modelling.

EC402.3	Design Finite State Machines using Verilog HDL and Analyze Synthesis design flow.
EC402.4	Analyze modes of operation of MOS transistor and its basic electrical properties
EC402.5	Draw stick diagrams and layouts for any MOS transistors and calculate the parasitic R & C
EC402.6	Design various combinational circuits using gates and transistors

Course Name: Electronic Instrumentation	Course Code: EC 403
CO	**Student should be able to**
EC403 .1	Differentiate the types errors in measurement and minimize them to reach standards.
EC403 .2	Choose different active and passive transducers to measure temperature for required applications.
EC403 .3	Apprehend the types of transducers to measure temperature, humidity and sound.
EC403 .4	Classify measuring instruments to measure different parameters and store the result.
EC403 .5	Demonstrate and analyze types of equipments that are used in biomedical signal analysis.

Elective-I COURSE CODE: PC351EC	
Course Name: Optical Fibre Communication	Course number: EC 411
CO	**Student should be able to**
EC 411.1	Comprehend the key concepts of modes and linearly polarized modes. Distinguish ray propagation in single mode and graded index fibers.
EC 411.2	Describe the effects of dispersion in optical fibers due to materials, waveguide, polarization modes
EC 411.3	Choose direct and indirect band gap materials, light source materials. Understand structures of LED, Laser diodes and the concepts of quantum laser, temperature effects and amplifiers.
EC 411.4	Describe the working of PIN, APD diodes and estimate noise performance of photo detector response time. Categorize different error sources and comprehend the concept of probability of error and quantum limit
EC 411.5	Analyze point to point link to estimate power link budget and rise time budget. Understand the operational details of Erbium doped fiber amplifiers and basics of SONET/SDH network

Course Name: Digital Image Processing	Course number: EC 412
CO	**Student should be able to**
C412.1	Interpret the fundamentals of Digital Image processing system and apply to evaluate various relationships between pixels.
C412.2	Analyze various transforms and its properties and apply the knowledge to Design & formulate the co-efficient matrices.
C412.3	Enhance the images using spatial and frequency domain techniques & and apply the knowledge to infer characteristics of images.
C412.4	Identify Image degradation processes. Model & Evaluate the Algebraic approach to restoration.
C412.5	Outline & measure various Redundancies of image compression, Analyze & evaluate various Lossless & Lossy coding techniques.
C412.6	Comprehend & classify the segmentation techniques based on point, line and edge detection.
C412.7	Infer Image representation and classify simple descriptors for Image processing

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Elective-II

COURSE NAME:Embedded Systems   COURSE CODE: EC 421
COURSE CODE: PC351EC

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CO	**Student should be able to**
EC 421.1	Classify different types of embedded systems and explain the different hardware and software component used in the system and various metrics or challenges in designing an embedded system.
EC 421.2	Identify the features of ARM core and analyze the ARM instruction set.
EC 421.3	Compare various protocols like serial, parallel and internet enabled system-network protocols.
EC 421.4	Use modern engineering tools necessary for integrating software and hardware components in embedded system designs.
EC 421.5	Outline different IDEs for firmware development of processors/controllers.

COURSE NAME: Entrepreneurship	COURSE CODE: MEXXX
CO	**Student should be able to**
MEXXX.1	To develop distinct entrepreneurial traits and ability to recognize business opportunities to build entrepreneurial career.
MEXXX.2	Students can develop and systematically apply entrepreneurial way of thinking that will allow them to identify and create business opportunities for commercialized success. To know the parameters to assess opportunities and constraints for new business ideas
MEXXX.3	To design and develop a well presented successful business plan that is feasible and to gain the advantage of Project financing.
MEXXX.4	To effectively plan projects through CPM/Pert techniques. To understand human aspects of business and helps to assess and evaluate tax burden.

MEXXX.5	This helps the entrepreneur to manage his human resources and time effectively.

COURSE NAME: Industrial Administration & Financial Management COURSE CODE: ME 472	
CO	**Student should be able to**
ME 472-1	On completion of this unit learner (student) will be able to, (a) define business, objectives of business and types of business organization such as private undertakings, public undertakings and joint sector. (b) Describe factors influencing the choice of suitable form of organization. (c) Explain organization structures and advantage of organization chart. (d) Describe principles of organization structure. (e) Summarize types of organization structures, their merits and demerits. (f) Explain functions of management. (g) Summarize factors influencing the selection of plant location and plat layout. (h) Discuss principle consideration of typical industries. (i) Explain types of layouts such as line or product layout, functional or process layout, fixed position and combination layout their advantages and disadvantages.
ME 472-2	On completion of this unit student will be able to, (a) State definitions and objectives of work study, method study and time study. (b) Discuss applications of work study and its advantages. (c) Know the contributions of F.W Taylor & Frank Gilbreth. (d) Explain objectives of method study and its procedure. (e) Prepare flow process charts and symbols used in process charts. (f) Discuss motion analysis, Therbligs and SIMO chart. (g) Summarize principles of motion economy and work place layout. (h) Compute standard time by time study. (i) Discuss performance rating factor and allowances. (j) Describe work sampling procedure. (k) Summarize job evaluation objectives and different types of job evaluation and their advantages. (l) Explain performance appraisal objectives, methods. (m) Discuss wages, incentives, wage payment plans and wage incentive plans.
ME 472-3	On completion of this unit student will be able to, (a) Define inspection and quality and their differences. (b) Discuss the objectives of inspection and kinds of inspections. (c) Summarize SQC and techniques used in SQC. (d) Explain sampling inspection – sampling by attributes and variables. (e) Prepare sampling plans – single, double and multiple sampling plans. (f) Draw various control charts and work out problems related to x-R chart, P. chart and C. chart. (g) Describe Quality Circles and ISO 9001 quality system. (h) Summarize production planning and control – principles and functions. (i) Describe types of manufacture and production. (j) Draw various production control charts.

ME 472-4	On completion of this unit student will be able to, (a) Define optimization and operations research. (b) Solve problems on LPP using graphical solution. (c) Compute assignment problems. (d) Define PERT & CPM and their differences. (e) Calculate critical path. (f) Describe MM functions and its objectives. (g) Summarize types of material & material planning techniques. (h) Express duties of purchase manager. (i) Determine economic ordering quantities. (j) Explain types of material purchase. (k) Classify different materials.
ME 472-5	On completion of this unit student will be able to, (a) Express types of cost and elements of cost. (b) Describe over heads, types of over heads and allocation of over heads. (c) Define depreciation, methods of depreciation and compute depreciation. (d) Explain break even analysis and calculate breakeven point. (e) Express techniques of capital budgeting. (f) Describe time value of money, valuation concepts. (g) Define financial leverage, types of leverages. (h) Summarize importance of cost of capital and classification of cost of capital.

Course Name: Microwave Lab	Course number: EC 431
CO	**Student should be able to**
EC431.1	Analyze frequency, Wave length, SWR and Impedance for Reflex klystron Oscillator by using its equation.
EC431.2	Evaluate of mode characteristics of Reflex klystron.
EC431.3	Evaluate the VI characteristics of Gunn Diode.
EC431.4	Analyze of the characteristics of Circulator, Isolator, Directional Coupler, Tees like (Magic tee, E & H plane tees) using the Scattering parameters.
EC431.5	Generate the Radiation pattern of different antennas like Yagi-Uda and Horn Antenna and measure the gain of the antennas

Course Name: EMBEDDED C AND VLSI DESIGN LAB	Course number: EC432
CO	**Student should be able to**
EC 432.1	Use the keil software for the development of logic,proteus software for hardware simulation and flash magic for downloading the code on to the target system.
EC 432.2	Develop the logic to interface devices like temp sensor,stepper motor,Buzzer to ARM microcontroller and analyze the working of GPIO,on-chip peripherals of ARM
EC 432.3	Comprehend the concepts of RTOS and demonstrate them in ARM microcontroller
EC 432.4	Design any building block of digital IC in transistor level using Back End design process of IC and verify its functionality
EC 432.5	Draw the Layouts for the circuits and verify its functionality.

CO	Course Name: Project Seminar	Course number: EC433

CO	Student should be able to
EC433.1	Carryout Literature survey in the area of interest.
EC433.2	Survey the recent advancements in the identified area
EC433.3	Demonstrate an Understanding and discuss the problem within group and to arrive at possible solutions
EC433.4	Develop interpersonal skills, presentation skills, soft skills and creativity
EC433.5	Prepare Technical reports
EC433.6	Demonstrate the qualities and attitudes of a professional engineer for forming a team

Academic Year 2017-18
B.E. IV/IV SEM-II

Course Name: Data Communication and Computer Networks Course number: EC451	
CO	Student should be able to
EC 451.1	Appreciate the importance of Data communications and the necessity of the reference models: OSI, TCP/IP, Analyze the design issues related to data link layer.
EC 451.2	Analyze MAC Sub layer, sliding window protocols and various IEEE 802 protocols and explain concept of Circuit Switching and Packet Switching.
EC 451.3	Infer the working of internet and the importance of the Network Layer in the Internet and ATM Networks.
EC 451.4	Assess the importance of transport services and various elements of transport layer like Connection management, TCP and UDP protocols.
EC 451.5	Relate the Network Security with Cryptography Symmetric Key and Public Key algorithms, and will appreciate the concept of Digital Signatures and Authentication Protocols

Elective -III	
Course Name: Radar systems Course number: EC464	
CO	Student should be able to
EC 464.1	Explain basics of RADAR system and will able to develop radar range equation. Illustrate the importance of various parameters in enhanced range estimation for accurate prediction

EC 464.2	Illustrate various types of radars such as CW radar and their variations and displays in radar
EC 464.3	Explain types of MTI radar and non-coherent MTI radar
EC 464.4	Illustrate on radar tracking methods and differences among them
EC 464.5	Explain search radars and various antennas used in radars

Course Name: Mobile cellular communications Course number: EC465	
Code No.	Statement
EC 465.1	Understand the method of selection and reuse of a set of frequency channels, Base station requirement, signals required for communication and hand over between Base stations.
EC 465.2	Appreciate and understand the methods of electromagnetic wave propagation in cellular communication. The evaluation of the electromagnetic energy reaching the mobile unit.
EC 465.3	Identify different a methods of mobile access technologies and which of them suitable for mobile cellular solutions. Understand process used for Bluetooth, Zigbee like low power devices.
EC 465.4	Explain features, authentication, , operational details of GSM and CDMA mobile cellular systems along with data frame structure details.
EC 465.5	The development and limitation of the preliminary and advanced generation of mobile systems. Present trends in Cellular communications and the future communication requirements.

Elective-IV	
Course Name: GLOBAL NAVIGATIONAL SATELLITE SYSTEM Course number: EC 472	
Code No.	Statement
EC 472.1	Analyze the GPS principal principle of operation and architecture.
EC 472.2	Conceptualize the GPS signal structure and derive concepts of various error sources in GPS and to minimize or overcome these errors.
EC 472.3	Illustrate different Augmentation systems for GPS and their architecture. Enumerate different applications of GNSS.
EC 472.4	Demonstrate the various types of GNSS constellations and their architectures.
EC 472.5	Understanding various types of Regional based navigation systems and GPS integration

Course Name: Wireless sensor networks Course number: EC474	
Code No.	Statement

EC 474.1	Understand Wireless Sensor Networks requirements, Challenges involved. He Will appreciate the emerging technologies developed in the recent past to realise Sensor networks
EC 474.2	Will be able to understand operating system software execution, hardware components with energy consumption profile .Optimization of requirements and parameters involved in figure of merit evaluation.
EC 474.3	Apply knowledge of Data protocols involved , physical layer design considerations, routing protocols.
EC 474.4	Understand the time synchronization requirements, commercial node details and Sensor node simulators. Compare the security protocols used in sensor networks
EC 474.5	Formulate and Slove problems creatively in the area of WSN

Course Name: Disaster Mitigation and Management	Course number: CE452
CO	Student should be able to
CE452.1	To understand the Natural, human induced and human made disasters and help reduce the international decade of disaster reduction
CE452.2	To understand the different Hydrometereological based disasters like Tropical cyclones, floods, drought and desertification,Earth quake, Tsunamis, Landslides and avalanches.
CE452.3	To understandchemical industrial hazards, major power breakdowns, traffic accidents
CE452.4	To analyze the different disasters using remote sensing and GISI disaster mitigation and management.
CE452.5	To understand the Rich and vulnerability to disaster - mitigation and help analyze situations using management options like warning and forecasting.

Course Name: GENERAL SEMINAR	Course number: EC481
CO	Student should be able to
EC481.1	Carryout Literature survey in the area of interest.
EC481.2	Survey the recent advancements in the identified area
EC481.3	Demonstrate an Understanding and discuss the problem within group and to arrive at possible solutions
EC481.4	Develop interpersonal skills, presentation skills, soft skills and creativity
EC481.5	Prepare Technical reports
EC481.6	Demonstrate the qualities and attitudes of a professional engineer for forming a team

Course Name: PROJECT	Course number: EC 482

Code No.	Statement ; Students should be able to
EC 482.1	Review acquired technical knowledge on the selected topic
EC 482.2	Undertake problem identification, formulation and find optimal solution
EC 482.3	Identify suitable hardware and software requirements and design engineering solution to complex problems utilizing a systematic approach.
EC 482.4	Conduct an Engineering project using the state of art hardware and Electronics Design & Automation tools.
EC 482.5	Exhibit team work and Communicate with Engineers and the community at large.
EC 482.6	Prepare project report/thesis

	Academic Year 2016-17
	B.E I/IV SEM -1
	BS101MT-EC101-ENGINEERING MATHEMATICS-1
CODE NO	Statement
BS101MT.1	Solve problems based on the concepts of rank of a matrix, Eigen values and Eigen vectors
BS101MT.2	Solve some problems based on the concept of convergence and divergence of infinite series and apply the various tests of convergence to determine the nature of an infinite series
BS101MT.3	Solve problems based on the fundamental theorems of differential calculus, expanding functions using Taylorâ€™s & Mc Laurinâ€™s series and solving problems on finding Radius of curvature , evolutes and envelopes
BS101MT.4	Evaluate limits, Continuity and derivatives of functions of two variables, Maxima & Minima for functions of two or more variables arising in Engineering Problems.
BS101MT.5	Solving problems based on vector differentiation and vector integration.
	BS102PH-EC102-ENGINEERING PHYSICS-1
CODE NO	Statement
BS102PH.1	To understand the basic concept in physical optiEC like Interference and Diffraction
BS102PH.2	To understand the polarization phenomena of light and to utilize Laser technology and Holography technique in various fields of Science and technology
BS102PH.3	To gain the knowledge of Optical fibers and UltrasoniEC and their engineering

	applications
BS102PH.4	To understand the basiEC of Statistical mechaniEC and its significance
BS102PH.5	To understand the basiEC of Wave mechaniEC and Electromagnetic theory

BS103CH-EC103-ENGINEERING CHEMISTRY-1	
CODE NO	**Statement**
BS103CH.1	Apply the knowledge of thermodynamic principles to determine the feasibility of chemical and physical processes.
BS103CH.2	Extend the concept of the phase rule in separation of pure metals from alloys and molten solutions and identify alloy as safety fuses and solders.
BS103CH.3	Identify the impurities present in water, the problems associated with hard water and utilize the principles and techniques involved in water treatment (analysis) to purify water for domestic and industrial purposes.
BS103CH.4	List types of the polymers
BS103CH.5	explain the influence of chemical structure on properties of polymers and the need for replacement of conventional materials with Polymers in engineering applications.
BS103CH.6	Classify Lubricants; Refractories, clay products and explain their properties, their use in engineering applications.

ES104CE-EC104-ENGINEERING MECHANICS-1	
CODE NO	**Statement**
ES104CE.1	Resolve forces acting on a body,obtain resultant force or moment acting due to set of forces and moments acting on a body and determine unknown forces from equations of equilibrium of forces and moments
ES104CE.2	Obtain location of centres of mass of regular and composite shapes, use Pappus theorems to calculate surface areas and volumes of composite structures
ES104CE.3	Distinguish between static and kinematic friction, determine effect of static or kinematic friction forces acting on a single or a system of connected bodies,effect of friction in screw jack,wedge,brakes and belt transmission
ES104CE.4	Compute area moment of inertia and products of inertia for simple and composite elements using integration methods and transform theorem, calculate mass MI and radius of gyration for regular and composite structures
ES104CE.5	Obtain displacement, velocity and acceleration relations of particles in rectilinear and curvilinear motion including projectiles,write equations of motion under influence of forces for particles and connected bodies and for plane motion of rigid bodies
ES104CE.6	Apply Principles of work and energy to motion of particle or connected bodies to evaluate the velocities and angular velocities of bodies in connected systems and involving plane motion
ES104CE.7	Apply Principle of conservation of Momentum and impulse force/moment to evaluate the velocities of a body after application of force/moment, and of bodies in impact/collision considering Coefficient of Restitution

	EC105EC-EC105-COMPUTER PROGRAMMING AND PROBLEM SOLVING
CODE NO	**Statement**
EC105EC.1	Understand the architecture of a computer; design strategies for solving basic programming problems; concepts of primitive datatypes, operators.
EC105EC.2	Apply concepts of selection statements, loops and functions to write C programs.
EC105EC.3	Understand the concepts of arrays and apply them to implement searching and sorting applications.
EC105EC.4	Understand the dynamiEC of the memory through pointers and distinguish between call by value and call by reference
EC105EC.5	learn concepts of strings.
EC105EC.6	Understand the concepts of derived data types and write programs on structures and unions
EC105EC.7	Apply the concepts of file handling operations.
	MC106EG-EC106-ENGINEERING ENGLISH
CODE NO	**Statement**
MC106EG.1	Learn the importance of communication Skills and its role and Importance and usage in verbal and non-verbal communication appropriately.
MC106EG.2	Able to understand the Importance of listening skills in the effective communication and the models of interpersonal development.
MC106EG.3	Able to apply writing techniques to develop a passage, draft an essay, make a prÃ©cis and construct general reports, Business communication
MC106EG.4	1. use appropriate idiomatic expressions, one-word substitutes, Development of vocabulary.
MC106EG.5	improve reading comprehension skills by reading inspirational texts and infer information.
	BS151PH-EC107-ENGINEERING PHYSICS LAB-1
CODE NO	**Statement**
BS151PH.1	To demonstrate the phenomena of interference and determine wavelength of a given light source.
BS151PH.2	To demonstrate the phenomena of diffraction and determine wavelength of a given light source .
BS151PH.3	To understand the principle of lasers and determine wavelength of a given laser source.
BS151PH.4	2. learn basic grammar and structure of the English language such as Tense and Aspect
BS151PH.5	Transformation of sentences
BS151PH.6	To verify Malus law of polarization of light.
BS151PH.7	To determine the specific rotatory power of an optically active substance using polarimeter.

	BS151CH-EC108-ENGINEERING CHEMISTRY LAB-1
CODE NO	**Statement**
BS151CH.1	Utilize analytical laboratory skills for performing chemical analysis and its data compilation individually or in teams for resolving related problems in day to day life.
BS151CH.2	Make use of titrimetric principles in preparation, standardisation and estimation of unknown chemical samples.
BS151CH.3	Identify and determine hardness causing impurities present in hard water by complexometric method.
BS151CH.4	Explain causes for carbonate and bicarbonate alkalinity of water and estimate their concentration in alkaline water.
BS151CH.5	Estimate quantitatively species like Fe^{+2}, Fe^{+3}, Cr^{+3}, Mn, present in unknown complex mixtures like ores, alloys by titrimetric methods.
	ES153CH-EC109-ENGINEERING GRAPHICS-1
CODE NO	**Statement**
ES153CH.1	The student would be able to recall the mathematical concepts related to scales, conic sections, involutes, etc and demonstrate proficiency in construction of these using the various methods described in literature.
ES153CH.2	The student would be able to analyse the various tools in AUTOCAD and utilize them for drawing of problems related to scales, conic sections, cycloids, etc..
ES153CH.3	The student would be able to analyse the position of points and lines when placed in different orientations with respect to reference planes and reproduce them using AUTOCAD.
ES153CH.4	The student would be able to draw the various views of planes when in simple position and in oblique positions using AUTOCAD.
ES153CH.5	The student would be able to assess the shapes of objects such as prisms, pyramids and solids of revolution and analyse their projections when they are placed in different orientations with reference planes. Subsequently the students would be able to draw these projections using AUTOCAD.
	ES154CH-EC110-COMPUTER PROGRAMMING LAB-1
CODE NO	**Statement**
ES154CH.1	Understand the procedure to create, compile and execute C program for different inputs.
ES154CH.2	Apply concepts of selection and looping statements
ES154CH.3	and apply concepts of functions to increase the modularity of the program and re usability.
ES154CH.4	Apply array concepts to implement different concepts like searching, sorting, matrix multiplication and many more.
ES154CH.5	Apply pointers concepts to access variables through address and understand the dynamic memory allocation.

ES154CH.6	Apply derived data types using structures and unions.
	ES155ME-EC111-ENGINEERING WORKSHOP-1
CODE NO	**Statement**
ES155ME.1	The student would be able to utilize the various tools of smithy namely forge, tongs, fullers, flatters, swage block, chisels, anvil, hammers, etc to perform various forging operations on the work piece (job) like flattering, bending, upsetting, fullering, etc.
ES155ME.2	The student would be able to understand the different types of welding techniques like arc welding, gas welding, brazing, soldering, etc and prepare various weld joints like lap joint, butt joint, T joint, etc.
ES155ME.3	The student would be able to utilize the various tools of machining namely lathe machine, cutting tools (single point cutting tool, knurling tool, parting tool, etc) to perform various machining operations like turning, facing, drilling, boring, threading, knurling, etc.
ES155ME.4	The student would be able to utilize the various tools of plumbing namely pipe vice, hack saw, pipe cutter, wrench, dies, pipe fittings, etc to prepare various pipe joints. Subsequently the student would be able to estimate how to prepare pipe connections for domestic and industrial applications.
CODE NO	
MC156EG.1	**MC156-EG-EC112-ENGINEERING ENGLISH LAB**
MC156EG.2	**Statement**
MC156EG.3	learn the sound system of English Language with the knowledge of IPA-classification & description
MC156EG.4	learn the word stress & aspects of connected speech
MC156EG.5	learn the Rhythm & Intonation of English language
	Improve the fluency in the spoken form of the language by partaking in Presentation skills, Public speaking, Group Discussion and Debate.
	learn to dictionary and thesaurus effectively in an appropriate way.
	Academic Year 2016-17
	B.E I/IV SEM -2
CODE NO	
BS201MY.1	**BS201MY-EC101-ENGINEERING MATHEMATICS-2**
BS201MY.2	**Statement**
BS201MY.3	Solve various types of First ordered ordinary differential equations and apply these techniques for solving some problems in Geometry, Electricity, Heat transfer and Radio activity.
BS201MY.4	Solve higher ordered linear O.D.E's with constant Coefficients using various techniques.
BS201MY.5	Solve linear O.D.E's using power series and Frobenius methods and apply these methods for solving Legendres D.E.

BS201MY.6	Evaluate improper integrals using Beta, Gamma and error functions and solve Bessel's differential equations.
	Solve some problems using the properties of Legendre polynomial and Bessel's functions.
	Evaluate Laplace Transforms and inverse Laplace transforms of various functions and solve linear ordinary differential equations using Laplace transforms.
CODE NO	
BS202PH.1	**BS202PH-EC102-ENGINEERING PHYSICS-2**
BS202PH.2	**Statement**
BS202PH.3	To acquire the knowledge on basic concepts of solid state physiEC.
BS202PH.4	To know and understand the properties and applications of magnetic and super conducting materials.
BS202PH.5	To know about the properties and applications of semiconducting and dielectric materials.
	To acquire the knowledge on latest material characterization techniques along with their applications.
	To know about nano technology and nano science.
CODE NO	
BS203CH.1	**BS203CH-EC103-ENGINEERING CHEMISTRY-2**
BS203CH.2	**Statement**
BS203CH.3	Recall, relate and apply various parameters of electrodes and electrolytes such as conductance, conductivity, molar, equivalent conductance, electrode potentials, emf, pH and their measurements by constructing electrochemical cells using suitable electrodes with the knowledge of standard reduction potential data.
BS203CH.4	Explain the basic operating principles of primary, secondary batteries, fuel cells, solar cells – their design, similarities, differences and applications.
BS203CH.5	List types of corrosion; explain their mechanism, factors affecting the rate of corrosion and apply the knowledge of various corrosion control methods for protection of metals.
	Classify chemical fuels, calculate calorific value, air quantities required for combustion of fuels, explain analysis of coal, refining of petroleum, cracking of petroleum, engine knocking , fuel rating , identify uses of solid , liquid , gaseous fuels and the importance of renewable energy sources such as bio-diesel.
	List types of composites; liquid crystals, identify their advantages, engineering applications in day to day life and relate concept and principles of green chemistry for design and manufacturing of engineering materials.
	HS204EG-EC104-BUSINESS COMMUNICATION AND PRESENTATION SKILLS
	know the importance of Business Communication, ABC of Technical Communication, and Channels of Communication appropriately

	learn models of Interpersonal Communication, Styles of Communication, Teamwork, Persuasion Techniques, Mobile phone and E-mail Etiquette and Time management
	learn the differences between Technical and General writing, Report-writing, and drafting Scientific Papers
	learn how to draft an SoP, Job application, Cover letter, Business letters, Agenda, and Minutes of Meeting
	plan and prepare to face Interviews and participate in Group Discussions
CODE NO	
PC205EC.1	**PC205EC-EC105-BASIC CIRCUIT ANALYSIS**
PC205EC.2	**Statement**
PC205EC.3	Appreciate the concept of Mesh, Super Mesh, Node, Super Node and Evaluate DC analysis of Network theorems, Topologies and terminal Characteristics of Passive components.
PC205EC.4	Compute Transient and steady state responses of RL, RC and RLC series and Parallel networks
PC205EC.5	Analyze AC circuits and magnetically coupled circuits.
	Differentiate between different sets of 2- Port network parameters along with interconnection of networks.
	Evaluate Complex Frequencies, Pole-Zeros of an Admittance or Impedance function and sketch Pole-Zero Plots and to find Resonance Q-Factor and Bandwidth.
CODE NO	
ES949EE.1	**ES949EE-EC106-ELECTRICAL TECHNOLOGY**
ES949EE.2	**Statement**
ES949EE.3	Appreciate the importance of ac & dc circuits.
ES949EE.4	The ability to select a suitable measuring instrument for measuring of electrical power .
ES949EE.5	Recall operation of transformers and applications.
	Identify the suitable DC motor and generator for application.
	The ability to formulate and then analyze the working of AC electrical machine.
CODE NO	
BS251PH.1	**BS251PH-EC107-ENGINEERING PHYSIEC LAB-2**
BS251PH.2	**Statement**
BS251PH.3	To examine the nature of ferromagnetic materials.
BS251PH.4	To characterize semiconducting device and calculate temperature co-efficient of resistance.
BS251PH.5	To study the characteristiEC of photo voltaic cell and evaluate the efficiency.
BS251PH.6	To characterize a semiconducting device and calculate the energy gap.
	To characterize a semiconducting device using junction diode and calculate the resistance for forward and reverse bias.
	To examine the nature of dielectric materials and evaluate their related

	parameter.
CODE NO	
BS251CH.1	**BS251CH-EC108-ENGINEERING CHEMISTRY LAB-2**
BS251CH.2	**Statement**
BS251CH.3	Extend the knowledge of electroanalytical techniques like Conductometry, Potentiometry, pHmetry and Colorimetry for performing chemical analysis and its data compilation individually or in teams for analyzing physical properties of engineering materials used in in daily life.
BS251CH.4	Estimate strength of weak acids, strong acids or acids present in mixtures by Conductometric, Potentiometric titrations.
BS251CH.5	Determine the strength of reducing agents like Fe^{+2} present in un known sample solutions by Potentiometry.
	Analyze acids quickly and accurately using pH metry.
	Test and determine chemical species like Iron and Manganese present in unknown complex mixtures or ores by Colorimetric method.
CODE NO	
ES930EC.1	**ES930EC-EC109-COMPUTER SKILLS LAB**
ES930EC.2	**Statement**
ES930EC.3	Identify assemble and disassemble the components of Personal Computer (PC) System.
ES930EC.4	Install the operating system.
ES930EC.5	Create Documents using MS WORD and spread sheets using MS EXCEL
ES930EC.6	Design presentations using MS POWER POINT
	Develop a website using HTML
	Use Documentation Tool LATEX to create reports, books, articles in standard formats.
CODE NO	
HS253EG.1	**HS253EG-EC110-COMMUNICATION SKILLS LAB**
HS253EG.2	**Statement**
HS253EG.3	use dialogues in a variety of situations and settings such as Role Play
HS253EG.4	make effective Presentations using multi-media and overcome stage fright
HS253EG.5	learn the art of planning and making a Public Speech
	participate in Group Discussions and Debates
	face Interviews effectively
CODE NO	
PC945EC.1	**PC945EC-EC111-ELECTRONIC WORKSHOP LAB**
PC945EC.2	**Statement**
PC945EC.3	Appreciate the difference between different Passive, Active and Electro mechanical components and their lead identification procedures.
PC945EC.4	Use different Electronic test and measuring instruments
	Analyze and understand network theorems using MULTI-SIM.
	Appreciate how to design PCB, soldering and De-soldering techniques

	Assess the importance of Transformer design, and its construction.

