Vision of the Department	
"To motivate the young graduates in the field of Electronics and Communication Engineering and to provide a research oriented experimentation so as to address the challenges in the next generation technologies"	
Mission of the Department	
1.	To inculcate analysis and design for innovative problems in the field of Electronics and Communication Engineering with the help of state of art curricula
2.	To impart practical training to face real life case studies and inter-disciplinary simple solutions to complex problems.
3.	To make engineering education an enjoyable learning experience through challenging tutorials, mini-projects, assignments and laboratory exercises.
4.	To build project team spirit for professional working environment with high ethical values
5.	To develop overall character that will care for the society and concerned for the Nation through extra-curricular activities
Program Education Objectives for UG program	
1.	To educate students with analytical and design skills in Electronics and Communication systems applicable to Industries and R&D labs
2.	To strengthen the basic knowledge in mathematical science and applied science with orientation in engineering applications.
3.	To develop overall personality and character with team spirit, professionalism, integrity, moral and ethical values with the support of humanities, social sciences and physical educational courses.
4.	To equip the students with laboratory training leading to solving real life practical problems and project analysis of electronics and communication systems through case-studies, seminars, mini-projects, internships and main projects.

B. Tech. (ECE) III Semester

BSC 105
MATHEMATICS – III

Course Objectives:

- Apply general methodology to solve linear first order and second order partial differential equations
- To study the classification of second order partial differential equations and solve them by using separation of variables methods
- To introduce a few numerical methods to solve non-linear equations and system of linear equations
- To provide the necessary basic concepts of numerical differentiation, numerical integration and differential equations

Course Outcomes: After completion of this course the students able to

CO1	Find solutions of the heat equation, wave equation, and the Laplace equation subject to boundary conditions
CO2	Solve non-linear equations, system of linear equations and differential equations numerically
CO3	Perform numerical differentiation and numerical integration

HS 901MB
MANAGERIAL ECONOMICS AND ACCOUNTANCY

Course Objectives:

- To learn important concepts of Managerial Economics and apply them to evaluate business decisions.
- To understand various parameters that determines the consumer's behaviour.
- To evaluate all the factors that affect production
- To understand the concepts of capital budgeting and payback period.
- To study the concepts of various book-keeping methods.

Course Outcomes: Student will be Able to:

CO1	Apply the fundamental concepts of managerial economics to evaluate business decisions.
CO2	Understand types of demand and factors related to it.
CO3	Identify different types of markets and determine price-output under perfect competition.
CO4	Determine working capital requirement and payback period.
CO5	Analyze and interpret financial statements through ratios.

PC 301 EC
ELECTRONIC DEVICES AND CIRCUITS

Course Objectives:

- Study semiconductor physics and Analyze the behavior of Semiconductor diodes in Forward and Reverse bias
- Develop Half wave and Full wave rectifiers with L, C, LC & CLC Filters
- Explain V-I characteristics of Bipolar Junction Transistor in CB, CE & CC configurations
- Design DC Biasing techniques and evaluate A.C parameters for BJT in Amplifier Applicati
- Explore V-I characteristics of FET's and MOSFET's

Course Outcomes:

CO1	Interpret the characteristics and apply diode models to analyze various applications of dio
CO2	Identify the merits and demerits of various filters, formulate and design rectifier circuits w filters Calculate ripple factor, efficiency and % regulation of rectifier circuits.
CO3	Discriminate the BJT configurations to recognize appropriate transistor configuration for a given application and design the biasing circuits with good stability
CO4	Analyze, compare and design of BJT amplifiers with various biasing circuits
CO5	Distinguish the working principles of BJT and FET also between FET & MOSFET

PC 302 EC
DIGITAL SYSTEM DESIGN

Course Objectives:

- To learn basic techniques for the design of digital circuits and fundamental concepts used in the design of digital systems.
- To understand common forms of number representation in digital electronic circuits and to be able to convert between different representations.
- To implement simple logical operations using combinational logic circuits and design of sequential logic circuits.
- To impart to student the concepts of sequential circuits, enabling them to analyze sequential systems in terms of state machines.
- To implement synchronous state machines using flip-flops.

Course Outcomes: Upon completion of the course, students should possess the following skills:

CO1	Be able to manipulate numeric information in different forms, e.g. different bases, signed integers, various codes such as ASCII, Gray, and BCD.
CO2	Be able to manipulate simple Boolean expressions using the theorems and postulates of Boolean algebra and to minimize combinational functions.
CO3	Be able to design and analyse small combinational circuits and to use standard combinational functions/building blocks to build larger more complex circuits.
CO4	Be able to design and analyze small sequential circuits and devices and to use standard

	sequential functions/building blocks to build larger more complex circuits.

PC 303 EC
SIGNALS AND SYSTEMS

Course Objectives:

- To explain signals and systems representations/classifications and also describe the time and frequency domain analysis of continuous time signals with Fourier series, Fourier transforms and Laplace transforms.
- To understand Sampling theorem, with time and frequency domain analysis of discrete time signals with DTFS, DTFT and Z-Transform.
- To present the concepts of convolution and correlation integrals and also understand the properties in the context of signals/systems and lay down the foundation for advanced courses.

Course Outcomes: Student will be

CO1	Apply the knowledge of linear algebra topics like vector space, basis, dimension, inner product, norm and orthogonal basis to signals.
CO2	Analyse the spectral characteristics of continuous-time periodic and a periodic signals using Fourier analysis
CO3	Understand the process of sampling and the effects of under sampling. Classify systems based on their properties and determine the response of LSI system using convolution.
CO4	Analyze system properties based on impulse response and Fourier analysis. Apply the Laplace transform and Z- transform for analyze of continuous-time and discrete-time signals and systems.

PC 304 EC
NETWORK ANALYSIS AND SYNTHESIS

Course Objectives:

- To introduce basic circuit elements, their terminal characteristics, DC Circuit analysis techniques, RMS Average values of periodic signals, Network Theorems.
- To introduce the concepts of Two Port networks, study about the different two port parameter representations and principles of two port network parameters topologic description of networks
- To introduce the concepts of impedance, phase, phasor, resonance, complex frequency, Transient Analysis.
- To Analyze and Design different LC filters and Attenuators.
- To Design concepts of network synthesis.

