DEPARTMENT OF EEE

Program Educational Objectives (PEOs):

This education is meant to prepare our students to thrive and to lead. In their careers, our graduates:

1. Will have successful technical or professional careers, including supportive and leadership roles on multidisciplinary teams.
2. Will acquire, use and develop skills required for effective professional practices.
3. Will acquire the holistic education necessary to be a responsible member of society.
4. Engage in life-long learning to remain current in their profession and be leaders in our technological society.

Programme Outcomes (POs):

Students in the Electrical and Electronics Engineering program should, at the time of their graduation, are in possession of:

1. Ability to apply knowledge of mathematics, science, and engineering.
2. Ability to design and conduct experiments, as well as to analyze and interpret data.
3. Ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability.
4. Ability to function on multi-disciplinary teams.
5. Ability to identify, formulate, and solve engineering problems.
6. Understanding of professional and ethical responsibility.
7. Ability to communicate effectively.
8. Broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context.
9. Recognition of the need for, and an ability to engage in life-long learning.
10. Knowledge of contemporary issues.
11. Ability to utilize experimental, statistical and computational methods and tools necessary for engineering practice.
12. Graduates will demonstrate an ability to design electrical and electronic circuits, power electronics, power systems; electrical machines analyze and interpret data and also an ability to design digital and analog systems and programming them.

Program Specific Outcomes (PSOs):

PSO I: Apply the knowledge of Mathematics, Science and Electrical Engineering fundamentals to solve complex problems in electrical machines, control systems, power systems and electronics.

PSO II: Ability to understand the recent technological developments in Electrical & Electronics Engineering and develop products/software to cater the societal & Industrial needs.

PSO III: Analyze and Design suitable controllers and power converters for the given system

PSO IV: Introduce and improvise the ability to apply project management techniques to electrical and electronics systems.

Code	Course Name	Course Outcomes
I B. Tech I Semester		
MA101BS	Mathematics – I	**At the end of this course, each student should be able to:** CO1: Write the matrix representation of a set of linear equations and to analyze the solution of the system of equations. CO2: Find the Eigen values and Eigen vectors CO3: Reduce the quadratic form to canonical form using orthogonal transformations. CO4: Analyze the nature of sequence and series. CO5: Solve the applications on the mean value theorems. CO5: Evaluate the improper integrals using Beta and Gamma Functions. CO6: Find the extreme values of functions of two variables with/ without constraints.
CH102BS	Chemistry	**At the end of this course, each student should be able to:** CO1. The knowledge of atomic, molecular and electronic changes, band theory related to conductivity. CO2. The required principles and concepts of electrochemistry, corrosion and in understanding the problem of water and its treatments. CO3. The required skills to get clear concepts on basic spectroscopy and application to medical and other fields. CO4. The knowledge of configurational and conformational analysis of molecules and reaction mechanisms.

Code	Course Name	Course Outcomes
EE103ES	Basic Electrical Engineering	**At the end of this course, each student should be able to:** CO1: To analyze and solve electrical circuits using network laws and theorems. CO2: To understand and analyze basic Electric and Magnetic circuits. CO3: To study the working principles of Electrical Machines CO4: To introduce components of Low Voltage Electrical Installations.
ME105ES	Engineering Workshop	**At the end of this course, each student should be able to:** CO1: Study and practice on machine tools and their operations. CO2: Practice on manufacturing of components using workshop trades including pluming, fitting, carpentry, foundry, house wiring and welding. CO3: Identify and apply suitable tools for different trades of Engineering processes. CO4: Including drilling, material removing, measuring, and chiseling. CO5: Apply basic electrical engineering knowledge for house wiring practice.
EN105HS	English	**At the end of this course, each student should be able to:** CO1: Use English Language effectively in spoken and written forms. CO2: Comprehend the given texts and respond appropriately. CO3: Communicate confidently in various contexts and different cultures. CO4: Acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills.
CH106BS	Engineering Chemistry Lab	**At the end of this course, each student should be able to:** CO1: Determination of parameters like hardness and chloride content in water. CO2: Estimation of rate constant of a reaction from concentration – time relationships. CO3: Determination of physical properties like adsorption and viscosity. CO4: Calculation of R values of some organic molecules by TLC technique.
EN107HS	English Language and Communication Skills Lab	**At the end of this course, each student should be able to:** CO1: Better understanding of nuances of English language through audio- visual experience and group activities CO2: Neutralization of accent for intelligibility CO3: Speaking skills with clarity and confidence which in turn enhances their employability skills.

Code	Course Name	Course Outcomes
EE108ES	Basic Electrical Engineering Lab	**At the end of this course, each student should be able to:** CO1: Get an exposure to basic electrical laws. CO2: Understand the response of different types of electrical circuits to different excitations. CO3: Understand the measurement, calculation and relation between the basic electrical parameters CO4: Understand the basic characteristics of transformers and electrical machines.
I B. Tech II Semester		
MA201BS	Mathematics - II	**At the end of this course, each student should be able to:** CO1. Identify whether the given differential equation of first order is exact or not CO2. Solve higher differential equation and apply the concept of differential equation to real world problems CO3. Evaluate the multiple integrals and apply the concept to find areas, volumes, centre of mass and Gravity for cubes, sphere and rectangular parallelepiped. CO4. Evaluate the line, surface and volume integrals and converting them from one to another
AP202BS	Applied Physics	**At the end of this course, each student should be able to:** CO1: The student would be able to learn the fundamental concepts on Quantum behaviour of matter in its micro state. CO2: The knowledge of fundamentals of Semiconductor physics, Optoelectronics, Lasers and fiber optics enable the students to apply to various systems like communications, solar cell, photo cells and so on. CO3: Design, characterization and study of properties of material help the students to prepare new materials for various engineering applications. CO4: The course also helps the students to be exposed to the phenomena of electromagnetism and also to have exposure on magnetic materials and dielectric materials.
CS203ES	Programming for Problem Solving	**At the end of this course, each student should be able to:** CO1: To write algorithms and to draw flowcharts for solving problems. CO2: To convert the algorithms/flowcharts to C programs. CO3:To code and test a given logic in C programming language. CO4: To decompose a problem into functions and to develop modular reusable code. CO5: To use arrays, pointers, strings and structures to write C programs such as Searching and sorting problems.

Code	Course Name	Course Outcomes
ME204ES	Engineering Graphics	**At the end of this course, each student should be able to** CO1: Preparing working drawings to communicate the ideas and information. CO2: Read, understand and interpret engineering drawings.
AP205BS	Applied Physics Lab	**At the end of this course, each student should be able to:** CO1. Formulate the algorithms for simple problems CO2. Translate given algorithms to a working and correct program CO3. Correct syntax errors as reported by the compilers CO4. Identify and correct logical errors encountered during execution CO5. Represent and manipulate data with arrays, strings and structures CO6. Use pointers of different types CO7. Create, read and write to and from simple text and binary files CO8. Modularize the code with functions so that they can be reused.
CS206ES	Programming for Problem Solving Lab	**At the end of this course, each student should be able to:** CO1:Formulate the algorithms for simple problems CO2:Translate given algorithms to a working and correct program CO3:Correct syntax errors as reported by the compilers CO4:Identify and correct logical errors encountered during execution CO5:Represent and manipulate data with arrays, strings and structures CO6:Use pointers of different types CO7:Create, read and write to and from simple text and binary files CO8: Modularize the code with functions so that they can be reused.
MC209ES	Environmental Science	**At the end of this course, each student should be able to:** Co1: Based on this course, the Engineering graduate will understand /evaluate / develop technologies on the basis of ecological principles and environmental regulations which in turn helps in sustainable development.
II B. Tech I Semester		

Code	Course Name	Course Outcomes
EE301ES	Engineering Mechanics	**At the end of the course the students can able to** CO1. Determine resultant of forces acting on a body and analyze equilibrium of a body subjected CO2. to a system of forces. Solve problem of bodies subjected to friction. Find the location of centroid and calculate moment of inertia of a given section. Understand the kinetics and kinematics of a body undergoing rectilinear, curvilinear, CO3. rotatory motion and rigid body motion. Solve problems using work energy equations for translation, fixed axis rotation and plane CO4. motion and solve problems of vibration.
EE302PC	Electrical Circuit Analysis	**At the end of the course the students can able to** CO1. Apply network theorems for the analysis of electrical circuits. CO2. Obtain the transient and steady-state response of electrical circuits. CO3. Analyze circuits in the sinusoidal steady-state (single-phase and three-phase). CO4. Analyze two port circuit behavior. .
EE303PC	Analog Electronics	**At the end of the course the students can able to** CO1. Know the characteristics, utilization of various components. CO2. Understand the biasing techniques CO3. Design and analyze various rectifiers, small signal amplifier circuits. CO4. Design sinusoidal and non-sinusoidal oscillators. CO5. A thorough understanding, functioning of OP-AMP, designs OP-AMP based circuits with linear integrated circuits.
EE304PC	Electrical Machines - I	**At the end of the course the students can able to** CO1. Identify different parts of a DC machine & understand its operation CO2. Carry out different testing methods to predetermine the efficiency of DC machines CO3. Understand different excitation and starting methods of DC machines CO4. Control the voltage and speed of a DC machines CO5. Analyze single phase and three phase transformers circuits.
EE305PC	Electromagnetic Fields	**At the end of the course the students can able to** CO1. To understand the basic laws of electromagnetism. CO2. To obtain the electric and magnetic fields for simple configurations under static conditions. CO3. To analyze time varying electric and magnetic fields. CO4. To understand Maxwell's equation in different forms and different media. CO5. To understand the propagation of EM waves.

Code	Course Name	Course Outcomes
EE306PC	Electrical Machines Lab - I	**At the end of the course the students can able to** CO1. Start and control the Different DC Machines. CO2. Assess the performance of different machines using different testing methods CO3. Identify different conditions required to be satisfied for self - excitation of DC Generators. CO4. Separate iron losses of DC machines into different components
EE307PC	Analog Electronics Lab	**At the end of the course the students can able to** CO1: Know the characteristics, utilization of various components. CO2: Understand the biasing techniques. CO3: Design and analyze various rectifiers, small signal amplifier circuits. CO4: Design sinusoidal and non-sinusoidal oscillators. CO5: A thorough understanding, functioning of OP-AMP, designs OP-AMP based circuits with linear integrated circuits.
MC309	Gender Sensitization Lab	**At the end of the course the students can able to** CO1. Students will have developed a better understanding of important issues related to gender in contemporary India. CO2. Students will be sensitized to basic dimensions of the biological, sociological, psychological and CO3. legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film. CO4. Students will attain a finer grasp of how gender discrimination works in our society and how to counter it. CO5. Students will acquire insight into the gendered division of labour and its relation to politics and economics. CO6. Men and women students and professionals will be better equipped to work and live together as equals. CO7. Students will develop a sense of appreciation of women in all walks of life. CO8. Through providing accounts of studies and movements as well as the new laws that provide protection and relief to women, the textbook will empower students to understand and respond to gender violence..
II B. Tech II Semester		
MA401BS	Laplace Transforms, Numerical Methods & Complex variables	**At the end of this course, each student should be able to:** CO1: Use the Laplace transforms techniques for solving ODE's CO2: Find the root of a given equation. CO3:Estimate the value for the given data using interpolation CO4:Find the numerical solutions for a given ODE's CO5:Analyze the complex function with reference to their analyticity, integration using Cauchy's integral and residue theorems CO6:Taylor's and Laurent's series expansions of complex function

Code	Course Name	Course Outcomes
EE402PC	Electrical Machines – II	**At the end of this course, each student should be able to:** CO1: Understand the concepts of rotating magnetic fields. CO2: Understand the operation of ac machines. CO3: Analyze performance characteristics of ac machines.
EE403PC	Digital Electronics	**At the end of this course, each student should be able to:** CO1. Understand working of logic families and logic gates. CO2: Design and implement Combinational and Sequential logic circuits. CO3: Understand the process of Analog to Digital conversion and Digital to Analog conversion. CO4: Be able to use PLDs to implement the given logical problem.
EE404PC	Control Systems	**At the end of this course, each student should be able to:** CO1. Understand the modeling of linear-time-invariant systems using transfer function and state-space representations. CO2. Understand the concept of stability and its assessment for linear-time invariant systems. CO3. Design simple feedback controllers.
EE405PC	Power System - I	**At the end of this course, each student should be able to:** CO1: Understand the concepts of power systems. CO2: Understand the operation of conventional generating stations and renewable sources of electrical power. CO3: Evaluate the power tariff methods. CO4:Determine the electrical circuit parameters of transmission lines CO5: Understand the layout of substation and underground cables and corona.
EE406PC	Digital Electronics Lab	**At the end of this course, each student should be able to:** CO1: Understand working of logic families and logic gates. CO2: Design and implement Combinational and Sequential logic circuits. CO3: Understand the process of Analog to Digital conversion and Digital to Analog conversion. CO4: Be able to use PLDs to implement the given logical problem.
EE407PC	Electrical Machines Lab - II	**At the end of this course, each student should be able to** CO1: Assess the performance of different machines using different testing methods. CO2:To convert the Phase from three phase to two phase and vice versa CO3:Compensate the changes in terminal voltages of synchronous generator after estimating the change by different methods CO4:Control the active and reactive power flows in synchronous machines CO5:Start different machines and control the speed and power factor.