Academic Year 2016-17
B.E. II/IV   SEM-I

Course Name: Applied Mathematics Course number: MT 202 Code : MT 202 Course number: EC-201	
Code No.	**Statement**
MAT202.1	Solve problems on formation of partial differential equations and some standard first order partial differential equations.
MAT 202.2	Solve problems based on differentiation and line integration of complex functions
MAT 202.3	Solve problems based on expansion of a given complex function in Taylor's series, Laurent's series ,some problems on contour integration and explain some standard conformal transformations.
MAT 202.4	Apply numerical methods for solving algebraic, transcendental , system of linear equations, initial value problems for first order ordinary differential equations and interpolation methods for estimation.
MAT 202.5	Apply method of least squares for curve fitting , computing correlation Coefficient and obtaining lines of regression for given data

Course Name: Basic Circuit Analysis Course number: EC-201	
Code No.	**Statement**
EC 201.1	Appreciate the concept of Mesh, Super Mesh, Node, Super Node their DC analysis.-Network theorems, Topologies and terminal Characteristics.
EC 201.2	Compute Transient and steady state responses of RL, RC and RLC series and Parallel networks.
EC 201.3	Analyze AC circuits and magnetically coupled circuits.
EC 201.4	Differentiate between different sets of 2- Port network parameters along with interconnection of networks.
EC 201.5	Evaluate Complex Frequencies, Pole-Zeros of an Admittance or Impedance function and sketch Pole-Zero Plots and to find Resonance Q-Factor and Bandwidth.

Course Name: Electromagnetic Theory Course number: EC202	
Code No.	**Statement**
EC202.1	Analyze the behaviour of static electric and magnetic fields.
EC202.2	Evaluate the equation for potentials and capacitances to understand the concepts of static and dynamic fields.

EC202.3	Compute the basic principles of static electric and magnetic fields with Maxwell's equations and extend them to time varying fields.
EC202.4	Describe and analyze Electromagnetic wave propagation in free space and conducting media.
EC202.5	Interpret and illustrate the Reflection of plane waves by different media both in normal and oblique incidence.

Course Name: Electronic Devices	Course number: EC 203
Code No.	**Statement**
EC 203.1	Interpret the V-I characteristics & switching characteristics to determine the diode parameters and apply diode models to analyze various applications of diodes.
EC 203.2	Identify the merits and demerits of various filters, formulate and design rectifier circuits with filters.
EC 203.3	Discriminate the BJT configurations to recognize appropriate transistor configuration for any given application and design the biasing circuits with good stability.
EC 203.4	Analyze, compare and design of BJT amplifiers with biasing circuits.
EC 203.5	Distinguish the working principles of BJT and FET also compare between FET & MOSFET.

COURSE NAME : Elements of Mechanical Engineering	COURSE CODE: MT
Code No.	**Statement**
M 221.1	The student would be able to correlate the laws of thermodynamics with the fundamental conceptual terminologies like properties, systems, processes, cycles, states, different types of equilibrium, energy, etc and solve related problems.
M 221.2	The student would be able to understand the different classifications of IC engines and reciprocating air compressors with specific focus on similarities and differences between (i) 2 stroke and 4 stroke engines and (ii) CI and SI engines. Subsequently, the student would be able to compute the performance parameters of the engines and reciprocating air compressors.
M 221.3	The student would be able to classify the different modes of heat transfer, analyze the governing equations, understand the applications of heat exchangers and solve related problems.
M 221.4	The student would be able to assess the relevance of different refrigeration systems with respect to their eco friendliness, suitability, performance etc., and also learn about different parameters of Psychrometry.
M 221.5	The student would be able to classify different manufacturing processes like forging, welding, forming, machining, etc and recognize their suitability for manufacturing of different industrial products.

M 221.6	The student would be able to understand the different types of power transmission systems like gears, gear trains, belts, ropes etc with emphasis on their kinematic mechanisms and solve related problems.

Course Name: Electrical TECHNOLOGY	Course number: EE222
Code No.	**Statement**
EE222.1	Understand the construction and operation of a DC generator and DC motor
EE222.2	Derive the generation of emf in an alternator
EE222.3	Analyze the operation of a single phase transformer
EE222.4	Comprehend the rotating magnetic field of a three phase induction motor
EE222.5	List the applications of single phase induction motor

Course Name: Electronic Devices Lab	Course number: EC 231
Code No.	**Statement**
EC231.1	Characterize the behavior of p-n junction diode, determine the diode parameters and design Zener voltage regulator using SPICE.
EC231.2	Evaluate the performance of rectifiers with & without filters. Analyze and design the rectifiers with filters using SPICE.
EC231.3	Distinguish between the characteristics of different BJT and FET transistor configurations.
EC231.4	Design and Evaluate the functionality of various biasing circuits for BJT and FET amplifiers.
EC231.5	Generate and interpret the characteristics of UJT, SCR, Tunnel diode and photo diode

Course Name: Electronic Workshop and Simulation Lab	Course number: EC232
Code No.	**Statement**
EC232.1	Appreciate the difference between different Passive, Active and Electro mechanical components and their lead identification procedures.
EC232.2	Use different Tools, Electronic test and measuring instruments.
EC232.3	Show expertise in Analyzing the network concepts and their theorems.
EC232.4	Appreciate how to start a project from the component selection to PCB design, soldering and De- soldering.
EC232.5	Assess the importance of Transformer design, and its construction.

Academic Year: 2016-17
B.E. II/IV SEM-II

Course Name: Analog Electronic Circuits	Course number: EC 251
CO	**Student should be able to**
EC251.1	Design and Analyze low frequency, mid frequency and high frequency response of small signal single stage and Multistage RC coupled and Transformer Amplifiers using BJT and FET.
EC 251.2	Identify the type of negative feedback, Analyze and design of negatfeedback amplifiers.
EC 251.3	Design Audio Frequency and Radio Frequency oscillators.
EC 251.4	Develop and formulate Transistorized voltage regulators
EC 251.5	Distinguish the classes of Power Amplifiers and their design considerations.
EC 251.6	Differentiate the performance and analyze single and double Tuned Amplifiers.

Course Name: Networks And Transmission Lines	Course number: EC 252
CO	**Student should be able to**
EC 252.1	Compute image impedance, iterative impedance, characteristic impedance and propagation constant for networks.
EC 252.2	Design different types of passive filters.
EC 252.3	Generalize the difference between impedance and admittance function
EC 252.4	Analyze physical significance of the equations of the transmission lines, compute open and short circuited lines and develop the condition for distortionless transmission lines.
EC 252.5	Classify various types of transmission lines and calculate the reflection co-efficient and different parameters of transmission lines using the analytical and graphical methods.

Course Name: Probability Theory and Stochastic Processes Course number: EC253	
CO	**\<statement\>** Student should be able to
EC253.1	Define the axiomatic formulation of modern Probability Theory and think of random variables as an intrinsic need for the analysis of random phenomena
EC253.2	Characterize probability models and function of random variables based on single & multiples random variables
EC253.3	Evaluate and apply moments & characteristic functions and understand the concept of inequalities and probabilistic limits.
EC253.4	Define random processes and determine covariance and spectral density of

	stationary random processes
EC253.5	Demonstrate the specific applications to Markov processes and Evaluate the response of LTI systems to stochastic processes in time and frequency domain

Course Name: Signals Analysis and Transform Techniques	Course number: EC254
CO	Student should be able to
EC254.1	Define and differentiate types of signals and systems in continuous and discrete time.
EC254.2	Apply the properties of the Fourier Series and Fourier Transform for Continuous and Discrete time signals.
EC254.3	List the properties of Fourier Transform and apply them to determine the Fourier spectrum.
EC254.4	Relate Laplace transforms to solve differential equations and to determine the response of the Continuous Time Linear Time Invariant Systems to known inputs.
EC254.5	Apply Z-Transforms for discrete time signals to solve Difference equations.
EC254.6	Compute frequency domain representation of discrete time signals and systems. Obtain Linear Convolution and Correlation of discrete time signals with graphical representation.

Course Name: Switching Theory and logic Design	Course number: EC255
CO	Student should be able to
EC255.1	Translate one number system to another number system and define various Boolean laws and theorems.
EC255.2	Deduce the simplified Boolean function using K-Map and Quine-Mc Clusky method and construct the logic circuits.
EC255.3	Design Combinational logic circuits and implement Boolean functions using IC's.
EC255.4	Illustrate the concept of sequential logic design, analyze the operation of flip-flop and design various types of sequential circuits.
EC255.5	Distinguish synchronous and asynchronous sequential circuits, Design sequential circuits and draw counters using various IC's.

Course Name: ENVIRONMENTAL STUDIES	Course number: CE 222
CO	Student should be able to
CE 222.1	Comprehend the importance of natural resources (Water and land) and their role in the sustainable environment
CE 222.2	Understand basic concepts of an ecosystem and its significance

CE 222.3	Illustrate the value of biodiversity and need for its conservation
CE 222.4	Identify different types of environmental pollution, their causes, effects and control measures and need for environmental legislation.
CE 222.5	Analyze global environmental issues, social aspects including population growth, disaster management.

Course Name: Analog Electronic Circuits Lab	Course number: EC281
CO	**Student should be able to**
EC281.1	Design Pulse circuits (Clippers, Clampers, multivibrators) to generate required waveforms and analyze outputs practically.
EC281.2	Analyze frequency response of two stages RC coupled and negative feed amplifiers at low frequency, mid frequency and high frequency and compare their bandwidths with BJT and FET.
EC281.3	Distinguish various oscillator circuits with respect to frequency of oscillations.
EC281.4	Analyze power amplifiers with their efficiency and Tuned amplifiers for their resonance frequency.
EC281.5	Calculate theoretical image impedance, characteristic impedance and verify practically. Design and verify m derived and Constant K filters.

Course Name: ELECTRICAL TECHNOLOGY LAB	Course number: EE292
CO	**Student should be able to**
EE292.1	Analyze the working of three phase induction by conducting a load test
EE292.2	Synthesis the equivalent circuit parameters of a single phase transformer
EE292.3	Evaluate the regulation of a alternator by implying synchronous impedance method at different powerfactor s at various suitable loads
EE292.4	Analyze the speed control and loading charectastrics of DC shunt and compound motors

Academic Year: 2016-17
III Year I Sem

Course Name: Linear IC Applications	Course number: EC301
CO	**Student should be able to**
EC 301.1	Analyze DC and AC characteristics for Single/Dual input Balanced/Unbalanced output configurations using BJTs.
EC 301.2	Distinguish various linear and non-linear applications of Op-Amp.
EC 301.3	Construct various linear and nonlinear circuits using Op-Amp.
EC 301.4	Design and Formulate Op-Amp oscillators, single chip oscillators, frequency generators and active filters and IC regulators.
EC 301.5	Analyze the operation of the most commonly used D/A and A/D converter types.

Course Name: Pulse And Digital Circuits	Course number: EC 302
CO	**Student should be able to**
EC 302.1	Construct different linear networks and analyze their response to different input signals
EC 302.2	U Understand switching characteristics of diodes and transistors and Construct various Non-linear circuits
EC 302.3	Understand ,Analyze and design multivibrators and sweep circuits using transistors.
EC 302.4	In Investigate the internal operation of a basic gate of various logic families and Compare basic operating characteristics of CMOS and TTL logic families
EC 302.5	B Build basic gates with MOS and CMOS logic family and design their interfacing circuits

Course Name: Analog Communication	Course number: EC303
CO	**Student should be able to**
EC303.1	Understand analog communication systems using amplitude modulation and demodulation.
EC303.2	Understand analog communication systems using angle modulation and demodulation.
EC303.3	Be familiar with analog radio transmitters and receivers.
EC303.4	Understand the performance of analog communications in the presence of noise.
EC303.5	Be familiar with analog pulse communication systems..

Course Name: Automatic Control Systems	Course Code: EC 304
CO	**Student should be able to**
EC 304.1	Classify the different types of the control systems and apply mathematical modeling to convert mechanical systems into electrical systems and Block diagram into Signal Flow Graph.

EC 304.2	Examine the stability of the system using R-H and Root locus techniques and calculate the Steady state error, order, type of the system.
EC 304.3	Illustrate the compensation techniques and frequency domain specifications and be able to fins the stability of the system using Bode plot and Nyquist plot.
EC 304.4	Characterize the digital control systems and Transfer function of sampled data system.
EC 304.5	Detect the Observability/Controllability of control systems and design their state models.

Course Name: Computer Organization And Architecture	Course Code: EC305
CO	**Student should be able to**
EC305.1	Apply the knowledge of Bus structure, Registers, Micro-operations, Instructions formats and addressing modes to design the basic structure of a digital computer.
EC305.2	Relate the number representation of digital computer to devise the Hardware arithmetic algorithms.
EC305.3	Comprehend control unit design using hardwired and Micro programmed organization.
EC305.4	Interpret different ways of communicating with I/O devices and appreciate the importance IOP.
EC305.5	Annotate the organization of various memory structures; Construct various memories like cache & Virtual. Associate the various replacement policies.
EC305.6	Conceptualize instruction level parallelism, VLIW architecture and deduce the various pipeline conflicts

Course Name: DSD Through Verilog HDL-A	Course Code: EC 306
CO	**Student should be able to**
EC306.1	Appreciate the constructs and conventions of the Verilog HDL programming
EC306.2	Generalize the Structural, Register-Transfer level (RTL) and Algorithmic levels of abstraction for modeling Digital hardware system and apply the concept of test-benches for simulation based verification
EC306.3	Design and analyze modeling of Combinational, Sequential digital systems and Finite state machines
EC306.4	Comprehend advanced features of Verilog HDL and apply them to design Complex Real Time digital systems
EC306.5	Create various circuits for memory devices and annotate the ASIC/FPGA design flow

Course Name: Pulse And Digital Integrated Circuits Lab	Course number: EC 331

CO	Student should be able to
EC 331.1	Identify different types of Integrated circuits, IC packages its pin description and Interpret the data sheet and can explain the importance of electrical parameters for considering an IC for different applications.
EC 331.2	Design and analyse the linear and non linear applications of op amps.
EC 331.3	Design Astable and Monostable Multivibrator circuits using NE555 IC Timer and design different applications based on it.
EC 331.4	Design Combinational circuits by using digital ICs.
EC 331.5	Design Sequential circuits by using digital ICs.

Course Name: Verilog HDL lab Course number: EC-332	
CO	Student should be able to
EC 332.1	Design building block of digital IC using Verilog HDL in all Dataflow, structural and behavioral modeling styles.
EC 332.2	Analyze various modeling styles by understanding their impact on final gate level circuit.(Gate–level Net list file)
EC 332.3	Generate stimulus blocks to effectively test the functionality of the designs.
EC 332.4	Develop and Analyze 4 bit sequence detector using Mealy and Moore type Finite state machine.
EC 332.5	Synthesize and implement the digital circuit on FPGA boards.

Academic Year: 2016-17	
III Year II Sem	
Course Name: Digital Communications Course number: EC351	
CO	Student should be able to
EC351.1	Classify the different types of digital modulation techniques PCM, DPCM, DM and ADM and compare their performance by SNR.
EC351.2	Illustrate the classification of channels and Entropy coding methods.
EC351.3	Distinguish different types of Error control codes along with their encoding/decoding algorithms.
EC351.4	Examine the Performance of different Digital Carrier Modulation schemes of Coherent and Non-coherent type based on Probability of error.
EC351.5	Generation of PN sequence usingSpread Spectrum and characterize the Acquisition Schemes for Receivers to track the signals.

Course Name: Digital Signal Processing Course number: EC 352	
CO	Student should be able to
EC 352.1	Evaluate DFT using direct and FFT methods. Analyze Circular and Linear

	convolution, and apply for linear filtering
EC 352.2	Design & compare Digital FIR filters using window method, Analyze the characteristics of various windows
EC 352.3	Formulate & apply Digital IIR filter design using Butterworth &Chebyshev approximations to Verify the characteristics of LPF, HPF, BPF& BEF.
EC 352.4	Comprehend & deduce Interpolator, Decimator & Multi-stage sampling rate conversion and appreciate its applications
EC 352.5	Visualize & Appreciate the Architecture of TMS320C54xx Processor and the Various Addressing modes.

Course Name: Antenna& Wave Propagation	Course number:EC353
CO	**Student should be able to**
EC353.1	Analyze different antenna parameters by applying the concept of Radiation and isotropic radiator.
EC353.2	Derive the far field pattern of loop and helical antennas by applying the concept of half wave dipole and quarter wave monopole.
EC353.3	Evaluate the features and analyze the radiation pattern of different VHF & UHF antennas by using different measurement techniques.
EC353.4	Analyze the characteristics of broad side and end fire arrays and calculate various parameters.
EC353.5	Compare and Contrast different wave propagation techniques and illustrate the radio wave behaviour in different modes of communications.

Course Name: Micro Processors and Micro Controllers	Course Code: EC354
CO	**STATEMENT**
EC354.1	Identify the architectural features of 8086,Comprehend the instruction set and Develop the assembly language programming
EC354.2	Conceptualize the interrupt structure of 8086, operation and interfacing of various peripheral devices like memory, 8254, 8257 and 8251.
EC354.3	Differentiate between microprocessor and microcontroller in their architectural features and develop the assembly language programming using 8051.
EC354.4	Develop programs using the timers/counters and UART with interrupts.
EC354.5	Extend the memory and I/O ports of 8051 and Program 8051 for real time applications.

Course Name: MANAGERIAL ECONOMICS & ACCOUNTANCY	Course number: CM371
CO	**COURSE OUTCOME**

	Student should be able to
CM371.1	Find out the general exposure about the business, economic environment and the structural aspects of Managerial Economics
CM371.2	Analyze different principles and laws of managerial economics & examine the consumer behaviour for taking various managerial decisions, such as forecasting demand for new and existing goods and services to the business units and also suggest the best profit maximizing production function to the producers/entrepreneurs.
CM371.3	Identify the impact of changes in internal factors, such as cost, price & volume on profitability and appraise of the firms behaviour in different markets structures with respective to competitive prices fixation of products and optimum input-output decisions.
CM371.4	Evaluate with the knowledge of capital budgeting methods and techniques for different business proposals and identify the best among them for prudent investment and also explore different sources of capital needed to the business
CM371.5	Construct and analyse the financial statements of the business and interpret them for taking ideal managerial decisions.

Course Name: Communication Lab Course number: EC381	
CO	Student should be able to
EC381.1	Generate and detect the signal using analog modulation schemes AM, FM, PAM, PWM and PPM and digiatal modulation techniques ASK, FSK, BPSK, DPSK and M-ary QPSK
EC381.2	Generate the multiplexed signal using TDM and FDM and Demultiplex it
EC381.3	Demonstrate the mixer characteristics, Pre-emphasis and De-emphasis Circuits.
EC381.4	Generate and demodulate the signal using PCM, DPCM, DM and ADM.
EC381.5	Transmit the message via serial communication using modem and represent the data using various signalling/data formats.

Course Name: Systems & Signal Processing Lab Course number: EC 382	
CO	<statement> Student should be able to
EC 382.1	Evaluate frequency response, output response, Linear & circular convolution using DFT. Appreciate efficient implementation of DFT using FFT.
EC 382.2	Design & Interpret FIR filters (LPF,HPF,BPF & BEF) using various window techniques
EC 382.3	Develop & contrast IIR filters (LPF, HPF, BPF & BEF) using Butterworth and Chebyshev approximations
EC 382.4	Implement Interpolation and Decimation.

EC 382.5	Devise the above concepts using MATLAB & CCS tools. Acquire knowledge to work on real time processing using DSK.

Course Name: Micro Processors and Micro Controllers Lab	Course Code: EC383
CO	**STATEMENT**
EC383.1	Identify various ICs used in the development of 8086 trainer kit.
EC383.2	Develop the logic using instruction set of 8086 in different addressing modes to carry out arithmetic, logical and string operations.
EC383.3	Use the IDE tool effectively for developing and executing the programs using 8051.
EC383.4	Comprehend the usage of on-chip timers and serial communication of 8051 and their interrupts using programs
EC383.5	Evaluate the operation of on-chip peripherals using interrupt method
EC383.6	Interface devices like ADC, DAC, LCD, and Stepper Motor to 8051

Course Name: Industrial Visit	Course number: EC 384
CO	**Statement**
EC 384.1	Forecast about the technical approach in different industries.
EC 384.2	Integrate their knowledge about different technologies and to apply them in problem solving techniques.
EC 384.3	Predict different problems that disturbs the environment and solve them.
EC 384.4	Construct different Projects with the knowledge acquired.
EC 384.5	Work in multidisciplinary teams.

Academic Year : 2016-17
IV Year I Sem

Course Name: Microwave Engineering	Course number: EC 401
CO	**Student should be able to**
EC 401.1	Analyse the Propagation of Guided waves in different modes between parallel planes.
EC 401.2	Evaluate different parameters (like impedance ,attenuation and quality factor.) for Rectangular and Circular Wave guides & Cavity Resonators
EC 401.3	Determining Scatt5erring parameters of different microwave components and analyse their properties.
EC 401.4	Integrate the concept of bunching and velocity modulation to summarize the operation of micro wave tubes and the high frequency limitations of conventional tubes.

EC 401.5	Analyse the principle, operation and characteristics of different micro wave solid state devices.

Course Name: VLSI Design	Course number: EC 402
CO	**Student should be able to**
EC402.1	Design building blocks of digital IC using Gate level and Dataflow Modelling.
EC402.2	Design blocks of digital IC using Behavioural Modelling.
EC402.3	Design Finite State Machines using Verilog HDL and Analyze Synthesis design flow.
EC402.4	Analyze modes of operation of MOS transistor and its basic electrical properties
EC402.5	Draw stick diagrams and layouts for any MOS transistors and calculate the parasitic R & C
EC402.6	Design various combinational circuits using gates and transistors

Course Name: Computer Networks	Course number: EC 403
CO	**Student should be able to**
EC403.1	Appreciate the importance of Data communications and the necessity of the reference models: OSI, TCP/IP, Analyze the design issues related to data link layer and various flow control protocols
EC403.2	Analyze the design issues related to data link layer and various flow control protocols.
EC403.3	Infer the working of internet and the importance of the Network Layer in the Internet and ATM Networks.
EC403.4	Assess the importance of transport services and various elements of transport layer like Connection management, TCP and UDP protocols.
EC403.5	Understand and comprehend the importance of Application layer and Domain Name System, SNMP, E-mail, World Wide Web.
EC403.6	Relate the Network Security with Cryptography Symmetric Key and Public Key algorithms, and will appreciate the concept of Digital Signatures and Authentication Protocols.

Course Name: Mobile and Cellular Communications	Course number: EC 404
CO	**Student should be able to**
EC 404.1	Understand the method of selection and reuse of a set of frequency channels, Base station requirement, signals required for communication and hand over between Base stations.
EC 404.2	Appreciate and understand the methods of electromagnetic wave propagation in cellular communication. The evaluation of the electromagnetic energy reaching the mobile unit.

EC 404.3	Identify different a methods of mobile access technologies and which of them suitable for mobile cellular solutions. Understand process used for Bluetooth, Zigbee like low power devices.
EC 404.4	Explain features, authentication, , operational details of GSM and CDMA mobile cellular systems along with data frame structure details.
EC 404.5	The development and limitation of the preliminary and advanced generation of mobile systems. Present trends in Cellular communications and the future communication requirements.

Elective-I	
Course Name: EMBEDDED SYSTEMS Course number: EC 411	
CO	**Student should be able to**
EC 411.1	Classify different types of embedded systems and explain the different hardware and software component used in the system and various metrics or challenges in designing an embedded system.
EC 411.2	Identify the features of ARM core and analyze the ARM instruction set.
EC 411.3	Compare various protocols like serial, parallel and internet enabled system-network protocols.
EC 411.4	Use modern engineering tools necessary for integrating software and hardware components in embedded system designs.
EC 411.5	Outline different IDEs for firmware development of processors/controllers.

Course Name: Optical Fibre Communication Course number: EC 412	
CO	**Student should be able to**
EC 412.1	Comprehend the key concepts of modes and linearly polarized modes. Distinguish ray propagation in single mode and graded index fibers.
EC 412.2	Describe the effects of dispersion in optical fibers due to materials, waveguide, polarization modes
EC 412.3	Choose direct and indirect band gap materials, light source materials. Understand structures of LED, Laser diodes and the concepts of quantum laser, temperature effects and amplifiers.
EC 412.4	Describe the working of PIN, APD diodes and estimate noise performance of photo detector response time. Categorize different error sources and comprehend the concept of probability of error and quantum limit
EC 412.5	Analyze point to point link to estimate power link budget and rise time budget. Understand the operational details of Erbium doped fiber amplifiers and basics of SONET/SDH network

Course Name: Digital Image Processing	Course number: EC 413
CO	**Student should be able to**
C413.1	Interpret the fundamentals of Digital Image processing system and apply to evaluate various relationships between pixels.
C413.2	Analyze various transforms and its properties and apply the knowledge to Design & formulate the co-efficient matrices.
C413.3	Enhance the images using spatial and frequency domain techniques & and apply the knowledge to infer characteristics of images.
C413.4	Identify degradation & Restoration processes. Model & Evaluate the Algebraic approach to restoration, inverse filtering and Wiener filtering techniques.
C413.5	Outline & measure various Redundancies of image compression Analyze & evaluate various Lossless & Lossy coding techniques.

COURSE NAME: Industrial Administration & Financial Management COURSE CODE: ECME 472	
CO	**Student should be able to**
ME 472-1	On completion of this unit learner (student) will be able to, (a) define business, objectives of business and types of business organization such as private undertakings, public undertakings and joint sector. (b) Describe factors influencing the choice of suitable form of organization. (c) Explain organization structures and advantage of organization chart. (d) Describe principles of organization structure. (e) Summarize types of organization structures, their merits and demerits. (f) Explain functions of management. (g) Summarize factors influencing the selection of plant location and plat layout. (h) Discuss principle consideration of typical industries. (i) Explain types of layouts such as line or product layout, functional or process layout, fixed position and combination layout their advantages and disadvantages.
ME 472-2	On completion of this unit student will be able to, (a) State definitions and objectives of work study, method study and time study. (b) Discuss applications of work study and its advantages. (c) Know the contributions of F.W Taylor & Frank Gilbreth. (d) Explain objectives of method study and its procedure. (e) Prepare flow process charts and symbols used in process charts. (f) Discuss motion analysis, Therbligs and SIMO chart. (g) Summarize principles of motion economy and work place layout. (h) Compute standard time by time study. (i) Discuss performance rating factor and allowances. (j) Describe work sampling procedure. (k) Summarize job evaluation objectives and different types of job evaluation and their advantages. (l) Explain performance appraisal objectives, methods. (m) Discuss wages, incentives, wage payment plans and wage incentive plans.

ME 472-3	On completion of this unit student will be able to, (a) Define inspection and quality and their differences. (b) Discuss the objectives of inspection and kinds of inspections. (c) Summarize SQC and techniques used in SQC. (d) Explain sampling inspection – sampling by attributes and variables. (e) Prepare sampling plans – single, double and multiple sampling plans. (f) Draw various control charts and work out problems related to x-R chart, P. chart and C. chart. (g) Describe Quality Circles and ISO 9001 quality system. (h) Summarize production planning and control – principles and functions. (i) Describe types of manufacture and production. (j) Draw various production control charts.
ME 472-4	On completion of this unit student will be able to, (a) Define optimization and operations research. (b) Solve problems on LPP using graphical solution. (c) Compute assignment problems. (d) Define PERT & CPM and their differences. (e) Calculate critical path. (f) Describe MM functions and its objectives. (g) Summarize types of material & material planning techniques. (h) Express duties of purchase manager. (i) Determine economic ordering quantities. (j) Explain types of material purchase. (k) Classify different materials.
ME 472-5	On completion of this unit student will be able to, (a) Express types of cost and elements of cost. (b) Describe over heads, types of over heads and allocation of over heads. (c) Define depreciation, methods of depreciation and compute depreciation. (d) Explain break even analysis and calculate breakeven point. (e) Express techniques of capital budgeting. (f) Describe time value of money, valuation concepts. (g) Define financial leverage, types of leverages. (h) Summarize importance of cost of capital and classification of cost of capital.

Course Name: Microwave Lab	Course number: EC 431
CO	**Student should be able to**
EC431.1	Analyze frequency, Wave length, SWR and Impedance for Reflex klystron Oscillator by using its equation.
EC431.2	Evaluate of mode characteristics of Reflex klystron.
EC431.3	Evaluate the VI characteristics of Gunn Diode.
EC431.4	Analyze of the characteristics of Circulator, Isolator, Directional Coupler, Tees like (Magic tee, E & H plane tees) using the Scattering parameters.
EC431.5	Generate the Radiation pattern of different antennas like Yagi-Uda and Horn Antenna and measure the gain of the antennas

Course Name: Electronic Design and Automation Lab	Course number: EC432
CO	**Student should be able to**
EC 432.1	Design combinational circuits using Verilog HDL.
EC 432.2	Design sequential circuits.
EC 432.3	Illustrate and design finite state machines.
EC 432.4	Design basic CMOS circuits in transistor level.
EC 432.5	Illustrate and design CMOS multiplexer and decoder.

Course Name: Project Seminar	Course number: EC433
CO	**Student should be able to**
EC433.1	Carryout Literature survey in the area of interest.
EC433.2	Survey the recent advancements in the identified area
EC433.3	Demonstrate an Understanding and discuss the problem within group and to arrive at possible solutions
EC433.4	Develop interpersonal skills, presentation skills, soft skills and creativity
EC433.5	Prepare Technical reports
EC433.6	Demonstrate the qualities and attitudes of a professional engineer for forming a team

Academic Year: 2016-17
IVYear II Sem

Course Name: Radar and Satellite Communication	Course number: EC451
CO	**Student should be able to**
EC 451.1	Explain basics of RADAR system, the importance of various parameters in range estimation.
EC 451.2	Illustrate various types of radars such as CW radar and their variations, MTI radar and its performance limitations and non-coherent MTI radar.
EC 451.3	Illustrate types of tracking methods and radar antennas, displays.
EC 451.4	Illustrate basics of satellite communication.
EC 451.5	Explain various types of satellite sub-systems and various multiple access techniques.
EC 451.6	Illustrate satellite link design and satellite data communication protocols.