Course Outcomes: Student will be

CO1	Able to Learn how to develop and employ circuit models for elementary electronic components and to adapt using various methods of circuit analysis, including simplified

	methods such as Series-parallel reductions, voltage and current dividers, superposition and Thevenin-Norton equivalent circuits etc.
CO2	Able to Analyze given Electrical Circuit in terms of A,B,C,D and Z,Y Parameter Model and Solve the circuits and how they are used in real time applications. Able to analyse the topologic description of networks. Ability to Solve Circuits using Tree, Node, Branch, Cutset, Tie Set Methods.
CO3	Able to analyze small RLC circuits Series and parallel Resonance of RC, RL and RLC circuits. Able to solve Transient Analysis.
CO4	Able to design different types of filters and Attenuator.
CO5	Able to synthesize the RL, RC & RLC networks Foster and Cauer Forms.

MC 220
CONSTITUTION OF INDIA

Course Objectives:

- To realise the significance of constitution of India to students from all walks of life and help them to understand the basic concepts of Indian constitution
- To identify the importance of fundamental rights as well as fundamental duties
- To understand the functioning of Union, State and Local Governments in Indian federal system
- To learn procedure and effects of emergency, composition and activities of election commission and amendment procedure

Course Outcomes: At the end of the course the student should be able to:

CO1	Understand and explain the significance of Indian Constitution as the fundamental law of the land.
CO2	Exercise his fundamental rights in proper sense at the same time identifies his responsibilities in national building.
CO3	Analyse the Indian political system, the powers and functions of the Union, State and Local Governments in detail
CO4	Understand Electoral Process, Emergency provisions and Amendment procedure.

PC 351 EC
ELECTRONIC DEVICES AND CIRCUITS LABORATORY

Course Objectives:

- Study the characteristics of PN diode.
- Learn the characteristics of BJT in CE, CB and CC configurations.
- Plot characteristics of FET in CS and CD configurations.
- Observe the parameters of BJT and FET amplifiers

Course Outcomes:

CO1	Understand characteristics of Diodes

	Plot the characteristics of BJT in different configurations.
CO2	Record the parameters of BJT and FET amplifiers.
CO3	Understand biasing techniques of BJT.
CO4	Use the SPICE software for simulating electronic circuits

PC 352 EC
DIGITAL SYSTEM DESIGN LABORATORY

Course Objectives:

- Analyze and design dc and switching circuits
- Analyze and design combinational logic circuits.
- Analyze and design sequential circuits.

Course Outcomes: On the completion of this laboratory course, the students will be able to:

CO1	Demonstrate the truth table of various expressions and combinational circuits using logic gates.
CO2	Design, test and evaluate various combinational circuits such as adders, subtractors, multiplexers and de-multiplexers.
CO3	Construct flips-flops, counters and shift registers.
CO4	Simulate BCD 7-Segment Display.

B. Tech. (ECE) IV Semester

PC 401 EC
ANALOG ELECTRONIC CIRCUITS

Course Objectives:

- Analyze frequency response of Amplifiers in different frequency ranges.
- Familiarize with concept and effect of negative feedback
- Study positive feedback and Design different types of oscillators.
- Design Power Amplifiers and calculate their efficiencies.
- Familiarize with concept of tuned Amplifiers.

Course Outcomes: After completion of this course the students able to

CO1	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.
CO2	Identify the type of negative feedback, analyze and design of negative feedback amplifiers.
CO3	Design Audio Frequency and Radio Frequency oscillators
CO4	Distinguish between the classes of Power Amplifiers and their design considerations.
CO5	Compare the performance of single and double Tuned Amplifiers

PC 402 EC
STOCHASTIC PROCESSES

Course Objectives:

- To understand different types of Random variables their density distribution functions.
- To learn one Random variable characteristic functions of different variables using their density functions.
- To learn the concepts of sequences of Random variables, Properties of Random vectors.
- To understand elementary concepts of the Random Processes or distribution functions.
- To understand the functions of two Random variables probability density distribution of the joint Random variables.

Course Outcomes: Student will be

CO1	Able to solve using an appropriate sample space by the concepts of probabilities and understand multiple random variables, relate the same through examples to real problems.
CO2	Able to Understand the usefulness of stochastic processes in their professional area.
CO3	Able to Characterize the response of LTI systems driven by a stationary random process using autocorrelation and power spectral density functions.
CO4	Able to Application of these principles in areas where presence of noise is a serious

	challenge.
PC 403 EC **ELECTROMAGNETIC THEORY AND TRANSMISSION LINES**	
Course Objectives:	
• To become familiar with the fundamental concepts of electrostatics and magneto statics laws their applications. • To familiar with the four Maxwell's equations used to study time varying EM or dynamic fields to apply them to solve practical EM problems. • To acquaint with theoretical analysis of the characteristics of electromagnetic waves in a wide variety of Practical Mediums.	
Course Outcomes: Students will be	
CO1	Able to express and elaborate Maxwell's Equations in differential and integral forms and the constitutive relations between the flux densities and field intensities of the electrostatics, magneto-statics and electrodynamics fields.
CO2	Able to derive the Helmholtz wave equations in its various forms and the wave nature of their solutions for time-harmonic waves in various mediums.
CO3	Able to apply fundamental electromagnetic concepts in applications such as Transmission Lines and Antennas.
PC 404 EC **PULSE AND INTEGRATED CIRCUITS**	
Course Objectives:	
• Analyze the behavior of Linear and non-linear wave shaping circuit • Understand the operation of OP-AMP and its internal circuits • Understand various digital ICs • Analyze the applications of OPAMP and 555 Timer • Explain the operation of various data converter circuits.	
Course Outcomes:	
CO1	Construct different linear networks and analyze their response to different input signals
CO2	Understand, Analyze and design multi vibrators and sweep circuits using transistors.
CO3	Analyze DC and AC characteristics for Single/Dual input Balanced/Unbalanced output configurations using BJTs.
CO4	Distinguish various linear and non-linear applications of Op-Amp.
CO5	Analyze the operation of the most commonly used D/A and A/D converter types.
PC 405 EC **COMPUTER ARCHITECTURE AND ORGANIZATION**	
Course Objectives:	

- To familiarize with Central Processing Unit (CPU) concepts.
- To understand register, architecture, addressing modes and instruction set of Intel microprocessor
- To design data path and control units of Central Processing Unit (CPU)
- To know IO processor and cache memory organization.
- To understand CPU performance enhancement strategies.