Code	Course Name	Course Outcomes
EE408PC	Control Systems Lab	**At the end of this course, each student should be able to** CO1: How to improve the system performance by selecting a suitable controller and/or a compensator for a specific application CO2: Apply various time domain and frequency domain techniques to assess the system performance CO3: Apply various control strategies to different applications(example: Power systems, electrical drives etc) CO4: Test system controllability and observability using state space representation and applications of state space representation to various systems.
III B. Tech I Semester		
EE501PC	Electrical Measurements &Instrumentation	**At the end of this course, each student should be able to:** CO1: Understand different types of measuring instruments, their construction, operation and characteristics. CO2: Identify the instruments suitable for typical measurements. CO3: Apply the knowledge about transducers and instrument transformers to use them effectively.
EE502PC	Power Systems-II	**At the end of this course, each student should be able to:** CO1: Able to compute inductance and capacitance for different configurations of transmission lines. CO2: Able to analyze the performance of transmission lines Can understand transient's phenomenon of transmission lines. CO3: Able to calculate sag and tension calculations. CO4: Will be able to understand overhead line insulators and underground cables.
EE503PC	Microprocessors & Microcontrollers	**At the end of this course, each student should be able to:** CO1: Understands the internal architecture and organization of 8086, 8051 and ARM processors/controllers. CO2: Understands the interfacing techniques to 8086 and 8051 and can develop assembly language programming to design microprocessor/ micro controller based systems.
EE504PC	Fundamentals Of Management	**At the end of this course, each student should be able to:** CO1: The students understand the significance of Management in their Profession. The various Management Functions like Planning, Organizing, Staffing, Leading, Motivation and Control aspects are learnt in this course. The students can explore the Management Practices in their domain area.

Code	Course Name	Course Outcomes
EE511OE	NON-CONVENTIONAL POWER GENERATION (OPEN ELECTIVE – I)	**At the end of this course, each student should be able to:** CO1: Analyze solar thermal and photovoltaic systems and related technologies for energy conversion. CO2: Understand Wind energy conversion and devices available for it. CO3: Understand Biomass conversion technologies, Geo thermal resources and energy conversion principles and technologies. CO4: Realize Power from oceans (thermal, wave, tidal) and conversion devices. CO5: Understand fundamentals of fuel cells and commercial batteries.
EE512OE	ELECTRICAL ENGINEERING MATERIALS (OPEN ELECTIVE – I)	**At the end of this course, each student should be able to:** CO1: Understand various types of dielectric materials, their properties in various conditions. CO2: Evaluate magnetic materials and their behavior. CO3: Evaluate semiconductor materials and technologies. CO4: Acquire Knowledge on Materials used in electrical engineering and applications.
EE513OE	NANOTECHNOLOGY (OPEN ELECTIVE – I)	**At the end of this course, each student should be able to:** CO1: The present syllabus of "Introduction to Nano Technology" will give insight into many aspects of Nano science, technology and their applications in the prospective of materials science.
EE505PC	Electrical Measurements & Instrumentations Lab	**At the end of this course, each student should be able to:** CO1: to choose instruments CO2: test any instrument CO3: find the accuracy of any instrument by performing experiment CO4: calibrate PMMC instrument using D.C potentiometer.
EE506PC	BASIC ELECTRICAL SIMULATION LAB	**At the end of this course, each student should be able to:** CO1: Apply signal generation in different systems. CO2: Analyze networks by various techniques CO3: Analyze circuit responses CO4: Analyze bridge rectifiers
EI507PC	MICROPROCESSORS AND MICROCONTROLLERS LAB	**At the end of this course, each student should be able to:** CO1: Understands the internal architecture and organization of 8086, 8051 and ARM processors/controllers. CO2: Understands the interfacing techniques to 8086 and 8051 and can develop assembly language programming to design microprocessor/ micro controller based systems.

Code	Course Name	Course Outcomes
MC500HS:	PROFESSIONAL ETHICS	**At the end of this course, each student should be able to:** CO1: The students will understand the importance of Values and Ethics in their personal lives and professional careers. The students will learn the rights and responsibilities as an employee, team member and a global citizen.
III B. Tech II Semester		
EE601PC	POWER SYSTEMS ANALYSIS	**At the end of this course, each student should be able to:** CO1: Develop the Y_{bus} and Z_{bus} matrices CO2: Analyze load flow for various requirements of the power system CO3: Analyze short circuit studies for the protection of power system CO4: Estimate stability and instability in power systems
EE602PC	POWER ELECTRONICS	**At the end of this course, each student should be able to:** CO1: Choose the appropriate converter for various applications CO2: Design the power converters suitable for particular applications CO3: Develop the novel control methodologies for better performance.
EE603PC	SWITCH GEAR AND PROTECTION	**At the end of this course, each student should be able to:** CO1: Understand the types of Circuit breakers and choice of Relays for appropriate protection of power system equipment. CO2: Understand various types of Protective devices in Electrical Power Systems. CO3: Interpret the existing transmission voltage levels and various means to protect the system against over voltages. CO4: Understand the importance of Neutral Grounding, Effects of Ungrounded Neutral grounding on system performance, Methods and Practices.
EE621OE	DESIGN ESTIMATION AND COSTING OF ELECTRICAL SYSTEMS (OPEN ELECTIVE – II)	**At the end of this course, each student should be able to:** CO1: Understand the design considerations of electrical installations. CO2: Design electrical installation for buildings and small Industries. CO3: Identify and design the various types of light sources for different applications.
EE622OE	ENERGY STORAGE SYSTEMS (OPEN ELECTIVE – II)	**At the end of this course, each student should be able to:** CO1: analyze the characteristics of energy from various sources and need for storage CO2: classify various types of energy storage and various devices used for the purpose CO3: Identify various real time applications.

Code	Course Name	Course Outcomes
EE623OE	INTRODUCTION TO MECHATRONICS (OPEN ELECTIVE – II)	**At the end of this course, each student should be able to:** CO1: At the end of the course, the student will be able to, Model, analyze and control engineering systems. Identify sensors, transducers and actuators to monitor and control the behavior of a process or product. Develop PLC programs for a given task. Evaluate the performance of mechatronic systems.
EM611PE	COMPUTER ORGANIZATION (PROFESSIONAL ELECTIVE – I)	**At the end of this course, each student should be able to:** CO1: Able to understand the basic components and the design of CPU, ALU and Control Unit. CO2: Ability to understand memory hierarchy and its impact on computer cost/performance. CO3: Ability to understand the advantage of instruction level parallelism and pipelining for high performance Processor design. CO4: Ability to understand the instruction set, instruction formats and addressing modes of 8086. CO5: Ability to write assembly language programs to solve problems.
EE612PE	LINEAR SYSTEMS ANALYSIS (PROFESSIONAL ELECTIVE – I)	**At the end of this course, each student should be able to:** CO1: Use mathematical modeling tools to represent linear systems CO2: Use mathematical modeling tools to analyze linear systems
EE613PE	LINEAR AND DIGITAL IC APPLICATIONS (PROFESSIONAL ELECTIVE – I)	**At the end of this course, each student should be able to:** CO1: A thorough understanding of operational amplifiers with linear integrated circuits. CO2: Understanding of the different families of digital integrated circuits and their characteristics. CO3: Also students will be able to design circuits using operational amplifiers for various applications.
EE614PE	ELECTRICAL AND ELECTRONICS INSTRUMENTATION (PROFESSIONAL ELECTIVE – I)	**At the end of this course, each student should be able to:** CO1: Design and implement systems utilizing analog / digital control devices. CO2: Apply the concepts of automatic control, including measurement, feedback, and feed forward regulation for the operation of continuous and discrete systems. CO3: Solve technical problems and be proficient in the analysis, design, test, and implementation of instrumentation and control systems. CO4: Apply the concepts of heat transfer to the design of process control systems. CO5: Able to utilize modern and effective management skills for performing investigation, analysis, and synthesis in the implementation of automatic control systems.

Code	Course Name	Course Outcomes
EE604PC	POWER SYSTEMS LAB	**At the end of this course, each student should be able to:** CO1: Perform various load flow techniques CO2: Understand Different protection methods CO3: Analyze the experimental data and draw the conclusions.
EE605PC	POWER ELECTRONICS LAB	**At the end of this course, each student should be able to:** CO1: Understand the operating principles of various power electronic converters. CO2: Use power electronic simulation packages& hardware to develop the power converters. CO3: Analyze and choose the appropriate converters for various applications.
EN606HS	ADVANCED ENGLISH COMMUNICATION SKILLS LAB	**At the end of this course, each student should be able to:** CO1: Acquire vocabulary and use it contextually CO2: Listen and speak effectively CO3: Develop proficiency in academic reading and writing CO4: Increase possibilities of job prospects CO5: Communicate confidently in formal and informal contexts
IV B. Tech I Semester		
EE701PC	POWER SEMICONDUCTOR DRIVES	**At the end of this course, each student should be able to:** CO1: Indentify the drawbacks of speed control of motor by conventional methods CO2: Differentiate Phase controlled and chopper controlled DC drives speed-torque characteristics merits and demerits CO3: Understand Ac motor drive speed–torque characteristics using different control strategies its merits and demerits CO4: Describe Slip power recovery schemes.
EE702PC	POWER SYSTEM OPERATION AND CONTROL	**At the end of this course, each student should be able to:** CO1: Analyze the optimal scheduling of power plants CO2: Analyze the steady state behavior of the power system for voltage and frequency fluctuations CO3: Describe reactive power control of a power system CO4: Design suitable controller to dampen the frequency and voltage steady state oscillations.

Code	Course Name	Course Outcomes
EE721PE	DIGITAL SIGNAL PROCESSING (PROFESSIONAL ELECTIVE – II)	**At the end of this course, each student should be able to:** CO1: Perform time, frequency, and Z -transform analysis on signals and systems. CO2: Understand the inter-relationship between DFT and various transforms. CO3: Understand the significance of various filter structures and effects of round off errors. CO4: Design a digital filter for a given specification. CO5: Understand the fast computation of DFT and appreciate the FFT processing. CO6: Understand the tradeoffs between normal and multi rate DSP techniques and finite length word effects.
EE722PE	HVDC TRANSMISSION (PROFESSIONAL ELECTIVE – II)	**At the end of this course, each student should be able to:** CO1: Compare EHV AC and HVDC system and to describe various types of DC links CO2: Analyze Graetz circuit for rectifier and inverter mode of operation CO3: Describe various methods for the control of HVDC systems and to perform power flow analysis in AC/DC systems CO4: Describe various protection methods for HVDC systems and classify Harmonics and design different types of filters.
EE723PE	SWITCH MODE POWER SUPPLIES (PROFESSIONAL ELECTIVE – II)	**At the end of this course, each student should be able to:** CO1: After completion of this course the students are able to understand the concepts and principle of operation of various types of switched mode power supply systems for both D.C. and A.C outputs.
MT723PE/EE724PE	RELIABILITY ENGINEERING (PROFESSIONAL ELECTIVE – II)	**At the end of this course, each student should be able to:** CO1: model various systems applying reliability networks CO2: evaluate the reliability of simple and complex systems CO3: estimate the limiting state probabilities of repairable systems CO4: apply various mathematical models for evaluating reliability of irreparable systems
EE731PE/EI733PE	DIGITAL CONTROL SYSTEMS (PROFESSIONAL ELECTIVE – III)	**At the end of this course, each student should be able to:** CO1: Carry map S-plane and Z-plane, do state-space analysis CO2: Carry stability analysis in S-domain and Z-domains CO3: Carry stability analysis through bilinear transformation and R-H criteria CO4: design of discrete-time control systems, design of lag, lead, lead-lag compensators, design of PID controllers and design of state feedback controllers and observers CO5: Apply the above concepts to real-world electrical and electronics problems and applications.

Code	Course Name	Course Outcomes
EE732PE	POWER QUALITY (PROFESSIONAL ELECTIVE – III)	**At the end of this course, each student should be able to:** CO1: Know the severity of power quality problems in distribution system. CO2: Understand the concept of voltage sag transformation from up-stream (higher voltages) to down-stream (lower voltage). CO3: Concept of improving the power quality to sensitive load by various mitigating custom power devices**.**
EE733PE	MODERN POWER ELECTRONICS (PROFESSIONAL ELECTIVE – III)	**At the end of this course, each student should be able to:** CO1: To understand various Power Electronics devices such as SCR, TRIAC, DIAC, IGBT, GTO etc. CO2: To understand application of aforesaid Power Electronics devices in Choppers, Inverters and Converters etc. CO3: To understand control of Electrical Motors through DC-DC converters, AC Converters etc. CO4: To understand the use of Inductors and Capacitors in Choppers, Inverters and Converters.
EE734PE/EC741PE	OPTIMIZATION TECHNIQUES (PROFESSIONAL ELECTIVE – III)	**At the end of this course, each student should be able to:** CO1: explain the need of optimization of engineering systems . CO2 : understand optimization of electrical and electronics engineering. CO3: problems apply classical optimization techniques, linear programming, simplex algorithm, transportation problem CO4: apply unconstrained optimization and constrained non-linear programming and dynamic programming CO5: Formulate optimization problems.
EE741PE	PROGRAMMABLE LOGIC CONTROLLERS (PROFESSIONAL ELECTIVE – IV)	**At the end of this course, each student should be able to:** CO1: Understand the purpose, functions, and operations of a PLC CO2 : Identify the basic components of the PLC and how they function CO3: View a directory of processor files using PLC software CO4: Ability to gain knowledge on Programmable Logic Controllers CO5: Will understand different types of Devices to which PLC input and output modules are Connected CO6: To provide the knowledge about understand various types of PLC registers CO7: Able to create ladder diagrams from process control descriptions CO8: Ability to apply PLC timers and counters for the control of industrial processes CO9: Able to use different types PLC functions, Data Handling Function.