Elective -II	
Course Name: Speech Processing	Course number: EC464
Code No.	**Student should be able to**
EC464.1	Associate the mechanism of speech production to the source filter model of speech production for various speech sounds and interpret the speech analysis techniques.
EC464.2	Comprehend feature extraction of speech such as voiced/unvoiced decision and pitch extraction using various algorithms like Rabiner and Gold, SIFT.
EC464.3	Classify the terminal analogue speech synthesizers and articulatory speech synthesizer.

Code No.	Student should be able to
EC464.4	Infer and apply various coding techniques for speech like Sub-band coding, Transform coding to achieve low bit rates.
EC464.5	Annotate the model for speech recognition system and compare the Dynamic time warping with hidden Markova models.

Course Name: Entrepreneurship	Course number: ME411
Code No.	Student should be able to
ME411.1	To develop distinct entrepreneurial traits and ability to recognize business opportunities to build entrepreneurial career.
ME411.2	Students can develop and systematically apply entrepreneurial way of thinking that will allow them to identify and create business opportunities for commercialized success. To know the parameters to assess opportunities and constraints for new business ideas
ME411.3	To design and develop a well presented successful business plan that is feasible and to gain the advantage of Project financing.
ME411.4	To effectively plan projects through CPM/Pert techniques. To understand human aspects of business and helps to assess and evaluate tax burden.
ME411.5	This helps the entrepreneur to manage his human resources and time effectively.

Elective-III	
Course Name: Global Positioning Systems	Course number: EC472
Code No.	Student should be able to
EC 472.1	Analyze the GPS constellation and its principle of operation. Familiarity of GDOP and different types of DOPs
EC 472.2	Derive concepts of different Coordinate systems - WGS-84, IGS, ECI, ECEF and various error sources in GPS and to minimize or overcome these errors.
EC 472.3	Derive the GPS signal structure and its C/A and P Codes associated with. Enumerate different applications of GPS.
EC 472.4	Demonstrate the various types of GPS augmentation systems and architecture of GAGAN and familiarity the concept of Local area augmentation system.
EC 472.5	Conceptualize the modernization of GPS and other satellite navigation systems with GPS integration
EC 472.1	Analyze the GPS constellation and its principle of operation. Familiarity of GDOP and different types of DOPs

Course Name: General Seminar	Course number: EC481
CO	Student should be able to
EC481.1	Carryout Literature survey in the area of interest.
EC481.2	Survey the recent advancements in the identified area

Code No.	Statement
EC481.3	Demonstrate an Understanding and discuss the problem within group and to arrive at possible solutions
EC481.4	Develop interpersonal skills, presentation skills, soft skills and creativity
EC481.5	Prepare Technical reports
EC481.6	Demonstrate the qualities and attitudes of a professional engineer for forming a team

Course Name: PROJECT	Course number: EC 482
Code No.	**Statement ; Students should be able to**
EC 482.1	Review acquired technical knowledge on the selected topic
EC 482.2	Undertake problem identification, formulation and find optimal solution
EC 482.3	Identify suitable hardware and software requirements and design engineering solution to complex problems utilizing a systematic approach. Design & Automation tools.
EC 482.4	Conduct an Engineering project using the state of art hardware and Electronics
EC 482.5	Exhibit team work and Communicate with Engineers and the community at large.
EC 482.6	Prepare project report/thesis

	Academic Year 2015-16
	B.E I/IV
CODE NO	
EG101.1	**EG101-EC101-ENGLISH**
EG101.2	**Statement**
EG101.3	learn the importance of communication, features and process of communication and verbal and Non verbal communication in order to communicate effectively
EG101.4	improve oral communication skills, listening skills, interpersonal communication and improve interpersonal skills by using Johari window and Knapp's model
	improve writing techniques such as passage expansion, Précis-writing, Essay writing, Report –writing, SoP, Résumé - writing and official letters
	learn the basic rules of grammar with appropriate usage and learn to use vocabulary such as synonyms and antonyms, homonyms and homophones
	improve comprehension skills by reading inspirational texts and infer information.
CODE NO	
MT101.1	**MT101-EC102-MATHEMATICS-1**
MT101.2	**Statement**
MT101.3	Solve some problems based on the concept of convergence and divergence of infinite series and apply the various tests of convergence to determine the nature of an infinite series

MT101.4	Solve problems based on the fundamental theorems of differential calculus, expanding functions using Taylor's & Mc Laurin's series and solve problems on finding Radius of curvature , evolutes and envelopes
MT101.5	Evaluate limits, Continuity and derivatives of functions of two variables, Maxima &Minima for functions of two or more variables arising in Engineering Problems.
	Evaluate double and triple integrals and solve problems based on vector differentiation and vector integration.
	Evaluate double and triple integrals and solve problems based on vector differentiation and vector integration.
CODE NO	
MT102	**MT102-EC103-MATHEMATICS-2**
MT103	**Statement**
MT104	Solve various types of First ordered ordinary differential equations and apply these techniques for solving some problems in Geometry, Electricity, Heat transfer and Radio activity.
MT105	Solve higher ordered linear O.D.E's with constant Coefficients using various techniques.
MT106	Solve linear O.D.E's using power series and Frobenius methods and apply these methods for solving Legendres D.E.
MT107	Evaluate improper integrals using Beta and Gamma functions and solve Bessel's differential equations.
	Solve some problems using the properties of Legendre polynomial and Bessel's functions.
	Evaluate Laplace Transforms and inverse Laplace transforms of various functions and solve linear ordinary differential equations using Laplace transforms.
CODE NO	
PH101.1	**PH101-EC104-ENGINEERING PHYSICS**
PH101.2	**Statement**
PH101.3	To understand the concept of interference, diffraction and polarization.
PH101.4	Ability to know the utilization of laser technology, Holography and optical fiber and their engineering applications in various disciplines.
PH101.5	To understand the basics of statistical mechanics, significance and applications of Schrodinger wave equation.
PH101.6	Able to analyze the various crystal structures and their defects and to understand the electrons behavior in solids.
	Gain the knowledge on magnetic materials and dielectric materials and superconducting materials.
	Understand the characterization and basic preparation methods in thin films and Nano-materials.
CODE NO	
CH101.1	**CH101-EC1105-ENGINEERING CHEMISTRY**
CH101.2	**Statement**

CH101.3	Explain quantitative relationship between chemical and electrical energy, construction and working of different types of electrodes used in construction of electrochemical cells Understand the operating principle and apply the knowledge to design batteries.
CH101.4	Relate the principle behind mechanism and rate of corrosion leading to deterioration of metal and apply corrosion control method.
CH101.5	Explain method to find impurities present in water and establish various methods of purifying water.
CH101.6	Show the need for replacement of conventional materials with polymers to be used as plastics, fibres, elastomers, conducting polymers and composites.
	Identify the dependence on conventional fuel like coal, petroleum, and gaseous fuel to meet present energy requirement. Introduce the need for change to renewable sources of energy.
	Interpret the importance of lubricants and liquid crystals. Phase rule concept is used to know the process of separation of pure metals from alloys. Apply the principles of Green chemistry to carryout eco-friendly chemical processes without causing environmental pollution.
CODE NO	
CS101.1	**CS101-EC106-PROGRAMMING IN C&C++**
CS101.2	**Statement**
CS101.3	Understand the procedure to create, compile and execute C program for different inputs.
CS101.4	Apply the concepts of control statements, operators, functions and arrays to implement matrix, searching and sorting algorithms.
CS101.5	Solve programs on pointers and strings
CS101.6	access variables through dynamic memory.
CS101.7	Understand and Apply the concepts of derived data types and file handling operations.
	Understand the concepts of object oriented programming through C++ and know the differences between C and C++ programs.
	Analyze and write programs on inheritance, polymorphism, classes and objects creation using C++.
CODE NO	
CE101.1	**CE101-EC107-ENGINEERING MECHANICS**
CE101.2	**Statement**
CE101.3	Resolve forces acting on a body; obtain resultant force or moment acting due to set of forces and moments acting on a body; and determine unknown forces from equations of equilibrium of forces and moments.
CE101.4	Obtain location of centres of mass of regular and composite shapes; use Pappus theorems to calculate surface areas and volumes of composite structures.
CE101.5	Distinguish between static and kinematic friction, determine effect of static or kinematic friction forces acting on a single or a system of connected bodies; effect of friction in screw jack,wedge,brakes and belt transmission.

CE101.6	Compute area moment of inertia and products of inertia for simple and composite elements using integration methods and transform theorem; calculate mass MI and radius of gyration for regular and composite structures.
CE101.7	Obtain displacement, velocity and acceleration relations of particles in rectilinear and curvilinear motion including projectiles; write equations of motion under influence of forces for particles and connected bodies and for plane motion of rigid bodies.
	Apply Principles of work and energy to motion of particle or connected bodies to evaluate the velocities and angular velocities of bodies in connected systems and involving plane motion.
	Apply Principle of conservation of Momentum and impulse force/moment to evaluate the velocities of a body after application of force/moment, and of bodies in impact/collision considering Coefficient of Restitution.
CODE NO	
CE102.1	**CE102-EC108-ENGINEERING GRAPHICS**
CE102.2	**Statement**
CE102.3	The student would be able to recall the mathematical concepts related to scales, conic sections, involutes, etc and demonstrate proficiency in construction of these using the various methods described in literature.
CE102.4	The student would be able to analyse the position of objects when placed in different orientations with respect to reference planes and reproduce them on drawing sheets to provide valid explanations.
CE102.5	The student would be able to draw the various views of three dimensional objects (Solids) which may be oriented in different positions with respect to the reference planes.
	The student would be able to assess the shapes of objects that can be generated when a given solid is cut by section planes in different orientations. These shapes are shown in the corresponding sectional views using the concepts of auxiliary planes. Further the development of the truncated solids can be drawn by recognizing the basic principles of developments of surfaces.
	The student would be able to recognize the various features of solids by viewing them from front, top and sides. Subsequently the student would also be able to generate a few three-dimensional views of the given objects using the principles of isometric projections.
CODE NO	
PH132.1	**PH132-EC109-PHYSICS LAB**
PH132.2	**Statement**
PH132.3	To demonstrate the phenomena of interference and diffraction to determine wavelength of a given light source of light.
PH132.4	To verify the laws of polarization and determine the specific rotator power of an optically active substance.
PH132.5	To understand the principle involved in laser and optical fiber technology.
PH132.6	To examine the nature of ferromagnetic and dielectric materials to evaluate the related parameters.

PH132.7	To characterize semiconducting devices to calculate parameters like resistance, energy gap and temperature co-efficient.
	To study the Characteristics of Photo Voltaic Cells and evaluate their efficiencies.
	To verify Malus law of polarization of light.
CODE NO	
CH132.1	**CH132-EC110-CHEMISTRY LAB**
CH132.2	**Statement**
CH132.3	Make use of analytical and electronic balances for weighing samples in chemical analysis.
CH132.4	Identify and estimate impurities causing hardness and alkalinity in water.
CH132.5	Find the strength of reducing species such as Fe+2, Fe+3, Cr+3, Cu+2 and Cl- by various titrimetric methods like complexometry and Iodometry.
CH132.6	Estimate quantitatively different chemical species present in complex mixtures, ores and unknown samples by various instrumentation techniques like Conductometry and Potentiometry.
	Determine quantitatively different chemical species present in unknown samples by various instrumentation techniques like pH metry and Colorimetry.
	Recall the methods of preparation of industrially important polymers.
CODE NO	
ME131.1	**ME131-EC111-WORKSHOP PRACTICE**
ME131.2	**Statement**
ME131.3	The student would be able to utilize the various tools of fitting namely bench vice, V block, files, surface plate, surface gauge, hacksaw, drill bits, etc to perform various operations on the work piece (job) like filing, scrapping, drilling, tapping, etc.
ME131.4	The student would be able to identify different types of connections like series, parallel, stair case wiring, etc. Subsequently, the student would be able to correlate the methods of electrical wiring in different domestic and industrial applications.
	The student would be able to utilize the various tools of carpentry namely bench vice, planes, mallet, hammers, files, different saws, etc to perform various carpentry joints like half lap joint, dove tail joint, bridle joint, etc.
	The student would be able to utilize the various tools of sheet metal (tin smithy) namely hammer, mallet, stakes, snips, pliers, punches, vernier calipers, wire gauge, etc to perform various operations like cutting, shearing, notching, bending, riveting, etc. on the given sheet metal and develop various objects like tray, funnel, scoop, cylinder,etc.
CODE NO	
CS131.1	**CS131-EC112-C PROGRAMMING LAB**
CS131.2	**Statement**

CS131.3	Understand the procedure to create, compile and execute C program for different inputs.
CS131.4	Apply the concepts of functions and arrays and write C programs for matrix, searching and sorting techniques.
CS131.5	Create Derived types and deal files by applying the concepts of structures and pointers.
CS131.6	Understand the procedure to create, compile and execute C++ program for different inputs.
	Apply the concepts of classes, objects, inheritance and polymorphism in C++.
	Write programs in both C and C++ and could distinguish the differences between C and C++.
CODE NO	
EG131.1	**EG131-EC113-ENGLISH LANGUAGE LAB**
EG131.2	**Statement**
EG131.3	learn the sound system of English Language with the knowledge of IPA-classification & description
EG131.4	learn the word stress & aspects of connected speech
EG131.5	learn the Rhythm & Intonation of English language
	improve the fluency in the spoken form of the language by participating in Presentation skills, Public speaking, Group Discussion and Debate.
	learn to dictionary and thesaurus effectively in an appropriate way.

Academic Year : 2015-16
II Year I Sem

Course Name: Applied Mathematics	Course number: MAT202
CO	**Student should be able to**
MAT202.1	Solve problems on formation of partial differential equations and some standard first order partial differential equations.
MAT 202.2	Solve problems based on differentiation and line integration of complex functions
MAT 202.3	Solve problems based on expansion of a given complex function in Taylor's series, Laurent's series ,some problems on contour integration and explain some standard conformal transformations.
MAT 202.4	Apply numerical methods for solving algebraic, transcendental , system of linear equations, initial value problems for first order ordinary differential equations and interpolation methods for estimation.
MAT 202.5	Apply method of least squares for curve fitting , computing correlation Coefficient and obtaining lines of regression for given data

Course Name: Basic Circuit Analysis	Course number: EC 201
CO	**Student should be able to**

EC 201.1	Appreciate the concept of Mesh, Super Mesh, Node, Super Node their DC analysis.-Network theorems, Topologies and terminal Characteristics.
EC 201.2	Compute Transient and steady state responses of RL, RC and RLC series and Parallel networks.
EC 201.3	Analyze AC circuits and magnetically coupled circuits.
EC 201.4	Differentiate between different sets of 2- Port network parameters along with interconnection of networks.
EC 201.5	Evaluate Complex Frequencies, Pole-Zeros of an Admittance or Impedance function and sketch Pole-Zero Plots and to find Resonance Q-Factor and Bandwidth.

Course Name: Electromagnetic Theory   Course number: EC202

CO	Student should be able to
EC202.1	Analyze the behaviour of static electric and magnetic fields.
EC202.2	Evaluate the equation for potentials and capacitances to understand the concepts of static and dynamic fields.
EC202.3	Compute the basic principles of static electric and magnetic fields with Maxwell's equations and extend them to time varying fields.
EC202.4	Describe and analyse Electromagnetic wave propagation in free space and conducting media.
EC202.5	Interpret and illustrate the Reflection of plane waves by different media both in normal and oblique incidence.

Course Name: Electronic Devices Course number:EC203	
CO	Student should be able to
EC203.1	Interpret the characteristics and apply diode models to analyze various applications of diodes
EC203.2	Identify the merits and demerits of various filters, formulate and design rectifier circuits with filters
EC203.3	Discriminate the BJT configurations to recognize appropriate transistor configuration for any given application and design the biasing circuits with good stability
EC203.4	Analyze ,compare and design of BJT amplifiers with various biasing circuits
EC203.5	Distinguish the working principles of BJT and FET also between FET & MOSFET

Course Name: Elements of mechanical engineering	Course number: ME221
CO	Student should be able to
M 221.1	The student would be able to correlate the laws of thermodynamics with the fundamental conceptual terminologies like properties, systems, processes, cycles, states, different types of equilibrium, energy, etc and solve related problems.
M 221.2	The student would be able to understand the different classifications of IC engines and reciprocating air compressors with specific focus on similarities and differences between (i) 2 stroke and 4 stroke engines and (ii) CI and SI engines. Subsequently, the student would be able to compute the performance parameters of the engines and reciprocating air compressors.
M 221.3	The student would be able to classify the different modes of heat transfer, analyze the governing equations, understand the applications of heat exchangers and solve related problems.
M 221.4	The student would be able to assess the relevance of different refrigeration systems with respect to their eco friendliness, suitability, performance etc., and also learn about different parameters of Psychrometry.
M 221.5	The student would be able to classify different manufacturing processes like forging, welding, forming, machining, etc and recognize their suitability for manufacturing of different industrial products.
M 221.6	The student would be able to understand the different types of power transmission systems like gears, gear trains, belts, ropes etc with emphasis on their kinematic mechanisms and solve related problems.

Course Name: Electrical Technology	Course number: EE222
CO	Student should be able to
EE222.1	Understand the construction and operation of a DC generator and DC motor
EE222.2	Derive the generation of emf in an alternator
EE222.3	Analyze the operation of a single phase transformer
EE222.4	Comprehend the rotating magnetic field of a three phase induction motor
EE222.5	List the applications of single phase induction motor

Course Name: Electronic Devices Lab	Course number: EC 231
CO	Student should be able to
EC231.1	Characterize the behavior of p-n junction diode, determine the diode parameters and design Zener voltage regulator using SPICE.
EC231.2	Evaluate the performance of rectifiers with & without filters. Analyze and design the rectifiers with filters using SPICE.
EC231.3	Distinguish between the characteristics of different BJT and FET transistor configurations.

CO	Student should be able to
EC231.4	Design and Evaluate the functionality of various biasing circuits for BJT and FET amplifiers.
EC231.5	Generate and interpret the characteristics of UJT, SCR, Tunnel diode and photo diode

Course Name: Electronic Workshop and Simulation Lab Course number: EC232	
CO	**Student should be able to**
EC232.1	Appreciate the difference between different Passive, Active and Electro mechanical components and their lead identification procedures.
EC232.2	Use different Tools, Electronic test and measuring instruments.
EC232.3	Show expertise in Analyzing the network concepts and their theorems.
EC232.4	Appreciate how to start a project from the component selection to PCB design, soldering and De- soldering.
EC232.5	Assess the importance of Transformer design, and its construction.

Academic Year : 2015-16
II Year II Sem

Course Name: Analog Electronic Circuits Course number: EC 251	
CO	**Student should be able to**
EC251.1	Design and Analyze low frequency, mid frequency and high frequency response of small signal single stage and Multistage RC coupled and Transformer Amplifiers using BJT and FET.
EC 251.2	Identify the type of negative feedback, Analyze and design of negatfeedback amplifiers.
EC 251.3	Design Audio Frequency and Radio Frequency oscillators.
EC 251.4	Develop and formulate Transistorized voltage regulators
EC 251.5	Distinguish the classes of Power Amplifiers and their design considerations.
EC 251.6	Differentiate the performance and analyze single and double Tuned Amplifiers.

Course Name: Networks And Transmission Lines Course number: EC 252	
CO	**Student should be able to**
EC 252.1	Compute image impedance, iterative impedance, characteristic impedance and propagation constant for networks.
EC 252.2	Design different types of passive filters.
EC 252.3	Generalize the difference between impedance and admittance function

EC 252.4	Analyze physical significance of the equations of the transmission lines, compute open and short circuited lines and develop the condition for distortionless transmission lines.
EC 252.5	Classify various types of transmission lines and calculate the reflection co-efficient and different parameters of transmission lines using the analytical and graphical methods.

Course Name: Probability Theory and Stochastic Processes	Course number: EC253
CO	**\<statement\>** Student should be able to
EC253.1	Define the axiomatic formulation of modern Probability Theory and think of random variables as an intrinsic need for the analysis of random phenomena
EC253.2	Characterize probability models and function of random variables based on single & multiples random variables
EC253.3	Evaluate and apply moments & characteristic functions and understand the concept of inequalities and probabilistic limits.
EC253.4	Define random processes and determine covariance and spectral density of stationary random processes
EC253.5	Demonstrate the specific applications to Markov processes and Evaluate the response of LTI systems to stochastic processes in time and frequency domain

Course Name: Signals Analysis and Transform Techniques	Course number: EC254
CO	**Student should be able to**
EC254.1	Define and differentiate types of signals and systems in continuous and discrete time.
EC254.2	Apply the properties of the Fourier Series and Fourier Transform for Continuous and Discrete time signals.
EC254.3	List the properties of Fourier Transform and apply them to determine the Fourier spectrum.
EC254.4	Relate Laplace transforms to solve differential equations and to determine the response of the Continuous Time Linear Time Invariant Systems to known inputs.
EC254.5	Apply Z-Transforms for discrete time signals to solve Difference equations.
EC254.6	Compute frequency domain representation of discrete time signals and systems. Obtain Linear Convolution and Correlation of discrete time signals with graphical representation.

Course Name: Switching Theory and logic Design	Course number: EC255

CO	Student should be able to
EC255.1	Translate one number system to another number system and define various Boolean laws and theorems.
EC255.2	Deduce the simplified Boolean function using K-Map and Quine-Mc Clusky method and construct the logic circuits.
EC255.3	Design Combinational logic circuits and implement Boolean functions using IC's.
EC255.4	Illustrate the concept of sequential logic design, analyze the operation of flip-flop and design various types of sequential circuits.
EC255.5	Distinguish synchronous and asynchronous sequential circuits, Design sequential circuits and draw counters using various IC's.

Course Name: ENVIRONMENTAL STUDIES Course number: CE 222	
CO	Student should be able to
CE 222.1	Comprehend the importance of natural resources (Water and land) and their role in the sustainable environment
CE 222.2	Understand basic concepts of an ecosystem and its significance
CE 222.3	Illustrate the value of biodiversity and need for its conservation
CE 222.4	Identify different types of environmental pollution, their causes, effects and control measures and need for environmental legislation.
CE 222.5	Analyze global environmental issues, social aspects including population growth, disaster management.

Course Name: Analog Electronic Circuits Lab Course number: EC281	
CO	Student should be able to
EC281.1	Design Pulse circuits (Clippers, Clampers, multivibrators) to generate required waveforms and analyze outputs practically.
EC281.2	Analyze frequency response of two stages RC coupled and negative feed amplifiers at low frequency, mid frequency and high frequency and compare their bandwidths with BJT and FET.
EC281.3	Distinguish various oscillator circuits with respect to frequency of oscillations.
EC281.4	Analyze power amplifiers with their efficiency and Tuned amplifiers for their resonance frequency.
EC281.5	Calculate theoretical image impedance, characteristic impedance and verify practically. Design and verify m derived and Constant K filters.

Course Name: ELECTRICAL TECHNOLOGY LAB Course number: EE292	
CO	Student should be able to

EE292.1	Analyze the working of three phase induction by conducting a load test
EE292.2	Synthesis the equivalent circuit parameters of a single phase transformer
EE292.3	Evaluate the regulation of a alternator by implying synchronous impedance method at different powerfactor s at various suitable loads
EE292.4	Analyze the speed control and loading charectastrics of DC shunt and compound motors

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Course Name: Linear ICs and Applications	Course number: EC301
CO	**Student should be able to**
EC301.1	Analyze DC and AC characteristics for Single/Dual input Balanced/Unbalanced output configurations using BJTs.
EC301.2	Distinguish various linear and non-linear applications of Op-Amp.
EC301.3	Construct various linear and nonlinear circuits using Op-Amp.
EC301.4	Design and Formulate Op-Amp oscillators, single chip oscillators, frequency generators and active filters and IC regulators.
EC301.5	Analyze the operation of the most commonly used D/A and A/D converter types.

Course Name: Digital IC Application	Course Code: EC 302
CO	**Student should be able to**
EC302.1	Annotate the differences between the logic families and select a suitable one for a specific application
EC302.2	Realize Boolean expressions using multiplexers
EC302.3	Design of combinational & sequential circuits like code converter & circuits like 4-bit serial adder.
EC302.4	Design synchronous and asynchronous sequential circuits ex: MSI IC counters (7490, 7492 &7493).
EC302.5	Classify various memories and comprehend PLDS (programmable Logic Devices).

Course Name: Analog Communication	Course number: EC303
CO	**Student should be able to**
EC303.1	Understand analog communication systems using amplitude modulation and demodulation.
EC303.2	Understand analog communication systems using angle modulation and demodulation.

EC303.3	Be familiar with analog radio transmitters and receivers.
EC303.4	Understand the performance of analog communications in the presence of noise.
EC303.5	Be familiar with analog pulse communication systems.

Course Name: Automatic Control Systems	Course Code: EC 304
CO	**STATEMENT**
EC 304.1	Classify the different types of the control systems and apply mathematical modeling to convert mechanical systems into electrical systems and Block diagram into Signal Flow Graph.
EC 304.2	Examine the stability of the system using R-H and Root locus techniques and calculate the Steady state error, order, type of the system.
EC 304.3	Illustrate the compensation techniques and frequency domain specifications and be able to find the stability of the system using Bode plot and Nyquist plot.
EC 304.4	Characterize the digital control systems and Transfer function of sampled data system.
EC 304.5	Detect the Observability/Controllability of control systems and design their state models.

Course Name: Microprocessor And Microcontrollers	Course Code: EC305
CO	**Student should be able to**
EC305.1	Identify the architectural features of 8086 and Conceptualize its interrupt structure
EC305.2	Develop the assembly language programming using 8086
EC305.3	Comprehend the operation of peripheral devices like memory, 8254, 8257,8251 and their interfacing with 8086.
EC305.4	Differentiate between microprocessor and microcontroller in their architectural features and develop the assembly language programming including the timers/counters in 8051.
EC305.5	Expand memory, I/O ports and design real time applications of 8051

Course Name: Integrated circuits Lab	Course Code: EC 331
CO	**Student should be able to**
EC331.1	Define significance of operational amplifier (741) and their importance.
EC331.2	Design circuits using operational amplifiers for various applications
EC331.3	Design and explain OP Amp as summer, Subtractor, Multiplierand Divider
EC331.4	Design and explain OP Amp to generate sine waveform, Square wave form, Triangular waveforms

EC331.5	Demonstrate their knowledge by designing analog circuits & digital circuits and vice versa
EC331.6	Design various combinational circuits using various Digital Integrated IC's.

Course Name: Analog Communication Lab	Course number: EC332
CO	**Student should be able to**
EC332.1	Design and simulate modulation and demodulation circuits such as AM,DSB-SC,FM.
EC332.2	Understand importance of pre-emphasis and de-emphasis at the transmitter and receiver respectively
EC332.3	Construct diode detector and AGC circuit that are necessary for good reception of the signal
EC332.4	Apply and appreciate the concept of time and frequency division multiplexing
EC332.5	Apply and simulate the PAM,PWM&PPM circuits

Course Name: Microprocessor And Microcontrollers Lab	Course Code: EC333
CO	**Student should be able to**
EC333.1	Identify various ICs used in the development of 8086 trainer kit.
EC333.2	Develop the logic using instruction set of 8086 in different addressing modes to carry out arithmetic, logical and string operations.
EC333.3	Interface devices like ADC, DAC, LCD, and Stepper Motor to 8086
EC333.4	Use the IDE tool effectively for developing and executing the programs using 8051.
EC333.5	Comprehend the usage of on-chip timers and serial communication of 8051 and their interrupts using programs
EC333.6	Interface devices like ADC, DAC, LCD, and Stepper Motor to 8051 and develop real time projects.

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Course Name: Digital Communications	Course number: EC351
CO	**<statement>** Student should be able to
EC351.1	Classify the different types of digital modulation techniques PCM, DPCM, DM and ADM and compare their performance by SNR.
EC351.2	Illustrate the classification of channels and Entropy coding methods.
EC351.3	Distinguish different types of Error control codes along with their

	encoding/decoding algorithms.
EC351.4	Examine the Performance of different Digital Carrier Modulation schemes of Coherent and Non-coherent type based on Probability of error.
EC351.5	Generation of PN sequence using Spread Spectrum and characterize the Acquisition Schemes for Receivers to track the signals.

Course Name: Digital Signal Processing	Course number: EC 352
CO	**Student should be able to**
EC 352.1	Evaluate DFT using direct and FFT methods. Analyze Circular and Linear convolution, and apply for linear filtering
EC 352.2	Design & compare Digital FIR filters using window method, Analyze the characteristics of various windows
EC 352.3	F Formulate & apply Digital IIR filter design using Butterworth &Chebyshev approximations to Verify the characteristics of LPF, HPF, BPF& BEF.
EC 352.4	Comprehend & deduce Interpolator, Decimator & Multi-stage sampling rate conversion and appreciate its applications
EC 352.5	Visualize & Appreciate the Architecture of TMS320C54xx Processor and the Various Addressing modes.

Course Name: Antenna & Wave Propagation	Course number: EC353
CO	**Student should be able to**
EC353.1	Analyse different antenna parameters by applying the concept of Radiation and isotropic radiator.
EC353.2	Derive the far field pattern of loop and helical antennas by applying the concept of half wave dipole and quarter wave monopole.
EC353.3	Analyse the characteristics of broad side and end fire arrays and calculate various parameters.
EC353.4	Evaluate the features and analyse the radiation pattern of different VHF & UHF antennas by using different measurement techniques.
EC353.5	Compare and Contrast different wave propagation techniques and illustrate the radio wave behaviour in different modes of communications.