Course Outcomes:

CO1	Design Arithmetic and Logic Unit for the given specifications.
CO2	Develop programs of Intel Microprocessor
CO3	Demonstrate data path and control unit realizations of CPU.
CO4	Analyze replacement policies in cache memory organization
CO5	Incorporate pipeline concept in a Central Processing Unit (CPU).

ES 401 EI
ELECTRONIC MEASUREMENTS AND INSTRUMENTATION

Course Objectives:

- To familiarize with various Static and Dynamic Characteristics of Instruments, SI units of measuring electrical quantities and Various Display devices.
- To learn the working principles of various types of DVMs and Wave analyzers.
- To understand the working of Simple CRO and design concepts of various types of CROs.
- To understand the working and design concepts of various transducers for the measurement of quantities like temperature, displacement, force, pressure etc.
- To understand the importance of DAS, its types and the concept of Virtual instrumentation.

Course Outcomes:

CO1	Analyze the various characteristics of instruments and familiar with the SI units of measurements. And understand the working principles of Display devices.
CO2	Analyze the design aspects of various DVMs and wave analyzers
CO3	Analyze and design concepts of CROs and different CROs for different applications
CO4	Analyze various models of Active and Passive Transducer circuits.
CO5	Analyze the DAS and virtual instruments.

MC 210
ENVIRONMENTAL SCIENCE

Course Objectives:

- To know the Natural resources and their importance.
- To understand and realize significance of Ecosystems and Biodiversity.
- To understand the types of pollution, abatement practices and Disaster Management.
- To sensitize the students, about the global issues, mitigation techniques.
- To build the awareness regarding sustainable future.

Course Outcomes:

CO1	Rational utilization of natural resource can be expected.
CO2	Protection and conservation of ecosystems and biodiversity.
CO3	Development of New technologies for the abatement of pollution.
CO4	Mitigative techniques will come from the students.
CO5	Sustainability can be achieved.

PC 451 EC
ANALOG ELECTRONIC CIRCUITS LABORATORY

Course Objectives:

- Design and analyze BJT, FET amplifiers.
- Design and analyze multivibrators
- Analyze Oscillator circuits
- Understand Op-Amp applications
- Understand filter circuits

Course Outcomes:

CO1	Calculate gain and bandwidth of BJT, FET.
CO2	Study multivibrator circuits.
CO3	Study oscillator circuits
CO4	Demonstrate filter circuits
CO5	Demonstrate power amplifier and Op-Amp Circuits

PC 452 EC
PULSE AND INTEGRATED CIRCUITS LABORATORY

Course Objectives:

- To implement high pass and low pass circuit and study it`s performance.
- To implement clipping and clamping circuits and study it`s performance.
- To design and test bi-stable, mono-stable multi-vibrators.
- To design and test filter circuits.
- To understand data conversion.

Course Outcomes:

CO1	Design and analyze linear wave shaping circuits.
CO2	Design and analyze clipping and clamping circuits.
CO3	Design and analyze multivibrator circuits.

CO4	Design Op-AMP applications.
CO5	Effective use of 555 timer

B. Tech. (ECE) V Semester

PC 3101 EC
LINEAR CONTROL SYSTEMS

Course Objectives:

- To develop mathematical modeling for different control systems.
- To construct state space model for continuous and discrete data systems and analyse them.
- To analyze control system in time domain and determine stability using Routh-Hurwitz criterion and Root-Locus technique.
- To analyze control system in frequency domain and determine stability using Nyquist criterion and bode plots.
- To design compensators for control systems.

Course Outcomes: After completion of this course the students will be

CO1	Able to develop mathematical models and derive transfer functions for various systems
CO2	Able to expose to an appropriate state space modeling of system and its analysis and the concept and testing of controllability and observability.
CO3	Able to analyze the systems in time domain and determine its stability.
CO4	Able to analyze the systems in frequency domain and determine relative stability.
CO5	Able to design compensators for a given specifications.

PC 3102 EC
ANALOG AND DIGITAL COMMUNICATION

Course Objectives:

- To understand the concept of modulation.
- To study various types of analog modulation techniques.
- To understand the analog modulation schemes.
- To study the block diagram and characteristics of transmitters and receivers.
- To study the types of noise and influence analog modulation.
- To interpret the principles of information theory and coding techniques.

Course Outcomes: Upon completion of this course, students will be:

CO1	Able to compare the performance of AM, FM and PM schemes with reference to bandwidth.
CO2	Able to understand generation of AM, FM, PM schemes.
CO3	Able to evaluate the performance of AM and FM transmitters and receivers.
CO4	Able to identify sources of noise, noise figure, signal to noise ratio for AM, FM, and PM.

CO5	Able to acquires knowledge about information theory and assesses entropy and efficiency of various channels.
CO6	Able to learn to design an optimum receiver and analyze the error performance of base band and band pass data transmission.
CO7	Able to understand to design block codes, convolution and cyclic codes.

PC 3103 EC
MICROPROCESSOR AND MICROCONTROLLER

Course Objectives:

- To understand the microprocessor architecture with the help of 8086.
- To study the block diagram and peripheral ICs of microprocessor.
- To understand and differentiate between a microprocessor and a microcontroller.
- To study the architecture and pin out of the 8051.
- To understand the instructions and program the 8051.

Course Outcomes: Student will be

CO1	Able to acquire an overview of what a processor and controller are and differentiate between them.
CO2	Able to understand the architecture of a microprocessor and microcontroller to enable to design applications using them.
CO3	Able to apply theoretical learning to practical real time problems for automation.
CO4	Able to understand the architecture of a microcontroller.
CO5	Able to analyze and design real world applications and interface peripheral devices to the microprocessor.