Code	Course Name	Course Outcomes
EE742PE	EHV AC TRANSMISSION SYSTEMS (PROFESSIONAL ELECTIVE – IV)	**At the end of this course, each student should be able to:** CO1: Understand the basic concepts of EHV AC transmission. CO2 : Get the Knowledge on EHV transmission line inductance and capacitance CO3: Understand the voltage gradients of conductor CO4: Identify corona effects on transmission lines CO5: Calculate electrostatic fields of EHVAC lines and its effects CO6: Analyze travelling waves CO7: Distinguish various compensators for voltage control.
EE743PE	FLEXIBLE A.C. TRANSMISSION SYSTEMS (PROFESSIONAL ELECTIVE – IV)	**At the end of this course, each student should be able to:** CO1: Choose proper controller for the specific application based on system requirements CO2 : Understand various systems thoroughly and their requirements CO3: Understand the control circuits of Shunt Controllers SVC & STATCOM for various functions viz. Transient stability Enhancement, voltage instability prevention and power oscillation damping CO4: Understand the Power and control circuits of Series Controllers GCSC, TSSC and TCSC.
EE744PE	SPECIAL MACHINES (PROFESSIONAL ELECTIVE – IV)	**At the end of this course, each student should be able to:** CO1: To select different special machines as part of control system components CO2 : To use special machines as transducers for converting physical signals into electrical signals CO3: To use micro-processors for controlling different machines CO4: To understand the operation of different special machine.
EE703PC	ELECTRICAL SYSTEMS SIMULATION LAB	**At the end of this course, each student should be able to:** CO1: Design and Analyze electrical systems in time and frequency domain CO2 : Analyze various transmission lines and perform fault analysis CO3: Model Load frequency control of Power Systems CO4: Design various Power Electronic Converters and Drives.
EE704PC	ELECTRICAL WORKSHOP	**At the end of this course, each student should be able to:** CO1: Get practical knowledge related to electrical CO2 : Fabricate basic electrical circuit elements/networks CO3: Trouble shoot the electrical circuits CO4: Design filter circuit for application CO5: Get debugging skills. CO6:Get hardware skills such as soldering, winding etc.
IV B. Tech II Semester		

Code	Course Name	Course Outcomes
EE851PE	ARTIFICIAL NEURAL NETWORKS AND FUZZY SYSTEMS (PROFESSIONAL ELECTIVE – V)	**At the end of this course, each student should be able to:** CO1: To understand artificial neural network models and their training algorithms CO2 : To understand the concept of fuzzy logic system components, fuzzification and defuzzification. CO3: Apply the above concepts to real-world problems and applications.
EE852PE	ELECTRICAL DISTRIBUTION SYSTEMS (PROFESSIONAL ELECTIVE – V)	**At the end of this course, each student should be able to:** CO1: distinguish between transmission, and distribution line and design the feeders CO2 : compute power loss and voltage drop of the feeders CO3: design protection of distribution systems CO4: understand the importance of voltage control and power factor improvement.
EE853PE	WIND, SOLAR AND HYBRID ENERGY SYSTEMS (PROFESSIONAL ELECTIVE – V)	**At the end of this course, each student should be able to:** CO1: Understand the energy scenario and the consequent growths of the power generate renewable energy sources. CO2: Understand the basic physics of wind and solar power generation. CO3: Understand the power electronic interfaces for wind and solar generation. CO4: Understand the issues related to the grid-integration of solar and wind energy systems.
EE854PE	HIGH VOLTAGE ENGINEERING (PROFESSIONAL ELECTIVE – V)	**At the end of this course, each student should be able to:** CO1: Acquire knowledge on, basics of high voltage engineering CO2 :Understand break-down phenomenon in different types of dielectrics CO3 : Understand generation and measurement of high voltages and currents CO4: understand the phenomenon of over-voltages, concept of insulation co-ordination CO5: know testing of various materials and electrical apparatus used in high voltage Engineering .

Code	Course Name	Course Outcomes
EM851PE/EE861PE	VLSI DESIGN (PROFESSIONAL ELECTIVE – VI)	**At the end of this course, each student should be able to:** CO1: Acquire qualitative knowledge about the fabrication process of integrated circuit using MOS transistors. CO2 : Choose an appropriate inverter depending on specifications required for a circuit CO3: Draw the layout of any logic circuit which helps to understand and estimate parasitic of any logic circuit CO4: Design different types of logic gates using CMOS inverter and analyze their transfer characteristics CO5: Provide design concepts required to design building blocks of data path using gates. CO6: Design simple memories using MOS transistors and can understand design of large memories. CO7: Design simple logic circuit using PLA, PAL, FPGA and CPLD. CO8: Understand different types of faults that can occur in a system and learn the concept of testing and adding extra hardware to improve testability of system.
EE862PE	SMART ELECTRIC GRID (PROFESSIONAL ELECTIVE – VI)	**At the end of this course, each student should be able to:** CO1: Recite the structure of an electricity market in either regulated or deregulated market conditions. CO2 : Understand the advantages of DC distribution and developing technologies in distribution CO3: Discriminate the trade-off between economics and reliability of an electric power system, differentiate various investment options (e.g. generation capacities, transmission, renewable, demand-side resources, etc) in electricity markets CO4: Analyze the development of smart and intelligent domestic systems.
EE863PE	UTILIZATION OF ELECTRIC POWER (PROFESSIONAL ELECTIVE – VI)	**At the end of this course, each student should be able to:** CO1: Acquire knowledge on, electric drives characteristics and their applicability in industry based on the nature of different types of loads and their characteristics CO2 : understands the concepts and methods of electric heating, welding, illumination and electric traction CO3: apply the above concepts to real-world electrical and electronics problems and applications.
EE864PE	ELECTRIC AND HYBRID VEHICLES (PROFESSIONAL ELECTIVE – VI)	**At the end of this course, each student should be able to:** CO1: Understand the models to describe hybrid vehicles and their performance. CO2: Understand the different possible ways of energy storage. CO3: Understand the different strategies related to energy storage systems.
A80089	Seminar	CO1. Ability to work in actual working environment. CO2. Ability to utilize technical resources CO3. Ability to write technical documents and give oral presentations related to the work completed.

Code	Course Name	Course Outcomes
A80088	Project Work	CO1. Ability to implement and execute well defined objective CO2. Ability to work in team at component level and system level CO3. Ability to troubleshoot.
A80090	Comprehensive Viva	CO1. Face any type of interviews, viva-voce, and aptitude tests. CO2. Perform well in competitive exams and group discussions CO3. Apply knowledge in building their career in particular fields. CO4. Enhance their communication skills and interactiveness.

DEPARTMENT OF ECE

Program Educational Objectives (PEOs):

PEO1 Excellence in Career to provide world class education in the principles of engineering that incorporate open ended design experience and the use of software and hardware tools related to Electronics and Communication Engineering and hence improve the employability skills of the student.

PEO2 Professional Effectiveness and Contribution to Society to provide learning environment to students to analyze real life problems and design socially accepted and economically feasible solutions in the respective fields.

PEO3 Continuing Education to provide solid foundation in Electronics and Communication Engineering fundamentals with an attitude to pursue higher education, participation in research and development activities, involve in lifelong learning and professional development.

PEO4 Exercising Leadership to make the student exhibit good communication skills in their professional career lead a team with good leadership traits and function with multi-disciplinary teams.

Programme Outcomes (POs):

PO1 Engineering Knowledge Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2 Problem Analysis Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3 Design/Development of Solutions Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4 Conduct Investigations of Complex Problems Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5 Modern Tool Usage Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6 The Engineer and Society Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7 Environment and Sustainability understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8 Ethics Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9 Individual and Team Work Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10 Communication Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11 Life-long Learning Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PO12 Project Management and Finance Demonstrate knowledge and understanding of the engineering and management principles and apply these to ones own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

Programme Specific Outcomes (PSOs):

PSO1 Professional Skills An ability to understand the basic concepts in Electronics & Communication Engineering and to apply them to various areas, like Electronics, Communications, Signal processing, VLSI, Embedded systems etc., in the design and implementation of complex systems.

PSO2 Problem-Solving Skills An ability to solve complex Electronics and communication Engineering problems, using latest hardware and software tools, along with analytical skills to arrive cost effective and appropriate solutions.

PSO3 Successful career and Entrepreneurship An understanding of social-awareness & environmental-wisdom along with ethical responsibility to have a successful career and to sustain passion and zeal for real-world applications using optimal resources as an Entrepreneur.

Code	Course Name	Course Outcomes
I B. Tech I Semester		
MA101BS	Mathematics – I	**At the end of this course, each student should be able to:** CO1. Write the matrix representation of a set of linear equations and to analyze the solution of the system of equations CO2. Find the Eigen values and Eigen vectors CO3. Reduce the quadratic form to canonical form using orthogonal transformations. CO4. Analyze the nature of sequence and series. CO5. Solve the applications on the mean value theorems. CO6. Evaluate the improper integrals using Beta and Gamma functions CO7. Find the extreme values of functions of two variables with/ without constraints.
CH102BS	Chemistry	**At the end of this course, each student should be able to:** CO1. The knowledge of atomic, molecular and electronic changes, band theory related to conductivity. CO2. The required principles and concepts of electrochemistry, corrosion and in understanding the problem of water and its treatments. CO3. The required skills to get clear concepts on basic spectroscopy and application to medical and other fields. CO4. The knowledge of configurational and conformational analysis of molecules and reaction mechanisms.
EE103ES	Basic Electrical Engineering	**At the end of this course, each student should be able to:** CO1. To analyze and solve electrical circuits using network laws and theorems. CO2. To understand and analyze basic Electric and Magnetic circuits CO3. To study the working principles of Electrical Machines CO4. To introduce components of Low Voltage Electrical Installations.

Code	Course Name	Course Outcomes
ME105ES	Engineering Workshop	**At the** end of this course, each student should be able to: CO1: Study and practice on machine tools and their operations. CO2: Practice on manufacturing of components using workshop trades including pluming, fitting, carpentry, foundry, house wiring and welding. CO3: Identify and apply suitable tools for different trades of Engineering processes. CO4: Including drilling, material removing, measuring, and chiseling. CO5: Apply basic electrical engineering knowledge for house wiring practice.
EN105HS	English	**At the end of** this course, each student should be able to: CO1. Use English Language effectively in spoken and written forms. CO2. 2. Comprehend the given texts and respond appropriately. CO3. 3. Communicate confidently in various contexts and different cultures. CO4. 4. Acquire basic proficiency in English including reading and listening comprehension, writing and speaking skills.
CH106BS	Engineering Chemistry Lab	At the end of this course, each student should be able to: CO1. Determination of parameters like hardness and chloride content in water. CO2. Estimation of rate constant of a reaction from concentration – time relationships. CO3. Determination of physical properties like adsorption and viscosity. CO4. Calculation of R values of some organic molecules by TLC technique.
EN107HS	English Language and Communication Skills Lab	At the end of this course, each student should be able to: CO1. Better understanding of nuances of English language through audio- visual experience and group activities CO2. Neutralization of accent for intelligibility CO3. Speaking skills with clarity and confidence which in turn enhances their employability skills.
EE108ES	Basic Electrical Engineering Lab	At the end of this course, each student should be able to: CO1. Get an exposure to basic electrical laws. CO2. Understand the response of different types of electrical circuits to different excitations. CO3. Understand the measurement, calculation and relation between the basic electrical parameters CO4. Understand the basic characteristics of transformers and electrical machines.
I B. Tech II Semester		
MA201BS	Mathematics – II	CO1. **At** the end of this course, each student should be able to: CO2. Identify whether the given differential equation of first order is exact or not CO3. Solve higher differential equation and apply the concept of differential equation to real world problems CO4. Evaluate the multiple integrals and apply the concept to find areas, volumes, centre of mass and Gravity for cubes, sphere and rectangular parallelepiped. CO5. Evaluate the line, surface and volume integrals and converting them from one to another

Code	Course Name	Course Outcomes
AP202BS	Applied Physics	At the end of this course, each student should be able to: CO1. The student would be able to learn the fundamental concepts on Quantum behaviour of matter in its micro state. CO2.The knowledge of fundamentals of Semiconductor physics, Optoelectronics, Lasers and fiber optics enable the students to apply to various systems like communications, solar cell, photo cells and so on. CO3.Design, characterization and study of properties of material help the students to prepare new materials for various engineering applications. CO4.The course also helps the students to be exposed to the phenomena of electromagnetism and also to have exposure on magnetic materials and dielectric materials.
CS203ES	Programming for Problem Solving	At the end of this course, each student should be able to: CO1. To write algorithms and to draw flowcharts for solving problems. CO2.To convert the algorithms/flowcharts to C programs. CO3.To code and test a given logic in C programming language. CO4. To decompose a problem into functions and to develop modular reusable code. CO5. To use arrays, pointers, strings and structures to write C programs. Searching and sorting problems.
ME204ES	Engineering Graphics	At the end of this course, each student should be able to CO1: Preparing working drawings to communicate the ideas and information. CO2: Read, understand and interpret engineering drawings.
AP205BS	Applied Physics Lab	At the end of this course, each student should be able to: CO1. Formulate the algorithms for simple problems CO2. Translate given algorithms to a working and correct program CO3. Correct syntax errors as reported by the compilers CO4. Identify and correct logical errors encountered during execution CO5. Represent and manipulate data with arrays, strings and structures CO6. Use pointers of different types CO7. Create, read and write to and from simple text and binary files CO8. Modularize the code with functions so that they can be reused.

Code	Course Name	Course Outcomes
CS206ES	Programming for Problem Solving Lab	**At the end of this course, each student should be able to:** CO1:Formulate the algorithms for simple problems CO2:Translate given algorithms to a working and correct program CO3:Correct syntax errors as reported by the compilers CO4:Identify and correct logical errors encountered during execution CO5:Represent and manipulate data with arrays, strings and structures CO6:Use pointers of different types CO7:Create, read and write to and from simple text and binary files CO8:Modularize the code with functions so that they can be reused.
MC209ES	Environmental Science	**At the end of this course, each student should be able to:** Co1: Based on this course, the Engineering graduate will understand /evaluate / develop technologies on the basis of ecological principles and environmental regulations which in turn helps in sustainable development.
II B. Tech I Semester		
EE301ES	Analog Electronics	**At the end of the course the students can able to** CO1.Design of single and multistage amplifiers for required gain of low and mid frequency range. (TL 5) CO2. Determine the gain parameters and design amplifiers for high frequency. (TL 4) CO3.Design amplifiers with gain control using negative feedback and design signal generators with positive feedback. Evaluation of amplifiers gains stabilization improvement of bandwidth. (TL 5) C04.Design of power amplifier for specified loads. (TL 5) CO5.Design of tuned amplifiers for audio and radio frequency range of transmitters and receivers. (TL 5)
EE302PC	**SIGNALS AND STOCHASTIC PROCESS**	**At the end of the course the students can able to** CO1.Represent any arbitrary analog or Digital time domain signal in frequency domain CO2.Understand the importance of sampling, sampling theorem and its effects CO3.Understand the characteristics of linear time invariant systems CO4.Determine the conditions for distortion less transmission through a system CO5Understand the response of linear time Invariant system for a Random Processes.