Course Name: Computer Organisation & Architecture	Course number: EC354
Code No.	**Student should be able to**
EC 354.1	Relate the number representation of digital computer to devise the Hardware arithmetic algorithms for fixed point and floating-point numbers

EC 354.2	Apply the knowledge of Bus structure, Registers, Micro-operations, various types of instruction formats, I/O configuration and program interrupt to design the basic structure of a digital computer with hardwired / Micro programmed control organization.
EC 354.3	Describe General register, stack organization, Instructions formats with different addressing modes
EC 354.4	Conceptualize instruction level parallelism & pipeline and deduce the Various pipeline conflicts. Appreciate vector and array processors over non-pipelined processors.
EC 354.5	Interpret different ways of communicating with I/O devices and appreciate the importance IOP, CPU-IOP communication.
EC 354.6	Annotate the organization of memories like cache & Virtual and associate the replacement policies.

Course Name: Electronic Instrumentation	Course Code: EC 355
CO	**Student should be able to**
EC355 .1	Differentiate the types errors in measurement and minimize them to reach standards.
EC355 .2	Choose different active and passive transducers to measure temperature for required applications.
EC355 .3	Apprehend the types of transducers to measure temperature, humidity and sound.
EC355 .4	Classify measuring instruments to measure different parameters and store the result.
EC355 .5	Demonstrate and analyze types of equipments that are used in biomedical signal analysis.

Course Name: MANAGERIAL ECONOMICS & ACCOUNTANCY Course number: CM371	
CO	**COURSE OUTCOME** Student should be able to
CM371.1	Find out the general exposure about the business, economic environment and the structural aspects of Managerial Economics
CM371.2	Analyze different principles and laws of managerial economics & examine the consumer behaviour for taking various managerial decisions, such as forecasting demand for new and existing goods and services to the business units and also suggest the best profit maximizing production function to the producers/entrepreneurs.
CM371.3	Identify the impact of changes in internal factors, such as cost, price & volume on profitability and appraise of the firms behaviour in different markets structures with respective to competitive prices fixation of products and optimum input-output decisions.

CM371.4	Evaluate with the knowledge of capital budgeting methods and techniques for different business proposals and identify the best among them for prudent investment and also explore different sources of capital needed to the business
CM371.5	Construct and analyse the financial statements of the business and interpret them for taking ideal managerial decisions.

Course Name: Digital Communication Lab	Course number: EC381
CO	**Student should be able to**
EC381.1	Understand baseband transmission (i.e., PCM, DPCM, DM, ADM) generation and detection.
EC381.2	Understand error detection and correction.
EC381.3	Obtain data formats.
EC381.4	Understand digital modulation (i.e., ASK, FSK, BPSK, DPSK, QPSK, MSK) generation and detection.
EC381.5	Measure optical fiber numerical aperture, attenuation.
EC381.6	Obtain modem characteristics.
EC381.7	Understand wavelength division multiplexing.
EC381.8	Understand digital fiber optic multiplexed llink

Course Name: DSP LAB	Course number: EC382
CO	**Student should be able to**
EC 382.1	Evaluate frequency response, output response of LTI systems. Linear & circular convolution using DFT. Appreciate efficient implementation of DFT using FFT.
EC 382.2	Design & Interpret FIR filters (LPF,HPF,BPF & BEF) using various window techniques
EC 382.3	Develop & contrast IIR filters (LPF, HPF, BPF & BEF) using Butterworth and Chebyshev approximations
EC 382.4	Implement Interpolation and Decimation.
EC 382.5	Acquire knowledge to work on real time processing using DSK TMS6713.

Course Name: Industrial Visit	Course number: EC 384
CO	**Statement**
EC 384.1	Forecast about the technical approach in different industries.
EC 384.2	Integrate their knowledge about different technologies and to apply them in problem solving techniques.
EC 384.3	Predict different problems that disturbs the environment and solve them.
EC 384.4	Construct different Projects with the knowledge acquired.

EC 384.5	Work in multidisciplinary teams.

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Course Name: Microwave Engineering	Course number: EC 401
CO	**Student should be able to**
EC 401.1	Analyse the Propagation of Guided waves in different modes between parallel planes.
EC 401.2	Evaluate different parameters (like impedance ,attenuation and quality factor.) for Rectangular and Circular Wave guides & Cavity Resonators
EC 401.3	Determining Scatt5erring parameters of different microwave components and analyse their properties.
EC 401.4	Integrate the concept of bunching and velocity modulation to summarize the operation of micro wave tubes and the high frequency limitations of conventional tubes.
EC 401.5	Analyse the principle, operation and characteristics of different micro wave solid state devices.

Course Name: VLSI Design	Course number: EC 402
CO	**Student should be able to**
EC402.1	Design building blocks of digital IC using Gate level and Dataflow Modelling.
EC402.2	Design blocks of digital IC using Behavioural Modelling.
EC402.3	Design Finite State Machines using Verilog HDL and Analyze Synthesis design flow.
EC402.4	Analyze modes of operation of MOS transistor and its basic electrical properties
EC402.5	Draw stick diagrams and layouts for any MOS transistors and calculate the parasitic R & C
EC402.6	Design various combinational circuits using gates and transistors

Course Name: Computer Networks	Course number: EC 403
CO	**Student should be able to**
EC403.1	Appreciate the importance of Data communications and the necessity of the reference models: OSI, TCP/IP, Analyze the design issues related to data link layer and various flow control protocols
EC403.2	Analyze the design issues related to data link layer and various flow control protocols.
EC403.3	Infer the working of internet and the importance of the Network Layer in the Internet and ATM Networks.

EC403.4	Assess the importance of transport services and various elements of transport layer like Connection management, TCP and UDP protocols.
EC403.5	Understand and comprehend the importance of Application layer and Domain Name System, SNMP, E-mail, World Wide Web.
EC403.6	Relate the Network Security with Cryptography Symmetric Key and Public Key algorithms, and will appreciate the concept of Digital Signatures and Authentication Protocols.

Course Name: Mobile and Cellular Communications	Course number: EC 404
CO	**Student should be able to**
EC 404.1	Understand the method of selection and reuse of a set of frequency channels, Base station requirement, signals required for communication and hand over between Base stations.
EC 404.2	Appreciate and understand the methods of electromagnetic wave propagation in cellular communication. The evaluation of the electromagnetic energy reaching the mobile unit.
EC 404.3	Identify different a methods of mobile access technologies and which of them suitable for mobile cellular solutions. Understand process used for Bluetooth, Zigbee like low power devices.
EC 404.4	Explain features, authentication, , operational details of GSM and CDMA mobile cellular systems along with data frame structure details.
EC 404.5	The development and limitation of the preliminary and advanced generation of mobile systems. Present trends in Cellular communications and the future communication requirements.

Elective-I	
Course Name: Optical Fibre Communication	Course number: EC 412
CO	**Student should be able to**
EC 412.1	Comprehend the key concepts of modes and linearly polarized modes. Distinguish ray propagation in single mode and graded index fibers.
EC 412.2	Describe the effects of dispersion in optical fibers due to materials, waveguide, polarization modes
EC 412.3	Choose direct and indirect band gap materials, light source materials. Understand structures of LED, Laser diodes and the concepts of quantum laser, temperature effects and amplifiers.
EC 412.4	Describe the working of PIN, APD diodes and estimate noise performance of photo detector response time. Categorize different error sources and comprehend the concept of probability of error and quantum limit
EC 412.5	Analyze point to point link to estimate power link budget and rise time budget. Understand the operational details of Erbium doped fiber amplifiers and basics of SONET/SDH network

Course Name: Digital Image Processing	Course number: EC 413
CO	**Student should be able to**
C413.1	Interpret the fundamentals of Digital Image processing system and apply to evaluate various relationships between pixels.
C413.2	Analyze various transforms and its properties and apply the knowledge to Design & formulate the co-efficient matrices.
C413.3	Enhance the images using spatial and frequency domain techniques & and apply the knowledge to infer characteristics of images.
C413.4	Identify degradation & Restoration processes. Model & Evaluate the Algebraic approach to restoration, inverse filtering and Wiener filtering techniques.
C413.5	Outline & measure various Redundancies of image compression Analyze & evaluate various Lossless & Lossy coding techniques.

COURSE NAME: Industrial Administration & Financial Management COURSE CODE: ECME 472	
CO	**Student should be able to**
ME 472-1	On completion of this unit learner (student) will be able to, (a) define business, objectives of business and types of business organization such as private undertakings, public undertakings and joint sector. (b) Describe factors influencing the choice of suitable form of organization. (c) Explain organization structures and advantage of organization chart. (d) Describe principles of organization structure. (e) Summarize types of organization structures, their merits and demerits. (f) Explain functions of management. (g) Summarize factors influencing the selection of plant location and plat layout. (h) Discuss principle consideration of typical industries. (i) Explain types of layouts such as line or product layout, functional or process layout, fixed position and combination layout their advantages and disadvantages.
ME 472-2	On completion of this unit student will be able to, (a) State definitions and objectives of work study, method study and time study. (b) Discuss applications of work study and its advantages. (c) Know the contributions of F.W Taylor & Frank Gilbreth. (d) Explain objectives of method study and its procedure. (e) Prepare flow process charts and symbols used in process charts. (f) Discuss motion analysis, Therbligs and SIMO chart. (g) Summarize principles of motion economy and work place layout. (h) Compute standard time by time study. (i) Discuss performance rating factor and allowances. (j) Describe work sampling procedure. (k) Summarize job evaluation objectives and different types of job evaluation and their advantages. (l) Explain performance appraisal objectives, methods. (m) Discuss wages, incentives, wage payment plans and wage incentive plans.

ME 472-3	On completion of this unit student will be able to, (a) Define inspection and quality and their differences. (b) Discuss the objectives of inspection and kinds of inspections. (c) Summarize SQC and techniques used in SQC. (d) Explain sampling inspection – sampling by attributes and variables. (e) Prepare sampling plans – single, double and multiple sampling plans. (f) Draw various control charts and work out problems related to x-R chart, P. chart and C. chart. (g) Describe Quality Circles and ISO 9001 quality system. (h) Summarize production planning and control – principles and functions. (i) Describe types of manufacture and production. (j) Draw various production control charts.
ME 472-4	On completion of this unit student will be able to, (a) Define optimization and operations research. (b) Solve problems on LPP using graphical solution. (c) Compute assignment problems. (d) Define PERT & CPM and their differences. (e) Calculate critical path. (f) Describe MM functions and its objectives. (g) Summarize types of material & material planning techniques. (h) Express duties of purchase manager. (i) Determine economic ordering quantities. (j) Explain types of material purchase. (k) Classify different materials.
ME 472-5	On completion of this unit student will be able to, (a) Express types of cost and elements of cost. (b) Describe over heads, types of over heads and allocation of over heads. (c) Define depreciation, methods of depreciation and compute depreciation. (d) Explain break even analysis and calculate breakeven point. (e) Express techniques of capital budgeting. (f) Describe time value of money, valuation concepts. (g) Define financial leverage, types of leverages. (h) Summarize importance of cost of capital and classification of cost of capital.

Course Name: Microwave Lab	Course number: EC 431
CO	**Student should be able to**
EC431.1	Analyze frequency, Wave length, SWR and Impedance for Reflex klystron Oscillator by using its equation.
EC431.2	Evaluate of mode characteristics of Reflex klystron.
EC431.3	Evaluate the VI characteristics of Gunn Diode.
EC431.4	Analyze of the characteristics of Circulator, Isolator, Directional Coupler, Tees like (Magic tee, E & H plane tees) using the Scattering parameters.
EC431.5	Generate the Radiation pattern of different antennas like Yagi-Uda and Horn Antenna and measure the gain of the antennas

Course Name: Electronic Design and Automation Lab	Course number: EC432
CO	**Student should be able to**
EC 432.1	Design combinational circuits using Verilog HDL.
EC 432.2	Design sequential circuits.
EC 432.3	Illustrate and design finite state machines.
EC 432.4	Design basic CMOS circuits in transistor level.

EC 432.5	Illustrate and design CMOS multiplexer and decoder.

Course Name: Project Seminar	Course number: EC433
CO	**Student should be able to**
EC433.1	Carryout Literature survey in the area of interest.
EC433.2	Survey the recent advancements in the identified area
EC433.3	Demonstrate an Understanding and discuss the problem within group and to arrive at possible solutions
EC433.4	Develop interpersonal skills, presentation skills, soft skills and creativity
EC433.5	Prepare Technical reports
EC433.6	Demonstrate the qualities and attitudes of a professional engineer for forming a team

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Course Name: Radar and Satellite Communication	Course number: EC451
CO	**Student should be able to**
EC 451.1	Explain basics of RADAR system, the importance of various parameters in range estimation.
EC 451.2	Illustrate various types of radars such as CW radar and their variations, MTI radar and its performance limitations and non-coherent MTI radar.
EC 451.3	Illustrate types of tracking methods and radar antennas, displays.
EC 451.4	Illustrate basics of satellite communication.
EC 451.5	Explain various types of satellite sub-systems and various multiple access techniques.
EC 451.6	Illustrate satellite link design and satellite data communication protocols.

Elective-II	
Course Name: Speech Processing	Course number: EC464
Code No.	**Statement**
EC464.1	Associate the mechanism of speech production to the source filter model of speech production for various speech sounds and interpret the speech analysis techniques.
EC464.2	Comprehend feature extraction of speech such as voiced/unvoiced decision and pitch extraction using various algorithms like Rabiner and Gold, SIFT.
EC464.3	Classify the terminal analogue speech synthesizers and articulatory speech synthesizer.

EC464.4	Infer and apply various coding techniques for speech like Sub-band coding, Transform coding to achieve low bit rates.
EC464.5	Annotate the model for speech recognition system and compare the Dynamic time warping with hidden Markova models.

Course Name: ENTREPRENEURSHIP	Course number: ME411
Code No.	**Statement**
ME411.1	To develop distinct entrepreneurial traits and ability to recognize business opportunities to build entrepreneurial career.
ME411.2	Students can develop and systematically apply entrepreneurial way of thinking that will allow them to identify and create business opportunities for commercialized success. To know the parameters to assess opportunities and constraints for new business ideas
ME411.3	To design and develop a well presented successful business plan that is feasible and to gain the advantage of Project financing.
ME411.4	To effectively plan projects through CPM/Pert techniques. To understand human aspects of business and helps to assess and evaluate tax burden.
ME411.5	This helps the entrepreneur to manage his human resources and time effectively.

Elective-III	
Course Name: Global Positioning Systems	**Course number: EC472**
Code No.	**Statement**
EC 472.1	Analyze the GPS constellation and its principle of operation. Familiarity of GDOP and different types of DOPs
EC 472.2	Derive concepts of different Coordinate systems - WGS-84, IGS, ECI, ECEF and various error sources in GPS and to minimize or overcome these errors.
EC 472.3	Derive the GPS signal structure and its C/A and P Codes associated with. Enumerate different applications of GPS.
EC 472.4	Demonstrate the various types of GPS augmentation systems and architecture of GAGAN and familiarity the concept of Local area augmentation system.
EC 472.5	Conceptualize the modernization of GPS and other satellite navigation systems with GPS integration
EC 472.1	Analyze the GPS constellation and its principle of operation. Familiarity of GDOP and different types of DOPs

Course Name: GENERAL SEMINAR	Course number: EC481
CO	**Student should be able to**
EC481.1	Carryout Literature survey in the area of interest.

EC481.2	Survey the recent advancements in the identified area
EC481.3	Demonstrate an Understanding and discuss the problem within group and to arrive at possible solutions
EC481.4	Develop interpersonal skills, presentation skills, soft skills and creativity
EC481.5	Prepare Technical reports
EC481.6	Demonstrate the qualities and attitudes of a professional engineer for forming a team

Course Name: PROJECT	Course number: EC 482
Code No.	**Statement ; Students should be able to**
EC 482.1	Review acquired technical knowledge on the selected topic
EC 482.2	Undertake problem identification, formulation and find optimal solution
EC 482.3	Identify suitable hardware and software requirements and design engineering solution to complex problems utilizing a systematic approach.
EC 482.4	Conduct an Engineering project using the state of art hardware and Electronics Design & Automation tools.
EC 482.5	Exhibit team work and Communicate with Engineers and the community at large.
EC 482.6	Prepare project report/thesis

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	B.E I/IV
CODE NO	
EG101.1	**EG101-EC101-ENGLISH**
EG101.2	**Statement**
EG101.3	learn the importance of communication, features and process of communication and verbal and Non verbal communication in order to communicate effectively
EG101.4	improve oral communication skills, listening skills, interpersonal communication and improve interpersonal skills by using Johari window and Knapp's model
EG101.5	improve writing techniques such as passage expansion, Précis-writing, Essay writing, Report –writing, SoP, Résumé - writing and official letters
	learn the basic rules of grammar with appropriate usage and learn to use vocabulary such as synonyms and antonyms, homonyms and homophones
	improve comprehension skills by reading inspirational texts and infer information.
CODE NO	
MT101.1	**MT101-EC102-MATHEMATICS-1**
MT101.2	**Statement**

MT101.3	Solve some problems based on the concept of convergence and divergence of infinite series and apply the various tests of convergence to determine the nature of an infinite series
MT101.4	Solve problems based on the fundamental theorems of differential calculus, expanding functions using Taylor's & Mc Laurin's series and solve problems on finding Radius of curvature , evolutes and envelopes
MT101.5	Evaluate limits, Continuity and derivatives of functions of two variables, Maxima &Minima for functions of two or more variables arising in Engineering Problems.
MT101.6	Evaluate double and triple integrals and solve problems based on vector differentiation and vector integration.
MT101.7	Evaluate double and triple integrals and solve problems based on vector differentiation and vector integration.
CODE NO	
MT102.1	**MT102-EC103-MATHEMATICS-2**
MT102.2	**Statement**
MT102.3	Solve various types of First ordered ordinary differential equations and apply these techniques for solving some problems in Geometry, Electricity, Heat transfer and Radio activity.
MT102.4	Solve higher ordered linear O.D.E's with constant Coefficients using various techniques.
MT102.5	Solve linear O.D.E's using power series and Frobenius methods and apply these methods for solving Legendres D.E.
	Evaluate improper integrals using Beta and Gamma functions and solve Bessel's differential equations.
	Solve some problems using the properties of Legendre polynomial and Bessel's functions.
	Evaluate Laplace Transforms and inverse Laplace transforms of various functions and solve linear ordinary differential equations using Laplace transforms.
CODE NO	
PH101.1	**PH101-EC104-ENGINEERING PHYSICS**
PH101.2	**Statement**
PH101.3	To understand the concept of interference, diffraction and polarization.
PH101.4	Ability to know the utilization of laser technology, Holography and optical fiber and their engineering applications in various disciplines.
PH101.5	To understand the basics of statistical mechanics, significance and applications of Schrodinger wave equation.
PH101.6	Able to analyze the various crystal structures and their defects and to understand the electrons behavior in solids.

	Gain the knowledge on magnetic materials and dielectric materials and superconducting materials.
	Understand the characterization and basic preparation methods in thin films and Nano-materials.
CODE NO	
CH101.1	**CH101-EC1105-ENGINEERING CHEMISTRY**
CH101.2	**Statement**
CH101.3	Explain quantitative relationship between chemical and electrical energy, construction and working of different types of electrodes used in construction of electrochemical cells Understand the operating principle and apply the knowledge to design batteries.
CH101.4	Relate the principle behind mechanism and rate of corrosion leading to deterioration of metal and apply corrosion control method.
CH101.5	Explain method to find impurities present in water and establish various methods of purifying water.
CH101.6	Show the need for replacement of conventional materials with polymers to be used as plastics, fibres, elastomers, conducting polymers and composites.
	Identify the dependence on conventional fuel like coal, petroleum, and gaseous fuel to meet present energy requirement. Introduce the need for change to renewable sources of energy.
	Interpret the importance of lubricants and liquid crystals. Phase rule concept is used to know the process of separation of pure metals from alloys. Apply the principles of Green chemistry to carryout eco-friendly chemical processes without causing environmental pollution.
CODE NO	
CS101.1	**CS101-EC106-PROGRAMMING IN C&C++**
CS101.2	**Statement**
CS101.3	Understand the procedure to create, compile and execute C program for different inputs.
CS101.4	Apply the concepts of control statements, operators, functions and arrays to implement matrix, searching and sorting algorithms.
CS101.5	Solve programs on pointers and strings
CS101.6	access variables through dynamic memory.
CS101.7	Understand and Apply the concepts of derived data types and file handling operations.
	Understand the concepts of object oriented programming through C++ and know the differences between C and C++ programs.
	Analyze and write programs on inheritance, polymorphism, classes and objects creation using C++.
CODE NO	
CE101.1	**CE101-EC107-ENGINEERING MECHANICS**
CE101.2	**Statement**

CE101.3	Resolve forces acting on a body; obtain resultant force or moment acting due to set of forces and moments acting on a body; and determine unknown forces from equations of equilibrium of forces and moments.
CE101.4	Obtain location of centres of mass of regular and composite shapes; use Pappus theorems to calculate surface areas and volumes of composite structures.
CE101.5	Distinguish between static and kinematic friction, determine effect of static or kinematic friction forces acting on a single or a system of connected bodies; effect of friction in screw jack,wedge,brakes and belt transmission.
CE101.6	Compute area moment of inertia and products of inertia for simple and composite elements using integration methods and transform theorem; calculate mass MI and radius of gyration for regular and composite structures.
CE101.7	Obtain displacement, velocity and acceleration relations of particles in rectilinear and curvilinear motion including projectiles; write equations of motion under influence of forces for particles and connected bodies and for plane motion of rigid bodies.
	Apply Principles of work and energy to motion of particle or connected bodies to evaluate the velocities and angular velocities of bodies in connected systems and involving plane motion.
	Apply Principle of conservation of Momentum and impulse force/moment to evaluate the velocities of a body after application of force/moment, and of bodies in impact/collision considering Coefficient of Restitution.
CODE NO	
CE102.1	**CE102-EC108-ENGINEERING GRAPHICS**
CE102.2	**Statement**
CE102.3	The student would be able to recall the mathematical concepts related to scales, conic sections, involutes, etc and demonstrate proficiency in construction of these using the various methods described in literature.
CE102.4	The student would be able to analyse the position of objects when placed in different orientations with respect to reference planes and reproduce them on drawing sheets to provide valid explanations.
CE102.5	The student would be able to draw the various views of three dimensional objects (Solids) which may be oriented in different positions with respect to the reference planes.
	The student would be able to assess the shapes of objects that can be generated when a given solid is cut by section planes in different orientations. These shapes are shown in the corresponding sectional views using the concepts of auxiliary planes. Further the development of the truncated solids can be drawn by recognizing the basic principles of developments of surfaces.
	The student would be able to recognize the various features of solids by viewing them from front, top and sides. Subsequently the student would also be able to generate a few three-dimensional views of the given objects using the principles of isometric projections.
CODE NO	
PH132.1	**PH132-EC109-PHYSICS LAB**
PH132.2	**Statement**

PH132.3	To demonstrate the phenomena of interference and diffraction to determine wavelength of a given light source of light.
PH132.4	To verify the laws of polarization and determine the specific rotator power of an optically active substance.
PH132.5	To understand the principle involved in laser and optical fiber technology.
PH132.6	To examine the nature of ferromagnetic and dielectric materials to evaluate the related parameters.
PH132.7	To characterize semiconducting devices to calculate parameters like resistance, energy gap and temperature co-efficient.
	To study the Characteristics of Photo Voltaic Cells and evaluate their efficiencies.
	To verify Malus law of polarization of light.
CODE NO	
CH132.1	**CH132-EC110-CHEMISTRY LAB**
CH132.2	**Statement**
CH132.3	Make use of analytical and electronic balances for weighing samples in chemical analysis.
CH132.4	Identify and estimate impurities causing hardness and alkalinity in water.
CH132.5	Find the strength of reducing species such as Fe^{+2}, Fe^{+3}, Cr^{+3}, Cu^{+2} and Cl^- by various titrimetric methods like complexometry and Iodometry.
CH132.6	Estimate quantitatively different chemical species present in complex mixtures, ores and unknown samples by various instrumentation techniques like Conductometry and Potentiometry.
	Determine quantitatively different chemical species present in unknown samples by various instrumentation techniques like pH metry and Colorimetry.
	Recall the methods of preparation of industrially important polymers.
CODE NO	
ME131.1	**ME131-EC111-WORKSHOP PRACTICE**
ME131.2	**Statement**
ME131.3	The student would be able to utilize the various tools of fitting namely bench vice, V block, files, surface plate, surface gauge, hacksaw, drill bits, etc to perform various operations on the work piece (job) like filing, scrapping, drilling, tapping, etc.
ME131.4	The student would be able to identify different types of connections like series, parallel, stair case wiring, etc. Subsequently, the student would be able to correlate the methods of electrical wiring in different domestic and industrial applications.
	The student would be able to utilize the various tools of carpentry namely bench vice, planes, mallet, hammers, files, different saws, etc to perform various carpentry joints like half lap joint, dove tail joint, bridle joint, etc.
	The student would be able to utilize the various tools of sheet metal (tin smithy) namely hammer, mallet, stakes, snips, pliers, punches, vernier calipers, wire gauge, etc to perform various operations like cutting, shearing, notching, bending, riveting, etc. on the given sheet metal and develop various objects like

	tray, funnel, scoop, cylinder,etc.
CODE NO	
CS131.1	**CS131-EC112-C PROGRAMMING LAB**
CS131.2	**Statement**
CS131.3	Understand the procedure to create, compile and execute C program for different inputs.
CS131.4	Apply the concepts of functions and arrays and write C programs for matrix, searching and sorting techniques.
CS131.5	Create Derived types and deal files by applying the concepts of structures and pointers.
CS131.6	Understand the procedure to create, compile and execute C++ program for different inputs.
	Apply the concepts of classes, objects, inheritance and polymorphism in C++.
	Write programs in both C and C++ and could distinguish the differences between C and C++.
CODE NO	
EG131.1	**EG131-EC113-ENGLISH LANGUAGE LAB**
EG131.2	**Statement**
EG131.3	learn the sound system of English Language with the knowledge of IPA-classification & description
EG131.4	learn the word stress & aspects of connected speech
EG131.5	learn the Rhythm & Intonation of English language
	improve the fluency in the spoken form of the language by participating in Presentation skills, Public speaking, Group Discussion and Debate.
	learn to dictionary and thesaurus effectively in an appropriate way.

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Course Name: Mathematics - III	Course number: BS301MAT
CO	**Student should be able to**
BS 301.1 MT	Solve problems based on differentiation and line integration of complex functions.
BS 301.2 MT	Develop Taylor's and Laurent's series for a given complex function and explain some standard conformal transformations and application of the theory of residues.
BS 301.3 MT	Develop a Fourier series for a given function in various Intervals.
BS 301.4 MT	Solve problems on formation of partial differential equations and on some standard first ordered and higher ordered linear partial differential equations.

BS 301.5 MT	Apply the theory of Fourier series to some boundary value problems associated with one - dimensional wave, heat and Laplace's Equation.

Course Name: Basic Circuit Analysis	Course number: EC-201
CO	**Student should be able to**
EC 201.1	Appreciate the concept of Mesh, Super Mesh, Node, Super Node their DC analysis.-Network theorems, Topologies and terminal Characteristics.
EC 201.2	Compute Transient and steady state responses of RL, RC and RLC series and Parallel networks.
EC 201.3	Analyze AC circuits and magnetically coupled circuits.
EC 201.4	Differentiate between different sets of 2- Port network parameters along with interconnection of networks.
EC 201.5	Evaluate Complex Frequencies, Pole-Zeros of an Admittance or Impedance function and sketch Pole-Zero Plots and to find Resonance Q-Factor and Bandwidth.

Course Name: Electromagnetic Theory	Course number: EC-202
CO	**Student should be able to**
EC 202.1	Comprehend conversion formula between various coordinate system and compute the force existing between two charges by Coulomb's law and electric flux existing across a closed surface by Gauss's law.
EC 202.2	Generalize capacitance effect and boundary conditions for electrostatic fields and calculate Laplace and Poisson's solution.
EC 202.3	Analyze inductance effect and boundary conditions for magnetostatic fields. calculate scalar and vector magnetic potentials.
EC 202.4	Interpret the Maxwell's equations for timing varying field and appreciate its importance for electromagnetic wave equations. Analyze Polarization of electromagnetic waves
EC 202.5	Conceptualize reflection of plane waves by different media and deduce reflection and transmission co-efficient. calculate the power and energy of propagated Electromagnetic waves.

Course Name: Electronic Devices	Course number: EC 203
CO	**Student should be able to**
EC 203.1	Interpret the V-I characteristics & switching characteristics to determine the diode parameters and apply diode models to analyze various applications of diodes.
EC 203.2	Identify the merits and demerits of various filters, formulate and design rectifier circuits with filters.

EC 203.3	Discriminate the BJT configurations to recognize appropriate transistor configuration for any given application and design the biasing circuits with good stability.
EC 203.4	Analyze, compare and design of BJT amplifiers with biasing circuits.
EC 203.5	Distinguish the working principles of BJT and FET also compare between FET & MOSFET.