PC 3104 EC
ANTENNA WAVE PROPAGATION

Course Objectives:

- To understand the various antenna parameters give insight of the radiation phenomena
- To have thorough understanding of radiation characteristics of different types of antennas
- To study the characteristics of array antennas having directional radiation characteristics.
- To give insight on aperture antennas and modern antennas.
- To understand the concepts of wave propagation and create awareness about the different types of propagation of radio waves at different frequencies.

Course Outcomes:

CO1	The student acquires knowledge about the basic antenna parameters and radiation concepts.
CO2	The student learns to analyze wire antennas in detail.

CO3	The student attains engineering fundamentals to analyze and design antenna arrays.
CO4	The student can classify, analyze and design aperture and modern antennas.
CO5	The student gains ability to identify and explain different modes of propagation in different regions of atmosphere.

PE 3105 EC
DIGITAL SYSTEM DESIGN USING VERILOG HDL
(PROFESSIONAL ELECTIVE –I)

Course Objectives:

- To familiarize with various modeling styles: structural and dataflow using Verilog HDL.
- To familiarize with behavioral modeling of digital systems using Verilog HDL
- To familiarize with various ICs available (combinational units) and their usage and to design them using Verilog HDL.
- To familiarize with various Register and counter ICs available in the market and develop their function using Verilog HDL.
- To design and develop real time applications such as adders, multipliers, Divider, ALU and DSP filter.

Course Outcomes: Student will be

CO1	Able to implement and distinguish different Verilog HDL modeling styles.
CO2	Able to construct and analyze Verilog HDL models of combinational and sequential circuits.
CO3	Able to make a choice among various ICs available in the market (combinational and sequential)
CO4	Able to understand types of memories and their design using Verilog HDL
CO5	Able to design and develop Verilog HDL modeling and test bench for digital systems for the given specifications

PE 3106 EC
BIO MEDICAL ELECTRONICS
(PROFESSIONAL ELECTIVE –I)

Course Objectives:

- Provide a basic knowledge of human physiology to engineering graduate students.
- Understand the applications of various branches of engineering in Medicine

Course Outcomes:

CO1	Importance and evolution of medical health care
CO2	Applications of solid and fluid mechanics in bio medical systems
CO3	Evaluation of Brain machine interface based systems
CO4	Understand the characteristics and design challenges in signal processing of bio-

	mechanical systems
CO5	Choose replacement materials for various implants

HS 3108 LW
LAW AND ENGINEERING

Course Objectives:

- To make the students understand the types of roles they are expected to play in the Society
- To know the different types of contracts, legal aspects of Arbitration and IPRs etc... As practitioners of the engineering profession to develop some ideas of the legal and practical aspects of their profession

Course Outcomes: Student will be able to

CO1	The students will understand the importance of professional practice, Law and Ethics in their personal lives and professional careers.
CO2	The students will learn the rights and responsibilities as an employee, team member and a global citizen.

PC 3109 EC
ANALOG AND DIGITAL COMMUNICATION LABORATORY

Course Objectives:

- To perform Analog modulation and demodulation techniques and measure modulation index.
- To perform experiments on Radio Receivers to measure their performance parameters.
- To perform Pulse analog modulation and demodulation techniques and understand.
- To perform Pulse digital modulation and demodulation techniques and understand.
- To perform carrier modulation techniques.

Course Outcomes: Student will be

CO1	Able to acquire knowledge of performing modulation and demodulation and analyse the effects of various parameters on the process.
CO2	Able to acquire knowledge of operation of various radio receiver sub systems.
CO3	Able to acquire in-depth understanding of pulse analog and pulse digital modulation techniques.
CO4	Able to acquire skill to perform carrier modulation schemes using MATLAB.

PC 3110 EC
MICROPROCESSOR AND MICROCONTROLLER LABORATORY

Course Objectives:

- To study the 8085 microprocessor and implement various basic programs on it.
- To study the 8086 microprocessor and implement basic programs on it.
- To write assembly language programs in 8086 for string manipulations.
- To interface the 8086 to stepper motor, ADC, DAC etc.
- To program the 8051 using Keil IDE.

Course Outcomes: Student will be

CO1	Able to write assembly language programs for arithmetic operations using 8086.
CO2	Able to implement simple programs on 8086
CO3	Able to perform string manipulation operations in 8086.
CO4	Able to interface the 8086 to peripherals like stepper motor, ADC, DAC etc.
CO5	Able to understand the Keil IDE and simulate 8051 programs on it.

PW3111 EC
MINI PROJECT

Course Objectives:

- mini project design in one of the selected areas of specialization with substantial multidisciplinary component
- using current technologies
- problem solving, motivational and time management skills for career and life
- problem based learning

Course Outcomes: Student will be

CO1	identify, formulate and solve problems related to their program of study
CO2	work independently with minimal supervision
CO3	demonstrate mastery of knowledge, techniques, practical skills and use modern tools of their discipline
CO4	write concisely & convey meaning in a manner appropriate to different readers and verbally express ideas easily understood by others who are unfamiliar with the topic

B. Tech. (ECE) VI Semester

PC 3201 EC
DIGITAL SIGNAL PROCESSING

Course Objectives:

- To study the DFT and FFT algorithms.
- To understand the concept of FIR and IIR filters.
- To study the types of filters.
- To understand Multi rate signal processing.
- To study the architecture of TMS processor.

Course Outcomes: Student will be

CO1	Able to find DFT of a given signal through Fast Fourier Transform techniques.
CO2	Able to design FIR and IIR type digital filters
CO3	Able to identify filter structures and evaluate the coefficient quantization effects.
CO4	Able to understand sample rate conversion techniques.
CO5	Able to compare the architectures of DSP and General Purpose Processors.

PC 3202 EC
VLSI DESIGN

Course Objectives:

- To provide a perspective on Digital Design in the Deep Sub-micron Technology.
- To focus on CMOS and Bi CMOS Short-channel Transistor Models.
- To Study CMOS Inverter elaborately.
- To explore static and dynamic implementations of combinational and sequential circuit designs and introduce Testability of VLSI circuits.