Code	Course Name	Course Outcomes
EE303PC	**M-IV**	**At the end of the course the students can able to** CO1.Analyze the complex functions with reference to their analyticity, integration using Cauchy's integral theorem CO2.Find the Taylor's and Laurent's series expansion of complex functions the bilinear transformation CO3.Express any periodic function in term of sines and cosines CO4.Express a non-periodic function as integral representation CO5.Enalyze one dimensional wave and heat equation
EE304PC	**ELECTRICAL TECHNOLOGY**	CO1.To analyze the performance of dc generators and motors. CO2.To analyze the performance of transformers CO3.To learn the in-depth knowledge on three phase induction motors. CO4.To analyze the performance of special motors and electrical instruments in real time applications
EE305PC	**NETWORK ANALYSIS**	CO1.Gains the knowledge on Basic network elements CO2.Learns and analyze the RLC circuits' behavior in detail. CO3.Analyze the performance of periodic wave forms CO4.Learns and gain the knowledge in characteristics of two port network parameters (Z, Y, ABCD, h &g). CO5.To analyze the filter design concepts in real world applications.
MC300ES	**Environmental Science and Technology**	CO1.evaluate / develop technologies on the basis of ecological principles and environmental regulations which in turn helps in sustainable development.
EC306ES	**Electronic Devices and Circuits Lab**	**At the end of this course, each student should be able to:** CO1.apply various devices to real time problems. CO2.compute frequency response of various amplifiers
EC307ES	**Basic Simulation Lab**	**At the end of this course, each student should be able to:** CO1.perform Basic operations on matrices using Mat lab CO2.generate various signals and sequences CO3.analyze different characteristics of signals CO4.apply convolution and correlation for signals and sequences
EC308ES	**Basic Electrical Engineering Lab**	**At the end of this course, each student should be able to:** CO1.verify KCL & KVL CO2.analyze serial and parallel resonance of RLC circuits CO3.determine time response of first order RL/RC networks CO4.verify two port network parameters. CO5.verify various network theorems
II B. Tech II Semester		

Code	Course Name	Course Outcomes
MA401BS	Switching Theory and Logic Design	**At the end of this course, each student should be able to:** CO1.Able to manipulate numeric information in different forms, e.g. different bases, signed integers, various codes such as ASCII, gray, and BCD. (TL1) CO2.Able to manipulate simple Boolean expressions using the theorems and postulates of Boolean algebra and to minimize combinational functions.(TL2) CO3.Able to design and analyze small combinational circuits and to use standard combinational functions/building blocks to build larger more complex circuits. (TL6) CO4.Able to design and analyze small Sequential circuits and to use standard combinational functions/building blocks to build larger more complex circuits. (TL6) CO5.Able to implement synchronous state machines using flip flops. (TL5)
EE402PC	Pulse and Design Circuit	**At the end of this course, each student should be able to:** CO1: Determine the response of High pass and Low pass circuits for A.C and D.C input signals. (TL 2) CO2: Design and develop clippers and clampers circuits for wave shaping voltage comparators, voltage regulators, Threshold voltage controllers (TL 5) CO3: Determine switching speed of Diodes and Transistor for given input signal of specified frequency. Design the gating controls for sampling gates. (TL 5) CO4: Design and develop Waveform generators and sweep generators based on time based signals. (TL 5) CO5: Design circuits for synchronization of signals with same or different frequencies using sweep circuits. CO6: Design of logic gates of different logic families by evaluating Propagation delay, Power dissipation, Fan-in, Fan-out (TL 5).
EE403PC	**ANALOGCOMMUNICATIONS**	**At the end of this course, each student should be able to:** CO1: **Define** the basics of analog communication systems, Multiplexing techniques. CO2: **Categorize** and **Explain** various analog modulation Techniques. CO3: **Summarize** the types of noise and **Explain** the noise performance in analog modulation techniques. CO4: **Describe** the characteristics of receivers.
EE404PC	Control Systems	**At the end of this course, each student should be able to:** CO1: Understand the modeling of linear-time-invariant systems using transfer function and state-space representations. CO2: Understand the concept of stability and its assessment for linear-time invariant systems. CO3: Design simple feedback controllers.
EE405PC	BEFA	**At the end of this course, each student should be able to** CO1: The students will understand the various Forms of Business and the impact of economic variables on the Business. CO2: The Students can study the firm's financial position by analysing the Financial Statements of a Company CO3: The Demand, Supply, Production, Cost, Market Structure, Pricing aspects are learnt

Code	Course Name	Course Outcomes
EC406ES	**Analog Communications Lab**	**At the end of this course, each student should be able to** CO1: analyze different modulation techniques like AM, FM, DSBSC,SSB CO2: Analyze spectral characteristics of AM&FM signals C03: Analyze the concepts of Multiplexing: Time CO4.Division Multiplexing (TDM) and Frequency Division Multiplexing (FDM). CO4: Design and analyze various Pulse Modulation Systems.
EC407ES	**Pulse and Digital Circuits Lab EC407ES**	**At the end of this course, each student should be able to** CO1:analyze the characteristics of Linear and Non-Linear wave Shaping. CO2: Compare different types of Comparators. CO3: Analyze the switching characteristics of a Transistor. CO4: Design various Multi vibrators. CO5: Design Boot Strap, Miller Sweep Circuit.
EC408ES	**Analog Electronics Lab**	**At the end of this course, each student should be able to** CO1:Simulate various electronic circuits using Multi-sim CO2:Determine the frequency response of CE, CC, CS, Two Stage RC Coupled, Current Shunt Feedback, Voltage Series Feedback , Single Tuned Voltage and Cascode Amplifiers CO3: Design Wien Bridge, Colipitts, Hartley and RC Phase shift Oscillators using Transistors CO4: Design Class-A and Class-B Power Amplifiers
MC309	Gender Sensitization Lab	**At the end of the course the students can able to** CO1: Students will have developed a better understanding of important issues related to gender in contemporary India. CO2: Students will be sensitized to basic dimensions of the biological, sociological, psychological and CO3: legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature and film. CO4: Students will attain a finer grasp of how gender discrimination works in our society and how to counter it. CO5: Students will acquire insight into the gendered division of labour and its relation to politics and economics. CO6: Men and women students and professionals will be better equipped to work and live together as equals. CO7: Students will develop a sense of appreciation of women in all walks of life. CO8: Through providing accounts of studies and movements as well as the new laws that provide protection and relief to women, the textbook will empower students to understand and respond to gender violence..
III B. Tech I Semester		

Code	Course Name	Course Outcomes
EC501PC	Electro Magnetic Theory &Transmission	**At the end of this course, each student should be able to** CO1.Able to explain the concepts related to static electric field and to apply them for various applications.(TL-3) CO2.Able to explain the concepts related to static magnetic field and to apply them for various applications.(TL-3) CO3.Demonstrate and analyze the Maxwell's equations for time varying fields.(TL-4) CO4.Describe Wave propagation in different media.(TL-2) CO5.Analyze basic transmission line parameters and interpret relationship between parameters. (TL-4)
EC503PC	**Digital Communication**	**At the end of this course, each student should be able to:** CO1.Able to Understand basic components of Digital Communication Systems and differentiate Pulse digital modulation techniques such as PCM and DM. (TL 2) CO2.Able to Design optimum receiver for Digital Modulation techniques. (TL 5) CO3.Able to Analyze the error performance of Digital Modulation Techniques. (TL 4) CO4.Understand the redundancy present in Digital Communication by using various source Coding techniques. (TL 2) CO5.Able to Design and Analyze different error detecting and error correction codes like block codes, cyclic codes and convolution codes and Able to Understand the Characteristics of Spread Spectrum Modulation. (TL 4& 5).
EC502PC	Linear and Digital IC Applications	**At the end of this course, each student should be able to:** CO1.Illustrate the significance and operation of internal building blocks of OP-AMP and study the characteristics of ideal and practical OP-AMP with emphasis on linear ICs CO2.Design circuits using OP-AMPs for various linear and non-linear applications and understands the operation and applications of voltage regulators, IC 555 Timer and IC 565 PLL. CO3.State the theory and specifications of DACs and ADCs CO4.Comprehend the different families of combinational digital ICs along with their characteristics and applications. CO5.Know the different families of sequential digital ICs, their applications and study different types of memories and their applications
SM504MS	Fundamentals Of Management	**At the end of this course, each student should be able to:** CO1: The students understand the significance of Management in their Profession. The various Management Functions like Planning, Organizing, Staffing, Leading, Motivation and Control aspects are learnt in this course. The students can explore the Management Practices in their domain area.
MC500HS:	PROFESSIONAL ETHICS	**At the end of this course, each student should be able to:** CO1: The students will understand the importance of Values and Ethics in their personal lives and professional careers. The students will learn the rights and responsibilities as an employee, team member and a global citizen.
III B. Tech II Semester		

Code	Course Name	Course Outcomes
EC601PC	**Antennas and Wave Propagation**	**At the end of this course, each student should be able to:** CO1.Able to define the parameters in the design of antenna and field evaluation under various conditions and formulate the electric as well as magnetic field equations.**(TL4)** CO2.Explain the design issues and the operation of fundamental antennas like Yagi-Uda , Horn antenna and Helical structure.**(TL5)** CO3.Design a lens structure and the bench setup for various antenna parameters.**(TL5)** CO4.Define the array system for different antennas and field analysis**.(TL1)** CO5.Describe effects of atmosphere on radio wave propagation and explain the Ionosphere and troposphere propagation **(TL2)**
EC604PC	**Digital Signal Processing**	**At the end of this course, each student should be able to:** CO1.Analyze time, frequency and Z-transform of signals and systems. (TL 4) CO2.Compute discrete time domain and frequency domain of signals using DFS,DTFT,FFT. (TL 5) CO3.Design IIR digital filter for a given specification. (TL 5) CO4.Design FIR digital filter for a given specification. (TL 5) CO5.Understand the tradeoff between normal and multi-rate DSP techniques and finite length word effects. (TL 2)
EC602PC	**Microprocessors and Micro controllers**	**At the end of this course, each student should be able to** CO1.Basic understanding of 8085 and 8086 microprocessors architectures and its Functionalities.(TL 2) CO2.Design and develop 8086 Microprocessor based Assembly Language Programs for real time applications. (TL 4) CO3.Able to Interface external peripherals, I/O devices Interrupt service Routine (ISR) and transmit data serially in Multi-processor applications. (TL 3) CO4.Basic understanding of 8051 microcontrollers architectures and its functionalities and Design and develop 8051 microcontroller Assembly Language Programs for real time applications (TL 2) CO5.To distinguish between RISC and CISC microcontrollers and Analyze the architecture of AVR family microcontroller (TL 2)
EC612PE	**Digital Image Processing**	**At the end of this course, each student should be able to:** CO1.Understand digital image fundamentals and transform image data into different domains for high and processing. (TL 2) CO2.Able to apply conventional and filtering for enhancing the image quantity. (TL 3) CO3.Able to apply different filtering techniques for restoration of images. (TL 3) CO4.Able to segment the images for the specific applications using conventional and morphological operations. (TL 2) CO5.Able to compress the image data able to apply various image compression techniques with loss or without loss. (TL 5)

Code	Course Name	Course Outcomes
EC611PE	Computer organization and operating system (PROFESSIONAL ELECTIVE – I)	CO1.To have a thorough understanding of the basic structure and operation of a digital computer. CO2.To discuss in detail the operation of the arithmetic unit including the algorithms & implementation of fixed-point and floating-point addition, subtraction, multiplication & division. CO3.To study the different ways of communicating with I/O devices and standard I/O interfaces. CO4.To study the hierarchical memory system including cache memories and virtual memory. CO5.To demonstrate the knowledge of functions of operating system memory management scheduling, file system and interface, distributed systems, security and deadlocks.
EC613PE	**SPREAD SPECTRUM COMMUNICATIONS** (PROFESSIONAL ELECTIVE – I)	**At the end of this course, each student should be able to:** C01.Generate various types of Spread spectrum sequences and can simulate CDMA system (Both Transmitter & Receiver). CO2.Analyze the performance of Spread spectrum systems in Jamming environment and systems with Forward Error Correction. CO3. Can provide detection and cancellation schemes for Multi users in CDMA cellular radio.
EC614PE	**DIGITAL SYSTEM DESIGN** (PROFESSIONAL ELECTIVE – I)	**At the end of this course, each student should be able to:** CO1.To understands the minimization of Finite state machine. CO2. To exposes the design approaches using ROM's, PAL's and PLA's. CO3.To provide in depth understanding of Fault models. CO4.To understands test pattern generation techniques for fault detection. CO5.To design fault diagnosis in sequential circuits.
IV B. Tech I Semester		
A70434	**Cellular and Mobile Communication**	**At the end of this course, each student should be able to** CO1.Apply the knowledge of cellular design concept, calculate the carrier to interference ratio and estimate the capacity for the given cellular environment. (TL 3) CO2.Calculate the co-channel and non co-channel interference and address the techniques to reduce interference. (TL 5) CO3.Understands different impairments in radio environment and different mobile antennas. (TL 2) CO4.Evaluate system efficiency using frequency management and channel assignments with reduction in interference. (TL 5) CO5.Understands handoff mechanism and types of handoff in cellular systems. (TL 2)