Course Name: Elements of mechanical engineering	Course number: ME221
CO	Student should be able to
M 221.1	The student would be able to correlate the laws of thermodynamics with the fundamental conceptual terminologies like properties, systems, processes, cycles, states, different types of equilibrium, energy, etc and solve related problems.
M 221.2	The student would be able to understand the different classifications of IC engines and reciprocating air compressors with specific focus on similarities and differences between (i) 2 stroke and 4 stroke engines and (ii) CI and SI engines. Subsequently, the student would be able to compute the performance parameters of the engines and reciprocating air compressors.
M 221.3	The student would be able to classify the different modes of heat transfer, analyze the governing equations, understand the applications of heat exchangers and solve related problems.
M 221.4	The student would be able to assess the relevance of different refrigeration systems with respect to their eco friendliness, suitability, performance etc., and also learn about different parameters of Psychrometry.
M 221.5	The student would be able to classify different manufacturing processes like forging, welding, forming, machining, etc and recognize their suitability for manufacturing of different industrial products.
M 221.6	The student would be able to understand the different types of power transmission systems like gears, gear trains, belts, ropes etc with emphasis on their kinematic mechanisms and solve related problems.

Course Name: Electrical Technology	Course number: EE222
CO	Student should be able to
EE222.1	Understand the construction and operation of a DC generator and DC motor
EE222.2	Derive the generation of emf in an alternator
EE222.3	Analyze the operation of a single phase transformer
EE222.4	Comprehend the rotating magnetic field of a three phase induction motor
EE222.5	List the applications of single phase induction motor

Course Name: Electronic Devices Lab	Course number: EC 231

CO	Student should be able to
EC231.1	Characterize the behavior of p-n junction diode, determine the diode parameters and design Zener voltage regulator using SPICE.
EC231.2	Evaluate the performance of rectifiers with & without filters. Analyze and design the rectifiers with filters using SPICE.
EC231.3	Distinguish between the characteristics of different BJT and FET transistor configurations.
EC231.4	Design and Evaluate the functionality of various biasing circuits for BJT and FET amplifiers.
EC231.5	Generate and interpret the characteristics of UJT, SCR, Tunnel diode and photo diode

Course Name: Electronic Workshop and Basic Circuits Lab	Course number: EC232
CO	**Student should be able to**
EC232.1	Appreciate the difference between different Passive, Active and Electro mechanical components and their lead identification procedures.
EC232.2	Use different Tools, Electronic test and measuring instruments.
EC232.3	Show expertise in Analyzing the network concepts and their theorems.
EC232.4	Appreciate how to start a project from the component selection to PCB design, soldering and De- soldering.
EC232.5	Assess the importance of Transformer design, and its construction.

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II Year II Sem

Course Name: Mathematics - IV	Course number: MAT251
CO	**Student should be able to**
MT 251.1	Solve problems based on differentiation and line integration of complex functions
MT 251.2	Develop Taylor's and Laurent's series for a given complex function and explain some standard conformal transformations.
MT 251.3	Apply the basic definition and properties of Z- transform for solving difference equations.
MT 251.4	Evaluate Fourier Transforms and inverse Fourier Transforms of various functions.
MT 251.5	Apply numerical methods for solving algebraic, transcendental , system of linear equations, initial value problems for first ordered ordinary differential equations.
MT 251.6	Apply interpolation methods for estimation.

Course Name: Analog Electronic Circuits	Course number: EC 251
CO	**Student should be able to**
EC251.1	Design and Analyze low frequency, mid frequency and high frequency response of small signal single stage and Multistage RC coupled and Transformer Amplifiers using BJT and FET.
EC251.2	Identify the type of negative feedback, Analyze and design of various negative feedback amplifiers.
EC251.3	Design various Audio Frequency and Radio Frequency oscillators.
EC251.4	Develop and formulate various regulators
EC251.5	Distinguish various classes of Power Amplifiers.
EC251.6	Differentiate the performance and analyze various Tuned Amplifiers.

Course Name: Networks And Transmission Lines	Course number: EC252
CO	**Student should be able to**
EC 252.1	Compute image impedance, iterative impedance, characteristic impedance and propagation constant for networks.
EC 252.2	Design different types of passive filters.
EC 252.3	Generalize the difference between impedance and admittance function
EC 252.4	Analyze physical significance of the equations of the transmission lines, compute open and short circuited lines and develop the condition for distortionless transmission lines.
EC 252.5	Classify various types of transmission lines and calculate the reflection co-efficient and different parameters of transmission lines using the analytical and graphical methods.

Course Name: Signals Analysis and Transform Techniques	Course number: EC254
CO	**Student should be able to**
EC253.1	Define and differentiate types of signals and systems in continuous and discrete time.
EC253.2	Apply the properties of the Fourier Series and Fourier Transform for Continuous and Discrete time signals.
EC253.3	List the properties of Fourier Transform and apply them to determine the Fourier spectrum.
EC253.4	Relate Laplace transforms to solve differential equations and to determine the response of the Continuous Time Linear Time Invariant Systems to known inputs.
EC253.5	Apply Z-Transforms for discrete time signals to solve Difference equations.
EC253.6	Compute frequency domain representation of discrete time signals and systems. Obtain Linear Convolution and Correlation of discrete time signals with graphical representation.

Course Name: Pulse Digital & Switching Circuits	Course number: EC254
CO	**Student should be able to**
EC254.1	Design Linear & Nonlinear Wave shaping Circuits such as Differentiators, Integrators, Clippers and Clampers.
EC254.2	Design various Multivibrators employing BJTs and Sweep circuits employing UJT & SCR.
EC254.3	Implement the Switching Circuits with minimum of Hardware.
EC254.4	Design Combinational Logic Circuits such as Adders, Subtractors, Code Converters, and Encoders & Decoders. To comprehend the need of Flip-flops in building Digital Systems.
EC254.5	Design Finite State Machines such as Counters & Sequence Detector.

Course Name: ENVIRONMENTAL STUDIES	Course number: CE 222
CO	**Student should be able to**
CE 222.1	Comprehend the importance of natural resources (Water and land) and their role in the sustainable environment
CE 222.2	Understand basic concepts of an ecosystem and its significance
CE 222.3	Illustrate the value of biodiversity and need for its conservation
CE 222.4	Identify different types of environmental pollution, their causes, effects and control measures and need for environmental legislation.
CE 222.5	Analyze global environmental issues, social aspects including population growth, disaster management.

Course Name: Electronic Circuits Lab	Course number: EC281
CO	**Student should be able to**
EC281.1	Design Pulse circuits (Clippers, Clampers, multivibrators) to generate required waveforms and analyze outputs practically.
EC281.2	Analyze frequency response of two stages RC coupled and negative feed amplifiers at low frequency, mid frequency and high frequency and compare their bandwidths with BJT and FET.
EC281.3	Distinguish various oscillator circuits with respect to frequency of oscillations.
EC281.4	Analyze power amplifiers with their efficiency and Tuned amplifiers for their resonance frequency.
EC281.5	Calculate theoretical image impedance, characteristic impedance and verify practically. Design and verify m derived and Constant K filters.

Course Name: ELECTRICAL TECHNOLOGY LAB	Course number: EE292

CO	Student should be able to
EE292.1	Analyze the working of three phase induction by conducting a load test
EE292.2	Synthesis the equivalent circuit parameters of a single phase transformer
EE292.3	Evaluate the regulation of a alternator by implying synchronous impedance method at different powerfactor s at various suitable loads
EE292.4	Analyze the speed control and loading charectastrics of DC shunt and compound motors

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Course Name: Linear ICs and Applications	Course number: EC301
CO	Student should be able to
EC301.1	Analyze DC and AC characteristics for Single/Dual input Balanced/Unbalanced output configurations using BJTs.
EC301.2	Distinguish various linear and non-linear applications of Op-Amp.
EC301.3	Construct various linear and nonlinear circuits using Op-Amp.
EC301.4	Design and Formulate Op-Amp oscillators, single chip oscillators, frequency generators and active filters and IC regulators.
EC301.5	Analyze the operation of the most commonly used D/A and A/D converter types.

Course Name: Digital IC & Applications	Course number: EC 302
CO	Student should be able to
EC 302.1	Annotate the differences between the logic families and select a suitable one for a specific application
EC 302.2	U Realize Boolean expressions using multiplexers.
EC 302.3	Design of combinational & sequential circuits like code converter & circuits like 4-bit serial adder.
EC 302.4	Design synchronous and asynchronous sequential circuits ex: MSI IC counters (7490, 7492 &7493).
EC 302.5	B Classify various memories and comprehend PLDS (programmable Logic Devices).

Course Name: Analog Communication	Course number: EC 303
CO	Student should be able to
EC 303.1	Understand analog communication systems using amplitude modulation and demodulation.
EC 303.2	Understand analog communication systems using angle modulation and

	demodulation.
EC303.3	Be familiar with analog radio transmitters and receivers.
EC303.4	Understand the performance of analog communications in the presence of noise.
EC303.5	Be familiar with analog pulse communication systems..

Course Name: Automatic Control Systems	Course Code: EC 304
CO	Student should be able to
EC 304.1	Classify the different types of the control systems and apply mathematical modeling to convert mechanical systems into electrical systems and Block diagram into Signal Flow Graph.
EC 304.2	Examine the stability of the system using R-H and Root locus techniques and calculate the Steady state error, order, type of the system.
EC 304.3	Illustrate the compensation techniques and frequency domain specifications and be able to fins the stability of the system using Bode plot and Nyquist plot.
EC 304.4	Characterize the digital control systems and Transfer function of sampled data system.
EC 304.5	Detect the Observability/Controllability of control systems and design their state models.

Course Name: Micro Processors and Micro Controllers	Course number: EC 305
CO	Student should be able to
EC305.1	Identify the architectural features of 8086 and Conceptualize its interrupt structure
EC305.2	Develop the assembly language programming using 8086
EC305.3	Comprehend the operation of peripheral devices like memory, 8254, 8257,8251 and their interfacing with 8086.
EC305.4	Differentiate between microprocessor and microcontroller in their architectural features and develop the assembly language programming including the timers/counters in 8051.
EC305.5	Expand memory, I/O ports and design real time applications of 8051

Course Name: Integrated circuits Lab	Course Code: EC 331
CO	Student should be able to
EC331.1	Define significance of operational amplifier (741) and their importance.
EC331.2	Design circuits using operational amplifiers for various applications
EC331.3	Design and explain OP Amp as summer, Subtractor, Multiplierand Divider
EC331.4	Design and explain OP Amp to generate sine waveform, Square wave form, Triangular waveforms

EC331.5	Demonstrate their knowledge by designing analog circuits & digital circuits and vice versa
EC331.6	Design various combinational circuits using various Digital Integrated IC's.

Course Name: Analog Communication Lab	Course number: EC332
CO	**Student should be able to**
EC332.1	Design and simulate modulation and demodulation circuits such as AM,DSB-SC,FM.
EC332.2	Understand importance of pre-emphasis and de-emphasis at the transmitter and receiver respectively
EC332.3	Construct diode detector and AGC circuit that are necessary for good reception of the signal
EC332.4	Apply and appreciate the concept of time and frequency division multiplexing
EC332.5	Apply and simulate the PAM,PWM&PPM circuits

Course Name: Micro Processors and Micro Controllers Lab	Course Code: EC 333
CO	**Student should be able to**
EC333.1	Identify various ICs used in the development of 8086 trainer kit.
EC333.2	Develop the logic using instruction set of 8086 in different addressing modes to carry out arithmetic, logical and string operations.
EC333.3	Interface devices like ADC, DAC, LCD, and Stepper Motor to 8086
EC333.4	Use the IDE tool effectively for developing and executing the programs using 8051.
EC333.5	Comprehend the usage of on-chip timers and serial communication of 8051 and their interrupts using programs
EC333.6	Interface devices like ADC, DAC, LCD, and Stepper Motor to 8051 and develop real time projects.

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III Year II Sem

Course Name: Digital Communications	Course number: EC 351
CO	**Student should be able to**
EC351.1	Classify the different types of digital modulation techniques PCM, DPCM, DM and ADM and compare their performance by SNR.
EC351.2	Illustrate the classification of channels and Entropy coding methods.

EC351.3	Distinguish different types of Error control codes along with their encoding/decoding algorithms.
EC351.4	Examine the Performance of different Digital Carrier Modulation schemes of Coherent and Non-coherent type based on Probability of error.
EC351.5	Generation of PN sequence usingSpread Spectrum and characterize the Acquisition Schemes for Receivers to track the signals.

Course Name: Digital Signal Processing	Course number: EC 352
CO	**Student should be able to**
EC352.1	Conclude DTFT to evaluate frequency response. Determine DFT using direct and FFT methods. Analyze Circular and Linear convolution and apply for linear filtering operations.
EC352.2	Design & compare Digital FIR filters using various windows, Analyze the characteristics of various windows.
EC352.3	Formulate & apply Digital IIR filter design using Butterworth &Chebyshev approximations to Verify the characteristics of LPF, HPF, BPF & BEF.
EC352.4	Comprehend & deduce Interpolator, Decimator & Multi-stage sampling rate conversion and apprehend its use in various signal processing/communication based applications.
EC352.5	Differentiate signal processor and general purpose processor, Visualize & Appreciate the Architecture of TMS320C54xx Processor and the Various Addressing modes.

Course Name: Antenna & Wave Propagation	Course number: EC353
CO	**Student should be able to**
EC 353.1	Analyse different antenna parameters by applying the concept of Radiation and isotropic radiator.
EC353.2	Derive the far field pattern of loop and helical antennas by applying the concept of half wave dipole and quarter wave monopole.
EC353.3	Analyse the characteristics of broad side and end fire arrays and calculate various parameters.
EC353.4	Evaluate the features and analyse the radiation pattern of different VHF & UHF antennas by using different measurement techniques.
EC353.5	Compare and Contrast different wave propagation techniques and illustrate the radio wave behaviour in different modes of communications.

Course Name: Computer Organization And Architecture Course Code: EC354	
CO	**Student should be able to**

EC354.1	Relate the number representation of digital computer to devise the Hardware arithmetic algorithms
EC354.2	Apply the knowledge of Bus structure, Registers, Micro-operations, control unit design using hardwired and Micro programmed organization
EC354.3	Comprehend various Instructions, addressing modes and instruction level parallelism and deduce the various pipeline conflicts
EC354.4	Interpret different ways of communicating with I/O devices and appreciate the importance of IOP
EC354.5	Analyze and Conceptualize the memory hierarchy with different types of memories

Course Name: Electronic Instrumentation	Course number: EC355
CO	**Student should be able to**
EC355.1	Differentiate the types errors in measurement and minimize them to reach standards.
EC355.2	Choose different active and passive transducers to measure temperature for required applications.
EC355.3	Apprehend the types of transducers to measure temperature, humidity and sound.
EC355.4	Classify measuring instruments to measure different parameters and store the result.
EC355.5	Demonstrate and analyze types of equipments that are used in biomedical signal analysis.

Course Name: MANAGERIAL ECONOMICS & ACCOUNTANCY Course number: CM371	
CO	**COURSE OUTCOME** Student should be able to
CM371.1	Find out the general exposure about the business, economic environment and the structural aspects of Managerial Economics
CM371.2	Analyze different principles and laws of managerial economics & examine the consumer behaviour for taking various managerial decisions, such as forecasting demand for new and existing goods and services to the business units and also suggest the best profit maximizing production function to the producers/entrepreneurs.
CM371.3	Identify the impact of changes in internal factors, such as cost, price & volume on profitability and appraise of the firms behaviour in different markets structures with respective to competitive prices fixation of products and optimum input-output decisions.

CM371.4	Evaluate with the knowledge of capital budgeting methods and techniques for different business proposals and identify the best among them for prudent investment and also explore different sources of capital needed to the business
CM371.5	Construct and analyse the financial statements of the business and interpret them for taking ideal managerial decisions.

Course Name: Digital Communication Lab	Course number: EC381
CO	**Student should be able to**
EC381.1	Understand baseband transmission (i.e., PCM, DPCM, DM, ADM) generation and detection.
EC381.2	Understand error detection and correction.
EC381.3	Obtain data formats.
EC381.4	Understand digital modulation (i.e., ASK, FSK, BPSK, DPSK, QPSK, MSK) generation and detection.
EC381.5	Measure optical fiber numerical aperture, attenuation.

Course Name: Digital Signal Processing Lab	Course number: EC 382
CO	**Student should be able to**
EC 382.1	E Evaluate frequency response, output response, Linear & circular convolution using DFT. Appreciate efficient implementation of DFT using FFT.
EC 382.2	D Design & Interpret FIR filters (LPF,HPF,BPF & BEF) using various window techniques
EC 382.3	D Develop & contrast IIR filters (LPF, HPF, BPF & BEF) using Butterworth and Chebyshev approximations
EC 382.4	I Implement Interpolation and Decimation.
EC 382.5	D Devise the above concepts using MATLAB & CCS tools. Acquire knowledge to work on real time processing using DSK.

Course Name: Industrial Visit	Course number: EC 384
CO	**Statement**
EC 384.1	Forecast about the technical approach in different industries.
EC 384.2	Integrate their knowledge about different technologies and to apply them in problem solving techniques.
EC 384.3	Predict different problems that disturbs the environment and solve them.
EC 384.4	Construct different Projects with the knowledge acquired.
EC 384.5	Work in multidisciplinary teams.

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Course Name: Microwave Engineering	Course number: EC 401
CO	**Student should be able to**
EC 401.1	Analyse the Propagation of Guided waves in different modes between parallel planes.
EC 401.2	Evaluate different parameters (like impedance ,attenuation and quality factor.) for Rectangular and Circular Wave guides & Cavity Resonators
EC 401.3	Determining Scatt5erring parameters of different microwave components and analyse their properties.
EC 401.4	Integrate the concept of bunching and velocity modulation to summarize the operation of micro wave tubes and the high frequency limitations of conventional tubes.
EC 401.5	Analyse the principle, operation and characteristics of different micro wave solid state devices.

Course Name: VLSI Design	Course number: EC 402
CO	**Student should be able to**
EC402.1	Design building blocks of digital IC using Gate level and Dataflow Modeling.
EC402.2	Design blocks of digital IC using Behavioral Modeling.
EC402.3	Design Finite State Machines using Verilog HDL and Analyze Synthesis design flow.
EC402.4	Analyze modes of operation of MOS transistor and its basic electrical properties
EC402.5	Draw stick diagrams and layouts for any MOS transistors and calculate the parasitic R & C
EC402.6	Design various combinational circuits using gates and transistors

Course Name: Computer Networks	Course number: EC 403
CO	**Student should be able to**
EC403.1	Appreciate the importance of Data communications and the necessity of the reference models: OSI, TCP/IP, Analyze the design issues related to data link layer and various flow control protocols
EC403.2	Analyze the design issues related to data link layer and various flow control protocols.
EC403.3	Infer the working of internet and the importance of the Network Layer in the Internet and ATM Networks.
EC403.4	Assess the importance of transport services and various elements of transport layer like Connection management, TCP and UDP protocols.

EC403.5	Understand and comprehend the importance of Application layer and Domain Name System, SNMP, E-mail, World Wide Web.
EC403.6	Relate the Network Security with Cryptography Symmetric Key and Public Key algorithms, and will appreciate the concept of Digital Signatures and Authentication Protocols.

Course Name: Mobile and Cellular Communications	Course number: EC 404
CO	**Student should be able to**
EC 404.1	Understand the method of selection and reuse of a set of frequency channels, Base station requirement, signals required for communication and hand over between Base stations.
EC 404.2	Appreciate and understand the methods of electromagnetic wave propagation in cellular communication. The evaluation of the electromagnetic energy reaching the mobile unit.
EC 404.3	Identify different a methods of mobile access technologies and which of them suitable for mobile cellular solutions. Understand process used for Bluetooth, Zigbee like low power devices.
EC 404.4	Explain features, authentication, , operational details of GSM and CDMA mobile cellular systems along with data frame structure details.
EC 404.5	The development and limitation of the preliminary and advanced generation of mobile systems. Present trends in Cellular communications and the future communication requirements.

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Course Name: Optical Fibre Communication	Course number: EC 412
CO	**Student should be able to**
EC 412.1	Comprehend the key concepts of modes and linearly polarized modes. Distinguish ray propagation in single mode and graded index fibers.
EC 412.2	Describe the effects of dispersion in optical fibers due to materials, waveguide, polarization modes
EC 412.3	Choose direct and indirect band gap materials, light source materials. Understand structures of LED, Laser diodes and the concepts of quantum laser, temperature effects and amplifiers.
EC 412.4	Describe the working of PIN, APD diodes and estimate noise performance of photo detector response time. Categorize different error sources and comprehend the concept of probability of error and quantum limit
EC 412.5	Analyze point to point link to estimate power link budget and rise time budget. Understand the operational details of Erbium doped fiber amplifiers and basics of SONET/SDH network

Course Name: Digital Image Processing	Course number: EC 413

CO	Student should be able to
C413.1	Interpret the fundamentals of Digital Image processing system and apply to evaluate various relationships between pixels.
C413.2	Analyze various transforms and its properties and apply the knowledge to Design & formulate the co-efficient matrices.
C413.3	Enhance the images using spatial and frequency domain techniques & and apply the knowledge to infer characteristics of images.
C413.4	Identify degradation & Restoration processes. Model & Evaluate the Algebraic approach to restoration, inverse filtering and Wiener filtering techniques.
C413.5	Outline & measure various Redundancies of image compression Analyze & evaluate various Lossless & Lossy coding techniques.

COURSE NAME: Industrial Administration & Financial Management COURSE CODE: ECME 472	
CO	Student should be able to
ME 472-1	On completion of this unit learner (student) will be able to, (a) define business, objectives of business and types of business organization such as private undertakings, public undertakings and joint sector. (b) Describe factors influencing the choice of suitable form of organization. (c) Explain organization structures and advantage of organization chart. (d) Describe principles of organization structure. (e) Summarize types of organization structures, their merits and demerits. (f) Explain functions of management. (g) Summarize factors influencing the selection of plant location and plat layout. (h) Discuss principle consideration of typical industries. (i) Explain types of layouts such as line or product layout, functional or process layout, fixed position and combination layout their advantages and disadvantages.
ME 472-2	On completion of this unit student will be able to, (a) State definitions and objectives of work study, method study and time study. (b) Discuss applications of work study and its advantages. (c) Know the contributions of F.W Taylor & Frank Gilbreth. (d) Explain objectives of method study and its procedure. (e) Prepare flow process charts and symbols used in process charts. (f) Discuss motion analysis, Therbligs and SIMO chart. (g) Summarize principles of motion economy and work place layout. (h) Compute standard time by time study. (i) Discuss performance rating factor and allowances. (j) Describe work sampling procedure. (k) Summarize job evaluation objectives and different types of job evaluation and their advantages. (l) Explain performance appraisal objectives, methods. (m) Discuss wages, incentives, wage payment plans and wage incentive plans.

ME 472-3	On completion of this unit student will be able to, (a) Define inspection and quality and their differences. (b) Discuss the objectives of inspection and kinds of inspections. (c) Summarize SQC and techniques used in SQC. (d) Explain sampling inspection – sampling by attributes and variables. (e) Prepare sampling plans – single, double and multiple sampling plans. (f) Draw various control charts and work out problems related to x-R chart, P. chart and C. chart. (g) Describe Quality Circles and ISO 9001 quality system. (h) Summarize production planning and control – principles and functions. (i) Describe types of manufacture and production. (j) Draw various production control charts.
ME 472-4	On completion of this unit student will be able to, (a) Define optimization and operations research. (b) Solve problems on LPP using graphical solution. (c) Compute assignment problems. (d) Define PERT & CPM and their differences. (e) Calculate critical path. (f) Describe MM functions and its objectives. (g) Summarize types of material & material planning techniques. (h) Express duties of purchase manager. (i) Determine economic ordering quantities. (j) Explain types of material purchase. (k) Classify different materials.
ME 472-5	On completion of this unit student will be able to, (a) Express types of cost and elements of cost. (b) Describe over heads, types of over heads and allocation of over heads. (c) Define depreciation, methods of depreciation and compute depreciation. (d) Explain break even analysis and calculate breakeven point. (e) Express techniques of capital budgeting. (f) Describe time value of money, valuation concepts. (g) Define financial leverage, types of leverages. (h) Summarize importance of cost of capital and classification of cost of capital.

Course Name: Microwave Lab	Course number: EC 431
CO	**Student should be able to**
EC431.1	Analyze frequency, Wave length, SWR and Impedance for Reflex klystron Oscillator by using its equation.
EC431.2	Evaluate of mode characteristics of Reflex klystron.
EC431.3	Evaluate the VI characteristics of Gunn Diode.
EC431.4	Analyze of the characteristics of Circulator, Isolator, Directional Coupler, Tees like (Magic tee, E & H plane tees) using the Scattering parameters.
EC431.5	Generate the Radiation pattern of different antennas like Yagi-Uda and Horn Antenna and measure the gain of the antennas

Course Name: Electronic Design and Automation Lab	Course number: EC432
CO	**Student should be able to**
EC 432.1	Design combinational circuits using Verilog HDL.
EC 432.2	Design sequential circuits.
EC 432.3	Illustrate and design finite state machines.
EC 432.4	Design basic CMOS circuits in transistor level.

EC 432.5	Illustrate and design CMOS multiplexer and decoder.

Course Name: Project Seminar	Course number: EC433
CO	**Student should be able to**
EC433.1	Carryout Literature survey in the area of interest.
EC433.2	Survey the recent advancements in the identified area
EC433.3	Demonstrate an Understanding and discuss the problem within group and to arrive at possible solutions
EC433.4	Develop interpersonal skills, presentation skills, soft skills and creativity
EC433.5	Prepare Technical reports
EC433.6	Demonstrate the qualities and attitudes of a professional engineer for forming a team

Academic Year: 2014-15
IVYear II Sem

Course Name: Radar and Satellite Communication	Course number: EC451
CO	**Student should be able to**
EC 451.1	Explain basics of RADAR system, the importance of various parameters in range estimation.
EC 451.2	Illustrate various types of radars such as CW radar and their variations, MTI radar and its performance limitations and non-coherent MTI radar.
EC 451.3	Illustrate types of tracking methods and radar antennas, displays.
EC 451.4	Illustrate basics of satellite communication.
EC 451.5	Explain various types of satellite sub-systems and various multiple access techniques.
EC 451.6	Illustrate satellite link design and satellite data communication protocols.

Elective -II	
Course Name: Speech Processing	Course number: EC464
Code No.	**Student should be able to**
EC464.1	Associate the mechanism of speech production to the source filter model of speech production for various speech sounds and interpret the speech analysis techniques.
EC464.2	Comprehend feature extraction of speech such as voiced/unvoiced decision and pitch extraction using various algorithms like Rabiner and Gold, SIFT.
EC464.3	Classify the terminal analogue speech synthesizers and articulatory speech synthesizer.

EC464.4	Infer and apply various coding techniques for speech like Sub-band coding, Transform coding to achieve low bit rates.
EC464.5	Annotate the model for speech recognition system and compare the Dynamic time warping with hidden Markova models.

Elective -III	
Course Name: Global Positioning Systems	**Course number: EC472**
Code No.	**Student should be able to**
EC 472.1	Analyze the GPS constellation and its principle of operation. Familiarity of GDOP and different types of DOPs
EC 472.2	Derive concepts of different Coordinate systems - WGS-84, IGS, ECI, ECEF and various error sources in GPS and to minimize or overcome these errors.
EC 472.3	Derive the GPS signal structure and its C/A and P Codes associated with. Enumerate different applications of GPS.
EC 472.4	Demonstrate the various types of GPS augmentation systems and architecture of GAGAN and familiarity the concept of Local area augmentation system.
EC 472.5	Conceptualize the modernization of GPS and other satellite navigation systems with GPS integration
EC 472.1	Analyze the GPS constellation and its principle of operation. Familiarity of GDOP and different types of DOPs

Course Name: ENTREPRENEURSHIP	**Course number: ME411**
CO	**Student should be able to**
ME411.1	To know the characteristics and skills required for Entrepreneurs. To understand the Indian Industrial environment for Entrepreneurial growth and development.
ME411.2	To know about first generation and women entrepreneurs. To generate various sources of ideas for innovative business.
ME411.3	To formulate a Project Proposal and knowing opportunities for project financing.
ME411.4	Outcome: To design and develop a well presented successful business plan that is feasible and to gain the advantage of Project financing.
ME411.5	To study the Behavioural aspects of entrepreneurs and time management approaches and matrix

Course Name: General Seminar	**Course number: EC481**
CO	**Student should be able to**
EC481.1	Carryout Literature survey in the area of interest.
EC481.2	Survey the recent advancements in the identified area

EC481.3	Demonstrate an Understanding and discuss the problem within group and to arrive at possible solutions
EC481.4	Develop interpersonal skills, presentation skills, soft skills and creativity
EC481.5	Prepare Technical reports
EC481.6	Demonstrate the qualities and attitudes of a professional engineer for forming a team

Course Name: PROJECT Course number: EC 482	
Code No.	**Statement ; Students should be able to**
EC 482.1	Review acquired technical knowledge on the selected topic
EC 482.2	Undertake problem identification, formulation and find optimal solution
EC 482.3	Identify suitable hardware and software requirements and design engineering solution to complex problems utilizing a systematic approach.
EC 482.4	Conduct an Engineering project using the state of art hardware and Electronics Design & Automation tools.
EC 482.5	Exhibit team work and Communicate with Engineers and the community at large.
EC 482.6	Prepare project report/thesis

	Academic Year: 2013-14
	I Year
CODE NO	**EG101-EC101-ENGLISH**
EG101.1	**Statement**
EG101.2	learn the importance of communication, features and process of communication and verbal and Non verbal communication in order to communicate effectively
EG101.3	improve oral communication skills, listening skills, interpersonal communication and improve interpersonal skills by using Johari window and Knapp's model
EG101.4	improve writing techniques such as passage expansion, Précis-writing, Essay writing, Report –writing, SoP, Résumé - writing and official letters
EG101.5	learn the basic rules of grammar with appropriate usage and learn to use vocabulary such as synonyms and antonyms, homonyms and homophones
	improve comprehension skills by reading inspirational texts and infer information.