Course Outcomes: At the end of this course, students will be able to:

CO1	Have an understanding of the Fabrication processes and the comparison between different state-of-the-art CMOS technologies.
CO2	Acquire the knowledge in understanding CMOS Inverter characteristics. Illustrate circuit diagrams, stick diagrams and layouts.
CO3	Design and analyze various Combinational Logic circuits in different models.
CO4	Design and analyze various Arithmetic Blocks and Memory structures.
CO5	Understand various fault models and test patterns

PC 3203 EC
DATA COMMUNICATION AND COMPUTER NETWORKS

Course Objectives:

- To provide a conceptual foundation for the study of data communications using the open Systems interconnect (OSI) model for layer architecture.
- To study the principles of network protocols and internet working
- To understand the Network security and Internet applications.
- To understand the concepts of switched communication networks.
- To understand the performance of data link layer protocols for error and flow control.
- To understand various routing protocols and network security.

Course Outcomes:

CO1	Understand the working of various network topologies and circuit and packets witching
CO2	Comprehend the role of data link layers and significance of MAC protocols
CO3	Understand the networking protocols and Internet protocols
CO4	Understand the transport layer working with TCP, UDP and ATM protocols
CO5	Comprehend the functionality of application layer and importance of network security.

PE 3204 EC
EMBEDDED SYSTEM DESIGN
(Professional Elective - II)

Course Objectives:

- To gain knowledge to design embedded systems.
- To understand the processor selection criteria for Embedded System Design.
- To gain the knowledge of ARM Cortex on Zynq for embedded systems.
- To gain the knowledge of tool chain for embedded systems.
- To understand the importance of RTOS in building real time systems

Course Outcomes: Student will be able to

CO1	Design an embedded system.
CO2	Distinguish between RISC and CISC
CO3	Use the ARM Cortex for design of embedded system
CO4	Use Embedded Software Development Tools for Designing Embedded System applications
CO5	Apply their understanding in building real time systems.

PE 3205 EC
ARTIFICIAL NEURAL NETWORKS AND FUZZY LOGIC
(Professional Elective - II)

Course Objectives:

- To understand the basics of Neural Networks and essentials of Artificial Neural Networks
- To train different Feedback Neural Networks Single Layer and Multilayer Feed Forward Networks.
- To understand the concepts of Associate Memories and introduces Fuzzy sets and Fuzzy Logic system components.
- Provide an understanding of the basic mathematical elements of the theory of fuzzy sets.
- Provide an emphasis on the differences and similarities between fuzzy sets and classical sets theories.

Course Outcomes: After completing this course, the student will be able to

CO1	Understand principles of neural networks.
CO2	Apply basic principles of ANN in solutions that require problem solving, inference, perception, knowledge representation, and learning.
CO3	Demonstrate an ability to share in discussions of NN, its current scope and limitations, and societal implications
CO4	Understand appropriate learning rules for each of the architectures and learn several neural network paradigms and its applications
CO5	Understand basic knowledge of fuzzy sets and fuzzy logic and different applications of these models to solve engineering and other problems.

PE 3206 EC
ADAPTIVE FILTER THEORY AND APPLICATIONS
(Professional Elective - II)

Course Objectives:

- To understand the adaptive filter
- To study LMS and convergence of LMS.
- To understand the applications of adaptive filter.
- To study the kalman filter and vector kalman filter
- To Understand the concept of vector kalman filter

Course Outcomes: Student will be

CO1	Able to understand adaptive filter.
CO2	Able to understand LMS algorithm and practical application of LMS algorithm.
CO3	Able to understand applications of adaptive filter
CO4	Able to understand kalman filter
CO5	Able to understand vector kalman filter for practical applications.

PE 3207 EC
OPTICAL COMMUNICATIONS
(Professional Elective - II)

Course Objectives:

- To become familiar with the fundamental concepts of Light, Basic laws of light, various types of Optical fibers, modes and configurations
- To acquaint with theoretical analysis of the Signal propagation and distortion during propagation of light in Optical Fibers
- To become familiar with Optical sources, Optical detectors and Optical amplifiers
- To understand the design principles of Digital and Analog links
- To know the operating principles of WDM and components for its realization

Course Outcomes: Student will be

CO1	Able to apply Optical Laws to provide solutions to the problems of Optical Waveguides
CO2	Able to deal with the Optical Communication System designs.
CO3	Able to carry out the calculations of various noise powers at Optical Receivers
CO4	Able to design the Optical Link Power Budget and Rise Time Budget for the given applications
CO5	Able to design the WDM systems with various system considerations

PE 3208 EC
INFORMATION THEORY AND CODING
(PROFESSIONAL ELECTIVE –III)

Course Objectives:

- To acquire the knowledge in measurement of information and errors
- Understand the importance of various codes for communication systems
- To design encoder and decoder of various codes.
- To know the applicability of source and channel codes
- To learn about emerging applications of error–control coding

Course Outcomes: Upon completing this course, the student will be able to

CO1	Learn measurement of information and errors.
CO2	Design encoders and decoders for linear block codes
CO3	Apply cyclic codes for error correction and detection.
CO4	Design encoders and decoders for convolution codes
CO5	Understand encoders and decoders for BCH codes

PE 3209 EC
WIRELESS COMMUNICATIONS
(PROFESSIONAL ELECTIVE –III)

Course objectives:

- To provide the students with the fundamental treatment about many practical and theoretical concepts that forms basic of wireless communications
- To give brief review of fundamental digital communication systems
- To prepare the students to give the classification of fading and modelling of wireless communication channel
- To give the fundamentals of CDMA systems and to explore the concept of MIMO
- To prepare students to understand the emerging technique OFDM and its importance in the wireless communications

Course Outcomes: Upon completion of the course, the student will be able to:

CO1	Understand the principles of wireless communications
CO2	Understand fundamentals of multipath fading
CO3	Understand the concept of CDMA and MIMO systems
CO4	Understand the concept of orthogonal frequency division multiplexing

PE 3210 EC
RADAR ENGINEERING
(PROFESSIONAL ELECTIVE –III)

Course Objectives:

- To familiarize with basic concepts of radar systems
- To understand different Radar Systems
- To know about Radar antennas
- To know the propagation effects on a radar signal
- To understand tracking radar principles

Course Outcomes: Student will be

CO1	Able to understand the components of a radar system
CO2	Able to demonstrate the function of FMCW radar
CO3	Able to analyze the concept of MTI radar systems
CO4	Able to incorporate the effects of environment condition in a radar system

PC 3211 EC
DIGITAL SIGNAL PROCESSING LABORATORY

Course Objectives:

- To understand the concept of basic signals and to generate them using MATLAB.
- To understand the concept of N-point FFT algorithm.
- To understand the concept of analog and digital filters and simulation using MATLAB.
- To study the architecture of TMS320 C54x.
- To understand the concept of Linear Convolution and simulate it using CCSTUDIO/Visual DSP ++

Course Outcomes: Student will be	
CO1	Able to develop various DSP Algorithms using MATLAB Software package.
CO2	Able to analyze and Observe Magnitude and phase characteristics (Frequency response Characteristics) of digital FIR filter using window techniques.
CO3	Able to analyze and Observe Magnitude and phase characteristics (Frequency response Characteristics) of digital IIR-Butterworth, Chebyshev filters.
CO4	Able to design and Implement DSP algorithms in software using a computer language such as C with TMS320C54x fixed point Processor.

OE3207CS
FUNDAMENTALS OF DATA STRUCTURES
(OPEN ELECTIVE-I)

Course Objectives:

- basic data structures and its usage in handling real world applications
- representing the data using linear data structures such as queues, circular queues, priority queue, and using nonlinear data structures such as trees
- representing and retrieving the data in the form of various types of trees and graph data structures
- searching of data with the help of various search methods, to sort data using various sorting methods, and to effectively store and retrieve data, using various hashing methods

Course Outcomes: Student will be

CO1	implement the basics of data structures in handling real world applications
CO2	represent data using linear data structures such as queues, circular queues, priority queue, and using nonlinear data structures such as trees and graphs
CO3	represent and retrieve the data in the form of various nonlinear data structures like trees and graphs
CO4	search for data with the help of various searching techniques

PC 3211 EC
ELECTRONIC DESIGN AND AUTOMATION LABORATORY

Course Objectives:

- To design and analyze building blocks for a Digital System using HDL platform.
- To understand a Digital System using HDL platform
- To design and analyze CMOS circuits using back-end platform.
- To draw layout of basic CMOS circuits.

Course Outcomes: Students will be able to

CO1	Demonstrate basic building blocks of a Digital System using HDL platform

CO2	Realize a basic Digital System in HDL platform
CO3	Demonstrate basic building blocks of a Digital System using schematic modeling
CO4	Demonstrate Layout design and parasitic extraction of CMOS Inverter.
CO5	Evaluate the performance parameters of CMOS inverter at different levels of design abstractions

B. Tech. (ECE) VII Semester

PC 4101 EC
MICROWAVE ENGINEERING

Course Objectives:

- To learn field calculations between parallel planes and rectangular wave guide.
- To study and understand various microwave devices and circuits
- To study the construction and to understand principal of amplification/ Oscillation at microwave frequency.

Course Outcomes: Student will be

CO1	Able to understand electromagnetic wave propagation in parallel plane waveguides.
CO2	Able to understand electromagnetic wave propagation in rectangular waveguides and resonators.
CO3	Able to understand the formulation of Scattering Matrix and define them for various microwave components.
CO4	Able to learn principle of operation and applications of specialized microwave vacuum tubes.
CO5	Able to distinguish between transfer electron devices from ordinary low frequency semiconductor devices and learn basic modes of operation of Gunn Diode and its applications

PE IV 4102 EC
SATELLITE COMMUNICATION
(PROFESSIONAL ELECTIVE –IV)

Course Objectives:

- To familiarize with basic concepts related to satellite Communication.
- To understand Sub-Systems of Satellites and Launches.
- To design the Earth Station antennas.
- To know about the parameters affecting the Satellite System Performance.
- To understand the applications of satellites.

Course Outcomes: Student will be

CO1	Able to have knowledge about the Satellite communications Principles and Properties.
CO2	Able to know about the Space craft subsystems and Launch vehicles.
CO3	Able to design the Satellite Earth station antennas
CO4	Able to analyze the effects of various parameters on Satellite System performance.
CO5	Able to understand the applications of Satellite Communication.

PE IV 4103 EC
WAVELET THEORY AND APPLICATION

(PROFESSIONAL ELECTIVE –IV)

Course Objectives:

- The objective of this course is to establish the theory necessary to understand and use wavelets and related constructions.
- To establish the relation between FT, STFT and Wavelet transform
- To know about the discrete wavelet decomposition structure
- Applications of wavelets in signal and image processing

Course Outcomes: Student will be

CO1	Understand the terminology that are used in the wavelets literature
CO2	Able to know the concepts, theory, and algorithms behind wavelets from an interdisciplinary perspective that unifies harmonic analysis (mathematics), filter banks (signal processing), and multiresolution analysis (computer vision).
CO3	Apply wavelets, filter banks, and multiresolution techniques to a problem at hand, and justify why wavelets provide the right tool.
CO4	Able to use the modern signal processing tools using signal spaces, bases, operators and series expansions

PE IV 4104 EC
FAULT DETECTION IN DIGITAL SYSTEMS
(PROFESSIONAL ELECTIVE –IV)

Course Objectives:

- To represent physical faults by logical faults and understand fault modeling methods.
- To understand methods for economical fault detection test experiments.
- To be able to generate tests for fault detection in sequential circuits.
- To understand the usage of coding techniques to generate test patterns for self-checking circuits.
- To address the problem of test generation for SSFs using TG algorithms.

Course Outcomes: Student will be

CO1	Able to understand various design and modeling concepts thoroughly.
CO2	Able to device test inputs using various methods and compare the complexity of the techniques qualitatively.
CO3	Able to design detection test sets for sequential circuits.
CO4	Able to understand the usage of self-checking codes for fault detection.
CO5	Able to understand various algorithms and compare their implementation costs qualitatively.