Code	Course Name	Course Outcomes
A70436	**Digital Image Processing**	**At the end of this course, each student should be able to:** CO1.Understand digital image fundamentals and transform image data into different domains for high and processing. (TL 2) CO2.Able to apply conventional and filtering for enhancing the image quantity. (TL 3) CO3.Able to apply different filtering techniques for restoration of images. (TL 3) CO4.Able to segment the images for the specific applications using conventional and mophological operations. (TL 2) CO5.Able to compress the image data able to apply various image compression techniques with loss or without loss. (TL 5)
A70515	**Computer Networks**	**At the end of this course, each student should be able to:** CO1.Able to compare the layers of OSI and TCP/IP models and Examine the detection and correction methods in Data Link Layers.(TL-04 & TL-05) CO2.Understand the various computer networking devices and concepts of collision methods in multiple access techniques. (TL-04) CO3.Estimate the paths for various routing protocols. (TL-05) CO4.Understand the compatibility between IPv4 and IPv6 Protocols.(TL-04) CO5.Understand the Application layer protocol and compare the TCP and UDP Protocols. (TL-04)
A70442	**MICROWAVE ENGINEERING**	**At the end of this course, each student should be able to:** CO1:**Summarize** concepts of Microwave frequencies, Rectangular waveguides and Micro-strip lines, Waveguide components CO2.**Categorize**Microwave tubes and **Analyze** Klystron, TWT CO3.**Explain** the working of Magnetron, Gunn diode CO4.**Examine** Frequency, Power, VSWR, Attenuation using Microwave Bench
A70444	**Optical Communication**	**At the end of this course, each student should be able to:** CO1.Analyzetheconstructionalparametersofoptical fibers. CO2.Designanopticalsystem. CO3.**E**stimatethelossesduetoattenuation,absorption,scatteringand bending. CO4.Compare various optical detectors and choose suitable one for different applications.
IV B. Tech II Semester		

Code	Course Name	Course Outcomes
A80452	**Satellite Communications**	**At the end of this course, each student should be able to:** CO1.Understand the Orbital mechanism of satellite and compute satellite orbital parameters.(TL-03) CO2.Understand the concept of launch vehicles to control over the position in the orbit of sub satellite systems and design link budget. (TL-03) CO3.Understand the various propagational effects and its access mechanism of a link. (TL-03) CO4.Understand the earth station technology, Satellite Navigation and Positioning Systems(TL-03) CO5.Understand the message transmissions for satellite communication over the Multiple access. (TL-03)
A80450	**Radar Systems**	**At the end of this course, each student should be able to:** CO1.Able to understand the basic operation of Radar and analyze the radar range equation. (TL 2, 4) CO2.Able to apply the knowledge of Doppler effect to analyze the characteristics of CW and FM-CW radars. (TL 3, 4) CO3.Able to analyze the characteristics of MTI Radar and Pulse Doppler Radars. (TL4) CO4.Able to evaluate different tracking methods and range measurements in radars. (TL3) le to analyze basic radar receivers with radar equation and understand beam steering methods in the phased array radar. (TL 2, 4)
A80454	**Wireless communications**	**At the end of this course, each student should be able to:** CO1.Understand the Principles of Wireless Communications CO2.Understand the fundamentals of Wireless Networking CO3.Analyze various multiple access schemes used in wireless communications CO4.Understand wireless wide area networks and their performanc analysis CO5.Demonstrate wireless local area networks and their specifications
A80089	Seminar	CO4. Ability to work in actual working environment. CO5. Ability to utilize technical resources CO6. Ability to write technical documents and give oral presentations related to the work completed.
A80088	Project Work	CO4. Ability to implement and execute well defined objective CO5. Ability to work in team at component level and system level CO6. Ability to troubleshoot.
A80090	Comprehensive Viva	CO5. Face any type of interviews, viva-voce, and aptitude tests. CO6. Perform well in competitive exams and group discussions CO7. Apply knowledge in building their career in particular fields. CO8. Enhance their communication skills and interactiveness.

DEPARTMENT OF CSE

PROGRAM OUTCOMES (POs)

PO1. **Engineering Knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

PO2. Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

PO3. Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.

PO4.Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.

PO5.Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.

PO6.The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

PO7.Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO8.Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

PO9.Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO10.Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11.Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

PO12.Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO-1: The ability to analyze and develop computer programs in the areas related to algorithms, system software, multimedia, web design, big data analytics, and networking for efficient design of computer-based systems of varying complexity.

PSO-2: The ability to apply standard practices and strategies in software project development using open-ended programming environments to deliver a quality product for business success.

PSO-3: The ability to employ modern computer languages, environments, and platforms in creating innovative career paths to be an entrepreneur, and a zest for higher studies.

MA301BS	Mathematics – IV	**At the end of this course, each student should be able to:** **CO1**: Analyze the complex functions with reference to their analyticity, integration using Cauchy's integral theorem. **CO2**: find the Taylor's and Laurent's series expansion of complex functions the bilinear transformation. **CO3**: express any periodic function in term of sines and cosines. **CO4**: express a non-periodic function as integral representation. **CO5**: analyze one dimensional wave and heat equation.
CS302ES	DATA STRUCTURES THROUGH C++	**At the end of this course, each student should be able to:** **CO1**: Ability to choose appropriate data structures to represent data items in real world problems. **CO2**: Ability to analyze the time and space complexities of algorithms. **CO3**: Ability to design programs using a variety of data structures such as stacks, queues. **CO4**: Hash tables, binary trees, search trees, heaps, graphs, and B-trees. **CO5:** Able to analyze and implement various kinds of searching and sorting techniques.
CS303ES:	MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE	CO1: Ability to apply mathematical logic to solve problems. CO2: Understand sets, relations, functions, and discrete structures. CO3: Able to use logical notation to define and reason about fundamental mathematical concepts such as sets, relations, and functions. CO4: Able to formulate problems and solve recurrence relations. CO5: Able to model and solve real-world problems using graphs and trees.
CS304ES:	DIGITAL LOGIC DESIGN	CO1: Able to understand number systems and codes. CO2: Able to solve Boolean expressions using Minimization methods. CO3: Able to design the sequential and combinational circuits. CO4: Able to apply state reduction methods to solve sequential circuits.

CS305ES:	OBJECT ORIENTED PROGRAMMING THROUGH JAVA	CO1: Able to solve real world problems using OOP techniques. CO2: Able to understand the use of abstract classes. CO3: Able to solve problems using java collection framework and I/o classes. CO4: Able to develop multithreaded applications with synchronization. CO5: Able to develop applets for web applications. CO6: Able to design GUI based applications.
CS306ES:	DATA STRUCTURES THROUGH C++ LAB	CO1: Able to identify the appropriate data structures and algorithms for solving real world problems. CO2: Able to implement various kinds of searching and sorting techniques. CO3: Able to implement data structures such as stacks, queues, search trees, and hash tables to solve various computing Problems.
CS307ES:	IT WORKSHOP	CO1: Apply knowledge for computer assembling and software installation. CO2: Ability how to solve the trouble shooting problems. CO3: Apply the tools for preparation of PPT, Documentation and budget sheet etc.
CS308ES:	OBJECT ORIENTED PROGRAMMING THROUGH JAVA LAB	CO1:Able to write programs for solving real world problems using java collection framework. CO2: Able to write programs using abstract classes. CO3: Able to write multithreaded programs. CO4: Able to write GUI programs using swing controls in Java.
MC300ES:	ENVIRONMENTAL SCIENCE AND TECHNOLOGY	CO: Based on this course, the Engineering graduate will understand /evaluate / develop technologies on the basis of ecological principles and environmental regulations which in turn help in sustainable development.
CS401ES:	COMPUTER ORGANIZATION	CO1: Able to understand the basic components and the design of CPU, ALU and Control Unit. CO2: Ability to understand memory hierarchy and its impact on computer cost/performance. CO3: Ability to understand the advantage of instruction level parallelism and pipelining for high performance processor design. CO4: Ability to understand the instruction set, instruction formats and addressing modes of 8086. CO5: Ability to write assembly language programs to solve problems.
CS402ES:	DATABASE MANAGEMENT SYSTEMS	CO1: Demonstrate the basic elements of a relational database management system. CO2: Ability to identify the data models for relevant problems. CO3: Ability to design entity relationship model and convert entity relationship diagrams into RDBMS and formulate SQL queries on the data. CO4: Apply normalization for the development of application software.
CS403ES:	OPERATING SYSTEMS	CO1: Apply optimization techniques for the improvement of system performance. CO2: Ability to design and solve synchronization problems. CO3: Learn about minimization of turnaround time, waiting time and response time and also maximization of throughput by keeping CPU as busy as possible. CO4: Ability to change access controls to protect files. CO5: Ability to compare the different operating systems.

CS404ES:	FORMAL LANGUAGES AND AUTOMATA THEORY	CO1:Able to understand the concept of abstract machines and their power to recognize the languages. CO2: Able to employ finite state machines for modeling and solving Computing problems. CO3: Able to design context free grammars for formal languages. CO4: Able to distinguish between decidability and undecidability. CO5: Able to gain proficiency with mathematical tools and formal methods.
SM405ES:	BUSINESS ECONOMICS AND FINANCIAL ANALYSIS	CO: The students will understand the various Forms of Business and the impact of economic variables on the Business. The Demand, Supply, Production, Cost, Market Structure, Pricing aspects are learnt. The Students can study the firm's financial position by analysing the Financial Statements of a Company.
CS407ES:	DATABASE MANAGEMENT SYSTEMS LAB	CO1: Ability to design and implement a database schema for given problem. CO2: Apply the normalization techniques for development of application software to realistic problems. CO3: Ability to formulate queries using SQL DML/DDL/DCL commands.
CS408ES:	OPERATING SYSTEMS LAB	CO4: Ability to develop application programs using system calls in Unix. CO5: Ability to implement inter process communication between two processes. CO6: Ability to design and solve synchronization problems. CO7: Ability to simulate and implement operating system concepts such as scheduling, deadlock management, file management, and memory management.
MC400HS:	GENDER SENSITIZATION LAB	CO1: Students will have developed a better understanding of important issues related to gender in contemporary India. CO2: Students will be sensitized to basic dimensions of the biological, sociological, psychological and legal aspects of gender. This will be achieved through discussion of materials derived from research, facts, everyday life, literature, and film. CO3: Students will attain a finer grasp of how gender discrimination works in our society and how to counter it. CO4: Students will acquire insight into the gendered division of labour and its relation to politics and economics. CO5: Men and women students and professionals will be better equipped to work and live together as equals. CO6: Students will develop a sense of appreciation of women in all walks of life. CO7: Through providing accounts of studies and movements as well as the new laws that provide protection and relief to women, the textbook will empower students to understand and respond to gender violence.
	DESIGN AND ANALYSIS OF ALGORITHMS	CO1: Ability to analyze the performance of algorithms. CO2: Ability to choose appropriate algorithm design techniques for solving problems. CO3: Ability to understand how the choice of data structures and the algorithm design methods impact the performance of programs.
	DATA COMMUNICATION AND COMPUTER NETWORKS	CO1: Students should be understood and explore the basics of Computer Networks and various protocols. He/She will be in a position to understand the World Wide Web concepts. CO2: Students will be in a position to administrate a network and flow of information further he/she can understand easily the concepts of network security, Mobile and adhoc networks.

	SOFTWARE ENGINEERING	CO1: Ability to identify the minimum requirements for the development of application. CO2: Ability to develop, maintain, efficient, reliable and cost effective software solutions. CO3:Ability to critically thinking and evaluate assumptions and arguments.
	FUNDAMENTALS OF MANAGEMENT	CO: The students understand the significance of Management in their Profession. The various Management Functions like Planning, Organizing, Staffing, Leading, Motivation and Control aspects are learnt in this course. The students can explore the Management Practices in their domain area.
	DESIGN AND ANALYSIS OF ALGORITHMS LAB	CO: Ability to write programs in java to solve problems using algorithm design techniques such as Divide and Conquer, Greedy, Dynamic programming, and Backtracking.
	COMPUTERNETWORKS LAB	CO1: Ability to understand the encryption and decryption concepts in Linux environment. CO2: Ability to apply appropriate algorithm for the finding of shortest route. CO3:Ability to configure the routing table.
	PROFESSIONAL ETHICS	CO: The students will understand the importance of Values and Ethics in their personal lives and professional careers. The students will learn the rights and responsibilities as an employee, team member and a global citizen.
	COMPILER DESIGN	CO1: Ability to design, develop, and implement a compiler for any language. CO2: Able to use lex and yacc tools for developing a scanner and a parser. CO3: Able to design and implement LL and LR parsers. CO4: Able to design algorithms to perform code optimization in order to improve the performance of a program in terms of space and time complexity. CO5: Ability to design algorithms to generate machine code.
	WEB TECHNOLOGIES	CO1: gain knowledge of client side scripting, validation of forms and AJAX programming CO2: have understanding of server side scripting with PHP language CO3: have understanding of what is XML and how to parse and use XML Data with Java CO4: To introduce Server side programming with Java Servlets and JSP.
	CRYPTOGRAPHY AND NETWORK SECURITY	CO1: Student will be able to understand basic cryptographic algorithms, message and web authentication and security issues. CO2: Ability to identify information system requirements for both of them such as client and server. CO3: Ability to understand the current legal issues towards information security.
	MOBILE COMPUTING	CO1: Able to think and develop new mobile application. CO2: Able to take any new technical issue related to this new paradigm and come up with a solution(s). CO3: Able to develop new ad hoc network applications and/or algorithms/protocols. CO4: Able to understand & develop any existing or new protocol related to mobile Environment.