	MT101-EC102-MATHEMATICS-1
CODE NO	**Statement**
MT101.1	Solve some problems based on the concept of convergence and divergence of infinite series and apply the various tests of convergence to determine the nature of an infinite series

MT101.2	Solve problems based on the fundamental theorems of differential calculus, expanding functions using Taylor's & Mc Laurin's series and solve problems on finding Radius of curvature , evolutes and envelopes
MT101.3	Evaluate limits, Continuity and derivatives of functions of two variables, Maxima &Minima for functions of two or more variables arising in Engineering Problems.
MT101.4	Evaluate double and triple integrals and solve problems based on vector differentiation and vector integration.
MT101.5	Evaluate double and triple integrals and solve problems based on vector differentiation and vector integration.

MT102-EC103-MATHEMATICS-2

CODE NO	Statement
MT102.1	Solve various types of First ordered ordinary differential equations and apply these techniques for solving some problems in Geometry, Electricity, Heat transfer and Radio activity.
MT102.2	Solve higher ordered linear O.D.E's with constant Coefficients using various techniques.
MT102.3	Solve linear O.D.E's using power series and Frobenius methods and apply these methods for solving Legendres D.E.
MT102.4	Evaluate improper integrals using Beta and Gamma functions and solve Bessel's differential equations.
MT102.5	Solve some problems using the properties of Legendre polynomial and Bessel's functions.
MT102.6	Evaluate Laplace Transforms and inverse Laplace transforms of various functions and solve linear ordinary differential equations using Laplace transforms.

PH101-EC104-ENGINEERING PHYSICS

CODE NO	Statement
PH101.1	To understand the concept of interference, diffraction and polarization.
PH101.2	Ability to know the utilization of laser technology, Holography and optical fiber and their engineering applications in various disciplines.
PH101.3	To understand the basics of statistical mechanics, significance and applications of Schrodinger wave equation.
PH101.4	Able to analyze the various crystal structures and their defects and to understand the electrons behavior in solids.
PH101.5	Gain the knowledge on magnetic materials and dielectric materials and superconducting materials.
PH101.6	Understand the characterization and basic preparation methods in thin films and Nano-materials.

CH101-EC1105-ENGINEERING CHEMISTRY

CODE NO	Statement

CH101.1	Explain quantitative relationship between chemical and electrical energy, construction and working of different types of electrodes used in construction of electrochemical cells Understand the operating principle and apply the knowledge to design batteries.
CH101.2	Relate the principle behind mechanism and rate of corrosion leading to deterioration of metal and apply corrosion control method.
CH101.3	Explain method to find impurities present in water and establish various methods of purifying water.
CH101.4	Show the need for replacement of conventional materials with polymers to be used as plastics, fibres, elastomers, conducting polymers and composites.
CH101.5	Identify the dependence on conventional fuel like coal, petroleum, and gaseous fuel to meet present energy requirement. Introduce the need for change to renewable sources of energy.
CH101.6	Interpret the importance of lubricants and liquid crystals. Phase rule concept is used to know the process of separation of pure metals from alloys. Apply the principles of Green chemistry to carryout eco-friendly chemical processes without causing environmental pollution.

CS101-EC106-PROGRAMMING IN C&C++

CODE NO	Statement
CS101.1	Understand the procedure to create, compile and execute C program for different inputs.
CS101.2	Apply the concepts of control statements, operators, functions and arrays to implement matrix, searching and sorting algorithms.
CS101.3	Solve programs on pointers and strings
CS101.4	access variables through dynamic memory.
CS101.5	Understand and Apply the concepts of derived data types and file handling operations.
CS101.6	Understand the concepts of object oriented programming through C++ and know the differences between C and C++ programs.
CS101.7	Analyze and write programs on inheritance, polymorphism, classes and objects creation using C++.

CE101-EC107-ENGINEERING MECHANICS

CODE NO	Statement
CE101.1	Resolve forces acting on a body; obtain resultant force or moment acting due to set of forces and moments acting on a body; and determine unknown forces from equations of equilibrium of forces and moments.
CE101.2	Obtain location of centres of mass of regular and composite shapes; use Pappus theorems to calculate surface areas and volumes of composite structures.
CE101.3	Distinguish between static and kinematic friction, determine effect of static or kinematic friction forces acting on a single or a system of connected bodies; effect of friction in screw jack,wedge,brakes and belt transmission.

CE101.4	Compute area moment of inertia and products of inertia for simple and composite elements using integration methods and transform theorem; calculate mass MI and radius of gyration for regular and composite structures.
CE101.5	Obtain displacement, velocity and acceleration relations of particles in rectilinear and curvilinear motion including projectiles; write equations of motion under influence of forces for particles and connected bodies and for plane motion of rigid bodies.
CE101.6	Apply Principles of work and energy to motion of particle or connected bodies to evaluate the velocities and angular velocities of bodies in connected systems and involving plane motion.
CE101.7	Apply Principle of conservation of Momentum and impulse force/moment to evaluate the velocities of a body after application of force/moment, and of bodies in impact/collision considering Coefficient of Restitution.

CE102-EC108-ENGINEERING GRAPHICS

CODE NO	Statement
CE102.1	The student would be able to recall the mathematical concepts related to scales, conic sections, involutes, etc and demonstrate proficiency in construction of these using the various methods described in literature.
CE102.2	The student would be able to analyse the position of objects when placed in different orientations with respect to reference planes and reproduce them on drawing sheets to provide valid explanations.
CE102.3	The student would be able to draw the various views of three dimensional objects (Solids) which may be oriented in different positions with respect to the reference planes.
CE102.4	The student would be able to assess the shapes of objects that can be generated when a given solid is cut by section planes in different orientations. These shapes are shown in the corresponding sectional views using the concepts of auxiliary planes. Further the development of the truncated solids can be drawn by recognizing the basic principles of developments of surfaces.
CE102.5	The student would be able to recognize the various features of solids by viewing them from front, top and sides. Subsequently the student would also be able to generate a few three-dimensional views of the given objects using the principles of isometric projections.

PH132-EC109-PHYSICS LAB

CODE NO	Statement
PH132.1	To demonstrate the phenomena of interference and diffraction to determine wavelength of a given light source of light.
PH132.2	To verify the laws of polarization and determine the specific rotator power of an optically active substance.
PH132.3	To understand the principle involved in laser and optical fiber technology.
PH132.4	To examine the nature of ferromagnetic and dielectric materials to evaluate the related parameters.

PH132.5	To characterize semiconducting devices to calculate parameters like resistance, energy gap and temperature co-efficient.
PH132.6	To study the Characteristics of Photo Voltaic Cells and evaluate their efficiencies.
PH132.7	To verify Malus law of polarization of light.

CH132-EC110-CHEMISTRY LAB

CODE NO	Statement
CH132.1	Make use of analytical and electronic balances for weighing samples in chemical analysis.
CH132.2	Identify and estimate impurities causing hardness and alkalinity in water.
CH132.3	Find the strength of reducing species such as Fe^{+2}, Fe^{+3}, Cr^{+3}, Cu^{+2} and Cl^- by various titrimetric methods like complexometry and Iodometry.
CH132.4	Estimate quantitatively different chemical species present in complex mixtures, ores and unknown samples by various instrumentation techniques like Conductometry and Potentiometry.
CH132.5	Determine quantitatively different chemical species present in unknown samples by various instrumentation techniques like pH metry and Colorimetry.
CH132.6	Recall the methods of preparation of industrially important polymers.

ME131-EC111-WORKSHOP PRACTICE

CODE NO	Statement
ME131.1	The student would be able to utilize the various tools of fitting namely bench vice, V block, files, surface plate, surface gauge, hacksaw, drill bits, etc to perform various operations on the work piece (job) like filing, scrapping, drilling, tapping, etc.
ME131.2	The student would be able to identify different types of connections like series, parallel, stair case wiring, etc. Subsequently, the student would be able to correlate the methods of electrical wiring in different domestic and industrial applications.
ME131.3	The student would be able to utilize the various tools of carpentry namely bench vice, planes, mallet, hammers, files, different saws, etc to perform various carpentry joints like half lap joint, dove tail joint, bridle joint, etc.
ME131.4	The student would be able to utilize the various tools of sheet metal (tin smithy) namely hammer, mallet, stakes, snips, pliers, punches, vernier calipers, wire gauge, etc to perform various operations like cutting, shearing, notching, bending, riveting, etc. on the given sheet metal and develop various objects like tray, funnel, scoop, cylinder,etc.

CS131-EC112-C PROGRAMMING LAB

CODE NO	Statement
CS131.1	Understand the procedure to create, compile and execute C program for different inputs.

CS131.2	Apply the concepts of functions and arrays and write C programs for matrix, searching and sorting techniques.
CS131.3	Create Derived types and deal files by applying the concepts of structures and pointers.
CS131.4	Understand the procedure to create, compile and execute C++ program for different inputs.
CS131.5	Apply the concepts of classes, objects, inheritance and polymorphism in C++.
CS131.6	Write programs in both C and C++ and could distinguish the differences between C and C++.

EG131-EC113-ENGLISH LANGUAGE LAB

CODE	Statement
EG131.1	learn the sound system of English Language with the knowledge of IPA-classification & description
EG131.2	learn the word stress & aspects of connected speech
EG131.3	learn the Rhythm & Intonation of English language
EG131.4	improve the fluency in the spoken form of the language by participating in Presentation skills, Public speaking, Group Discussion and Debate.
EG131.5	learn to dictionary and thesaurus effectively in an appropriate way.

Academic Year: 2013-14
II Year I Sem

Course Name: Mathematics - III	Course number: BS301MAT
CO	**Student should be able to**
BS 301.1 MT	Solve problems based on differentiation and line integration of complex functions.
BS 301.2 MT	Develop Taylor's and Laurent's series for a given complex function and explain some standard conformal transformations and application of the theory of residues.
BS 301.3 MT	Develop a Fourier series for a given function in various Intervals.
BS 301.4 MT	Solve problems on formation of partial differential equations and on some standard first ordered and higher ordered linear partial differential equations.
BS 301.5 MT	Apply the theory of Fourier series to some boundary value problems associated with one - dimensional wave, heat and Laplace's Equation.

Course Name: Basic Circuit Analysis	Course number: EC-201
CO	**Student should be able to**

EC 201.1	Appreciate the concept of Mesh, Super Mesh, Node, Super Node their DC analysis.-Network theorems, Topologies and terminal Characteristics.
EC 201.2	Compute Transient and steady state responses of RL, RC and RLC series and Parallel networks.
EC 201.3	Analyze AC circuits and magnetically coupled circuits.
EC 201.4	Differentiate between different sets of 2- Port network parameters along with interconnection of networks.
EC 201.5	Evaluate Complex Frequencies, Pole-Zeros of an Admittance or Impedance function and sketch Pole-Zero Plots and to find Resonance Q-Factor and Bandwidth.

Course Name: Electromagnetic Theory	Course number: EC-202
CO	**Student should be able to**
EC 202.1	Comprehend conversion formula between various coordinate system and compute the force existing between two charges by Coulomb's law and electric flux existing across a closed surface by Gauss's law.
EC 202.2	Generalize capacitance effect and boundary conditions for electrostatic fields and calculate Laplace and Poisson's solution.
EC 202.3	Analyze inductance effect and boundary conditions for magnetostatic fields. calculate scalar and vector magnetic potentials.
EC 202.4	Interpret the Maxwell's equations for timing varying field and appreciate its importance for electromagnetic wave equations. Analyze Polarization of electromagnetic waves
EC 202.5	Conceptualize reflection of plane waves by different media and deduce reflection and transmission co-efficient. calculate the power and energy of propagated Electromagnetic waves.

Course Name: Electronic Devices	Course number: EC 203
CO	**Student should be able to**
EC 203.1	Interpret the V-I characteristics & switching characteristics to determine the diode parameters and apply diode models to analyze various applications of diodes.
EC 203.2	Identify the merits and demerits of various filters, formulate and design rectifier circuits with filters.
EC 203.3	Discriminate the BJT configurations to recognize appropriate transistor configuration for any given application and design the biasing circuits with good stability.
EC 203.4	Analyze, compare and design of BJT amplifiers with biasing circuits.
EC 203.5	Distinguish the working principles of BJT and FET also compare between FET & MOSFET.

Course Name: Elements of mechanical engineering	Course number: ME221
CO	**Student should be able to**
M 221.1	The student would be able to correlate the laws of thermodynamics with the fundamental conceptual terminologies like properties, systems, processes, cycles, states, different types of equilibrium, energy, etc and solve related problems.
M 221.2	The student would be able to understand the different classifications of IC engines and reciprocating air compressors with specific focus on similarities and differences between (i) 2 stroke and 4 stroke engines and (ii) CI and SI engines. Subsequently, the student would be able to compute the performance parameters of the engines and reciprocating air compressors.
M 221.3	The student would be able to classify the different modes of heat transfer, analyze the governing equations, understand the applications of heat exchangers and solve related problems.
M 221.4	The student would be able to assess the relevance of different refrigeration systems with respect to their eco friendliness, suitability, performance etc., and also learn about different parameters of Psychrometry.
M 221.5	The student would be able to classify different manufacturing processes like forging, welding, forming, machining, etc and recognize their suitability for manufacturing of different industrial products.
M 221.6	The student would be able to understand the different types of power transmission systems like gears, gear trains, belts, ropes etc with emphasis on their kinematic mechanisms and solve related problems.

Course Name: Electrical Technology	Course number: EE222
CO	**Student should be able to**
EE222.1	Appreciate the importance of ac & dc circuits.
EE222.2	The ability to select a suitable measuring instrument for measuring of electrical power .
EE222.3	Recall operation of transformers and applications.
EE222.4	Identify the suitable DC motor and generator for application.
EE222.5	The ability to formulate and then analyze the working of AC electrical machine.

Course Name: Electronic Devices Lab	Course number: EC 231
CO	**Student should be able to**
EC231.1	Characterize the behavior of p-n junction diode, determine the diode parameters and design Zener voltage regulator using SPICE.
EC231.2	Evaluate the performance of rectifiers with & without filters. Analyze and design the rectifiers with filters using SPICE.

EC231.3	Distinguish between the characteristics of different BJT and FET transistor configurations.
EC231.4	Design and Evaluate the functionality of various biasing circuits for BJT and FET amplifiers.
EC231.5	Generate and interpret the characteristics of UJT, SCR, Tunnel diode and photo diode

Course Name: Electronic Workshop and Simulation Lab Course number: EC232	
CO	**Student should be able to**
EC232.1	Appreciate the difference between different Passive, Active and Electro mechanical components and their lead identification procedures.
EC232.2	Use different Tools, Electronic test and measuring instruments.
EC232.3	Show expertise in Analyzing the network concepts and their theorems.
EC232.4	Appreciate how to start a project from the component selection to PCB design, soldering and De- soldering.
EC232.5	Assess the importance of Transformer design, and its construction.

Academic Year: 2013-14
II Year II Sem

Course Name: Mathematics - IV Course number: MAT251	
CO	**Student should be able to**
MT 251.1	Solve problems based on differentiation and line integration of complex functions
MT 251.2	Develop Taylor's and Laurent's series for a given complex function and explain some standard conformal transformations.
MT 251.3	Apply the basic definition and properties of Z- transform for solving difference equations.
MT 251.4	Evaluate Fourier Transforms and inverse Fourier Transforms of various functions.
MT 251.5	Apply numerical methods for solving algebraic, transcendental , system of linear equations, initial value problems for first ordered ordinary differential equations.
MT 251.6	Apply interpolation methods for estimation.

Course Name: Analog Electronic Circuits Course number: EC 251	
CO	**Student should be able to**
EC251.1	Design and Analyze low frequency, mid frequency and high frequency response of small signal single stage and Multistage RC coupled and Transformer Amplifiers using BJT and FET.

EC251.2	Identify the type of negative feedback, Analyze and design of various negative feedback amplifiers.
EC251.3	Design various Audio Frequency and Radio Frequency oscillators.
EC251.4	Develop and formulate various regulators
EC251.5	Distinguish various classes of Power Amplifiers.
EC251.6	Differentiate the performance and analyze various Tuned Amplifiers.

Course Name: Networks And Transmission Lines	Course number: EC-252
CO	**Student should be able to**
EC 252.1	Compute image impedance, iterative impedance, characteristic impedance and propagation constant for networks.
EC 252.2	Design different types of passive filters.
EC 252.3	Generalize the difference between impedance and admittance function
EC 252.4	Analyze physical significance of the equations of the transmission lines, compute open and short circuited lines and develop the condition for distortionless transmission lines.
EC 252.5	Classify various types of transmission lines and calculate the reflection co-efficient and different parameters of transmission lines using the analytical and graphical methods.

Course Name: Signals Analysis and Transform Techniques	Course number: EC254
CO	**Student should be able to**
EC253.1	Define and differentiate types of signals and systems in continuous and discrete time.
EC253.2	Apply the properties of the Fourier Series and Fourier Transform for Continuous and Discrete time signals.
EC253.3	List the properties of Fourier Transform and apply them to determine the Fourier spectrum.
EC253.4	Relate Laplace transforms to solve differential equations and to determine the response of the Continuous Time Linear Time Invariant Systems to known inputs.
EC253.5	Apply Z-Transforms for discrete time signals to solve Difference equations.
EC253.6	Compute frequency domain representation of discrete time signals and systems. Obtain Linear Convolution and Correlation of discrete time signals with graphical representation.

Course Name: Pulse Digital & Switching Circuits	Course number: EC254
CO	**Student should be able to**
EC254.1	Design Linear & Nonlinear Wave shaping Circuits such as Differentiators,

	Integrators, Clippers and Clampers.
EC254.2	Design various Multivibrators employing BJTs and Sweep circuits employing UJT & SCR.
EC254.3	Implement the Switching Circuits with minimum of Hardware.
EC254.4	Design Combinational Logic Circuits such as Adders, Subtractors, Code Converters, and Encoders & Decoders. To comprehend the need of Flip-flops in building Digital Systems.
EC254.5	Design Finite State Machines such as Counters & Sequence Detector.

Course Name: ENVIRONMENTAL STUDIES	Course number: CE 222
CO	**Student should be able to**
CE 222.1	Comprehend the importance of natural resources (Water and land) and their role in the sustainable environment
CE 222.2	Understand basic concepts of an ecosystem and its significance
CE 222.3	Illustrate the value of biodiversity and need for its conservation
CE 222.4	Identify different types of environmental pollution, their causes, effects and control measures and need for environmental legislation.
CE 222.5	Analyze global environmental issues, social aspects including population growth, disaster management.

Course Name: Electronic Circuits Lab	Course number: EC281
CO	**Student should be able to**
EC281.1	Design Pulse circuits (Clippers, Clampers, multivibrators) to generate required waveforms and analyze outputs practically.
EC281.2	Analyze frequency response of two stages RC coupled and negative feed amplifiers at low frequency, mid frequency and high frequency and compare their bandwidths with BJT and FET.
EC281.3	Distinguish various oscillator circuits with respect to frequency of oscillations.
EC281.4	Analyze power amplifiers with their efficiency and Tuned amplifiers for their resonance frequency.
EC281.5	Calculate theoretical image impedance, characteristic impedance and verify practically. Design and verify m derived and Constant K filters.

Course Name: ELECTRICAL TECHNOLOGY LAB	Course number: EE292
CO	**Student should be able to**
EE292.1	Analyze the working of three phase induction by conducting a load test
EE292.2	Synthesis the equivalent circuit parameters of a single phase

	transformer
EE292.3	Evaluate the regulation of a alternator by implying synchronous impedance method at different powerfactor s at various suitable loads
EE292.4	Analyze the speed control and loading charectastrics of DC shunt and compound motors

Academic Year: 2013-14
III Year I Sem

Course Name: Linear ICs and Applications	**Course number: EC301**
CO	**Student should be able to**
EC301.1	Analyze DC and AC characteristics for Single/Dual input Balanced/Unbalanced output configurations using BJTs.
EC301.2	Distinguish various linear and non-linear applications of Op-Amp.
EC301.3	Construct various linear and nonlinear circuits using Op-Amp.
EC301.4	Design and Formulate Op-Amp oscillators, single chip oscillators, frequency generators and active filters and IC regulators.
EC301.5	Analyze the operation of the most commonly used D/A and A/D converter types.

Course Name: Digital IC & Applications	**Course number: EC 302**
CO	**Student should be able to**
EC 302.1	Annotate the differences between the logic families and select a suitable one for a specific application
EC 302.2	U Realize Boolean expressions using multiplexers.
EC 302.3	Design of combinational & sequential circuits like code converter & circuits like 4-bit serial adder.
EC 302.4	Design synchronous and asynchronous sequential circuits ex: MSI IC counters (7490, 7492 &7493).
EC 302.5	B Classify various memories and comprehend PLDS (programmable Logic Devices).

Course Name: Analog Communication	**Course number: EC 303**
CO	**Student should be able to**
EC 303.1	Understand analog communication systems using amplitude modulation and demodulation.
EC 303.2	Understand analog communication systems using angle modulation and demodulation.

EC303.3	Be familiar with analog radio transmitters and receivers.
EC303.4	Understand the performance of analog communications in the presence of noise.
EC303.5	Be familiar with analog pulse communication systems..

Course Name: Automatic Control Systems	Course Code: EC 304
CO	**Student should be able to**
EC 304.1	Classify the different types of the control systems and apply mathematical modeling to convert mechanical systems into electrical systems and Block diagram into Signal Flow Graph.
EC 304.2	Examine the stability of the system using R-H and Root locus techniques and calculate the Steady state error, order, type of the system.
EC 304.3	Illustrate the compensation techniques and frequency domain specifications and be able to fins the stability of the system using Bode plot and Nyquist plot.
EC 304.4	Characterize the digital control systems and Transfer function of sampled data system.
EC 304.5	Detect the Observability/Controllability of control systems and design their state models.

Course Name: Micro Processors and Micro Controllers	Course number: EC 305
CO	**Student should be able to**
EC305.1	Identify the architectural features of 8086 and Conceptualize its interrupt structure
EC305.2	Develop the assembly language programming using 8086
EC305.3	Comprehend the operation of peripheral devices like memory, 8254, 8257,8251 and their interfacing with 8086.
EC305.4	Differentiate between microprocessor and microcontroller in their architectural features and develop the assembly language programming including the timers/counters in 8051.
EC305.5	Expand memory, I/O ports and design real time applications of 8051

Course Name: Integrated circuits Lab	Course Code: EC 331
CO	**Student should be able to**
EC331.1	Define significance of operational amplifier (741) and their importance.
EC331.2	Design circuits using operational amplifiers for various applications
EC331.3	Design and explain OP Amp as summer, Subtractor, Multiplierand Divider
EC331.4	Design and explain OP Amp to generate sine waveform, Square wave form, Triangular waveforms
EC331.5	Demonstrate their knowledge by designing analog circuits & digital circuits

	and vice versa
EC331.6	Design various combinational circuits using various Digital Integrated IC's.

Course Name: Analog Communication Lab	Course number: EC332
CO	Student should be able to
EC332.1	Design and simulate modulation and demodulation circuits such as AM,DSB-SC,FM.
EC332.2	Understand importance of pre-emphasis and de-emphasis at the transmitter and receiver respectively
EC332.3	Construct diode detector and AGC circuit that are necessary for good reception of the signal
EC332.4	Apply and appreciate the concept of time and frequency division multiplexing
EC332.5	Apply and simulate the PAM,PWM&PPM circuits

Course Name: Micro Processors and Micro Controllers Lab	Course Code: EC 333
CO	Student should be able to
EC333.1	Identify various ICs used in the development of 8086 trainer kit.
EC333.2	Develop the logic using instruction set of 8086 in different addressing modes to carry out arithmetic, logical and string operations.
EC333.3	Interface devices like ADC, DAC, LCD, and Stepper Motor to 8086
EC333.4	Use the IDE tool effectively for developing and executing the programs using 8051.
EC333.5	Comprehend the usage of on-chip timers and serial communication of 8051 and their interrupts using programs
EC333.6	Interface devices like ADC, DAC, LCD, and Stepper Motor to 8051 and develop real time projects.

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III Year II Sem

Course Name: Digital Communications	Course number: EC 351
CO	Student should be able to
EC351.1	Classify the different types of digital modulation techniques PCM, DPCM, DM and ADM and compare their performance by SNR.
EC351.2	Illustrate the classification of channels and Entropy coding methods.
EC351.3	Distinguish different types of Error control codes along with their encoding/decoding algorithms.
EC351.4	Examine the Performance of different Digital Carrier Modulation schemes of Coherent and Non-coherent type based on Probability of error.

EC351.5	Generation of PN sequence usingSpread Spectrum and characterize the Acquisition Schemes for Receivers to track the signals.

Course Name: Digital Signal Processing	Course number: EC 352
CO	**Student should be able to**
EC352.1	Conclude DTFT to evaluate frequency response. Determine DFT using direct and FFT methods. Analyze Circular and Linear convolution and apply for linear filtering operations.
EC352.2	Design & compare Digital FIR filters using various windows, Analyze the characteristics of various windows.
EC352.3	Formulate & apply Digital IIR filter design using Butterworth &Chebyshev approximations to Verify the characteristics of LPF, HPF, BPF & BEF.
EC352.4	Comprehend & deduce Interpolator, Decimator & Multi-stage sampling rate conversion and apprehend its use in various signal processing/communication based applications.
EC352.5	Differentiate signal processor and general purpose processor, Visualize & Appreciate the Architecture of TMS320C54xx Processor and the Various Addressing modes.

Course Name: Antenna & Wave Propagation	Course number: EC 353
CO	**Student should be able to**
EC 353.1	Analyse different antenna parameters by applying the concept of Radiation and isotropic radiator.
EC353.2	Derive the far field pattern of loop and helical antennas by applying the concept of half wave dipole and quarter wave monopole.
EC353.3	Analyse the characteristics of broad side and end fire arrays and calculate various parameters.
EC353.4	Evaluate the features and analyse the radiation pattern of different VHF & UHF antennas by using different measurement techniques.
EC353.5	Compare and Contrast different wave propagation techniques and illustrate the radio wave behaviour in different modes of communications.

Course Name: Computer Organization And Architecture	Course Code: EC 354
CO	**Student should be able to**
EC354.1	Relate the number representation of digital computer to devise the Hardware arithmetic algorithms
EC354.2	Apply the knowledge of Bus structure, Registers, Micro-operations, control unit design using hardwired and Micro programmed organization

EC354.3	Comprehend various Instructions, addressing modes and instruction level parallelism and deduce the various pipeline conflicts
EC354.4	Interpret different ways of communicating with I/O devices and appreciate the importance of IOP
EC354.5	Analyze and Conceptualize the memory hierarchy with different types of memories

Course Name: Electronic Instrumentation Course number: EC355	
CO	**Student should be able to**
EC355.1	Differentiate the types errors in measurement and minimize them to reach standards.
EC355.2	Choose different active and passive transducers to measure temperature for required applications.
EC355.3	Apprehend the types of transducers to measure temperature, humidity and sound.
EC355.4	Classify measuring instruments to measure different parameters and store the result.
EC355.5	Demonstrate and analyze types of equipments that are used in biomedical signal analysis.

Course Name: MANAGERIAL ECONOMICS & ACCOUNTANCY Course number: CM371	
CO	Student should be able to
CM371.1	Find out the general exposure about the business, economic environment and the structural aspects of Managerial Economics
CM371.2	Analyze different principles and laws of managerial economics & examine the consumer behaviour for taking various managerial decisions, such as forecasting demand for new and existing goods and services to the business units and also suggest the best profit maximizing production function to the producers/entrepreneurs.
CM371.3	Identify the impact of changes in internal factors, such as cost, price & volume on profitability and appraise of the firms behaviour in different markets structures with respective to competitive prices fixation of products and optimum input-output decisions.
CM371.4	Evaluate with the knowledge of capital budgeting methods and techniques for different business proposals and identify the best among them for prudent investment and also explore different sources of capital needed to the business
CM371.5	Construct and analyse the financial statements of the business and interpret them for taking ideal managerial decisions.

Course Name: Digital Communication Lab	Course number: EC381
CO	**Student should be able to**
EC381.1	Understand baseband transmission (i.e., PCM, DPCM, DM, ADM) generation and detection.
EC381.2	Understand error detection and correction.
EC381.3	Obtain data formats.
EC381.4	Understand digital modulation (i.e., ASK, FSK, BPSK, DPSK, QPSK, MSK) generation and detection.
EC381.5	Measure optical fiber numerical aperture, attenuation.

Course Name: Digital Signal Processing Lab	Course number: EC 382
CO	**Student should be able to**
EC 382.1	E Evaluate frequency response, output response, Linear & circular convolution using DFT. Appreciate efficient implementation of DFT using FFT.
EC 382.2	D Design & Interpret FIR filters (LPF,HPF,BPF & BEF) using various window techniques
EC 382.3	D Develop & contrast IIR filters (LPF, HPF, BPF & BEF) using Butterworth and Chebyshev approximations
EC 382.4	I Implement Interpolation and Decimation.
EC 382.5	D Devise the above concepts using MATLAB & CCS tools. Acquire knowledge to work on real time processing using DSK.

Course Name: Industrial Visitng	Course number: EC 401
CO	**Student should be able to**
EC 384.1	Forecast about the technical approach in different industries.
EC 384.2	Integrate their knowledge about different technologies and to apply them in problem solving techniques.
EC 384.3	Predict different problems that disturbs the environment and solve them.
EC 384.4	Construct different Projects with the knowledge acquired.
EC 384.5	Work in multidisciplinary teams.