PE V 4105 EC
DIGITAL IMAGE PROCESSING
(PROFESSIONAL ELECTIVE –V)

Course Objectives:

- Understand the image formation and its digital representation.
- Learn digital image fundamentals. Be exposed to simple image processing techniques.
- Learn representation of images in frequency domain and enhancement techniques.
- Be familiar with image compression and segmentation techniques. Learn to represent image in form of features.
- Students would be able to solve the problems related to image compression and restoration.

Course Outcomes: Upon completion of this course, students will be able to:

CO1	Understand how images are formed, sampled and quantized.
CO2	Apply various transforms like Fourier, DCT, Haar, DWT and Hadamard Transform to different applications.
CO3	Apply image enhancement techniques for practical applications
CO4	Implement the image restoration techniques.
CO5	Implement image compression techniques by removing the redundancy.

PE V 4106 EC
INTERNET OF THINGS
(PROFESSIONAL ELECTIVE –V)

Course Objectives:

- To introduce the concepts of automation in daily life.
- To familiarize the concepts of all IoT based communication systems.
- To understand the importance of cloud technologies in the field of IoT.
- To get familiar with standard embedded boards like Raspberry Pi.
- To study a real time system with a view of an application program interface (API).

Course Outcomes: Student will be

CO1	Able to design IoT based solutions for given problem statements.
CO2	Able to develop programs for Raspberry Pi.
CO3	Able to demonstrate the functionality of cloud communication.
CO4	Able to analyze the technologies used in IoT.
CO5	Able to incorporate multiple sensors to develop an IoT based system

PE V 4107 EC
LOW POWER VLSI DESIGN
(PROFESSIONAL ELECTIVE –V)

Course Objectives:

- To understand major evolutions, effects on transistor characteristics
- To learn the Power estimation techniques of CMOS circuits.
- To familiarize with dynamic power optimization techniques.
- To familiarize with leakage power optimization techniques.
- Know Low Power Very Speed Dynamic Digital circuit designs.

Course Outcomes: Student will be

CO1	Understand major evolutions in MOS and its behavior.
CO2	Estimate power in CMOS circuits.
CO3	Use dynamic power reduction techniques in designs
CO4	Use leakage power reduction techniques in designs
CO5	Use advance fast computation methods.

OE II 4108 HS
DISASTER MANAGEMENT
(OPEN ELECTIVE –II)

Course Objectives:

- To provide students an exposure to disasters, their significance and types.
- To ensure that students begin to understand the relationship between vulnerability, disasters, disaster prevention and risk reduction.
- To gain a preliminary understanding of approaches of Disaster Risk Reduction (DRR)
- To enhance awareness of institutional processes in the country and
- To develop rudimentary ability to respond to their surroundings with potential disaster response in areas where they live, with due sensitivity

Course Outcomes:

CO1	The students will be able to understand impact on Natural and manmade disasters.
CO2	Able to classify disasters and destructions due to cyclones
CO3	Able to understand disaster management applied in India

OE II 4109 HS
NON-CONVENTIONAL ENERGY SOURCES
(OPEN ELECTIVE –II)

Course Objectives:

- To understand the different types of energy sources
- To Understand the need of non-conventional energy sources and their principles
- To understand the limitations of non-conventional energy sources
- To outline division aspects and utilization of renewable energy sources for diriment application
- To analyze the environmental aspects of renewable energy resources

Course Outcomes: Student will be able to	
CO1	Know the different energy resources and need of renewable energy resources
CO2	Understand the concepts of working of fuel cell systems along with their applications
CO3	Describe the use of solar energy and the various components and measuring devices used in the energy production and their applications
CO4	Appreciate the need of Wind Energy and their classification and various components used in energy generation and working of different electrical wind energy system
CO5	Understand the concept of OTEC technology, Biomass energy resources and different types of biogas Plants used in India

OE II 4110 HS
STARTUP ENTREPRENEURSHIP
(OPEN ELECTIVE –II)

Course Objectives:

- To motivate students to take up entrepreneurship in future
- To learn nuances of starting an enterprise by creative thinking and shape ideas into reality.
- To understand action driven business plan and learn to prepare project budget.

Course Outcomes: Student will be able to	
CO1	Think creatively and transform ideas into reality.
CO2	Differentiate market transforming strategy.
CO3	Create a complete business plan and workout the budget plan.

PC 4111 EC
MICROWAVE ENGINEERING LABORATORY

Course Objectives:

- To define the range of frequencies for operation in microwave engineering.
- To discover the functioning of microwave components.
- To verify the various Characteristics of Active and Passive Microwave Devices Practically.
- To Measure Different parameters of an Antenna.
- To find Practically Optical Fiber Characteristics.

Course Outcomes: Student will be	
CO1	Study the characteristics of microwave sources.
CO2	Estimate the guide wave length and free space wave length of a wave.
CO3	Analyze the characteristics of microwave devices.
CO4	Plot the radiation characteristics of UHF and microwave antennas.
CO5	Analyze the fiber optic analog and digital link characteristics.

PW 4112 EC
PROJECT STAGE - 1

Course Objectives:

- To enhance practical and professional skills.
- To familiarize tools and techniques of systematic Literature survey and documentation
- To expose the students to industry practices and team work.
- To encourage students to work with innovative and entrepreneurial ideas

Course Outcomes:

CO1	Demonstrate the ability to synthesize and apply the knowledge and skills acquired in the academic program to real-world problems evaluate different solutions based on economic and technical feasibility.
CO2	effectively plan a project and confidently perform all aspects of project management.
CO3	Demonstrate effective written and oral communication skills.

SI 4113 EC
SUMMER INTERNSHIP

Course Objectives:

- To give an experience to the students in solving real life practical problems with all its constraints.
- To give an opportunity to integrate different aspects of learning with reference to real life problems.
- To enhance the confidence of the students while communicating with industry engineers and give an opportunity for useful interaction with them and familiarize with work culture and ethics of the industry.

Course Outcomes: Student will be

CO1	Able to design/develop a small and simple product in hardware or software.
CO2	Able to complete the task or realize a prespecified target, with limited scope, rather than taking up a complex task and leave it.
CO3	Able to learn to find alternate viable solutions for a given problem and evaluate these alternatives with reference to prespecified criteria.
CO4	Able to implement the selected solution and document the same.