	DESIGN PATTERNS	CO1: Create software designs that are scalable and easily maintainable CO2: Understand the best use of Object Oriented concepts for creating truly OOP programs. CO3: Use creational design patterns in software design for class Instantiation. CO4: Use structural design patterns for better class and object Composition. CO5: Use behavioral patterns for better organization and communication between the objects. CO6: Use refactoring to compose the methods for proper code Packaging. CO7: Use refactoring to better organize the class responsibilities of current code.
	ARTIFICIAL INTELLIGENCE	CO1: Possess the ability to formulate an efficient problem space for a problem expressed in English. CO2: Possess the ability to select a search algorithm for a problem and characterize its time and space complexities. CO3: Possess the skill for representing knowledge using the appropriate technique. CO4: Possess the ability to apply AI techniques to solve problems of Game Playing, Expert Systems, Machine Learning and Natural Language Processing.
	WEB TECHNOLOGIES LAB	CO1: Use LAMP Stack for web applications. CO2: Use Tomcat Server for Servlets and JSPs. CO3: Write simple applications with Technologies like HTML, Javascript, AJAX, PHP, Servlets and JSPs. CO4: Connect to Database and get results. CO5: Parse XML files using Java (DOM and SAX parsers)
	ADVANCED ENGLISH COMMUNICATION SKILLS LAB	Students will be able to: CO1: Acquire vocabulary and use it contextually. CO2: Listen and speak effectively. CO3: Develop proficiency in academic reading and writing. CO4: Increase possibilities of job prospects. CO5:Communicate confidently in formal and informal contexts.

DEPARTMENT OF IT

Program Educational Objectives (PEOs)

1. Engage in continuous learning by upgrading skills in Information Technology and solve real life & professional problems with the knowledge of fundamental science and engineering concepts.
2. Exhibit professional excellence, ethics, soft skills, leadership qualities and also responsibility towards societal needs.
3. To train students with good scientific and engineering breadth so as to comprehend, analyze, design, and create novel products and solutions for the real life problems.

Program Specific Outcomes (PSOs)

1. To possess the knowledge of information technology, on social issues to find solution.
2. To use recent techniques, skills and tools to solve complex engineering problems.

3. To design, develop, implement and evaluate software components, process and systems to meet the industrial needs and contribute to society.

Program Outcomes (POs):

Program Outcome / Program Educational Outcomes / Student Learning Outcomes describe what students are expected to know and be able to do by the time of graduation. Outcomes are narrower statements and these relate to the skills, knowledge, and behaviors/attitudes that students acquire as they progress through the program.

After completing this program the student will be able to:

1. Apply knowledge of mathematics, science and engineering
2. Design and conduct experiments, as well as to analyze and interpret data
3. Design a system, component, or process to meet desired needs with in realistic constraints as economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability.
4. Function on multi-disciplinary teams.
5. Identify and formulate solutions for engineering problems.
6. Learn professional and ethical responsibility.
7. Communicate effectively.
8. Learn the impact of computer engineering solutions in a global and societal context.
9. Recognize the need for, an ability to engage in life-long learning.
10. Acquire knowledge of contemporary issues and to become a good entrepreneur.
11. Use the techniques, skills and modern engineering tools necessary for engineering practice.
12. Create and/or use Computer Science and Engineering related software tools, to get employment and succeed in higher studies.

COURSE OUTCOMES (COs)

B.TECH – INFORMATION TECHNOLOGY

JNTUH: 2018-2019

Code	Course Name	Course Outcomes
I B. Tech		
A10001	English	**At the end of this course, each student should be able to:** CO1. Realize the value of English as an international language, as a Lingua-Franca and try to improve their knowledge regarding language skills and elements to be perfect in their usage. CO2. Usage of English Language, written and spoken. CO3. Enrichment of comprehension and fluency CO4. Gaining confidence in using language in verbal situations. CO5. Develop the ability to analyze the language used in descriptions and narrations.
A10002	Mathematics – I	**At the end of this course, each student should be able to:** CO1. Write the matrix representation of a set of linear equations and to analyze solutions of system of equations. CO2. Analyze the methods of differential calculus to optimize single and multivariable functions. CO3. Evaluate the multiple integrals and can apply the concepts to find the areas, volumes, moment of inertia etc., of regions on a plane or in space. CO4. Identify the type of differential equation and uses the right method to solve the differential equation. Also able to apply the theory of differential equations to the real world problems. CO5. Solve certain differential equations using Laplace transform. Also able to transform functions on time domain to frequency domain using Laplace transforms.
A10003	Mathematical Methods	**At the end of this course, each student should be able to:** CO5. Predict the value of the data at an intermediate point and by curve fitting, can find the most appropriate formula for a guessed relation of the data variables. This method of analysis data helps engineers to understand the system for better interpretation decision making. CO6. Find a root of a given equation and will be able to find a numerical solution for a given differential equation. CO7. Find the expansion of a given function by Fourier series and Fourier transform of the function. CO8. Helps in phase transformation, phase change and attenuation coefficients in acoustics. CO9. Find a corresponding partial differential equation for an unknown function with many independent variables and to find their solution.

Code	Course Name	Course Outcomes
A10004	Engineering Physics	**At the end of this course, each student should be able to:** CO1. Learn the fundamental concepts on behavior of crystalline solids. CO2. Have knowledge on fundamentals of Quantum Mechanics, Statistical Mechanics enables the student to apply to various systems like Communications Solar Cells, Photo Cells and so on. CO3. Design, Characterization and study of properties of materials help the student to prepare new materials for various Engineering applications. CO4. Expose to non-destructive testing methods. CO5. Develop problem solving skills and analytical skills.
A10005	Engineering Chemistry	**At the end of this course, each student should be able to:** CO1. Extrapolate the knowledge of cell, electrode, cathode, anode, electrolysis, electromotive force and reference electrode. CO2. Explore the engineering applications of polymeric materials. CO3. Develop awareness about the usage of conducting polymers as an engineering material. CO4. Justify the immense importance of basic constructional material, Portland cement in Civil Engineering works. CO5. Summarize the application of phase rule to one and two component systems.
		I B. Tech
A10501	Computer Programming	**At the end of this course, each student should be able to:** CO1. Identify and understand the working of key components of a computer system. CO2. Develop algorithms and flowcharts for solving mathematical and engineering problems. CO3. Design programs involving decision structures, loops and functions. CO4. Use structured data types and the concept of arrays in simple data processing applications. CO5. Understand the concept of recursion and describe its implementation using a stack.
A10301	Engineering Drawing	**At the end of this course, each student should be able to:** CO1. Identify the basic concepts of Engineering Drawing. CO2. Construct various conic sections, cycloids and scales. CO3. Apply the principles of orthographic projections to projections of points and lines. CO4. Sketch different sections and sectional views of solids. CO5. Design the perspective projections of various points, lines, plane figures and simple solids.
A10581	Computer Programming Lab	**At the end of this course, each student should be able to:** CO1. Write programs in C to solve real-world problems. CO2. Choose the appropriate data structure and algorithm design method for a specified application. CO3. Implement simple searching and sorting methods. CO4. Write complex applications using structured programming methods.

Code	Course Name	Course Outcomes
A10081	Engineering Physics/Engineering Chemistry Lab	**At the end of this course, each student should be able to:** **Physics Lab:** CO1. Analyze the concept of error and its analysis. CO2. Compare the theory and correlate with experiment. CO3. Analyze the applications of physics experiments in day to day life **Chemistry Lab:** CO4. Develop experimental skills to design new experiments in Engineering. c. Exposure to these experiments the student can compare the theory and correlate with experiment. CO5. Estimate the number of free ions, charge & mobility of ions in the mixture of acids using conductivity meter and also gets an idea about titrations without using any indicator. CO6. Determine the presence and quantity of impurities in water and he can estimate amount of metal in metalores.
A10083	English Language Communication Skills Lab	**At the end of this course, each student should be able to:** CO1. Discuss role and importance of communication skills and learn to make use of various forms of communication in their respective professional fields. CO2. Use communication tool to be an effective team leader or team member. CO3. Use communication modes as a tool for success in career progression. CO4. Analyze and share the ideas by various media of information transfer. CO5. Design various behavioral aspects in relation to problem solving.
A10082	IT Workshop/ Engineering Workshop	**At the end of this course, each student should be able to:** **Engineering Workshop** CO1. Prepare various jobs with carpentry trade and fitting trade. CO2. Prepare various jobs with Black smithy trade. CO3. Produce various patterns with foundry techniques. CO4. Combine various metal pieces with the techniques of welding. CO5. Identify various power tools in construction, wood working, electrical and mechanical engineering. CO6. Recognize the methods of plumbing. **IT Workshop** CO1. Analyze various aspects of information technology. CO2. Demonstrate capability to work with LaTeX. CO3. Perform upgrading and repairing of PC‘s.
II B. Tech I Semester		

Code	Course Name	Course Outcomes
A30008	Probability and Statistics	**At the end of this course, each student should be able to:** CO5. Identify distribution in certain realistic situation. CO6. Differentiate among many random variables involved in the probability models. CO7. Calculate mean and proportions (small and large sample) and to make important decisions from few samples which are taken out of unmanageably huge populations. CO8. Find the expected queue length, the ideal time, the traffic intensity and the waiting time. CO9. Know the random process, Markov process and Markov chains which are essentially models of many time dependent processes such as signals in communications, time series analysis, queuing systems. CO10. Find the limiting probabilities and the probabilities in nth state.
A30504	Mathematical Foundations of Computer Science	**At the end of this course, each student should be able to:** CO1. Visualize data numerically and/or graphically. CO2. Analyze and be able to use the notions of propositions and predicate formulae, satisfiability, and formal proof. CO3. Illustrate by examples the basic terminology of functions, relations, and sets and demonstrate knowledge of their associated operations. CO4. Demonstrate in practical applications the use of basic counting principles of permutations, combinations, inclusion/exclusion principle and the pigeonhole methodology. CO5. Represent and apply graph theory in solving computer science problems.
A30502	Data Structures	**At the end of this course, each student should be able to:** CO1. Learn how to use data structure concepts for realistic problems. CO2. Identify appropriate data structure for solving computing problems in respective language. CO3. Solve problems independently and think critically. CO4. Describe the usage and operations for maintaining various data structures. CO5. Describe various data structures like Stacks, Queues, Linked lists, Trees and Graphs are represented in memory and used by algorithms. CO6. Apply basic algorithm strategies and to design algorithms for concrete problems of reasonable difficulty.
A30401	Digital Logic Design and Computer Organization	**At the end of this course, each student should be able to:** CO1. Learn number systems, binary addition and subtraction, 2's complement representation and operations with this representation. CO2. Identify the importance of SOP and POS canonical forms in the minimization or other optimization of Boolean formulas in general and digital circuits. CO3. Evaluate functions using various types of minimizing algorithms like Boolean algebra, Karnaugh map or tabulation method. CO4. Analyze the design procedures of Combinational and Sequential logic circuits. CO5. Analyze memory organizations, PAL, PLA and memory hierarchy concepts.

Code	Course Name	Course Outcomes
A30404	Electronic Devices and Circuits	**At the end of this course, each student should be able to:** CO9. Learn and analyze the different types of diodes, operation and its characteristics. CO10. Analyze the function of diode as rectifier. CO11. Design and analyze the DC bias circuitry of BJT and FET. CO12. Design biasing circuits using diodes and transistors. CO13. Analyze and design diode application circuits, amplifier circuits and oscillators employing BJT, FET devices.
A30202	Basic Electrical Engineering	**At the end of this course, each student should be able to:** CO1. Explain basic electrical concepts, including electric charge, current, electrical potential, electrical Power and energy. CO2. Apply Kirchhoff's voltage and current laws to the analysis of electric circuits. CO3. Differentiate different types of instruments and their application. CO4. Describe the electrical machines based on real time system. CO5. Analyze simple problems of AC circuits.
A30282	Electrical and Electronics Lab	**At the end of this course, each student should be able to:** CO1. Learn the circuit theorems and various electrical components. CO2. Learn applications of DC and AC machines. CO3. Identify and selection of various electronic components. CO4. Analyze the characteristics of various electronics components. CO5. Understand the conversion of AC power to DC power.
A30582	Data Structures Lab	**At the end of this course, each student should be able to:** CO1. Identify the appropriate data structure for given problem. CO2. Design and analyze the time and space complexity of algorithm or program. CO3. Effectively use compilers include library functions, debuggers and trouble shooting.
II B. Tech II Semester		

Code	Course Name	Course Outcomes
A50511	Principles of Programming Languages	**At the end of this course, each student should be able to:** CO1. Review the concepts of programming languages, List out various programming paradigms used in different languages. CO2. Recall the design issues of various programming language implementation, discuss various programming environments. CO3. Elaborate the features of attribute grammars and draw parse trees. List out various data types in different programming languages. CO4. Tabulate different parameter passing techniques of different programming languages, List out the concepts of object oriented programming in C++, Ada95, and Smalltalk. CO5. Apply logic programming concepts by using PROLOG, Use of functional programming languages like LISP, ML, and Haskell. CO5. Recall the importance of semaphores, monitors, message passing, Apply scripting languages in web design and real-time applications.
A40507	Database Management Systems	**At the end of this course, each student should be able to:** CO5. Demonstrate the basic elements of a relational database management system. CO6. Identify data models for relevant problems. CO7. Design entity relationship and convert entity relationship diagrams into RDBMS and formulate SQL queries on the respect data. CO8. Apply normalization for the development of application software's. CO9. Design and implement a full real size database system.
A40503	Java Programming	**At the end of this course, each student should be able to:** CO6. List and use Object Oriented Programming concepts for problem solving. CO7. Write programs using Java collection API as well as the java standard class library. CO8. Solve the inter-disciplinary applications using the concept of inheritance. CO9. Apply JDBC to provide a program level interface for communicating with database using java programming. CO10. Apply the garbage collection for saving the resources automatically.
A40009	Environmental Studies	**At the end of this course, each student should be able to:** CO1. Apply Knowledge regarding environment and its components. CO2. Learn various ecosystems, their biodiversity and Scientific methods to protect them. CO3. Comprehend different types of pollutions and their control measures. CO4. Enhance their ability for effective methods of waste management CO5. Learn about global environmental problems and come out with best possible solutions. CO6. Create awareness about environmental laws, Environmental Impact assessments.