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Course Name: Microwave Engineering	Course number: EC 401
CO	**Student should be able to**
EC 401.1	Analyse the Propagation of Guided waves in different modes between parallel

	planes.
EC 401.2	Evaluate different parameters (like impedance ,attenuation and quality factor.) for Rectangular and Circular Wave guides & Cavity Resonators
EC 401.3	Determining Scatt5erring parameters of different microwave components and analyse their properties.
EC 401.4	Integrate the concept of bunching and velocity modulation to summarize the operation of micro wave tubes and the high frequency limitations of conventional tubes.
EC 401.5	Analyse the principle, operation and characteristics of different micro wave solid state devices.

Course Name: VLSI Design	Course number: EC 402
CO	Student should be able to
EC402.1	Design building blocks of digital IC using Gate level and Dataflow Modeling.
EC402.2	Design blocks of digital IC using Behavioral Modeling.
EC402.3	Design Finite State Machines using Verilog HDL and Analyze Synthesis design flow.
EC402.4	Analyze modes of operation of MOS transistor and its basic electrical properties
EC402.5	Draw stick diagrams and layouts for any MOS transistors and calculate the parasitic R & C
EC402.6	Design various combinational circuits using gates and transistors

Course Name: Computer Networks	Course number: EC 403
CO	Student should be able to
EC403.1	Appreciate the importance of Data communications and the necessity of the reference models: OSI, TCP/IP, Analyze the design issues related to data link layer and various flow control protocols
EC403.2	Analyze the design issues related to data link layer and various flow control protocols.
EC403.3	Infer the working of internet and the importance of the Network Layer in the Internet and ATM Networks.
EC403.4	Assess the importance of transport services and various elements of transport layer like Connection management, TCP and UDP protocols.
EC403.5	Understand and comprehend the importance of Application layer and Domain Name System, SNMP, E-mail, World Wide Web.
EC403.6	Relate the Network Security with Cryptography Symmetric Key and Public Key algorithms, and will appreciate the concept of Digital Signatures and Authentication Protocols.

Course Name: Mobile and Cellular Communications	Course number: EC 404
CO	Student should be able to
EC 404.1	Understand the method of selection and reuse of a set of frequency channels, Base station requirement, signals required for communication and hand over between Base stations.
EC 404.2	Appreciate and understand the methods of electromagnetic wave propagation in cellular communication. The evaluation of the electromagnetic energy reaching the mobile unit.
EC 404.3	Identify different a methods of mobile access technologies and which of them suitable for mobile cellular solutions. Understand process used for Bluetooth, Zigbee like low power devices.
EC 404.4	Explain features, authentication, , operational details of GSM and CDMA mobile cellular systems along with data frame structure details.
EC 404.5	The development and limitation of the preliminary and advanced generation of mobile systems. Present trends in Cellular communications and the future communication requirements.

Elective-I	
Course Name: Optical Fibre Communication	Course number: EC 412
CO	Student should be able to
EC 412.1	Comprehend the key concepts of modes and linearly polarized modes. Distinguish ray propagation in single mode and graded index fibers.
EC 412.2	Describe the effects of dispersion in optical fibers due to materials, waveguide, polarization modes
EC 412.3	Choose direct and indirect band gap materials, light source materials. Understand structures of LED, Laser diodes and the concepts of quantum laser, temperature effects and amplifiers.
EC 412.4	Describe the working of PIN, APD diodes and estimate noise performance of photo detector response time. Categorize different error sources and comprehend the concept of probability of error and quantum limit
EC 412.5	Analyze point to point link to estimate power link budget and rise time budget. Understand the operational details of Erbium doped fiber amplifiers and basics of SONET/SDH network

Course Name: Digital Image Processing	Course number: EC 413
CO	Student should be able to
C413.1	Interpret the fundamentals of Digital Image processing system and apply to evaluate various relationships between pixels.
C413.2	Analyze various transforms and its properties and apply the knowledge to Design & formulate the co-efficient matrices.

C413.3	Enhance the images using spatial and frequency domain techniques & and apply the knowledge to infer characteristics of images.
C413.4	Identify degradation & Restoration processes. Model & Evaluate the Algebraic approach to restoration, inverse filtering and Wiener filtering techniques.
C413.5	Outline & measure various Redundancies of image compression Analyze & evaluate various Lossless & Lossy coding techniques.

COURSE NAME: Industrial Administration & Financial Management COURSE CODE: ECME 472	
CO	**Student should be able to**
ME 472-1	On completion of this unit learner (student) will be able to, (a) define business, objectives of business and types of business organization such as private undertakings, public undertakings and joint sector. (b) Describe factors influencing the choice of suitable form of organization. (c) Explain organization structures and advantage of organization chart. (d) Describe principles of organization structure. (e) Summarize types of organization structures, their merits and demerits. (f) Explain functions of management. (g) Summarize factors influencing the selection of plant location and plat layout. (h) Discuss principle consideration of typical industries. (i) Explain types of layouts such as line or product layout, functional or process layout, fixed position and combination layout their advantages and disadvantages.
ME 472-2	On completion of this unit student will be able to, (a) State definitions and objectives of work study, method study and time study. (b) Discuss applications of work study and its advantages. (c) Know the contributions of F.W Taylor & Frank Gilbreth. (d) Explain objectives of method study and its procedure. (e) Prepare flow process charts and symbols used in process charts. (f) Discuss motion analysis, Therbligs and SIMO chart. (g) Summarize principles of motion economy and work place layout. (h) Compute standard time by time study. (i) Discuss performance rating factor and allowances. (j) Describe work sampling procedure. (k) Summarize job evaluation objectives and different types of job evaluation and their advantages. (l) Explain performance appraisal objectives, methods. (m) Discuss wages, incentives, wage payment plans and wage incentive plans.
ME 472-3	On completion of this unit student will be able to, (a) Define inspection and quality and their differences. (b) Discuss the objectives of inspection and kinds of inspections. (c) Summarize SQC and techniques used in SQC. (d) Explain sampling inspection – sampling by attributes and variables. (e) Prepare sampling plans – single, double and multiple sampling plans. (f) Draw various control charts and work out problems related to x-R chart, P. chart and C. chart. (g) Describe Quality Circles and ISO 9001 quality system. (h) Summarize production planning and control – principles and functions. (i) Describe types of manufacture and production. (j) Draw various production control charts.

	On completion of this unit student will be able to, (a) Define optimization and operations research. (b) Solve problems on LPP using graphical solution. (c) Compute assignment problems. (d) Define PERT & CPM and their differences. (e) Calculate critical path. (f) Describe MM functions and its objectives. (g) Summarize types of material & material planning techniques. (h) Express duties of purchase manager. (i) Determine economic ordering quantities. (j) Explain types of material purchase. (k) Classify different materials.
ME 472-4	
ME 472-5	On completion of this unit student will be able to, (a) Express types of cost and elements of cost. (b) Describe over heads, types of over heads and allocation of over heads. (c) Define depreciation, methods of depreciation and compute depreciation. (d) Explain break even analysis and calculate breakeven point. (e) Express techniques of capital budgeting. (f) Describe time value of money, valuation concepts. (g) Define financial leverage, types of leverages. (h) Summarize importance of cost of capital and classification of cost of capital.

Course Name: Microwave Lab	Course number: EC 431
CO	**Student should be able to**
EC431.1	Analyze frequency, Wave length, SWR and Impedance for Reflex klystron Oscillator by using its equation.
EC431.2	Evaluate of mode characteristics of Reflex klystron.
EC431.3	Evaluate the VI characteristics of Gunn Diode.
EC431.4	Analyze of the characteristics of Circulator, Isolator, Directional Coupler, Tees like (Magic tee, E & H plane tees) using the Scattering parameters.
EC431.5	Generate the Radiation pattern of different antennas like Yagi-Uda and Horn Antenna and measure the gain of the antennas

Course Name: Electronic Design and Automation Lab	Course number: EC432
CO	**Student should be able to**
EC 432.1	Design combinational circuits using Verilog HDL.
EC 432.2	Design sequential circuits.
EC 432.3	Illustrate and design finite state machines.
EC 432.4	Design basic CMOS circuits in transistor level.
EC 432.5	Illustrate and design CMOS multiplexer and decoder.

Course Name: Project Seminar	Course number: EC433
CO	**Student should be able to**
EC433.1	Carryout Literature survey in the area of interest.
EC433.2	Survey the recent advancements in the identified area
EC433.3	Demonstrate an Understanding and discuss the problem within group and to

	arrive at possible solutions
EC433.4	Develop interpersonal skills, presentation skills, soft skills and creativity
EC433.5	Prepare Technical reports
EC433.6	Demonstrate the qualities and attitudes of a professional engineer for forming a team

Academic Year: 2013-14
IVYear II Sem

Course Name: Radar and Satellite Communication	Course number: EC451
CO	**Student should be able to**
EC 451.1	Explain basics of RADAR system, the importance of various parameters in range estimation.
EC 451.2	Illustrate various types of radars such as CW radar and their variations, MTI radar and its performance limitations and non-coherent MTI radar.
EC 451.3	Illustrate types of tracking methods and radar antennas, displays.
EC 451.4	Illustrate basics of satellite communication.
EC 451.5	Explain various types of satellite sub-systems and various multiple access techniques.
EC 451.6	Illustrate satellite link design and satellite data communication protocols.

Elective-II	
Course Name: Global Positioning Systems	Course number: EC452
Code No.	**Student should be able to**
EC 452.1	Analyze the GPS constellation and its principle of operation. Familiarity of GDOP and different types of DOPs
EC 452.2	Derive concepts of different Coordinate systems - WGS-84, IGS, ECI, ECEF and various error sources in GPS and to minimize or overcome these errors.
EC 452.3	Derive the GPS signal structure and its C/A and P Codes associated with. Enumerate different applications of GPS.
EC 452.4	Demonstrate the various types of GPS augmentation systems and architecture of GAGAN and familiarity the concept of Local area augmentation system.
EC 452.5	Conceptualize the modernization of GPS and other satellite navigation systems with GPS integration
EC 452.6	Analyze the GPS constellation and its principle of operation. Familiarity of GDOP and different types of DOPs

Elective-III	
Course Name: Speech Processing	Course number: EC453

Code No.	Student should be able to
EC453.1	Associate the mechanism of speech production to the source filter model of speech production for various speech sounds and interpret the speech analysis techniques.
EC453.2	Comprehend feature extraction of speech such as voiced/unvoiced decision and pitch extraction using various algorithms like Rabiner and Gold, SIFT.
EC453.3	Classify the terminal analogue speech synthesizers and articulatory speech synthesizer.
EC453.4	Infer and apply various coding techniques for speech like Sub-band coding, Transform coding to achieve low bit rates.
EC453.5	Annotate the model for speech recognition system and compare the Dynamic time warping with hidden Markova models.

Course Name: General Seminar	Course number: EC481
CO	Student should be able to
EC481.1	Carryout Literature survey in the area of interest.
EC481.2	Survey the recent advancements in the identified area
EC481.3	Demonstrate an Understanding and discuss the problem within group and to arrive at possible solutions
EC481.4	Develop interpersonal skills, presentation skills, soft skills and creativity
EC481.5	Prepare Technical reports
EC481.6	Demonstrate the qualities and attitudes of a professional engineer for forming a team

Course Name: PROJECT	Course number: EC 482
Code No.	Statement ; Students should be able to
EC 482.1	Review acquired technical knowledge on the selected topic
EC 482.2	Undertake problem identification, formulation and find optimal solution
EC 482.3	Identify suitable hardware and software requirements and design engineering solution to complex problems utilizing a systematic approach. Design & Automation tools.
EC 482.4	Conduct an Engineering project using the state of art hardware and Electronics
EC 482.5	Exhibit team work and Communicate with Engineers and the community at large.
EC 482.6	Prepare project report/thesis

MVSR ENGINEERING COLLEGE
DEPARTMENT OF E.C.E

Academic Year 2017-18

M.E. 1 Year

COURSE NAME : Micro Controllers for Embedded System Design. COURSE CODE: EC 601	
Code No.	Statement
EC601.1	Understand the features of embedded system and use the hardware and software components to meet the challenges and design issues of embedded system.
EC601.2	Conceptualize the architectural features of PIC microcontrollerand its on-chip peripherals.
EC601.3	Identify the features of ARM Core and analyse the ARM instruction set
EC601.4	Understand the Thumb instruction set and memory management features of ARM core
EC601.5	Extend the knowledge of microcontrollers to develop and debug embedded system.

COURSE NAME : VLSI Design and Technology. COURSE CODE: EC 602	
Code No.	Statement
EC 602.1	Explain the structure and operation of MOS transistor and analyse the perforamance of CMOS and Bipolar inverters
EC 602.2	Design CMOS based Combinational and sequential logic circuits
EC 602.3	Demonstrate Lambda based design rules and design layouts
EC 602.4	Illustrate the Data path and Semiconductor Memory Designs
EC 602.5	Comprehend various Interconnect designs

COURSE NAME :Analog IC Design . COURSE CODE: EC 603	
Code No.	Statement
EC 603.1	Understand the basic concepts of CMOS circuits to analyze and design current sources/sinks/mirrors
EC 603.2	Describe the low-frequency characteristics of single-stage amplifiers , differential amplifiers and band gap reference circuits.
EC 603.3	Understand the concepts of OPAMPs and its characteristics.
EC 603.4	Analyze the operation of comparators and various oscillators.
EC 603.5	Emphasize the concepts of switched capacitor circuits

COURSE NAME: Real Time Operating Systems. COURSE CODE: EC 604	
Code No.	Statement
EC 604.1	Describe the features of UNIX operating system and differentiate between UNIX and POSIX.

EC 604.2	Differentiate between Hard and Soft Real time systems and familiarize with classical Uni-processor scheduling algorithms
EC 604.3	Understand the concepts of Real time operating systems and analyze the Inter process communication.
EC 604.4	Explain the features of VxWorks and compare the commercially available RTOS's
EC 604.5	Understand the debugging tools and cross development environment.

COURSE NAME: Digital IC Design COURSE CODE: EC 605	
Code No.	Statement
EC 605.1	Analyze modeling of sequential digital systems and minimize the finite state machines.
EC 605.2	Design and implement synchronous sequential circuits.
EC 605.3	Design and implement asynchronous sequential circuits.
EC 605.4	Comprehend the features of sample and hold circuits and apply them to design Nyquist rate data converter circuits.
EC 605.5	Analyze and design oversampling rate data converter circuits

COURSE NAME: VLSI Physical Design COURSE CODE: EC 606	
Code No.	Statement
EC 606.1	Identify the basic structures of VLSI components.
EC 606.2	Understand the concepts of physical design
EC 606.3	Analyze stick diagrams and apply lambda based design rules to draw layout diagrams
EC 606.4	Comprehend the basic cell layout design and system level physical design.
EC 606.5	Understand the CAD tools for modeling and extraction of circuit parameters.

Course Name: Low Power VLSI Design Course Code: EC 621	
Code No.	Statement
EC621.1	Understand the need for low power design and different strategies for low power.
EC621.2	Estimate the Power at various levels of abstraction.
EC621.3	Optimize the power at various levels of the design using power optimization techniques.
EC621.4	Describe the energy recovery circuit design
EC621.5	Estimate the software design for low power.

Course Name: Digital System Design . Course Code: EC 502	
Code No.	Statement
EC 502.1	Design the various digital systems using PLDs and sequential circuits design and conversion between Mealy and Moore machines.
EC 502.2	Identify the merits and demerits of synchronous and asynchronous sequential machines and Designs hazard free logic circuits.
EC 502.3	Draw ASM chart for various digital systems and design the digital logic for the given sequential machine.
EC 502.4	Generate the test vectors by locating the fault in the given combinational circuit.
EC 502.5	Understand various test approaches and design of fault detection experiment.

COURSE NAME: Digital Signal Processors Course Code: EC 506	
Code No.	Statement
EC 506.1	Determine DFT using direct and FFT methods. Analyze Circular and Linear convolution, and apply for linear filtering.
EC 506.2	Compute the errors in DSP System Design & Suggest to Design the Accurate DSP Systems.
EC 506.3	Discuss the Architectural features of programmable DSP devices & Implement various functional units of DSP Systems.
EC 506.4	Compare & Comprehend the features of Texas based fixed-point & floating-point DSP Processors.
EC 506.5	Understand various interfacing signals & interface memory and parallel I/O Peripherals to Programmable DSP Devices.

Course Name: Advanced Digital Design with Verilog HDL Course Code: EC 521	
Code No.	Statement
EC 521.1	Describe the various modelling styles of Verilog HDL modules.
EC 521.2	Design Combinational, Sequential logic circuit models and Finite State Machines.
EC 521.3	Understand and implement the complete design flow of FPGA's and ASIC's.
EC 521.4	Discuss functional verification and timing analysis.

EC 521.5	Design various functional units of a CPU.

Course Name: Field Programmable Gate Arrays.	Course Code: EC 522
Code No.	Statement
EC 522.1	Understand the design flow of ASICs and identify the implementation tools required for simulation and synthesis of FPGA Design
EC 522.2	Describe the architecture of FPGA's.
EC 522.3	Explain the physical design of FPGA's and CAD tools for low level design entry.
EC 522.4	Estimate the placement & routing algorithms .
EC 522.5	Validate the digital design and discuss the general design issues.

Course Name: Global and Regional Navigational Satellite Systems. Course Code: EC 530	
Code No.	Statement
EC 530.1	Familiarize with the GNSS fundamentals and GPS architecture.
EC 530.2	Describe the different types of GNSS Signals and GNSS Datum.
EC 530.3	Analyze the GPS errors and their modeling techniques.
EC 530.4	Understanding various GPS data processing and GPS integration techniques.
EC 530.5	Conceptualize the augmentation systems and regional navigation satellite systems.

COURSE NAME: Design and Simulation Lab-1 COURSE CODE: EC 607 COURSE CODE: PC351EC	
Code No.	Statement
EC607.1	Draw the designs using schematic editor and simulate them using Mentor Graphics EDA tool
EC607.2	Simulate combinational and sequential circuits using Verilog HDL.
EC607.3	Simulate and analyze DC, AC and Transient response of Amplifier circuits using different types of current mirrors.
EC607.4	Use the IDE tool effectively for developing and executing the programs on ARM Microcontroller kit.
EC607.5	Interface devices like LCD, and Stepper Motor to LPC2148 and program them accordingly.

COURSE NAME: Design and Simulation Lab-II COURSE CODE: EC 608 COURSE CODE: PC351EC	
Code No.	**Statement**
EC 608.1	Use the Mentor Graphics EDA tool effectively for synthesizing various analog and digital circuits.
EC 608.2	Draw layouts of logic gates (NOT,NAND,NOR) and perform DRC ,LVS and RC extractions.
EC 608.3	Synthesize and perform physical design of various combinational and sequential circuits.
EC 608.4	Understand the concept of file system calls and process system calls by programming in UNIX operating system
EC 608.5	Simulate the timing concepts, scheduling algorithms and semaphores using VxWorks

Course Name: Seminar-I Course Code: EC 609	
Code No.	**Statement**
EC609.1	Identify possible technical advancements in the field of Embedded Systems and VLSI design.
EC609.2	Carryout Literature survey in the research problem related to specialisation
EC609.3	Demonstrate an understanding of the evolution of the technology and possible future trends of the chosen topic
EC609.4	Prepare and organize the technical presentation exhibiting soft skills and creativity
EC609.5	Make oral presentation to Develop interpersonal & presentation skills.
EC609.6	Prepare technical report employing elements of good technical writing, and critical thinking.

Course Name: Seminar-II Course Code: EC 610	
Code No.	**Statement**
EC610.1	Identify possible technical advancements in the field of Embedded Systems and VLSI design.
EC610.2	Carryout Literature survey in the research problem related to specialisation
EC610.3	Demonstrate an understanding of the evolution of the technology and possible future trends of the chosen topic
EC610.4	Prepare and organize the technical presentation exhibiting soft skills and creativity
EC610.5	Make oral presentation to Develop interpersonal & presentation skills.
EC610.6	Prepare technical report employing elements of good technical writing, and critical thinking.

Course Name: Project Seminar	Course Code: EC 611
Code No.	**Statement**
EC611.1	Carryout Literature survey in the area of interest.
EC611.2	Survey the recent advancements in the identified area
EC611.3	Demonstrate an Understanding and discuss the problem to arrive at possible solutions
EC611.4	Develop interpersonal, presentation, soft skills and creativity
EC611.5	Prepare a technical report covering the problem definition, related literature analysis of the problem and methodology proposed to carry out the work.
EC611.6	Demonstrate the qualities and attitudes of a professional engineer for forming a team

Course Name: Dissertation	Course Code: EC 612
Code No.	**Statement**
EC 612.1	Review acquired technical knowledge on the selected topic
EC 612.2	Undertake problem identification, formulate and find optimal solution
EC 612.3	Identify suitable hardware and software requirements and design engineering solution to complex problems utilizing a systematic approach.
EC 612.4	Conduct an Engineering project using the state of art hardware and Electronic Design & Automation tools.
EC 612.5	Exhibit team work and Communicate with Engineers and the community at large.
EC 612.6	Prepare project report/thesis

MVSR ENGINEERING COLLEGE **DEPARTMENT OF E.C.E**
Academic Year 2016-17
M.E. 1 Year

COURSE NAME : Micro Controllers for Embedded System Design. COURSE CODE: EC 601	
Code No.	**Statement**
EC601.1	Understand the features of embedded system and use the hardware and software components to meet the challenges and design issues of embedded system.
EC601.2	Conceptualize the architectural features of PIC microcontrollerand its on-chip peripherals.

EC601.3	Identify the features of ARM Core and analyse the ARM instruction set
EC601.4	Understand the Thumb instruction set and memory management features of ARM core
EC601.5	Extend the knowledge of microcontrollers to develop and debug embedded system.

COURSE NAME : VLSI Design and Technology. COURSE CODE: EC 602	
Code No.	Statement
EC 602.1	Explain the structure and operation of MOS transistor and analyse the perforamance of CMOS and Bipolar inverters
EC 602.2	Design CMOS based Combinational and sequential logic circuits
EC 602.3	Demonstrate Lambda based design rules and design layouts
EC 602.4	Illustrate the Data path and Semiconductor Memory Designs
EC 602.5	Comprehend various Interconnect designs

COURSE NAME :Analog IC Design . COURSE CODE: EC 603	
Code No.	Statement
EC 603.1	Understand the basic concepts of CMOS circuits to analyze and design current sources/sinks/mirrors
EC 603.2	Describe the low-frequency characteristics of single-stage amplifiers , differential amplifiers and band gap reference circuits.
EC 603.3	Understand the concepts of OPAMPs and its characteristics.
EC 603.4	Analyze the operation of comparators and various oscillators.
EC 603.5	Emphasize the concepts of switched capacitor circuits

COURSE NAME: Real Time Operating Systems. COURSE CODE: EC 604	
Code No.	Statement
EC 604.1	Describe the features of UNIX operating system and differentiate between UNIX and POSIX.
EC 604.2	Differentiate between Hard and Soft Real time systems and familiarize with classical Uni-processor scheduling algorithms
EC 604.3	Understand the concepts of Real time operating systems and analyze the Inter process communication.
EC 604.4	Explain the features of VxWorks and compare the commercially available RTOS's
EC 604.5	Understand the debugging tools and cross development environment.

COURSE NAME: Digital IC Design COURSE CODE: EC 605	

Code No.	Statement
EC 605.1	Analyze modeling of sequential digital systems and minimize the finite state machines.
EC 605.2	Design and implement synchronous sequential circuits.
EC 605.3	Design and implement asynchronous sequential circuits.
EC 605.4	Comprehend the features of sample and hold circuits and apply them to design Nyquist rate data converter circuits.
EC 605.5	Analyze and design oversampling rate data converter circuits

COURSE NAME: VLSI Physical Design COURSE CODE: EC 606	
Code No.	Statement
EC 606.1	Identify the basic structures of VLSI components.
EC 606.2	Understand the concepts of physical design
EC 606.3	Analyze stick diagrams and apply lambda based design rules to draw layout diagrams
EC 606.4	Comprehend the basic cell layout design and system level physical design.
EC 606.5	Understand the CAD tools for modeling and extraction of circuit parameters.

Course Name: Low Power VLSI Design Course Code: EC 621	
Code No.	Statement
EC621.1	Understand the need for low power design and different strategies for low power.
EC621.2	Estimate the Power at various levels of abstraction.
EC621.3	Optimize the power at various levels of the design using power optimization techniques.
EC621.4	Describe the energy recovery circuit design
EC621.5	Estimate the software design for low power.

Course Name:Digital System Design . Course Code: EC 502	
Code No.	Statement
EC 502.1	Design the various digital systems using PLDs and sequential circuits design and conversion between Mealy and Moore machines.
EC 502.2	Identify the merits and demerits of synchronous and asynchronous sequential machines and Designs hazard free logic circuits.

EC 502.3	Draw ASM chart for various digital systems and design the digital logic for the given sequential machine.
EC 502.4	Generate the test vectors by locating the fault in the given combinational circuit.
EC 502.5	Understand various test approaches and design of fault detection experiment.

COURSE NAME: Digital Signal Processors course code:EC 506	
Code No.	Statement
EC 506.1	Determine DFT using direct and FFT methods. Analyze Circular and Linear convolution, and apply for linear filtering.
EC 506.2	Compute the errors in DSP System Design & Suggest to Design the Accurate DSP Systems.
EC 506.3	Discuss the Architectural features of programmable DSP devices & Implement various functional units of DSP Systems.
EC 506.4	Compare & Comprehend the features of Texas based fixed-point & floating-point DSP Processors.
EC 506.5	Understand various interfacing signals & interface memory and parallel I/O Peripherals to Programmable DSP Devices.
EC 520.4	Discuss I/O Interfacing concepts.
EC 520.5	Demonstrate the challenges & Limtations of Instruction Level Parrallelism.

Course Name: Advanced Computer Organisation Course Code:EC 520	
Code No.	Statement
EC 520.1	Comprehend the organization of the CPU and data path design.
EC 520.2	Understand the concepts of Hardwired and Micro programmed Control Unit design of general purpose computer
EC 520.3	Describe the memory organization and hierarchy.
EC 520.4	Discuss I/O Interfacing concepts.
EC 520.5	Describe the challenges & Limtations of Instruction Level Parallelism

Course Name: Advanced Digital Design with Verilog HDL Course Code: EC 521	

Code No.	Statement
EC 521.1	Describe the various modelling styles of Verilog HDL modules.
EC 521.2	Design Combinational, Sequential logic circuit models and Finite State Machines.
EC 521.3	Understand and implement the complete design flow of FPGA's and ASIC's.
EC 521.4	Discuss functional verification and timing analysis.
EC 521.5	Design various functional units of a CPU.
EC 522.4	Estimate the placement & routing algorithms .
EC 522.5	Validate the digital design and discuss the general design issues.

Course Name: Field Programmable Gate Arrays. Course Code: EC 522	
Code No.	Statement
EC 522.1	Understand the design flow of ASICs and identify the implementation tools required for simulation and synthesis of FPGA Design
EC 522.2	Describe the architecture of FPGA's.
EC 522.3	Explain the physical design of FPGA's and CAD tools for low level design entry.
EC 522.4	Estimate the placement & routing algorithms .
EC 522.5	Validate the digital design and discuss the general design issues.

COURSE NAME: Design and Simulation Lab-1 COURSE CODE: EC 607 COURSE CODE: PC351EC	
Code No.	Statement
EC607.1	Draw the designs using schematic editor and simulate them using Mentor Graphics EDA tool
EC607.2	Simulate combinational and sequential circuits using Verilog HDL.
EC607.3	Simulate and analyze DC, AC and Transient response of Amplifier circuits using different types of current mirrors.
EC607.4	Use the IDE tool effectively for developing and executing the programs on ARM Microcontroller kit.
EC607.5	Interface devices like LCD, and Stepper Motor to LPC2148 and program them accordingly.

COURSE NAME: Design and Simulation Lab-II COURSE CODE: EC 608 COURSE CODE: PC351EC	
Code No.	Statement
EC 608.1	Use the Mentor Graphics EDA tool effectively for synthesizing various analog

	and digital circuits.
EC 608.2	Draw layouts of logic gates (NOT,NAND,NOR) and perform DRC ,LVS and RC extractions.
EC 608.3	Synthesize and perform physical design of various combinational and sequential circuits.
EC 608.4	Understand the concept of file system calls and process system calls by programming in UNIX operating system
EC 608.5	Simulate the timing concepts, scheduling algorithms and semaphores using VxWorks

Course Name: Seminar-I	Course Code: EC 609
Code No.	**Statement**
EC609.1	Identify possible technical advancements in the field of Embedded Systems and VLSI design.
EC609.2	Carryout Literature survey in the research problem related to specialisation
EC609.3	Demonstrate an understanding of the evolution of the technology and possible future trends of the chosen topic
EC609.4	Prepare and organize the technical presentation exhibiting soft skills and creativity
EC609.5	Make oral presentation to Develop interpersonal & presentation skills.
EC609.6	Prepare technical report employing elements of good technical writing, and critical thinking.

Course Name: Seminar-II	Course Code: EC 610
Code No.	**Statement**
EC610.1	Identify possible technical advancements in the field of Embedded Systems and VLSI design.
EC610.2	Carryout Literature survey in the research problem related to specialisation
EC610.3	Demonstrate an understanding of the evolution of the technology and possible future trends of the chosen topic
EC610.4	Prepare and organize the technical presentation exhibiting soft skills and creativity
EC610.5	Make oral presentation to Develop interpersonal & presentation skills.
EC610.6	Prepare technical report employing elements of good technical writing, and critical thinking.