B. Tech. (ECE) VIII Semester

PE VI 4201 EC
WIRELESS SENSOR NETWORKS
(PROFESSIONAL ELECTIVE –VI)

Course Objectives:

- To understand the fundamentals of wireless sensor networks and its application to critical real time scenarios.
- To study the various protocols at various layers and its differences with traditional protocols.
- To understand the issues pertaining to sensor networks and the challenges involved in managing a sensor network.

Course Outcomes: Student will be

CO1	To understand the state-of-the-art in network protocols, architectures and applications
CO2	To Explain the Fundamental Concepts and applications of ad hoc and wireless sensor networks
CO3	To Describe the MAC protocol issues of Adhoc and sensor networks
CO4	To Discuss the WSN routing issues by considering QoS measurements
CO5	To understand the state-of-the-art techniques and protocols in QoS and Energy management for wireless sensor networks.

PE VI 4202 EC
SIGNAL PROCESSING FOR AI & ML
(PROFESSIONAL ELECTIVE –VI)

Course Objectives:

- Study the concepts of Artificial Intelligence.
- Learn the methods of solving problems using Artificial Intelligence.
- Introduce the concepts of machine learning.
- Inter relate the use of signal processing in AI & ML
- Application of ML in 5 G wireless communications

Course Outcomes: At the end of the course, the student should be able,

CO1	To identify problems that are amenable to solution by AI methods.
CO2	To identify appropriate AI methods to solve a given problem & implement basic AI algorithms
CO3	To study the basics of Machine learning.
CO4	To Inter relate the use of signal processing in AI & ML
CO5	To use the ML concepts in wireless communications

PE VI 4203 EC
SYSTEM ON CHIP DESIGN
(PROFESSIONAL ELECTIVE –VI)

Course Objectives:

- To Understand the System Architecture and Processor Architecture, approach for a SOC
- Design and the concept of pipelining.
- To Learn about SOC external memory, Scratchpads and Cache memory and Multilevel Caches.
- To familiarize with on-chip memory concepts for SoC and to adopt the architectural support for operating systems.

Course Outcomes: Students will be able to:

CO1	Analyze the system and processor architecture approach for SoC design
CO2	Explore the concept of pipelining.
CO3	Understand the concept of memory interface and bus architecture for SoC design.
CO4	Analyze the performance metrics of on-chip memory. 5. Understand the architectural support for operating systems.

PE VI 4204 EC
OPTIMIZATION TECHNIQUES
(PROFESSIONAL ELECTIVE –VI)

Course Objectives:

- To understand the need and basic concepts of operations research and classify the optimization problems.
- To study about the linear programming and non-linear programming concepts and their applications.
- To understand various constrained and un-constrained optimization techniques and their applications.
- To understand the concepts and implementation of Genetic Algorithms to get the optimum solutions
- To study the concepts of Metaheuristics Optimization techniques

Course Outcomes: Student will be

CO1	Analyze any problem of optimization in an engineering system and able to formulate a mathematical model to the problem and solving it by the techniques that are presented.
CO2	Solve problems of L.P. by graphical and Simplex methods.
CO3	Apply various constrained and un-constrained optimization techniques for the specific problems.
CO4	Could able to implement the Genetic Algorithms to solve for the optimum solution.
CO5	Understands the concepts to use the Metaheuristics Optimization techniques

OE III 4205 CS
INFORMATION SECURITY

(OPEN ELECTIVE –III)

Course Objectives:

- To understand the meaning of attacks and to illustrate the need for information security
- To explain the concept of cryptography and its techniques
- To explore the use of symmetric and asymmetric ciphers
- To study the message authentication using hash functions

Course Outcomes: Student will be

CO1	Able to know the meaning of attacks and to illustrate the need for information security
CO2	Able to know the concept of cryptography
CO3	Able to explore the use of ciphers
CO4	To study the message authentication using hash functions

OE III 4206 HS
IPR AND PATENTING
(OPEN ELECTIVE –III)

Course Objectives:

- To recognize the importance of IP and to educate the pupils on basic concepts of Intellectual Property Rights.
- To identify the significance of practice and procedure of Patents.
- To make the students to understand the statutory provisions of different forms of IPRs in simple forms.
- To learn the procedure of obtaining Patents, Copyrights, Trade Marks &Industrial Design

Course Outcomes: Student will be able to

CO1	Distinguish and Explain various forms of IPRs.
CO2	Identify criteria's to fit one's own intellectual work in particular form of IPRs.
CO3	Apply statutory provisions to protect particular form of IPRs.
CO4	Analyze rights and responsibilities of holder of Patent, Copyright and Trademark.
CO5	Identify procedure to protect different forms of IPRs national and international level.

HUMAN VALUES AND PROFESSIONAL ETHICS

Course Objectives:

- To create an awareness on Engineering Ethics and Human Values
- To instill Moral and Social Values and Loyalty
- To appreciate the rights of others
- To create awareness on assessment of safety and risk

Course Outcomes: Student will be able to

CO1	Identify and analyze an ethical issue in the subject matter under investigation or in a relevant field
CO2	Identify the multiple ethical interests at stake in a real-world situation or practice
CO3	Articulate what makes a particular course of action ethically defensible
CO4	Assess their own ethical values and the social context of problems
CO5	Identify ethical concerns in research and intellectual contexts, including academic integrity, use and citation of sources, the objective presentation of data, and the treatment of human

PW 4209 EC
MAJOR PROJECT PHASE - II

Course Objectives:

- To enhance practical and professional skills.
- To familiarize tools and techniques of systematic Literature survey and documentation
- To expose the students to industry practices and team work.
- To encourage students to work with innovative and entrepreneurial ideas.

Course Outcomes:

CO1	Demonstrate the ability to synthesize and apply the knowledge and skills acquired in the academic program to real-world problems
CO2	Evaluate different solutions based on economic and technical feasibility
CO3	Effectively plan a project and confidently perform all aspects of project management
CO4	Demonstrate effective written and oral communication skills