Code	Course Name	Course Outcomes
CS502PC	Data Communication & Computer Networks	**At the end of this course, each student should be able to:** CO1. Students should be understand and explore the basics of Computer Networks and Various Protocols. He /She will be in a position to understand the World Wide Web concepts.
CS502PC	Data Communication & Computer Networks	**At the end of this course, each student should be able to:** CO5. Students should be understand and explore the basics of Computer Networks and Various Protocols. He /She will be in a position to understand the World Wide Web concepts. CO6. Students will be in a position to administrate a network and flow of information further he/she can understand easily the concepts of network security, Mobile and adhoc networks.
CS501PC	Design and Analysis of Algorithms	**At the end of this course, each student should be able to:** CO7. Ability to analyze the performance of algorithm. CO8. Ability to choose appropriate algorithm design techniques for solving problem. CO9. Ability to understand how the choice of data structures and the algorithm design methods impact the performance of programs.
A40585	Java Programming Lab	**At the end of this course, each student should be able to:** CO1. Implement basics of java programming, multi-threaded programs and exception handling. CO2. Apply OOP in java programming in problem solving. CO3. Access data from a DB with java programs. CO4. Simulate dynamic and interactive programs using applets. CO5. Use of GUI components (console and GUI based).
A40584	Database Management Systems Lab	**At the end of this course, each student should be able to:** CO9. Design and implement a database schema for given problem. CO10. Capable to design and build a GUI application. CO11. Apply the normalization techniques for development of application software to realistic problems. CO12. Formulate queries using SQL DML/DDL/DCL commands.
III B. Tech I Semester		

Code	Course Name	Course Outcomes
A50513	Automata & Compiler Design	**At the end of this course, each student should be able to:** CO1. Analyze the design of a compiler and the phases of program translation from source code to executable code and the files produced by these phases. CO2. Use the powerful compiler generation tools such as Lex and YACC for generating the parser. CO3. Identify the analysis phase, similarities and differences among various parsing techniques and grammar transformation techniques. CO4. Implement major parsing techniques ranging from the recursive decent methods to the computationally more intensive LR techniques that have been used in parser generator. CO5. Implement the global optimization using data flow analysis such as basic blocks and DAG. CO6. Learn the code generation techniques to generate target code.
A70517	Linux Programming	**At the end of this course, each student should be able to:** CO1. Identify the functionality of UNIX Operating System Utilities and commands. CO2. Use shell programs in the UNIX environment while exploring OS features. CO3. Translate Unix Commands to develop C programs. CO4. Implement awk scripts in UNIX environment. CO5. Analyze various methods for Inter Process Communication in UNIX. CO1. Evaluate the performance of visual and screen editors
A50518	Software Engineering	**At the end of this course, each student should be able to:** CO1. Adapt the basic software engineering methods and practices in their appropriate applications CO2. Distinguish the various software process models such as waterfall model, evolutionary models, etc. CO3. Compose the requirements document by understanding the software requirements CO4. Relate the software architectural styles to the suitable applications. CO5. Determine the need for, and an ability to engage in, life-long learning. CO6. Analyze, design and maintain software systems.
A50510	Operating Systems	**At the end of this course, each student should be able to:** CO1. Learn the basic concepts of operating systems. and about process management CO2. Apply different optimization techniques for the improvement of system performance CO3. Learn and apply different memory management techniques CO4. Discuss various protection and security aspects. CO5. Apply different deadlock prevention techniques

Code	Course Name	Course Outcomes
A50515	Computer Networks	**At the end of this course, each student should be able to:** CO1. Explore the basis of computer networks and various protocols. She/he will be in a position to understand the World Wide Web concepts. CO2. Administrate a network and flow of information further he/she can understand easily the concepts of network security, mobile and ad hoc networks. CO3. Enumerate the layers of the OSI model and TCP/IP, explain the function(s) of each layer. CO4. Analyze different MAC mechanisms (Aloha, Slotted Aloha, TDMA, and FDMA) and understand their pros and cons. CO5. Predict ethical, legal, security and social issues related to computer networks.
A60010	Managerial Economics and Financial Analysis	**At the end of this course, each student should be able to:** CO1. Learn the market dynamics namely, demand and supply, demand forecasting, elasticity of demand and supply, pricing methods and pricing in different market structures. CO2. Gain an insight into how production function is carried out to achieve least cost combination of inputs and cost analysis. CO3. Develop an understanding of how capital budgeting decisions are carried out. CO4. Analyze the framework for both manual and computerized accounting process.
A50589	Operating Systems Lab	**At the end of this course, each student should be able to:** CO1. Understand and implement basic services and functionalities of the operating system using system calls. CO2. Use modern operating system calls and synchronization libraries in software/ hardware interfaces. CO3. Analyze and simulate CPU Scheduling Algorithms like FCFS, Round Robin, SJF, and Priority. CO4. Implement memory management schemes and page replacement schemes.
A50588	Computer Networks Lab(Through LINUX)	**At the end of this course, each student should be able to:** CO1. Learn the practical approach of how a compiler works. CO2. Analyze the working of lex and yacc compiler for debugging of programs. CO3. Develop program for solving parser problems. CO4. Enable him to work in the development phase of new computer languages in industry. CO5. Learn how to write programs that execute faster.
		III B. Tech II Semester
A60512	Web Technologies	**At the end of this course, each student should be able to:** CO1. Gain knowledge of client side scripting, validation of forms and AJAX programming. CO2. Have understanding of server side scripting with PHP language. CO3. Have understanding of what is XML and how to parse and use XML Data with Java. CO1. Create applications by using the concepts like JSP and Servlet.

Code	Course Name	Course Outcomes
A50018	Human Values and Professional Ethics	**At the end of this course, each student should be able to:** CO2. Aware of significance of Human values for the development of individual as well as the society at large. CO3. Recognize the engineering ethical theories and models which guides an individual in overall personality development CO4. Significance of Code of ethics plays a vital role in job performance. CO5. Identify the global ethical issues and ability to prevent those issues at organizational and individual level. CO1. Acquires knowledge on safety, responsibilities and rights through case studies.
A60524	Object Oriented Analysis and Design	**At the end of this course, each student should be able to:** CO1. Demonstrate the Conceptual model of UML and SDLC. CO2. Define classes modeling techniques and instances modeling techniques. CO3. Describe interaction diagrams and their modeling techniques. CO4. Demonstrate activity diagram and their modeling techniques. CO5. Demonstrate component and deployment diagram.
A70520	Data Warehousing and Data Mining	**At the end of this course, each student should be able to:** CO1. Explore various data pre-processing procedures and their application scenarios. CO2. Visualize and interpret the results produced by data mining. CO3. Discuss the data-mining tasks like classification, regression, clustering, association mining. CO4. Solve real-world problems in business and scientific information using data mining.
A60525	Software Testing Methodologies	**At the end of this course, each student should be able to:** CO6. Demonstrate the importance and purpose of testing and its applications in software development life cycle. CO7. Learn the model for testing by taking a project, environment, program and bugs. CO8. Apply the process of testing and various methodologies in testing for developed software. CO9. Write test cases for given software to test it before delivery to the customer.
A70519	Cloud Computing	**At the end of this course, each student should be able to:** CO1. Analyze the virtualization and cloud computing concepts. CO2. Learn the architecture, deployment models, and infrastructure models of Cloud Computing. CO3. Demonstrate knowledge on the cloud computing security, federation, presence, identity, and privacy CO4. Familiar with open source cloud computing software, and free/commercial cloud services. CO5. Learn the privacy policy of cloud providers.

Code	Course Name	Course Outcomes
A60591	Data Warehousing and Mining and Web Technologies Lab	**At the end of this course, each student should be able to:** CO1. Apply data mining techniques for real world data CO2. Explore various data pre-processing procedures and their application scenarios. CO3. Apply data mining algorithms as a component to the existing tools. CO1. Visualize different patterns extracted from different data sets **Web Technologies:** CO2. Use LAMP stack for web applications. CO3. Use Tomcat Server for Servlets and JSPs. CO4. Write simple applications with technologies like HTML, JavaScript, AJAX, PHP, Servlets and JSPs. CO5. Connect to database and get results.
A60086	Advanced Communication Skills Lab	**At the end of this course, each student should be able to:** CO1. Identify the sounds of RP and apply them to transcribe words. CO2. Listen, speak, read & write the sounds of English using correct stress, tone and rhythm. CO3. Language Skills- Grammar Exercises, Jumbled Sentences & correcting errors. CO4. Role-Play- enacting ideas, themes(short duration & one-on-one activity) CO5. Introducing Self & Others- Learning the nuances of Introduction, Asking questions and Overcoming stage fright.
IV B. Tech I Semester		
A70522	Information Security	**At the end of this course, each student should be able to:** CO2. Analyze basic cryptographic algorithms, message and web authentication and security issues. CO3. Identify information system requirements for both of them such as client and server. CO4. Learn the process of combining security association and key management. CO5. Analyze how security is provided for many applications through SNMP. Analyze the current legal issues towards information security.
A70530	Design Patterns	**At the end of this course, each student should be able to:** CO1. Demonstrate a thorough understanding of patterns and their underlying principles. CO2. Know what design pattern to apply to a specific problem. CO3. Demonstrate what tradeoffs need to be made when implementing a design pattern CO4. Use design patterns when developing software.

Code	Course Name	Course Outcomes
A70535	Mobile application Development	**At the end of this course, each student should be able to:** CO1. Ability to install J2ME toolkit. CO2. Ability to develop the user interface and authenticate with a Web Server CO3. Ability to design Web application using J2ME.
A70533	Information Retrieval Systems	**At the end of this course, each student should be able to:** CO1. Implement algorithms like clustering, pattern searching, and stemming algorithms. CO2. Possess the ability to store and retrieve textual documents using appropriate models. CO3. Possess the ability to use the various retrieval utilities for improving search. CO4. Possess an understanding of indexing and compressing documents to improve space and time efficiency. CO5. Demonstrate various technologies the most appropriate one for the task of extracting such as copy/paste software functions, photocopier, scanner, audio/visual equipment.
A70541	Wireless Networks and Mobile Computing	**At the end of this course, each student should be able to:** CO1. Able to think and develop new mobile application. CO2. Able to take any new technical issue related to s new paradigm and come up with a solution(s). CO3. Able to develop new ad hoc network applications and/or/ algorithms/ protocols. CO4. Able to understand & develop any existing or new protocol related to mobile environment.
A70531	Human Computer Interaction	**At the end of this course, each student should be able to:** CO1. Apply an interactive design process and universal design principles to designing HCI systems. CO2. Describe and use HCI design principles, standards and guidelines. CO3. Analyze and identify user models, user support, socio-organizational issues, and stakeholder requirements of HCI systems. CO4. Discuss tasks and dialogs of relevant HCI systems based on task analysis and dialog design.
A70593	Case Tools Software Testing Lab	**At the end of this course, each student should be able to:** **Case Tools:** CO1. Understand the history cost of using and building CASE tools. CO2. Construct and evaluate hybrid CASE tools by integrating existing tools.

Code	Course Name	Course Outcomes
A70531	Mobile Application Development Lab	**At the end of this course, each student should be able to:** CO1. Ability to install J2ME toolkit. CO2. Ability to develop the user interface and authenticate with a web server. CO3. Ability to design web application using J2ME.
IV B. Tech II Semester		
A80014	Management Science	**At the end of this course, each student should be able to:** CO1. Plan an organizational structure for a given context in the organization CO2. Carry out production operations through Work study. CO3. Understand the markets, customers and competition better and price the given products appropriately CO4. Ensure quality for a given product or service CO5. Plan and control the HR function better CO6. Plan, schedule and control projects through PERT and CPM CO7. Evolve a strategy for a business or service organization
A80550	Storage Area Networks	**At the end of this course, each student should be able to:** CO1. Demonstrate the storage area networks and their products. CO2. Identify and describe the functions to build data center networking for switch network. CO3. Provide the mechanisms for the backup/recovery. CO4. Describe the different role in providing disaster recovery and business continuity capabilities.
A80544	E-Commerce	**At the end of this course, each student should be able to:** CO1. Ability to identify the business relationships between the organizations and their customers CO2. Ability to perform various transactions like payment, data transfer and etc.
A80087	Industry Oriented Mini Project	CO1. Formulate a real world problem and develop its requirements CO2. Test and validate the conformance of the developed prototype against the original requirements of the problem CO3. Work as a responsible member and possibly a leader of a team in developing software solutions CO4. Participate in and possibly moderate, discussions that lead to making decisions CO5. Self learn new tools, algorithms, and/or techniques that contribute to the software solution of the project CO6. Generate alternative solutions, compare them and select the optimum one.
A80089	Seminar	CO7. Ability to work in actual working environment. CO8. Ability to utilize technical resources CO9. Ability to write technical documents and give oral presentations related to the work completed.

Code	Course Name	Course Outcomes
A80088	Project Work	CO7. Ability to plan and execute well defined objective CO8. Ability to work in team at component level and system level CO9. Ability to troubleshoot CO10. Ability to reuse- or integrate with- existing components CO11. Ability to derive performance metrics and assess quantitatively the performance of system CO12. Ability to report and present the findings in standard formats
A80090	Comprehensive Viva	CO9. Face any type of interviews, viva-voce, and aptitude tests. CO10. Perform well in competitive exams and group discussions CO11. Apply knowledge in building their career in particular fields. CO12. Enhance their communication skills and interactiveness.