Course Name: Project Seminar	Course Code: EC 611
Code No.	**Statement**
EC611.1	Carryout Literature survey in the area of interest.
EC611.2	Survey the recent advancements in the identified area

EC611.3	Demonstrate an Understanding and discuss the problem to arrive at possible solutions
EC611.4	Develop interpersonal, presentation, soft skills and creativity
EC611.5	Prepare a technical report covering the problem definition, related literature analysis of the problem and methodology proposed to carry out the work.
EC611.6	Demonstrate the qualities and attitudes of a professional engineer for forming a team

Course Name: Dissertation	Course Code: EC 612
Code No.	**Statement**
EC 612.1	Review acquired technical knowledge on the selected topic
EC 612.2	Undertake problem identification, formulate and find optimal solution
EC 612.3	Identify suitable hardware and software requirements and design engineering solution to complex problems utilizing a systematic approach.
EC 612.4	Conduct an Engineering project using the state of art hardware and Electronic Design & Automation tools.
EC 612.5	Exhibit team work and Communicate with Engineers and the community at large.
EC 612.6	Prepare project report/thesis

Academic Year 2015-16
M.E. 1 Year

COURSE NAME : Micro Controllers for Embedded System Design. COURSE CODE: EC 601	
Code No.	**Statement**
EC601.1	Understand the features of embedded system and use the hardware and software components to meet the challenges and design issues of embedded system.
EC601.2	Conceptualize the architectural features of PIC microcontrollerand its on-chip peripherals.
EC601.3	Identify the features of ARM Core and analyse the ARM instruction set
EC601.4	Understand the Thumb instruction set and memory management features of ARM core
EC601.5	Extend the knowledge of microcontrollers to develop and debug embedded system.

COURSE NAME : VLSI Design and Technology.	COURSE CODE: EC 602

Code No.	Statement
EC 602.1	Explain the structure and operation of MOS transistor and analyse the performance of CMOS and Bipolar inverters
EC 602.2	Design CMOS based Combinational and sequential logic circuits
EC 602.3	Demonstrate Lambda based design rules and design layouts
EC 602.4	Illustrate the Data path and Semiconductor Memory Designs
EC 602.5	Comprehend various Interconnect designs

COURSE NAME :Analog IC Design .	COURSE CODE: EC 603

Code No.	Statement
EC 603.1	Understand the basic concepts of CMOS circuits to analyze and design current sources/sinks/mirrors
EC 603.2	Describe the low-frequency characteristics of single-stage amplifiers , differential amplifiers and band gap reference circuits.
EC 603.3	Understand the concepts of OPAMPs and its characteristics.
EC 603.4	Analyze the operation of comparators and various oscillators.
EC 603.5	Emphasize the concepts of switched capacitor circuits

COURSE NAME: Real Time Operating Systems.	COURSE CODE: EC 604

Code No.	Statement
EC 604.1	Describe the features of UNIX operating system and differentiate between UNIX and POSIX.
EC 604.2	Differentiate between Hard and Soft Real time systems and familiarize with classical Uni-processor scheduling algorithms
EC 604.3	Understand the concepts of Real time operating systems and analyze the Inter process communication.
EC 604.4	Explain the features of VxWorks and compare the commercially available RTOS's
EC 604.5	Understand the debugging tools and cross development environment.

COURSE NAME: Digital IC Design	COURSE CODE: EC 605

Code No.	Statement
EC 605.1	Analyze modeling of sequential digital systems and minimize the finite state machines.
EC 605.2	Design and implement synchronous sequential circuits.
EC 605.3	Design and implement asynchronous sequential circuits.
EC 605.4	Comprehend the features of sample and hold circuits and apply them to design Nyquist rate data converter circuits.

EC 605.5	Analyze and design oversampling rate data converter circuits

COURSE NAME: VLSI Physical Design COURSE CODE: EC 606	
Code No.	Statement
EC 606.1	Identify the basic structures of VLSI components.
EC 606.2	Understand the concepts of physical design
EC 606.3	Analyze stick diagrams and apply lambda based design rules to draw layout diagrams
EC 606.4	Comprehend the basic cell layout design and system level physical design.
EC 606.5	Understand the CAD tools for modeling and extraction of circuit parameters.

Course Name: Low Power VLSI Design Course Code: EC 621	
Code No.	Statement
EC621.1	Understand the need for low power design and different strategies for low power.
EC621.2	Estimate the Power at various levels of abstraction.
EC621.3	Optimize the power at various levels of the design using power optimization techniques.
EC621.4	Describe the energy recovery circuit design
EC621.5	Estimate the software design for low power.

Course Name: Scripting Languages for VLSI Design Automation. Course Code: EC 623	
Code No.	Statement
EC623.1	Apply basic commands in Linux and perform operations on files and directories.
EC623.2	Exercise on various language constructs of PERL scripting like pattern matching, statements and declarations.
EC623.3	Employ subroutines and data structures in Perl programming.
EC623.4	Use Perl debugger commands and exercise advanced Perl programming concepts.
EC623.5	Understand broad features of other scripting languages like TCL, JAVA SCRIPT and VB SCRIPT.

COURSE NAME: Digital Signal Processors

course code:EC 506	
Code No.	**Statement**
EC 506.1	Determine DFT using direct and FFT methods. Analyze Circular and Linear convolution, and apply for linear filtering.
EC 506.2	Compute the errors in DSP System Design & Suggest to Design the Accurate DSP Systems.
EC 506.3	Discuss the Architectural features of programmable DSP devices & Implement various functional units of DSP Systems.
EC 506.4	Compare & Comprehend the features of Texas based fixed-point & floating-point DSP Processors.
EC 506.5	Understand various interfacing signals & interface memory and parallel I/O Peripherals to Programmable DSP Devices.

Course Name: Advanced Digital Design with Verilog HDL Course Code: EC 521	
Code No.	**Statement**
EC 521.1	Describe the various modelling styles of Verilog HDL modules.
EC 521.2	Design Combinational, Sequential logic circuit models and Finite State Machines.
EC 521.3	Understand and implement the complete design flow of FPGA's and ASIC's.
EC 521.4	Discuss functional verification and timing analysis.
EC 521.5	Design various functional units of a CPU.

Course Name: Field Programmable Gate Arrays. Course Code: EC 522	
Code No.	**Statement**
EC 522.1	Understand the design flow of ASICs and identify the implementation tools required for simulation and synthesis of FPGA Design
EC 522.2	Describe the architecture of FPGA's.
EC 522.3	Explain the physical design of FPGA's and CAD tools for low level design entry.
EC 522.4	Estimate the placement & routing algorithms .
EC 522.5	Validate the digital design and discuss the general design issues.

Course Name: Global and Regional Navigational Satellite Systems.   Course Code:

EC 530	
Code No.	Statement
EC 530.1	Familiarize with the GNSS fundamentals and GPS architecture.
EC 530.2	Describe the different types of GNSS Signals and GNSS Datum.
EC 530.3	Analyze the GPS errors and their modeling techniques.
EC 530.4	Understanding various GPS data processing and GPS integration techniques.
EC 530.5	Conceptualize the augmentation systems and regional navigation satellite systems.

COURSE NAME: Design and Simulation Lab-1 COURSE CODE: EC 607 COURSE CODE: PC351EC	
Code No.	Statement
EC607.1	Draw the designs using schematic editor and simulate them using Mentor Graphics EDA tool
EC607.2	Simulate combinational and sequential circuits using Verilog HDL.
EC607.3	Simulate and analyze DC, AC and Transient response of Amplifier circuits using different types of current mirrors.
EC607.4	Use the IDE tool effectively for developing and executing the programs on ARM Microcontroller kit.
EC607.5	Interface devices like LCD, and Stepper Motor to LPC2148 and program them accordingly.

COURSE NAME: Design and Simulation Lab-II COURSE CODE: EC 608 COURSE CODE: PC351EC	
Code No.	Statement
EC 608.1	Use the Mentor Graphics EDA tool effectively for synthesizing various analog and digital circuits.
EC 608.2	Draw layouts of logic gates (NOT,NAND,NOR) and perform DRC ,LVS and RC extractions.
EC 608.3	Synthesize and perform physical design of various combinational and sequential circuits.
EC 608.4	Understand the concept of file system calls and process system calls by programming in UNIX operating system
EC 608.5	Simulate the timing concepts, scheduling algorithms and semaphores using VxWorks

Course Name: Seminar-I   Course Code: EC 609

Code No.	Statement
EC609.1	Identify possible technical advancements in the field of Embedded Systems and VLSI design.
EC609.2	Carryout Literature survey in the research problem related to specialisation
EC609.3	Demonstrate an understanding of the evolution of the technology and possible future trends of the chosen topic
EC609.4	Prepare and organize the technical presentation exhibiting soft skills and creativity
EC609.5	Make oral presentation to Develop interpersonal & presentation skills.
EC609.6	Prepare technical report employing elements of good technical writing, and critical thinking.

Course Name: Seminar-II	Course Code: EC 610
Code No.	**Statement**
EC610.1	Identify possible technical advancements in the field of Embedded Systems and VLSI design.
EC610.2	Carryout Literature survey in the research problem related to specialisation
EC610.3	Demonstrate an understanding of the evolution of the technology and possible future trends of the chosen topic
EC610.4	Prepare and organize the technical presentation exhibiting soft skills and creativity
EC610.5	Make oral presentation to Develop interpersonal & presentation skills.
EC610.6	Prepare technical report employing elements of good technical writing, and critical thinking.

Course Name: Project Seminar	Course Code: EC 611
Code No.	**Statement**
EC611.1	Carryout Literature survey in the area of interest.
EC611.2	Survey the recent advancements in the identified area
EC611.3	Demonstrate an Understanding and discuss the problem to arrive at possible solutions
EC611.4	Develop interpersonal, presentation, soft skills and creativity
EC611.5	Prepare a technical report covering the problem definition, related literature analysis of the problem and methodology proposed to carry out the work.
EC611.6	Demonstrate the qualities and attitudes of a professional engineer for forming a team

Course Name: Dissertation	Course Code: EC 612
Code No.	**Statement**
EC 612.1	Review acquired technical knowledge on the selected topic

EC 612.2	Undertake problem identification, formulate and find optimal solution
EC 612.3	Identify suitable hardware and software requirements and design engineering solution to complex problems utilizing a systematic approach.
EC 612.4	Conduct an Engineering project using the state of art hardware and Electronic Design & Automation tools.
EC 612.5	Exhibit team work and Communicate with Engineers and the community at large.
EC 612.6	Prepare project report/thesis

Academic Year 2014-15
M.E.

COURSE NAME : Micro Controllers for Embedded System Design. COURSE CODE: EC 503	
Code No.	**Statement**
EC503.1	Understand the features of embedded system and use the hardware and software components to meet the challenges and design issues of embedded system.
EC503.2	Explain the architectural features of 8051 and interface ADC, DAC, Stepper Motor, LCD
EC503.3	Conceptualize the architectural features of PIC microcontrollerand its on-chip peripherals.
EC503.4	Describe te concepts of Embedded software development tools.
EC503.5	Extend the knowledge of microcontrollers to develop and debug embedded system.

COURSE NAME: Digital IC Design COURSE CODE: EC 631	
Code No.	**Statement**
EC 631.1	Design Building blocks for digital design
EC 631.2	Write codes using various Hardware Description Languages
EC 631.3	Illustrate BJT based logic gates Demonstrate Lambda based design rules and design layouts
EC 631.4	Explain various logics of CMOS Circuits
EC 631.5	Design FSMs for various applications

COURSE NAME: Analog and Mixed Signal IC Design COURSE CODE: EC 632	
Code No.	**Statement**
EC 632.1	Understand the basic concepts of CMOS circuits, analyze and design current sources/sinks/mirrors and band gap reference circuits

EC 632.2	Analyze low-frequency characteristics of single-stage amplifiers , differential amplifiers .
EC 632.3	Describe the operation of OPAMPs and its characteristics.
EC 632.4	Appreciate the importance of switched capacitors, sample and hold circuits.
EC 632.5	Explain the operation of various A/D and D/A converters .
EC 632.6	Analyze the concept of oversampling data conversion and PLL .

COURSE NAME: Principles of VLSI System Design. COURSE CODE: EC 633	
Code No.	**Statement**
EC 633.1	Understand the VLSI System Design , technology implications and chip cost.
EC 633.2	Characterize and estimate the performance of Static & Dynamic CMOS circuits.
EC 633.3	Illustrate the CMOS design methods and chip design options.
EC 633.4	Design of CMOS Subsystem arithmetic circuits and memory elements.
EC 633.5	Demonstrate the core of RISC Micro Controller ALU address architectures.

COURSE NAME: VLSI Physical Design COURSE CODE: EC634	
Code No.	**Statement**
EC634.1	Identify the basic structures of VLSI components.
EC634.2	Understand the concepts of physical design
EC634.3	Analyze stick diagrams and apply lambda based design rules to draw layout diagrams
EC634.4	Comprehend the basic cell layout design and system level physical design.
EC634.5	Understand the CAD tools for modeling and extraction of circuit parameters.

COURSE NAME: Real Time Operating Systems. COURSE CODE: EC635	
Code No.	**Statement**
EC 635.1	Describe the features of UNIX operating system and differentiate between UNIX and POSIX.
EC 635.2	Differentiate between Hard and Soft Real time systems and familiarize with classical Uni-processor scheduling algorithms
EC 635.3	Understand the concepts of Real time operating systems and analyze the Inter process communication.
EC 635.4	Explain the features of VxWorks and compare the commercially available RTOS's
EC 635.5	Understand the debugging tools and cross development environment.

COURSE NAME: Design and Simulation Laboratory-1   COURSE CODE: EC 637-1 COURSE CODE: PC351EC

Code No.	Statement
EC637-1.1	Study the CADENCE tools effectively for designing and simulating the circuits.
EC637-1.2	Simulate Various logic gates (NOT,NAND,NOR) and various combinational and sequential circuits using Verilog HDL.
EC637-1.3	Simulate and analyze DC, AC and Transient response of Amplifier circuits using various current mirrors.
EC637-1.4	Use the IDE tool effectively for developing and executing the programs using 8051.
EC637-1.5	Interface devices like ADC, DAC, LCD, and Stepper Motor to 8051

COURSE NAME: Design and Simulation Laboratory-II COURSE CODE: EC 637-2 COURSE CODE: PC351EC	
Code No.	Statement
EC 637-2.1	Use the CADENCE tools effectively for synthesizing various analog and digital circuits.
EC 637-2.2	Draw layouts of logic gates (NOT,NAND,NOR) and perform DRC ,LVS and RC extractions.
EC 637-2.3	Synthesize and perform physical design of various combinational and sequential circuits.
EC 637-2.4	Understand the concept of file system calls and process system calls by programming in UNIX operating system
EC 637-2.5	Simulate the timing concepts, scheduling algorithms and semaphores using VxWorks

Course Name: Seminar-I Course number: EC 638-1	
Code No.	Statement
EC638-1.1	Identify possible technical advancements in the field of Embedded Systems and VLSI design.
EC638-1.2	Carryout Literature survey in the research problem related to specialisation
EC638-1.3	Demonstrate an understanding of the evolution of the technology and possible future trends of the chosen topic
EC638-1.4	Prepare and organize the technical presentation exhibiting soft skills and creativity
EC638-1.5	Make oral presentation to Develop interpersonal & presentation skills.
EC638-1.6	Prepare technical report employing elements of good technical writing, and critical thinking.

Course Name: Seminar-II   Course Code: EC 638-2

Code No.	Statement
EC638-2.1	Identify possible technical advancements in the field of Embedded Systems and VLSI design.
EC638-2.2	Carryout Literature survey in the research problem related to specialisation
EC638-2.3	Demonstrate an understanding of the evolution of the technology and possible future trends of the chosen topic
EC638-2.4	Prepare and organize the technical presentation exhibiting soft skills and creativity
EC638-2.5	Make oral presentation to Develop interpersonal & presentation skills.
EC638-2.6	Prepare technical report employing elements of good technical writing, and critical thinking.

Course Name: Project Seminar   Course Code: EC 638-3

Code No.	Statement
EC638-3.1	Carryout Literature survey in the area of interest.
EC638-3.2	Survey the recent advancements in the identified area
EC638-3.3	Demonstrate an Understanding and discuss the problem to arrive at possible solutions
EC638-3.4	Develop interpersonal, presentation, soft skills and creativity
EC638-3.5	Prepare a technical report covering the problem definition, related literature analysis of the problem and methodology proposed to carry out the work.
EC638-3.6	Demonstrate the qualities and attitudes of a professional engineer for forming a team

Course Name: Dissertation   Course Code: EC 639

Code No.	Statement
EC 639.1	Review acquired technical knowledge on the selected topic
EC 639.2	Undertake problem identification, formulate and find optimal solution
EC 639.3	Identify suitable hardware and software requirements and design engineering solution to complex problems utilizing a systematic approach.
EC 639.4	Conduct an Engineering project using the state of art hardware and Electronic Design & Automation tools.
EC 639.5	Exhibit team work and Communicate with Engineers and the community at large.
EC 639.6	Prepare project report/thesis

Course Name:CPLD & FPGA Architectures and Applications.   Course number: EC 640

Code No.	Statement

Code No.	Statement
EC 640.1	Describe and use different programmable logic devices and programming technologies.
EC 640.2	Discuss the architectures of XILINX, Altera and Actel FPGA's .
EC 640.3	Describe the architecture of Altera ,Flex Logic, AT & T and Cypress CPLD's.
EC 640.4	Familiarize with different Placement and Routing algorithms, Routability estimation, net delays.
EC 640.5	Familiarization and expertise in using the front end and back end tools for FPGA and ASIC's.

Course Name: DSP Processors -Architecture .	Course number: EC 641
Code No.	Statement
EC 641.1	Determine DFT using direct and FFT methods. Analyze Circular and Linear convolution, and apply for linear filtering.
EC 641.2	Compute the errors in DSP System Design & Suggest to Design the Accurate DSP Systems.
EC 641.3	Discuss the Architectural features of programmable DSP devices & Implement various functional units of DSP Systems.
EC 641.4	Compare & Comprehend the features of Texas based fixed-point & floating-point DSP Processors.
EC 641.5	Understand various interfacing signals & interface memory and parallel I/O Peripherals to Programmable DSP Devices.

Course Name: Scripting Languages for VLSI Design Automation . Course number: EC645	
Code No.	Statement
EC 645.1	Apply basic commands in Linux and perform operations on files and directories.
EC 645.2	Exercise on various language constructs of PERL scripting like pattern matching, statements and declarations.
EC 645.3	Employ subroutines and data structures in Perl programming.
EC 645.4	Use Perl debugger commands and exercise advanced Perl programming concepts.
EC 645.5	Understand broad features of other scripting languages like TCL, JAVA SCRIPT and VB SCRIPT.

Course Name: Low Power VLSI Design	Course number: EC 648
Code No.	Statement
EC648.1	Understand the need for low power design and different strategies for low power.
EC648.2	Estimate the Power at various levels of abstraction.
EC648.3	Optimize the power at various levels of the design using power optimization

	techniques.
EC648.4	Describe the energy recovery circuit design
EC648.5	Estimate the software design for low power.

Course Name: Data and Computer Communication Networks Course number: EC 504	
Code No.	Statement
EC 504.1	Understand the concepts of data communications using the open Systems interconnect (OSI) model for layered architecture.
EC 504.2	Explain the principles of network protocols and internetworking
EC 504.3	Comprehend the circuit switcvhing and packet switching algorithms.
EC 504.4	Describe the performance of data link layer protocols for error and flow control.
EC 504.5	understand the various routing protocols and network security.

Course Name: Advanced Computer Organisation. Course number: EC 510	
Code No.	Statement
EC 510.1	Comprehend the organization of the CPU and data path design.
EC 510.2	Understand the concepts of Hardwired and Micro programmed Control Unit design of general purpose computer
EC 510.3	Describe the memory organization and hierarchy.
EC 510.4	Discuss I/O Interfacing concepts.
EC 510.5	Describe the challenges & Limtations of Instruction Level Parallelism

Academic Year 2013-14
M.E.

COURSE NAME : Micro Controllers for Embedded System Design. COURSE CODE: EC 503	
Code No.	Statement
EC503.1	Understand the features of embedded system and use the hardware and software components to meet the challenges and design issues of embedded system.
EC503.2	Explain the architectural features of 8051 and interface ADC, DAC, Stepper Motor, LCD
EC503.3	Conceptualize the architectural features of PIC microcontrollerand its on-chip peripherals.
EC503.4	Describe te concepts of Embedded software development tools.
EC503.5	Extend the knowledge of microcontrollers to develop and debug embedded system.

COURSE NAME: Digital IC Design	COURSE CODE: EC 631
Code No.	Statement
EC 631.1	Design Building blocks for digital design
EC 631.2	Write codes using various Hardware Description Languages
EC 631.3	Illustrate BJT based logic gates Demonstrate Lambda based design rules and design layouts
EC 631.4	Explain various logics of CMOS Circuits
EC 631.5	Design FSMs for various applications

COURSE NAME: Analog and Mixed Signal IC Design	COURSE CODE: EC 632
Code No.	Statement
EC 632.1	Understand the basic concepts of CMOS circuits, analyze and design current sources/sinks/mirrors and band gap reference circuits
EC 632.2	Analyze low-frequency characteristics of single-stage amplifiers , differential amplifiers .
EC 632.3	Describe the operation of OPAMPs and its characteristics.
EC 632.4	Appreciate the importance of switched capacitors, sample and hold circuits.
EC 632.5	Explain the operation of various A/D and D/A converters .
EC 632.6	Analyze the concept of oversampling data conversion and PLL .

COURSE NAME: Principles of VLSI System Design.	COURSE CODE: EC 633
Code No.	Statement
EC 633.1	Understand the VLSI System Design , technology implications and chip cost.
EC 633.2	Characterize and estimate the performance of Static & Dynamic CMOS circuits.
EC 633.3	Illustrate the CMOS design methods and chip design options.
EC 633.4	Design of CMOS Subsystem arithmetic circuits and memory elements.
EC 633.5	Demonstrate the core of RISC Micro Controller ALU address architectures.

COURSE NAME: VLSI Physical Design	COURSE CODE: EC634
Code No.	Statement
EC634.1	Identify the basic structures of VLSI components.
EC634.2	Understand the concepts of physical design
EC634.3	Analyze stick diagrams and apply lambda based design rules to draw layout diagrams
EC634.4	Comprehend the basic cell layout design and system level physical design.
EC634.5	Understand the CAD tools for modeling and extraction of circuit parameters.

COURSE NAME: Real Time Operating Systems. COURSE CODE: EC635	
Code No.	**Statement**
EC 635.1	Describe the features of UNIX operating system and differentiate between UNIX and POSIX.
EC 635.2	Differentiate between Hard and Soft Real time systems and familiarize with classical Uni-processor scheduling algorithms
EC 635.3	Understand the concepts of Real time operating systems and analyze the Inter process communication.
EC 635.4	Explain the features of VxWorks and compare the commercially available RTOS's
EC 635.5	Understand the debugging tools and cross development environment.

COURSE NAME: Design and Simulation Laboratory-1 COURSE CODE: EC 637-1 COURSE CODE: PC351EC	
Code No.	**Statement**
EC637-1.1	Study the CADENCE tools effectively for designing and simulating the circuits.
EC637-1.2	Simulate Various logic gates (NOT,NAND,NOR) and various combinational and sequential circuits using Verilog HDL.
EC637-1.3	Simulate and analyze DC, AC and Transient response of Amplifier circuits using various current mirrors.
EC637-1.4	Use the IDE tool effectively for developing and executing the programs using 8051.
EC637-1.5	Interface devices like ADC, DAC, LCD, and Stepper Motor to 8051

COURSE NAME: Design and Simulation Laboratory-II COURSE CODE: EC 637-2 COURSE CODE: PC351EC	
Code No.	**Statement**
EC 637-2.1	Use the CADENCE tools effectively for synthesizing various analog and digital circuits.
EC 637-2.2	Draw layouts of logic gates (NOT,NAND,NOR) and perform DRC ,LVS and RC extractions.
EC 637-2.3	Synthesize and perform physical design of various combinational and sequential circuits.
EC 637-2.4	Understand the concept of file system calls and process system calls by programming in UNIX operating system
EC 637-2.5	Simulate the timing concepts, scheduling algorithms and semaphores using VxWorks

Course Name: Seminar-I	Course number: EC 638-1
Code No.	**Statement**
EC638-1.1	Identify possible technical advancements in the field of Embedded Systems and VLSI design.
EC638-1.2	Carryout Literature survey in the research problem related to specialisation
EC638-1.3	Demonstrate an understanding of the evolution of the technology and possible future trends of the chosen topic
EC638-1.4	Prepare and organize the technical presentation exhibiting soft skills and creativity
EC638-1.5	Make oral presentation to Develop interpersonal & presentation skills.
EC638-1.6	Prepare technical report employing elements of good technical writing, and critical thinking.

Course Name: Seminar-II	Course Code: EC 638-2
Code No.	**Statement**
EC638-2.1	Identify possible technical advancements in the field of Embedded Systems and VLSI design.
EC638-2.2	Carryout Literature survey in the research problem related to specialisation
EC638-2.3	Demonstrate an understanding of the evolution of the technology and possible future trends of the chosen topic
EC638-2.4	Prepare and organize the technical presentation exhibiting soft skills and creativity
EC638-2.5	Make oral presentation to Develop interpersonal & presentation skills.
EC638-2.6	Prepare technical report employing elements of good technical writing, and critical thinking.

Course Name: Project Seminar	Course Code: EC 638-3
Code No.	**Statement**
EC638-3.1	Carryout Literature survey in the area of interest.
EC638-3.2	Survey the recent advancements in the identified area
EC638-3.3	Demonstrate an Understanding and discuss the problem to arrive at possible solutions
EC638-3.4	Develop interpersonal, presentation, soft skills and creativity
EC638-3.5	Prepare a technical report covering the problem definition, related literature analysis of the problem and methodology proposed to carry out the work.
EC638-3.6	Demonstrate the qualities and attitudes of a professional engineer for forming a team

Course Name: Dissertation	Course Code: EC 639
Code No.	**Statement**
EC 639.1	Review acquired technical knowledge on the selected topic
EC 639.2	Undertake problem identification, formulate and find optimal solution
EC 639.3	Identify suitable hardware and software requirements and design engineering solution to complex problems utilizing a systematic approach.
EC 639.4	Conduct an Engineering project using the state of art hardware and Electronic Design & Automation tools.
EC 639.5	Exhibit team work and Communicate with Engineers and the community at large.
EC 639.6	Prepare project report/thesis

Course Name:CPLD & FPGA Architectures and Applications. Course number: EC 640	
Code No.	**Statement**
EC 640.1	Describe and use different programmable logic devices and programming technologies.
EC 640.2	Discuss the architectures of XILINX, Altera and Actel FPGA's .
EC 640.3	Describe the architecture of Altera ,Flex Logic, AT & T and Cypress CPLD's.
EC 640.4	Familiarize with different Placement and Routing algorithms, Routability estimation, net delays.
EC 640.5	Familiarization and expertise in using the front end and back end tools for FPGA and ASIC's.

Course Name: DSP Processors -Architecture . Course number: EC 641	
Code No.	**Statement**
EC 641.1	Determine DFT using direct and FFT methods. Analyze Circular and Linear convolution, and apply for linear filtering.
EC 641.2	Compute the errors in DSP System Design & Suggest to Design the Accurate DSP Systems.
EC 641.3	Discuss the Architectural features of programmable DSP devices & Implement various functional units of DSP Systems.
EC 641.4	Compare & Comprehend the features of Texas based fixed-point & floating-point DSP Processors.
EC 641.5	Understand various interfacing signals & interface memory and parallel I/O Peripherals to Programmable DSP Devices.

Course Name: Scripting Languages for VLSI Design Automation . Course number: EC645	

Code No.	Statement
EC 645.1	Apply basic commands in Linux and perform operations on files and directories.
EC 645.2	Exercise on various language constructs of PERL scripting like pattern matching, statements and declarations.
EC 645.3	Employ subroutines and data structures in Perl programming.
EC 645.4	Use Perl debugger commands and exercise advanced Perl programming concepts.
EC 645.5	Understand broad features of other scripting languages like TCL, JAVA SCRIPT and VB SCRIPT.

Course Name: Low Power VLSI Design	Course number: EC 648
Code No.	**Statement**
EC648.1	Understand the need for low power design and different strategies for low power.
EC648.2	Estimate the Power at various levels of abstraction.
EC648.3	Optimize the power at various levels of the design using power optimization techniques.
EC648.4	Describe the energy recovery circuit design
EC648.5	Estimate the software design for low power.

Course Name: Data and Computer Communication Networks	Course number: EC 504
Code No.	**Statement**
EC 504.1	Understand the concepts of data communications using the open Systems interconnect (OSI) model for layered architecture.
EC 504.2	Explain the principles of network protocols and internetworking
EC 504.3	Comprehend the circuit switcvhing and packet switching algorithms.
EC 504.4	Describe the performance of data link layer protocols for error and flow control.
EC 504.5	understand the various routing protocols and network security.

Course Name: Advanced Computer Organisation.	Course number: EC 510
Code No.	**Statement**
EC 510.1	Comprehend the organization of the CPU and data path design.
EC 510.2	Understand the concepts of Hardwired and Micro programmed Control Unit design of general purpose computer
EC 510.3	Describe the memory organization and hierarchy.
EC 510.4	Discuss I/O Interfacing concepts.
EC 510.5	Describe the challenges & Limtations of Instruction Level Parallelism