DEPARTMENT OF HUMANITES & SCIENCES

Program Educational Objectives (PEOs)

Code	Course Name	Course Outcomes
I B. Tech I Semester		
MA101BS	**Mathematics – I**	**At the end of this course, each student should be able to:** **CO1:** Write the matrix representation of a set of linear equations and to analyze the solution. **CO2**: Find the Eigen values and Eigen vectors. **CO3**: Reduce the quadratic form to canonical form using orthogonal transformations. **CO4**: Analyze the nature of sequence and series. **CO5**: Solve the applications on the mean value theorems. **CO6**: Evaluate the improper integrals using Beta and Gamma functions. **CO7**: Find the extreme values of functions of two variables with/ without constraints.

Code	Course Name	Course Outcomes
AP102BS(SEM I, ECE) AP202BS (SEM II, EEE, CSE, IT)	**Applied Physics**	CO1: The student would be able to learn the fundamental concepts on Quantum behavior of matter in its micro state. CO2: The knowledge of fundamentals of Semiconductor physics, Optoelectronics, Lasers and Fibre optics enable the students to apply to various systems like communications, solar cell, Photo cells and so on. CO3: Design, characterization and study of properties of material help the students to prepare new materials for various engineering applications. CO4: The course also helps the students to be exposed to the phenomena of electromagnetism and also to have exposure on magnetic materials and dielectric materials.
CH102BS(SEM I, CSE, EEE, IT) CH202BS (SEM II, ECE)	**Chemistry**	The basic concepts included in this course will help the student to gain: 1. The knowledge of atomic, molecular and electronic changes, band theory related to conductivity. 2. The required principles and concepts of electrochemistry, corrosion and in understanding the problem of water and its treatments. 3. The required skills to get clear concepts on basic spectroscopy and application to medical and other field. 4. The knowledge of configurationally and conformational analysis of molecules and reaction mechanisms.
EN105HS(SEM I CSE, EEE, IT) EN205HS(SEMII ECE)	**English**	1. Students should be able to 2. Use English language effectively in spoken & written forms. 3. Comprehend the given texts and respond appropriately 4. Communicate confidently in various contexts & different cultures 5. Acquire basic proficiency in English including reading and listening comprehension, writing & speaking skills.
MA201BS II Semester for All Branches	Mathematics II	CO1: Identify the types of differential equations CO2: Solve the first and higher order differential equations and apply the concept of differential equation to the real world problems. CO3: Evaluate the multiple integrals and apply the concept to find the areas and volumes for cubes, sphere and rectangular parallelepiped. CO4: Evaluate the line, surface and volume integrals and converting them from one to another.
CS103ES ECE I SEMESTER CS203ES (EEE,CSE & IT) II SEMESTER	Programming for Problem Solving	The student will learn CO1:To write algorithms and to draw flowcharts for solving problems. CO2: To convert the algorithms/flowcharts to C programs. CO3: To code and test a given logic in C programming language. CO4: To decompose a problem into functions and to develop modular reusable code. CO5: To use arrays, pointers, strings and structures to write C programs. Searching and sorting problems.

Code	Course Name	Course Outcomes
EE108ES (EEE,CSE & IT) I SEMESTER /EE208ES ECE II SEMESTER	BASIC ELECTRICAL ENGINEERING	CO1: Get an exposure to basic electrical laws. CO2: Understand the response of different types of electrical circuits to different excitations. CO3: Understand the measurement, calculation and relation between the basic electrical parameters CO4: Understand the basic characteristics of transformers and electrical machines.
ME104ES(ECE) I Semester /ME204ES(EEE,IT,CSE) II Semester	ENGINEERING GRAPHICS	At the end of the course, the student will be able to: CO1: Preparing working drawings to communicate the ideas and information. CO2: Read, understand and interpret engineering drawings.
EE108ES I SEMESTER (EEE, CSE & IT)/ EE208ES (ECE II SEMESTER):	BASIC ELECTRICAL ENGINEERING LAB	Get an exposure to basic electrical laws. CO1: Understand the response of different types of electrical circuits to different excitations. CO2: Understand the measurement, calculation and relation between the basic electrical parameters. CO3: Understand the basic characteristics of transformers and electrical machines.
CS106ES(ECE I Semester)/ CS206ES: (EEE,CSE & IT II Semester)	PROGRAMMING FOR PROBLEM SOLVING LAB	The candidate is expected to be able to: CO1: Formulate the algorithms for simple problems. CO2: Translate given algorithms to a working and correct program. CO3: Correct syntax errors as reported by the compilers CO4: Identify and correct logical errors encountered during Execution. CO5: Represent and manipulate data with arrays, strings and Structures. CO6: Use pointers of different types create, read and write to and from simple text and binary files CO7: Modularize the code with functions so that they can be reused.
ME105ES(I semester CSE, EEE & IT) / ME205ES: (II SEMESTER – ECE)	ENGINEERING WORKSHOP	At the end of the course, the student will be able to: CO1: Study and practice on machine tools and their Operations. CO2: Practice on manufacturing of components using workshop trades including pluming, fitting, carpentry, foundry, house wiring and welding. CO3: Identify and apply suitable tools for different trades of Engineering processes including drilling, material removing, measuring, chiseling. CO4: Apply basic electrical engineering knowledge for house wiring practice
EN107HS(I SEMESTER EEE, CSE & IT)/ EN207HS: (II SEMESTER - ECE)	ENGLISH LANGUAGE AND COMMUNICATION SKILLS LAB	Students will be able to attain CO1: Better understanding of nuances of English language through audio- visual experience and group activities CO2: Neutralization of accent for intelligibility CO3: Speaking skills with clarity and confidence which in Turn enhances their employability skills.
*MC109ES: (ECE I SEMESTER)/ (EEE, CSE & IT II SEMESTER)	ENVIRONMENTAL SCIENCE	Course Out Comes: Based on this course, the Engineering graduate will understand /evaluate / develop technologies on the basis of ecological principles and environmental regulations which in turn helps in sustainable development

Code	Course Name	Course Outcomes

DEPARTMENT OF MECHANICAL ENGINEERING

Program Educational Objectives (PEOs)

PEOs reflect the career and professional accomplishments of graduates during the first few {1-3} years after graduation.

PEO 1: Graduate shall have the ability to apply knowledge in emerging areas of Mechanical Engineering and across the disciplines for academic excellence, research, and handle the realistic problems.
PEO 2: Graduates shall maintain ethical conduct, sense of responsibility to serve the society and protect the environment.
PEO 3: Graduates shall possess soft skills, managerial skills, leadership qualities, knowledge of contemporary issues for successful professional career and higher studies.

PROGRAM OUTCOMES (POs)

Program Outcome / Program Educational Outcomes / Student Learning Outcomes describe what students are expected to know and be able to do by the time of graduation. Outcomes are narrower statements and these relate to the skills, knowledge, and behaviors/attitudes that students acquire as they progress through the program. They will reflect all the Graduate Attributes at the end of the course.

Engineering programs will demonstrate that their students attain the following outcomes:
After completing this program the student will be able to:

1. Apply knowledge of mathematics, science and engineering
2. Design and conduct experiments, as well as to analyze and interpret data
3. Design a system, component, or process to meet desired needs with in realistic constraints as economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability.
4. Function on multi-disciplinary teams.
5. Identify and formulate solutions for engineering problems.
6. Learn professional and ethical responsibility.
7. Communicate effectively.
8. Learn the impact of Mechanical Engineering solutions in a global and societal context.

9. Recognize the need for, an ability to engage in life-long learning.
10. Acquire knowledge of contemporary issues and to become a good entrepreneur.
11. Use the techniques, skills and modern engineering tools necessary for engineering practice.

Able to use Mechanical Engineering related software tools, to get employment and succeed in higher studies.

PROGRAM SPECIFIC OUTCOMES (PSOs)

PSO-1: Mechanical Engineering graduates would be able to Work in power plants and manufacturing industry in the sphere of operation and maintenance.
PSO-2: Mechanical Engineering graduates would be able to apply creative thinking to design mechanical equipment and processes including development of domain specific software tools.

Code	Course Name	Course Outcomes
II B. Tech I Semester		
ME30PC	Machine Drawing	1) Identify dimensions individual components of an assembly 2) Describe the functional relationship between components of machine tools, I. C. Engines, Steam Engines. 3) Sketch assembly drawings as per given dimensions 4) Understand component drawings used in industry. 5) Design component drawings used in production of various industrial products.
ME304PC	Production Technology	1. Select appropriate manufacturing process to manufacture a component based application. 2. Explain basic principles of different manufacturing processes 3. Describe any of the manufacturing processes with the aid of neat sketches. 4. Identify the functional aspects of various machinery and equipment used in various manufacturing processes. 5. Modify the sequence of operations to be performed in producing a component based on application and production cost.
ME302PC	**Mechanics Of Solids**	1. Analyze the behavior of the solid bodies subjected to various types of loading. 2. Apply knowledge of materials and structural elements to the analysis of simple structures. 3 .Undertake problem identification, formulation and solution using a range of analytical methods. 4 .Analyze and interpret laboratory data relating to behavior of structures and the materials they are made of, and undertake associated laboratory work individually and in teams.

Code	Course Name	Course Outcomes
ME305PC	**Thermodynamics**	1. Solve Problems related to different concepts on thermodynamics 2. Apply the laws of thermodynamics to different types of systems undergoing various processes 3. Analyze concepts of Refrigeration Cycles, Brayton and Rankine cycles and to perform thermodynamic performance parameters.
ME303PC	**Metallurgy and Material Science**	1. Identify the properties of metals with respect to crystal structures and grain size. 2. Interpret the phase diagrams of materials. 3. Classify and distinguish different types of cast irons, steels and non ferrous alloys. 4. Describe the concept of heat treatment of steels and strengthening mechanisms.
ME306PC	**Production Technology Lab**	1) Understand method of conducting experiment. 2) Describe the experimental setup and related equipment. 3) Conduct the procedure as per standard procedure. 4) State the industrial application of conducting experiment. 5) Acquire practical skill in manufacturing component
III B. Tech I Semester		
EE511OE	**Non Conventional Power Generation**	1. Analyze solar thermal and photovoltaic systems and relative technologies for energy conversions. 2. Understand wind energy conversion and devices available for it. 3. Understand Biomass conversion and technologies, Geo thermal resources and energy conversions principles and technologies. 4. Realize power from Oceans (Thermal, wave, Tidal) and conversion devices. 5. Understand Fundamentals of fuel cells and commercial batteries.
SM504MS	**Fundamentals Of Management**	1. Identify roles, levels and skills of management and different approaches 2. Understand Planning and Decision making Processes 3. Apply the Principles and the concepts of Organization and HRM concepts 4. Apply Leadership , Motivational and Controlling concepts
ME503PC	**Metrology and Machine Tools**	1. Understand the cutting tool geometry, mechanism of chip formation and mechanics of orthogonal cutting. 2. Identify basic parts and operations of machine tools including lathe, shaper, planer, drilling, boring, milling and grinding machine. 3. Design locating and clamping devices to produce a component. 4. Select a machining operation and corresponding machine tool for a specific application in real time. 5. Select a measuring instrument to inspect the dimensional and geometric features of a given component.

Code	Course Name	Course Outcomes
ME502PC	**Thermal Engineering-I**	1. Understand various types of I.C. Engines and Cycles of operation. 2. Analyze the effect of various operating variables on engine performance 3. Identify fuel metering and fuel supply systems for different types of engines 4. Understand normal and abnormal combustion phenomena in SI and CI engines 5. Evaluate performance Analysis of IC Engine and Justify the suitability of IC Engine for different application 6. Understand the conventional and non-conventional fuels for IC engines and effects of emission formation of IC engines, its effects and the legislation standards. 7. Analyze & Solve the performance of Gas Turbine
MC500HS	**Professional Ethics**	1. The students will understand the basic perception of profession, professional ethics, various moral & social issues, industrial standards, code of ethics and role of professional ethics in engineering field. 2. The students will aware of professional rights and responsibilities of an engineer, responsibilities of an engineer for safety and risk benefit analysis. 3. The students will acquire knowledge about various roles of engineers in variety of global issues and able to apply ethical principles to resolve situations that arise in their professional lives.
ME501PC	**Design Of Machine Elements - I**	1. The student acquires the knowledge about the principles of design, material selection, component behavior subjected to loads, and criteria of failure. 2. Understands the concepts of principal stresses, stress concentration in machine members and fatigue loading. 3. Design on the basis of strength and rigidity and analyze the stresses and strains induced in a machine element.
IV B. Tech I Semester		
ME742PE	**Turbo machines**	1. Ability to design and calculate different parameters for turbo machines 2. Prerequisite to CFD and Industrial fluid power courses 3. Ability to formulate design criteria 4. Ability to understand thermodynamics and kinematics behind turbo machines
ME723PE	**Power Plant Engineering**	1. Able to get the basics of Power Plants. 2. Able to get the idea about the power generation by renewable and non-renewable energy resources. 3. Able to know about the different types of cycles and natural resources used in power plants and their applications.

Code	Course Name	Course Outcomes
ME702PC	**Instrumentation and Control System**	1. Graduation will demonstrate the ability to use basic knowledge in mathematics, science and engineering and apply them to solve problems specific to mechanical engineering. 2. Graduation will demonstrate the ability to design and conduct experiments, interpret and analyze data, and report results. 3. Graduation will be able to design a system to meet desired needs within environmental, economic, political, ethical health and safety, manufacturability and management knowledge and techniques to estimate time, resources to complete project.
ME733EE	**Robotics**	**1.** At the end of the course, the student will be able to understand the basic components of robots. **2.** Differentiate types of robots and robot grippers. Model forward and inverse kinematics of robot manipulators. **3.** Analyze forces in links and joints of a robot programmed a robot to perform tasks in industrial applications. Design intelligent robots using
ME701PC	**CAD/CAM**	1. Describe the mathematical basis in the technique of representation of geometric entities including points, lines, and parametric curves, surfaces and solid, and the technique of transformation of geometric entities using transformation matrix. 2. Able to write part programming and describe the use of GT and CAPP for the product development. 3. Identify the various elements and their activities in the Computer Integrated Manufacturing Systems.